City of Big Bear Lake
Department of Water and Power

2020 URBAN WATER MANAGEMENT PLAN

REVISED FINAL | March 2022

carollo

Errata Sheet for Minor Corrections to
Big Bear Lake DWP 2020 Urban Water Management Plan (UWMP)

This errata sheet logs minor content errors that were identified after final adoption of the Big Bear Lake DWP 2020 UWMP. DWR has determined that these corrections are minor and do not require the UWMP to be amended.

☑ These data errors have been corrected in the Department of Water Resources (DWR) UWMP database at https://wuedata.water.ca.gov/secure/

☑ This errata sheet has been filed with the UWMP in all locations where it is made publicly available, including the California State Library. Errata may be submitted to State Library via email to cslgps@library.ca.gov

Name and agency of the person filing errata sheet:

Reggie Lamson, Big Bear Lake Department of Water and Power

#	Description of Correction	Location	Rationale	Date Error Corrected
1	Added Table 8-3.	Page 8-2	This table was originally omitted as BBLDWP does not have supply augmentation options. However, BBLDWP is prepared to take other actions if supply shortages occur, which are described in Table 8-3.	March 25, 2022

Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap?	Additional Explanation or Reference *(optional)*
1	Expand Public Information Campaign	Unknown	Bill inserts, e-newsletters, portal alerts, newspaper, water efficiency workshops, educational outreach, etc.
1	Improve Customer Billing	Unknown	Increase frequency of meter reading
1	Other Actions (describe)	Unknown	Targeted water audits, increased rebates and giveaways for water efficient devices, expand rebates for landscape conversion, reduce line flushing, review water loss and plan repairs, patrol areas of largest water use, improve enforcement of water use violations
2		None	No action taken
3		None	No action taken
4		None	No action taken
5		None	No action taken
6		None	No action taken
7	Transfers	Unknown	In the event of an emergency, BBLDWP may use water from Big Bear City Community Services District using interties.
NOTE: There is very little opportunity for BBLDWP to augment supply as they are wholly dependent on local groundwater. To connect to the State Water Project would cost an estimated $100 M and would include having to lift the water over 4,000 feet, which is neither economically or operationally practical. As such, BBLDWP is heavily reliant on demand reduction measures and operational changes to address water shortages.			

City of Big Bear Lake
Department of Water and Power

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Abbreviations

°F	degrees Fahrenheit
AB	State Assembly Bill
ACS	American Community Survey
AF	acre-feet
afy	acre-feet per year
AMI	Advanced Metering Infrastructure
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BBARWA	Big Bear Area Regional Wastewater Agency
BBCCSD	Big Bear City Community Services District
BBLDWP	City of Big Bear Lake Department of Water and Power
BBMWD	Big Bear Municipal Water District
BMPs	Best Management Practices
BVBGSA	Bear Valley Basin Groundwater Sustainability Agency
BVES	Bear Valley Electric Service
BVWSP	Bear Valley Water Sustainability Project
CalWEP	California Water Efficiency Partnership
Carollo	Carollo Engineers, Inc.
CASGEM	California Statewide Groundwater Elevation Monitoring
ccf	hundred cubic feet
CCRs	Annual Consumer Confidence Reports
CD	compact disc
CII	commercial, industrial, and institutional
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Plan
CLAWA	Crestline Lake Arrowhead Water Agency
CREAT	Climate Resilience Evaluation and Awareness Tool
CWC	California Water Code
DMMs	demand management measures
DRA	Drought Risk Assessment
DWP	Department of Water and Power
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
ETo	evapotranspiration

GHG	greenhouse gas
GIS	geographic information system
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GSAs	groundwater sustainability agencies
GSPs	groundwater sustainability plans
IRWMP	Integrated Regional Water Management Plan
kWh	kilowatt hours
Method 3	Hydrologic Region Target
MFR	multi-family residential
mgd	million gallons per day
mg/L	millgrams per liter
MOU	Memorandum of Understanding
MWELO	Model Water Efficient Landscape Ordinance
PFAS	per- and polyfluoroalkyl substances
RHNA	Regional Housing Needs Assessment
SB	Senate Bill
SB X7-7	Water Conservation Bill of 2009
SCAG	Southern California Association of Governments
SFR	single-family residential
SGMA	Sustainable Groundwater Management Act
sq ft	square feet
SRAMP	Seismic Risk and Mitigation Plan
TDS	total dissolved solids
TRT	Technical Review Team
ULFT	ultra-low flush toilet
USDA	United States Department of Agriculture
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
Valley	Bear Valley
WCMP	Water Conservation Management Plan
WSCP	water shortage contingency plan
WTP	water treatment plant
WUE	water-use efficiency

Chapter 1

INTRODUCTION AND LAY DESCRIPTION

1.1 Lay Description

The City of Big Bear Lake Department of Water and Power's (BBLDWP's) water service area is located in Bear Valley (Valley) in the San Bernardino Mountains of San Bernardino County, California. The sole supply source within BBLDWP's service area is the Bear Valley Water groundwater basin. The maximum perennial yield for the Bear Valley groundwater basin has been estimated at 3,100 acre-feet per year (afy) available to BBLDWP (Geoscience, 2006). The distribution system is comprised of 25 active groundwater wells, 22 slant wells, 2 springs, 15 above-ground reservoirs, 13 booster stations, approximately 52 pressure-reducing valves, and approximately 184 miles of distribution pipeline that provides service to 4 different water systems, which include the Big Bear System, Fawnskin, Big Bear Shores RV Park, and Lake William.

In 2020, the average annual population was estimated to be 29,589 (ACS, 2019). The total annual population included approximately 13,155 full-time residents and 16,434 temporary population. The population is anticipated to increase to 35,317 by the year 2045, based on an average annual growth rate of.0.7 percent and the inclusion of low income housing. The City of Big Bear Lake is in the process of updating the General Land Use Plan, which will be completed by October 2021. Therefore, projections may be adjusted in future Urban Water Management Plan (UWMP) updates to reflect the land use changes. The population projection methodology is described in Chapter 3.

The water demands served by BBLDWP are primarily residential, including single-family residential (SFR) and multi-family residential (MFR). All connections in BBLDWP are metered. The total demand in 2020 was approximately 2,332 afy. Residential demands account for 1,641 afy (or 70 percent) of the total demand, while commercial demands account for 445 afy (or 19 percent). The remaining balance of 246 afy (or 11 percent) is attributed to unbilled consumption and water loss. The per capita water demand was 70 gallons per capita per day (gpcd) in 2020, which is within the Water Conservation Bill of 2009 (Senate Bill [SB] X7-7) target of 142 gpcd by 2020 for BBLDWP using Method 3 (Hydrologic Region Target). Although BBLDWP was able to meet the 2020 target, the year 2020 did not represent a typical year due to the impacts of the COVID-19 pandemic. As mentioned in Chapter 3, beginning March 19, 2020, the Executive Order N-33-20 declared California in a state of emergency and ordered residents living in California to stay at home to prevent the spread of COVID-19. The reduction in international and air travel, and the shift to local travel and outdoor recreation, resulted in an increase in demands within the BBLDWP service area. In comparison to the 2020 per capita demand, the average per capita demand between 2016 and 2019 was 65 gpcd. However, since the 2020 per capita demand of 70 gpcd was below the goal for 2020, adjustments for extraordinary events were not made. Although the year 2020 was used for SBX7-7 reporting, the average demand between 2016 and 2019 was used as a baseline when projecting future demands.

Based on the growth rate of 0.7 percent and the inclusion of low income housing, demands under normal conditions are anticipated to be 2,283 afy by the year 2045 with passive conservation. In addition, supply availability was reviewed under a single-dry year and five-consecutive-year drought. The highest projected demand that occurred in the single-dry year and multi-dry year scenario was 2,508 afy in year 2045. However, if population trends follow the predicted 0.7 percent growth, per capita demand remains steady or decreases, and there are no further changes, under all three conditions (normal, single-dry year, and five-consecutive-year drought), demands were projected to be within the operating safe yield of 3,100 afy. BBLDWP performs monthly groundwater monitoring, demonstrating that the groundwater basin levels have remained relatively steady throughout recent drought periods and are expected to be sufficient to meet future demands. This is also a result of BBLDWP's successful implementation of conservation programs, which have significantly reduced per capita demand. Additional details are provided in Chapter 4 through Chapter 7 and Chapter 9 of the UWMP.

BBLDWP's Water Shortage Contingency Plan (WSCP) was also updated to address the latest requirements set forth by California Department of Water Resources (DWR) for drought planning. The WSCP now includes seven stages response actions for demand reduction, supply augmentation, operational changes, and mandatory prohibitions to address shortage levels. Existing ordinances, procedures, and penalties are outlined in the WSCP. In addition, BBLDWP is proactively planning to implement additional conservation measures that are outlined in the Water Conservation Management Plan (WCMP) and summarized in Chapter 9, which will assist in maintaining or reducing per capita demand as growth occurs within the service area.

1.2 Background and Purpose

The California Water Code (CWC) requires urban water suppliers within the state to prepare and adopt UWMPs for submission to DWR. The UWMP, which must be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983, including amendments that have been made to the Act. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (AF) of water annually, to prepare a UWMP.

The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions. This document, which was prepared in compliance with the CWC, and as set forth in the 2020 Urban Water Management Plan Guidebook for Urban Water Suppliers (March 2021) established by the DWR, constitutes the BBLDWP 2020 UWMP.

This 2020 UWMP was prepared in compliance with the UWMPA (CWC §10610 et seq.) and the Water Conservation Bill of 2009 (SB X7-7) by Carollo Engineers, Inc, (Carollo). Contact information for the BBLDWP and Carollo is included in the Contact Sheet provided at the beginning of this document.

The BBLDWP recognizes the importance of maintaining a high-quality, reliable water supply. Although water is a renewable resource, it is limited. A long-term reliable supply of water is essential for the areas residents and to protect the local economy. The main focus for the BBLDWP is to provide high quality water, maximize the efficient use of water, and promote conservation.

References used in the writing of this report can be found in Appendix A.

1.2.1 Previous Urban Water Management Plan

The BBLDWP previously prepared an UWMP in 2015, which was approved and adopted on June 29, 2016. Following adoption, the 2015 UWMP was submitted to and formally approved by the DWR. The 2020 UWMP report serves as an update to the 2015 UWMP and pulls extensively from that report.

1.3 Urban Water Management Planning and the California Water Code

The CWC sections applicable to UWMPs are briefly summarized in the sections below.

1.3.1 Urban Water Management Planning Act

In 1983, State Assembly Bill (AB) 797 modified the CWC Division 6 by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in the UWMPs.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed.

Other amendments require that UWMPs include provisions for recycled water use, demand management measures (DMMs), and a WSCP. The UWMPA requires a WSCP which meets the specifications set forth therein. Recycled water was added in the reporting requirements for water usage and figures prominently in the requirements for evaluation of alternative water supplies when future projections predict the need for additional supplies.

Each urban water purveyor must coordinate the preparation of the WSCP with other urban water purveyors in the area, to the extent practicable. Water suppliers must also describe their water DMMs that are being implemented or are scheduled for implementation.

In addition to the UWMPA and its amendments, there are several other regulations that are related to the content of the UWMP. In summary, the key relevant regulations are:

- AB 1420: Requires implementation of DMMs/Best Management Practices (BMPs) and meeting the 20-by-2020 targets to qualify for water management grants or loans.
- AB 1420: Requires a plan to quantify and report on distribution system water loss.
- AB 1420: Provides for water use projections to display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans, when that information is available and applicable to an urban water supplier.
- AB 1465: Requires water suppliers to describe opportunities related to recycled water use and stormwater recapture to offset potable water use.
- Amendments SB 610 (Costa, 2001) and AB 901 (Daucher, 2001): Require counties and cities to consider information relating to the availability of water to supply new large developments by mandating the preparation of further water supply planning (Daucher) and Water Supply Assessments (Costa).
- SB 1087: Requires water suppliers to report SFR and MFR projected water use for lower income areas separately.

- Amendment SB 318 (Alpert, 2004): Requires the UWMP to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as long-term supply.
- AB 105 (Wiggins, 2004): Requires urban water suppliers to submit their UWMPs to the California State Library.
- SB X7-7: Requires development and use of new methodologies for reporting population growth estimates, base per capita use, and water conservation. An agency can choose from four methods to establish their interim (2015) and year 2020 water conservation targets.
- AB 2067: Requires water suppliers to provide narratives of water DMMs.
- SB 1036: Provides for an urban water supplier to include certain energy-related information, including, but not limited to, and estimate of the amount of energy used to extract or divert water supplies.
- AB 2409: Requires urban water suppliers to analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains separately from swimming pools and spas.
- SB 664: Addition of a Seismic Risk Assessment.
- SB 606: Inclusion of a WSCP with six standard water shortage levels, drought risk assessment for a five-year historic sequence, reporting of energy intensity, and consideration of climate change.
- Amendment AB 1668: New standards for indoor residential water usage (55 gpcd) until January 2025, then 52.5 gpcd until 2030, and 50 gpcd by 2030). In addition, the establishment of new standards for outdoor residential water uses as well as commercial, industrial, and institutional (CII) uses by 2021.
- AB 1414: Annual water supply and demand assessment after 2020, the first of which should include a narrative that describes water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027.

1.3.2 Applicable Changes to the Water Code since the 2015 UWMPs

A summary of the major new requirements to the CWC (Section 10608 - 10608.44, Section 10609 - 10609.38, and Section 10610 - 10657) since 2015 UWMPs are summarized in Table 1-1.

Table 1-1: Applicable Changes to the Water Code Since 2015 UWMPs

Topic	Summary
Five Consecutive Dry-Year Water Reliability Assessment	The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation.
Drought Risk Assessment	The Drought Risk Assessment (DRA) requires a supplier to assess water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.
Seismic Risk Assessment (SB 664)	Requires Suppliers to specifically address seismic risk to various water system facilities and to have a mitigation plan.
Water Shortage Contingency Plan (SB 606)	New requirements are more prescriptive than previous versions.
Groundwater Supplies Coordination	Water Code now requires Suppliers' 2020 UWMPs to be consistent with Groundwater Sustainability Plans, in areas where those plans have been completed by Groundwater Sustainability Agencies.
Lay Description	Suppliers to include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks. This section of the UWMP could be viewed as a go-to synopsis for new staff, new governing members, customers, and the media, and it can ensure a consistent representation of the Supplier's detailed analysis.

1.3.3 Water Conservation Act of 2009 (SB X7-7)

Beginning in 2016, retail water suppliers are required to comply with the water conservation requirements in SB X7-7 in order to be eligible for State water grants or loans. Refer to Chapter 5 for detailed information on SB X7-7.

1.4 Report Organization

This UWMP contains ten chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

- **Chapter 1 - Introduction and Lay Description.** This chapter presents a lay description and the purpose of this UWMP stressing the importance and extent of the water management planning efforts.
- **Chapter 2 - Plan Preparation.** This chapter provides information on the process for developing the UWMP as well as coordination efforts with appropriate local agencies and discusses the measures used to solicit public participation during the development of the UWMP.

- **Chapter 3 - System Description.** This chapter presents a description of BBLDWP's service area and characteristics including climate, population, and other demographic factors.
- **Chapter 4 - Customer Water Use.** This chapter presents a description of BBLDWP's current and projected water uses within the service area in five-year increments.
- **Chapter 5 - Conservation Target Compliance.** This chapter presents information on BBLDWP's compliance with the 2020 per-capita water conservation mandate to demonstrate that the 2020 target adopted in the 2015 UWMP was met in 2020. This chapter also provides analyses and calculations associated with the water conservation target pursuant to SB X7-7.
- **Chapter 6 - System Supplies.** This chapter presents a description of BBLDWP's current and projected potable and non-potable water supply sources including information on the use of groundwater and BBLDWP's future considerations of a recycled water system.
- **Chapter 7 - Water System Reliability.** This chapter presents the reliability of BBLDWP's water system including a discussion on future water reliability and an analysis of supply availability in a normal, single dry year and in five consecutive dry years.
- **Chapter 8 - Water Shortage Contingency Plan.** This chapter includes an overview of the water shortage contingency analysis that includes stages of action in the event of water supply shortages; prohibitions in consumption, reduction methods, and penalties; actions to be taken during a catastrophic interruption of service; and a mechanism for measuring water use reduction.
- **Chapter 9 - Demand Management Measures.** This chapter communicates BBLDWP's efforts to promote conservation and to reduce demand. The chapter includes narratives on each DMM.
- **Chapter 10 - Plan Adoption, Submittal, and Implementation.** This chapter describes the steps taken to adopt, submit, and implement the UWMP and make it publicly available.

Chapter 2
PLAN PREPARATION

This section includes specific information on how the UWMP was developed, including efforts in coordination and outreach.

2.1 Basis for Plan Preparation

CWC 10617 requires that urban water suppliers with 3,000 or more service connections or supplying 3,000 or more AF of water per year prepare an UWMP every five years. Since BBLDWP has over 15,000 service connections, it is responsible for the preparation of an UWMP every five years.

> *10617 "Urban water supplier" means a supplier, either publicly, or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems...*

2.1.1 Public Water Systems

> *California Health and Safety Code 116275 (h) "Public Water System" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.*

BBLDWP serves four (4) public water systems, which include Big Bear, Fawnskin, Lake William, and Big Bear Shores RV Park. To demonstrate the basis of reporting, the Public Water Systems are listed in Table 2-1.

Table 2-1: Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020
CA 3610044	Big Bear System	14,945	2,210
CA 3610022	Fawnskin	723	77
CA 3600283	Lake William	125	28
CA 3600395	Big Bear Shores RV Park	1	18
	TOTAL	**15,794**	**2,332**

NOTES:
(1) Sugarloaf/Erwin Lake (CA 3610061) combined with Big Bear Lake/Moonridge, now called Big Bear System (CA 3610044).

As listed in Table 2-1, BBLDWP served a total of 15,794 active connections and a total of 2,332 AFY in year 2020. Hence, BBLDWP is considered a public water system that must comply with the CWC 10617.

2.2 Individual Planning and Compilance

This UWMP reports solely on the BBLDWP service area, as shown in Table 2-2. The BBLDWP has notified and coordinated with appropriate regional agencies and constituents.

Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable*
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		

2.3 Calendar Year and Units of Measure

> *CWC 1608.20 (a) (1) Urban retail water suppliers…may determine the targets on a fiscal year or calendar year basis.*

BBLDWP is reporting on a calendar year basis and therefore, 2020 data includes the months of January to December 2020. Table 2-3 indicates BBLDWP's type of reporting year, and the units of measure for reporting water volumes throughout the 2020 UWMP.

Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP (select from drop down)	
Unit	Acre Feet (AF)

2.4 Coordination and Outreach

The UWMPA requires that the UWMP identify the water agency's coordination with appropriate nearby agencies.

BBLDWP coordinated its efforts with the City of Big Bear Lake (City), San Bernardino County (County) and the State of California (State) to confirm that the data and issues discussed in the plan are presented accurately.

2.4.1 Wholesale and Retail Coordination

Retail agencies that receive a water supply from one or more wholesalers are required to provide wholesalers with projected water demand from that source, in five-year increments for 20 years. The BBLDWP does not purchase or receive potable water from a wholesaler. Therefore, Table 2-4 has been left blank.

Table 2-4: Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
N/A

2.4.2 Coordination with Other Agencies and the Community

> *10620 (d)(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.*
>
> *10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan…*

BBLDWP solicited participation from other agencies, organizations, and the community for the preparation of the 2020 UWMP. Table 2-5 summarizes how the UWMP preparation was coordinated.

Table 2-5: Retail: Coordination With Appropriate Agencies								
Coordinating Agencies	**Participated in Developing the Plan**	**Notified of UWMP Update**	**Commented on the Draft**	**Attended Public Meetings**	**Was Contacted for Assistance**	**Was Sent a Copy of the Draft Plan**	**Was Sent a Notice of Intention to Adopt**	**Not Involved No Information**
Big Bear Area Regional Wastewater Agency						X	X	
San Bernardino County		X				X	X	
Big Bear City Community Services District						X	X	
City of Big Bear Lake		X			X	X	X	
Big Bear Municipal Water District						X		

2.4.3 Notice to Cities and Counties

CWC 10621 (b) requires that agencies notify cities and counties to which they serve water that the BBLDWP's UWMP is being updated and reviewed.

> *10621(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify a city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.*

BBLDWP provided formal written notification to the City and the County that BBLDWP UWMP was being updated. In accordance with the UWMPA, this notification was provided at least 60 days prior to the public hearing of the plan. Electronic copies of the final UWMP will be provided to the parties notified no later than 30 days after its submission to DWR. Appendix B contains copies of outreach documents.

Notices were published informing interested parties that the draft 2020 UWMP was available for review. Pursuant to California Code Section 6066, a notification of the time and place of the public hearing was published in the local newspaper on April 14 and April 21, 2021. A notice was also posted on BBLDWP's website. Copies of these notifications are included in Appendix B.

The plan was presented to BBLDWP's Board of Commissioners at a public hearing on May 25, 2021. This hearing provided an opportunity for BBLDWP's customers, residents, and employees to learn and ask questions about the current and future water supply of BBLDWP. A copy of the associated documentation is included in Appendix B.

Chapter 3

SYSTEM DESCRIPTION

The UWMPA requires that the UWMP include a thorough description of the water system, service area, and various aspects of the area served including climate, population, and other demographic factors.

> *10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.*

3.1 General Description

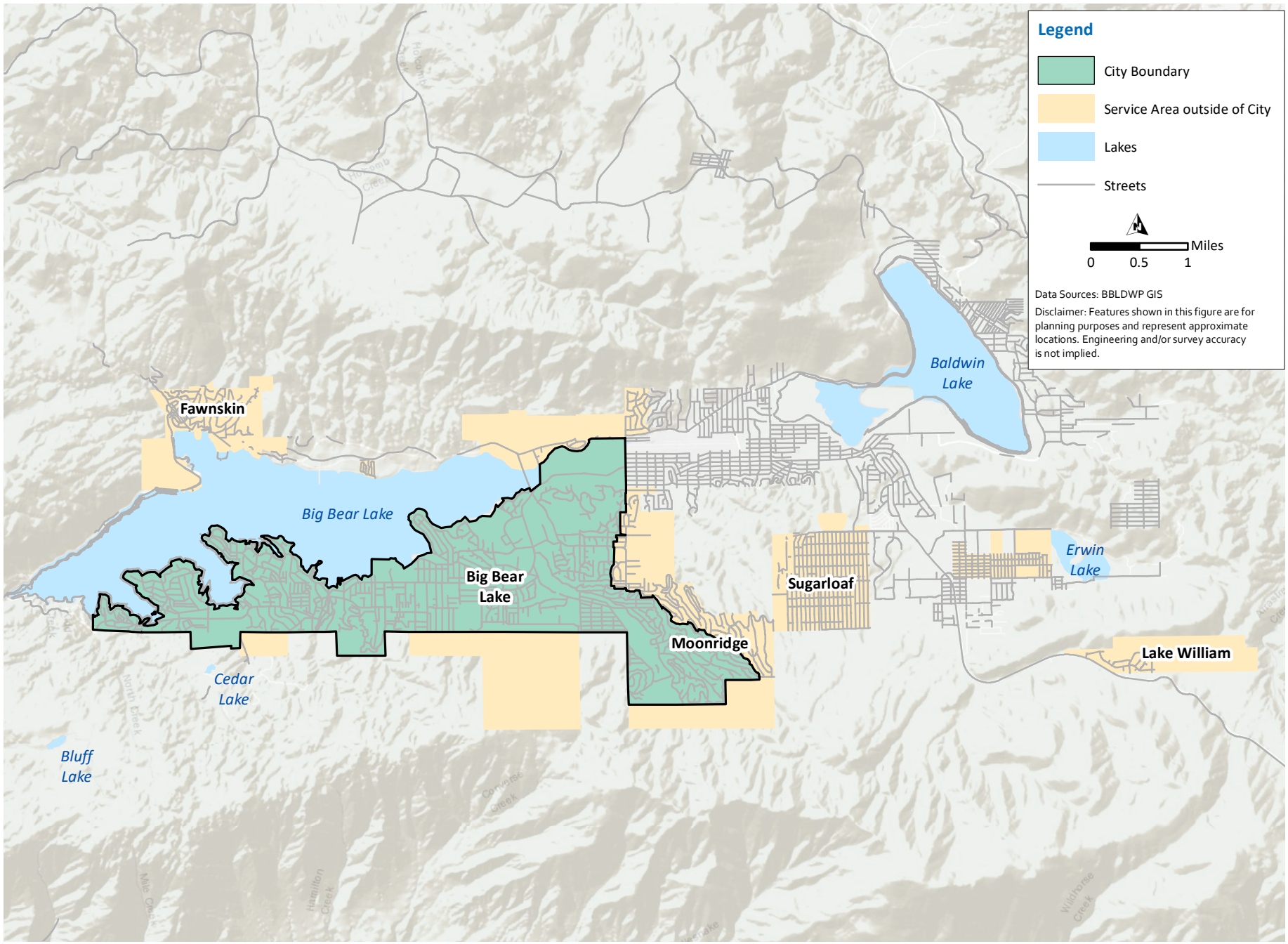
BBLDWP's water service area is located in Bear Valley (Valley) in the San Bernardino Mountains of San Bernardino County, California as depicted in Figure 3-1. Regionally, the City of Big Bear Lake is known for its recreational amenities, like skiing and other snow sports in the winter, mountain biking, hiking, fishing and other outdoor mountain activities in the summer. Within the Valley, BBLDWP's service area is located primarily along the south shore of Big Bear Lake. In addition, there are three other areas located outside the City boundary. Fawnskin lies to the north of the lake, while the Sugarloaf-Erwin Lake and Lake William areas are located east of the City. In total, BBLDWP's water service area encompasses approximately 13.25 square miles.

BBLDWP's service area is characterized by primarily residential land use. Recreation tourism has been the most important economic factor in the Valley for nearly a century. Residential use composes 79 percent of the total service area demand. Commercial accounts make up approximately 21 percent of the total service area demand. There is no significant industrial or agricultural water use within BBLDWP's service area.

3.1.1 Description of Transmission, Treatment, and Distribution Facilities

BBLDWP's service area is comprised of four (4) systems, which include the Big Bear System, Fawnskin, Big Bear Shores RV Park, and Lake William systems.

The water system is comprised of 25 active groundwater wells, 22 slant wells, 2 springs, 15 above ground reservoirs, 13 booster stations, approximately 52 pressure reducing valves, and about 184 miles of distribution pipeline.



carollo

Last Revised: April 06, 2021 pw://Carollo/Documents/Client/CA/BBLDWP/12077A00/GIS/MXD/Service Area Map.mxd

Figure 3-1 Water Service Area

3.2 Service Area Climate

> *10631(a). A plan shall… Describe the service area of the supplier, including … climate…*
>
> *10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning… while accounting for impacts of climate change.*

BBLDWP's service area climate is a semi-arid, Mediterranean environment with cold winters, warm summers, and moderate rainfall. Average monthly evapotranspiration (ETo) rates, rainfall, and temperature are summarized in Table 3-0.

Table 3-0: Climate Characteristics

Month	Standard Monthly Average ETo[1] (inches)	Monthly Average Rainfall[2] (inches)	Monthly Average Temperature[1] (°F)
January	1.8	6.8	33.7
February	2.3	7.4	33.8
March	3.9	5.2	38.2
April	5.1	2.5	43.5
May	6.2	0.7	49.5
June	7.1	0.1	59.4
July	6.5	0.7	63.4
August	6.0	0.7	61.9
September	4.9	0.9	56.4
October	3.6	1.3	47.5
November	2.2	3.4	38.3
December	1.5	5.2	32.9
Annual	**51.0**	**34.9**	**46.5**

NOTES:
Source: California Irrigation Management Information System (CIMIS) Station #199.
(1) Represents monthly average ETo and temperature from January 2010 to December 2020.
(2) Precipitation data represents monthly average from 1960 to September 2020

As shown in Table 3-0, BBLDWP service area's average monthly temperature ranges from about 32.9 to 63.4 degrees Fahrenheit (°F), with an average annual temperature of 46.5°F. Average annual total values of ETo and precipitation are 51 inches and 34.9 inches, respectively. Records show that the average monthly precipitation ranges from 0.1 inches to 7.4 inches with most of the precipitation typically occurring from November through March.

3.3 Service Area Population and Demographics

> *10631(a). Describe the service area of the supplier, including current and projected population …The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.*

This section summarizes historical, current, and projected population trends in BBLDWP. Population projections are essential to the planning process and form the basis for most

planning decisions, yet projecting future growth is far from an exact science given the complex set of variables that can affect the rate of growth. Typically, projections are developed by taking past patterns and combining them with assumptions regarding the future to obtain an estimate of future growth rates. These projections serve to provide BBLDWP insight on the type and quantity of future growth, as well as guidance regarding future planning activities; therefore, such planning activities can only be as effective as the ability to anticipate population growth.

3.3.1 Service Area Population

BBLDWP's population is composed of full-time and temporary residents. The temporary population includes recreational visitors and second home-owners and is assumed to primarily occur during the weekend and holidays. According to BBLDWP's 2015 UWMP, temporary visitors can increase to as much as 100,000 on peak days. Therefore, a distinction has been made between the full-time population and the average annual population, which also includes temporary population.

3.3.1.1 Historical Population

Historical population for years 1995 through 2015 were retrieved from the 2015 UWMP. Full-time service area population for years before 2010 were estimated by combining 2010 full-time residential population data with 2010 residential account data to create an account-to-population ratio. This ratio was combined with historical connection data to estimate historical full-time population data.

The historical data and population projection methodology in the approved 2015 UWMP was utilized to determine the historical population between 2010 and 2020. Since 2020 Census data has not been released, the 2019 American Community Survey (ACS) was used to update the percentage of full-time households and average household size. The 2010 ACS data for the four different zip codes within the BBLDWP's service area was utilized to determine the housing units, occupied homes, and population. The percentage of permanent households was updated using the ratio between the 2019 occupied homes and 2010 Census housing units, which averaged to approximately 32.9 percent of households within the BBLDWP's service area. Average household size was estimated by using a ratio between the 2019 ACS population and the occupied homes, which equated to approximately 2.45 people per household. The average number of full-time residential connections for 2020 (or 16,358 total connections at 32.9 percent occupancy equating to 5,375 permanent connections) was then multiplied by the average of 2.45 people per household to yield a full-time service area population estimate of 13,155.

Given the influx of weekend and holiday visitors to the service area, it was estimated that the temporary population is 4 times the full-time population, or 52,620 for all weekends and holidays throughout the year (totaling 114 days). This equates to an average temporary population of 16,434. Since full-time population is represented 365 days out of the year and the temporary population is assumed to be represented during all weekend and holidays (114 days out of the year), the average annual population in 2020 was estimated to be 29,589. The City is moving forward with a new policy that will require rental homes to register, allowing for better reporting and confirmation of the temporary population assumption. The historical population for years 1995 to 2020 is shown in Figure 3-2.

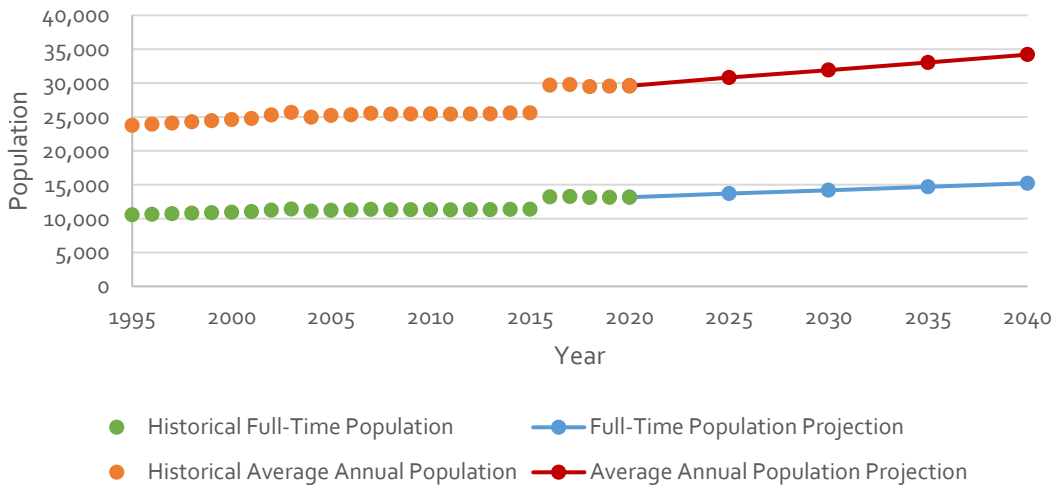


Figure 3-2: Historical and Projected Population

As shown in Figure 3-2, the population growth has been minimal, with the exception of the increase shown between 2015 and 2016. This increase in full time population (and subsequent estimated temporary population) is due to an adjustment to account for the population in mobile home parks and apartments. Since these units are billed as commercial, they were previously considered businesses and not residential units. In addition, the apartment complex and mobile home parks may be billed as one meter, but serve multiple household units. Following the 2015 UWMP, each of these accounts were contacted to determine the number of residential units served by the account. Thus, the number of households or units has been adjusted for 2016 and beyond. An annual growth rate of 0.7 percent is assumed beginning in year 2020. The current and projected population for the BBLDWP is summarized in Table 3-1.

The Regional Housing Needs Assessment (RHNA) mandated by State Housing Law as part of the periodic process of updating local housing elements of the General Plan, is requiring the City of Big Bear to include low-income housing by 2029. This RHNA mandate includes 50 units for very-low income, 33 units for low income, 37 units for moderate income, and 92 units for above-moderate income. Based on input from the City, a goal of 50 affordable housing units will be considered for the housing element update. This assumes that 10 units will be built per year for the next 5 years, which has been added to the projected population from 2021 to 2025.

Table 3-1: Retail: Population – Current and Projected

Population Served	2020	2025	2030	2035	2040	2045
Full-time Residents[1,2,4]	13,155	13,662	14,145	14,646	15,164	15,701
Average Temporary Population[3,4]	16,434	17,068	17,672	18,297	18,945	19,616
Average Annual Population[4]	29,589	30,730	31,817	32,943	34,109	35,317

NOTES:
(1) Based on 2019 ACS, approximately 32.9% of the BBLDWP's households are occupied and assumed to be permanent.
(2) Assumed average household is 2.45 persons (2019 ACS) year-round.
(3) Temporary population assumed to equate to 4 times the full-time population during the holidays and weekends (114 days out of the year).
(4) Assumes a 0.7% annual growth rate beginning in 2020. In addition, 50 units at 2.45 persons per unit has been added to the population.

3.3.2 Other Social, Economic and Demographic Factors

> *10631. Describe the service area of the supplier, including… other social, economic and demographic factors affecting the supplier's water management planning.*

BBLDWP's population is composed of both full-time residents and temporary residents. Since the temporary population consists primarily of people visiting for recreational and vacation purposes, the population varies. The City of Big Bear Lake's existing General Plan (October 2013 – October 2021) identifies two low-income housing units within BBLDWP's service area. However, as mentioned in Section 3.3.1, the City's housing element is currently being updated and will consider the new RHNA mandate.

In March 2020, an executive order from California State Governor Gavin Newsom directed all Californians to stay home for non-essential needs to limit the spread of coronavirus (COVID-19). As a result, non-essential businesses were closed throughout California and non-essential travel was initially prohibited. As a result, BBLDWP water demand dropped between mid-March and May of 2020. Following this lull in activity, the area experienced a marked increase in occupancy and tourism beginning just before Memorial Day, as more people travelled locally to areas offering outdoor recreation opportunities. Observational and anecdotal evidence showed that some short-term rentals transitioned to full-time residences as people began to work from home. In addition, with most people staying at home, use patterns changed within the service area. BBLDWP experienced an average increase of 14 percent in demand between June 2020 and November 2020 when compared to the average of the previous three years. The long-term impacts are unknown. Therefore, changes to permanent and temporary population trends will be assessed as more data becomes available.

3.4 Land Uses within Service Area

> *10631(a). The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities…*

BBLDWP's service area consists primarily of residential, commercial, and public/open space land uses. Based on the Southern California Association of Governments (SCAG), the majority of the existing land use within the service area is single-family residential. The commercial land uses are generally within the village area and include lodging, retail, ski resorts, and other general commercial uses. Based on the current General Plan land use, the projected land use is anticipated to generally remain the same with some changes from single-family residential to multi-family residential. The newly mandated RHNA requirement may impact the land use within BBLDWP's service area. The City of Big Bear Lake's General Plan housing element update is planned for completion in late 2021.

BBLDWP is currently anticipating two significant developments within the service area. The Village Specific Plan is an ongoing effort to improve the Village area of the City by adding more resort/residential use areas and improve open space opportunities within the Village. The Moonridge Specific Plan proposes a mix of commercial retail, commercial, residential, and recreation within a one (1) mile stretch. This plan is still in the early stages of development and thus, the timing is unknown.

3.5 Climate Change

Climate change mitigation and adaptation efforts are being implemented as part of the 2020 UWMP Guidebook update. Projected climate change trends for California include increasing temperature and increasing precipitation as rainfall rather than snow. Water suppliers are now having to assess local climate challenges and plan for vulnerabilities within their systems. As these risks are identified, methods of adaption and mitigation can be employed to increase sustainability of water resources.

In the past decade, there has been a significant increase in tools and models to help identify potential impacts of climate change. The various resources differ in the information available in each service area, scenario assumptions, and parameters potentially impacted by climate change. The following tools were evaluated for this UWMP and described in further detail in the sections below:

- Climate Resilience Evaluation and Awareness Tool (CREAT).
- Cal-Adapt Extended Drought Scenarios Tool.
- Cal-Adapt Wildfire Tool.

3.5.1 EPA Climate Resilience Evaluation and Awareness Tool

The United States Environmental Protection Agency (EPA) created an online resource called CREAT to assist water agencies in preparing for potential future impacts on their systems caused by climate change. This tool utilizes model simulation to estimate changes in temperature, precipitation, storms, extreme heat, and sea level rise. For the purposes of this UWMP, the Cal-Adapt tool was used, which is consistent with the tool presented by DWR.

3.5.2 Cal-Adapt Extended Drought Scenarios Tools

Cal-Adapt is an online resource created by State of California's scientific and research community to provide visualization tools and high-quality data regarding climate change at a local level. This resource allows the user to explore charts, maps, data, and projected climate variables for the State of California, and is a key recommendation of the 2009 California Climate Adaptation Strategy and the California Department of Water Resources. All projections generated include two possible climate outcomes; one scenario where greenhouse gas (GHG) emissions peak near year 2040 and decline beyond 2040 (medium, RCP 4.5), and another in which GHG emissions continue to rise throughout the 21st century (high, RCP 8.5). The tool allows the user to search by watershed, grid, counties, census tracts, and incorporated and census designated places. Thus, this tool was used to evaluate the impacts of climate change within BBLDWP's service area using the medium, RCP 4.5 and high, RCP 8.5 GHG emission scenarios.

The Extended Drought tool was used to evaluate early and late century variable climate impacts for the Bear Creek Watershed over a 20-year drought including 5 years prior and 4 years following. This two-decade extended drought period is often referred to as a "mega-drought". The results, which include minimum and maximum temperature, precipitation, evapotranspiration, and runoff, are summarized in Table 3-2.

Table 3-2 Retail: Extended Drought Scenario Projections			
Parameter	**Observed Historical (1961 - 1990)**	**Early-Century (2023 - 2042)**	**Late-Century (2051 - 2070)**
Maximum Temperature (°F)	61.7	66.5	70.0
Minimum Temperature (°F)	32.5	36.8	40.5
Precipitation (inch)	25.9	17.7	17.7
Evapotranspiration (inch)	17.3	13.0	13.1
Runoff (inch)	3.6	2.1	2.3
Snow Water Equivalent (inch)	254.7	73.6	16.9
NOTES: (1) Retrieved using Cal-Adapt Extended Drought tool using the medium/high GHG emission scenario, RCP 8.5.			

The increase in maximum temperature from historical years to late-century is 8.3 degrees Fahrenheit (13.4 percent), whereas the increase in minimum temperature is 8.0 degrees Fahrenheit (24.6 percent). Precipitation is projected to decrease by 8.2 inches by late century (31.7 percent) and evapotranspiration by 4.2 inches (24.3 percent). Runoff will likely be reduced by 1.3 inches (36.1 percent) and snow water equivalent reduced by 234 inches (93.4 percent). Data from the Extended Drought tool can be seen in Appendix C.

3.5.3 Cal-Adapt Wildfire

The Cal –Adapt Wildfire tool utilizes four models identified by the California Climate Action Team as priority models contributing to the 2018 California Fourth Climate Change Assessment. The models listed below describe the scenarios used in area burned wildfire projections.

- Warm/dry scenario (HadGEM2-ES).
- Cooler/wetter scenario (CNRM-CM5).
- Average scenario (CanESM2).
- A scenario that is unlike the first three models, the "complement" scenario (MIROC5).

The model projections generated include the same two possible climate outcomes: RCP4.5 and RCP 8.5. Time periods for the wildfire analysis include historical (1961-1990), mid-century (2035-2064), and end of the century (2051-2070). The population growth scenario for the BBLDWP service area was identified as central, or median. Summary statistics of all four priority models under medium and high RCP conditions are below in Table 3-3. Wildfire area burned data can be found in Appendix C. Based on these statistics, the probability of wildfires in the BBLDWP

is anticipated to be fairly steady, while the average area burned is anticipated to increase under both the RCP 4.5 and RCP 8.5 conditions.

Table 3-3: Retail: Summary of Projected Wildfire Area Burned

Parameter	Observed Historical (1961 - 1990)	Mid-Century (2035 - 2064)	End of the Century (2051 - 2070)
RCP 4.5 Conditions			
Minimum Area Burned (hectares)	12.0	10.0	15.0
Average Area Burned (hectares)	33.1	36.1	33.4
Maximum Area Burned (hectares)	84.0	78.0	66.0
RCP 8.5 Conditions			
Minimum Area Burned (hectares)	9.0	11.0	6.0
Average Area Burned (hectares)	34.6	36.9	33.0
Maximum Area Burned (hectares)	68.0	59.0	88.0

NOTES:
(1) Retrieved using Cal-Adapt Wildfire tool.

Chapter 4

CUSTOMER WATER USE

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown by user classification. This section describes the water system demands and water demand projections.

4.1 Non-Potable Versus Potable Water Use

This chapter covers potable and raw water demand. Recycled water is addressed comprehensively in Chapter 6.

4.2 Past, Current, and Projected Water Use By Sector

> *10631(d). (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…*
>
> *(2). The water use projections shall be in the same five-year increments described in subdivision (a).*
>
> *(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.*
>
> *(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections. (ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.*

Water demands served by BBLDWP are primarily residential, including SFR and MFR water use. All connections in BBLDWP are metered. The demands for potable water are presented in Table 4-1 for the 2020 calendar year. As shown in Table 4-1, residential demands (single family and multi-family) account for 1,641 afy or approximately 70 percent of BBLDWP's total demand, while commercial demands account for 445 afy or approximately 19 percent of BBLDWP's total demand. The remaining 11 percent is attributed to unbilled consumption and water loss.

Table 4-1: Retail: Demands for Potable and Non-Potable Water - Actual			
Use Type	**2020 Actual**		
	Additional Description *(as needed)*	**Level of Treatment When Delivered**	**Volume**
Single Family	n/a	Drinking Water	1,464
Multi-Family	n/a	Drinking Water	177
Commercial	n/a	Drinking Water	445
Losses	n/a	Drinking Water	246
TOTAL			**2,332**

Since BBLDWP met their 2020 SB X7-7 goal, which is discussed further in Chapter 5, the per capita demand is projected to remain steady. Table 4-2 contains the projected potable water demands from 2025 through 2045. The demand projections are based on the BBLDWP selecting the average of calendar years 2016 to 2019 as the baseline water use. To project the number of connections per customer sector, it was assumed that the number of connections will grow consistently with the projected water demands at an average of 0.7 percent increase per year, which is based on the relative distribution of customer types, accounts, and water use reported for the last five years, excluding 2020. In addition, a total of 50 affordable housing units were included between the years 2021 to 2025 to comply with the RHNA mandate discussed in Chapter 3. However, the customer sector water deliveries in Table 4-2 are only general estimates of projected use and may vary significantly based on future development and water conservation measures taken. Ultimately, the implementation, magnitude, and type of future development will determine the distribution of water use per use type.

Table 4-2: Retail: Demands for Potable and Non-Potable Water - Projected						
Use Type	**Additional Description (as needed)**	**Projected Water Use**				
		2025	**2030**	**2035**	**2040**	**2045**
Single Family[(1)]		1,409	1,459	1,511	1,564	1,619
Multi-Family		169	175	182	188	195
Commercial		426	441	456	473	489
Losses		235	244	252	261	271
Other[(2)]	Passive Savings	-93	-155	-211	-255	-291
TOTAL		**2,147**	**2,164**	**2,190**	**2,231**	**2,283**

NOTES:
(1) Single Family includes 50 units for affordable housing in compliance with the RHNA mandate.
(2) Passive savings based on estimates from the 2019 Water Conservation Management Plan (Maddaus, 2019).

As shown in Table 4-2, the projected water demand is anticipated to decrease from 2,332 afy to 2,283 afy by year 2045 with the inclusion of passive conservation savings. The BBLDWP total water demands for potable and raw water, and recycled water demand, based on the figures presented in Table 4-1, Table 4-2, and Table 6-4, are summarized in Table 4-3.

Table 4-3: Retail: Total Gross Water Use (Potable and Non-Potable)

	2020	2025	2030	2035	2040	2045
Potable Water, Raw, Other Non-potable(1)	2,332	2,147	2,164	2,190	2,231	2,283
Recycled Water Demand(2)	0	0	0	0	0	0
TOTAL WATER USE	2,332	2,147	2,164	2,190	2,231	2,283

NOTES:
(1) From Table 4-1R. Potable water demands assume a 0.7% increase.
(2) From Table 6-4. Recycled water demands have not yet been established.

As shown in Table 4-3 and discussed later in Chapter 6, the recycled water demand projections are not included in this UWMP. Though BBLDWP is participating in a regional recycled water project (Replenish Big Bear), the project is still in the preliminary planning and permitting stages and is anticipated to include two phases. The first phase would include the replenishment of Big Bear Lake, water supply to the Stickleback Pond and irrigation of the local golf course. The first phase will not impact the recycled water demand in Table 4-3. The first phase could reduce ground water pumping up to 200 afy. The second phase would include recharge at the Sand Canyon Recharge site. The first phase is anticipated to occur within the next five years, while the second phase is anticipated to occur in the long-term planning horizon. However, the timing of the second phase may change if supplemental supplies are needed during a severe drought period. It is estimated that approximately 400 afy could be used for groundwater recharge. Therefore, the future recycled water demand would be adjusted in Table 4-3 to incorporate the anticipated recharge amount.

4.3 Distribution System Water Losses

> *10631(e)(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:*
>
> *(J) Distribution system water loss.....*
>
> *10631(d)(3) (A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34*

Distribution system water losses ("real" losses) are the physical water losses from the water distribution system and the supplier's storage facilities, up to the point of customer consumption. The BBLDWP distribution system losses are quantified using the American Water Works Association (AWWA) Method Guidance "Water Resources Water Audit Manual." The

distribution system water loss for the most recent 12-month period available (2020 calendar year) is reported in Table 4-4.

Table 4-4: Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	**Volume of Water Loss (1)**
01/2020	246
NOTES: (1) Since BBLDWP reports water loss by fiscal year, the water loss volume in this table is calculated. The AWWA Water Loss Audit for 2019-2020 fiscal year reports 301.05 afy.	

As shown in Table 4-4, the BBLDWP had approximately 246 afy of water loss (or 10.6 percent) in 2020. The 2019-2020 fiscal year AWWA water audit (starting July of 2019), which is in Appendix D, reports 301 afy of water loss. The Water Loss Audits, using the AWWA calculation, were not required prior to the 2016-2017 fiscal year. In addition, prior to fiscal year 2018-2019, the interpretation of auditing only applied to one of BBLDWP's systems, so some years were incomplete. For this reason, this section will not reflect the AWWA Water Loss Audit data. The system losses for the five preceding years were derived from billed consumption for all customers and water production from all sources for each calendar year. Loss were as follows:

- 2016 – 243 afy of water loss.
- 2017 – 245 afy of water loss.
- 2018 – 191 afy of water loss.
- 2019 – 301 afy of water loss.
- 2020 – 246 afy of water loss.

The five-year average water loss is 245 afy. BBLDWP did not conduct AWWA water loss audits prior to 2017. The state standard was met for each of the required years.

4.4 Estimating Future Water Savings

"Passive" water savings are water savings from codes, standards, ordinances, or transportation and land use plans. As shown in Table 4-5, future water savings are included in the total water use projections (Table 4-2). The passive water savings were calculated as part of the Water Conservation Management Plan Section 3.2.1.

Table 4-5: Retail: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections?	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Section 3.2.1.
Are Lower Income Residential Demands Included In Projections?	Yes

4.5 Water Use for Lower Income Households

The UWMPA requires that the UWMP identify planned low-income housing developments within the agency's service area and develop demand projections for those units. A lower income household is defined as one with an income below 80 percent of area median income, adjusted for family size.

> *10631.1(a). The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.*

The City of Big Bear Lake's General Plan Housing Element is an eight-year plan (October 2013-October 2021) that provides information on the RHNA progress. The current housing element of the General Plan identified the need to construct one (1) extremely low-income and one (1) very low-income housing unit between 2014 and 2021. The update to the existing housing element in the General Plan is underway and is anticipated to be complete by late 2021.

As mentioned in Chapter 3, the City anticipates constructing up to 50 affordable housing units over the next 5-years in compliance with latest RHNA mandate. It is assumed that 10 units will be constructed each year over the next five years and that the average persons per unit is 2.45. To estimate demand, the average per capita demand of 65 gpcd was assumed, which aligns with the average usage between 2016 to 2019.

Projected water demands from the low-income housing with the mandated RHNA considerations are summarized in Table 4-6.

Table 4-6: Low Income Projected Water Demands

Description	Water Demands				
	2025	2030	2030	2035	2040
Low Income Housing(1)	9	9	9	9	9

NOTES:
(1) Assumes up to 50 low-income housing units with an average of 2.45 people per dwelling unit.

The City has interest from a developer to develop low-income housing. However, the process is preliminary, and no detail is available for these potential developments.

4.6 Climate Change Considerations

As temperature rises, water demands from various types of users will likely increase. Daily heat patterns such as the duration of daytime heat prior to nighttime cooling, will change the diurnal demand patterns and peaking factors for activities such as landscaping, and other outdoor water use features (e.g., pools, fountains, open water bodies) due to increased ET values. The altered climate patterns in California creating hotter days and longer heat waves, will increase customer water use and evaporative water losses. Extended drought periods are expected to become both more frequent, and more severe, which could lead to reduced surface water flows, reduced snowpack, and less groundwater availability for the BBLDWP. The combination of a long-term reduction in water supply availability with a long-term increase in water demand and higher summer demand peaks, will increase pressure on the BBLDWP to meet demands. Water storage

projects, such the replacement of the Wolf Reservoir, are increasingly important. Ensuring that reservoirs are appropriately sized, placed, and resistant to damage from natural disasters or tampering, will be of the utmost importance in future planning. Technology and devices to increase monitoring through the distribution system will help the BBLDWP prepare for, and respond to, changes in supply and demand due to climate change. Creating redundancy through backup systems, the addition of pipes to connect dead ends or areas only served by one main line or water source, will help the department achieve efficiencies required in the face of climate change considerations. Getting localized, region specific data on climate change forecasts and impacts would also help prepare the agency for planning purposes.

BBLDWP's service area is predicted to have declining precipitation and increasing temperatures. The increasing temperatures may change demand levels and patterns. BBLDWP has been able to maintain a decreasing trend in per capita demands through conservation efforts in the past decade. However, continued reduction in per capita demand with water conservation will become more challenging as BMP saturation levels climb. When preparing for climate change impacts, the BBLDWP must consider that this UWMP is based on a modest growth projection for both permanent and temporary residents, and has taken into account the potential RHNA allocation of additional low-income housing units, which may translate into additional water demand. This is juxtaposed against the likelihood that the groundwater supply availability may decline due to reduced precipitation and infiltration. Hence, it can be concluded that climate change will likely put more strain on BBLDWP's ability to meet demands long-term. As a relatively isolated mountain region, the BBLDWP is relatively unique in California that it does not, and cannot, rely on imported water from the State Water Project. If per capita water demand were to increase with temperature, or the population were to increase at a higher rate as people move to escape poor air quality and heat, or groundwater supplies were to drop due to extended droughts, or water availability were to be impacted due to wildfires, the effects could have serious and devastating consequences for a community with no access to imported water.

Chapter 5

CONSERVATION TARGET COMPLIANCE

The UWMPA requires that the UWMP identify the baseline water demand, urban water use target, and interim urban water use target for BBLDWP. In the 2015 UWMP these waters use targets were determined per the DWR Methodologies. The daily per capita water use, expressed in gpcd, is the total water use within the service area divided by the population. These targets are necessary to judge compliance with the 2020 use reductions set forth in the Water Conservation Bill of 2009 (SB X7-7).

The purpose of this section in the 2020 UWMP is to determine whether BBLDWP has met the 20-percent conservation mandate. All SB X7-7 forms are included in Appendix E.

5.1 2015 UWMP Baseline and Targets

A supplier may update the baseline and target water use if there were changes to their distribution area. BBLDWP's distribution area has not changed since 2015. Therefore, the baseline and target gpcd values from the 2015 UWMP are utilized in this UWMP to determine compliance with the 2020 target.

In the 2015 UWMP, a 10-year baseline and a 5-year baseline were calculated to establish the minimum criteria for BBLDWP water use reduction targets. The UWMPA stipulates an agency may use either a 10 or 15-year average to determine its baseline. If 10 percent of total water deliveries in 2008 were from recycled water, then the agency can use a 15-year average baseline. Since BBLDWP's recycled water deliveries in 2008 were not 10 percent of the total water deliveries, a 10-year average for the period 1995 to 2004, was used for baseline determination. In addition to the 10-year baseline, a 5-year baseline, for the period 2003 and 2007, was also calculated, which was used to establish the minimum criteria for the BBLDWP's use reduction targets.

A summary of the 10-year baseline range (1995 to 2004) and 5-year baseline range (2003 to 2007) is included in Table 1 of the SB X7-7 Verification Forms (Appendix E).

5.2 Service Area Population

> *10608.20. (e) An urban retail water supplier shall include in its urban water management plan due in 2010… the baseline per capita water use,…along with the bases for determining those estimates, including references to supporting data.*
>
> *(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.*
>
> *10644. (a)(2) The plan… shall include any standardized forms, tables or displays specified by the department.*

As mentioned in Chapter 3, BBLDWP's population is unique in that it is composed of permanent full-time residents and temporary residents with the majority of residential connections

belonging to the latter. Since the 2015 UWMP utilized the 2010 U.S. Census data for the methodology described in Chapter 3, adjustments were not made for historical population for the 2020 UWMP. BBLDWP's population for the baseline years and the compliance year are summarized in Table 2 of the SB X7-7 Verification Forms (Appendix E).

Since the 2020 Census is not yet available, the 2020 population was estimated based on the ACS, which equates to an estimated average population of 29,589 in year 2020. Service area population is reported for each year in the baseline periods as well as year 2020 (the compliance year) in Table 3 of the SB X7-7 Verification Forms (Appendix E).

5.3 Gross Water Use

> *10608.12 (g) "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:*
> *(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier*
> *(2) The net volume of water that the urban retail water supplier places into long term storage*
> *(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier*
> *(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.*

"Gross Water Use" is the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier with certain acceptable exclusions. Gross water use is reported for each year in the baseline periods as well as year 2020 (the compliance year) in Table 4 of the SB X7-7 Verification Forms (Appendix E). The annual gross water values are the "total amount of potable water" reporting in the Annual Reports to the Drinking Water Program. These values do not account for losses at the water treatment plant (WTP) or in the distribution system. The gross water use for the compliance year is approximately 2,332 afy.

5.4 Baseline Daily Per Capita Water Use

The baseline daily per capita water use in each of the baseline years is calculated in Table 5 of the SB X7-7 Verification Form (Appendix E) by dividing annual gross water use by annual service area population. The average baseline daily per capita water use is summarized in Table 6 of the SB X7-7 Verification Form (Appendix E) for the 10-year baseline, 5-year baseline, and the year 2020.

5.5 Baselines and Targets Summary

> *10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivisions (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.*

As mentioned above, a supplier may update the baseline and target water use if there were changes to their distribution area. BBLDWP's distribution area has not changed since 2015.

Therefore, the baseline and target gpcd values from the 2015 UWMP are utilized in this UWMP to determine compliance with the 2020 target.

The baseline years used in the 2015 UWMP were also used in this UWMP. The average per capita consumption during this 10-year baseline period was 101 gpcd, while the per capita consumption of the 5-year baseline period, 2003 to 2007, was reduced to 91 gpcd. The maximum per capita consumption for year 2020 is defined as 95 percent of the 5-year gpcd, which establishes a maximum water conservation target of 86 gpcd. However, if the 5-year baseline daily per capita use falls below 100 gpcd, no adjustment to the water use target is needed. According to the DWR guidelines, the 2020 target is valid since it is less than the target confirmation criteria of 142 gpcd.

A summary of the various baselines and the confirmed 2020 target are summarized in Table 5-1. Refer to Table 7 and Table 8 of the SB X7-7 Verification Forms (Appendix E) for more information on the calculation method and a summary of the targets.

Table 5-1: Baselines and Targets Summary

Baseline Period	Start Year(2)	End Year(2)	Average Baseline gpcd(1,3)	Confirmed 2020 Target(1, 4)
10-15 year	1995	2004	101	142
5 Year	2003	2007	91	

NOTES:
(1) All values are in gpcd
(2) Value derived from SBX7-7 Table 1.
(3) Value derived from SBX7-7 Table 5.
(4) Value derived from SBX7-7 Table 7-F.

As shown in Table 5-1, the calculated confirmed target for year 2020 is 142 gpcd. This target was based on Method 3 (Hydrologic Region Target) as defined by SB X7-7 (see Table 7-E Verification Forms, Appendix E) and described in the 2015 UWMP.

5.6 2020 Compliance Daily Per Capita Water Use

> *10608.12(e) "Compliance daily per-capita water use" means the gross water use during the final year of the reporting period…*
>
> *10608.20 (e) An urban retail water supplier shall include in its urban water management plan due in 2010… compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.*

The State's 20 by 2020 water conservation plan has identified specific urban water use targets for 2015 and 2020 for each of the ten hydrologic regions. To determine the target using Method 3, 95 percent of the region-specific conservation goal is calculated. Based on a regional target of 149 gpcd for the Hydrologic Region 4 (South Coast), the Method 3 target is 142 gpcd for year 2020.

Compliance daily per-capita water use means the gross water use during the final year of the reporting period. Water suppliers are required to calculate their actual 2020 water use (2020 calendar year) and evaluate whether their per capita 2020 target use was met. BBLDWP met the 2020 target (142 gpcd) in the year 2020 (70 gpcd).

Although BBLDWP was able to meet the 2020 target goal, the year 2020 did not represent a typical year due to the impacts of the COVID-19 pandemic. As mentioned in Chapter 3, beginning March 19, 2020, the Executive Order N-33-20 declared California in a state of emergency and ordered residents living in California to stay at home to prevent the spread of COVID-19. The reduction in international and air travel and increase in local travel to destinations with outdoor recreation opportunities resulted in an increase in demands within the BBLDWP service area starting in late May 2020, following the initial lockdown. In comparison to the 2020 per capita demand, the average per capita demand between the years 2016 to 2019 was 65 gpcd. However, since the 2020 per capita demand of 70 gpcd was below the 2020 goal, adjustments for extraordinary events were not made in Table 5-2.

If the BBLDWP can maintain water consumption rates, conservation goals will be met. However, if consumption rates begin to rise as a result of permanent demand use changes from COVID-19, additional conservation measures may be required.

Table 5-2: 2020 Compliance

2020 GPCD			2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD	2020 TOTAL Adjustments	Adjusted 2020 GPCD (Adjusted if applicable)		
70	0	70	142	Yes

NOTES: From SBX7-7 2020 Compliance Form.

Chapter 6
SYSTEM SUPPLIES

The UWMPA requires that the UWMP include a description of the agency's existing and future water supply sources for the next 20 years. The description of water supplies must include detailed information on surface water, groundwater, the groundwater basin, potential opportunities for desalination of groundwater and seawater, and detailed information on the agency's imported water.

6.1 Water Supply Overview

BBLDWP's sole supply source is local ground water and the agency does not currently rely on surface or imported water to meet its water demand. Up until September 2014, BBLDWP served the Rimforest area by imported water delivered from the Crestline Lake Arrowhead Water Agency (CLAWA). This area is geographically separated from Bear Valley and receives water from CLAWA. Previously, Rimforest annual demand accounted for approximately 2 percent of BBLDWP's total annual demand. Since Rimforest is no longer in BBLDWP's service area, BBLDWP does not currently use imported water.

BBLDWP also has interconnections with Big Bear City Community Services District (BBCCSD) in order to transfer water in the event of an emergency shortage. These connections are for temporary emergency supplies only ,and are therefore not factored into demand projections.

Further information regarding supply availability is provided in Chapter 7.

6.2 Groundwater

Groundwater underlying BBLDWP's service area is of good quality and requires little treatment before use in the potable water supply system. The maximum perennial yield for the Bear Valley groundwater basin is approximately 3,100 afy available to BBLDWP (Geoscience, 2006).

6.2.1 Groundwater Basin Description

> *10631 (b) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
>
> *(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater.*

Bear Valley lies in the northeastern portion of the Santa Ana River Watershed. The Bear Valley groundwater basin (Basin) is primarily composed of alluvium and the main tributaries include Rathbun Creek, Grout Creek, Van Dusen Canyon, Sawmill Canyon, Sand Canyon, Knickerbocker Creek, Metcalf Creek, and North Creek. Based on the hydrogeologic formations, Bear Valley is divided into 16 hydrologic subunits (LCA, 1987 a & b). Details on the Basin can be found in California's Groundwater bulletin 118, which are included in Appendix F.

The water bearing deposits within the Valley have been divided into upper, middle, and lower aquifers. The upper and middle aquifers are the primary water-producing formations. The upper

aquifer extends through the eastern part of the Basin where it reaches more than 200 feet thick, but is thin and unsaturated in the western portion of the Basin. The middle aquifer is found throughout the Basin and ranges from 150 to more than 800 feet thick (DWR, 2004).

Basin recharge is from percolation of precipitation and runoff, as well as underflow from fractured rock formations. Groundwater levels generally correlate with annual fluctuations of precipitation.

Total storage capacity of the Basin is estimated at 42,000 AF. Average inflow is 6,240 afy and main losses to the basin are outflow and pumping (DWR, 2004).

6.2.2 Groundwater Management

> *10631 (b) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
>
> *(1) A copy of any groundwater management plan adopted by the urban water supplier... or any other specific authorization for groundwater management.*

The Basin is not an adjudicated basin and is well managed with no water rights issues. The Sustainable Groundwater Management Act (SGMA) classifies groundwater basins into four various categories of prioritization (very low, low, medium, and high). Basins that are classified as medium or high priority are required to develop groundwater sustainability agencies (GSAs), develop groundwater sustainability plans (GSPs) and manage groundwater for long-term sustainability. Bear Valley (8-009) has zero priority points, making it a very-low priority and is not subject to GSAs or GSPs requirements. However, BBLDWP elects to be a member of GSA and is in the process of developing a GSP. BBLDWP is part of the California Statewide Groundwater Elevation Monitoring (CASGEM) program and provides monthly monitoring data to the State. Based on the BBLDWP's groundwater monitoring data, the Basin has maintained a steady depth. Reports for the various hydrologic subunits as of June 18, 2020 and SGMA basin priority details are attached in Appendix F.

6.2.3 Overdraft Conditions

> *10631 (b)(2) For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.*

While the Village subunit was overdrafted in previous years, it has since recovered (CDM, 2005). Since BBLDWP's production was approximately 3,014 afy in 2002, nearing the aquifer estimated perennial yield of 3,100 afy, BBLDWP began a comprehensive conservation program. Between 2016-2019, BBLDWP's production has averaged 2,155 afy. At present, no subunit within the Bear Valley groundwater basin is known to be in overdraft.

6.2.4 Historical Groundwater Pumping

> *10631 (b) …If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
>
> *(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.*

BBLDWP has 53 wells to extract water from the Basin. Of these wells, 22 are slant wells, 2 are springs and 29 are typical pump powered vertical wells (25 active, 1 standby, and 5 inactive). Based on the 2020 Draft Water Master Plan (ALDA, Inc., 2020), the combined production capacity is estimated at 4,800 gallons per minute (gpm) (ALDA, Inc., 2020). Select wells have been removed from service or require additional blending due to water quality considerations. The wells include Division Well No. 4 (high manganese levels - offline), Knickerbocker Well (Arsenic levels – requires treatment or blending - offline), Onyx Well (high levels of Fluoride – requires blending), Division 2 (high manganese levels – requires treatment), Canvasback (uranium), and Seminole (due to proximity to the Lake requires surface water treatment in the event of intrusion).

The groundwater volume pumped over the past 5-years is summarized in Table 6-1.

Table 6-1: Retail: Groundwater Volume Pumped

☐	Supplier does not pump groundwater. The supplier will not complete the table below.
☐	All or part of the groundwater described below is desalinated.

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	Bear Valley Basin	2,165	2,168	2,092	2,193	2,332
	TOTAL	2,165	2,168	2,092	2,193	2,332

NOTES:
Source: Groundwater volume based on water superintendent reports from calendar years 2016 through 2020.

The Big Bear area experienced an unusually high volume of visitors during calendar year 2020 due to the pandemic. The 8 percent increase in pumping should not be used in projections for future estimates. During 2021 pumping patterns are returning to normal.

6.3 Surface Water

BBLDWP does not currently use surface water to meet its water demand.

6.4 Stormwater

BBLDWP has not identified any opportunities related to stormwater recapture to offset potable water use.

6.5 Wastewater and Recycled Water

The UWMPA requires that the UWMP address the opportunities for development of recycled water, including the description of existing recycled water applications, quantities of wastewater currently being treated to recycled water standards, limitations on the use of available recycled water, an estimate of projected recycled water use, the feasibility of said projected uses, and practices to encourage the use of recycled water.

6.5.1 Recycled Water

> *10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.*

In 2015, the Big Bear Area Regional Wastewater Authority (BBARWA), Big Bear Municipal Water District (BBMWD), BBCCSD, and BBLDWP partnered to develop a Facilities Plan for the Replenish Big Bear Project, formally known as the Bear Valley Water Sustainability Project (BVWSP). In 2017 the Bear Valley Basin Groundwater Sustainability Agency (BVBGSA), was created and was added to the Replenish Big Bear Team. The purpose of the project is to repurpose treated wastewater currently discharged and utilized outside of Big Bear Valley to help maintain Big Bear Lake levels and groundwater levels, even during periods of drought.

The project is still in the preliminary planning andpermitting stages and is anticipated to include two phases. The first phase would include the replenishment of Big Bear Lake. The second phase would include recharge at the Sand Canyon Recharge site. The first phase is anticipated to occur within the next five years, while the second phase is anticipated to occur in the long-term planning horizon. However, the timing of the second phase may change if supplemental supplies are needed during a severe drought period. It is estimated that approximately 400 afy could be used for groundwater recharge.

6.5.2 Wastewater Collection, Treatment Systems, and Disposal

> *10633. (a) (Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*

Wastewater collection systems within the service area for BBLDWP are operated by the City, BBCCSD, and the County of San Bernardino County Service Area 53B (CSA 53B). The collection systems deliver wastewater to BBARWA's interceptor system.

BBARWA was formed in March 1974 and its service area includes the entire 79,000 acres of Bear Valley. It is served by three collection systems maintained by the individual member agencies, which include the City, BBCCSD, and CSA 53B.

BBARWA operates three main lines; the low-pressure sewer force main that services the City's wastewater system, the North Shore Interceptor that services the county's wastewater system, and the BBARWA Trunk Line that services the BBCCSD's wastewater system and conveys flow from the North Shore Interceptor to the treatment plant. Wastewater flows from the three main lines is conveyed to the BBARWA WWTP located on a 94-acre parcel near Baldwin Lake in Big Bear City (ER, 2010). The plant occupies about 11.2 acres, leaving 82.3 acres for evaporation

ponds and other purposes. The plant has a peak hydraulic capacity of 9.1 million gallons per day (mgd), a secondary wastewater treatment capacity of 4.9 mgd. The average flow is about 2 mgd.

The 2020 wastewater flows from the BBLDWP 's service area is summarized in Table 6-2. As shown in Table 6-2, the BBLDWP contributed nearly 1,302 afy of wastewater flow to BBARWA's WWTP in 2020.

Table 6-2: Retail: Wastewater Collected Within the Service Area in 2020

☐	There is no wastewater collection system. The supplier will not complete this table.
	Percentage of 2015 service area covered by wastewater collection system (optional)
	Percentage of 2015 service area population covered by wastewater collection system (optional)

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2020	Name of Wastewater Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party? (optional)
BBARWA	Metered	1,302	BBARWA	BBARWA WWTP	No	
Total Wastewater Collected from		1,302				

6.5.3 Wastewater Treatment and Discharge within Service Area

As shown in Table 6-3, wastewater is not disposed of in BBLDWP's service area. Currently, BBARWA discharges the secondary wastewater treatment plant effluent to a 480-acre site in Lucerne Valley where it is used to irrigate fodder crops. The sludge is collected, dewatered, and hauled to disposal facilities. BBARWA is permitted to discharge treated wastewater for irrigation, construction compaction, dust control, and wildland firefighting in the Valley (CDM, 2005).

Table 6-3: Retail: Wastewater Treatment and Discharge Within Service Area in 2020

☑	No wastewater is treated or disposed pf within the UWMP service area. The supplier will not complete this table.

6.5.4 Recycled Water System Description

> *10633. (c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.*

Currently, there is no recycled water system available in the BBLDWP's service area.

6.5.5 Recycled Water Beneficial Uses

6.5.5.1 Current and Planned Uses of Recycled Water

BBLDWP currently does not utilize recycled water. As mentioned in Section 6.5.1, BBLDWP is currently working with BBARWA, BBCCSD, and MWD to develop a regional water treatment project called Replenish Big Bear that would maximize the use of local supply sources to replenish Big Bear Lake and the local groundwater aquifer. BBARWA is the lead agency on the

project. Currently, BBARWA treats the Valley's wastewater to secondary standards and exports approximately 2,000 afy to Lucerne Valley to irrigate an alfalfa field.

As mentioned in Section 6.5.1, the Replenish Big Bear project is still in the preliminary and permitting stages and would include two phases. The first phase would include replenishing Big Bear Lake and would not impact supply availability. The second phase would include recharging at the Sand Canyon Recharge site. It is estimated that approximately 400 afy could be used for groundwater recharge. However, the timing and need of the second phase is unknown. Thus, Table 6-4 is not applicable to this 2020 UWMP.

Table 6-4: Retail: Recycled Water Direct Beneficial Uses Within Service Area	
☑	Recycled Water is not used and is not planned for use within the service area of the supplier. The supplier will not complete this table.

6.5.6 Planned Versus Actual Use of Recycled Water

> *10633. (b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.*
>
> *(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.*
>
> *(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.*

The 2015 UWMP did not project any recycled water use in 2020. Thus, the DWR standardized Table 6.5, which compares the 2015 projections for 2020 to the actual use in 2020, is not applicable for BBLDWP.

Table 6-5: Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual	
☑	Recycled Water was not used in 2015 nor projected for use in 2020. The supplier will not complete this table.

6.5.7 Actions to Encourage and Optimize Future Recycled Water Use

> *10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier... and shall include the following:*
>
> *(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.*

BBLDWP does not currently have recycled water within its service area. Given the geography of BBLDWP's service area, it is not practical to connect to other existing recycled water systems. As mentioned, BBLDWP is working with other neighboring agencies in developing the Replenish Big Bear project. If completed, BBLDWP may utilize the supply for groundwater recharge. According to the 2010 UWMP and the 2015 UWMP, BBLDWP also analyzed the potential of utilizing supply for water recharge, snowmaking, and golf course irrigation.

Since recycled water allocations from the proposed facility have not yet been determined, expected recycled water use has not been calculated and actions to encourage recycled water use have not been determined as listed in Table 6-6.

Table 6-6: Retail: Methods to Expand Future Recycled Water Use	
☑	Supplier does not plan to expand recycled water system use in the future. Supplier will not complete this table and has provided a narrative explanation in Section 6.5.5.

6.6 Desalinated Water Opportunities

10631(d). Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

No opportunities exist for development of desalinated water by BBLDWP. Participation in an ocean water desalination plant would be cost prohibitive as BBLDWP is located approximately 90 miles inland and 6,750 feet above sea level.

6.7 Exchanges or Transfers

10631(d). Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

6.7.1 Exchanges

Water exchanges entail water being delivered by one water user to another water user, with the receiving water user providing water in return at a specified time or when the conditions of the parties' agreements are met. BBLDWP does not have any existing or planned water exchanges.

6.7.2 Transfers

Water transfers entail a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights. The DWP does not currently have any existing or new transfer opportunities identified.

6.7.3 Emergency Interties

BBLDWP currently has two emergency supply interconnections with the BBCCSD system, which supplies water to unincorporated areas of Big Bear City and the eastern portion of the Valley. These interconnections are for emergencies that disrupt BBLDWP's or the BBCCSD's ability to serve their customers. The interconnections are intended to be used until either agency declares water exchanges are no longer necessary.

There are no set agreements between the BBCCSD and BBLDWP for limits on the quantity of water that could be transferred. Each transfer would be evaluated on a case-by-case basis but would not be allowed to affect the transferring agency's ability to supply their customers' needs (CDM, 2005).

6.8 Future Water Projects

> *10631(f)… The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

BBLDWP recently completed its 2021 water master plan. The plan includes a 10-year $32,500,000 Capital Improvement Plan (CIP). These improvements include Division Well nine. This well will replace division wells two and five, which have exceeded their useful life and require treatment. Division well nine will provide a more reliable and cost-effective supply. The proposed Wolf reservoir, booster, and pipeline project will provide additional storage capacity to the Moonridge area. The booster station will provide more efficient, and increased capacity, to transfer water between pressure zones. The pipeline replacements will allow the Moonridge system to be operated more efficiently and will reduce water loss associated with aging pipe. The CIP also includes 17 miles of new and replacement pipelines. The new pipelines will provide added water supply, redundancy, and efficiency for the Erwin Lake system, Whispering Forest, and Bear Loop communities. Replacement pipelines will reduce water loss associated with aging pipelines.

In addition, as mentioned in prior sections of Chapter 6, BBLDWP is participating in a regional recycled water project called Replenish Big Bear. The project is still in the preliminary planning stages and is anticipated to include two phases. The first phase would include the replenishment of Big Bear Lake, water supply to the stickleback ponds, and irrigation to the local golf course. Currently the stickleback ponds and golf course are supplied with ground water. The Replenish Big Bear project could reduce ground water pumping by 200 afy. However, the second phase would include recharge at the Sand Canyon Recharge site. The first phase is anticipated to occur within the next five years, while the second phase is anticipated to occur in the long-term planning horizon. The timing of the second phase is unknown and may be expedited if supplemental supplies are needed during a severe drought period. It is estimated that approximately 400 afy could be used for groundwater recharge. Since the timing and need of phase two are unknown, additional supplies have not been considered for the 2020 UWMP.

Table 6-7: Retail: Expected Future Water Supply Projects or Programs

☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete this table.
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.
Page 6-8	Provide page location of narrative in the UWMP.

Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Agency
N/A	N/A	N/A	N/A	N/A	N/A	N/A

6.9 Summary of Existing and Planned Sources of Water

> *10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following…*
>
> *(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.*
>
> *(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).*

The actual source and volume of water for the year 2020 is presented in Table 6-8. As shown in Table 6-8, BBLDWP's actual supply was approximately 2,332 afy, which is below the Basin's safe yield of 3,100 afy.

Table 6-8 Retail: Water Supplies — Actual

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume (afy)	Water Quality	Total Right or Safe Yield (afy)
Groundwater	Bear Valley Basin	2,332	Drinking Water	3,100
Total	N/A	2,332	N/A	3,100

The projected water supply in five-year increments is included in Table 6-9. For BBLDWP, the available water supply is projected based on estimated future demands, which are below the safe yield of the Basin. These estimates rely on a low rate of growth and retaining a low gpcd through continued conservation efforts.

Table 6-9: Retail: Water Supplies — Projected

Water Supply	Additional Detail on Water Supply	Projected Water Supply									
		2025		2030		2035		2040		2045	
		Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield
Groundwater	Bear Valley Basin	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100
Total		3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100

NOTES:
(1) Reasonably available volume is based on BBLDWP's safe yield of 3,100 afy.
(2) Recycled Water projections have not yet been determined and are not included in these projections.

6.10 Climate Change Impacts to Supply

The CWC requires that suppliers consider climate change in their water supply analysis. The potential water supply effects related to climate change are discussed briefly in this section.

Because BBLDWP is 100 percent reliant on groundwater for its potable water supply, the effects of climate change are best summarized by considering the effects of the region as a whole. These effects will likely include:

- Reduction in snowpack, which is a significant source of water as it melts and feeds aquifers in the San Bernardino Mountains.
- Increase in intensity and frequency of extreme weather events.
- Effects on groundwater recharge during droughts.
- General decline in ecosystem health and function.
- Changes to demand levels and patterns due to increasing temperatures.

As scientific understanding of climate change continues to advance, the nature of these impacts and the impact on water supply availability and reliability will be thoroughly studied to identify proper mitigation and adaptation strategies.

One additional consideration for BBLDWP is the impact of wildfires on water quality. The wildfire season is typically followed by the rainy season and sometimes heavy precipitation, leading to high levels of sediment in runoff that can severely degrade water quality, such as the increase in turbidity levels. In addition, Per- and polyfluoroalkyl substances (PFAS) is also an emerging contaminant that can be found in firefighting foam that can stay and spread in the environment for decades and become a major contributor to drinking water contamination. With the increasing frequency of wildfires and atmospheric rivers across California, changes in treatment operations and/or treatment processes may be necessary to reliably treat and maintain water service to customers experiencing back-to-back impacts.

According to a recent article a, "first-of-its-kind national-scale study of private well water, conducted in collaboration with the Centers for Disease Control and Prevention, showed that drought may lead to elevated levels of naturally occurring arsenic and that the longer a drought lasts, the higher the probability of arsenic concentrations exceeding U.S. Environmental Protection Agency's standard for drinking water (USGS, 2021). Additional details related to climate change data that has been collected using the Cal-Adapt tool are included in Chapter 3 and Appendix C of this UWMP.

6.11 Energy Intensity

The 2020 UWMP guidebook requests that water suppliers provide information on the energy required to produce and distribute their water supply. In 2020, BBLDWP produced 2,332 afy of water within its service area. BBLDWP is only able to report on energy consumed from supply production and not treatment nor distribution. The kilowatt hours (kWh) of energy needed across a majority of BBLDWP's water system is 1,757,404 kWh, excluding BBLDWP's office, Division Well Field, and the RV Park. The Division Well Field consumed an estimated 371,416 kWh to make the total of energy consumed for water production to be 2,128,820 KWh. Therefore, the total energy consumed in year 2020 was approximately 912.9 kWh/AF (or 2,801.5 kWh/million gallons). The Big Bear Shores RV Park water production was not included

in these values. The impact of the RV Park production is minimal compared to the total BBLDWP service area. The energy intensity analysis is located in Appendix G (Table O-1B) of the UWMP.

In addition, BBLDWP produces solar powered energy on the Division Well Field site. In 2020, the total solar production was 480,708 kWh. The total energy consumed for the Division Well Field was 371,416 kWh. Approximately 217,852 kWh of the total solar energy produced was sent to Bear Valley Electric Service (BVES). BVES provided 108,560 kWh of energy to the Division Well Field and the remaining energy required was supplemented by solar production. The net metering program was reestablished in October 2020.

BBLDWP is proactively saving energy with solar power technology and continuously explores ways to improve energy efficiency throughout the operations of the distribution system.

Chapter 7

WATER SYSTEM RELIABILITY AND DROUGHT RISK ASSESSMENT

The UWMPA requires that the UWMP address the reliability of the agency's water supplies. This includes supplies that are vulnerable to seasonal or climatic variations. In addition, an analysis must be included to address supply availability in a single-dry year and in five-consecutive year drought.

> *10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

7.1 Constraints of Water Sources

> *10631 (b)(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.*

There are two aspects of supply reliability that can be considered. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the supply facilities. The second aspect is climate related and involves the availability of water during mild or severe drought periods.

There are a variety of factors that can affect water supply reliability. The factors that might result in supply reliability issues for BBLDWP include water quality and climactic changes.

7.1.1 Water Supply Quality

The groundwater quality within the Basin is generally good and characterized by low/medium hardness with total dissolved solids (TDS) concentrations ranging from 91 to 420 millgrams per liter (mg/L) with an average TDS of 255 mg/L and is absent of high nutrients such as nitrates (WSC, 2016). In addition, the eastern part of the Basin is characterized by elevated levels of naturally occurring fluoride. Other constituents of concern include manganese, uranium, and arsenic. Water quality issues have resulted in occasional blending projects, water treatment plants, and wells being shut down. However, water quality issues are not anticipated to disrupt groundwater supply (DWR, 2004). Annual Consumer Confidence Reports (CCRs) for BBLDWP's service area in year 2020 can be found in Appendix H.

7.1.2 Climate Change

Climate change is likely to add uncertainties to supply planning and future supply availability. The severe and prolonged drought that began in 2012 has been a test of BBLDWP's ability to prepare for, and adapt to, the effects of climate change. Considering reductions in per capita use and projected demands below the safe perennial yield, BBLDWP continues to balance a cautious optimism with a long-term strategy for sustainable sources of supply.

BBLDWP has continued to participate in regional climate change studies, such as, the Upper Santa Ana River Watershed Integrated Regional Water Management Plan (IRWMP) (RMC, 2015) that assess potential long-term impacts of climate change and mitigation and adaption strategizes.

As stated in Chapter 4, the altered climate patterns in California, which are creating hotter days and longer heat waves, will increase customer water use and evaporative water losses. Extended drought periods are expected to become both more frequent, and more severe, which could lead to reduced surface water flows, reduced snowpack, and less groundwater availability for the BBLDWP. According to the California Department of Public Health 2017 "Climate Change and Health Profile Report San Bernardino County," Big Bear is expected to lose around 8 inches [of precipitation] per year by 2090 (CDPH, 2017). The same report cites the Cal-Adapt CCSM3 climate model high emissions scenario showing March snowpack in the Big Bear area will diminish from the 2.5-inch level of 2010 to 1.4 inches in 2030 and almost zero by 2090. Higher temperatures and decreased precipitation will result in drought, making wildfires more frequent, more severe, and harder to fight with less water supplies. Wildfires, followed by flooding, mean more landslides and mudslides, further impacting water supply reliability. Creating defensible space as well as slope stabilization and erosion prevention near critical infrastructure will be important for preserving supplies.

Efficient use of water is paramount in the BBLDWP effort to adapt to climate change. Retrofit, new, and appropriately sized/placed reservoirs will be critical along with the technology and equipment to appropriately monitor and manage water supplies. Ensuring that pipes are appropriately sized and upgraded to minimize water loss is equally important. Redundancy in source of supply will provide operational flexibility in the event supplies are interrupted by fire, floods, earthquakes, or drought. Climate change effects such as drought, wildfire, and temperature fluctuations may all contribute to a degradation of water quality over time.

7.1.3 Potential Alternative Sources

Since all of BBLDWP's current and future water supply is groundwater, with a current estimate of perennial yield available to BBLDWP of 3,100 afy, BBLDWP has identified and evaluated alternative water sources for its service area. It has determined that some local water supply options have yet to be explored. Sixteen alternative water sources were evaluated in the Reconnaissance Analysis of Alternative Water Sources document prepared by the Alternative Water Source Committee and BBLDWP staff in 2010. The alternative sources were evaluated by potential volume supplied, capital costs, operations and maintenance costs, technical feasibility, and political feasibility. A list of all potential projects investigated by BBLDWP can be found in Appendix F.

Based on the study, two alternatives will be focused on in the next 10 to 20 years:

- Maximizing extraction from each hydrologic subunit.
- Enhance groundwater recharge.

In addition, as mentioned in Chapter 6, BBLDWP is participating in a regional water treatment project called Replenish Big Bear. The project is still in the preliminary planning stages and is anticipated to include two phases. The first phase would include the replenishment of Big Bear Lake. The second phase would include recharge at the Sand Canyon Recharge site. The first phase is anticipated to occur within the next five years, while the second phase is anticipated to occur in the long-term planning horizon. However, the timing of the second phase may change if supplemental supplies are needed during a severe drought period. It is estimated that approximately 400 afy could be used for groundwater recharge.

7.2 Water Supply Reliability by Type of Year

This section considers the BBLDWP water supply reliability during three water scenarios: average year, single-dry year, and five-consecutive-year drought. An average year is also referred to as a "normal" year.

These scenarios are defined as follows:

- Average Year: A year, or an averaged range of years, that most closely represents the average water supply available to BBLDWP. Generally, a year in the historical sequence that most closely represents median precipitation levels and patterns. Based on the historic records from 1995 to 2020, calendar year 2009 best characterizes average year conditions.
- Single Dry Year: The year that represents the lowest water supply available to BBLDWP. Based on the historic records from 1995 to 2020, calendar year 2013 best characterizes single dry year conditions.
- Five-Consecutive-Year Drought: the period that represents the driest five-year historical sequence for BBLDWP. Generally considered to be the lowest average precipitation for a five-consecutive-year period. Based on the historic records from 1995 to 2020, the period from 2011 through 2015 best characterizes the five-year consecutive drought conditions.

7.2.1 Methodology

In the event of single and multiple dry years, reduced rainfall results in lower groundwater recharge. However, aquifers contain more water in storage than the perennial yield. Thus, water remains available. The DWR estimates total storage of the Basin at approximately 42,000 AF. Provided annual pumping does not exceed safe yield, the groundwater basin will continue to contain sufficient water during multiple dry-year conditions.

BBLDWP's system has an instantaneous pumping capacity of roughly 4,800 gpm with approximately 500 gpm of this capacity from slant wells. During droughts, water production from slant wells will decline, requiring vertical wells to make up lost production. In addition to the existing wells, BBLDWP completed the Sawmill Well Pumping Plant in 2019, which increased pumping capacity by approximately 565 afy (or 350 gpm) to about 5,150 gpm.

Due to the estimated 42,000 AF of storage capacity in the Basin and proper groundwater management, there should be sufficient groundwater to meet future supply needs during a

limited drought period. Based on the current water table, the groundwater levels have remained steady in comparison to the last drought on record. The groundwater basin is being monitored on a monthly basis. For reference, the monthly data is located in Appendix F. Based on the data, the groundwater basin is still showing signs of recovery and recharge since the previous drought period from 2011 to 2015.

7.2.2 Basis of Water Year Data

The specific years identified for average, single-dry, and five-consecutive-year drought are presented in Table 7-1, which were based on historical precipitation records from 1995 to 2020. The available supplies represent the supply production for the years specified, which is below BBLDWP's perennial yield of 3,100 afy. Therefore, demands were met during both the average and dry-year conditions.

Table 7-1: Basis of Water Year Data

Year Type	Base Year	Available Supplies if Year Type Repeats	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available	% of Average Supply
Average Year	2009	2,374	100%
Single-Dry Year	2013	2,484	105%
Consecutive Dry Years 1st Year	2011	2,210	93%
Consecutive Dry Years 2nd Year	2012	2,291	97%
Consecutive Dry Years 3rd Year	2013	2,484	105%
Consecutive Dry Years 4th Year	2014	2,249	95%
Consecutive Dry Years 5th Year	2015	2,095	88%

The historical per capita consumption from the period 1995 to 2020 is shown in Figure 7-1. The average consumption during this period was 87 gpcd.

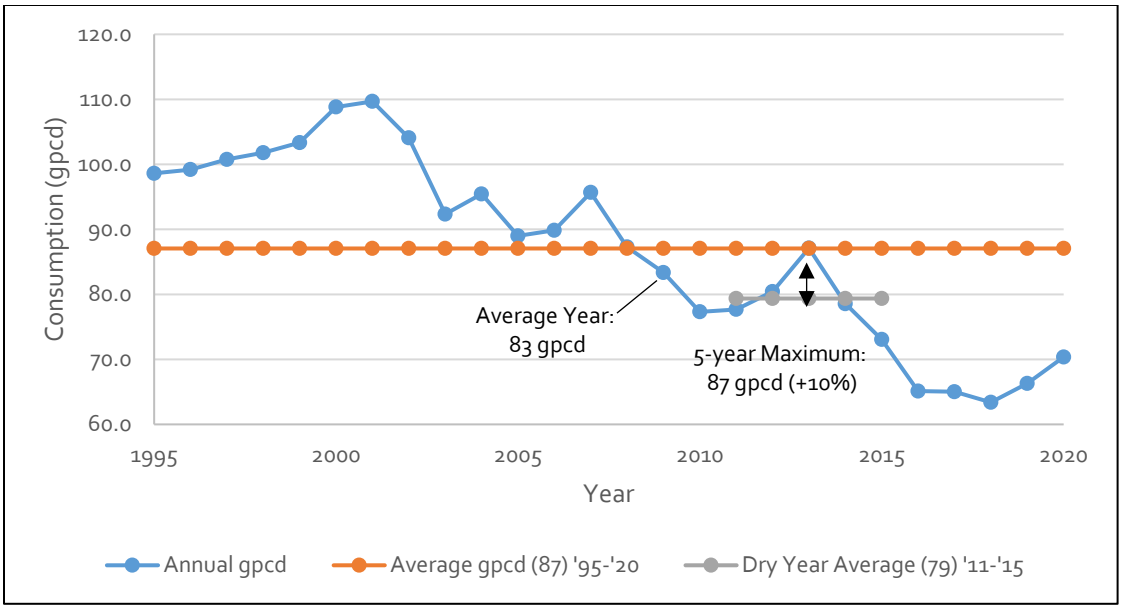


Figure 7-1: Historical Per Capita Consumption Variation

The years chosen to represent the dry-year scenarios were determined by examining precipitation records. Based on precipitation data, BBLDWP has experienced low rainfall levels with the lowest level occurring in the year 2013. As shown in Figure 7-1, the average per capita demand during this five-year period was 79 gpcd. The 2013 demand was 10 percent greater than the average gpcd demand over this five-year period. Per capita consumption in the multiple-dry year period of 2011 to 2015 was 78 gpcd, 80 gpcd, 87 gpcd, 79 gpcd, and 73 gpcd, which are approximately 2 percent lower than the average use, 1 percent higher than the average use, 10 percent higher than the average use, 1 percent lower than the average use, and 8 percent lower than the average use, respectively. The decrease in per capita demand during the last year of the multiple-dry year period is likely a result of conservation efforts. For conservative planning purposes and to mimic the effects of conservation efforts, demand was therefore increased by 10 percent for the single-dry year. Demands were also adjusted by the percent changes in gpcd over the five-year drought period listed above for the multiple-dry year comparison.

As mentioned in Section 7.1.2, BBLDWP will continue to assess the long-term impacts of climate change on water supplies within the region and identify mitigation and adaption strategies.

7.3 Water Service Reliability Assessment

> *10635(a). Every urban water Supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

The projected demand and supplies are compared in five-year increments in Table 7-2, Table 7-3, and Table 7-4.

7.3.1 Average Year

As shown in Table 7-2, on an average year, demands are projected to increase up to 2,283 afy by year 2045 with passive conservation savings. Since BBLDWP is able to pump up to 3,100 afy from the Basin, it is projected that BBLDWP has sufficient supplies available to meet demand through year 2045 under average year conditions.

Table 7-2: Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply totals[(1)]	3,100	3,100	3,100	3,100	3,100
Demand totals[(2)]	2,147	2,164	2,190	2,231	2,283
Difference	953	936	910	869	817

NOTES
(1) Values from Table 6-9. Available supplies assumed to be equal to BBLDWP's share of the operating safe yield of the groundwater basin.
(2) Values from Table 4-3 and includes projected passive conservations savings from the 2019 WCMP (Maddaus, 2019).

7.3.2 Single-Dry Year

Table 7-3 provides an estimate of the projected single-dry year supply and demand totals. Demand reductions due to water shortage stage rationing measures are not included in the single-dry year demand estimates.

As described in the previous section, the projected average year water demand was increased by 10 percent to estimate the water demand during a single-dry year, which increases demands to 2,506 afy by year 2045. The projected demands are summarized in Table 7-3.

As shown in Table 7-3, based on BBLDWP's 3,100 afy operating safe yield, BBLDWP is projected to have sufficient supply available to meet water demand through 2045 for single-dry year conditions. Based on historical groundwater monitoring data, the groundwater levels have been steady in recent years due to flexibility in BBLDWP pumping practices. Since groundwater levels maintained relatively stable levels, it is expected that BBLDWP will be able to operate up to the 3,100 afy operating safe yield during a single-dry year.

Table 7-3: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045
Supply totals(1)	3,100	3,100	3,100	3,100	3,100
Demand totals(2)	2,356	2,375	2,404	2,449	2,506
Difference	744	725	696	651	594

NOTES
(1) Available supplies assumed to be equal to BBLDWP's share of the operating safe yield of the groundwater basin.
(2) Projected demands include passive conservation savings from the 2019 WCMP (Maddaus, 2019).

7.3.3 Five-Consecutive-Year Drought

Table 7-4 provides an estimate of the projected five-consecutive-year drought supply and demand totals. Demand reductions due to water shortage stage rationing measures are not included in the five-consecutive-year drought demand estimates.

To estimate the water demand during multiple-dry years, the projected average year water demand was adjusted based on the percent changes in per capita demand over the five-year drought period from 2011 through 2015. Increases in demand occurred in the second and third years. The highest increase in demand occurred in the third year (2,506 afy by 2045), which was based on an increase of 10 percent in usage. Reduction in demand occurred the first, fourth, and fifth years. The highest reduction occurred in the fifth year (2,102 afy by 2045), which was based on a decrease of 8 percent in usage.

Based on historical data, demands reduced during the last year of the multiple-dry year are a result of conservation efforts. The projected demands are summarized in Table 7-4.

Table 7-4: Multiple Dry Years Supply and Demand Comparison						
		2025	2030	2035	2040	2045
First Year	Supply totals(1)	3,100	3,100	3,100	3,100	3,100
	Demand totals(2)	2,102	2,118	2,144	2,184	2,235
	Difference	998	982	956	916	865
Second Year	Supply totals(1)	3,100	3,100	3,100	3,100	3,100
	Demand totals(2)	2,176	2,193	2,219	2,261	2,313
	Difference	924	907	881	839	787
Third Year	Supply totals(1)	3,100	3,100	3,100	3,100	3,100
	Demand totals(2)	2,356	2,375	2,404	2,449	2,506
	Difference	744	725	696	651	594
Fourth Year	Supply totals(1)	3,100	3,100	3,100	3,100	3,100
	Demand totals(2)	2,125	2,142	2,168	2,208	2,260
	Difference	975	958	932	892	840
Fifth Year	Supply totals(1)	3,100	3,100	3,100	3,100	3,100
	Demand totals(2)	1,976	1,992	2,016	2,054	2,102
	Difference	1,124	1,108	1,084	1,046	998

NOTES
(1) Available supplies assumed to be equal to BBLDWP's share of the operating safe yield of the groundwater basin.
(2) Projected demands include passive conservation savings from the 2019 WCMP (Maddaus, 2019).

As shown in Table 7-4, BBLDWP is projected to have sufficient supply available to meet water demands through the year 2045 for multiple-dry year conditions, which is within BBLDWP's operating safe yield of 3,100 afy.

7.3.4 Description of Management Tools and Options

> *10620(f). An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*

Currently, BBLDWP solely utilizes local groundwater supplies to meet potable water demands. BBLDWP plans to continue to use groundwater to meet demands through the year 2045.

7.3.5 Seismic Risk Assessment and Mitigation Plan

As part of the preparation of the 2020 UWMP, a Seismic Risk and Mitigation Plan (SRAMP) was developed. The objective of the SRAMP was to provide BBLDWP with an overview of seismic vulnerabilities related to the above ground water system facilities and identify recommendations for the mitigation of those vulnerabilities to minimize system disruption. The SRAMP is provided in Appendix K (confidential).

7.4 Drought Risk Assessment

> *10635(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following…*
>
> *(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period. [Emphasis added]*
>
> *(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.*

CWC Section 10635(b) is a new requirement for the 2020 UWMPs where suppliers are required to prepare a DRA with descriptions of data and methods used, basis for the supply shortage conditions, determination of the reliability of sources, and a comparison of the total water supplies and uses during the drought. The DRA will be submitted every five years in addition to conducting an annual water supply and demand assessment. Evaluation for the DRA is based on the five dry years with consideration of climate changes, regulations, and other local criteria. In the event of stressed hydrologic conditions, suppliers will consider management of their water supplies in relation to customer usage, identify potential system vulnerabilities, and provide explanations of assumptions and decisions on which the analysis was based.

A summary of BBLDWP's water supply drought risk assessment from 2021 through 2025 is summarized in Table 7-5. The supply is based on the use of the perennial yield of the basin, which is 3,100 afy. Therefore, there is sufficient supply to meet projected demands within the next five years. The DRA report is included in Appendix I, which includes additional details regarding potential supply vulnerabilities.

Table 7-5: Five-Year Drought Risk Assessment Tables to Address CWC Section 10635(b)	
2021	**Total**
Total Water Use	2,131
Total Supplies	3,100
Surplus/Shortfall Without WSCP Action	969
Planned WSCP Actions (use reduction and supply augmentation)	N/A
WSCP- supply augmentation benefit	N/A
WSCP - use reduction savings benefit	N/A
Revised Surplus (shortfall)	969
Resulting % Use Reduction from WSCP Action	0%
2022	**Total**
Total Water Use	2,136
Total Supplies	3,100
Surplus/Shortfall Without WSCP Action	964
Planned WSCP Actions (use reduction and supply augmentation)	N/A
WSCP- supply augmentation benefit	N/A
WSCP - use reduction savings benefit	N/A
Revised Surplus (shortfall)	964
Resulting % Use Reduction from WSCP Action	0%
2023	**Total**
Total Water Use	2,142
Total Supplies	3,100
Surplus/Shortfall Without WSCP Action	958
Planned WSCP Actions (use reduction and supply augmentation)	N/A
WSCP- supply augmentation benefit	N/A
WSCP - use reduction savings benefit	N/A
Revised Surplus (shortfall)	958
Resulting % Use Reduction from WSCP Action	0%
2024	**Total**
Total Water Use	2,145
Total Supplies	3,100
Surplus/Shortfall Without WSCP Action	955
Planned WSCP Actions (use reduction and supply augmentation)	N/A
WSCP- supply augmentation benefit	N/A
WSCP - use reduction savings benefit	N/A
Revised Surplus (shortfall)	955
Resulting % Use Reduction from WSCP Action	0%
2025	**Total**

Table 7-5: Five-Year Drought Risk Assessment Tables to Address CWC Section 10635(b)	
Total Water Use	2,147
Total Supplies	3,100
Surplus/Shortfall Without WSCP Action	953
Planned WSCP Actions (use reduction and supply augmentation)	N/A
WSCP- supply augmentation benefit	N/A
WSCP - use reduction savings benefit	N/A
Revised Surplus (shortfall)	953
Resulting % Use Reduction from WSCP Action	0%

7.5 Regional Supply Reliability

> *10620 (f) an urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*

BBLDWP does not utilize imported water within its service area. As described in Chapter 6, BBLDWP is currently in coordination with BBARWA, BBMWD, and BBCCSD for the Replenish Big Bear project. This project will maximize local resources by retaining over 600 million gallons each year of treated wastewater inside Big Bear Valley to maintain lake levels, offset current potable uses, and may be used as a supplemental supply source to recharge the local groundwater basin during periods of severe drought. New Well Pumping Plants, Reservoir, and Pipeline projects will increase water system operational efficiencies and create a more reliable supply through additional redundant facilities.

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

In response to the severe drought of 2012-2016, new legislation in 2018 created a WSCP mandate replacing the water shortage contingency analysis under former law. The new requirements are more prescriptive to have consistency throughout California. The WSCP document is now separate from the UWMP and can be amended as needed, without amending the current UWMP.

The WSCP is included in Appendix J.

8.1 WSCP Overview

BBLDWP's WSCP details the actions to be taken during a reduction in available water supply. These actions are broken up based upon six possible stages of water shortage. Reductions in supply are most frequently associated with drought, but could also be the result of flooding, major fires, earthquakes, power outages, water contamination, main breaks or any other situation that could impact the water supply. Thus, to account for this situation, the BBLDWP also created a seventh "stage" reserved for acute water shortages that may be short term, but with an unpredictable volume of water shortage.

The goal of a WSCP is to have a procedure for managing and mitigating shortages that allow BBLDWP to respond to shortages in an efficient and timely manner. Water shortage response actions may include demand reduction, operational changes, and mandatory prohibitions to address shortage levels. The following sections summarize BBLDWP's water shortage stages and the conservation measures employed during each stage, as outlined in the WSCP.

8.1.1 Stages of Action

In compliance with the 2018 legislation for WSCP's, BBLDWP has updated the water shortage levels in the WSCP from four stages to six stages, plus a seventh level for acute shortages. The mandatory response actions for each water shortage stage are outlined in Table 8-1. Additional details on the triggering mechanisms for each shortage level are provided in the WSCP (see Table 4 through Table 9) in Appendix J, which aligns with DWR's Table 8-2. Since BBLDWP is only supplied by local groundwater sources, there are no existing supply augmentation opportunities to consider in DWR's Table 8-3. However, BBLDWP is participating in a regional effort that may include groundwater recharge during severe drought periods, which is discussed in Chapter 6 and Chapter 7, and is prepared to take other actions to respond to shortages. Shortage response actions other than supply augmentation are shown in Table 8-3.

In addition to the shortage response actions, BBLDWP currently implements permanent water use restrictions in adherence to both local and state guidelines. The permanent restrictions are briefly discussed in Chapter 9 and included in the WSCP. The implementation of permanent water restrictions assists with maintaining and promoting responsible water use during non-drought periods.

Table 8-1: Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions**
1	Up to 10%	Water Shortage Watch
2	Up to 20%	Moderate Water Shortage
3	Up to 30%	Major Water Shortage
4	Up to 40%	Extreme Water Shortage
5	Up to 50%	Critical Water Shortage Emergency
6	>50%	Catastrophic Interruption of Water Supplies
7	Variable	Acute Water Shortage(2)

NOTES:
(1) Including wildfires, earthquakes, regional power outages, and emergencies other than water shortage.
(2) Short-term water shortage conditions with variable percent shortages.

Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	**Supply Augmentation Methods and Other Actions by Water Supplier**	**How Much is This Going to Reduce the Shortage Gap?**	**Additional Explanation or Reference (optional)**
1	Expand Public Information Campaign	Unknown	Bill inserts, e-newsletters, portal alerts, newspaper, water efficiency workshops, educational outreach, etc.
1	Improve Customer Billing	Unknown	Increase frequency of meter reading
1	Other Actions (describe)	Unknown	Targeted water audits, increased rebates and giveaways for water efficient devices, expand rebates for landscape conversion, reduce line flushing, review water loss and plan repairs, patrol areas of largest water use, improve enforcement of water use violations
2		None	No action taken
3		None	No action taken
4		None	No action taken
5		None	No action taken
6		None	No action taken
7	Transfers	Unknown	In the event of an emergency, BBLDWP may use water from BBCCSD using interties.

NOTE:
There is very little opportunity for BBLDWP to augment supply as they are wholly dependent on local groundwater. To connect to the State Water Project would cost an estimated $100 million and would include having to lift the water over 4,000 feet, which is neither economically or operationally practical. As such, BBLDWP is heavily reliant on demand reduction measures and operational changes to address water shortages.

8.1.2 Shortage Response Actions

BBLDWP's General Manager (or a designated representative) is authorized and directed to implement the provisions of the WSCP. The rules and regulations associated with the shortage levels will be effective immediately upon declaration and approval of the General Manager. Additional water shortage response actions and/or changes in shortage levels may be recommended by the Technical Review Team (TRT).

Water shortage response actions are detailed in the WSCP (see Table 4 through Table 9 in Appendix J) and BBLDWP's rules and regulations. Table 4 through Table 9 in the WSCP align with DWR Table 8-2. Violations are considered waste and an unauthorized use of water, which result in penalties as outlined in Resolution No. DWP 2008-05 and Conservation Policy #2014-02 (see Appendix L). In accordance with the UWMPA, penalties or charges for excessive use during water shortages must be included, which are outlined in the WSCP (see Appendix J).

In addition to the demand reduction actions, BBLDWP plans on implementing additional conservation measures outlined in their WCMP summarized in Chapter 9. These conservation measures include an Advanced Metering Infrastructure (AMI) customer portal to monitor water usage, dedicated irrigation metering requirements, multi-unit submetering, and additional incentive programs. The existing and new conservation measures are anticipated to maintain or decrease the per-capita water use.

Chapter 9

DEMAND MANAGEMENT MEASURES

The UWMPA requires that the UWMP involve a comprehensive discussion of the agency's water conservation measures.

> 10631 (f)(A)...The narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.30.
>
> (B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:
>
> (i) Water waste prevention ordinances
>
> (ii) Metering
>
> (iii) Conservation pricing
>
> (iv) Public education and outreach
>
> (v) Programs to assess and manage distribution system real loss
>
> (vi) Water conservation program coordination and staffing support.
>
> (vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measure, if implemented.

This chapter presents details of the DMMs contained in the UWMPA, as well as BBLDWP existing and planned efforts to further develop their water conservation program. The UWMPA was amended in 2014 to streamline DMMs from 14 specific measures to six more general requirements and an "other" category.

To assist with statewide conservation efforts and increase efficient water use statewide, the California Water Efficiency Partnership (CalWEP) was created. CalWEP's goal was to integrate urban water conservation BMPs into the planning and management of California's water resources. A Memorandum of Understanding (MOU) regarding Urban Water Conservation in California was developed to expedite implementation of reasonable water conservation measures in urban areas and to establish appropriate assumptions for use in calculating estimates of reliable future water conservation savings. Since CalWEP became a chapter of the Alliance for Water Efficiency (AWE), reporting on BMPs through CalWEP is no longer required.

Although reporting on BMPs through CalWEP is not required, BBLDWP is committed to water conservation and has continued to implement policies and on-going programs that promote and encourage water conservation. In addition, BBLDWP has several drought-specific programs that can be implemented if water supplies become limited and the need for more intensive water conservation becomes necessary. To assist with long-term conservation planning within BBLDWP's service area, the 2019 WCMP (Maddaus Water Management, Inc., 2019) was developed. A summary of the proposed water and cost savings related to the implementation and development of proposed programs listed in the WCMP is included in Appendix M.

The following sections describe BBLDWP's current and planned implementation of DMMs.

9.1 Water Waste Prevention Ordinances

As part of BBLDWP's Water Conservation Program (see Policy #2014-02), several water use policies have been implemented to prevent water waste. The policy requires that water should be used reasonably and productively at all times. In addition, BBLDWP has developed Failure to Comply Procedures (Resolution No. DWP 2016-13), which outline water service termination procedures and penalties. This is further described in the WSCP in Appendix J.

Ordinances and resolutions are included in Appendix L for reference.

9.1.1 Implementation of Permanent Water Use Restrictions

BBLDWP maintains permanent restrictions regardless of the water supply condition. This includes State-mandated restrictions that were permanently prohibited by the Governor of California on May 9, 2016. A list of all permanent restrictions (state and local) is provided in the WSCP in Appendix J and briefly described below.

Regulations require customers to repair all water leaks from any water line, faucet, toilet, etc. once detected. In addition, all new structures must be equipped with low flow faucets, showerheads, toilets, and urinals in compliance with current state standards. All dishwashers and clothes washers must follow the EPA's current guidelines.

For outdoor use, BBLDWP does not allow water run-off onto adjacent properties, public, or private roadways, and streets. Vehicle washing must be completed with a bucket and a hose with an automatic shutoff nozzle. The policy also prohibits hose washing of sidewalks, driveways, parking areas, tennis courts, patios, or other areas except when needed to protect public health and safety. Fire hydrants are only used for fire protection purposes and approved construction purposes.

Restrictions have also been placed on landscaping. Outdoor watering is restricted to alternate days, based on the customers address, and is restricted to the hours between 6 p.m. and 9 a.m. All outdoor irrigation must be shut off and winterized between November 1 and April 1, annually.

All new and retrofitted landscapes must follow the requirements for landscape plan submittals as identified in the Water Conservation Program (see Policy #2014-02). These landscape water use restrictions include, but are not limited to, the following:

- For new landscapes, turf, and water features combined may not occupy more than 25 percent of the landscaped area in all proposed landscapes and decorative fountains and water features must use recirculating systems.
- Landscape elements are expected to be appropriately maintained to maximize water-use efficiency (WUE) and grouped by similar irrigation requirements.
- Irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs.
- All new and retrofitted landscapes with turf must be irrigated, using a system with Weather Based Irrigation Controllers.
- Weather Based Irrigation Controllers must have the ability to accommodate all time and date restrictions employed by BBLDWP and must be equipped with one of the following: rain shutoff, soil moisture sensors, or have ETo adjustment capabilities.

The City of Big Bear Lake and County of San Bernardino enforce the Model Water Efficient Landscape Ordinance (MWELO) on all new or retrofit landscapes subject to a permit. The measure requires new multi-family units and CII developments with more than 5,000 square feet (sq ft) of irrigated landscape to install dedicated irrigation meters. The landscape and irrigation code updates for new accounts is estimated to save about 3 afy by 2045.

BBLDWP works diligently in implementing the water waste prevention restrictions and imposes consequences on those who fail to comply. If the customer fails to correct the violation or contact BBLDWP staff, BBLDWP may terminate service and the customer can be reinstated once the correction has been made. The customer has the ability to appeal the violation before the Board of Commissioners per the Failure to Comply Policy.

9.1.2 Implementation of Future Water Use Restrictions

Per the MWELO, MFR, multi-unit residential, and CII developments with more than 1,000 sq ft of newly irrigated landscape or single-family accounts with more than 5,000 sq ft of newly irrigated landscape are required to install dedicated irrigation meters. The landscape and irrigation code updates for existing accounts is estimated to save about 10 afy by 2045.

BBLDWP completed the installation of AMI meters in 2020. BBLDWP plans to develop an AMI Customer Portal to show customer-specific water use patterns and assist in identifying leaks in their system. This AMI-based customer water loss notification and enforcement program has an estimated savings of 83 afy by 2045. The AMI system will also identify potential irrigation restriction violations and high use patterns. This AMI-based irrigation notification and enforcement program has an estimated savings of 10 afy by 2045.

The BBLDWP will require sub metering of individual units in new multi-unit residential development or mixed-use commercial/residential development per CWC Chapter 8 Article 5. Multiunit Structures [537 - 537.5].

9.2 Metering

Agencies are required to install water meters on all municipal and industrial service connections located within its service area by year 2025. BBLDWP does not have any industrial meters within its service area. Beginning in 1989, BBLDWP required water meters for all new and existing services. The last non-metered account was changed to a metered account in 2003. BBLDWP is fully metered, and customers within BBLDWP's service area are billed for usage. BBLDWP considered implementing a program that provided incentives to exchange mixed-use accounts to install dedicated landscape meters, but determined such a program would not be cost effective. BBLDWP determined that it is more cost effective and water efficient to pursue a total reduction in heavily irrigated landscapes, which was accomplished through a landscape ordinance (see Appendix L) and a Turf BuyBack Program, which is further discussed in Section 9.7.3.

9.2.1 Implementation of Metering Program

To better track water system demands in real time and measure the effects of conservation measures, BBLDWP's Board of Commissioners approved and implemented an AMI project to replace all of the meters in the system with new meters and radio read technology. BBLDWP conducted extensive research and testing on 11 different types of meters from 5 different manufacturers and 5 different radio read systems. Upon completion of the research and testing,

BBLDWP selected the Sensus accuSTREAM™ and Omni meters and Sensus 520M MXU radio system. BBLDWP began installing Sensus accuSTREAM™ composite meters with Sensus 520M MXU radios in October 2014 and completed the project in June 2020.

9.2.2 Implementation of Future Metering Programs

Currently, some multi-unit developments are served using a master meter. BBLDWP plans to require all new multi-unit developments to sub meter individual units per CWC Chapter 8 Article 5. The new development submetering has an estimated savings of 5 afy by 2045.

Another proposed program includes the Multi-Unit Submetering incentive for existing properties. This would provide a rebate to the multi-unit property owners that install submeters on each individual unit. This program has an estimated savings of 7 afy by 2045.

9.3 Conservation Pricing

The UWMPA requires each agency to describe the pricing structure, including a conservation pricing structure. Conservation pricing can come in different forms, including a tiered rate structure or parcel-based water budgets.

BBLDWP applies a tiered rate schedule to consumption on all residential connections ranging from $2.92 to $13.54 per hundred cubic feet (ccf) billed bi-monthly as listed in Table 9-1. Through BBLDWP's tiered pricing structure, customers are encouraged to minimize water use to avoid high water bills. New customers, and those changing service, are notified of the landscape water use regulations. BBLDWP also has a high-water use outreach program in which residential customers utilizing over 25 ccf per month are sent a letter including conservation brochures and offering free indoor or outdoor audits to help them find ways to conserve. Unlike the tiered rate schedule for residential connections, commercial customers pay a flat rate of $3.52 per ccf and are billed on a monthly basis as listed in Table 9-1. The rates presented in Table 9-1 are in accordance with Ordinance No. 2018-462, which adjusts the usage fee on July 1st of each year.

In addition to volume charges, a bi-monthly service charge is assessed based on account classification and meter size. As of July 1, 2021, this varies from $40.35 to $413.65 (5/8-inch to 6-inch meter) for residential services and a monthly charge of $47.80 to $421.10 (5/8-inch to 6-inch meter) for commercial services. This amount is subject to change per the most recent rate study.

9.4 Public Education and Outreach

BBLDWP educates the public and businesses on water supply issues and conservation through a variety of means, including local newspapers and radio advertisements, websites, restaurant table cards, bill inserts, business placards, and various platforms of social media.

9.4.1 Ongoing Education and Outreach Programs

BBLDWP posts seasonally appropriate signage at high traffic points within its service area, offers lists of drought-tolerant and native plants, and conducts presentations for community groups, such as Kiwanis, Rotary, and the Sierra Club. BBLDWP has also partnered with agencies such as Meals on Wheels and the electric company to distribute collateral materials on finding and fixing leaks in resident's homes.

Table 9-1: Rate Structure		
Level	**Water Usage (ccf)**	**Volumetric Rate (per ccf)**
Residential Tier One	9-24	$2.92
Residential Tier Two	25-40	$4.38
Residential Tier Three	41-60	$5.75
Residential Tier Four	61-100	$7.61
Residential Tier Five	101+	$13.54
Commercial (Monthly)	5+	$3.45

NOTES:
(1) Rate structure obtained from BBLDWP website and is effective as of July 1, 2021. Residential is bi-monthly. The service charge for residential accounts may also be interpreted as "Tier One" and includes up to 8 ccf of water use bi-monthly. Commercial accounts minimum service charge includes up to 4 ccf per month.

BBLDWP manages two Xeriscape Demonstration Gardens. One, constructed in July 2012, is approximately 1,300 sq ft, is open to the public along a busy street, and serves to educate the residents and visitors on water-efficient landscape design, particularly in the mountain community. The more recently constructed Sunrise Demonstration Garden was built in conjunction with the Division Well Solar Field project. At approximately 26,000 sq ft, this garden is actually a series of garden beds connected by recycled material paths and a mountain meadows area irrigated by the product of water treatment at Division Well No. 2.

BBLDWP also features drought-tolerant gardens at the front entrance of the BBLDWP building where customers come to pay their bills, open accounts, and get information.

BBLDWP sponsors and participates in the Xeriscape Garden Tour, which features seven to eight homes and businesses, and attracts 300 to 650 attendees. BBLDWP also conducts or participates in other public events, such as the Earth Day event co-hosted with the neighboring Bear Valley Electric Service. BBLDWP also hosts school education programs, including a water cycle education program, a water efficiency program, and production tours for middle- and high-school children.

BBLDWP also implemented an Outdoor Efficiency Education initiative, which includes workshops, training and demonstration to homeowners, business owners, landscapers, and contractors. BBLDWP also offers outdoor surveys in which BBLDWP staff assists customers on irrigation scheduling, setting irrigation controllers, physically verifying leaks, and other methods of increasing their outdoor water efficiencies. The outdoor surveys program has an estimated savings of less than 1 afy by 2045.

9.4.2 Planned Education and Outreach Programs

Future plans for the Outdoor Efficiency Education initiative may include sponsorship of bilingual (English and Spanish) training in irrigation efficiency. In 2021 the BBLDWP launched a Native Plant Rebate program in partnership with local nurseries. The program incentivizes the purchase of Big Bear native plants at upwards of $15 per plant. The Outdoor Efficiency Education initiative, including both existing and future potential, has an estimated savings of 4 afy by 2045.

9.5 Programs to Assess and Manage Distribution System Water Loss

A water audit is a process of accounting for water use throughout a water system in order to quantify unmetered water usage. Non-revenue-water is the difference between metered water production (or supplies) and metered use (consumption) on a system-wide basis.

BBLDWP performed a full water system audit in 2001, when 167 miles of the distribution system were surveyed. BBLDWP has been active in locating and repairing leaks and responding immediately to repair leaks. Field personnel are trained to recognize potential service and main line leaks. Pipelines with chronic leak problems are prioritized for replacement.

When BBLDWP purchased the system from Southern California Water Company in 1989, the percent of unaccounted-for-water was 29.6 percent. At that time, BBLDWP applied for and obtained a low-interest loan from the State of California and began a significant leak detection and repair program. Between 1990 and 2000, BBLDWP replaced over 108,000 feet (20.5 miles) of pipelines in the system, reducing the unaccounted-for-water from 29.6 to 11.05 percent. Recent records show a 10.6 percent unaccounted-for-water loss, which is typical for Southern California water agencies. BBLDWP's water loss audits are provided in Appendix D for reference.

Since 1989, the main focus of BBLDWP's Capital Improvement Plan (CIP) has been on supply facilities and pipeline replacement. BBLDWP has replaced several well pumping units and constructed new wells to improve the quantity and quality of pumping facilities. BBLDWP replaced 5.5 miles of pipelines during the summer of 2012 and a half mile of pipeline in the Erwin Lake area in 2013-2014. BBLDWP also constructed 1.7 miles of new pipelines associated with the Arrastre Creek Well and Angels Camp Reservoir Projects. Most recently, BBLDWP pursued and secured $15 million in funding from the United States Department of Agriculture (USDA) for pipeline replacements on the west side of the service area. This has become a primary focus of BBLDWP's system rehabilitation efforts in recent years and will include the replacement of up to 12 miles of old and undersized pipelines.

Additional projects have been identified in BBLDWP's recent Master Plan (ALDA, Inc., 2021) and are summarized below:

- 18,440 feet of transmission pipelines and over 55,000 feet of distribution pipelines.
- Replacement of Division Well No. 2.
- A new 0.5-million-gallon welded steel reservoir to replace the Wolf reservoir.
- A new pump station at the Wolf reservoir site to replace the existing facility.

9.5.1 Implementation of Water Loss Programs and Projects

BBLDWP conducts regular mass balance audits of metered water production versus metered water sales to detect unusual changes in the water operation. The implementation of the AMI system in 2020 has further assisted in identifying leaks and water loss. Ten years ago, BBLDWP averaged 40 to 50 main leaks per year. Currently, BBLDWP averages about 5 to 10 main line leaks per year.

As part of the recent 2021 Master Plan, BBLDWP's hydraulic model was updated and used to identify existing system deficiencies. The Master Plan also evaluated additional replacement needs based on age. A list of pipeline replacement projects was developed and prioritized in a short-term (7-year) and long-term (27-year) CIP. The current geographic information system (GIS) database contains a complete inventory of all pipelines in the service area, which include

data regarding the pipelines age, material, and diameter. This information, along with the hydraulic model, was used as a basis for developing the pipeline replacement program.

BBLDWP also applied and received partial funding from the WaterSmart grant program for the Big Bear Boulevard Pipeline Replacement project. The project, within Big Bear Boulevard right-of-way included the replacement of an existing 12-inch diameter riveted, unlined steel pipeline that was constructed in 1947. The 12-inch diameter Big Bear Boulevard Transmission main is a key transmission facility within BBLDWP's system and is nearly 21,000 linear feet. Due to frequent leaks, BBLDWP began replacing the steel Big Bear Boulevard Pipeline in 1990. Replacement of the remaining 4,000 linear feet was completed in March 2017.

9.5.2 Planned Implementation of Water Loss Programs and Projects

The planned AMI Customer Portal discussed in Section 9.1 will assist in identifying potential leaks within the system and will provide the ability to notify customers accordingly. Other potential programs to assist in improving water loss include a thorough meter testing and repair/replacement program. This program has an estimated to savings of 78 afy by 2045.

In addition, BBLDWP staff will continue to apply for grant funding to assist in the replacement of aging pipelines identified in the 2021 Master Plan.

9.6 Water Conservation Program Coordination and Staffing Support

BBLDWP employs two full-time staff, a Water Conservation and Communications Supervisor and one Water Conservation Specialist to manage the responsibilities of the water conservation program.

9.7 Other Demand Management Measures

9.7.1 Indoor Conservation Consults/Audits

BBLDWP offers all residential and commercial customers free indoor water conservation consultations. In the process, staff checks showerheads, faucets, and toilets for leaks and flow rates. If an item fails to meet current state and/or federal standards they are offered a rebate or free low-flow fixture. From January 2016 through December 2020, BBLDWP conducted at least 787 indoor water audits/consultations. This number would have certainly been higher if it were not for pandemic protocols, during which the BBLDWP suspended all indoor audits for social distancing purposes.

Every new customer receives a new customer information packet informing them of all the rules and regulations, as well as survey programs and rebates. Existing customers are informed of the program through bill inserts, radio commercials, newspaper advertisements, community events, social media pages, and the BBLDWP website (http://www.bbldwp.com). As part of Policy #2014-02, BBLDWP enforces a Retrofit on Change of Service requirement, which requires fixtures that do not meet federal standards be replaced per current California standards. Property owners must inspect fixtures for compliance or request a complimentary site audit. This program has an estimated savings of 95 afy by 2045.

BBLDWP also provides high-efficiency fixtures for customers at the counter and during surveys including shower timers, dish scrapers, leak detection tablets, low flow faucet aerators, and 1 to 1.25-gpm showerheads. The indoor fixtures have an estimated savings of 13 afy by 2045.

9.7.2 Incentive and Rebate Programs

BBLDWP provides a limited number of water-efficient items, shower timers and rain gauges, to current account holders for free at the BBLDWP office or upon request, as well as other water-efficient items found useful upon completion of an indoor or outdoor audit, such as high-efficiency showerheads and low flow faucet aerators. In addition, BBLDWP offers rebate programs, such as high-efficiency toilet rebates, WaterSense certified weather-based irrigation controllers and sprinkler heads, free or rebated rain barrels, and a Turf BuyBack Program. Current free items and rebate incentives are summarized in Table 9-1.

Based solely on items given during audits or delivered during the pandemic, from calendar year 2016 through calendar year 2020, BBLDWP granted rebates for 804 low-flow toilets and gave away more than 722 showerheads, 1,344-bathroom aerators, and 327 kitchen aerators. While BBLDWP records devices given away on each survey form and at the counter, it is more difficult to account for all devices given away at community events. Therefore, true savings may be higher based on inventory and items given away that have not been recorded.

The high-efficiency toilet rebate program provides a rebate of $50 to $100 per toilet. Prior to installation, BBLDWP conservation staff performs an indoor audit to confirm the existing toilet is not an ultra-low flush toilet (ULFT). Once the toilet has been installed, the customer delivers a receipt or invoice to BBLDWP, along with proof that the new ULFT has been installed, and the rebate is issued as a credit on the customer's water bill. During the pandemic this program was altered to allow photo evidence of the high flow toilet prior to removal and a rebate.

BBLDWP calculated the water savings from toilet replacement to be 31 gallons per day per toilet. The cost per AF of water savings is approximately 13 afy by 2045. Assuming a 20-year life for a toilet, the cost per AF over the lifetime of the toilet comes out to $106 per AF for rebates.

BBLDWP instituted a Retrofit on Change of Service program, Resolution No. DWP 2014-05 (see Appendix L) more than a decade ago, prior to a state regulation with similar effects. This resolution requires that all faucets and showerheads meet California state standards, and toilets meet Federal standards. Property owners must inspect fixtures to confirm compliance and provide a signed certificate to BBLDWP. BBLDWP provides rebate of up to $100 per toilet dependent on the flow rate of the existing toilet.

Water savings based on installing low-flow showerheads, faucet aerators, and toilet displacement devices was estimated by the CalWEP to be 5.5 gallons per day (gpd), 1.5 gpd, and 4 gpd respectively. All three devices are generally distributed concurrently, so for the purposes of this DMM the total estimated water savings is based on the cumulative savings of 11 gpd.

As part of the Outdoor Efficiency Incentives program, BBLDWP now provides incentives for a standard list of outdoor water-efficient equipment, such as sprinkler nozzles and weather-based irrigation controllers. This measure also provides rain barrels as part of this program. After 2022, BBLDWP plans to launch the alternative irrigation incentives. This program will provide incentives for the installation of an alternative irrigation source system, such as gray water systems.

BBLDWP also plans on implementing a Commercial Incentives program to provide rebates for commercial owners to utilize and purchase water-efficient equipment. This program has an estimated savings of 2 afy by 2045. In addition to commercial incentives, BBLDWP plans to implement an Institutional Retrofits program to provide funding to replace or upgrade fixtures

and irrigation systems at schools, parks, and government buildings. This program will include an indoor and/or outdoor audit and has an estimated savings of 2 afy by 2045.

9.7.3 Landscape Surveys and Turf Buybacks

Landscape surveys are performed by the Water Conservation Specialist upon request. During these surveys, the Specialist examines the sprinkler system, landscaping, and makes recommendations for improving WUE. BBLDWP provides a number of incentives to encourage landscape WUE. In 2005, a Turf BuyBack Program was implemented in which BBLDWP reimburses customers who voluntarily removed turf from their property. Under this program, the reimbursement rate is now $1.00 per square foot with no minimum or maximum limitations, however, this program will sunset in coming years.

From July 2015 to June 2020, BBLDWP issued $56,953 in turf buybacks to customers who removed a total 109,344 sq ft of grass. It is difficult to determine the water savings from turf removal due to multiple factors, including customers that may stop watering their lawn before having it removed, replacing the lawn with other water-thirsty plants, and the possibility of using slightly more water than usual to establish new plants once the lawn is removed. In addition, there are changes to the account holders, seasonal and annual changes in the weather, and the general trend toward conservation. Based on the 2019 WCMP, the estimated savings for the turf buybacks is 2 afy by 2045.

9.7.4 School Education

BBLDWP provides water conservation kits that are installed at home and a corresponding lesson plan provided in the classroom. As part of this program, BBLDWP staff conducts classroom activities such as lessons on drought, the water cycle, conservation, and the energy nexus. This program has an estimated savings of 5 afy by 2045.

9.8 Planned Implementation to Achieve Water Use Targets

BBLDWP plans on continuing to implement its existing programs with the exception of the Turf Buyback Program, which is projected to end in 2022. The Alternative Irrigation Incentive is anticipated to begin in 2023. In addition to the existing programs, BBLDWP plans to implement the following programs mentioned in the previous sections:

- Landscape and Irrigation Codes – Existing Accounts.
- New Development Submetering.
- Outdoor Efficiency Incentives.
- Alternative Irrigation Incentives.
- Commercial Incentives.
- Institutional Retrofits.
- Multi-Unit Submetering Incentive.

The WCMP includes a timeline of the implementation of these programs, which is included in Appendix M. The implementation will assist BBLDWP in continuing to meet the objectives outlined in SB 606 and AB 1668. This includes the indoor water use objective of 55 gpcd by the year 2025, which BBLDWP is assumed to meet based on the 2020 water use of 70 gpcd for both indoor and outdoor demand.

Chapter 10

PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

The BBLDWP prepared this 2020 UWMP between the fall of 2020 and spring of 2021. A completed UWMP checklist is included in Appendix B.

10.1 Inclusion of All 2020 Data

The 2020 UWMPs must include the water use and planning data for the entire calendar year of 2020. The BBLDWP is reporting on a calendar year basis, and, therefore, the 2020 data includes the months of January to December 2020.

10.2 Notice of Public Hearing

A public hearing was held on May 25, 2021, at the BBLDWP Board Room, 41972 Garstin Drive, Big Bear Lake, California. Notices were provided to adjacent cities and San Bernardino county, and to the public. The public hearing provided an opportunity for the public to provide input to the plan before it is adopted. Additionally, the public hearing provided an opportunity for the BBLDWP customers, residents, and employees to learn and ask questions about the current and future water supply of the BBLDWP.

10.2.1 Notice to Cities and Counties

> *10621(b) Every urban water supplier required to prepare a plan shall… at least 60 days prior to the public hearing on the plan… notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.*
>
> *10642… The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area…*

The cities and counties to which the BBLDWP provides water supplies, as shown in Table 10-1, were provided 60-day notification (prior to the public hearing) that the BBLDWP was in the process of preparing the 2020 UWMP. The 60-day notification letters are included in Appendix B. The cities and counties were provided a notice of public hearing, including the time and location. The notice of public hearing to cities and counties is included in Appendix B.

Table 10-1: Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
City of Big Bear Lake	Yes	Yes
County Name	**60 Day Notice**	**Notice of Public Hearing**
San Bernardino County	Yes	Yes

10.2.2 Notice to the Public

> *10642… Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection… Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code…*

The UWMPA requires that the UWMP show the water agency solicited public participation. The notice to the public was included in a local newspaper as prescribed in Government Code 6066. This notice included the time and location of the public hearing, in addition to the location of where the UWMP was available for public inspection. The notice of public hearing to the public is included in Appendix B.

On April 14 and April 21, 2021, the BBLDWP placed a notice in the Big Bear Grizzly (local newspaper) stating that its UWMP was being updated, and that a public hearing was to be conducted to address comments and concerns from members of the community. The notice stated that a public review period would be scheduled through May 25, 2021.

The Draft 2020 UWMP was available for public inspection at the BBLDWP office, as well as the BBLDWP website (http://www.bbldwp.com).

10.3 Public Hearing and Adoption

> *10642…Prior to adopting a plan, the urban water supplier shall hold a public hearing thereon.*
>
> *10608.26(a). In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:*
>
> *(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.*
>
> *(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.*
>
> *(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20 for determining its urban water use target.*
>
> *10642… After the hearing, the plan shall be adopted as prepared or as modified after the hearing.*

The plan was presented and adopted at the public hearing on May 25, 2021. The BBLDWP Resolution is included in Appendix B. The hearing provided an opportunity for the BBLDWP customers, residents, and employees to learn and ask questions about the current and future water supply of the BBLDWP. At the hearing, the UWMP, water use targets, and conservation implementation plan were discussed.

10.3.1 Adoption

After the public hearing, the 2020 UWMP was adopted as prepared or as modified after the hearing.

10.4 Plan Submittal

The public hearing will be followed by submittal of the UWMP to the DWR, the California State Library, and cities and counties (see Commitment to Distribute in Appendix B).

10.4.1 Submission to DWR

The 2020 UWMP will be submitted to DWR within 30 days of adoption.

10.4.2 Electronic Data Submission

The 2020 UWMP, in addition to tabular data, will be submitted using the WUE data submittal tool.

10.4.3 Submission to the California State Library

The 2020 UWMP will be submitted in compact disc (CD) or hardcopy format to the California State Library within 30 days of adoption.

10.4.4 Submission to Cities and Counties

The 2020 UWMP, which includes the WSCP, will be submitted in electronic format to cities and counties within 30 days of adoption.

10.5 Public Availability

Within 30 days of submitting the UWMP to DWR, the adopted UWMP will be available for public review during normal business hours at the locations specified herein.

10.6 Amending and Adopted UWMP

The plan may be updated at any time when the urban water supplier believes significant changes have occurred in population, land use, and/or water sources that may affect the contents of the plan. Copies of amendments or changes to the plan shall be submitted electronically to DWR, the California State Library, and any cities or counties which the BBLDWP provides water supplies within 30 days of adoption.