Prepared by

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JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Jordan Valley Water Conservancy District Drought Contingency Plan

December 2021

Resiliency // Collaboration // Conservation

FINAL

Jordan Valley Water Conservancy District
Drought Contingency Plan

Prepared for
Jordan Valley Water Conservancy District
West Jordan, Utah
December 2021

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List of Abbreviations

°C	degrees Celsius
AF	acre-feet
AFY	acre-feet per year
Agr&Reg	Agreements & Regulatory
AMI	Advanced Metering Infrastructure
ASR	Aquifer Storage and Recovery
BCWTP	Big Cottonwood Water Treatment Plant
CBRFC	Colorado Basin River Forecast Center
cfs	cubic feet per second
Cons&DM	Conservation & Demand Management
Conv	Conveyance
CUP	Central Utah Project
CUPCA	Central Utah Project Completion Act
CUWCD	Central Utah Water Conservancy District
CWP	Central Water Project
DCP	drought contingency plan
DIST	District
DMIC	U.S. Drought Monitor Intensity Classification
Ed&Outrch	Education & Outreach
gpcd	gallons per capita daily
GSLAC	Great Salt Lake Advisory Council
GWMgnt	Groundwater Management
IPCC	Intergovernmental Panel on Climate Change
JRC	Jordan River Commission
JVWCD	Jordan Valley Water Conservancy District
M	million
M&I	municipal and industrial
MDD	maximum daily demand
mgd	million gallons per day
MWDSLS	Metropolitan Water District of Salt Lake and Sandy
n/a	not available
NewSup	New Water Supplies
NRW	non-revenue water
NSA	U.S. National Security Agency
RO	reverse osmosis
RTL	retail-customer focused
SERWTP	Southeast Regional Water Treatment Plant
Stor	Supply Storage
SWJVGW	Southwest Jordan Valley Groundwater
TAZ	Traffic Analysis Zone
Tre	Treatment Process
UDWRe	Utah Division of Water Resources
ULC	Utah Lake Commission
ULS	Utah Lake System
ULWUA	Utah Lake Water Users Association
USBR	United States Bureau of Reclamation
WBWCD	Weber Basin Water Conservancy District
WES	Water Efficiency Standards
WFRC	Wasatch Front Regional Council
WSPro&Mgnt	Watershed Protection & Management
WTP	Water Treatment Plant

Executive Summary

Jordan Valley Water Conservancy District (JVWCD) has developed a Drought Contingency Plan (DCP) to build long-term resilience to drought and reduce drought impacts on water supplies, deliveries, and water quality. In creating this DCP, JVWCD worked with Member Agencies and stakeholders to establish an understanding of these impacts and how to prepare for potential shortages.

Need for a DCP

The need for this plan is evident in the current drought conditions and the anticipated future increase in frequency and intensity of drought events caused by more extreme and changing hydrologic conditions. Population growth within the plan area is anticipated to increase and is expected to result in potential increase in water demand, even when taking into account projected water conservation efforts.

Depending on the severity of drought conditions, water shortages may adversely impact the state's economic growth, recreation, agriculture, and ecosystems. Given that JVWCD supplies drinking water to nearly a quarter of Utah's population as of 2020, and that there are no existing drought response agreements or planning documents for the JVWCD service area, the potential benefit of implementing the DCP is substantial.

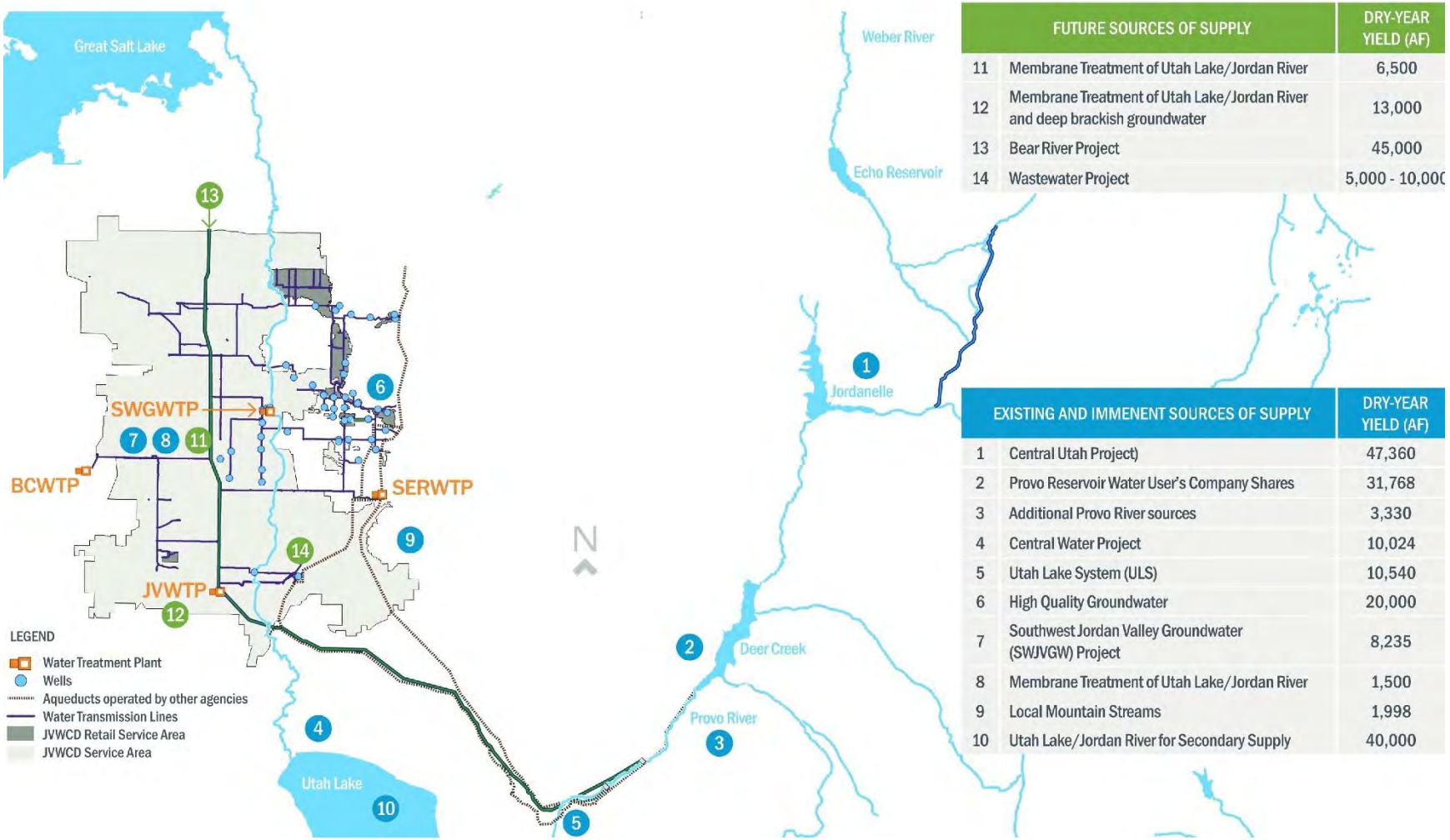
JVWCD DCP Development Process

JVWCD provides wholesale water to its Member Agencies and also provides direct retail service in various limited areas in the Salt Lake Valley. Approximately 90 percent of JVWCD's deliveries are for wholesale water to cities, improvement districts, and agencies, while the remaining 10 percent of deliveries are for retail served in cities and unincorporated areas. Additional services include treatment and delivery of Metropolitan Water District of Salt Lake and Sandy (MWDSLS) water supplies and providing untreated water to irrigators in Salt Lake and Utah counties. To create this DCP, JVWCD brought together stakeholders from across its range of services to prepare for drought and reduce water shortages and negative impacts. The DCP builds drought resilience for all stakeholders within the JVWCD service area and the communities it serves.

Throughout the DCP process, JVWCD provided opportunities for input and discussion from stakeholders through a Task Force made up of individuals representing municipal and industrial (M&I), agricultural, recreational, and environmental interests, and a Stakeholder Outreach Group that includes representatives from across the JVWCD service area. Workshops to present and discuss key milestones in DCP development and content were held with both groups, and DCP sections were provided for review and comment. Content included a summary of the JVWCD water system, the vulnerability assessment approach and results, the drought monitoring process, and the drought mitigation measures and response actions.

JVWCD Water System Supply and Demand Summary

The JVWCD water system supply includes the key resources identified in the supply source map in Figure ES-1. The supply sources include the Jordanelle, Echo, and Dear Creek reservoirs; the Provo River and the Weber River; and groundwater and mountain streams.



	FUTURE SOURCES OF SUPPLY	DRY-YEAR YIELD (AF)
11	Membrane Treatment of Utah Lake/Jordan River	6,500
12	Membrane Treatment of Utah Lake/Jordan River and deep brackish groundwater	13,000
13	Bear River Project	45,000
14	Wastewater Project	5,000 - 10,000

	EXISTING AND IMMENENT SOURCES OF SUPPLY	DRY-YEAR YIELD (AF)
1	Central Utah Project)	47,360
2	Provo Reservoir Water User's Company Shares	31,768
3	Additional Provo River sources	3,330
4	Central Water Project	10,024
5	Utah Lake System (ULS)	10,540
6	High Quality Groundwater	20,000
7	Southwest Jordan Valley Groundwater (SWJVGW) Project	8,235
8	Membrane Treatment of Utah Lake/Jordan River	1,500
9	Local Mountain Streams	1,998
10	Utah Lake/Jordan River for Secondary Supply	40,000

Figure ES-1. Map of M&I and irrigation water sources for the JVWCD service area

Overall, approximately 60 percent of JVWCD's supply is surface water, while the remaining 40 percent comes from groundwater.

JVWCD conducted a *Demand, Supply, and Major Conveyance Study* to consider projected supply and demand. The study evaluated four demand scenarios (i.e., scenarios based on 1) a low range, 2) a basis of plan, 3) a basis of plan with low conservation, and 4) a high range of projected water demands) with three projection model inputs — population, water usage rate in gallons per capita per day (gpcd), and climate change impacts. Figure ES-2 shows the demand projections across the four demand scenarios.

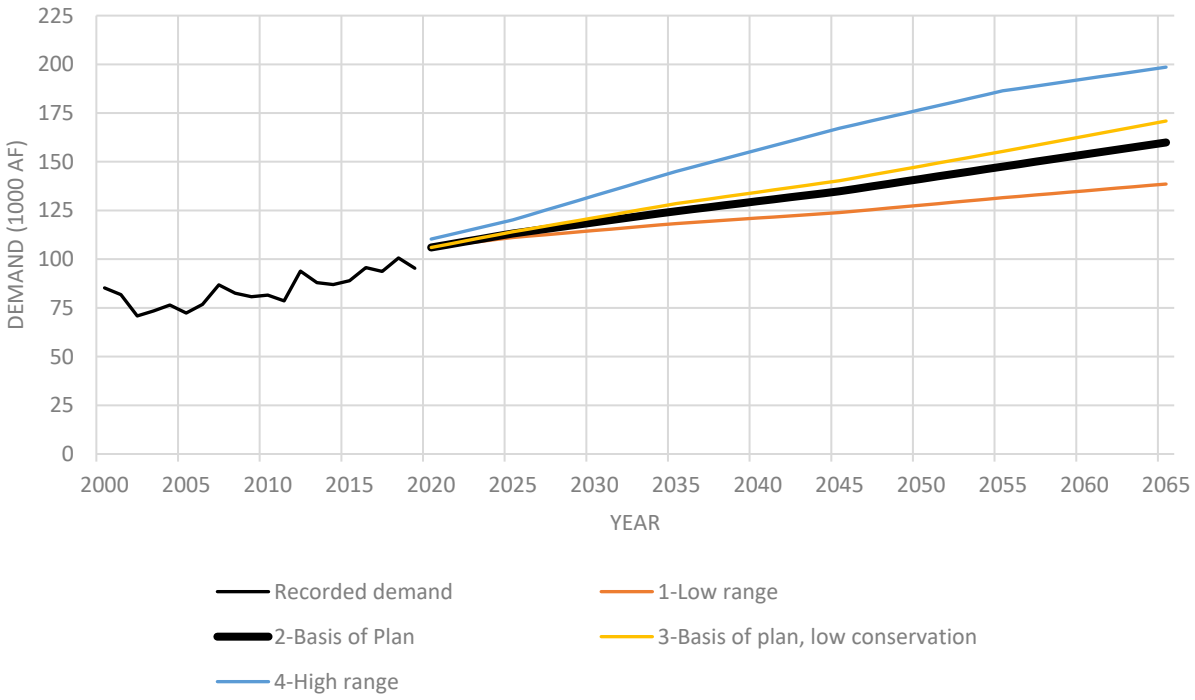


Figure ES-2. Current and future water demands

Vulnerability Assessment

The vulnerability assessment considered supply-side vulnerabilities to JVWCD's portfolio and estimated when water shortfalls could be experienced during potential drought years.

For this assessment, risk factors were developed to assess drought vulnerability for each supply source. Risk for this assessment was determined by likelihood and consequence values. Likelihood was represented by a qualitative score based on the risk factors and their potential to reduce the availability of a given supply source. Consequence was a quantitative score based on what percentage the specific supply makes up of JVWCD's overall portfolio. Results of the assessment indicated the supplies on which drought mitigation measures should focus and provided an understanding of supply source vulnerability (see Figure ES-3). The assessment guided development of drought mitigation measures to reduce the consequence and/or likelihood of supply reduction.

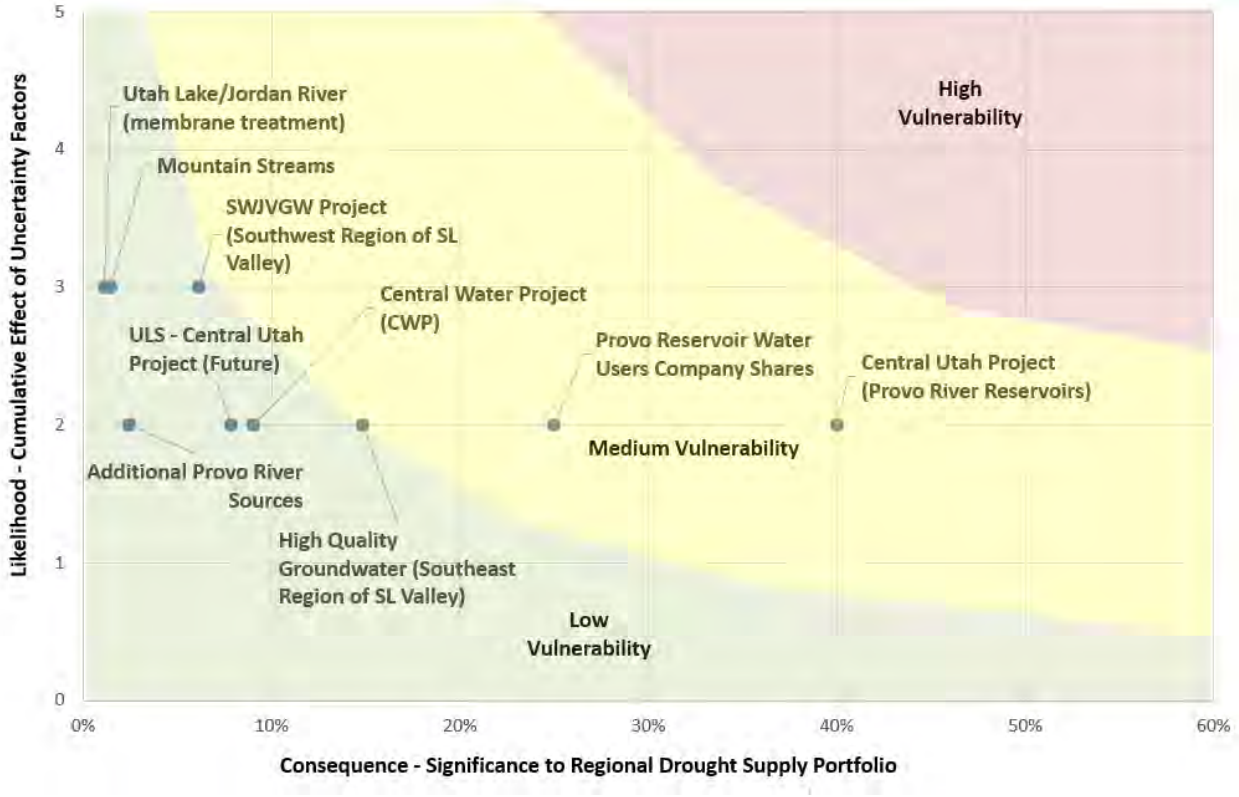


Figure ES-3. Vulnerability of critical supply sources indicated by combined values for likelihood and consequence

Results of the vulnerability assessment indicated that there are no supply sources that fall within the "High Vulnerability" category. Therefore, the sources that represent the highest vulnerability in JVWCD's water supply portfolio fall within the "Medium Vulnerability" category and include the following:

- Central Utah Project (CUP), (40 percent of the supply portfolio)
- Provo Reservoir Water Users Company (PRWUC) Shares (20-25 percent of the supply portfolio)
- High Quality Groundwater (15 percent of the supply portfolio)

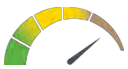
Risk factors contributing to higher likelihoods of reduced supply revealed in the vulnerability assessment include climate change, asset/facility susceptibility to disruption, and source water quality degradation. Notable sector impacts from the vulnerability assessment include supply limitations due to in-stream flow requirements, early runoff patterns, and increased occurrence of algal blooms and algae by-products. An initial list of mitigation measures was developed based on the above inputs and these vulnerability assessment results.

A shortfall analysis indicated that new wells should be immediately developed and the JVWTP Phase 1 expansion should be completed by 2025 to meet maximum day demand in a dry year, and that the additional Utah Lake System (ULS) water to meet annual demands in a dry year will be needed by 2028. The analysis also indicated that, due to the uncertainty of climate change impacts, M&I water users in the JVWCD service area should be prepared to reduce water use by 30 percent or more from typical usage to address water shortfalls in exceptional, prolonged drought conditions.

Drought Monitoring

The process of developing and establishing drought monitoring within the DCP includes creating a list of drought levels, which are identified as "Water Supply Availability Levels" in this DCP. These levels are provided in Table ES-1 below.

Table ES-1. Water Supply Availability Level and Triggering Criteria

Water Supply Availability Level	Water Shortage Description	Water Demand Reduction Target
Level 0 	Normal	None
Level 1 	Moderate	5%
Level 2 	Severe	10%
Level 3 	Extreme	20%
Level 4 	Critical/Exceptional	30 - 50%

Snowpack, runoff, and groundwater data are monitored and measured to determine whether specific supply reduction triggers are reached. A water supply availability level will be determined annually between March 15 and May 15. Each year a Drought Monitoring Committee will be convened by JVWCD that consists of applicable JVWCD staff and one representative from each Member Agency. The committee will review presented supply forecast information and recommend a preliminary water supply availability level. The preliminary recommendation is reviewed and presented at the JVWCD annual Member Agency Meeting, and a final water supply availability level is officially recommended by the Drought Monitoring Committee to the JVWCD Board of Trustees. The Board will typically make the formal level declaration at its May Board meeting.

When a triggering criterion (e.g., specific percentage of reduced supply) is reached and a consequential water supply availability level is determined, response actions to reduce impact can be initiated.

Mitigation Measures

Mitigation measures provide preemptive actions that can be deployed before drought occurs to reduce drought risk and impacts.

Mitigation measures include projects and efforts focused on enhancing and relieving pressure to JVWCD's most vulnerable supply sources and mitigating the greatest risk factors as identified in the vulnerability assessment. Initially, a total of 49 mitigation measures with potential to address these vulnerabilities were compiled. Evaluation criteria were established to score and rank each measure to create a shortlist of 15 highest ranked mitigation measures that will be implemented by JVWCD and other stakeholders as shown in Table ES-2.

Table ES-2. Vulnerability Reduction and Benefits by Mitigation Measure

Mitigation Measure	Vulnerability Reduction and Benefits
Secondary Water Metering	Reduces demand on Utah Lake which subsequently influences high-consequence supplies (CUP, PRWUC Shares, High Quality Groundwater) during dry-years. Benefits agricultural sector users hit hardest during drought. Supports better use tracking for staying within and planning for dry-year supply limitations (e.g., changes to in-stream flow requirements).
Enhanced Advanced Metering Infrastructure (AMI) program analytics	Supports conservation and demand management at customer level and reduces water supply uncertainty. Also supports urban customer water use efficiency through leak repair and conservation. Leverages increased customer communication in future drought stages, facilitates response actions, and helps reduce demand during drought.
Customer Rebate Programs	Supports conservation and demand management at the customer level and addresses water supply uncertainty. Supports reducing use of dry-year supplies over time and promotes local and regional water use efficiency.
Landscape Leadership Grant Program	Supports conservation and demand management for large users and reduces supply uncertainty. Supports reducing use of dry-year supplies and promotes local and regional water use efficiency and conservation ethic (i.e., building a "culture of conservation") at customer level.
Member Agency Grant Program (multiple funding tiers)	Supports conservation and demand management at the customer or the systemwide level to address water supply uncertainty. Supports reducing use of dry-year supplies over time and promotes a local and regional water use efficiency and conservation ethic at the customer level.
JVWCD Aquifer Storage and Recovery (ASR) operational expansions	Has potential to reduce groundwater capacity limitations and supports managing uncertainty in water rights allocations. Supports maintaining sustainable yield as determined by State Engineer, helps reduce reliance on CUP and Provo River Water sources, and promotes more climate-resilient source options (i.e., as opposed to surface water sources).
New shallow groundwater wells	May increase dry-year supplies, reduces dependence on CUP and Provo River Water sources, and promotes more climate-resilient source options.
High-quality groundwater wells	May increase peak season production capacity from the well field to offset impairments to surface water sources. Also reduces reliance on CUP and Provo River Water sources and promotes more climate-resilient source options.
Begin taking delivery of ULS supply by 2030 or earlier	May increase dry-year supplies, addresses infrastructure resiliency (i.e., supports managing water supply uncertainty during dry years, and uncertainty regarding water rights and changes in environmental regulations).
Member Agency wastewater reuse projects for secondary irrigation water	Decreases demand for potable supply during dry years. Indirectly benefits agricultural sector by leaving more water in the canal system. Also provides the potential for an increase in supply sources during dry years, and an increase in secondary irrigation supply.
Drought contingency provisions for wholesale water purchase agreements and retail water service agreements	Addresses contract limitations and helps reduce dry-year supply use. Supports reducing adverse impacts to climate change through drought preparation. Facilitates response actions (see Subsection 5.6 of this DCP).
Evaluate effectiveness of using conservation-based water rates in the service area	Can reduce demand by providing an economic incentive for consumers to conserve water. This measure can be in the form of a study and addresses dry-year supply limitations, facilitates response actions, and supports demand reduction during drought.
Evaluate storage for secondary irrigation systems using Provo River spring runoff	Provides a more stable source in case of changes in precipitation or snow patterns (e.g., climate change impacts, including changes in runoff patterns). Addresses potential dry-year supply capacities and reduces reliance on CUP and Provo River Water sources.
Watershed-based management with stakeholders	Addresses potential water quality degradation due to runoff, contribution to algal blooms, and general source water quality degradation for Utah Lake (and other sources within the watershed). Also supports greater collaboration for implementing environmental/regulatory considerations and projects.
Enclose canals	Reduces seepage and evaporation losses during conveyance of Utah Lake and Jordan River water making more efficient use of that source yield. Also increases the reliability of the supply making future treatment of the water at JVWTP for potable uses more feasible.

A description, potential barriers to implementation, cost considerations, associated triggers, steps for implementation, and benefits for each of the above drought mitigation measures is provided for further elaboration in Section 5 of this DCP. A list of drought planning activities is also included within this section. These include activities that may take less than 1 year to implement, and/or do not need additional funding (either existing funding is in place, or no funding is necessary to implement). These include a range of activities in areas such as conservation and demand management (e.g., water efficiency standards [WES], web-based usage dashboards, and leak mitigation); education and outreach (e.g., media campaigns and resources, training, and reporting of drought plan results and assessments); and watershed protection (e.g., continued sponsorship and involvement in watershed protection councils and organizations).

Response Actions

As with drought mitigation measures, development of drought response actions included collecting data to be considered when establishing water supply availability levels, metrics for supply availability monitoring, and triggers for when these levels are reached. Drought response actions are reactive; they are enacted to decrease the severity of immediate drought impacts and are tied to the specific water supply availability levels established in this DCP. Response actions were developed based on input from both the Task Force and Stakeholder Outreach Group via workshops. An initial list of potential drought response actions was developed for each level. The water supply availability level determined by the Drought Monitoring Committee directs which response actions will be activated at which levels. The final list of response actions fell into one of two categories:

1. Actions implemented by JVWCD with its wholesale customers and the broader community within the service area (identified by an ID starting with “DIST” for District).
2. Actions implemented with JVWCD retail customers (identified by an ID starting with “RTL” for Retail).

Table ES-3 contains the final drought response action list.

Table ES-3. Drought Response Actions Final List			
Water Supply Availability Level	Response Action ID	Response Action	Estimated Water Savings (acre-feet per year [AFY])
Level 0[a]	DIST-A-0	Conservation Garden Park classes and events	-
	DIST-B-0	Public Web Dashboard	-
	DIST-C-0	Slow the Flow	-
	DIST-D-0	Meetings with the Great Salt Lake Advisory Council (GSLAC) and/or the Utah Lake Commission (ULC)	-
	DIST-E-0	Annual Drought Committee meetings	-
	RTL-A-0	Customer leak detection using AMI and billing software	230
Level 1	DIST-F-1	Wholesale customer water delivery reduction	9,030
	DIST-G-1	Using ASR banked water	50
	RTL-B-1	Public notification of diminished water supply and voluntary reduction in water use	175
Level 2	DIST-F-2	Wholesale customer water delivery reduction	14,530
	DIST-G-2	Use ASR banked water	70
	RTL-B-2	Public notification of diminished water supply and seek reduction in typical use (at least 10%)	45
	RTL-C-2	Water delivery reductions to large water users	10
	RTL-D-2	Residential and commercial lawn watering restrictions	530
	RTL-E-2	Dispense “Drought Drive-Thrus” Water Wise kits	25
Level 3	DIST-F-3	Wholesale customer water delivery reduction (level 3)	22,430
	DIST-G-3	Use ASR banked water	-
	RTL-B-3	Notify public of diminished water supply and seek reduction in typical use (at least 20% with increase of tier 4 rate)	355
	RTL-C-3	Water delivery reductions to large water users	225
	RTL-D-3	Residential or commercial lawn watering limited to certain number of days per week	1,285
	RTL-E-3	Dispense “Drought Drive-Thrus” Water Wise kits	25
	RTL-F-3	Incentivize timely repair for customer water leaks	90
Level 4	DIST-F-4	Wholesale customer water delivery reduction (level 4)	30,335
	DIST-G-4	Use ASR banked water	-
	RTL-B-4	Notify public of diminished water supply and seek significant reduction in use (at least 30% to 50% with increase of tiers 2, 3, and 4 rate depending on drought severity)	915
	RTL-C-4	Water delivery reductions to large water users	35
	RTL-D-3	Residential or commercial lawn watering limited to certain days	1,725
	RTL-E-4	Dispense “Drought Drive-Thrus” Water Wise kits	25
	RTL-F-4	Incentivize timely repair for customer water leaks	90
	RTL-G-4	Pool and water fixture restrictions	30

a. *Level 0 drought response actions will continue throughout all stages of drought.*

A summary of demand reduction and supply augmentation achieved at each level with implemented response actions was estimated and is presented in Table ES-4.

Table ES-4. Estimated Retail and Wholesale Customers Demand Reduction and Supply Augmentation by Level

	Water Supply Availability Level				
Retail Customers	**0**	**1**	**2**	**3**	**4**
2018 Retail Customer Demand[a] (AFY)	8,975				
Retail Customers Demand Reduction (AFY)	-	400	835	2,940	3,045
Retail Customers Supply Augmentation[b] (AFY)	-	50	70	-	-
Total Retail Customer Demand Reduction and Supply Augmentation (AFY)	-	450	905	2,940	3,045
Demand Reduction Percentage (Retail Customers)	0	5%	10%	33%	34%
	Water Supply Availability Level				
Wholesale Customers	**0**	**1**	**2**	**3**	**4**
2018 Wholesale Deliveries[a] (AFY)	98,765				
Wholesale Customers Demand Reduction (AFY)	-	9,030	14,530	22,430	30,335
Wholesale Customers Supply Augmentation[b] (AFY)	-	-	-	-	-
Demand Reduction Percentage (Wholesale Customers)[c]	0	10%	16%	24%	33%

a. *Source: Monthly usage data from 2018. This year was selected as it represents a more average year compared to the very wet year in 2019 and very dry hot year in 2020, as reported by JVWCD staff.*
b. *Supply augmentation provided by ASR. ASR projected to provide total of 500 to 700 acre-feet (AF). Mitigation measures will support determination of achievable amount.*
c. *Estimate based on 1) a water demand reduction target percentage for respective water supply availability levels and based on 2) a specified not to exceed percentage of wholesale contract amounts.*

Achieving the wholesale customer demand reductions will require Member Agencies to implement their own drought response actions. Member Agencies were provided guidance and resources to develop response actions specific to their service areas. Those response actions will be gathered in an ongoing process as they are developed by the Member Agencies and included as an appendix to this DCP. This will also be an important part of maintaining and updating the JVWCD DCP as a living document.

Implementing and Updating the DCP

Implementing this DCP will support continued cohesive and collaborative efforts to build drought resilience for JVWCD, its Member Agencies, and the communities they serve. Funding mechanisms have been investigated to support the short-term and long-term planned drought mitigation measures presented in this DCP, and the formation and carrying out of the annual Drought Monitoring Committee meetings and water supply availability level determination will facilitate the implementation of the drought response actions. The combination of both, supported by reducing supply side and sector vulnerabilities and information gleaned from consistent drought monitoring, will enable drought preparation and reduce negative impacts. Regular updates to this DCP every 5 years as required by the United States Bureau of Reclamation (USBR) will keep this plan relevant to developments in drought science and provide a sound informational base for future decision making.

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Section 1

Introduction

A Drought Contingency Plan (DCP) helps communities and regions become more resilient and pursue a proactive approach to drought management. Supported by the United States Bureau of Reclamation (USBR) Response Program, the creation of DCPs helps local communities and agencies recognize early stages of drought, understand potential drought impacts, and protect against potential negative repercussions by establishing a set of measures and actions. These activities are conducted with the input of stakeholders throughout the DCP development process to enable successful implementation and ensure measures and actions are tailored to the needs of the communities it serves.

Jordan Valley Water Conservancy District (JVWCD) has developed this DCP to bring about a cohesive understanding of drought and its impacts on supplies, deliveries, water quality, and shortages by taking into account past and future drought conditions for the Salt Lake Valley and the surrounding area. The DCP is an effort to foster long-term resilience to drought, particularly given the increased likelihood of more extreme drought events due to changing hydrologic conditions. The first section of the DCP provides a list of objectives and summaries of steps taken in the development of the plan, including activities conducted for stakeholder engagement and collaboration with existing plans and drought related efforts in the region. The plan considers long-term future conditions into the year 2065. However, the assessments and presented content focuses on measures and actions that can be implemented over the next 10 years to support actionable steps within a 2030 planning horizon.

1.1 Background

JVWCD is primarily a wholesaler of water to cities and improvement districts within Salt Lake County, Utah. JVWCD is a political subdivision of the State of Utah and one of the largest water districts in the State of Utah. It was created in 1951 under the Water Conservancy Act and was named the Salt Lake County Water Conservancy District. In 1999, the name of the organization was formally changed to the Jordan Valley Water Conservancy District (JVWCD).

JVWCD delivers approximately ninety percent of its municipal water on a wholesale basis to 17 cities, improvement districts, and agencies in the Salt Lake Valley and has a retail service area in various cities and unincorporated areas of the county, making up about 10 percent of its deliveries. In addition, JVWCD treats and delivers Metropolitan Water District of Salt Lake and Sandy (MWDSLS) water supplies on a contractual basis for delivery to Salt Lake City and Sandy City. JVWCD also delivers untreated water to irrigators in Salt Lake and Utah Counties to meet commitments under irrigation exchanges

Several of JVWCD's Member Agencies receive irrigation water from private irrigation companies which are members of the Utah Lake Water Users Association (ULWUA). These irrigation companies primarily hold water rights in Utah Lake and the Jordan River. Water is diverted from these sources to the Member Agencies through a series of canals and the Member Agencies distribute that water through pressurized secondary irrigation systems.

Historically, JVWCD has developed and secured reliable, sustainable water supplies to meet both current and future demands of the community. However, the growing population in the Plan Area and a forecast for more severe drought conditions will stress JVWCD's water supplies more than ever.

In 2016, after several years of drought conditions that started in 2012, Utah Lake dropped to levels causing the Utah State Engineer to prohibit diversions of more than 100,000 acre-feet (AF) of secondary storage rights (junior water right holders) in Utah Lake. The low water levels also intensified a wide-spread algal bloom in Utah Lake, prompting public health advisories. Declining water levels and algal blooms caused by drought conditions are a chronic issue. Even more concerning, the recently completed Weber River and Bear River tree-ring stream flow reconstructive studies and JVWCD's *Preparing for Climate Change—A Management Plan* forecast the likelihood of much more severe and longer-term droughts in the future.

JVWCD's service area includes more than 750,000 people or nearly a quarter of Utah's population as of 2020. The 2012 drought contributed to public-health issues that threaten state economic growth, restrictions to agricultural users and recreational activities, and damage to the vibrant ecosystems surrounding the shrinking Great Salt Lake and Utah Lake. In May 2017, JVWCD completed a study called *Preparing for Climate Change—A Management Plan* (revised March 2018), which indicates that the drought mitigation projects of the 20th century are likely inadequate to compensate for the impacts of climate change and to mitigate the area's longest droughts. Prior to this DCP no formalized drought response agreements or planning documents for the stakeholders in and around the JVWCD service area had been established. Stakeholders agree that planning to mitigate the risks associated with a severe drought can no longer be delayed. JVWCD has endeavored to create a DCP for all facilities and water users within its service area. JVWCD assembled these stakeholders from the municipal and industrial (M&I), agricultural, recreational, and environmental communities to establish the projects, actions, and partnerships needed to prepare for and reduce water shortages and provide better drought resilience for the area's diverse water users.

In 2018, JVWCD received grant funding from the USBR for the development of a DCP for water facilities and water users within its service area. The purpose of the DCP is to assist JVWCD in optimizing its use of supplies from USBR facilities and other sources and will enable JVWCD to minimize the potential damages that might otherwise occur as a result of a severe and/or extended drought. With the DCP, JVWCD will improve its long-term resilience to drought conditions consistent with Reclamation and Department of Interior initiatives. The DCP also covers how drought mitigation and response actions will be conveyed to and implemented by JVWCD and its 17 Member Agencies.

The JVWCD DCP includes planning for approximately two-thirds of the developed land area in Salt Lake County, Utah, and a small portion of neighboring northern Utah County. The geographic boundary for the DCP (Plan Area) includes the service area for JVWCD and its 17 Member Agencies as shown in Figure 1-1. The DCP considers the M&I, agricultural, recreational, and environmental interests in the Plan Area.

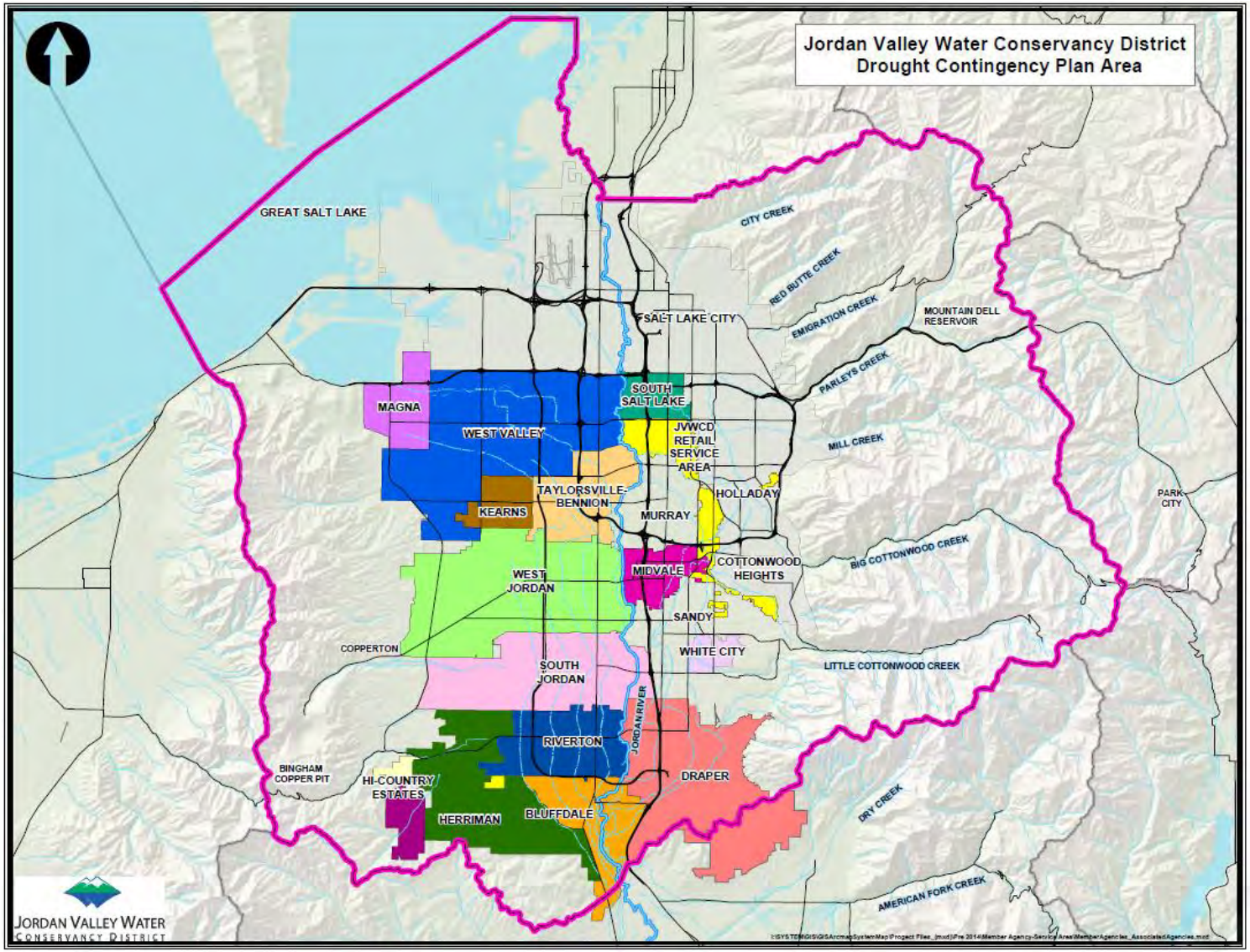

Figure 1-1. JVWCD DCP plan area

1.1.1 History of Drought in Utah

Utah is the second driest state in the nation and currently home to 3.2 million (M) people with approximately 80 percent of the population living in the Wasatch Front. Over the last 135 years there have been seven periods of extended drought along the Wasatch Front. Dry periods are evident in the time series shown below in Figure 1-2 as indicated by the tan shading.

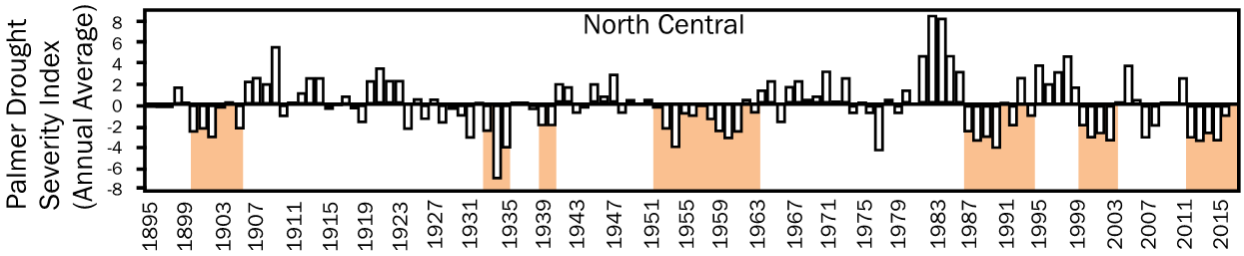

Figure 1-2. North Central Utah Palmer drought severity index

(Recreated and adapted from original figure provided at https://site.utah.gov/dps-emergency/wp-content/uploads/sites/18/2019/02/6-Drought.pdf)

The time series below in Figure 1-3 shows the Palmer Drought Severity Index from the year 1000 to 2018. Values from 1985-2018 (shown in red) are based upon recorded temperature and precipitation. Values prior to 1985 (shown in blue) are estimated from indirect measures such as tree rings. The moving thick black line is a 20-year average. The time series shows extended wet and dry periods in the state. In the modern area (shown in red), the wet periods of the early 1900s and 1980-90s can be seen along with the dry period of the 1950s.

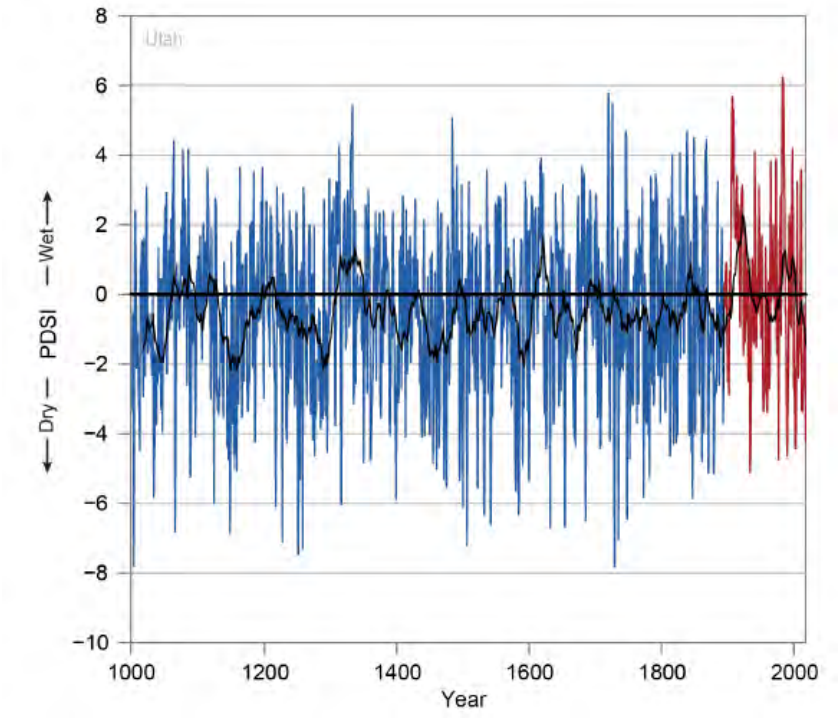

Figure 1-3. Utah Palmer Drought Severity index

(Source: https://statesummaries.ncics.org/downloads/UT-screen-hi.pdf)

1.1.2 Status of Previously Existing Planning Efforts

JVWCD has a history of working to address various threats to water supply, including drought. However, these efforts have lacked the definition and documentation of comprehensive drought mitigation and response plans. The JVWCD DCP builds upon previously existing planning efforts to support plan development and the screening of mitigation and response alternatives:

- **Preparing for Climate Change—A Management Plan:** In May 2017, JVWCD completed this study to prepare for and manage the risk it faces because of changing climate conditions. The plan was updated in March 2018. It informed the stakeholder group on changes to drought planning that need to be made to account for climate change.
- **Demand, Supply, and Major Conveyance Study:** This study identified the infrastructure improvements needed to provide reliable water supply through buildout. JVWCD completed an update of this report in 2021. It informed the DCP effort with updated demand projections and supply plans.
- **Conservation Plan Update:** In 2019 JVWCD performed an update to their Conservation Plan. The Conservation Plan established goals for water reduction by 2030 through conservation programs which are outlined in depth. It informed the demand projections for the Plan Area by providing the anticipated amount of water use which will be reduced per capita each year through 2030.
- **DCP for Weber Basin Water Conservancy District (WBWCD):** In 2018, WBWCD completed a DCP for their service area. WBWCD is very similar to JVWCD in that both are primarily water wholesalers which deliver water to multiple cities in an area. The DCP produced informed what is being done nearby and what measures will be taken in a neighboring county in regards to drought response, messaging, and mitigation.
- **DCP for Salt Lake City Department of Public Utilities:** In 2019 the Salt Lake City Department of Public Utilities completed a DCP for their service area. JVWCD's Plan Area neighbors Salt Lake City. The DCP produced informed what is being done nearby and what measures will be taken in the surrounding area in regards to drought response, messaging, and mitigation.
- **Utah Drought Response Plan:** In 2013 the Utah Department of Natural Resources and Division of Emergency Management updated their Drought Response Plan. The plan provides measures and procedures for dealing with drought conditions. It informed the DCP effort as to measures that the State of Utah will take in a drought scenario.
- **Localscapes:** The Localscapes approach is a series of landscaping patterns and practices that consider Utah's unique climate. JVWCD developed the Localscapes approach, and had partnered with local businesses and other water conservancy districts to promote it throughout the state. This drought mitigation strategy is incorporated into the DCP.
- **Slow the Flow, Save H_20:** This is an educational conservation campaign designed to raise awareness, empower people, and connect Utah residents to tools and resources. The campaign is funded by the governor's Water Conservation Team, of which JVWCD is one of six members. It is another primary drought mitigation strategy that will likely be influenced by the DCP.

1.2 DCP Development Process

Development of the DCP began once a Work Plan was reviewed and accepted by the USBR. The Work Plan was a document which outlined the major tasks associated with the development of the DCP, hours budgeted for JVWCD staff and their consultant, Brown and Caldwell, how the DCP would be reviewed by stakeholders and the community, and a timeline for its completion. The Work Plan submitted and approved by the USBR in November 2019 can be found in Appendix A. The Work Plan

called out the following tasks for the DCP development, six of which were elements required by the USBR:

1. Complete the initial DCP steps associated with identifying a Task Force, finalizing the Work Plan, and developing a communication and outreach plan.
2. Compile background for the Plan Area relative to water resources and supplies and drought planning and analysis.
3. Summarize water supplies and demands and make projections on future conditions and perform a vulnerability analysis.
4. Define the drought monitoring process and how water supply conditions are monitored at the local level. *(Required Element)*
5. Perform a vulnerability assessment to determine how drought affects the resources of JVWCD and other interest groups within the Plan Area. *(Required Element)*
6. Identify mitigation projects and actions which will build long-term resilience to drought, mitigate the risks posed by drought, decrease sector vulnerabilities, and reduce the need for drought response actions. These include preemptive strategies, programs, or activities put in place to reduce risk and impacts of drought. They are implemented during non-drought periods and may include construction of new facilities for additional storage or treatment of new and existing water sources. *(Required Element)*
7. Identify drought response actions that can be triggered during specific stages of drought to manage the limited supply and decrease the severity of drought impacts. These include reactive strategies, programs, or activities put in place to decrease the severity of immediate drought impacts and may be in the form of water curtailments and rate increases for various sectors. *(Required Element)*
8. Develop the operational and administrative framework for undertaking the actions necessary to implement each element of the DCP, including communicating with the public about those actions. *(Required Element)*
9. Document the DCP development and formalize an update process to ensure the DCP will be kept current and used as a dynamic plan in the future. *(Required Element)*
10. Finalize the DCP receiving review and feedback from the Task Force, Plan Area community, JVWCD Board of Trustees and its 17 Member Agencies, and the USBR.
11. Project management of the DCP and reporting to the USBR.

Completion of the DCP was anticipated to occur within 2 years of its kickoff as seen in Table 1-1, but was extended another 6 months due to delays associated with the COVID-19 pandemic.

Table 1-1. DCP Schedule

	Task	Month from Notice to Proceed											
		2	4	6	8	10	12	14	16	18	20	22	24
	Task 1. Initial DCP Steps												
	Task 2. Background and Plan Area												
	Task 3. Supplies and Demands												
Required Elements 1-6	Task 4. Drought Monitoring Process												
	Task 5. Vulnerability Assessment				▲	▲							
	Task 6. Drought Mitigation Actions						▲						
	Task 7. Drought Response Actions							▲					
	Task 8. Admin and Organization Framework								▲				
	Task 9. Plan Development and Update Process												
	Task 10. DCP Document									▲			
	Task 11. Project Management												
	Stakeholder Meetings												

Key: ▲ *= Task Force Workshops* ▲ *= Outreach Group Workshops*

1.3 Outreach and Communication Plan

A key element of the DCP was to receive and include input from the diverse interest groups and the community within the Plan Area. This was done by relying on stakeholders representing various interest groups to provide the review of the DCP as it was developed and meet as a group to discuss needs and issues. JVWCD provided opportunities for the public to comment on the DCP in a JVWCD Board of Trustees meeting. JVWCD also provided the DCP for review and comment to its 17 Member Agencies – this allowed them to know how JVWCD would respond in various drought scenarios, how water service could potentially be modified, and make suggestions as to how the DCP could be improved.

1.3.1 Task Force

JVWCD assembled a Task Force comprised of stakeholders representing diverse M&I, agricultural, recreational, and environmental interests to establish the projects, actions, and partnerships needed to prepare for and reduce water shortages and provide better drought resilience for the area's many water users. The stakeholder Task Force was comprised of 10 individuals representing the many interests of the Plan Area (see Table 1-2). The primary responsibility of the Task Force was to provide input on the DCP throughout the development process to ensure that the collective needs of the Plan Area were considered and would be met in the event of a drought scenario.

Table 1-2. DCP Task Force			
Interests	Name	Organization	Position/Role
M&I	Alan Packard	JVWCD	Assistant General Manager and Chief Engineer
M&I	Travis Christensen	JVWCD	Registered Staff Engineer and DCP Project Manager
M&I (City Perspective)	Jason Rasmussen	South Jordan City	South Jordan City Public Works Director
M&I (Improvement District Perspective)	Greg Anderson	Kearns Improvement District	KID Public Works Director
M&I (Secondary Water Provider Perspective)	David Gardner	WaterPro/Draper Irrigation	Assistant General Manager
M&I and Agricultural	Laura Haskell	State Division of Water Resources	Jordan River Specialist and State Drought Coordinator
Agricultural and Water Rights	John Larsen	ULWUA and Utah Division of Water Rights	Utah Lake and Jordan River Distribution System Commissioner
Environmental and Recreational	Eric Ellis	Utah Lake Commission (ULC)	Executive Director
Environmental and Recreational	Soren Simonsen	Jordan River Commission (JRC)	Executive Director
Environmental and Industrial	Laura Vernon	State Division of Forestry, Fire, and State Lands	Sovereign Lands Planner/Coordinator

1.3.2 Community Outreach

Community input for the DCP allowed for the interests and concerns of the public to be considered prior to its completion. JVWCD presented the DCP during its public Executive Committee Meeting held on August 09, 2021. Opportunities for public comment were given during JVWCD's subsequent regular Board Meetings.

1.3.3 Member Agency Outreach

JVWCD recognizes that the ability to implement the DCP during a drought scenario hinges upon feedback and acceptance from its 17 Member Agencies. Representatives from three Member Agencies served on the Task Force. In addition, all 17 Member Agencies were part of an Outreach Group that reviewed the measures, actions and responses as the DCP was being developed. The Outreach Group had opportunities to provide feedback throughout the DCP development process to create responses that uniquely fit each agency. Each Member Agency was given a chance to review the draft DCP and provide comments prior to being submitted to the USBR for their preliminary review.

Section 2

Water System Overview

JVWCD was organized as a regional water supply agency primarily delivering water on a wholesale basis to its 17 wholesale Member Agencies. JVWCD also operates a retail distribution system in limited areas of Salt Lake County (approx. 9,200 total retail connections). JVWCD provides annual deliveries of approximately 100,000 AF of high-quality drinking water to its wholesale and retail customers. Some JVWCD Member Agencies rely 100 percent upon JVWCD supplies, while others use JVWCD supplies to supplement their own supplies (primarily groundwater or secondary irrigation water).

JVWCD water supply deliveries are made by the operation of raw water aqueducts which convey water diverted from the Provo River, treatment plants, pump stations, storage reservoirs, wells, and a system of transmission and distribution pipelines ranging in size from 6- to 78-inches throughout the Salt Lake Valley. These include aqueduct facilities owned by the USBR which JVWCD operates to serve its Member Agencies, and also operates on behalf of the MWDSLS. JVWCD operations provide for the annual delivery of approximately 15,000 AF of MWDSLS supplies to its member cities (Salt Lake City and Sandy City). JVWCD also operates a pump station diverting water from the Jordan River to the Welby and Jacob canals for agricultural and M&I secondary uses. This diversion meets exchange agreement requirements between JVWCD and the Welby-Jacob Water Users Company.

Several of Utah's fastest growing cities are in the JVWCD service area and demands upon JVWCD water supplies are steadily increasing. JVWCD has developed a diverse portfolio of existing and planned future water supplies to meet these growing demands. JVWCD will implement the measures identified in this DCP to increase the reliability of its water supplies by reducing the likelihood of water supply shortages due to drought, and it will also implement measures to reduce the severity of consequences resulting from shortages that do occur.

2.1 Service Area

As discussed, the JVWCD service area boundaries include approximately 60 percent of the developable land area in Salt Lake County, Utah, and a small portion of neighboring Utah County. See Figure 2-1 for the JVWCD service area overview. The current population served by JVWCD is approximately 750,000 and that population is expected to grow to 820,000+ by 2030. Salt Lake County is the most populous county in Utah and is home to the state capital, Salt Lake City. The proposed geographic boundary for the DCP (Plan Area) includes the service area for JVWCD and its Member Agencies. The DCP considers agricultural, M&I, recreational, and environmental interests in the Plan Area.

Figure 2-1. Data centers continue to grow in the region

2.1.1 Water Users and Usage Types

There is a wide variety of water uses in the Plan Area. Almost all M&I water users within the Plan Area are served by JVWCD and its 17 Member Agencies, while much of the agricultural water use is served by a network of canals owned by private irrigation companies that divert water from the Jordan River near the Salt Lake County and Utah County boundary. The natural water bodies within the Plan Area facilitate a variety of recreational activities and provide critical environmental benefits.

M&I: Within the Plan Area, JVWCD supplies are used to satisfy the majority of all M&I demands (approx. 65 percent JVWCD supplies, 35 percent Member Agency self-supplies). In the future, JVWCD supplies will become an even bigger component of the overall M&I need (estimated 70 percent JVWCD supplies by 2030).

The southern end of Salt Lake County and the northern end of Utah County, areas served by JVWCD, have become known as the Silicon Slopes because of the influx of tech companies, mimicking the early growth of Silicon Valley in California. Approximately 20 data centers have been constructed in the region, the most significant of which is the U.S. National Security Agency's (NSA) $1 billion data center. This industry is contributing to the strength of the economy in the Plan Area, creating a strong demand for new housing and the associated increasing demands on M&I water supplies.

A reliable M&I water supply is a key pillar supporting strong and sustainable economic activity in the Plan Area. The prosperity and wellbeing of the existing and future population in the Plan Area will be impaired if the availability of an adequate water supply is uncertain.

Agricultural: Agricultural uses in Salt Lake County are declining as land is being developed. According to the 1987 Agricultural Census, Salt Lake County had 155,398 acres of farmland, and 16,030 acres of irrigated land. As of the 2017 Agricultural Census, Salt Lake County had 61,965 acres of farmland and 7,430 acres of irrigated land (exemplified in Figure 2-2).

Figure 2-2. Typical Salt Lake County farmland

JVWCD expects the amount of total farmland and irrigated land will continue to decline with development activity, and much of the water used for irrigation will continue to be converted to sources of M&I secondary irrigation water. The canals which provide the agricultural and M&I secondary water will continue to be a viable and important part of the water resources needed for Salt Lake County.

Environmental: Among the countless environmental benefits provided by the natural water bodies in the Plan Area, perhaps the most significant is served by the unique system of saltwater and freshwater wetlands surrounding the Great Salt Lake (see Figure 2-3 for visual). Millions of birds use the Great Salt Lake as a resting point in their journey from Canada to Central and South America, in large part because of the rich feeding ground that the wetlands provide.

Figure 2-3. Typical Great Salt Lake wetlands

Recreational: Utah Lake, the Jordan River, small irrigation reservoirs, and the Great Salt Lake provide a host of recreational activities for residents of the community and visitors to the state. Utah Lake is a popular destination for fishing and motorized boating and the Great Salt Lake is popular for sail boats and is integral to the popular Antelope Island State Park. As an urban waterway, the Jordan River hosts boat ramps providing access for canoe and kayak tours and a trail system that spans the entire length of the river and is used for biking, walking, and access for fishing (see Figure 2-4).

Figure 2-4. Recreational use of the Jordan River

2.2 Water Supply Sources and Facilities

JVWCD utilizes various sources of supply as each supply has unique characteristics, key facilities, and features which affect the broad community uses of the water supply (e.g. M&I, agricultural, environmental, etc.) Table 2-1 lists each of JVWCD's existing supplies, and planned future supplies and notes the average yield, drought year yield, and other characteristics of the supply. Figure 2-5 shows the Map of M&I and irrigation water sources for the JVWCD service area.

Table 2-1. JVWCD Supply Sources

Existing and imminent new sources of M&I Supply	2030 Yield (AF)		Key facilities operated by others	Key facilities operated by JVWCD	Sectors Affected
Name/Description	Average	Drought (1 in 50 Year 5yr duration)			
Central Utah Project (CUP) Federal project administered by Central Utah Water Conservancy District (CUWCD), storage in Jordanelle Reservoir	50,000	47,360	CUP Bonneville Unit facilities - Upper Stillwater, Jordanelle Reservoir, Olmsted Pipeline, etc.	Jordan Aqueduct, JVWTP, JVWCD transmission system	M&I, environmental, recreation
Provo Reservoir Water Users Company (PRWUC) Shares JVWCD owns majority shares in PRWUC which has direct flow rights and storage rights in Deer Creek Reservoir	43,600	31,768	Provo River Project facilities - Deer Creek Reservoir, Duchesne Diversion, Weber/Provo canal, Provo River Aqueduct, Salt Lake Aqueduct	Jordan Aqueduct, JVWTP, Southeast Regional Water Treatment Plant (SERWTP), JVWCD transmission system	M&I, environmental, recreation
Additional Provo River sources Provo River rights per former West Union Canal Co shares owned, also includes shares in other Provo River irrigation co.	5,000	3,330	Provo River Aqueduct	Jordan Aqueduct, Jordan Valley Water Treatment Plant (JVWTP), SERWTP, JVWCD transmission system	M&I, environmental
Central Water Project (CWP) Non-federal project owned by CUWCD. The supply is primarily from groundwater in Utah County (Vineyard area) supplemented by treated water from Provo River.	11,680	10,024	CWP facilities - wells in Vineyard, Don A Christiansen Regional Water Treatment Plant (DACRWTP), North Shore Aqueduct (NSA), North Shore Terminal Reservoir (NSTR)	Central Pipeline, 150th S Pipeline, Jordan Aqueduct, JVWCD transmission system	M&I, environmental
Utah Lake System (ULS) Federal Project - last phase of CUP. Administered by CUWCD, storage in Strawberry Reservoir	16,400	10,540	Strawberry Reservoir, ULS conveyance tunnels and aqueducts, Provo River Aqueduct	Jordan Aqueduct, JVWTP, JVWCD transmission system	M&I, environmental, recreation
High Quality Groundwater wells primarily in southeast region of Salt Lake Valley deep aquifer. No treatment required other than adding chlorine and fluoride. Lower production in average years increases reliability of drought year yield.	12,000	20,000	n/a	37 wells and well pump stations, JVWCD transmission system	M&I
Southwest Jordan Valley Groundwater (SWJVGW) Project Membrane treatment of brackish groundwater in southwest region of Salt Lake Valley deep aquifer. Part of Kennecott groundwater cleanup project.	8,235	8,235	Bingham Canyon Water Treatment Plant (BCWTP) and supply wells	Southwest Groundwater Treatment Plant (SWGWTP) and supply wells, JVWCD transmission system	M&I, environmental
Membrane Treatment of Utah Lake/Jordan River SWGWTP was built to accommodate at least 1.5kAF of shallow groundwater treated with reverse osmosis (RO) membranes. Water rights supporting this shallow groundwater production are Utah Lake/Jordan River rights	1,500	1,500	n/a	SWGWTP and shallow groundwater supply wells, JVWCD transmission system	M&I, environmental
Local Mountain Streams Five small streams from Bell Canyon stream to Big Willow stream collected and treated at the SERWTP. No storage.	3,000	1,998	n/a	Southeast collection pipeline, SERWTP, JVWCD transmission system	M&I
Existing Agricultural and M&I Secondary Irrigation Supply	**2030 Yield (AF)**		**Key facilities operated by others**	**Key facilities operated by JVWCD**	**Sectors Affected**
Name/Description	**Average**	**Drought (1 in 50 year, 5 year duration)**			
Utah Lake/Jordan River Welby Jacob Exchange Project pumping water from Jordan River to Welby & Jacob Canals	40,000	40,000	Utah Lake outlet gates, Utah Lake pump station, Turner Dam	Jordan Narrows Pump Station	Agricultural, M&I, environmental, recreation
Future sources of M&I Supply	**Yield (AF)**		**Key facilities operated by others**	**Key facilities operated by JVWCD**	**Sectors Affected**
Name/Description	**Average**	**Drought (1 in 50 years, 5 year duration)**			
Membrane Treatment of Utah Lake/Jordan River Expand the capacity of SWGWTP from 7 million gallons per day (mgd) to 14 mgd. The primary source for the expansion will be shallow groundwater and/or riverbank filtration of Jordan River water.	6,500	6,500	n/a	SWGWTP and supply wells, brine by-product discharge facilities, JVWCD transmission system	M&I, environmental
Membrane Treatment of Utah Lake/Jordan River and deep brackish groundwater Construct new 14 mgd membrane treatment plant in northern region of JVWCD service area. Source water to the new treatment plant will be a combination of shallow groundwater and deep brackish groundwater.	13,000	13,000	n/a	New 14 mgd membrane treatment plant and supply wells, brine by-product discharge facilities, JVWCD transmission system	M&I, environmental
Bear River Project Allocation of the State Bear River Development Project. JVWCD facilities will include a new treatment plant in West Haven, Utah (jointly owned with WBWCD) and finished water pipeline to Salt Lake County.	50,000	45,000	Dams/reservoirs (TBD by State of Utah), pipelines conveying raw water to JVWCD/WBWCD treatment plant site in West Haven, Utah.	West Haven WTP, finished water pipeline from WHWTP to JVWCD system in Salt Lake County, JVWCD transmission system.	M&I, environmental, recreation
Wastewater Reuse Project JVWCD does not plan to directly develop wastewater reuse projects, but several JVWCD Member Agencies are investigating non-potable and potable reuse projects.	5 - 10,000	5 - 10,000	Wastewater Treatment Plants (WTP), advanced treatment plants, reuse pump stations.	n/a	M&I, environmental

n/a = not available

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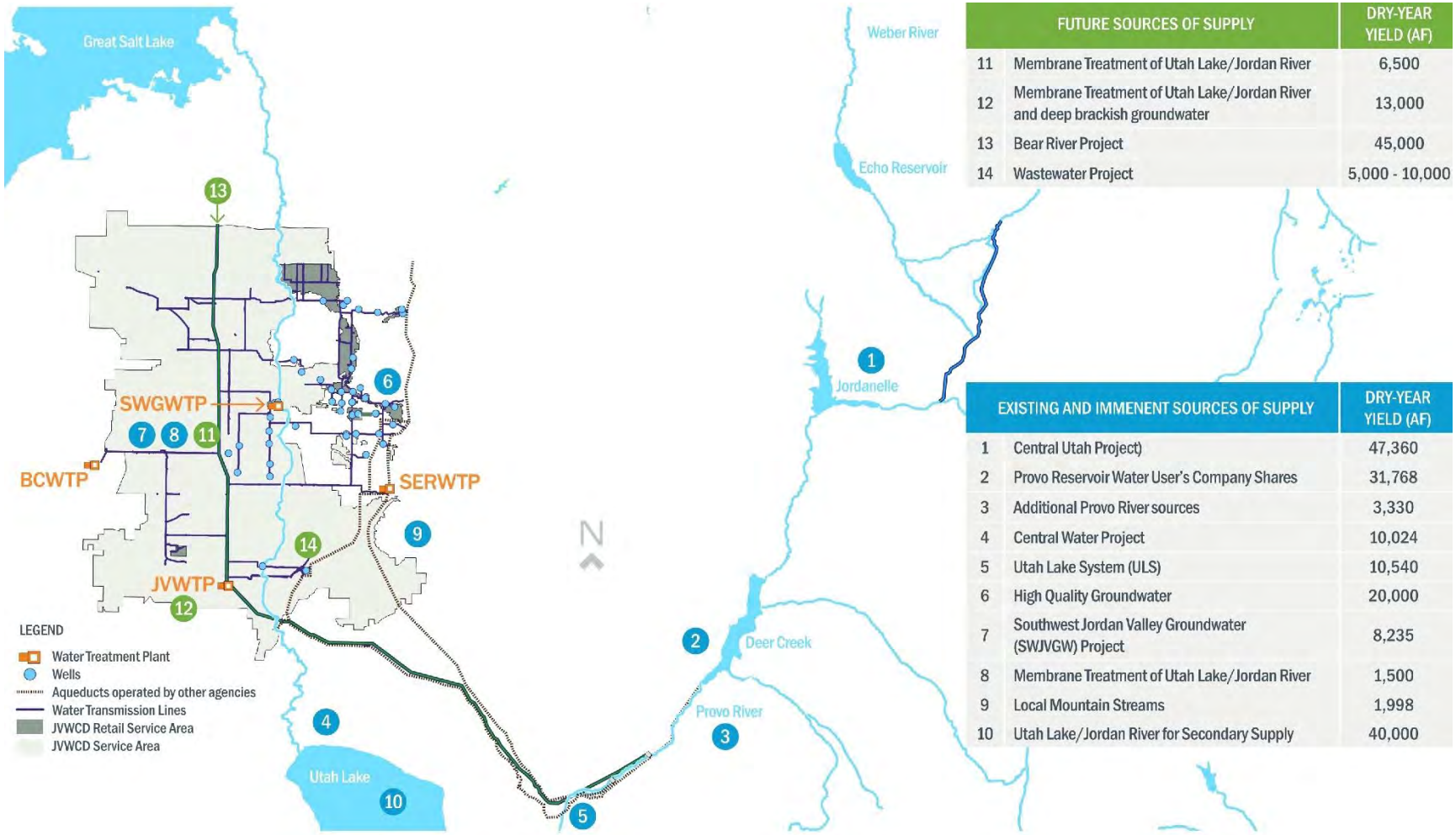


	FUTURE SOURCES OF SUPPLY	DRY-YEAR YIELD (AF)
11	Membrane Treatment of Utah Lake/Jordan River	6,500
12	Membrane Treatment of Utah Lake/Jordan River and deep brackish groundwater	13,000
13	Bear River Project	45,000
14	Wastewater Project	5,000 - 10,000

	EXISTING AND IMMENENT SOURCES OF SUPPLY	DRY-YEAR YIELD (AF)
1	Central Utah Project)	47,360
2	Provo Reservoir Water User's Company Shares	31,768
3	Additional Provo River sources	3,330
4	Central Water Project	10,024
5	Utah Lake System (ULS)	10,540
6	High Quality Groundwater	20,000
7	Southwest Jordan Valley Groundwater (SWJVGW) Project	8,235
8	Membrane Treatment of Utah Lake/Jordan River	1,500
9	Local Mountain Streams	1,998
10	Utah Lake/Jordan River for Secondary Supply	40,000

Figure 2-5. Map of M&I and irrigation water sources for the JVWCD service area

2.3 Current and Future Demand

JVWCD regularly monitors and updates current and future water demands on its system. Every five years JVWCD updates its *Water Conservation Plan* and reviews the system water demands as well as goals to reduce demand. The last plan update was in 2019. Additionally, the *Preparing for Climate Change—A Management Plan* and *Demand, Supply, and Major Conveyance Study* further define the water demand of the area given potential climate change impacts to future water supply availability.

2.3.1 M&I Demand

To meet their overall demand, many of the Member Agencies have their own water supplies that supplement the water deliveries received from JVWCD. The demands presented in this section only represent the demands the Member Agencies impart on JVWCD's supplies and do not include the total demand of each individual agency.

JVWCD's *Demand, Supply, and Major Conveyance Study* evaluated four demand scenarios by modifying three different projection model inputs. The model input categories are: population, water usage rate in gallons per capita per day (gpcd), and climate change impacts. Table 2-2 is an explanation of each scenario input and how these scenarios varied. The demand projection model estimates per capita usage rates based on new plumbing code impacts, JVWCD's planned conservation measures, and level of investment in each of those measures (alternative conservation programs). Climate change impacts were derived from analysis performed for JVWCD's *Preparing for Climate Change—A Management Plan.* Climate change impacts are discussed in greater detail in Section 4.5.

Table 2-2. Scenario Summary

Scenario	Population	Per Capita Use Rate	Climate Change Impact by 2065	Losses (NRW)	
				Member Agency	District
1 – Low range	WFRC TAZ	Conservation Program C – maximum level of investment in conservation measures, minus NRW	None	6%	2%
2 – Basis of Plan	WFRC TAZ	Conservation Program B – optimized level of investment in conservation measures, minus NRW	+10%		
3 – Low Conservation	WFRC TAZ	Member Agency total demand ÷ total population, minus NRW			
4 – High Range	Member Agency projections w/Kennecott high growth	Conservation Program B – optimized level of investment in conservation measures, minus NRW			

NRW = non-revenue water
TAZ = Traffic Analysis Zone
WFRC = Wasatch Front Regional Council

Figure 2-6 provides the results from the demand projections, including historical and future water demands. Projections in the figure extend to the year 2065, however the planning horizon for this DCP ends in 2030. Scenario 2 – Basis of Plan represents JVWCD's opinion of the most likely demand scenario within the range of possible demand based on current information. The Basis of Plan scenario predicts by the year 2030, the demand will be 121,300 AF. Population projections for the

high range scenario are 16.5 percent greater than for the Basis of Plan, resulting in the significant difference between the two demand projections. The majority of the population difference comes from uncertainty of timing of when the significant land area owned by the operators of the Bingham Canyon Copper Mine will be developed.

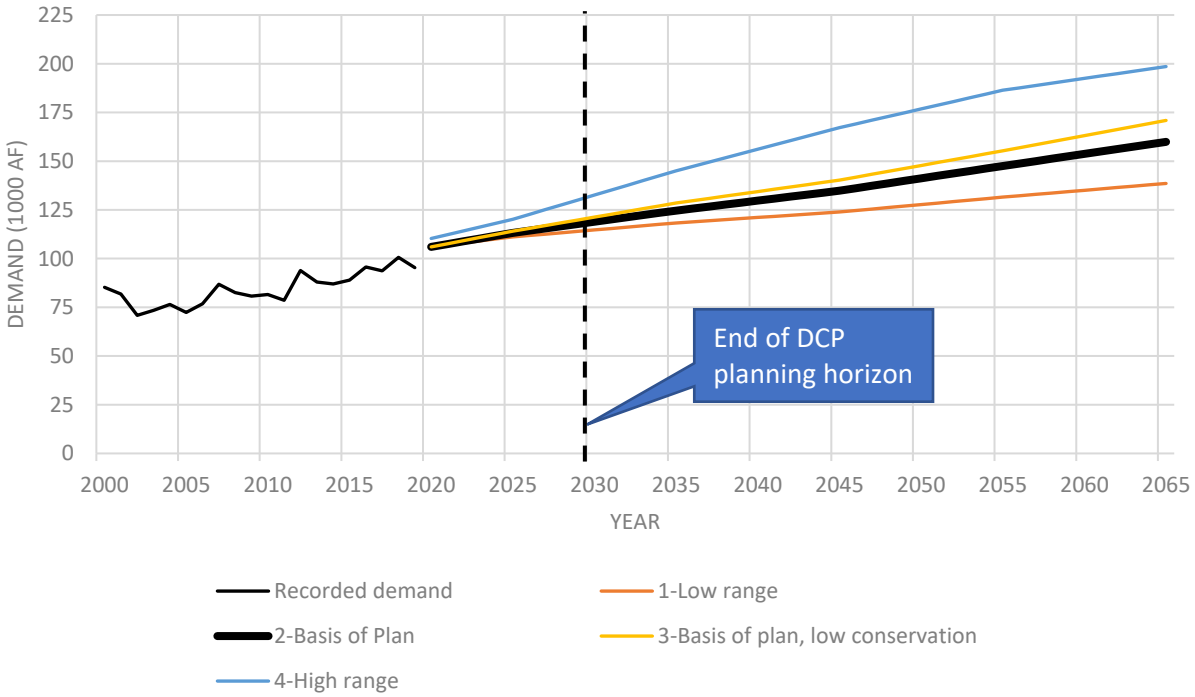


Figure 2-6 Current and future water demands

2.3.2 Agricultural Demand

Agricultural demands within the JVWCD service area are supplied by canal companies or private wells. JVWCD does not have a direct influence on agricultural water demand or supplies and they are therefore not presented in this plan.

2.3.3 Environmental and Recreational Stream Flow and Lake Level Requirements

The JVWCD service area shares source water with five primary water bodies. Stream flow and lake level considerations for each are listed below.

- **Utah Lake** – The minimum allowable lake level in Utah Lake has never been determined.
- **Great Salt Lake** – A minimum allowable lake level has not been determined. However, multiple studies have determined that declining water levels in the lake will result in significant economic and environmental impacts. Also, the Great Salt Lake Advisory Council (GSLAC) commissioned a recent study to consider ways to protect instream flows and help sustain a minimum Great Salt Lake level (SWCA, 2017).
- **Provo River** – The CUP Completion Act established the following minimum instream flow requirements:
  - Jordanelle Dam to Deer Creek Reservoir: 125 cubic feet per second (cfs)
  - Confluence of Deer Creek and the Provo River to the Olmsted Diversion: 100 cfs

  - Olmsted Diversion to Utah Lake: 75 cfs

  Water from the Provo River is supplied to JVWCD by CUWCD and Provo River Water Users Association (PRWUA). CUWCD and PRWUA coordinate to maintain the minimum stream flows in the Provo River and account for those minimum stream flows as they determine the available water supplies from their respective projects.

- **Local mountain streams** – these are seasonal streams on the western slopes of the Wasatch Range that do not have minimum stream flow requirements downstream of the JVWCD diversion points.
- **Jordan River** – The Jordan River flows from Utah Lake to the Great Salt Lake and receives inflows from multiple tributaries and permitted discharges. There are no minimum streamflow requirements.

2.4 Water Use Efficiency

In the mid-1990s, the State of Utah began efforts to promote the efficient use of water resources. In 1998, the Utah State Legislation passed the "Water Conservation Plan Act", which requires culinary water providers and conservancy districts to submit water conservation plans and updates every five years. In 2001, the State adopted a goal to lower per capita use rates by 25 percent by 2050 (using year 2000 as the base year).

JVWCD has been a leading advocate for water conservation and in 2002, JVWCD adopted an accelerated goal to reduce the year 2000 per capita usage rate in its system by 25 percent by 2025 (In 2013 the State of Utah adopted the same 25 percent by 2025 goal). To achieve that goal, JVWCD has made significant investments in education (e.g. Slow the Flow campaign, Conservation Garden Park waterwise demonstration garden, Localscape educational material and classes, etc.) and incentive programs (e.g. toilet replacement rebates, grants to Member Agencies for conservation programs, etc.). Since 1998, JVWCD has funded or used donated funds to spend more than $25M on conservation related projects or programs. As a result, the average per capita usage rate for 2015-2019 was 15 percent lower than the year 2000 per capita usage rate. These results show important progress and that JVWCD has the facilities, programs, staff, and funding commitments in place to continue this progress.

In its 2019 Conservation Plan Update, JVWCD adopted a conservation goal consistent with the State of Utah's newly developed regional conservation goals. This new goal is to reduce per capita consumption to 187 gpcd by 2030, and JVWCD's long term planning projects further reductions in per capital consumption after 2030.

In 2019, JVWCD took a major step towards improving water use efficiency when it adopted WES applicable to all new construction in its service area. The WES limit the amount of turf grass allowed in new residential, commercial, institutional, and industrial developments and encourages the use of WaterSense certified indoor plumbing fixtures. Although JVWCD doesn't have land use jurisdiction to require compliance with the WES by ordinance, it is working with its Member Agencies to implement the WES by their City ordinances, or other appropriate methods. As of September 2021, four of JVWCD's Member Agencies (Herriman, South Jordan, West Jordan, and Bluffdale) have adopted the WES by ordinance. Through the full implementation of the WES by all JVWCD Member Agencies, JVWCD projects the per capita usage rate will be less than 170 gpcd by 2065 (excluding climate change effects). During both normal, non-drought conditions and all levels of drought conditions, JVWCD will consistently promote programs which will result in durable reductions in per capita usage rates.

Section 3

Drought Monitoring

Drought monitoring establishes a process for determining short-term and long-term water availability and for confirming existing drought. The section explains the collection, interpretation, and dissemination of data and information used in this monitoring process. Several steps are undertaken to determine drought levels represented by water supply availability levels, and to identify and establish metrics and triggers. Establishing this process enables local agencies and communities to recognize potential drought events and strengthens resilience against impacts through informed drought recognition and preparation.

3.1 Overview

In determining appropriate water supply availability levels designations and associated drought response actions, it is important to use indicators that are as reliable and consistent as possible. The two largest sources of supply upon which JVWCD relies are; 1) CUP (Jordanelle storage) operated by the CUWCD, and 2) PRWUC shares which provide access to the Provo River Project (Deer Creek storage) operated by the PRWUA. CUWCD and PRWUA both use various water supply forecast tools and each organization informs JVWCD of the planned yield of their respective projects in the late spring of each calendar year. JVWCD is relying on the information provided by CUWCD and PRWUA as data for two of the three supply availability level defining criteria described in Section 3.3. Another important source of JVWCD supply is its high-quality groundwater wells. A metric related to the condition of the Salt Lake Valley deep aquifer will also be used to determine the availability of this source of supply and serves as the third water supply availability level defining criteria listed in Section 3.3. The availability of other JVWCD water supplies can be reasonably estimated using these water supply availability level criteria for these three supply sources.

Several of JVWCD's Member Agencies operate pressurized secondary irrigation systems which rely on shares of Utah Lake/Jordan River rights held by private irrigation companies. These private irrigation companies operate canals and as members of the ULWUA, these companies jointly own the Utah Lake pump station. Although neither JVWCD nor its Member Agencies directly control the distribution of ULWUA supplies, secondary irrigation deliveries constitute a significant portion (approximately 25 percent) of the total M&I water delivered in the JVWCD service area. Therefore, it is important that this DCP include provisions to coordinate with ULWUA and develop consistent water supply availability level criteria and complementary responses to the extent possible.

3.2 Water Supply Availability Levels

This JVWCD DCP will use water supply shortage conditions to define five water supply availability level designations. These conditions are visualized using a gradual shift from normal (green) to critical/exceptional (brown) conditions as represented in the dial shown in Figure 3-1. To provide a further breakdown, Table 3-1 summarizes each water supply availability level with their associated water shortage condition.

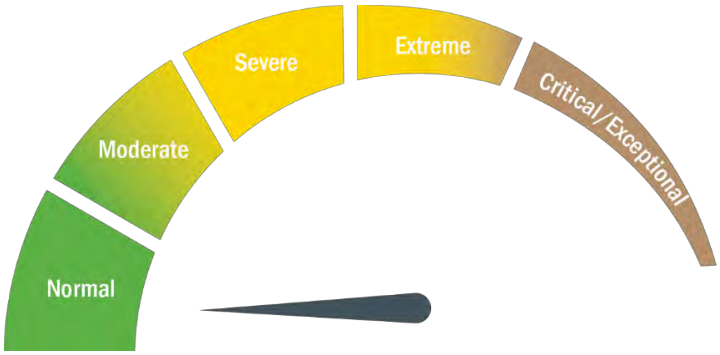
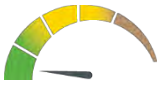
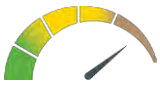


Figure 3-1 Shift in water supply shortage conditions visualized from normal (green) to critical/exceptional (brown)

Table 3-1. Water Supply Availability Level		
Water Supply Availability Level	**Advisory Code**	**Water Shortage Description**
Level 0		Normal: Normal or near normal water supply conditions exist
Level 1		Moderate: Water supplies are moderately below normal
Level 2		Severe: Water supplies are severely below normal
Level 3		Extreme: Water supplies are extremely below normal
Level 4		Critical/Exceptional: Water supplies are exceptionally and critically below normal

3.3 Water Supply Availability Level Triggering Criteria

JVWCD will use the following three criteria to guide the determination of water supply availability level. Specific triggering parameters in each of the three criteria will apply to the various water supply availability levels and typically, all three parameters need to be satisfied to establish the applicable water supply availability level.

1. **Supply availability of CUP with storage in Jordanelle reservoir as provided by CUWCD** – CUWCD administers the CUP supply stored in Jordanelle reservoir to accommodate single year deliveries which can exceed the JVWCD contract amount (50,000 AF) so long as the 5-year running average of the delivery amounts is less than the contract amount. This provides valuable flexibility and supply resiliency to JVWCD. JVWCD can develop multiple water supply forecast scenarios based on the current multi-year running average amount (i.e. account balance and amount of "overdraft" which may be committed to the current year supply) and the current year snowpack and water supply forecast. For the current year snowpack and water supply forecast, CUWCD uses forecasts published by the Colorado Basin River Forecast Center (CBRFC) section of the National Weather Service/National Oceanic and Atmospheric Administration.
2. **Supply availability (declared allocation) of Provo River Project (Deer Creek storage) as determined by PRWUA** – For the current year snowpack and water supply forecast, PRWUA uses

forecasts published by the Colorado Basin River Forecast Center section of the National Weather Service/National Oceanic and Atmospheric Administration (CBRFC).

3. **Supply availability of high-quality groundwater** – Condition of Salt Lake Valley deep aquifer as reported in Groundwater Conditions in Utah annual report published by Utah Dept of Natural Resources, Utah Dept of Environmental Quality, and United States Geological Survey (most recent version is the conditions as of spring 2018). JVWCD will manage to the safe yield of the Salt Lake Valley deep aquifer. Triggering criteria for various water supply availability levels will be determined based on the quantity of diversions to compensate for shortages, and whether the 3-year average exceeds safe yield. Groundwater is naturally more resilient to climatic changes than surface water resources, responding more slowly to shifts in precipitation and temperature patterns. Utilizing groundwater as a resource, when sustainably managed, supports a climate resilient water supply portfolio.

JVWCD leverages studies by DeRose et al. (2015) and Bekker et al. (2014), which used dendrochronology[1] along the Weber and Bear Rivers to understand and plan for potential future projections. These studies provide tree ring data dating thousands of years that indicate significant climate variability including longer and drier drought periods than experienced in recent history. JVWCD has conducted and considered water supply scenarios under adverse climate conditions to understand supply side impacts (see example in Figure 3-2 from Forsyth and Schultz, 2018), and will continue to look for long-term predictive indicators and will use those for future updates.

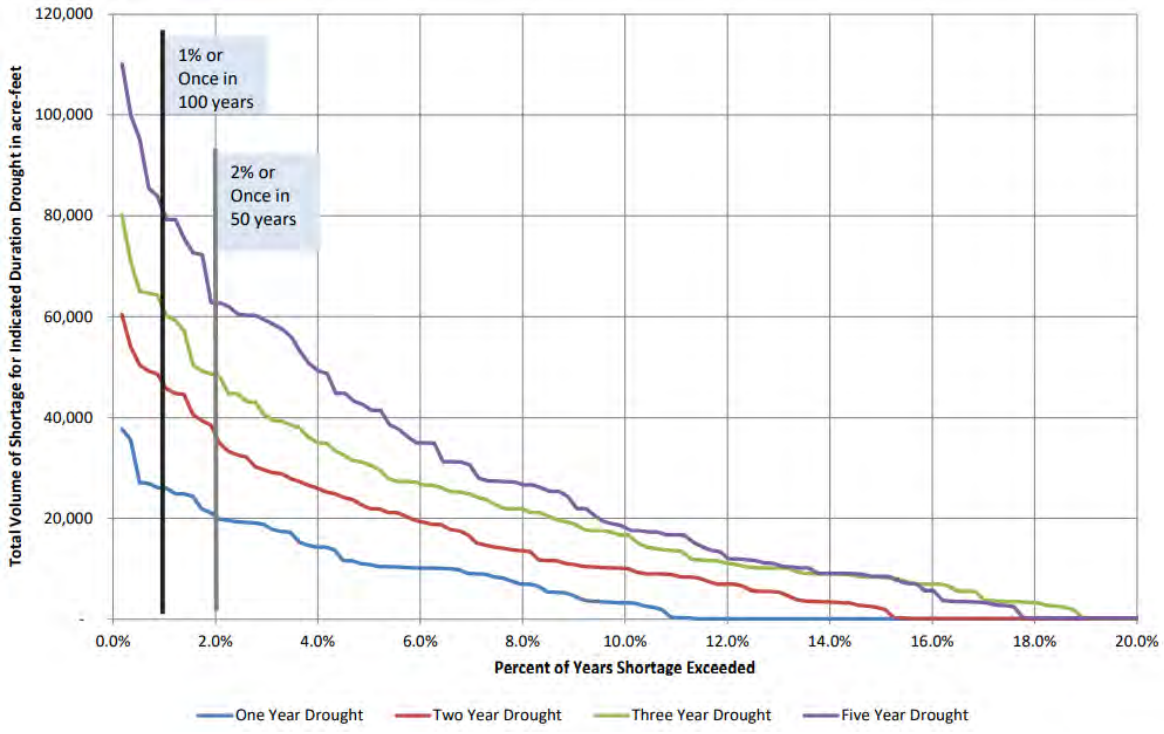


Figure 3-2. Simulated JVWCD M&I System Shortages versus Frequency by Drought Duration, from 578 years of Weber River Paleo Hydrology Data adjusted for Adverse Climate Variation from the CUP Water Supply Variability Study by HDR in Appendix C of in Forsyth and Schultz (2018).

[1] Dendrochronology is the science and study of annual growth rings of timber and trees (e.g. tree ring data) to determine dates and chronological orders of past events (e.g. drought).

Further elaboration on the understanding and accounting of climate change risks for JVWCD's future supply portfolio is provided in subsection 4.5 Climate Change Risk presented in Section 4 Vulnerability Assessment.

3.4 Framework for Characterization and Confirmation of Drought

JVWCD will generally determine the water supply availability level condition between April 15th and June 15th in each calendar year. During this period, there will be reasonable confidence in the snowpack conditions and runoff forecasts for CUWCD and PRWUA to determine the water supply availability of the respective projects which they operate and administer. JVWCD will also evaluate the Salt Lake Valley deep principle aquifer water level conditions during this period.

Each year JVWCD will convene a drought monitoring committee which will include one representative from each Member Agency and applicable JVWCD staff. This drought monitoring committee will initially meet in March and at that meeting, JVWCD will present M&I water supply forecast information and Utah Lake conditions affecting the ULWUA supply. The committee will determine a preliminary water supply availability level recommendation based on a majority vote of the committee members, which will be presented at the JVWCD annual Member Agency meeting in April of each calendar year. Following the presentation of the preliminary water supply availability level recommendation at the annual Member Agency meeting, the committee will consider feedback and updated water supply forecast information and will determine a final recommendation no later than May 1. JVWCD will establish the water supply availability level by formal action of its Board of Trustees at its May Board meeting and will encourage each Member Agency to similarly establish the water supply availability level by formal action of their respective governing bodies.

In developing its recommendations, the drought monitoring committee will consider the three determining criteria defined in each of the water supply availability levels. The criteria are intended to provide guidance to the committee, but it is expected that the committee will need to exercise conservative judgement to hedge against more extreme consequences resulting from potential multi-year drought events beyond the current year being evaluated.

The established water supply availability level will typically remain in effect until the end of the calendar year, but JVWCD will conduct monthly re-assessments throughout the year and will inform its Member Agencies of changes that may be considered. JVWCD will re-reconvene the drought monitoring committee prior to making any changes to the established water supply availability level. Figure 3-3 shows the timeline of the drought monitoring process.

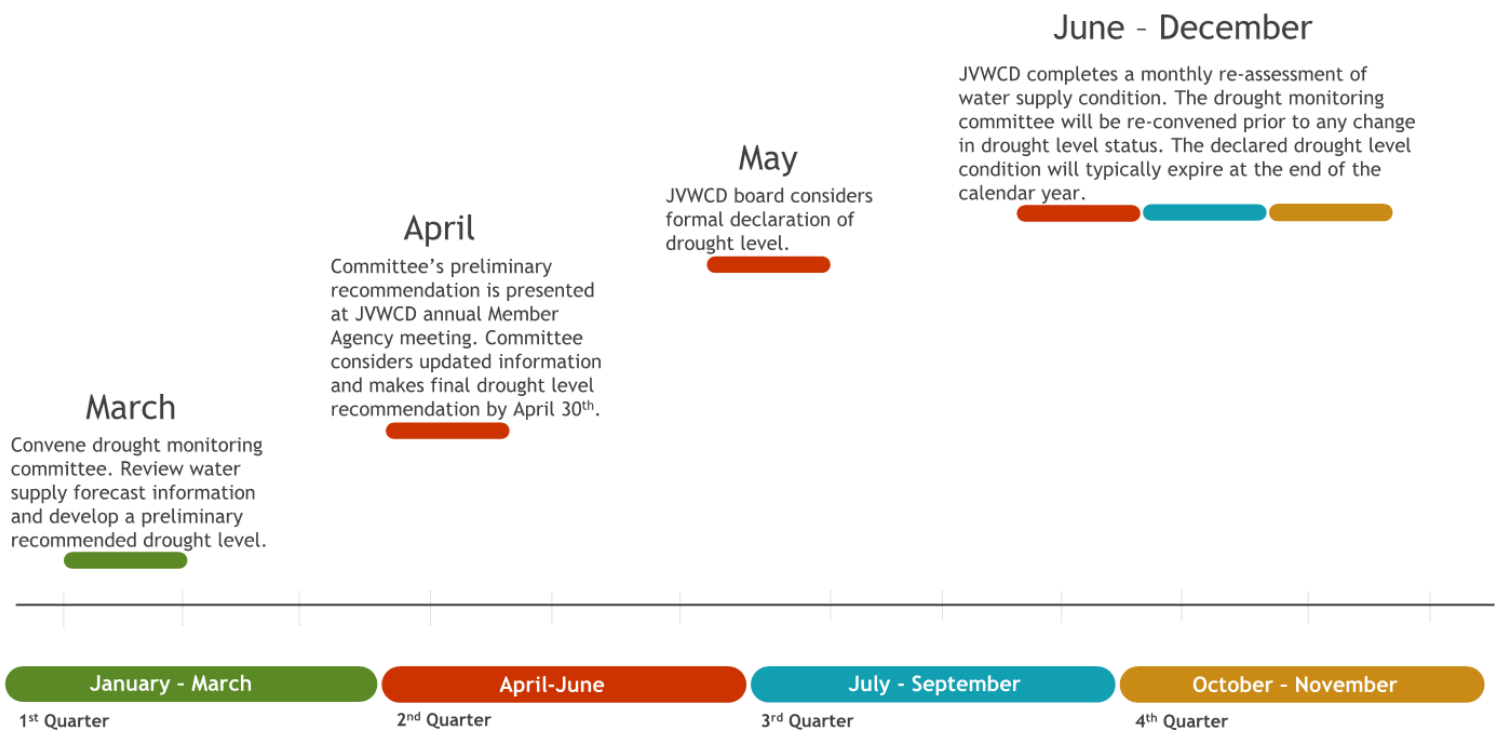


Figure 3-3. JVWCD drought monitoring process timeline

JVWCD will coordinate with the ULWUA as it establishes the water supply availability level and will seek to develop consistent and complementary responses to water supply availability level conditions. The ULWUA will determine its own criteria for each water supply availability level (primarily based on the level of Utah Lake) and response actions. Drought response actions are discussed in greater detail in Section 5.

The U.S. Drought Monitor Intensity Classification (DMIC) system is based on precipitation measurements and provides an indication of various levels of drought conditions relative to normal precipitation. Most of the JVWCD water supply is based on projects which include storage reservoirs (e.g. Jordanelle, Deer Creek, Salt Lake Valley deep aquifer) which can yield water supplies in drought years using water stored from previous years of normal precipitation. The DMIC does not consistently correlate with the availability of the JVWCD water supply, so it will not be directly used as criteria to determine water supply availability level.

The triggering criteria for each water supply availability level are summarized in Table 3-2 and described in more detail in the following subsections.

Table 3-2. Water Supply Availability Levels and Triggering Criteria

Water Supply Availability Level	Water Shortage Description	Triggering Criteria Applied to Water Supply Availability Levels[a]		
		CUWCD Supply Availability (Jordanelle storage of CUP)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
 Level 0	Normal	at least 95% supply availability	at least an 80% supply allocation	3 year average diversions less than safe yield
 Level 1	Moderate	at least a 95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 year average exceeds safe yield
 Level 2	Severe	at least 90-95% supply availability	75-80%supply allocation	JV gw diversions to compensate for shortage exceeds 16,000 AF, or 3 year average exceeds safe yield
 Level 3	Extreme	at least 90-95% supply availability	<75%supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 year average exceeds safe yield
 Level 4	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 year average exceeds safe yield

a. Typically all three criteria need to be satisfied to establish a water shortage level condition

Level 0 (Normal)

Level 0 will be established when normal or near normal water supply conditions exist. In Level 0, JVWCD expects to have adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts. JVWCD expects it will also be able to provide for the 20 percent contingency amount noted in the wholesale water purchase agreements plus additional deliveries beyond 20 percent of minimum contract amount. The following criteria will be considered in the establishment of this water supply availability level:

1. CUWCD confirms at least 95 percent supply availability of Jordanelle storage of CUP
2. PRWUA declares at least an 80 percent supply allocation in the Provo River Project
3. The 3 year moving average of total groundwater diversions from Salt Lake Valley deep principal aquifer is less than 165,000 AF (100 percent of the safe yield established in the State Engineer's Salt Lake Valley Groundwater Management Plan). The source of this data is the annual "Groundwater Conditions in Utah" cooperative investigations report published by Utah Dept of Natural Resources, Utah Dept of Environmental Quality, and United State Geological Survey

Examples of past years with below average water supply conditions that would be classified as Level 0 (Normal) include 2015 and 2018.

Water Supply Availability Level 1 (Moderate)

Water supply availability level 1 will be established when water supplies are moderately below normal. Through the implementation of Level 1 drought response actions, JVWCD expects to have adequate supplies to satisfy retail customer needs, and wholesale minimum contract amounts plus 20 percent, but will likely be unable to provide any deliveries beyond the minimum contract amount plus 20 percent. The following criteria will be considered in the establishment of this water supply availability level:

1. CUWCD confirms at least a 95 percent supply availability of Jordanelle storage of CUP
2. PRWUA declares a 75 to 80 percent supply allocation in the Provo River Project, and JVWCD does not have sufficient holdover amounts from previous years to make up the shortfall
3. JVWCD groundwater diversions from the Salt Lake Valley deep principal aquifer necessary to replace the water supply shortages resulting from criteria 1 or 2 projected to exceed 12,000 AF, or the 3-year moving average of total groundwater diversions exceeds 165,000 AF (which is the fixed safe yield established in the State Engineer's Salt Lake Valley Groundwater Management Plan, unless modified by the State Engineer)

Examples of past years with below average water supply conditions that would be classified as water supply availability level 1 (Moderate) include 2003 and 2013.

Water Supply Availability Level 2 (Severe)

Water supply availability level 2 will be established when water supplies are severely below normal. Through the implementation of Level 2 drought response actions, JVWCD expects to have adequate supplies to satisfy retail customer needs, and wholesale minimum contract amounts plus modest amounts (5 to 10 percent) beyond minimum contract amounts. The following criteria will be considered in the establishment of this water supply availability level:

1. CUWCD confirms at least 90 to 95 percent supply availability of Jordanelle storage of CUP
2. PRWUA declares a 75 to 80 percent supply allocation in the Provo River Project, and JVWCD does not have sufficient holdover amounts from previous years to make up the shortfall

3. JVWCD groundwater diversions from the Salt Lake Valley deep principal aquifer necessary to replace the water supply shortages resulting from criteria 1 or 2 projected to exceed 16,000 AF, or the 3 year moving average of total groundwater diversions exceeds 165,000 AF (safe yield established in the State Engineer's Salt Lake Valley Groundwater Management Plan)

Examples of past years with below average water supply conditions that would be classified as water supply availability level 2 (Severe) include 1991-92 and 2004.

Water Supply Availability Level 3 (Extreme)

Water supply availability level 3 will be established when water supplies are extremely below normal. Through the implementation of Level 3 drought response actions, JVWCD expects to have adequate supplies to provide for restricted retail customer needs, and wholesale deliveries restricted to minimum contract amounts. The following criteria will be considered in the establishment of this water supply availability level:

1. CUWCD confirms at least 90 to 95 percent supply availability of Jordanelle storage of CUP
2. PRWUA declares less than 75 percent supply allocation in the Provo River Project, and JVWCD does not have sufficient holdover amounts from previous years to make up the shortfall
3. JVWCD groundwater diversions from the Salt Lake Valley deep principal aquifer necessary to replace the water supply shortages resulting from criteria 1 or 2 projected to exceed 20,000 AF, or the 3 year moving average of total groundwater diversions exceeds 165,000 AF (safe yield established in the State Engineer's Salt Lake Valley Groundwater Management Plan)

Examples of past years with below average water supply conditions that would be classified as water supply availability level 3 (Severe) include 1977.

Water Supply Availability Level 4 (Critical/Exceptional)

Water supply availability level 4 will be established when water supplies are exceptionally and critically below normal. Through the implementation of Level 4 drought response actions, JVWCD projects to have adequate supplies to support essential needs of its retail and wholesale customers while minimizing economic damage. JVWCD expects it will be unable to deliver wholesale minimum contract purchase amounts and will need to allocate reduced supplies in proportion to the minimum contract amounts. The following criteria will be considered in the establishment of this water supply availability level:

1. CUWCD confirms less than 90 percent supply availability of Jordanelle storage of CUP
2. PRWUA declares less than 45 percent supply allocation in the Provo River Project, and JVWCD does not have sufficient holdover amounts from previous years to make up the shortfall
3. JVWCD groundwater diversions from the Salt Lake Valley deep principal aquifer necessary to replace the water supply shortages resulting from criteria 1 or 2 projected to exceed 20,000 AF, or the 3 year moving average of total groundwater diversions exceeds 165,000 AF (safe yield established in the State Engineer's Salt Lake Valley Groundwater Management Plan)

Conditions that would trigger a water supply availability level 4 designation have not been experienced since the completion of the M&I System of the Bonneville Unit of the CUP (mid 1990's). However, as mentioned earlier in this section, multiple dendrochronology (tree ring) studies conclude that droughts significantly more severe and longer duration than identified in the historical record have occurred in the past and are likely to occur again.

Section 4

Vulnerability Assessment

This section summarizes the approach, analysis, and results of the JVWCD DCP vulnerability assessment. The plan will focus on the drought measures and response actions that can be implemented over the next 10 years. Therefore, the assessment is focused on understanding future conditions using a 2030 planning horizon. Subsections delve into potential future supply shortfalls, risk factors potentially impacting these supplies, water supply source vulnerability, as well as further consideration for climate change risk and sector-specific impacts. The section rounds out with priority areas on which to focus for development of mitigation measures and response actions.

The approach to the vulnerability assessment involves identifying potential supply shortfalls, and the risks that could exacerbate potential deficits and their impacts on JVWCD's water resource portfolio. This chapter provides the description of the risk assessment and its main components, likelihood and consequence of source impairment for a one in 50-year, 5-year drought during the year 2030. Likelihood for the purpose of this assessment is defined as a qualitative score based on risk factors that contribute to reduced supply (see Section 4.2), while consequence is characterized as a quantitative score based on significance (reliance) of supply source (see Section 4.3). The relationship between these components is provided in the following equation:

Risk of reduced JVWCD supply = Likelihood of reduced JVWCD supply x Consequence of reduced JVWCD supply

Section 4.4 provides the analysis and results of the likelihood and consequence components described above and indicates which critical supplies for JVWCD are most vulnerable for JVWCD's water portfolio. The sections on climate change (Section 4.5) and on sector impacts (Section 4.6) provide further insight, taking into consideration the results of this analysis and connecting this to longer planning horizons considered in JVWCD's past climate change-impact related studies, and to how impacts may affect specific sectors. The culmination of this chapter's contents provides support for how to identify and consider alternatives for mitigating vulnerability to drought.

4.1 Potential for Future Supply Shortfalls

Drought supply shortfall can occur in two ways, a shortfall of source water yields as compared to annual water demand and/or a shortfall in supply production capacity compared to maximum day demand in a hot, dry year.

4.1.1 Annual Yield Shortfall

For source water yields compared to annual demand JVWCD has established a level of service goal to have adequate water supply for 105 percent of system demands in a 1 in 50-year, 5-year duration drought. The additional 5 percent serves as a buffer for uncertainty in demand projections. Through careful long-term planning and acquisition of water rights JVWCD has secured the water resources to meet this level of service for what is currently understood to be a 1 in 50-year, 5-year duration drought. Figure 4-1 shows a comparison of the demand projections to the estimated 1 in 50-year, 5-year drought yields for the sources to which JVWCD has acquired water rights. The figure shows that, based on the supply requirements (dashed line) supply capacity for the next set of water rights (ULS water) is needed by 2029.

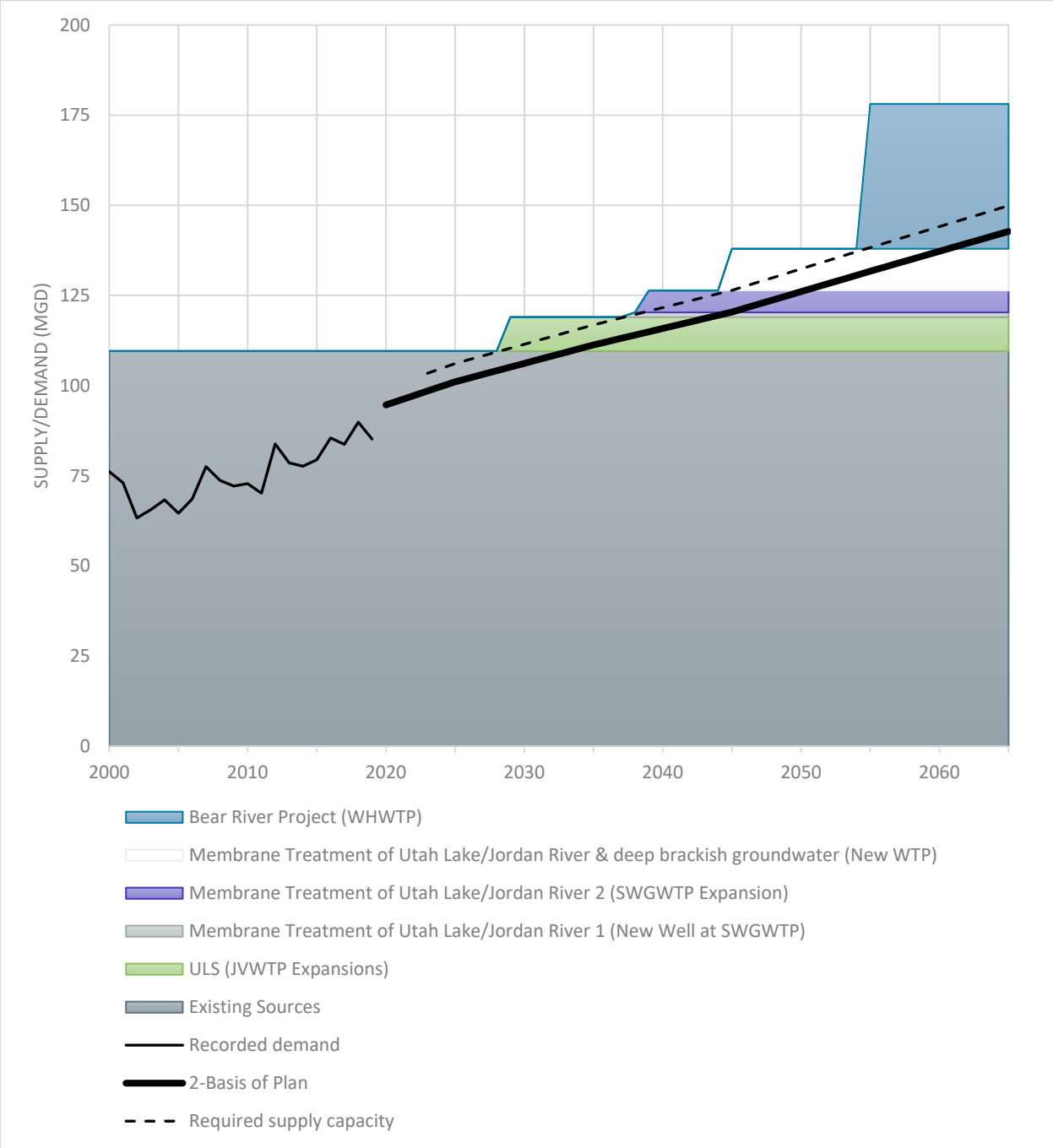


Figure 4-1. Comparison of demand projections to estimated 1 in 50-year, 5-year drought yields for sources with acquired water rights

It should be noted that the source water yields shown in the figure are for yields for a recurrence interval drought that is estimated from historical paleo hydrology records. As discussed in greater detail in Sections 4.2.2 and 4.5, climate change presents significant uncertainty in how drought levels will be elevated at various recurrence intervals, and subsequently how source water yields will be impacted at each interval. CUWCD estimates that the surface water allocations that JVWCD relies on could go from a 25 percent reduction for a 1 in 50-year, 5-year duration drought to a 50 percent reduction with adverse climate change impacts, and from a 27 percent reduction for a 1 in 100-year, 5-year duration drought to a 54 percent reduction with adverse climate change impacts as shown in Table 4-1.

Table 4-1. CUP Supply CUPSIM Modeling Results for Five-Year Duration Drought (adapted and recreated from Forsyth and Schultz 2018, p.33)

Water Supply	Avgerage Annual Allocation	Average Annual Reduction[a]	Percent reduction	Average Annual Reduction[a] Adverse Climate	Percent reduction	Average Annual Reduction[b]	Percent reduction	Average Annual Reduction[b] Adverse Climate	Percent Reduction
CUP Supply	50,000	2,640	5.3%	12,560	25.1%	3,660	7.3%	15,840	31.7%
CUP - ULS Supply	16,400	5,860	35.7%	13,580	82.8%	6,460	39.4%	14,960	91.2%
Lower Provo Natural Flow	100,000	33,400	33.4%	57,600	57.6%	35,200	35.2%	59,400	59.4%
Total	166,400	41,900	25.2%	83,740	50.3%	45,320	27.2%	90,200	54.2%

a. 1 in 50, 5year Duration
b. 1 in 100, 5year Duration

Approximately, 70 percent of JVWCD supply is surface water. The other 30 percent coming from groundwater has proven to be resilient to drought. With adverse climate change impacts reducing JVWCD surface water supplies by 50 percent or more under drought conditions, JVWCD and its customers must be prepared to restrict deliveries to 65 percent (30 percent from groundwater plus 1/2 the typical surface water supply) or less of typical year supplies.

4.1.2 Production Capacity Shortfall

Figure 4-2 shows the projected maximum day demand for hot, dry conditions compared to the JVWCD maximum supply capacity. The comparison shows that the new wells must be developed immediately and that the JVWTP Phase 1 expansion must be completed by 2024 to continue meeting maximum day demand in the system. JVWCD's level of service goal is to maintain adequate capacity for 110 percent of the projected maximum daily demand (MDD) to account for uncertainty in demand projections. JVWCD is taking efforts, like its WES, to reduce outdoor water use that has the highest influence on maximum day demand, but it will take many years for those measures to have significant impact on the demands.

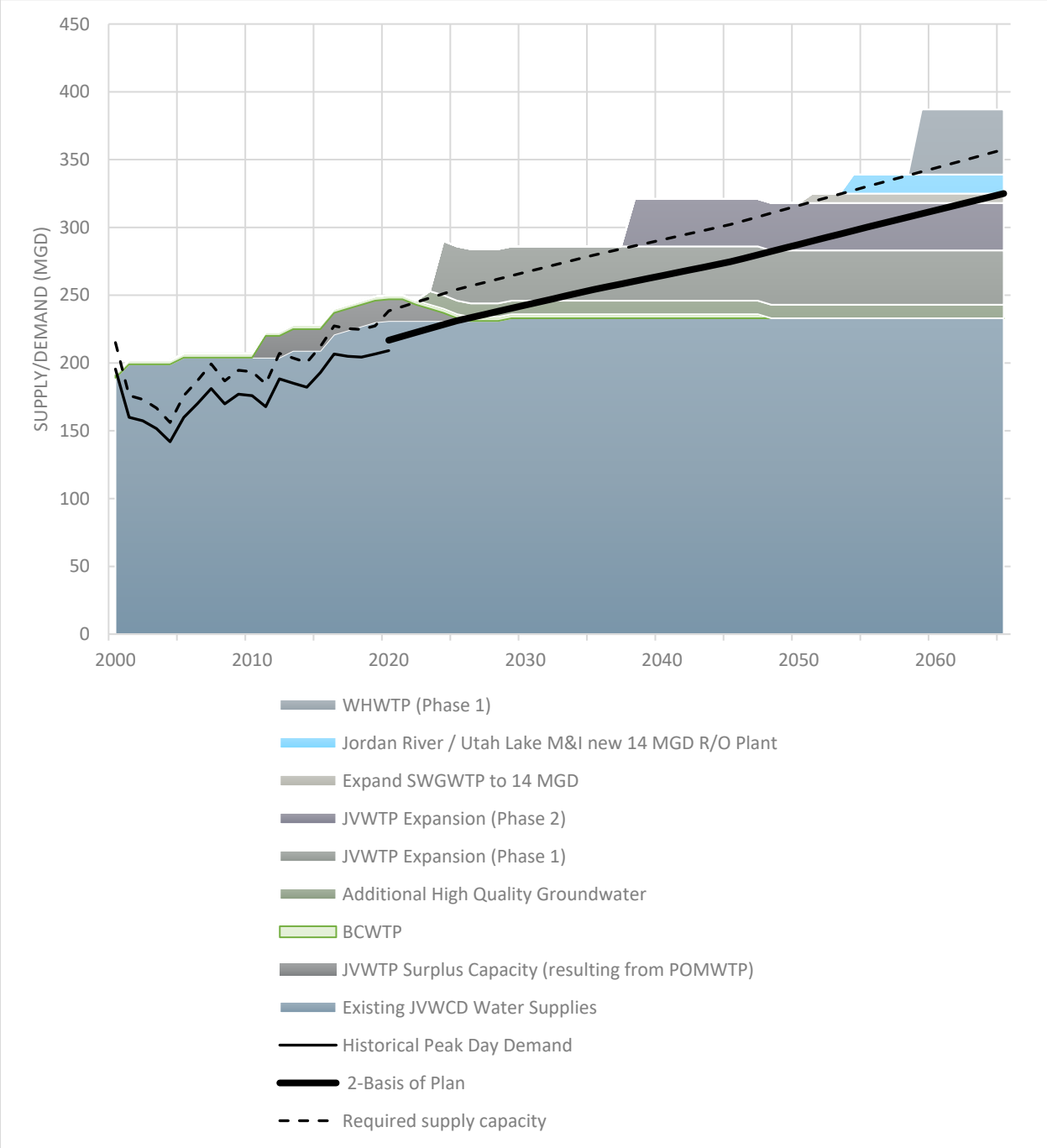


Figure 4-2. Projected maximum day demand for hot, dry conditions compared to the JVWCD maximum supply capacity

4.1.3 Supply Improvement Summary

The annual yield and production capacity analyses were used to determine the critical year by which each supply improvement is needed. This timing is summarized in Table 4-2. All sources except for the CUP are new sources, and all production facilities except the SWFWTP are new facilities.

Table 4-2. Supply/Production Capacity Timing		
Source(s)	Production Facility	Completion Year
Additional High-Quality Groundwater	New wells	2022
CUP, PRWUC Shares, Additional Provo River sources	JVWTP Expansion (Phase 1)	2024
ULS		2029
ULS	JVWTP Expansion (Phase 2)	2037
Membrane Treatment of Utah Lake/Jordan River water	Existing SWGWTP	2038
Additional Membrane Treatment of Utah Lake/Jordan River water	Expand SWGWTP to 14 mgd	2039
Membrane Treatment of Utah Lake/Jordan River & deep brackish groundwater	Jordan River/Utah Lake M&I new 14 mgd RO Plant	2045
Bear River Project	West Haven WTP (Phase 1)	2055

4.2 Risk Factors

Likelihood for reduced supply can be investigated through the use of "risk factors" that focus on potential impacts to critical supply resources. A list of six uncertainties or "risk factors" was developed in coordination with JVWCD staff and input from Task Force members to understand future conditions. These risk factors address future changes that may impact critical resources for JVWCD's water supplies and distribution and are listed in Table 4-3. Further description of these risk factors is provided following Table 4-3 within this section.

Table 4-3. Risk Factors	
Risk Factor	Description
1. Dry year supply limitations	• Limitations due to in-stream/downstream flow requirements • Groundwater production capacity limitations
2. Climate Change	• Altered or extreme precipitation patterns • Increased frequency and or severity of droughts, including beyond historical record • Higher water temperatures • Reduced snowpack and earlier runoff patterns
3. Regulatory, environmental, and water rights constraints	• Water rights and contract limitations • More stringent water quality regulations (State and Federal) • More stringent environmental protection regulations
4. Cost constraints and affordability	• Aging infrastructure and rising costs for infrastructure improvements • Pumping costs • Increased treatment requirements
5. Source water quality degradation	• Algae by-products • Salinity and nutrients • Constituents of concern • Groundwater contamination • Differing water quality • Contamination spill • Forest/Rangeland wildfires
6. Asset/Facility Susceptibility to Disruption	• Potential for disruption through asset failure • Susceptibility to hazards (including seismic, flooding, land subsidence) • Lack of redundancy for critical facilities

4.2.1 Dry Year Supply Limitations

Water shortages during drought may be exacerbated due to in-stream or downstream flow requirements in the form of a change in the amount of flow, the timing of releases (including for fish spawning or recreational purposes). Groundwater sources can also be affected by production capacity limitations due to the need to stay within sustainable pumping levels, and to meet demands for groundwater-dependent ecosystems.

4.2.2 Climate Change

With impacts from climate change the timing or method of source water delivery may change entirely, and supplies need to be resilient and flexible to these changes. This risk factor also includes reductions in water supply due to the effects of warming, including greater evapotranspiration, and potential increased water demand. Current modeling associated with the CUP anticipate surface water supply reductions due to climate change (see Section 4.5 for impacts beyond the 2030 planning horizon).

4.2.3 Regulatory, Environmental, and Water Rights Constraints

Regulatory, environmental, and water rights constraints due to current or future water rights and contracts could impact supply reliability. Some of the water rights are direct flow only and have limitations when JVWCD can start diverting flow. Additionally, some supplies are subject to strict agreements or contract terms that may be inherently unmet during drought. Limitations due to regulatory changes and changes in environmental protection regulations can also affect the water quality and water delivery of each source.

4.2.4 Cost Constraints and Affordability

This risk factor points to ways in which rising water rates (whether due to needed infrastructure improvement costs, pumping, or treatment) can make some sources unaffordable for customers within the service area.

4.2.5 Source Water Quality Degradation

Some water sources are more susceptible to natural or anthropogenic degradation of water quality. This includes degradation due to continued urbanization near the water sources. Changing surfaces from pervious to impervious causes more runoff and less infiltration allowing water to collect additional contaminants. Other potential sources of water quality degradation include increased nutrient loading from wastewater discharges or agriculture that may cause algae blooms and algae by-products. Forest or rangeland fires can also cause water quality challenges. Additionally, past events have demonstrated potential vulnerability to contamination due to chemical spills for some sources.

4.2.6 Asset/Facility Susceptibility to Disruption

Asset/facility susceptibility to disruption includes disruption due to seismic, flooding, or land subsidence events that may cause a major disruption or complete shutdown of key system assets or facilities. Water supply vulnerability increases for sources without redundant systems or with aging assets. Seismic events are likely along the Wasatch Front, making assets that are properly designed to withstand these events critical within this area.

These risk factors were analyzed for each critical supply source and a summary of potential impacts is identified in Table 4-4.

Table 4-4. Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources (scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Supply Source	Dry Year Supply Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	Cost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	1	3	2	2	3	2		
CUP Federal project administered by CUWCD, storage in Jordanelle Reservoir	• Limitations due to in-stream/downstream flow requirements • Dry year supply limitations, especially for multiple dry years	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield) • Increase in demand based on longer growing seasons (may mean supplies do not go as far in the future given changed conditions)	• Increased environmental regulations • Unforeseen changes in release requirements and storage rights • Potential changes in current water rights and water rights law (e.g. recent local news articles and reports, and water rights for upper Colorado River Watershed) • Flexibility through a +/-20% of JVWCD allocation provision (maintaining average over 5-7yr period)	• Failure due to aging infrastructure • Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements) • Costs associated with increases/alteration of environmental regulations. • Gravity systems have lowered costs	• Algal by-products/blooms during drought (e.g. State-level studies in progress on this topic) • Weeds • Salinity and nutrients (esp. more recent issues with nutrient loading and need to address nitrates more than in the past) • Water quality impacts from wildfires • Misc. manmade events (e.g. diesel spill) • Urbanization impacts on source water quality (increase in impervious surfaces - esp. around Jordanelle Reservoir, e.g. parking lots, roads, as well as sediment and organic matter). Note: All top three seem pretty likely. Urbanization may be biggest risk to Jordanelle and Provo River Water.	• Conveyance lines cross fault lines (e.g. Wasatch Fault Zone) • Jordanelle Reservoir and Dam built to withstand 7.5 Richter scale magnitude at Wasatch Fault Zone, and 6.5 magnitude for local earthquake (directly below dam). • Flood risk in Provo River and upper tributaries.	2	40%
Likelihood	1	2	3	2	2	4		
High Quality Groundwater Wells primarily in southeast region of Salt Lake Valley deep aquifer. No treatment required other than adding chlorine and fluoride. Show lower production in average years to provide more reliable production of drought year yield.	• Dry year supply limitations • Groundwater production capacity limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • More frequent and severe droughts (adverse impacts to reliable yield, including for groundwater replenishment) • Inefficient runoff impacts to groundwater replenishment	• Increased environmental regulations • Potential changes in current water rights • Unforeseen changes in allocation or withdrawal requirements • More stringent water quality regulations (State and Federal) • Potential requirements or planning enacted in response to increased urbanization (e.g. reduction of pervious surfaces) Note: At least a 3, need to consider in-practice water rights on paper may differ from what is available in practice	• Low treatment costs (limited treatment required) • Groundwater pumping costs	• Generally very good supply source quality • Salinity and nutrients (Brackish groundwater migration) • Wastewater discharges • Contamination (intentional and unintentional events)	• Failure due to aging infrastructure (e.g. age of wells) • Seismic risk due to proximity of infrastructure to faults (e.g. Wasatch Fault Zone) • Difficulty in reliably maintaining well equipment. Wells are unpredictable in terms of when they go down, but can anticipate 1/3 wells down at any one time	2	15%

Table 4-4. Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources (scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Supply Source	Dry Year Supply Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	Cost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	4	3	3	2	4	4		
Canal Company Sources Primarily Utah Lake and also Jordan River	• Since 2008 several voluntary shutoffs have been performed due to supply limitations (e.g. early shutdown of canals due to lower level of Utah Lake in the past) • In 2018, due to lack of water availability in Utah Lake, secondary storage rights were not allowed to divert	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield)	• Increased environmental regulations • Additional regulation at state level to address water loss may impact canal companies' financial stability in the case that no state funding is provided • Potential changes to distribution which could impact canal diversions. State Engineer is currently developing a new Jordan River distribution plan. • Potential increased instream flow requirements or regulations addressing the water level of Great Salt Lake may leaving less water for canal use	• Utah Lake water is very inexpensive, cost to deliver the water to the canals is approximately $2 per acre-foot.	• Utah Lake Water Quality Study (currently about halfway through 5 year study) to be implemented by 2030 with the goal to reduce nutrient loading from point and non-point sources and decrease algal bloom events. • Utah Lake Island project could improve water quality by increasing depth and decreasing evaporation. • Higher frequency of Cyanotoxin contamination in the next 10 years • Growth of grasses • Past examples of shutdown for a week due to water quality issues and reliance on culinary supply	• Utah Lake Pump Station - New pump station built in 2013 and now operational, Turner Dam, JNPS, Several Diversion Structures. Overall facilities are in good shape. • Flood risk from canal breach can be very costly and could shutdown a canal for an entire season		The Canal Company Sources are not a direct critical supply source for the JVWCD portfolio. However, they are included in this analysis due to their importance as a source for agricultural users, and also as a source of secondary irrigation M&I deliveries by some JVWCD Member Agencies. There is potential for increased demand for JVWCD's resources should the Canal Company Supplies be compromised.
Likelihood	1	3	1	2	3	2		
PRWUC Shares JVWCD owns majority shares in PRWUC which has direct flow rights and some storage rights in Deer Creek Reservoir (This source includes Deer Creek Reservoir and direct stream flow from Provo River)	• Limitations due to in-stream/downstream flow requirements • Dry year supply limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield)	• Potential changes in current water rights • Unforeseen changes in release requirements and storage rights	• Pumping costs • Failure due to aging infrastructure • Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements)	• Issues due to nutrients likely (e.g. algal by-products/blooms during drought, agricultural runoff, wastewater discharges) • Water quality impacts from wildfires likely (e.g. sediment loads) • Misc. manmade events (e.g. truck submersion)	• Infrastructure (e.g., storage) costs, including rehabilitation and replacement • Conveyance lines cross fault lines (e.g. Wasatch Fault Zone) • Flood risk in Provo River and upper tributaries.	2	20-25%
Likelihood	3	3	1	2	3	2		
Additional Provo River sources Provo River rights per former West Union Canal Co shares owned. Also shares in other Provo River irrigation Co.	• Limitations due to in-stream/downstream flow requirements • Dry year supply limitation	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield)	• Increased environmental regulations • Potential changes in current water rights • Unforeseen changes in release requirements and storage rights	• Pumping costs • Infrastructure (e.g., storage) costs, including rehabilitation and replacement • Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements)	• Issues due to nutrients more likely (e.g. algal by-products/blooms during drought, agricultural runoff, wastewater discharges) • Water quality impacts from wildfires likely (e.g. sediment loads) • Misc. manmade events (e.g. truck submersion)	• Issues due to low flow, or higher than average peak flows • Failure due to aging infrastructure • Seismic risk due to proximity of infrastructure to faults (e.g. Wasatch Fault Zone) • Flood risk in Provo River and upper tributaries.	2	2%

Table 4-4. Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources (scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Supply Source	Dry Year Supply Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	Cost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	1	2	2	2	2	2		
CWP Non-federal project owned by CUWCD. The supply is primarily from groundwater in Utah County (Vineyard area) supplemented by treated water from Provo River.	• Dry year supply limitations • Groundwater production capacity limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield, including for groundwater replenishment)	• Increased environmental regulations • Potential changes in current water rights • Unforeseen changes in allocation or withdrawal requirements • More stringent water quality regulations (State and Federal)	• Groundwater pumping costs • Infrastructure (e.g., storage) costs, including rehabilitation and replacement	• Salinity and nutrients • Agriculture runoff • Wastewater discharges	• Seismic risk due to proximity of infrastructure to faults (e.g. Wasatch Fault Zone)	2	9%
Likelihood	1	4	1	2	2	3		
ULS (future source in 2030) Federal Project - last phase of CUP. Administered by CUWCD, storage in Strawberry Reservoir	• Limitations due to in-stream/downstream flow requirements • Dry year supply limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adverse impacts to reliable yield)	• Increased environmental regulations • Potential changes in current water rights • Unforeseen changes in release requirements and storage rights • Current petition contract for additional CUP water	• Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements) Gravity systems have lowered costs	• Algal by-products/blooms during drought • Salinity and nutrients • Water quality impacts from wildfires	• Issues due to low flow, or higher than average peak flows • Seismic risk due to proximity to faults (e.g. Wasatch Fault Zone) • Flood risk	2	8%
Likelihood	1	2	3	4	2	3		
SWJVGW Project Membrane treatment of brackish groundwater in southwest region of Salt Lake Valley deep aquifer. Part of Kennecott groundwater cleanup project and includes both the BCWTP and SWGWTP	• Dry year supply limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • More frequent and severe droughts (adverse impacts to reliable yield, including for groundwater replenishment) • Inefficient runoff impacts to groundwater replenishment	• Increased environmental regulations • Potential changes in current water rights for Utah Lake/Jordan River • Unforeseen changes in allocation or withdrawal requirements • Changes in requirements for groundwater dependent ecosystems (GDEs)	• High costs to operate RO systems required to treat this water. • Groundwater pumping costs	• Potential for new groundwater contaminant	• Newer plant built to current seismic codes. • Mechanical failure of well or treatment equipment	3	6%
Likelihood	1	3	3	4	3	3		
Membrane Treatment of Utah Lake/Jordan River SWGWTP was built to accommodate 2K AF of shallow groundwater treated with reverse osmosis membranes. Water rights supporting this shallow groundwater production are Utah Lake/Jordan River rights	• Dry year supply limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • More frequent and severe droughts (adverse impacts to reliable yield, including for groundwater replenishment)	• Increased environmental regulations • Potential changes in current water rights • Unforeseen changes in allocation or withdrawal requirements • Changes in requirements for groundwater dependent ecosystems (GDEs)	• High costs to operate RO systems required to treat this water. • Significant capital cost to dispose of treatment by-products. • Groundwater pumping costs	• Potential susceptibility to cyanotoxins from Utah Lake	• Newer plant built to current seismic codes. • Mechanical failure of well or treatment equipment	3	1%

Table 4-4. Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources (scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Supply Source	Dry Year Supply Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	Cost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	3	4	1	2	3	4		
Local Mountain Streams Five small streams from Bell Canyon stream to Big Willow stream collected and treated at the SERWTP. No storage.	• No holdover storage capacity in the watershed to mitigate drought impacts from one-year to the next. Dry year supply limitations	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack (small steep watershed in which moderate increases in winter snowpack elevation can have a significant spring runoff) • More frequent and severe droughts (adverse impacts to reliable yield)	• Increased environmental regulations • Potential changes in current water rights	• Treatment costs	• Water quality impacts from wildfires with increased likelihood during drought (e.g. warmer, drier conditions) and increased risk to quality of local canyon creeks	• Conveyance lines from intake structures are currently showing signs of failure for which rehabilitation is needed. • Conveyance lines cross or are in close proximity to fault lines Flood risk	3	1%

Assumptions for above table:

- *Reservoirs and other surface water sources are assumed to have similar likelihood of impacts for climate change due to warmer temperatures and evaporative losses for lakes, reservoirs, and stream and inefficient runoff due to premature snowmelt.*
- *Groundwater supply source likelihood of impact from seismic events assumed to be mixed and depend on aquifer characteristics (see further information from the USGS "Groundwater Effects from Earthquakes" website in the DCP references list)*
- *Many of the same potential impacts occur across supply sources. However, differences exist related to potential infrastructure susceptibility, water rights (and in some cases existing petitions), and potential in-stream/downstream flow requirements.*
- *"Additional Provo River Sources" assumed to have similar likelihoods of impact as the PRWUC.*

4.3 Reliance on Critical Supply Sources

The consequence of critical supplies is demonstrated in the percentage of these supplies as part of JVWCD's water resource supply portfolio. The percentages as demonstrated in Figure 4-3 represent the portion of the supply as anticipated during the year 2030 and includes assumed impacts from climate change factored into the total supply source availability.

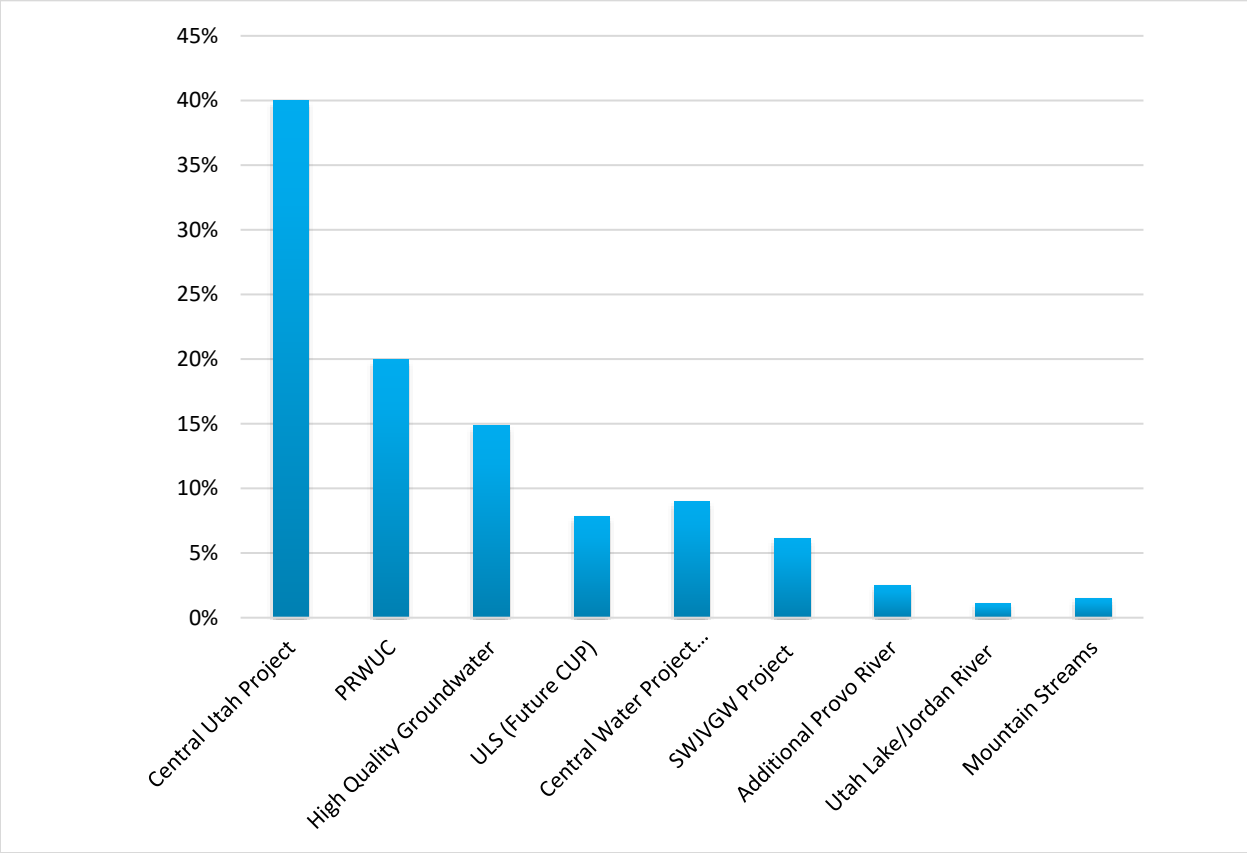


Figure 4-3. Reliance on critical supply sources

The percentages indicate the upper bound limit of potential impact to JVWCD's portfolio should the supply source become unusable or unavailable. JVWCD's long history of discerning supply planning is evidenced in the fact that no one source constitutes more than 50 percent of JVWCD's supply portfolio. This provides inherent resiliency in the system that is reflected in the vulnerability assessment below.

4.4 Supply Source Vulnerability

Results of the vulnerability assessment indicate which supplies JVWCD should focus on for the consideration and development of drought mitigation measures. The results of the assessment are presented in Table 4-4 which features a description of potential impacts of each risk factor for each of the critical supply sources for JVWCD's water supply portfolio.

Likelihood values for the risk factors presented in Section 4.2 are developed and applied to each of JVWCD supply sources. A likelihood score is given based on a scale of one to five (low to high)

likelihood of impact for the year 2030 under multi-year drought conditions. A cumulative likelihood score is provided and represents an average of the individual risk factors scores. As shown below in Figure 4-4, the supply sources with the highest likelihood of potential impact include Utah Lake, Jordan River, Mountain Streams, and the SWJVGW Project.

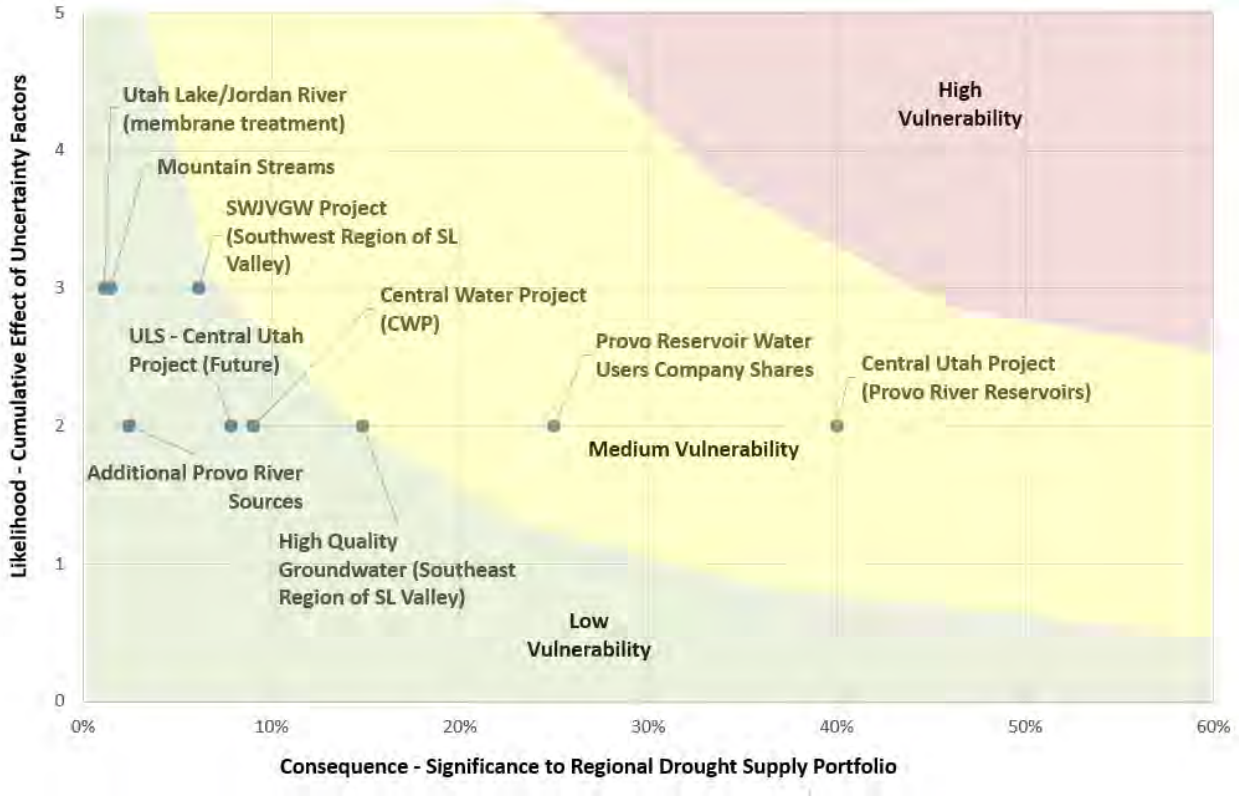


Figure 4-4. Vulnerability of critical supply sources indicated by combined values for likelihood and consequence

The summary also features the consequence, representing the significance of the supply source in terms of percentage of drought supply portfolio. Consequence is the percentage of the total drought supply portfolio the critical supply source provides for a 1 in 50 year, 5-year drought in 2030. As shown below in Figure 4-4, the supply sources with the highest consequence of potential impact include Central Utah Project (CUP), Provo Reservoir Water Users Company (PRWUC) Shares, and High-Quality Groundwater.

The values expressed for the risk factor likelihood and the consequence of potential impact of these supplies for JVWCD's portfolio can be expressed in a risk matrix (see Figure 4-4 below) to identify the supply sources that represent a high, medium, or low vulnerability for JVWCD's water portfolio.

Results of the vulnerability assessment indicated that there are no supply sources that fall within the "High Vulnerability" category. Therefore, the sources that represent the highest vulnerability, a combination of likelihood and consequence, in JVWCD's water supply portfolio fall within the "Medium Vulnerability" category and include the following:

- Central Utah Project (CUP), (40 percent of the supply portfolio)
- Provo Reservoir Water Users Company (PRWUC) Shares (20-25 percent of the supply portfolio)
- High Quality Groundwater (15 percent of the supply portfolio)

As indicated in Figure 4-4, the majority of the JVWCD's portfolio critical supply at the 2030 planning horizon fall within low to medium vulnerability. JVWCD's system has the highest potential for vulnerability from its CUP supply in in large part due to the higher percentage of the portfolio's reliance on this individual source. Sources with the highest likelihood of potential impact on JVWCD's supply portfolio include Utah Lake, Jordan River, Mountain Streams, and the SWJVGW Project.

4.5 Climate Change Risk

Climate change impacts are anticipated to exacerbate existing extreme weather events, including the length and intensity of drought and floods through changes in precipitation and temperature. Although there is uncertainty in the degree of potential changes in the hydrologic cycle, projected trends according to the Intergovernmental Panel on Climate Change indicate a high likelihood for increases in temperature and changes in the severity and intensity of precipitation events (Intergovernmental Panel on Climate Change [IPCC] 2013). At the regional and local level, studies by DeRose at al. (2015) and Bekker et al. (2014) using dendrochronology along the Weber and Bear Rivers in Utah have yielded relevant information on paleohydrology and have demonstrated "significant annual and decadal climate variability, including drought periods that are much longer and drier than those experienced in the recorded history" (Forsyth and Schultz 2018, p.4). The JVWCD service area makes use of these studies and past palaeohydrological data to understand what potential, more severe droughts occurred in the past, and may potentially impact or recur in the future. These impacts to JVWCD may include changes in precipitation and general hydrologic patterns, reduction of snowpack and water supply, water quality impacts, and potential increases in water demand.

4.5.1 Precipitation and Temperature

The climate of the State of Utah has seen high variability across the past 1,000 years, with greater variability in terms of extremes for both wet and dry periods experienced in recent instrumental period (Forsyth and Schultz 2018, p.5). The State has demonstrated an increasing trend in temperature that corresponds to trends predicted by global climate models. The impacts of this changing condition include changes in snowmelt flows, and the anticipation of greater inefficiencies of these flows in the future. Premature snowmelt resulting in inefficient conversion of snowmelt run-off to reservoir inflow occurred between 2000-2004 during a drought that effected most Utah watersheds, and is an example of what could be expected to continue with increasing temperatures. This early snowmelt shifts average peak streamflow periods that are currently relied upon by existing water supplies. Other impacts include potential increase in the rate of evapotranspiration due to increased temperatures, as well as an increase in the intensity of rainfall events.

Research from Strong and team from the University of Utah Department of Atmospheric Sciences summarizes and indicates potential key changes for temperature and precipitation may result in the following by the year 2100:

- Temperature increase between 1.5 to 5 degrees Celsius (°C)
- Precipitation increase between 5 to 10 percent (Wasatch), 20 percent (Uinta)
- Snowpack increase of 10 percent above 8,500 feet and decrease of 11 percent below 8,500 feet (Strong et al. 2018).

4.5.2 Supply and Demand Beyond 2030

JVWCD considered various scenarios for water supply and demand patterns under adverse climate conditions in the 2018 report, Preparing for Climate Change – A Management Plan (Forsyth and Schultz, 2018). Parameters for these climate change scenarios included scenarios involving one in

50 year and one in 100 year droughts including both paleo drought conditions and predicted impacts due to climate change to understand supply side impacts. For the water demand side, scenarios were identified involving increased water demand in the JVWCD service area using predicted climate changes by year 2060 from global climate models.

Results from the scenario analyses are summarized in Figure 4-5. The analysis shows that with projected climate change impacts, the existing sources may not provide enough water to meet projected demand shortly after 2030. It also shows that by 2065 the water supply shortfall could be as much as 56 mgd with predicted climate change impacts.

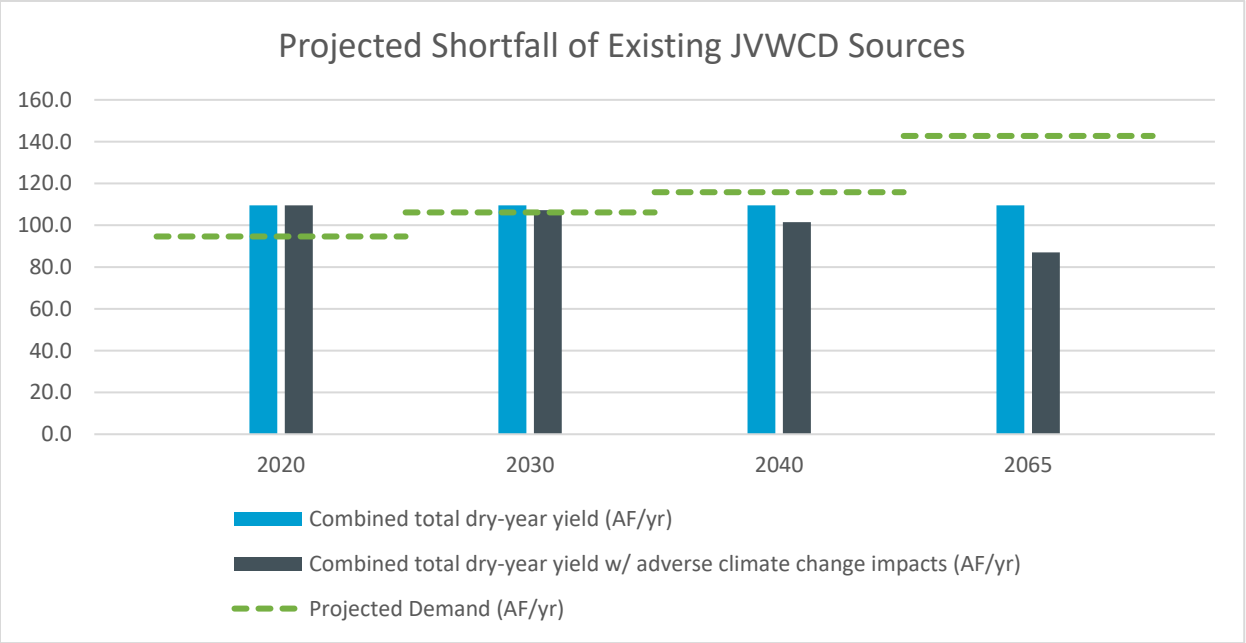


Figure 4-5. Projected shortfall based on climate change scenario results

A key consideration for this assessment and beyond is the potential for multiple droughts to occur shortly after one another, reducing the ability of reservoirs to recharge between drought periods. Impacts to water rights holders is another important consideration, especially for rights holders relying on river direct flow or natural flow without a storage right like JVWCD. With climatic changes, there is an anticipated reduction in flows during the later summer months. There may be a shift to greater direct flows during spring run-off periods, which exceed existing demand during this period and result in less water availability during later periods when demand is higher. Climate change is assumed to have an increasing impact and is anticipated to reduce supply gradually over time, as modeled over a 40 year period from 2020-2060 for the purpose of the scenario analysis (Forsyth and Schultz 2018, p.39).

4.6 Impacts to Water Quality

Adverse impacts to water quality could occur with increasing temperatures and may appear in the form of algae blooms in Utah Lake. This is a concern particularly when reservoir levels are low during dry periods. Quality degradation in Utah Lake may reduce confidence in the usability of this source as a supply for secondary water systems, which may increase pressure for JVWCD water supply and capacity.

These potential impacts, particularly in the consideration of adverse climate change effects, can be used as a starting point to develop mitigation measures. The next section also contributes to the development of measures by providing further insight into how the risk factors presented previously impact specific sectors.

4.7 Sector Impacts

The M&I, environmental, agriculture, and recreation sectors reflect the interests and priorities of JVWCD and Stakeholders in the service area. Drought affects each sector differently as shown in Table 4-5.

Table 4-5. Drought Impacts Across Sectors

Risk Factor and Drought Impact	M&I	Environmental	Agriculture	Recreation
Dry Year Supply Limitations				
Supply limitations due to in-stream flow requirements	x	x	x	x
Groundwater production capacity limitations and supply reduction	x		x	
Climate Change				
Early runoff pattern	x	x	x	x
Reduced reservoir levels	x	x	x	x
Reduced stream flows	x	x	x	x
Increased evapotranspiration	x	x	x	x
Regulatory, environmental, and water rights constraints				
Reduction of contracted water exchanges	x		x	
Increased State and Federal regulation on supply sources to support environmental flows	x	x	x	x
Cost constraints and affordability				
Rising water rates	x		x	
Source water quality degradation				
Water quality impacts from anthropogenic sources (chemical spill, urbanization)	x	x	x	x
Water quality impacts from wildfires	x	x		
Increased occurrence of algal blooms and algae by-products	x	x	x	x
Increased nutrient levels	x	x	x	
Increased water temperatures	x	x		x
Asset/Facility Susceptibility to Disruption				
Asset damage from seismic events	x		x	x
Asset failure due to aging infrastructure	x		x	

4.7.1 M&I

The M&I sector relies on each water source in the JVWCD portfolio and the various assets used to store, convey, or treat the water. Any form of disruption to these sources can heavily impact this sector.

4.7.2 Environmental

Lower stream and groundwater flows and altered runoff patterns impact ecosystems that rely on surface and groundwater. They can damage habitat and alter natural lifecycles. Water quality degradation due to drought can also cause adverse impacts to ecosystems. For example, the lower Provo River is designated as a critical habitat for the June Sucker, an endangered species endemic to Utah Lake. Current recovery projects for this species are closely related to the water quality, quantity, and hydrology of Utah Lake and its tributaries.

4.7.3 Agricultural

Groups within this sector rely on quality water, free of high salinity concentrations or toxic algae by-products. Impacts to the water quality due to drought can quickly interrupt water sources this sector relies on causing them to be temporarily or permanently unusable. The previously mentioned 2016 algal blooms in Utah Lake that prompted secondary water systems to shut down are an example of this. Without the ability to use these secondary water systems, this sector's demand on the JVWCD system increased. These events can trigger further economic hardship to agriculture groups due to raising water rates or loss of agricultural products and income.

This sector relies on existing canal infrastructure to deliver the water needed. Disruptions to assets, such as pumping stations, may leave agricultural water sources unusable. These disruptions may occur from lower lake water levels causing pumping systems to be inoperable.

4.7.4 Recreation

The sources within the project area are home to various recreational interests including bird watching, fishing, sail boating, swimming, kayaking, hunting, and water skiing. Reservoir levels and river levels are reduced during times of drought, which can limit recreational activities.

Additionally, degraded water quality may cause recreation area closures to protect public health. Recreational closures already regularly occur due to harmful algae blooms. The Utah Department of Environmental Quality has established a recreational water monitoring program to facilitate recreational closures and protect the public.

4.7.5 Stakeholder Input of Sector Impacts

Input from the DCP Task Force and Outreach Group was requested to help identify specific sector impacts from drought. For the Outreach Group, which includes representatives of JVWCD's Member Agencies, questions were asked to solicit information on which risk factors most impact their sectors and how their sector was impacted during the last drought. The most common responses are captured below in Table 4-6.

Table 4-6. Outreach Group Feedback Considered when Developing Mitigation Measures
Which risk factors most impact your sector?
Dry year limitation (7 responses)
Climate change (2 responses)
Cost-affordability (5 responses)
Water quality (1 response)
All of the above (1 response)
How was your sector impacted during the last drought?
Habitat impacts
Struggles to reduce water waste
Challenges educating the public
Decreased economic output
Enhanced conservation emphasis

4.8 Vulnerability Assessment Summary and Opportunities to Reduce Drought Vulnerability

The vulnerability assessment evaluated the vulnerability of JVWCD's different water supply resources based on risk factors that contribute to reduced supply (determining likelihood of risk) and based on the reliance JVWCD has on this supply source as a percentage of its portfolio (which determined the consequence). Results of the assessment, as previously shown in Figure 4-4, indicated that the following supply sources represent the highest vulnerability in JVWCD's water supply portfolio:

- CUP, (40 percent of the supply portfolio)
- PRWUC Shares (24 percent of the supply portfolio)
- High Quality Groundwater (15 percent of the supply portfolio)

Key vulnerabilities consisting of risk factor likelihood scores of 3 or more were identified along with risks contributing to the vulnerability. Risks contributing to the vulnerabilities developed from the discussions held with JVWCD, the DCP Task Force, and the Outreach Group while performing the vulnerability assessment are summarized in Table 4-7.

Table 4-7. Summary of Key Vulnerabilities

Key Drought Vulnerability	Risks Associated with Vulnerability
Water supply uncertainty in dry years	• Local mountain streams lack holdover storage • Provo river sources are subject to instream/downstream flow requirements during drought
Some surface water supplies lack resiliency and flexibility to impacts from climate change	• More frequent and severe droughts (multi-year drought) • Altered/extreme precipitation patterns (less in spring, higher intensity storms in winter) • Reduction in available water supply due to usability timeframes impacted by premature snowmelt and reduced snowpack • Increased demand based on longer growing seasons
Water supply uncertainty due to water rights, environmental regulations, or other regulations	• Urbanization causing certain plans or requirements to enact for groundwater sources • Increased environmental regulations impacting use of the source (e.g. changes to requirements for groundwater dependent ecosystems)
Costly treatment of water sources	• Reverse osmosis technology required to treat Utah Lake and brackish groundwater sources • Groundwater pumping costs are 2 times greater than JVWTP treatment costs.
Source water quality degradation during drought	• Algal by-products/blooms impacting usability of sources • Sudden inability to use secondary water sources due to algal blooms (imparts higher demand on JVWCD supplies) • Salinity and nutrients from urbanization (increase in impervious surfaces) • Increased wildfires • Misc. anthropogenic water quality degradation events (e.g. diesel spill)
Inability to utilize supplies due to aging infrastructure and equipment reliability	• Aging wells • Operations typically expects 1/3 of high-quality groundwater wells down at any one time due to equipment reliability • Canal breaches/failure causing higher demand on JVWCD supplies • Mechanical failure of wells or treatment equipment • Current conveyance lines for local mountain streams source showing signs of failure
Failure due to seismic events	• Infrastructure proximity to faults (e.g. Wasatch Fault Zone)
Heavy reliance on CUP and PRWUC water sources	• These sources combined make up more than 50% of the supply portfolio

Note: Includes any risk factor with a score of 3 or more. Excludes canal company sources vulnerabilities but includes the impacts of canal company sources failure.

Considerations for areas of vulnerability based on the assessment provided in this section include the following:

- Surface water supplies due to their susceptibility to climate change impacts, and particularly when considering longer term forecasts than the 2030 planning horizon
- Consideration for adjustments to existing water rights to enable diversion and storage would be an important part of developing these capacities
- Risks to secondary source supplies, like water quality in Utah Lake, that may if compromised mean greater demand for JVWCD's supplies and infrastructure
- Continued need to develop supply and continue conservation efforts is needed and assumed will support reducing supply shortfalls
- Consideration for increased demand and identifying further opportunity for individual consumption efficiencies will be important when considering impacts of increased temperatures
- Understanding impacts to groundwater yield (and limitations for sustainable yield)

Both the CUP and PRWUC are critical supply sources at potential risk to limitations (or reduced available supply) due to in-stream or downstream flow requirements and potential dry year supply limitations. Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter)

and premature snowmelt and reduced snowpack may further reduce these flows and adversely impact these sources. The primary water quality concern is wastewater and agricultural nutrient loading exacerbating algal bloom issues. These supply sources as well as JVWCD's High Quality Groundwater may experience more frequent and severe droughts, generating adverse impacts to reliable yield. Although unlikely, they all may also be impacted by potential future changes in existing water rights and release requirements.

These risk factors corresponded to notable impacts including supply limitations due to in-stream flow requirements, changes in early runoff patterns, and potential for increased occurrence of algal blooms and algae by-products. In Sections 5 and 6, this DCP identifies strategies aimed to reduce some of the vulnerabilities identified in this Section (Section 4).

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Section 5

Drought Mitigation Measures

This section identifies, evaluates, and prioritizes mitigation measures that will build long-term resiliency. Mitigation measures are defined as preemptive actions or activities put in place before drought to reduce risk and impacts of drought. For example, mitigation measures may include construction of new facilities for additional storage or treatment of new and existing water sources. These measures occur outside of regular water management activities and are separate from what this section defines as drought planning activities. Drought planning activities are those that may take less than one year to implement, and/or do not need additional funding (either existing funding is in place or no funding is necessary to implement).

The drought mitigation measures presented reduce sector vulnerabilities, support activation of drought response actions needed during times of drought, and by enabling preemptive actions reduce the need for further response actions. In contrast, response actions are reactive strategies, programs, or activities put in place to decrease the severity of immediate drought impacts. They include triggers tied to specific stages of drought or water supply availability levels. Response actions may include water curtailments and rate increases for various sectors. Further information related drought response actions can be found in Section 6.

5.1 Existing Drought Mitigation Measures and Coordination

JVWCD's current drought mitigation efforts include water conservation and water resource planning. JVWCD's level-of-service criteria for water resource planning includes 1) meeting total system demand for a 1 in 50 year, 5 year-duration drought, and 2) maintaining a surplus capacity that is 5 percent greater than the projected average annual demand. The supply planning details are provided in Section 2. The water conservation efforts are summarized below.

As previously mentioned, in 1998, the Utah State legislature passed the Water Conservation Plan Act, which requires culinary water providers and conservancy districts to submit water conservation plan updates to the Utah Division of Water Resources (UDWRe) every 5 years. JVWCD submitted its first water conservation plan in 1999, with updates in 2004, 2009, 2014, and 2019.

The 2019 Water Conservation Plan Update (2019 Plan) outlines JVWCD's overall water conservation goal of 187 gpcd by 2030. This goal is based on the Salt Lake regional goal established in Utah's Regional M&I Water Conservation Goals Report, which was published in 2019 and sponsored by UDWRe.

Many factors can significantly impact how much water is consumed from year to year, including changes in rainfall, temperature, regulations, or population density. Many of these influences were assumed to have an effect on water consumption through 2030.The 2019 Plan showed that JVWCD's increasing population and water demand projections would result in a 11,064 AF deficit in available supply to meet future 2030 demand relative to the 2030 goal. However, if widescale adoption of the WES are achieved, that supply gap could be reduced to 2,770 AF.

Reducing overall water use can be accomplished by persuading water users to modify their behaviors (water conservation) or by creating structural changes that allow water-consuming tasks to be accomplished using less water (water efficiency). To meet JVWCD's goal, both approaches are needed.

Effective strategies for water conservation and efficiency for JVWCD are built upon three pillars: education, incentives, and regulations. Effective education helps water users make sound choices and preserve water resources for the future. Effective incentive programs can influence water users to make structural changes that reduce water demand. Effective regulations have indoor and outdoor WES to help create more sustainable communities. JVWCD offers a variety of programs, initiatives, and measures to target each of these pillars as listed in Table 5-1.

Table 5-1. Existing Water Conservation Programs in JVWCD's Service Area

Education	Incentives	Regulations
Slow the Flow	Localscapes Rewards	WES
Localscapes	Flip Your Strip	Indoor Fixtures
Conservation Garden Park	Toilet Rebates	Residential Landscapes
Landscape Consultations	Smart Controller Rebates	Irrigation Design
Customer Feedback Tools	Landscape Leadership Grants	Commercial, Industrial, and Institutional Landscapes
Leak Mitigation	Member Agency Grants	
Strategic Water Management	Custom Incentive Program	

Two recent accelerators to JVWCD's water conservation efforts include the development of UtahWaterSavers.com and a set of WES for new development. In 2017, UtahWaterSavers.com was developed to host several turnkey water conservation programs for its service area. In 2018, the website was expanded in partnership with UDWRe to host additional statewide rebate programs. This project is mutually beneficial to JVWCD and UDWRe because it allows the agencies to share promotional, hosting, and development costs and provides a single go-to resource for the public. Currently the following programs are managed through the Utah Water Savers website: Localscapes Rewards, Flip Your Strip, toilet replacement rebates, smart controller rebates, and landscape consultations. Widescale public recognition and use of the Utah Water Savers website will be essential to escalate the programs to the levels described in this DCP.

In 2019, JVWCD developed a set of WES based on extensive research into landscape ordinances, water conservation programs, and indoor future standards of many western water providers and cities. These standards are now being used to guide JVWCD's planning, programs, initiatives, model landscape ordinances, and future indoor recommendations.

The standards prohibit the installation of turf grass in park strips and parking lot landscape islands. The standards also place a cap on the amount of turf grass that can be installed in residential front and side yards (35 percent) and limit commercial, industrial, and institutional turf grass installations (20 percent). JVWCD also implements policy changes to encourage each of its Member Agencies to adapt the standards by municipal ordinance or other similar regulatory mechanism. As of September 1, 2021, Herriman City, South Jordan City, Bluffdale, and West Jordan City have adopted these standards into their respective city code.

Building off JVWCD's existing robust programs, future mitigation measures can continue to reduce the gap in JVWCD's projected demand and supplies.

5.2 Development and Evaluation of Future Drought Mitigation Measures

Drought mitigation measures developed for this DCP take into account the results of the vulnerability assessment completed in Section 4, and specifically consider vulnerabilities of supply sources, sector impacts (including M&I, environmental, agricultural, and recreational impacts), and the general benefits that can be derived from each measure. Mitigation measures also include measures that establish frameworks or programs that enable future drought response actions. These considerations are made to ensure that mitigation measures reduce vulnerabilities specific to the JVWCD's system and are actionable and achieved within a specific timeframe. The following subsections identify the steps taken to establish the mitigation measures as illustrated on Figure 5-1.

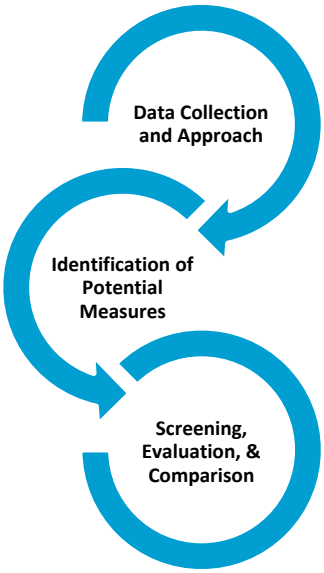


Figure 5-1. Steps taken to develop and evaluate future mitigation measures

5.2.1 Data Collection and Approach

The approach for developing an initial list of mitigation measures included a review of results from the vulnerability assessment that indicated which water resource supplies provide the highest vulnerability for JVWCD's system, and which supplies should, therefore, be addressed by mitigation measures to reduce drought impacts. The approach and results of the vulnerability assessment were reviewed and discussed with the DCP Task Force and the Outreach Group as described in Section 4.

The results of the vulnerability assessment indicated the following risk factors have the highest likelihood to impact supplies out of all risk factors evaluated:

- Climate change (contributing to changing precipitation and temperature patterns and influencing snowmelt and snowpack)
- Asset/facility susceptibility to disruption (related to potential seismic vulnerabilities, aging infrastructure, and flood risk in Provo River and upper tributaries)
- Source water quality degradation (especially issues related to nutrients)

In addition to the input received from the Task Force and Outreach Groups, existing JVWCD plans and studies were reviewed to identify current and planned projects that serve as potential mitigation

measures to reduce drought impacts. These plans and studies included the 2019 Water Conservation Plan Update and the Climate Change Management Plan. This review was complemented by meetings and discussions with JVWCD staff.

5.2.2 Identification of Initial Potential Mitigation Measures

When developing and refining the initial list of potential mitigation measures the categories listed below were considered. Some mitigation measures on the initial list were determined to instead be drought planning activities. Based on the data collected and understanding established from the vulnerability assessment and outreach efforts, the following categories were established and used to group mitigation measures (abbreviations are indicated in parentheses):

- **Agreements & Regulatory (Agr&Reg):** This category is important to consider potential changes in future regulations, water and storage rights, and service agreements.
- **Conservation & Demand Management (Cons&DM):** Feedback from outreach groups indicated that this category is especially important given the impacts to the region during the past drought and the continued need for conservation. JVWCD maintains a robust water conservation program with annual investments to help prepare for and be used in the case of drought.
- **Education & Outreach (Ed&Outrch):** Closely tied to conservation and demand management activities, this category increases customer awareness of current water supply status and programs JVWCD has in place to help prepare the region for future drought conditions.
- **Conveyance (Conv):** This category was developed to consider enhancing system reliability and efficiency through conveyance-related projects and efforts.
- **Treatment Process (Tre):** This category was developed to consider improving system reliability and efficiency through adjustments and or use of new treatment processes.
- **New Water Supplies (NewSup):** This category supports further portfolio diversification to address risk factors and increase supply redundancy and flexibility.
- **Groundwater Management (GWMgnt):** This category addresses the need to further develop supplies and diversify the water supply portfolio in anticipation of drought impacts to surface supplies.
- **Supply Storage (Stor):** This category was developed because additional supply storage increases operational flexibility and may act as a supply buffer in drought years.
- **Watershed Protection & Management (WSPro&Mgnt):** This category includes measures that would target the need for amplified watershed programs that protect source water quality (e.g., Utah Lake).

5.2.3 Screening, Evaluation, and Comparison

A preliminary list of measures was developed for further screening and evaluation. These measures were ranked for comparison before being narrowed to a shortlist of final drought mitigation measures for this DCP. The full list included 49 mitigation measures, which are provided in Appendix B.

The evaluation criteria listed in Table 5-2 were developed to screen and prioritize the list of considered mitigation measures.

Table 5-2. Drought Mitigation Measures Evaluation Criteria

Criterion	Weight	Score = 1	Score = 2	Score = 3
1. Project yield acre-feet per year (AFY)/Availability	20%	Yield is < 1,000 AFY	Yield is between 1,000 and 5,000 AFY	Yield > 5,000 AFY
2. Project timing (concept, feasibility, design, construction)	15%	Implementation in > 10 years	Implementation in 5 to 10 years	Implementation in 0 to 5 years
3. Regional benefit to drought mitigation/resiliency	20%	No	For JVWCD and its MAs.	For JVWCD, its MAs, and other peer agencies.
4. Institutional considerations (stakeholder support, technical complexity, regulatory, reliance on other projects)	15%	Complex project/significant stakeholder considerations	Moderate project complexity/some stakeholder considerations	Relatively simple project/broad stakeholder support
5. Other ancillary benefits realized outside of drought response periods (environmental, recreational, social)	10%	None	Localized benefit	Regional benefit
6. Funding sources, i.e., are there matching funds available to fund the project	10%	No	State or federal loan programs, shared cost with partner agencies	Grants (including Water Smart)/Funding in place
7. Addresses multiple vulnerabilities	10%	Addresses one vulnerability for one source	Addresses one vulnerability for two separate sources; or Addresses more than one vulnerability for one source	Addresses one vulnerability for more than two separate sources; or Addresses multiple vulnerabilities for multiple sources

The project yield criteria enabled a rough quantification of the potential for the proposed mitigation measure to increase the water supply or reduce demand on the supply. Project timing indicated the general trajectory of when the mitigation measure could feasibly be implemented, while the institutional considerations indicated the level of complexity and potential stakeholder support. Benefits for the initial list of mitigation measures were addressed with the regional benefit and ancillary benefits criteria as well as the criteria on whether the measure addresses multiple vulnerabilities for different supply sources and risk factors as identified in the DCP vulnerability assessment. These criteria support potential for the measures to have wider positive reach throughout the JVWCD service area and potentially beyond, as well as consider reduction of specifically identified vulnerabilities and risk factors and determine if there are environmental, recreational, and agricultural and M&I sector benefits.

5.3 Mitigation Measure Shortlist Selection

Using the above criteria, the mitigation measures were evaluated and then ranked and prioritized based on a weighted total score for each measure. With the goal of establishing between 10 to 15 mitigation measures for feasible implementation, a total of 15 highest-ranked mitigation measures made the final shortlist. The initial list and shortlist were reviewed with Task Force members and the shortlist was reviewed with Outreach Group members to solicit their input. Input was obtained through interactive ranking and polling activities and facilitated discussions of these measures during Task Force workshops. Input from these workshops was taken into account as an additional filter through which the original scoring for each measure was re-evaluated. The final set of drought mitigation measures selected based on the criteria and outreach input is presented in Table 5-3.

Table 5-3. Shortlist of Prioritized Mitigation Measures		
Mitigation Measure Number	Mitigation Measure Name	Weighted Total Score[a]
Cons&DM-03	Secondary Water Metering	2.35
Cons&DM-04	Enhanced Advanced Metering Infrastructure (AMI) program analytics	2.50
Cons&DM-06	Customer Rebate Programs	2.35
Cons&DM-10	Landscape Leadership Grant Program	2.20
Cons&DM-11	Member Agency Grant Program (multiple funding tiers)	2.25
Conv-02	Enclose canals to reduce seepage and evaporation losses	2.3
GWMgnt-02	JVWCD Aquifer Storage & Recovery (ASR) operational expansions	2.40
GWMgnt-06	New shallow groundwater wells	2.20
NewSup-03	Develop high quality groundwater wells	2.25
NewSup-08	Begin taking delivery of ULS supply by 2030 or earlier	2.25
NewSup-06	Member Agency wastewater reuse projects for secondary irrigation water	2.20
Agr&Reg-02	Defining actions for drought contingency provisions in wholesale water purchase agreements and retail water service agreements	2.25
Agr&Reg-07	Evaluate effectiveness of using conservation-based water rates in the service area.	2.15
Stor-01	Evaluate storage for secondary irrigation systems using Provo River spring runoff and West Side Mountain Streams	2.15
WSPro&Mgnt-03	Watershed-based management with stakeholders	2.35

a. Maximum Weighted Total Score = 3.00

A further analysis for each of these mitigation measures took place to elaborate on potential barriers, cost, opportunities to partner with participating agencies, and associated triggers, and to further elaborate on potential vulnerabilities addressed by the mitigation measure (represented as benefits). The results of this analysis are described in the following subsections.

5.3.1 Secondary Water Metering (Cons&DM-03)

Description. This program provides educational and financial support to secondary water utilities, including Member Agencies, to add secondary water meters to retail customers. Currently a portion of the secondary water meter installations are executed by the Member Agencies using JVWCD grant funds. This is considered a Tier 1 grant, which means JVWCD covers 75 percent to 80 percent of the cost when billed volumetrically or combined with a report. This measure considers increasing the amount of JVWCD conservation grant funds dedicated to these measures, lobbying for additional funding sources to allow Member Agencies to accelerate their meter installation efforts, and providing guidance to the Member Agencies on funding sources available to them.

Potential Barriers. Potential barriers include public/stakeholder acceptance and lack of funding sources. Some secondary system retail customers may resist metering for its potential to facilitate pay-per-volume billing. Water utilities may have a hard time raising rates to pay for the cost of meter installations because customers do not see a direct value from them.

Cost Considerations. The cost of this program is approximately $1,500/meter, and JVWCD currently allocates approximately $60,000/year in grants for secondary metering (based on fiscal year 2018-2019 spending). There are additional costs for staff time to coordinate with applicable Member Agencies, and potential incentive/rebate programs to support metering install either within

or outside of the existing grant-funding program. Potential funding sources include the New Secondary Water Meter Funding Program through the Utah Board of Water Resources and the Water Smart Grant Program through USBR.

Associated Triggers. The program is ongoing and can be enhanced if additional funding is identified and made available.

Steps for Implementation. If additional funding sources can be secured and education efforts address public concerns, secondary metering efforts can be accelerated significantly in the JVWCD service area.

- Continue secondary metering grants.
- Lobby for funding sources to support meter installations.
- Support Member Agency efforts to apply for funding sources.
- Build on existing JVWCD efforts.
- Consider a public education campaign that includes communications collateral development.

Benefits. This mitigation measure is a tool for reducing demand (e.g., as evidenced by Utah's 20 percent reduction) on Utah Lake which subsequently would reduce pressure on limited dry-year supplies for the region, including JVWCD's key supplies. Agricultural users are hit hardest during drought—secondary metering would leave more water in the canals for agricultural use. Secondary metering may also support better use tracking for regulatory, environmental, and water rights constraints.

5.3.2 Enhanced AMI Program Analytics (Cons&DM-04)

Description. This program will develop enhanced AMI program analytics for customer leak detection and watering schedule monitoring. JVWCD will augment its existing leak mitigation program to incorporate data from its retail AMI program to issue notifications and water use alerts. JVWCD will also support Member Agencies in their AMI installation efforts and analytic programs.

Potential Barriers. Potential barriers include retail customer resistance to increased levels of monitoring, lack of customer response to fix leaks, and overcoming any program learning curve and time needed for refinement.

Cost Considerations. According to the 2019 Water Conservation Plan Update, the average cost of water saved through the current AMI program is $921/AF, and the projected program expenses for leak mitigation for 2019–2030 are $92,400. Procuring outside services to enhance the program by developing analytics and an alert system may cost $25,000 to $50,000. This program also requires staff time to create educational materials, communicate with customers, and analyze data.

Associated Triggers. As improved AMI analytics would better inform future response actions, immediate implementation is recommended to test and refine AMI analytics with a pilot group. Program refinement ahead of drought will improve drought response through better data.

Steps for Implementation. Implementation should occur in the next 6 to 12 months, depending on staff availability and procurement of an outside contractor.

- Develop analytics in the JVWCD's system to facilitate customer leak detection and watering schedule drought response actions.
- Assist Member Agencies without AMI by providing guidance for system install and analytics.

Benefits. This mitigation measure will support conservation and demand management at the customer level to help address water supply uncertainty. It supports urban customer water use efficiency through leak repair and conservation and allows increased customer communication to be

leveraged in future drought stages (e.g., using an app or website to provide messaging opportunities). The increased transparency can also benefit public image if a customer receives early notification of a leak rather than a sudden, expensive water bill. AMI program analytics also facilitates drought response actions, specifically by serving as a monitoring tool for leak repair and watering schedule enforcement; it also helps enable demand reduction during drought.

5.3.3 Customer Rebate Programs (Cons&DM-06)

Description. As mentioned, UtahWaterSavers.com is run in partnership between JVWCD and UDWRe to host water conservation programs throughout JVWCD's service area and the state. This project benefits both agencies through shared promotional, hosting, and development costs and provides a single go-to resource for the public. This mitigation measure considers increased investment in the most effective rebate programs and advertising of UtahWaterSavers.com.

Potential Barriers. Potential barriers include procurement and implementation costs and customer education/participation. Additionally, there may be some unintended consequences of reduced indoor water use flows that include water quality issues from increased water age in the system and low wastewater flows which can lead higher concentrated, more corrosive wastewater streams and more solids settling in sewer lines. The program should also consider studying the current level of device saturation in the service area when deciding on the scale and timeline for the program.

Cost Considerations. Cost per acre foot is estimated for each of JVWCD's rebate programs in the 2019 Water Conservation Plan Update. According to the update, the projected program expenses for 2019–2030 are $9.2M including the following approximate annual spend per program:

- Localscapes Rewards - $300,000 per year (anticipated to increase)
- Flip Your Strip - $140,000 per year (anticipated to increase)
- Toilet Replacement Rebates - $1,300 in overhead for administration (DWRe pays the rebates)
- Smart Controller Rebates - $16,900 in overhead for administration (DWRe pays the rebates)
- Landscape Consultations - $40,000 (anticipated to increase)

Associated Triggers. Immediate increased investment is recommended to achieve established conservation goals. Pairing rebates for high-efficiency fixtures with updated building ordinances/codes may be helpful.

Steps for Implementation.

- Continue implementing current program.
- Seek additional funding sources to expand the program.

Benefits. This mitigation measure will support conservation and demand management at the customer level to help address water supply uncertainty. It may support reducing use of dry-year supplies over time and also promotes a local and regional water use efficiency and conservation ethic at the customer level.

5.3.4 Landscape Leadership Grant Program (Cons&DM-10)

Description. JVWCD's Landscape Leadership Grant program was created to help businesses, institutions, and associations become community leaders in water conservation (specifically for commercial, industrial, and institutional landscapes). Funding is provided for landscaping projects that provide measurable water savings and have high promotional appeal. Projects may include landscape renovations that convert lawn to water-efficient landscaping, or new landscape construction projects that install water-efficient landscaping instead of considerable lawn areas. This measure considers increased investment in these grants.

Potential Barriers. Potential barriers include a lack of participant awareness of the program or saturation of the water-efficient landscape market.

Cost Considerations. This program requires District staff effort for project reviews, site visits, coordination, and communication with contractors and project owners. The typical cost of water saved through this program is $1,035 per AF but can range between $500 and $1,600 per AF depending on the project score. The 2019 Water Conservation Plan Update lists the projected program expenses for 2019–2030 as $4.9M starting at $230,000 per year with anticipated increases to this annual spend.

Associated Triggers. If customer participation or available funding increases for this program, JVWCD can decide to dedicate more staff hours to support a ramp up of program activities.

Steps for Implementation.

- Continue implementing current program.
- Seek additional funding sources to expand the program.

Benefits. This mitigation measure will support conservation and demand management for the large users to help address water supply uncertainty. It may support reducing use of dry-year supplies over time and promotes a local and regional water use efficiency and conservation ethic (i.e., building a "culture of conservation") at the customer level.

5.3.5 Member Agency Grant Program (multiple funding tiers) (Cons&DM-11)

Description. The Member Agency Grant Program helps Member Agencies fund and implement water conservation measures, projects, and programs in their respective service areas. This measure considers increased investment in these grants. Depending on the project, JVWCD will fund between 20 percent and 80 percent of a project, with a cap of $50,000 plus $1 per AF of an agency's water purchase contract volume, in AFY. JVWCD spends approximately $350,000 per year on Member Agency grants.

Potential Barriers. Potential barriers include a lack of Member Agency resources and awareness to develop new conservation measures and apply for the grants.

Cost Considerations. Funding matches from JVWCD to the Member Agencies are determined by the following tier structure. According to the 2019 Water Conservation Plan Update, the projected program expenses for 2019–2030 are $1.48M.

- **Tier 1 Measure (Agency matches at least 20 percent):** This is for projects with proven, quantifiable water savings that result in direct water use reduction. JVWCD will review each application and estimate the potential water savings to determine the funding match level. Examples of fundable efforts include landscaping projects that reduce turf or implement waterwise practices, indoor fixture replacement programs, irrigation product rebates, secondary water metering for existing secondary connections, leak mitigation programs, or customer feedback programs.
- **Tier 2 Measure (Agency matches at least 40 percent):** This includes studies and projects that have a strong research component with the potential for significant future water use reduction. Examples of potential projects include studies relating to secondary water metering, water rate structures, demand management, end use, or cost effectiveness of conservation programs. Requests for consulting services are also considered Tier 2.
- **Tier 3 Measure (Agency matches at least 60 percent):** This involves conservation measures where water use reduction is difficult to determine. Examples of potential projects include promotional materials, public information campaigns, or demonstration gardens.

Associated Triggers. Immediate increased investment is recommended to achieve established conservation goals.

Steps for Implementation.

- Continue implementing current program.
- Seek additional funding sources to expand the program.

Benefits. This mitigation measure will support conservation and demand management at the customer or the systemwide level to help address water supply uncertainty. It may support reducing use of dry-year supplies over time and promotes a local and regional water use efficiency and conservation ethic at the customer level.

5.3.6 Enclose Canals to Reduce Seepage and Evaporation Losses (Conv-02)

Description. This mitigation measure would focus on enclosing portions of the Welby Canal to reduce losses through seepage and evaporation, most likely including the portion located between the Jordan Narrows Pump Station discharge and the JVWTP. A detailed seepage study within Technical Publication No. 82 for the State of Utah Department of Natural Resources was completed in 1985 sectioning the Welby-Jacob Canal into 5 or 6 segments. The segment leading to the plant showed approximately 1,000 AFY of losses, with all segments totaling to ~7,500 AFY of losses. Enclosing the canal has potential to greatly reduce these losses.

It also improves the reliability of the canal and makes year-round operations feasible. Enclosure reduces the likelihood of service disruptions in the canal from earthquake or other natural disasters because piped systems can be designed with greater seismic resiliency. Year-round operations are made possible by eliminating the susceptibility that open canals have to freezing. This increased reliability and operability allows JVWCD to consider using the canal to convey Utah Lake/Jordan River water to be treated at the JVWTP plant as they consider future supply improvement alternatives. Planning future JVWTP expansions to include treatment capabilities for algae by-product removal/neutralization would address the source water quality risk factor which scored as one of the three highest likelihood risks for JVWCD's vulnerability assessment.

Potential Barriers. Potential barriers include securing required funding and permitting for canal enclosure. Construction may also disrupt service of the canal temporarily.

Cost Considerations. JVWCD can consider applying for the WaterSMART Water and Energy Efficiency Projects grant program.

Associated Triggers. If there is a need for greater long-term supply recovery opportunities, or if canal renewal needs arise, this project could be prioritized to occur in the next 10 years. Leaks from the banks of the canal are becoming more frequent. One leak is schedule for repair in 2021 and two more have been repaired in the last 5 years. The Beef Hollow siphon in the canal is in need of replacement as well.

Steps for Implementation. A study in Technical Publication No. 82 for the State of Utah Department of Natural Resources has been completed that estimated losses from sections of the canal. Next steps should include prioritizing high-impact sections of the canal for enclosure and further engineering studies as well as permitting applications as applicable. Implementation for this project could be realized within approximately 10 years.

Benefits. This mitigation measure will support water use efficiency at the regional level to help address water supply uncertainty. It addresses two of the three highest likelihood risks; source water quality degradation by conveying Utah Lake/Jordan River water to JVWTP where harmful algal by-products can be treated, and asset susceptibility to disruption by improving seismic resiliency of the

canal. Successful implementation can result in significant reductions in flow diversions, maintaining greater natural stream flows year-round, and may support reducing use of dry-year supplies over time. The project would be relatively simple with potential for broad stakeholder support.

5.3.7 JVWCD Aquifer Storage & Recovery (ASR) Operational Expansions (GWMgnt-02)

Description. This mitigation measure expands the existing program in which treated water is injected into the aquifer through designated injection wells for later recovery when it is needed. The volume that can be recovered from the aquifer is reduced by 10 percent for each year after the volume was injected for storage. JVWCD currently stores up to 500-700 AFY and typically withdraws the same quantity within the same year. The system is designed to store up to 5,800 AFY. If this capacity could be fully utilized, and taking into account state regulations for withdrawing ASR water, JVWCD could accumulate a stored volume of 31,900 AF over 10 years of typical surface water source yield. JVWCD will analyze the feasibility of utilizing the system to "bank" water from a wet year, or series of wet years, for use in a dry year.

Potential Barriers. Potential barriers include operational staff resources. It is challenging for distribution operators to run the injection wells while addressing the many needs of the distribution system. The reliability of ASR water as a supplemental source during a drought year is also dependent on the availability of excess water in the 10 years prior to that drought year. As a result, ASR cannot be counted as a fixed source for a given drought year but can serve to limit use of surface water storage volume in the first year or two of an extended drought.

Cost Considerations. JVWCD will be able to expand the amount of water injected and recovered without additional capital expense. There will be additional operations and maintenance costs associated with the water (staff time, additional electrical costs to reinject the water into the aquifer and then to later recover the injected water). Historically existing wells have been converted to ASR facilities, if a new ASR facility were to be constructed there would be significant costs associated with drilling an injection well and providing the necessary equipment and structure.

Associated Triggers. Triggers for this mitigation measure are tied to climate change impacts on surface water supply yields and state aquifer management decisions. If earlier runoffs are predicted, JVWCD may decide to use ASR to store water flows for later in the season.

Steps for Implementation.

- Conduct study to evaluate operational expansion for JVWCD ASR.
- Provide operator tools to simplify ASR operations.
- Evaluate potential funding opportunities and review/meet regulatory requirements (especially environmental).
- Design and construct new injection wells if needed.

Benefits. This mitigation measure has the potential to reduce groundwater capacity limitations, supports managing uncertainty in water rights allocations (i.e., addresses one or more vulnerability for one source). It also supports maintaining sustainable yield as determined by the State Engineer, helps reduce reliance on CUP and Provo River Water sources, and promotes more climate-resilient source options (e.g., as opposed to surface water sources).

5.3.8 New Shallow Groundwater Wells (GWMgnt-06)

Description. Some Member Agencies are considering new shallow groundwater wells to increase supplies. Shallow groundwater wells are typically constructed near the Jordan River and used as the point of diversion for Utah Lake water rights. This measure may include JVWCD developing new primary wells for potable use, and Member Agencies developing wells for secondary use. JVWCD has

studied projects that would provide feedwater for SWGWTP (shallow wells are intended to be near Jordan River and within a half mile of the SWGWTP). JVWCD has secured water rights for this project which is capable of supporting a combination of shallow and deep wells. Member Agencies have studied projects combining this groundwater with treated effluent from wastewater reclamation facilities for use in secondary systems. This would include new wells, a monitoring well, and a test well. WaterPro, one of JVWCD's Member Agencies who provides pressurized culinary and secondary water to areas in Draper, Utah, already has rights approved near the Jordan Basin Water Reclamation Facility (JBWRF) to withdraw shallow groundwater for use in their secondary water system.

Potential Barriers. Potential barriers include a potential for adverse environmental impacts (e.g., groundwater-dependent ecosystems relying on shallow groundwater). Shallow wells may also be equally susceptible to drought impacts on surface water yields.

Cost Considerations. JVWCD shallow groundwater wells have a $5.5M total estimated cost. This would support the existing third train of the groundwater treatment plant. The current plant is 7 mgd and consists of three trains but is currently only operating at 2/3 capacity (5 mgd) due to feed water limitations. New shallow wells would provide an additional 2 mgd, bringing the plant to full capacity (i.e., 7 mgd) being able to utilize all 3 trains. Between 1,500 and 2,000 AF would be the estimated increased yield. The estimated cost to construct a series of vertical wells and related piping extending to the JBWRF pump station for the WaterPro study is $6.32M.

Associated Triggers. If demand for secondary use is anticipated to increase (e.g., if communities served by South Valley Sewer District need recycled water to offset Utah Lake/Jordan River canal water demands), new shallow groundwater wells may be pursued as an additional source.

Steps for Implementation. Using the WaterPro study as an example, steps may include:

- Test blending viability (options) and determine selected blending opportunity for desired water quality.
- Developing agreements for rights to reuse water.
- Conducting shallow aquifer site impact investigation and determine potential for settling due to proposed shallow groundwater pumping.
- As appropriate, constructing new facilities for diverting effluent, adding chlorine to maintain residual, pumping blended water, and conveying blended water to secondary irrigation distribution systems.

Benefits. This mitigation measure may potentially increase dry-year supplies (addresses one or more vulnerability for one source), reduces dependence on CUP and Provo River Water sources, alleviates strain on the canal system also used by agricultural customers, and promotes more climate-resilient source options (e.g., as opposed to surface water sources).

5.3.9 Develop High-quality Groundwater Wells (NewSup-03)

Description. This mitigation measure would increase well field production capacity by 10 mgd. This would not be an increase in water rights or annual yield but rather an increase in peak season production capacity from the well field to offset impairments to surface water sources capacity due to drought. The additional capacity would also facilitate enhanced ASR. Probable locations for new wells include Etienne Way, Murray Holliday Road, and potentially others.

Potential Barriers. Potential barriers include environmental impacts and operational impacts to neighboring wells from aquifer level changes.

Cost Considerations. The estimated cost for the additional wells is approximately $9.1M.

Associated Triggers. MWDSLS has started using more of its 2/7 capacity in the JVWTP. As they progress to using their full capacity allocation and as demands continue to increase in the system, the additional well capacity will be needed to replace the JVWTP capacity that will be used by MWDSLS.

Steps for Implementation. The desired level of service is to maintain a 10 percent supply buffer over projected maximum day demands. As illustrated in Table 4-2, it is projected that the new well will be needed by 2022 to maintain this buffer while MWDSLS starts using its JVWTP capacity. Design for the new wells should begin immediately. Implementation steps may include:

- Performing necessary studies to verify selected well locations.
- Designing and constructing new groundwater wells.

Benefits. This mitigation measure can be used to increase peak season production capacity from the well field to offset impairments to surface water sources due to drought. It also reduces reliance on CUP and Provo River Water sources and promotes more climate-resilient source options (e.g., as opposed to surface water sources).

5.3.10 Begin taking Delivery of ULS Supply by 2030 or Earlier (NewSup-08)

Description. This measure provides an additional average year supply of 16,400 AFY and dry year supply of 10,540 AFY. The additional source water would replace dry-year losses in existing sources and enhance system resiliency to climate change impacts. JVWCD already has a contract in place with the CUWCD for delivery of ULS water when it is needed. Expansion of the JVWTP is also required to use the additional source water effectively.

The JVWTP expansion will be executed in phases. The first phase will increase plant capacity from 180 mgd to at least 220 mgd, with a potential for a second phase to expand to 255 mgd. The entire 75-mgd expansion may occur in one phase if there are no clear cost savings from phasing.

JVWCD's share in the Welby-Jacob Canal (Canal), and the Canal's proximity to the plant, provide either an additional raw water source to further expand the JVWTP, or as a drought-hardening measure to increase firm dry-year yield. JVWCD should conduct a pilot study to test the feasibility of treating Canal water to primary drinking water standards, including acceptable taste and odor standards. Successful treatment of sources that have total dissolved solids level, total suspended solids, total organic carbon, and potential for harmful algal by-products (e.g. phenols, tannins, cyanotoxins), as seen typically seen in the Canal water, requires additional treatment beyond the current facilities at JVWTP. Such treatment trains might include lime softening, advanced oxidation, granular activated carbon filtration, and/or ozonation. The Phase 1 JVWTP Expansion should also include a facility planning effort that dedicates space on the site for these facilities to be added in future phases of the expansion.

Potential Barriers. Potential barriers include environmental/in-stream flow requirements that could limit the amount of water available for withdrawal (managed by CUWCD).

Cost Considerations. The estimated cost for the JVWTP expansion is $91M in 2027 dollars. The cost for the additional ULS water is $301.29 per AF or $3.18M-$4.94M per year for a dry year.

Associated Triggers. This would be needed to meet MDD and average annual supply requirements. MWDSLS owns and has started using its 2/7 capacity in the JVWTP. As they progress to using their full 2/7 capacity and as demands continue to increase in the system, the additional JVWTP capacity will be needed. When average annual demands increase to 115.5 AFY, the ULS capacity will be needed to meet the desired level of service.

Steps for Implementation. The desired level of service is to maintain a 10 percent supply buffer over projected maximum day demands. Assuming the new high-quality groundwater wells are developed first, it is projected that the JVWTP expansion will be needed by 2024 to maintain this buffer while MWDSLS starts using its JVWTP capacity. The expansion can be operated from existing sources until average annual demand is reaches 115.5 AFY, which is expected by 2029. Design for the JVWTP expansion should begin immediately. Implementation steps include:

- Executing the sedimentation basin equipment replacement project.
- Coordinating existing formal agreements to enable additional delivery.
- Performing Pre-design, Designing and constructing the JVWTP expansion.

Benefits. This mitigation measure increases dry-year supplies as sources are strained from adverse climate change impacts. A hazard mitigation plan currently being developed by JVWCD also identified significant seismic failure risks at JVWTP. Therefore, the expansion of the plant can also be executed to address asset susceptibility to disruption. Planning can also be done to treat waters impacted by algal by-products to address source water quality degradation issue in future plant expansions. The extra 5,860 AF of supply available in a typical year as compared to a dry-year could also be used to facilitate aquifer storage in typical years to recover and use in dry years through the ASR measure.

5.3.11 Member Agency Wastewater Reuse Projects for Secondary Irrigation Water (NewSup-06)

Description. WaterPro and Bluffdale City Wastewater Reuse Project at Jordan Basin Water Reclamation Facility is an example of this mitigation measure. A study was completed to assess the viability of the project. Phase 1 of the study was conducted for determining the use of effluent from the JBWRF. The effluent has high concentration of chloride from use of water softeners in the JBWRF service area. The JBWRF effluent is planned for blending with shallow groundwater produced at or near the JBWRF site to achieve satisfactory water quality. This effluent is treated at the JBWRF through a microfiltration membrane process that produces treated wastewater that complies with Type 1 wastewater effluent reuse requirements, making it suitable for landscape irrigation and irrigation at individual homes. Stakeholders involved in the project include WaterPro, Bluffdale, South Jordan, Riverton, and Herriman. WaterPro will be the recipient of this reuse water.

Potential Barriers. Potential barriers include the feasibility of wastewater reuse projects for selected sites. Available funding from Central Utah Project Completion Act (CUPCA) will likely not be available for the next 5 years, i.e., 2026), and there is potential for adverse impacts to downstream water bodies.

Cost Considerations. The total cost estimate from the WaterPro Water Reuse Study Phase 1 was $27.42M and includes:

- Reusing the pump station, including all suction side yard piping: $10.89M
- Constructing a series of vertical wells and related piping extended to pump station at the JBWRF: $6.32M (design capacity: 7.20 mgd)
- Secondary system improvements for Bluffdale city pipelines to secondary irrigation systems (4,200 feet of 20-inch pipeline and off-site shallow well): $1.61M
- Draper Irrigation Company (WaterPro) secondary system improvements, including 10,063 feet of pipelines (already installed): $2.16M; 9,198 feet of 24- to 30-inch pipeline to be installed: $4.34M, WaterPro pump station and other system upgrades: $2.10M
- **Potential funding source:** CUPCA Section 207 sources, although this funding source is likely not available for the next 5 years per the WaterPro Study. An alternative source of potential funding

may be found through the USBR Title IVX grants, which provide federal funding for water reuse projects in the 17 western states and Hawaii.

Associated Triggers. Triggered when required by increases in secondary demand.

Steps for Implementation. Steps to implement this mitigation measure would be pursued by Member Agencies interested in furthering water reuse.

- Testing blending viability (options) to determine selected blending opportunity for desired water quality.
- Developing agreements for rights to reuse water.
- Conducting a shallow aquifer site impact investigation and determining the potential for settling due to proposed shallow groundwater pumping.
- As appropriate, constructing new facilities for diverting effluent, adding chlorine to maintain residual, pumping blended water, conveying blended water to secondary irrigation distribution systems.

These activities may present potential opportunities to coordinate with JVWCD (e.g. cost-shared funding or coordination role).

Benefits. The main benefit is a decrease in the demand for potable supply during dry years. An indirect benefit for the agricultural sector is more water left in canal system. There is also a potential for an increase in supply sources during dry years, and an increase in secondary irrigation supply (addresses one or more vulnerability for one source or addresses one vulnerability for two or more sources).

5.3.12 Defining Actions for Drought Contingency Provisions in Wholesale Water Purchase Agreements and Retail Water Service Agreements (Agr&Reg-02)

Description. The water service agreements for wholesale and retail customers include provisions for drought related actions, such as limiting deliveries in water shortages and increasing rates to reduce consumption. For this measure JVWCD will execute a study to define the appropriate rate increases for each tier in the current rate structure at each level of drought, particularly for levels 2, 3 and 4. It will also determine if other procedures are needed for limiting deliveries during a water shortage.

Potential Barriers. Potential barriers include reaching agreement on an equitable pricing and allocation for water contracts (volume, pricing, and drought level), monitoring, and enforcement levels.

Cost Considerations. The program would require a rate cost analysis specific to drought pricing that may be done internally or through a consultant. Comparable efforts to evaluate other policies in the West cost roughly $25,000.

Associated Triggers. This measure is currently relevant and should be implemented prior to drought to better inform response actions. Immediate engagement is recommended to begin the study.

Steps for Implementation.

- Conduct a rate cost analysis either internally or through a consultant, with a specific task for drought pricing.
- Gather stakeholder feedback on proposed rate increased and delivery reduction procedures.
- Present defined actions for JVWCD Board of Trustees approval.

Benefits. This measure addresses contract limitations (can address multiple vulnerabilities for multiple sources, including addressing dry-year supply limitations, reduces impacts from climate

change, and addresses potential environmental, regulatory, or water rights constraints). It also facilitates drought response actions (see subsection 5.6) and helps enable reduction of demand during drought.

5.3.13 Evaluate Effectiveness of Using Conservation-based Water Rates in the Service Area (Agr&Reg-07)

Description. This mitigation measure will evaluate the effectiveness of conservation-oriented rate structures being used throughout the service area. JVWCD would also provide guidance to Member Agencies on updating rate structures to promote further conservation in their retail areas.

Potential Barriers. Potential barriers include concerns for affordability, political will to potentially raise rates, and customer acceptance of increased costs.

Cost Considerations. The primary cost of this program would be toward staff time, with a potential cost for a consultant for a rate study.

Associated Triggers. Water use reductions from changes in rate structure are realized gradually over time. JVWCD has identified the possibility that current rate structures within the service area may not be driving water use reduction effectively.

Steps for Implementation.

- Conduct a rate study that analyzes efficiency and effectiveness of the various rate structures used across the service area. This can be completed either internally or through a consultant.
- Undergo public comment process and seek Board of Trustees approval.
- Report out and communicate results of study to Member Agencies. Provide, as relevant, recommended rate structure changes, including guidance on whether they could be permanent or activated only in times of drought (could have drought rates in place/approved ahead of time to be turned on or off when needed).

Benefits. Water pricing can reduce demand by providing an economic incentive for consumers to conserve water. This measure addresses dry-year supply limitations, facilitates response actions, and helps enable reduction of demand during drought.

5.3.14 Evaluate Storage for Secondary Irrigation Systems using Provo River Spring Runoff and West Side Mountain Streams (Stor-01)

Description. This measure evaluates storage for secondary irrigation systems to leverage availability of high-quality Provo River spring runoff and Wasatch Mountain Streams. This measure would look at constructing small storage reservoirs for secondary irrigation systems on the west side of the Salt Lake Valley. In most years (approximately eight out of 10 years), JVWCD's allocation of Provo River flows is greater than system demand and reservoir storage capacity during spring runoff period. In these instances, JVWCD sends the excess to the Welby Jacob Canal System. This measure would evaluate the feasibility and benefits of delivering the excess water to a secondary irrigation reservoir on the west side of the Salt Lake Valley via the canal system.

Potential Barriers. Potential barriers include concerns for environmental impacts and upstream effects depending on location and quantity of runoff capture, as well as concerns for environmental impacts of storage facilities if new facilities need to be constructed. Potential environmental impacts should be studied prior to project implementation.

Cost Considerations. The primary cost of this program would come with the cost associated for conducting the study.

Associated Triggers. The study should be conducted if there is increased interest and available funding to look into storage potential to enhance availability of water for secondary irrigation systems.

Steps for Implementation.

- Conduct study on environmental impacts to Utah Lake and Great Salt Lake, model spring runoff and suitability overlay with criteria for optimizing storage locations for secondary systems (either internally or hire consultant) to map, cost out (including cost sharing), and prioritize potential storage locations and facilities.
- Perform a triple-bottom-line benefit-cost analysis to determine if benefits justify the financial, environmental, and social costs.

Benefits. This measure has the potential to provide a more stable source in case of changes in precipitation or snow patterns. It also addresses potential dry-year supply capacities and reduces reliance on CUP and Provo River Water sources.

5.3.15 Watershed-based Management with Stakeholders (WSPro&Mgnt-03)

Description. This mitigation measure requires collaboration with local partners and stakeholders to improve water quality and reduce algal bloom events for Utah Lake. JVWCD will work with stakeholders for watershed-based management to review funding sources and write descriptions to match funding opportunities, as available. Potential stakeholders will work on stormwater planning projects that enforce best management practices in the watershed. One source of projects and activities in which JVWCD can get involved will be the Utah Division of Water Quality Utah Lake Water Quality Study, once it is completed.

Potential Barriers. Potential barriers include the level of JVWCD staff resources required to coordinate stakeholder involvement.

Cost Considerations. The initial cost of this effort would go toward staff time to coordinate and facilitate regional discussions on strategic watershed management. One potential funding opportunity could come from USBR's Cooperative Watershed Management Grant, which funds up to $50K per year, for up to 2 years.

Associated Triggers. If there is basin-wide interest in pursuing the Cooperative Watershed Management Grant, then JVWCD can be involved in a coordination role.

Steps for Implementation. The implementation timeline depends on the current status of stakeholder interaction/organization, and potential duration of coordination support (including for projects). Potential steps include:

- Coordinating with water agencies, environmental groups, and community groups that work in the watershed.
- Reviewing funding sources, coordinating to formulate desired project, creating a project description (ensure match to available funding opportunities), and integrating best management practices.
- Coordinating application submittal.

Benefits. This measure addresses potential water quality degradation due to runoff, source water quality degradation, and environmental/regulatory considerations. It also addresses more than one vulnerability for one source, primarily Utah Lake, but potentially for other sources within the watershed.

5.4 Mitigation Measure Implementation Timeline

The estimated implementation timeline of the highest ranked mitigation measures are shown in Table 5-4. The yellow bars indicate a planning or conceptual phase, blue bars a design phase, and green bars an implementation phase. As shown, implementation of some of the highest ranked mitigation measures are already in place. White bars indicate that some programs will need some time to ramp up or are intended to sunset or close out after a certain number of years.

Table 5-4. Drought Mitigation Measure Implementation Timeline

Mitigation Measure Number	Mitigation Measure	Immediate (within 1 year)	Short Term (2-5 years)	Medium Term (5-10 years)	Long Term (> 10 years)
Cons&DM-03	Secondary Water Metering				
Cons&DM-04	Enhanced AMI program analytics				
Cons&DM-06	Customer Rebate Programs				
Cons&DM-10	Landscape Leadership Grant Program				
Cons&DM-11	Member Agency Grant Program (multiple funding tiers)				
Conv-02	Enclose canals to reduce seepage and evaporation losses				
GWMgnt-02	JVWCD ASR operational expansions				
GWMgnt-06	New shallow groundwater wells				
NewSup-03	Developing high-quality groundwater wells				
NewSup-08	Begin taking delivery of ULS supply by 2030 or earlier				
NewSup-06	Member Agency wastewater reuse projects for secondary irrigation water				
Agr&Reg-02	Drought contingency provisions for wholesale water purchase agreements and retail water service agreements				
Agr&Reg-07	Evaluate effectiveness of using conservation-based water rates in the service area				
Stor-01	Evaluate storage for secondary irrigation systems using Provo River spring runoff				
WSPro&Mgnt-03	Watershed-based management with stakeholders				

The estimated implementation timeline of the highest ranked mitigation measures are shown in Table 5-4. The yellow bars indicate a planning or conceptual phase, blue bars indicate a design phase, and green bars indicate an implementation phase. As shown, implementation of some of the highest ranked mitigation measures are already in place. White bars indicate that some programs will need some time to ramp up or are intended to sunset or close out after a certain number of years.

Legend
- Planning/Conceptual
- Design
- Implementation

5.5 Drought Planning Activities

As mentioned, the following list of activities in Table 5-5 are current efforts that were considered for further development, but were not prioritized for increased investment or enhancement during the creation of this DCP. Evaluation indicated that these activities are valuable for drought mitigation and should be continued in parallel with the drought mitigation measures outlined in this section.

Table 5-5. List of Drought Planning Activities

Drought Planning Activity Category	Drought Planning Activity Name
Cons&DM	WES (outdoor landscaping requirements and indoor fixture recommendations)
Cons&DM	Customer Usage Web Dashboard Enhancements
WSPro&Mgnt	Continue as a sponsor of the Provo River Watershed Council
Ed&Outrch	Slow the Flow (water conservation educational materials and campaigns)
Ed&Outrch	Drought Plan Results (provide information to all water users about key elements of the final DCP)
Ed&Outrch	Annual Member Agency drought assessment, coordination, and planning
Ed&Outrch	Preparation of media campaign assets and resources to be used during drought
Cons&DM	Leak mitigation and replacement of leaking infrastructure
Ed&Outrch	Member Agency staff and governing board training on drought levels and independent mitigation measures and response actions.
Agr&Reg	Stand-by or short-term water purchase contracts with applicable water suppliers (e.g. MWDSLS, CUWCD, etc.)
Ed&Outrch	Public Web Dashboard (provide widespread information on drought status and resources)
Agr&Reg	Update ordinances and policies with needed response actions for drought (could include drought surcharge)
Agr&Reg	Secure agreements using WARN and private contractors for assistance in making system repairs in other emergencies

5.6 Connecting to Drought Response Actions

Table 5-6 identifies several drought mitigation measures and drought planning activities that are put in place to enable drought response actions. These response actions are dependent on mitigation measures and drought planning activities that are focused on providing information to the public, enable expanded use of ASR, as well as further conservation and leak detection activities. The drought response actions are elaborated in further detail in the next section of this DCP.

Table 5-6. Drought Response Actions Tied to Listed Mitigation Measures and Drought Planning Activities

Required Mitigation Measure/Drought Planning Activity ID	Required Mitigation Measure/Drought Planning Activity Name	Response Action ID	Response Action Name
Drought Planning Activity	Public Web Dashboard (provide widespread information on drought status and resources)	DIST-B-0	Public Web Dashboard
Ed&Outrch-09	Preparation of media campaign assets and resources to be used during drought	DIST-C-0	Slow the Flow
Cons&DM-04	Enhanced AMI program analytics	RTL-A-0	Customer leak detection using AMI and billing software
Agr&Reg-02	Drought contingency provisions for wholesale water purchase agreements and retail water service agreements	RTL-C-2,3,4	Large water users' delivery reductions
GWMgnt-02	JVWCD Aquifer Storage & Recovery (ASR) operational expansions	DIST-G-2,3,4	Use ASR banked water
Agr&Reg-02	Drought contingency provisions for wholesale water purchase agreements and retail water service agreements	DIST-F-1,2,3,4	Notify public of diminished water supply and request voluntary water use reduction

Section 6

Drought Response Actions

JVWCD will implement drought response actions during times of drought. These actions are reactive activities put in place during a drought to decrease the severity of immediate drought impacts at various water supply availability levels. They focus on enhanced water supply management and water use reductions. These activities work to provide continuous supply availability for essential uses and services, such as general health and sanitation.

Drought response actions are tied to specific water supply availability levels. Each response action is activated when one of the water supply availability levels defined in Section 3 is reached and may be deactivated when the water supply availability level changes.

6.1 Response Actions Across Water Supply Availability Levels

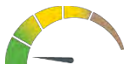
As the water supply availability level progresses, the intensity of the required water use reduction or efforts for water supply management increases. For some response actions, this translates to the same response action taking place across more than one or multiple water supply availability levels, but with increasing severity or intensity (e.g., greater required reductions in use). This DCP establishes the framework for each response action prior to a drought so that they can be implemented quickly and effectively during a drought. This section identifies activities JVWCD will perform to ensure each action is ready to be implemented at the appropriate water supply availability level. Some of the response actions that require pre-drought preparation are tied to mitigation measures identified in Section 5.

6.2 Approach for Determining Response Actions

The process of defining the response actions that will be implemented in the JVWCD service area included data collection to determine water use reduction targets, screening response action alternatives, detailed evaluation of the selected alternatives, and coordination with Member Agencies on development of their response actions.

6.2.1 Defining Water Use Reduction Targets

Water use reduction targets are defined for each water supply availability level and a compiled list of the response actions were considered for the service area. The supply availability for each water supply availability levels established in Section 3 was used to establish water use reduction and water supply management goals. These goals are required to maintain or increase the supply for a given year and water supply availability level. Table 6-1 shows the triggering criteria applied to water supply availability levels and the targeted water use reductions.

Table 6-1. Water Supply Availability Level and Triggering Criteria		
Water Supply Availability Level	Water Shortage Description	Water Demand Reduction Target
 Level 0	Normal	None
 Level 1	Moderate	5% reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120% of wholesale contract amounts
 Level 2	Severe	10% reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110% of wholesale contract amounts
 Level 3	Extreme	20% reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts
 Level 4	Critical/Exceptional	30% reduction in typical use for wholesale Member Agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e. 90%, 85%, etc.) at the time that this water supply availability is established

An initial list of drought response actions was established by collecting examples from other DCPs within Utah as well as from other states. Additional input from the DCP Task Force provided information on response actions that Task Force members currently have in place and potential response actions to be implemented by JVWCD. Tables 6-2 and 6-3 categorize the response actions considered for this DCP into supply management and demand management, respectively.

Table 6-2. Summary of Supply Management Drought Response Actions from Past Examples
Adjusting water purchase contracts based on drought levels.
Developing parallel structure for retail service areas.
Reducing secondary water use and shorten irrigation season.
Implementing short-term transfer agreements between JVWCD and water right owners (aka fallowing agreements setup before drought).
Obtaining additional water from other water suppliers.
Using interim water recycling.
Using a mobile water treatment facility (for meeting non-discretionary water demands, such as sanitation, health, and safety requirements).
Meeting more frequently with habitat advisory groups as drought levels increase.
Relying on aquifer storage and recovery (ASR) banked water.
Using wells more in drought for indoor water needs.
Education the public through drought-level dashboard website.
Educating the public through Slow the Flow campaigns.

Table 6-3. Summary of Supply Management Drought Response Actions from Past Examples
Conducting media and educational campaigns to promote voluntary water use reductions.
Implementing outdoor landscaping water use restrictions.
Implementing residential water use restrictions.
Enhancing the Water Loss Program.
Enacting a building moratorium.
Imposing municipal and commercial water use restrictions, e.g., discontinued watering of lawns, parks, athletic fields, or golf courses.
Increasing rates or introducing drought surcharge fees on secondary water.
Reducing vehicle washing.
Developing the golf course superintendents' voluntary program before the next drought to set voluntary irrigation limits.
Reducing secondary water use.
Educating the public through drought-level dashboard.
Using "Drought Drive-Thrus" to provide pre-made Water Wise conservation kits.
Implementing Water Wise workshops.
Using AMI to monitor for customer leak detection and enforce repair mandate.
Requiring one-day fixes for customer leaks.
Ensuring irrigation systems are not damaged, misaligned, or missing sprinkler heads; minimize sprinkler spray on walks, drives, and gutters.
Implementing water patrols.
Enforcing published best management practices related to water use for industries.
Restricting operation of private pools, fountains, waterfalls, and ponds; require recirculation pump or complete feature shut off.
Requiring use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss due to splashing.
Discontinuing service to a customer after proper notice for neglect, failure, or refusal to comply.
Prohibiting new service connections.
Vehicle washing prohibited unless at certified carwash.
Enacting time-of-day restrictions on outdoor water use.
Allowing golf course watering of greens and tees by permit; prohibit watering of roughs and fairways.
Curtailing water use from large water users such as schools, churches, parks, recreation areas, etc.
Allowing residential and commercial lawns to go dormant (reduce watering to a minimum to keep grass, trees, and gardens alive)

6.2.2 Response Action Alternatives Screening

Response action alternatives screening included filtering response actions that were not applicable to JVWCD and then assigning actions and intensity of those actions to specific water supply availability levels. For screening purposes, it is useful to categorize the response actions as those applied to retail customers and those applied to wholesale customers. The retail customers represent an end user who is directly responsible for their water use. Response actions applied to retail customers focus on specific actions these customers will implement to reduce water use. Response actions applied to wholesale customers focus more broadly on water use reduction goals that those customers will meet by implementing response actions of their own.

The Task Force and Outreach Groups reviewed each response action in workshops and provided feedback on the effectiveness, ease of implementation, and impact to various users. This review was used to eliminate alternatives that were not a good fit for the JVWCD service area and to define application of the remaining alternatives to each water supply availability level. These lists were further refined through JVWCD internal discussions based on this input.

Table 6-4 provides the JVWCD-focused drought response actions evaluated by JVWCD and Task Force and Outreach groups, listed by their applicable water supply availability level. Several response actions, including informational and coordination-based actions like the public dashboard and conservation and education materials, occur across all water supply availability levels. Table 6-5 provides the retail customer-focused drought response actions. Each response action has been given an alphabetic identifier that will be used in Section 6.3.

Table 6-4. Evaluated Drought Response Actions: District Focused

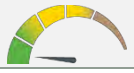
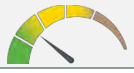
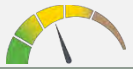
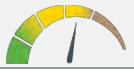
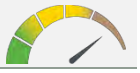
Response Action ID	Drought Response Action	Water Supply Availability Level				
		0 Normal 	1 Moderate 	2 Severe 	3 Extreme 	4 Critical 
DIST-B	Public Web Dashboard	X	X	X	X	X
DIST-C	Slow the Flow (water conservation educational materials and campaigns)	X	X	X	X	X
DIST-D	More frequent meetings with the GSLAC and/or the ULC	X	X	X	X	X
DIST-E	Drought Task Force meetings	X	X	X	X	X
DIST-F	Reduced delivery: (e.g., contract amount plus 20%)		X	X	X	X
DIST-G	Rely on ASR banked water		X	X	X	X
DIST-H	Obtain additional water from other water suppliers				X	X
DIST-I	Interim water recycling				X	X
DIST-J	Implement short-term transfer agreements between District and water right owners (e.g., fallowing agreements setup before drought)					X

Table 6-5. Evaluated Drought Response Actions: Retail-Customer Focused						
Response Action ID	Drought Response Action/Drought Level	Water Supply Availability Level				
		0 Normal	1 Moderate	2 Severe	3 Extreme	4 Critical
A	Customer leak detection using AMI and billing software	X	X	X	X	X
RTL-B	Increasing rates, drought surcharges			X	X	X
RTL-C	Water delivery reductions to large water users			X	X	X
RTL-D	Watering rotations: Watering on even/odd days, or limit days of the week watering can take place			X		
RTL-E	"Drought Drive-Thrus"; customers pick up pre-made water wise conservation kits			X	X	X
RTL-F	Repair mandate: incentivize timely repair for customer leaks				X	X
RTL-G	No water use for refilling private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds					X
RTL-H	Golf course superintendents' voluntary program. Set voluntary irrigation limits		X	X		
RTL-I	Reduce washing of vehicles			X	X	
RTL-L	No residential or commercial lawn watering (trees and gardens yes)				X	X
RTL-M	Use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss from splashing and evaporation				X	
RTL-N	Golf course: watering greens and tees allowed by permit; no watering of roughs and fairways				X	
RTL-P	No watering of parks, athletic fields, or golf courses					X
RTL-R	Vehicle washing prohibited unless at a certified carwash					X
RTL-S	New service connections not permitted					X

6.2.3 Detailed Evaluation of Response Actions Short List

A detailed evaluation of the screened shortlist of response action alternatives was performed by determining the potential water savings, impact to various users, lead time to activate the action, and implementation costs. Priority was given to response actions that can be implemented quickly during a drought to mitigate the impacts and provide rapid benefits. Each response action was discussed among JVWCD, Brown and Caldwell, the Task Force group, and Outreach Group. During these discussions, response actions were modified or removed from the list and the drought response actions were finalized. Results of this evaluation are summarized in Section 6.3.

6.2.4 Member Agencies Response Actions Development

A drought response action analysis spreadsheet template was developed and provided to Member Agencies to help them analyze agency-specific drought response actions at each of the water supply availability levels. The template is provided in Appendix D. Member Agencies were provided examples of potential response actions and were encouraged to consider additional response actions outside of the examples provided. Member Agency response actions will be gathered in an ongoing process as they are developed by the Member Agencies and will included as an appendix in this DCP. The purpose of JVWCD's effort in providing this support is to enable transparent and consistent drought response actions across the service area and to help Member Agencies meet reduction requirements at the water supply availability levels.

6.3 Selected Drought Response Actions

The Member Agency response action lists are provided in Appendix F. The content of Table 6-6 shows the final JVWCD drought response actions for each water supply availability level and the estimated water savings for each action (see Subsection 6.4 for a summary of total estimated savings).

The final response action list combines the JVWCD-focused actions and retail-customer focused actions into one list. The list includes a response action ID with the following format:

- DIST- or RTL-: differentiator between JVWCD-action focused (DIST for District) or retail-customer focused (RTL) response actions.
- -alphabet letter: Identifies drought response action. Similar response actions share the same letter identifier.
- - water supply availability level number: Identifies the water supply availability level associated with the response action.

A concise summary of each JVWCD response action is provided after Table 6-6 within this subsection. The summaries include a brief description, impact to various users, lead time for activation, implementation costs, and procedural requirements as applicable.

Table 6-6. Drought Response Actions Final List

Water Supply Availability Level	Response Action ID	Response Action	Estimated Water Savings (AFY)
Level 0[a]	DIST-A-0	Conservation Garden Park classes and events	-
	DIST-B-0	Public Web Dashboard	-
	DIST-C-0	Slow the Flow	-
	DIST-D-0	Meetings with the GSLAC and/or the ULC	-
	DIST-E-0	Annual Drought Committee meetings	-
	RTL-A-0	Customer leak detection using AMI and billing software	230
Level 1	DIST-F-1	Wholesale customer water delivery reduction (level 1)	9,030
	DIST-G-1	Using ASR banked water	50
	RTL-B-1	Public notification of diminished water supply and voluntary reduction in water use	175
Level 2	DIST-F-2	Wholesale customer water delivery reduction (level 2)	14,530
	DIST-G-2	Use ASR banked water	70
	RTL-B-2	Public notification of diminished water supply and seek reduction in typical use (at least 10%)	45
	RTL-C-2	Water delivery reductions to large water users	10
	RTL-D-2	Residential and commercial lawn watering restrictions	530
	RTL-E-2	Dispense “Drought Drive-Thrus” Water Wise kits	25
Level 3	DIST-F-3	Wholesale customer water delivery reduction (level 3)	22,430
	DIST-G-3	Use ASR banked water	-
	RTL-B-3	Notify public of diminished water supply and seek reduction in typical use (at least 20% with increase of tier 4 rate)	355
	RTL-C-3	Water delivery reductions to large water users	225
	RTL-D-3	Residential or commercial lawn watering limited to certain number of days per week	1,285
	RTL-E-3	Dispense “Drought Drive-Thrus” Water Wise kits	25
	RTL-F-3	Incentivize timely repair for customer water leaks	90
Level 4	DIST-F-4	Wholesale customer water delivery reduction (level 4)	30,335
	DIST-G-4	Use ASR banked water	-
	RTL-B-4	Notify public of diminished water supply and seek significant reduction in use (at least 30% to 50% with increase of tiers 2, 3, and 4 rate depending on drought severity)	915
	RTL-C-4	Water delivery reductions to large water users	35
	RTL-D-3	Residential or commercial lawn watering limited to certain days	1,725
	RTL-E-4	Dispense “Drought Drive-Thrus” Water Wise kits	25
	RTL-F-4	Incentivize timely repair for customer water leaks	90
	RTL-G-4	Pool and water fixture restrictions	30

Notes:
a, Level 0 drought response actions will continue throughout all stages of drought.

6.3.1 DIST-A-0: Conservation Garden Park Classes and Events (all levels)

Description. These are public classes and events held at the JVWCD Conservation Garden Park that teach a variety of water wise topics, from landscape design, yard maintenance, and irrigation optimization.

Impact to various users. The action focuses on educating the users on being water efficient and providing customers with knowledge on how to meet water use reductions needed during drought. The negative impacts from implementing this action are minimal.

Lead time for activation. Classes and events are currently in place at the JVWCD Conservation Garden Park.

Implementation costs. Implementation costs are minimal and are primarily reflected in JVWCD staff time.

Procedural requirements. JVWCD should prepare material appropriate to each water supply availability level so the courses can easily be adapted to the drought conditions at the time.

6.3.2 DIST-B-0: Public Web Dashboard (all levels)

Description. An online dashboard that communicates the current water supply availability level and associated response actions. The dashboard is updated regularly and is available to anyone. This action provides a mode of communicating and coordinating drought response actions and levels.

Impact to various users. This action focuses on increasing the general awareness of drought conditions in the community. The negative impacts from implementing this action are minimal.

Lead time for activation. Development of the public web dashboard has been added as an activity on the drought planning list and should be completed before critical drought conditions occur.

Implementation costs. Once the public web dashboard is established, the operational costs will be minimal and mostly involve staff time to keep the information current.

Procedural requirements. JVWCD staff will update the dashboard after the drought monitoring committee water supply availability level recommendation and Board approval, and as updated information is available.

6.3.3 DIST-C-0: Slow the Flow (all levels)

Description. This is an educational campaign funded by JVWCD as well as other water agencies from around the state. The campaign raises awareness of state conservation goals and empowers people to make water-saving changes to homes and landscapes. This effort is used to direct Utahns to available tools and resources for water conservation.

Impact to various users. This action educates users on being water wise. The negative impacts from implementing this action are minimal.

Lead time for activation. Currently in place.

Implementation costs. This is part of normal JVWCD operations. JVWCD pays about $55,000 per year to be a part of this educational campaign.

Procedural requirements. JVWCD provides input on Slow the Flow campaign information relevant to current water supply conditions.

6.3.4 DIST-D-0: Meetings with the GSLAC, the ULC (all levels), and/or the JRC

Description. Coordination meetings with GSLAC, ULC, JRC, and JVWCD are led by JVWCD. Meeting goals are to consider environmental impacts of drought and impacts of planned DCP activities to the Great Salt Lake, Utah Lake, and Jordan River.

Impact to various users. This action helps JVWCD consider environmental impacts of mitigation measures and response actions during drought.

Lead time for activation. Currently in place.

Implementation costs. Primarily JVWCD staff time.

Procedural requirements. Prepare a summary of JVWCD's drought-related activities prior to meetings.

6.3.5 DIST-E-0: Annual Drought Committee Meetings (all levels)

Description. During Drought Committee meetings, committee members will review the water supply outlook, recommend the water supply availability level be adopted throughout the JVWCD service area, and continue to monitor the water supply availability situation throughout the year.

Impact to various users. Drought Committee members will need to provide additional time and effort to meet and plan as the water supply availability level progresses. Negative impacts are minimal.

Lead time for activation. Drought Committee meetings are scheduled annually.

Implementation costs. Primarily JVWCD staff time and Drought Committee Members' time.

Procedural requirements. JVWCD staff prepares the water supply/shortage outlook and identifies potential water supply availability level designations prior to the committee meeting. JVWCD staff also coordinates and facilitates the meeting.

6.3.6 DIST-F-1,2,3,4: Wholesale Customer Water Delivery Reduction

Description. This response action stipulates water delivery reduction goals for wholesale and retail customers at each water supply availability level:

- At level 1, water delivery reductions: 5 percent reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120 percent of wholesale contract amount.
- At level 2, water delivery reductions: 10 percent reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110 percent of wholesale contract amounts.
- At level 3, water delivery reductions: 20 percent reduction in typical use for wholesale Member Agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts.
- At level 4, water delivery reductions: 30 percent or more reduction in typical use for wholesale Member Agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e., 90 percent, 85 percent, etc.) at the time that this level of water supply availability is established.

Impact to various users. Impacts vary between wholesale customers based on how close their typical demand on JVWCD is to their contract amount. JVWCD will likely implement drought pricing to encourage compliance with the reduced water supply allocations.

Lead time for activation. The water delivery reductions are predetermined, and water supply availability levels are recommended by the Drought Committee with formal designation by the JVWCD Board of Trustees (typically each May). Wholesale customers are part of the drought committee.

Implementation costs. Primarily JVWCD staff time. There are costs to each of the wholesale customers and to JVWCD to implement the other response actions required to achieve the reductions that are not listed here.

Procedural requirements. Decisions from the JVWCD Board of Trustees will be communicated in an official letter to wholesale customers. JVWCD will initiate the response actions for retail customers to achieve the reduction targets.

6.3.7 DIST-G-1,2,3,4: Use Aquifer Storage and Recovery (ASR) Banked Water

Description: As discussed in mitigation measure GWMgnt-02 described in Section 5.3.6, JVWCD will make a policy decision to use ASR to provide a greater level of stored capacity for drought years. It is proposed that at water supply availability level 1, up to 50 AF would be used to supply retail customers. For water supply availability level 2, up to 70 AF would be used for retail customers. At water supply availability levels 3 and 4 the remaining ASR capacity would be available for wholesale customers.

Impact to various users. Expanded operation of JVWCD ASR facilities may increase JVWCD cost of service.

Lead time for activation. Infrastructure and equipment are already in place to use ASR banked water; however, favorable runoff conditions are not always available.

Implementation costs. Primarily JVWCD staff time and the additional well operations costs for extraction of any stored water that was previously injected.

Procedural requirements. Water injection occurs during off-season. Well operations must be manually altered to enable withdrawal. Metering is used and must be monitored to ensure that the water withdrawal does not exceed the amount of available water injected.

6.3.8 RTL-A-0: Customer Leak Detection Using AMI and Billing Software (all levels)

Description. JVWCD will use AMI analytics to identify customer leaks and then issue notifications to customers with larger leaks. JVWCD operations staff may notify the customer in person for larger leaks or send a notice for smaller leaks. Information can be integrated into a personalized dashboard unique to each customer's account.

Impact to various users. Expected to impact users with older homes and businesses. Member Agencies who currently use AMI to discover leaks and notify customers of leaks have received positive feedback from users. These users were notified of large leaks about which they were previously unaware. They have minimal response from users who have small leaks.

Lead time for activation. There is a mitigation measure to develop the analytics that will identify customer leaks and alert JVWCD staff. It is assumed that it will take 6 months to a year to implement the analytics, but after it is in place, monitoring will be continual and require no lead time for activation.

Implementation costs. Upfront costs are reflected in mitigation measure Cons&DM-04 described in Section 5.3.2. Costs are mostly covered by staff time with some additional budget that may be needed to enhance the response action to have direct customer notification. Costs are potentially $15,000 to $20,000. There are negligible costs over time to maintain this response action.

Procedural requirements. Procedures need to be put in place for the continual monitoring and notification of customer leaks.

6.3.9 RTL-B-1,2,3,4: Public Notification of Diminished Water Supply and Voluntary Reductions in Water Use

Description. Reductions in water use will occur voluntarily and will be incentivized through modifications to the existing water rate tiers depending on the water supply availability level. JVWCD will modify the water rate tiers by either increasing the rates associated with each tier, reducing the maximum water usage allotted to each tier, or doing a combination of both strategies. The following show the changes associated with each water supply availability level:

- At level 1: Notify public of diminished water supply and request voluntary reductions in water use.
- At level 2: Notify public of diminished water supply and request voluntary reduction in water use resulting in at least a 10 percent reduction.
- At level 3: Notify public of diminished water supply and request voluntary reductions in water use resulting in at least a 20 percent reduction. Encourage water use reduction with modifications to a tier 4 and possibly tier 3 rates and/or usage allotments.
- At level 4: Notify public of diminished water supply and request voluntary reductions in water use resulting in at least a 30 percent to 50 percent reduction. Encourage water use reduction with modifications to tiers 2, 3, and 4 rates and/or usage allotments depending on drought severity.

Impact to various users.

- At level 1, impacts are minimal. Serves to notify all retail customers of the water supply availability level.
- At level 2, there is minimal impact due to voluntary reduction in water use and no fee increases.
- At level 3, Tier 4 rates primarily target outdoor water use. This response action will impact users with large lawns, such as churches, parks, schools (those that are not included in the large water users category).
- At level 4, impacts will be high to outdoor water users. Increasing water rates for tiers 2, 3, and 4 are intended to reduce non-essential water use.

Lead time for activation. Time required for messaging campaign.

Implementation costs. Primarily JVWCD staff time.

Procedural requirements. Notifications of water use reductions and tier modifications will be sent to customers via bi-annual mailers and announcements added to each monthly water bill. Notifications will be sent to both wholesale and retail customers.

6.3.10 RTL-C-2,3,4: Water Delivery Reductions to Large Water Users

Description. Mitigation Measure Agr&Reg-02 described in Section 5.3.12 establishes specific delivery reductions for large water users that are established in specific service agreements with these water users. Beginning at water supply availability level 2, water delivery reductions stipulated in large water users' service agreements are activated (e.g., car washes, data centers, schools, parks, etc.).

Impact to various users. JVWCD's large water users (top 15 by water usage) in 2020 consisted of schools, apartment complexes/condos, a public farm, a church, and a fast-food restaurant.

Individual water service agreement will minimize major financial impacts to the companies by considering each water users situation.

Lead time for activation. Reductions are predetermined and tied to drought levels. Water supply availability levels are assigned well in advance of peak water use season.

Implementation costs. Primarily JVWCD staff time.

Procedural requirements. Mitigation Measure Agr&Reg-02 establishes the specific service agreements. The procedure for this response action is to implement the established service agreement provisions. A reminder will be sent to large water users after the drought level is established for the year. The reminder will contain the specific requirements associated with the drought level that is established in their service agreement.

6.3.11 RTL-D-2,3,4: Residential and Commercial Lawn Watering Restrictions

Description. Lawn watering restricted to a schedule set forth by JVWCD. An example of the restriction for this drought level is limiting the number of outdoor irrigation days per week and specifying when during the day irritation may occur:

- At level 3 and 4: (limited to certain days), lawn watering restrictions are based on a schedule set forth by JVWCD.

Impact to various users.

- At level 2: Lawns will stay alive and but not thrive (brown spots are common) with this amount of watering; it reduces excessive watering by educating residential and commercial customers to improve lawn watering habits. Appendix G shows the UDWRe lawn watering guide an example of a schedule JVWCD may implement. Negative impacts to outdoor water users will be temporary.
- At level 3: The watering schedule at this level is intended to keep lawns alive but widespread yellowing of lawns will be common. The goal of the schedule set forth by JVWCD is to minimize economic damage to customers that would come from completely prohibiting lawn watering.
- At level 4: Minimal water to support trees and shrubs and reduce dormancy for lawns. The goal of the schedule set forth by JVWCD is to minimize economic damage to customers that would come from completely prohibiting lawn watering.

Lead time for activation. Lead time is minimal. Assumes procedures are already in place and a framework to disseminate the messaging is already identified.

- At level 4: Extensive coordination for widespread messaging:

Implementation costs. The implementation costs is mostly staff time and the cost to notify customers of the required reduction. Typical methods could include bill stuffers, email, text, or letters. For email and text, JVWCD could use an automated system, such as Twilio or something similar that requires a per-use type of payment ($5,000 to 10,000 range for service). For bill stuffers, estimated cost is approximately $1,000 based on recent messaging efforts (including design and printing costs):

- At level 3 and 4: Costs for messaging and enforcement.

Procedural requirements. Restrictions are communicated through monthly mailers during summer months. Lawn watering is monitored using AMI, and customers who are non-compliant are notified via letters in monthly bills, email, or text (depending on the drought level and severity of non-compliance).

6.3.12 RTL-E-2,3,4: Dispense "Drought Drive-Thrus" Waterwise Kits

Description. Customers receive pre-made water wise conservation kits. Kits may include faucet aerators, soil moisture meters, water-saving showerhead, energy cost calculator, toilet leak detector tablets, flow rate test bag, etc.

Impact to various users. Increases user awareness of water use reduction methods. Negative impacts are minimal.

Lead time for activation. 1 to 2 months are required for program advertising and kit preparation.

Implementation costs. Cost varies. Commercially available kits run from $15 and up. Example cost from another agency ranged closer to $10 (assumes approximately 200 to 300 kits be provided initially).

Procedural requirements. The kits will be distributed via drive-thru events. Customers are notified of the event's time and place. The kits will also be available at any time for those who call JVWCD and request them. A local water supplier has had success distributing several hundred of these kits over the years by providing an announcement on its website and having customers pick them up at the supplier's office. Kits could also be distributed to schools or during JVWCD's water conservation classes.

6.3.13 RTL-F-3,4: Incentivize Timely Repair for Customer Water Leaks

Description. Customers are notified of water leaks. During drought levels 3 and 4, leak repair is incentivized through reimbursements to their water bill for any water wasted due to leaks for a specified period.

Impact to various users. Expected to impact users with older homes and businesses. Incentivized program is intended to be less obtrusive than a repair mandate while accomplishing the same thing.

Lead time for activation. Program is not already in place, and it will require time to develop.

Implementation costs. Costs for incentives and JVWCD time to administer the program.

Procedural requirements. JVWCD monitors for water leaks using its AMI system. Customers with small water leaks are notified via email, text, or phone call. JVWCD may notify customers with larger water leaks through a phone call or by sending someone to their home. During the time of notification, customers will be provided with incentives to fix the leak in a timely manner.

6.3.14 RTL-G-4: Pool and water Fixture Usage Restrictions

Description. No water use for refilling private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds. Participation is voluntary.

Impact to various users. Direct impact to leisure for residential customers as well as outdoor aesthetic appeal for businesses that have water features.

Lead time for activation. 1 to 2 months required for program advertising. Assumes intensive messaging effort, but little enforcement.

Implementation costs. Negligible cost, assuming little to no enforcement on the part of JVWCD.

Procedural requirements. Messaging is sent out through drought dashboard, emails, announcements on monthly water bills, and other communication.

6.4 Estimated Drought Response Actions Water Savings

The estimated savings are based on reduction in current demand and are expected to increase proportionally to growth in demand in the future. Current demands were estimated using 2018 demands because 2019 was an abnormally low water use year and 2020 water usage was impacted significantly by the COVID-19 pandemic. Appendix C provides the spreadsheet used to estimate water savings for JVWCD's response actions. Tables 6-7 provide a summary of the estimated water savings for retail customers, and Table 6-8 provides a summary of the estimated water savings for wholesale customers resulting from response action implementation for each level.

Table 6-7. Summary of Retail Customers Demand Reduction and Supply Augmentation by Water Supply Availability Level

	Water Supply Availability Level				
	0	1	2	3	4
2018 Retail Customer Demand[a] (AFY)	8,975				
Retail Customers Demand Reduction (AFY)	-	400	835	2,940	3,045
Retail Customers Supply Augmentation[b] (AFY)	-	50	70	-	-
Total Retail Customer Demand Reduction and Supply Augmentation (AFY)	-	450	905	2,940	3,050
Demand Reduction Percentage	0	5%	10%	33%	34%

Notes:

a. *Source: Monthly usage data from 2018.*
b. *Supply augmentation provided by ASR. ASR projected to provide total of 500 to 700 AF.*

Table 6-8. Summary of Wholesale Customers Demand Reduction and Supply Augmentation by Water Supply Availability Level

	Water Supply Availability Level				
	0	1	2	3	4
2018 Wholesale Deliveries[a] (AFY)	98,765				
Wholesale Customers Demand Reduction (AFY)	-	9,030	14,530	22,430	30,335
Wholesale Customers Supply Augmentation[b] (AFY)	-	TBD	TBD	TBD	TBD
Demand Reduction Percentage	0	10%	16%	24%	33%

Notes:

a. *Source: Monthly usage data from 2018.*
b. *Supply augmentation provided by ASR. ASR projected to provide total of 500 to 700 AF. Mitigation measures will support determination of achievable amount.*

Assumptions used to estimate water savings for each action are provided in the spreadsheet provided in Appendix C. These estimated savings, as well as the savings estimated for JVWCD drought response actions, are anticipated to be updated as new information, such as monthly usage data and projected supply augmentation provided by ASR becomes available.

Section 7

Operational and Administrative Framework

This framework provides clear direction on how JVWCD will carry out the drought monitoring activities, establish the drought mitigation measures to prepare for drought, and support efficient implementation of response actions at various water supply availability levels.

7.1 Overview

The operational and administrative framework defines the responsibilities, the critical tasks and procedures, and the person or group that will perform or oversee the identified tasks. The key elements of the DCP listed below will be outlined in the operational and administrative framework:

- Drought monitoring
- Mitigation measures planning and implementation
- Response activities planning and implementation
- DCP update procedures

7.2 Drought Monitoring

JVWCD will follow the drought monitoring process outlined in Section 3 of the DCP and will administer the related processes. The responsible JVWCD staff member(s) or stakeholders, their roles/responsibilities, and the critical tasks and procedures they will complete are shown in Table 7-1.

Table 7-1. Drought monitoring implementation

Person or Workgroup	Responsibilities	Critical Tasks and Procedures
JVWCD Assistant General Managers (Chief Engineer and Operations/Maintenance)	Monitor snowpack, stream flow forecast, reservoir storage conditions, and Salt Lake Valley deep principal aquifer groundwater levels.	Prepare a monthly report that documents the applicable parameters and compares these parameters to historical period average, dry, and wet years.
Drought Monitoring Committee [(a)]	Review water supply forecast data and recommend drought severity level in accordance with triggering criteria.	Meet as a committee at least once each spring to review data and water supply availability level criteria and develop a recommendation to be presented by the JVWCD committee member at the JVWCD annual Member Agency meeting. Each Member Agency will have one voting member on the committee and JVWCD will have one voting member on the committee. The committee will re-convene as necessary to re-evaluate any potential changes to an established water supply availability level.
JVWCD General Manager	Report applicable information to the JVWCD Board of Trustees and recommend applicable policy changes that require approval by the Board of Trustees.	Provide a monthly water supply report to the JVWCD Board of Trustees based on the report from Assistant General Manager. Provide guidance to JVWCD staff regarding potential policy changes associated with the DCP.

Table 7-1. Drought monitoring implementation		
Person or Workgroup	**Responsibilities**	**Critical Tasks and Procedures**
JVWCD Board of Trustees	Provide governing oversight of JVWCD organization and all its operation.	As part of the regular monthly meeting, receive reports on current water supply conditions. Consider and establish the drought severity level based on Drought Monitoring Committee recommendations and supplemental information from JVWCD General Manager.

Note:

a. *The Drought Monitoring Committee will consist of one voting member representative from each JVWCD wholesale Member Agency, and one voting member from JVWCD (Assistant General Manager/Chief Engineer). Other applicable JVWCD staff may serve as non-voting members of the committee.*

7.3 Mitigation Measures Planning and Implementation

JVWCD will plan and implement the mitigation measures as outlined in section 5 of the DCP and will administer the related processes. The responsible JVWCD staff member(s), their roles/responsibilities, and the critical tasks and procedures they will complete are shown in Table 7-2.

Table 7-2. Drought Mitigation Measure Implementation		
Person or Workgroup	**Responsibilities**	**Critical Tasks and Procedures**
JVWCD Assistant General Managers (Chief Engineer, Operations/Maintenance, and Communications/Technology)	Incorporate drought mitigation measures into the JVWCD 10-year capital plan and other associated planning documents. Develop and modify mitigation measures as conditions and regulations change. Oversee JVWCD department managers' implementation of drought mitigation measures.	Annually update the 10-year capital plan and other associated planning documents to include mitigation measures from the DCP. Actively work with JVWCD Member Agencies, peer agencies, and the public to promote mitigation measure implementation and compliance. Obtain mitigation funding assistance from local, state, and federal entities.
JVWCD Engineering Department Manager and Communications Department	Implement drought mitigation measures. Serve as Member Agency liaison to support Member Agency mitigation measure implementation.	Manage and direct the implementation of selected drought mitigation measures. Drought committee meetings to be used to check status of Member Agency mitigation measure implementation. Liaison to support Member Agencies in developing and implementing mitigation measures.
JVWCD General Manager	Present or oversee the presentation of mitigation measures to the JVWCD Board of Trustees.	Review selected drought mitigation measures with the Assistant General Managers and include them in the annual budget that is presented to the JVWCD Board of Trustees each year.
JVWCD Board of Trustees	Authorize implementation of drought mitigation measures.	Approve drought mitigation measures during the annual budget meeting. Approve the expenditure of funds and authorize drought mitigation projects as they are presented to the Board of Trustees throughout the year.

7.4 Response Actions Planning and Implementation

JVWCD will initiate applicable drought response actions outlined in Section 6 of the DCP and will administer the related processes. The responsible JVWCD staff member(s), their roles/responsibilities, and the critical tasks and procedures they will complete are shown in Table 7-3.

Table 7-3. Drought Response Action Implementation

Person or Workgroup	Responsibilities	Critical Tasks and Procedures
JVWCD Operations Department Manager, Distribution System Division Manager, and Water Supply System Manager	Implement restrictions on water deliveries as set forth by the Drought Monitoring Committee and as approved by the JVWCD Board of Trustees.	Monitor overall water use trends in the retail service area and for each Member Agency. Ensure that contractual restrictions are not exceeded and communicate status with applicable Member Agency staff. Designate a person or workgroup who will work with Member Agencies to help them implement their response actions. Meet regularly with Assistant General Managers to provide updates and receive direction.
JVWCD Communications Department and Operations Meter Section	Implement drought response actions in the retail service area as approved by the JVWCD Board of Trustees.	Notify retail customers of drought conditions and make necessary adjustments to messaging, billing, and operational procedures to implement response actions. Meet regularly with Assistant General Managers to provide updates and receive direction.
JVWCD General Manager, Assistant General Manager (Communications/Technology), Public Information Manager, and Communications Department	Notify Member Agencies of drought status. Manage public drought messaging, media relations, press releases, website updates, and social media posts.	Coordinate drought messaging tactics and strategies. Support Member Agencies' drought response actions with communication assets. Review with JVWCD Board of Trustees as needed.
JVWCD General Manager	Present or direct presentation of drought response actions to the JVWCD Board of Trustees and manage overall effort.	Review needed response actions with the JVWCD Board of Trustees for approval prior to implementation.
JVWCD Board of Trustees	Consider approval of proposed response actions.	Review response actions recommended by the JVWCD General Manager. Approve implementation as needed.

7.5 Funding Opportunities for DCP Implementation

Successful implementation of many actions outlined in this DCP rely on acquiring additional resources and funding. The federal and state funding opportunities that are most relevant to JVWCD's DCP implementation shown in Table 7-4 may support mitigation measures identified in Section 5 and response actions identified in Section 6. Federal and state funding opportunities are separated in the table below and denoted with an "F" or "S" in the ID column. Implementation of some mitigation measures will also support implementation of some response actions in future drought emergencies.

Table 7-4. Federal and State Grant and Loan Funding Opportunities

ID	Program	Opportunity Description	Relevant Mitigation Measures and Response Action Activities	Funding Timeline
Federal Funding Opportunities				
F - 1	WaterSMART: Drought Resiliency Program	Grant program offered by Reclamation. The Drought Resiliency Program provides cost-shared funding for projects that will build long-term resiliency to drought (i.e., projects that mitigate the impacts of current and future droughts) and help avoid the high-cost approach of implementing emergency response actions. Reclamation will prioritize projects supported by an existing drought planning effort. Potential mitigation actions or tools should improve water management flexibility or improve access to critical water supply information that will help water managers build resiliency and avoid a crisis during drought.	Potentially each of the top 15 mitigation measures in this plan, except for the education and outreach measure, could be eligible for this grant program. The following measures are recommended for application in order of descending priority: • Begin taking delivery of ULS supply by 2030 or earlier (NewSup-08) • Develop high-quality groundwater wells (NewSup-03) • JVWCD Aquifer Storage & Recovery (ASR) operational expansions (GWMgnt-02) • Evaluate storage for secondary irrigation systems using Provo River spring runoff and West Side Mountain Streams (Stor-01)	Applications are typically due in August
F - 2	WaterSMART Drought Program: Emergency Response Actions	Emergency grant program offered by Reclamation. Reclamation will fund emergency response actions under the Drought Response Program to minimize losses and damages resulting from drought, relying on the authorities in Title I of the Drought Act. Emergency response actions are crisis driven actions in response to unanticipated circumstances.	• JVWCD should consider application to this program during a drought to mitigate the costs of implementing response actions. Does not apply to mitigation measures.	Based on emergency need
F - 3	WaterSMART: Environmental Water Resources Projects	Grant program offered by Reclamation. The Environmental Water Resources program supports projects that that benefit plant and animal species, fish and wildlife habitat, riparian areas, and ecosystems that are directly influenced by water resources management. Projects may include but are not limited to efforts that improve the timing or quantity of water available; improve water quality and temperature; or that improve stream or riparian conditions.	• Watershed-based management with stakeholders (WSPro&Mgnt-03)	Applications are due in December
F - 4	WaterSMART: Water and Energy Efficiency	Grant program offered by Reclamation. The Water and Energy Efficiency program provides 50/50 cost-share funding for projects that conserve and use water more efficiently; increase the production of hydropower; mitigate conflict risk in areas at a high risk of future water conflict; and accomplish other benefits that contribute to water supply reliability in the western United States. Projects are selected through a competitive process and the focus is on projects that can be completed within two or three years. (http://www.usbr.gov/watersmart/weeg/index.html)	• JVWCD Aquifer Storage & Recovery (ASR) operational expansions (GWMgnt-02) • Enclose canals to reduce seepage and evaporation losses (Conv-02)	Applications are due in December
F - 5	WaterSMART: Small Scale Efficiency Projects	Grant program offered by Reclamation. The Small Scale Efficiency program provides 50/50 cost share funding to irrigation and water districts, tribes, states and other entities with water or power delivery authority. Projects support small-scale water management efforts that have been identified through previous planning efforts. Reclamation has developed a streamlined selection and review process to reflect the small-scale nature of these projects. (https://www.usbr.gov/watersmart/swep/index.html)	• Enhanced AMI program analytics (Cons&DM-04)	Applications are typically due in March

Table 7-4. Federal and State Grant and Loan Funding Opportunities				
ID	**Program**	**Opportunity Description**	**Relevant Mitigation Measures and Response Action Activities**	**Funding Timeline**
F - 6	Title XVI	Grant program offered by Reclamation. The Title XVI program supports recycled water feasibility, demonstration, and construction projects through the Water Reclamation and Reuse Program authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI) and its amendments. Projects successful in the application process are authorized by Congress and included in USBR's annual budget request to the president. Congress then appropriates funds, and USBR ranks and prioritizes projects and disburses the money on a competitive grant basis each year. Prioritized projects are those that postpone the development of new water supplies, reduce diversions from natural watercourses, and reduce demand on federal water supply facilities, or that have a regional or watershed perspective. (http://www.usbr.gov/watersmart/title/)	• Member Agency wastewater reuse projects for secondary irrigation water (NewSup-06)	Applications are typically due in April
F - 7	Water Infrastructure Finance and Innovation Act (WIFIA)	Loan program offered by the EPA. The WIFIA loan program accelerates investment in the nation's water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects. The WIFIA program was established by the Water Infrastructure Finance and Innovation Act of 2014. (https://www.epa.gov/wifia).	• JVWCD Aquifer Storage & Recovery (ASR) operational expansions (GWMgnt-02) • Begin taking delivery of ULS supply by 2030 or earlier (NewSup-08) • Enclose canals to reduce seepage and evaporation losses (Conv-02) • Develop high-quality groundwater wells (NewSup-03) • Member Agency wastewater reuse projects for secondary irrigation water (NewSup-06)	Application process takes approximately 6 months of the Notice of Funding Availability
State Funding Opportunities				
S - 1	State and Federal State Revolving Funds (SRF)	Loan program offered by the Division of Drinking Water (DDW). The State and Federal SRF programs provide financial assistance to eligible public water systems for infrastructure projects, administration, technical assistance, source water protection, etc. Each program has a unique set of criteria and requirements but utilizes a combined application form. (https://deq.utah.gov/drinking-water/drinking-water-construction-assistance-programs)	• JVWCD Aquifer Storage & Recovery (ASR) operational expansions (GWMgnt-02) • Develop high-quality groundwater wells (NewSup-03) • New shallow groundwater wells (GWMgnt-06) • Enclose canals to reduce seepage and evaporation losses (Conv-02) • Begin taking delivery of ULS supply by 2030 or earlier (NewSup-08)	Applications are accepted for Board review throughout the year.
S – 2	New Secondary Water Meter Funding Program	Loan program offered by the Utah Board of Water Resources. The board reserves specific funds to encourage secondary water metering that, combined with educational and/or tiered rate components, can increase water efficiency, stretch water supplies, and reduce the impact on water delivery infrastructure. (https://water.utah.gov/development-branch/funding/)	• Secondary Water Metering (Cons&DM-03)	Applications accepted on a rolling basis.

Table 7-4. Federal and State Grant and Loan Funding Opportunities

ID	Program	Opportunity Description	Relevant Mitigation Measures and Response Action Activities	Funding Timeline
S – 3	Watershed Restoration Initiative (WRI)	A group of federal and state agencies working with NGO's, industry, local elected officials and stakeholders for water quality and yield, wildlife and agriculture. Project must relate to approved goals and objectives, mitigates a threat to land health, maximizes return on the investment. Protect values important for our present and future quality of life: water quality and yield, wildlife and agriculture. (https://wri.utah.gov/wri/)	• WSPro&Mgnt-03 Watershed-based management with stakeholders	Information not currently available. To be revisited at later time.
S – 4	State Nonpoint Source (NPS) Funding	Grant program offered by the Water Quality Board to reduce NPS Pollution. Eligible projects will support on-the-ground implementation, NPS studies, and information and education efforts to promote the protection and improvement of water quality. (https://deq.utah.gov/water-quality/funding-for-nonpoint-source-related-projects)	• WSPro&Mgnt-03 Watershed-based management with stakeholders	Applications are typically due in April
S – 5	Utah Board Funding	Loan program offered by the Board of Water Resources to improve safety and water efficiency, develop new water projects, and refurbish aging infrastructure. Private or public water service providers are eligible to apply. (https://water.utah.gov/development-branch/funding/)	• JVWCD Aquifer Storage & Recovery (ASR) operational expansions (GWMgnt-02) • Develop high-quality groundwater wells (NewSup-03) • New shallow groundwater wells (GWMgnt-06) • Enclose canals to reduce seepage and evaporation losses (Conv-02) • Begin taking delivery of ULS supply by 2030 or earlier (NewSup-08)	Applications are accepted for Board review throughout the year.
S – 6	Municipal Storm Water Loans	Loan program offered by the Utah Wastewater Project Assistance Program. Eligible storm water projects must have a significant portion of the project for the purpose of improving water quality. Political subdivisions of the state are eligible for this loan to finance all or part of project costs only after other financing agreements have been evaluated and found either unavailable or unreasonably expensive. (https://rules.utah.gov/publicat/code/r317/r317-101.htm#T8)	• WSPro&Mgnt-03 Watershed-based management with stakeholders	Storm water project loans will be made twice per year.

Funding opportunities are subject to change over time. To capture the full benefits of available funding to support implementation of the mitigation measures and response actions, the list of funding opportunities should be updated on the same timeline as the DCP update process.

7.6 DCP Update Process

The DCP will be updated at least every 5 years. The procedures used to perform the update are outlined below.

7.6.1 Monitoring and Evaluation

JVWCD Assistant General Manager/Chief Engineer will be responsible for monitoring relevant studies and conditions that will be used to inform updates to the DCP. Topics of relevant studies or conditions may include climate change, dendrochronology, new water supply projects, new water conservation projects, etc.

7.6.2 Schedule

The process to complete a formal update of the DCP will generally require 10 to 14 months to complete.

7.6.3 Outreach and Communication

When initiating the process to formally update the DCP, JVWCD will organize a Task Force and an Outreach Group and will solicit input from these two groups. JVWCD will work to have similar representation on the DCP update Task Force and Outreach Group as are serving on the original DCP groups.

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Section 8

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Appendix A: JVWCD DCP: Detailed Work Plan

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JVWCD Drought Contingency Plan: Detailed Work Plan

November 1, 2019

Agreement Number: R18AC0084
EIN Number: 876011348
DUNS Number: 008360265

Introduction

This workplan has been prepared as per Reclamation's April 2016 Drought Response Program Framework and in response to local stakeholder support for Jordan Valley Water Conservancy District (JVWCD) to lead the development of a Drought Contingency Plan (DCP) for water facilities and water users within its service area, which includes nearly a quarter of Utah's population. Stakeholders agree that planning to mitigate the risks associated with a severe drought can no longer be delayed. JVWCD is assembling these stakeholders from the municipal and industrial (M&I), agricultural, recreational, and environmental communities to establish the projects, actions, and partnerships needed to prepare for and reduce water shortages and provide better drought resilience for the area's diverse water users.

Scope and Purpose

The DCP will assist JVWCD to optimize its use of supplies from Reclamation facilities and other sources and will enable JVWCD to minimize the potential damages that might otherwise occur as a result of a severe and/or extended drought. With the DCP, JVWCD will improve its long-term resilience to drought conditions consistent with Reclamation and Department of Interior initiatives. The DCP will also cover how drought mitigation and response actions will be conveyed to and implemented by JVWCD and its 17 member agencies.

Planning Area

JVWCD is located at West Jordan, Salt Lake County, Utah. The JVWCD DCP includes planning for approximately two thirds of the developed land area in Salt Lake County, Utah, and a small portion of neighboring Utah County. Salt Lake County is the most populous county in Utah and is home to the state capital, Salt Lake City. The geographic boundary for the DCP (Plan Area) includes the service area for JVWCD and its 17 member agencies as shown in Figure 1. The DCP will include agricultural, M&I, recreational, and environmental interests in the Plan Area.

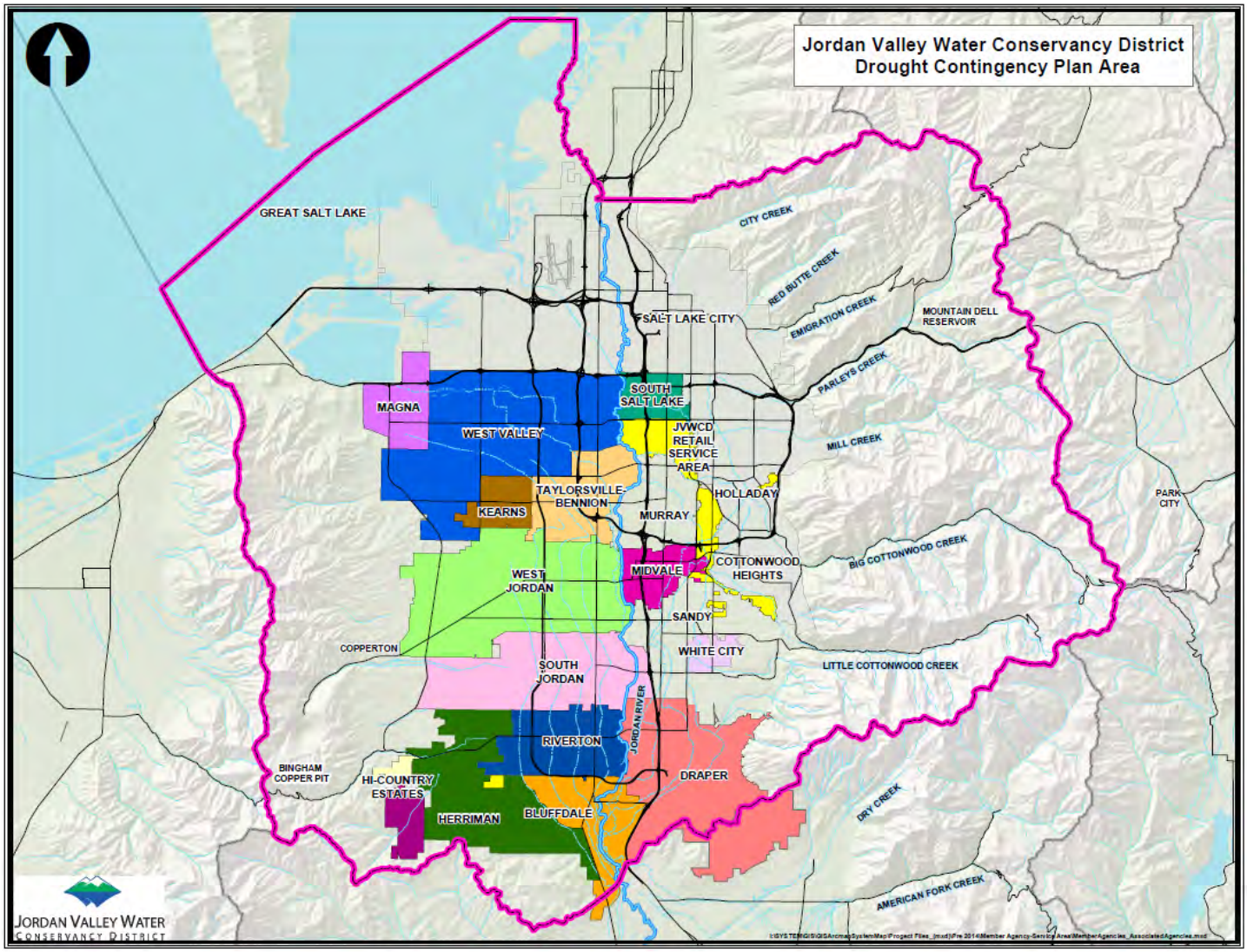


Figure 1: DCP Plan Area

Municipal and Industrial: JVWCD estimates its current service area population to be 680,000, but it also provides a portion of the water supply to the Metropolitan Water District of Salt Lake and Sandy (MWDSLS), which serves a population of 430,000. JVWCD also serves water on a retail basis to approximately 8,800 connections in Salt Lake County.

The southern end of Salt Lake County and the northern end of Utah County, areas served by JVWCD, have become known as the Silicon Slopes because of the influx of tech companies, mimicking the early growth of Silicon Valley in California. Approximately 20 data centers have been constructed in the region, the most significant of which is the U.S. National Security Agency's (NSA) $1 billion data center.

Agricultural: The network of canals that service agricultural water needs in the area are owned and operated by various canal companies formed to serve these agricultural water users. More than 630 farms account for nearly 80,000 acres of farmland and support 10,000 head of livestock in the County. Most of this farmland falls within the Plan Area.

Environmental: Among the countless environmental benefits provided by the natural water bodies in the Plan Area, perhaps the most significant is served by the unique system of saltwater and freshwater wetlands surrounding the Great Salt Lake. Tens of thousands of birds use the Great Salt Lake as a resting point in their journey from Canada to Central and South America, in large part because of the rich feeding ground that the wetlands provide.

Recreational: Utah Lake, the Jordan River, small irrigation reservoirs, and the Great Salt Lake provide a host of recreational activities for residents of the community and visitors to the state. Utah Lake is a popular destination for fishing and motorized boating and the Great Salt Lake is popular for sail boats and hikes to scenic overlooks. As an urban waterway, the Jordan River hosts boat ramps providing access for canoe and kayak tours and a trail system that now nearly spans the entire length of the river and is used for biking, walking, and access for fishing.

Background

JVWCD's largest single source of supply is the Reclamation Central Utah Project (CUP)—Bonneville Unit. JVWCD's CUP petition amount is 50,000 acre-feet, which is the largest of any Bonneville Unit petitioner, and that amount constitutes more than half of JVWCD's current total M&I supply. JVWCD is also the largest petitioner of the Utah Lake Drainage Basin System (ULS) phase of the CUP. JVWCD paid a portion of the costs to enclose the Provo Reservoir Canal (now called the Provo River Aqueduct), which will be used to convey ULS water into Salt Lake County. JVWCD will rely on the ULS supply to meet the demands of the rapidly growing population in its service area. In addition to the CUP, JVWCD receives water from Reclamation's Provo River Project (PRP) attributable to its share ownership in Provo River Water Users Company, which in turn owns shares in the Provo River Water Users Association. This is also a significant portion of the JVWCD water supply portfolio.

JVWCD is also a member of the Utah Lake Water Users Association, which includes several governmental public water suppliers, private irrigation companies, and a major self-supplied industrial user. Members of the association jointly own and operate facilities necessary to use water stored in Utah Lake. Utah Lake is not only a key source of irrigation and industrial water in the region, but the early priority water rights held by members of the association together with the operation of Utah Lake significantly influence the operation of Reclamation projects (CUP and PRP).

In addition to relying on water supplies from Reclamation projects, JVWCD operates and maintains the Jordan Aqueduct by agreement with Reclamation, Central Utah Water Conservancy District, and MWDSLS. Reclamation constructed the Jordan Aqueduct reaches 1, 2, 3, and 4 as key features of the CUP facilities for deliveries to Salt Lake County. Reclamation maintains ownership of the Jordan Aqueduct but, by agreement, JVWCD performs all operation and maintenance activities.

JVWCD is currently in the process of updating its Demand, Supply, and Major Conveyance Study which was originally developed in 2005. As part of this update, JVWCD is meeting with

each of its 17-member agencies to identify their plans for growth for the next 40 years. This information will be coupled with population projections to determine where infrastructure is needed to support growth. Some of the information being gathered as well as some of the analysis will be support the Drought Contingency Plan such as population projections, future indoor water demand, and future outdoor water demand.

Planning Approach

Detailed Budget

The estimated total cost for the DCP is $334,227, as shown in Table 1. JVWCD commits to providing $174,227 in non-federal matching funds in support of the activities identified in this proposal. It is expected that this amount will be satisfied by JVWCD revenues including water supply charges, property taxes, and fees, as well as anticipated in-kind costs. Funding from entities other than Reclamation will not be requested.

The anticipated in-kind costs are estimated at $89,926 and reflect services related to the initial DCP steps including developing the Task Force, developing the detailed work plan, and communications and outreach as well as leading DCP technical tasks. The technical tasks that JVWCD staff will lead include documenting the background and plan area, and water supplies and demands, developing the process for monitoring near- and long-term water availability, and defining drought stages as trigger mechanisms for initiating drought mitigation measures and drought response actions. JVWCD will also define the administrative and operational framework for undertaking the actions necessary to implement the DCP and define the DCP update process.

Of the total cost of $334,227 for the DCP, federal funding obtained through this grant process would contribute $160,000 (48 percent), in-kind contributions from JVWCD would account for $89,926 (27 percent) of the cost, and JVWCD would contribute $84,301 (25 percent) of the cost directly. No other federal funds will be used to develop the JVWCD DCP.

The detailed budget by task for JVWCD in-kind effort is shown in Table 1. The detailed budget by task for the consultant's effort is shown in Table 2.

Table 1: *Detailed Budget by Task – In-Kind*

Task/subtask		Assistant General Manager/Chief Engineer	Assistant General Manager of Supply and	Project Manager/Engineer	Engineering Department Manager	Senior Business Data Analyst	Communication Department Manager	Public Information Manager	Engineering Intern	Administrative Services	Total
1	**Initial Drought Contingency Plan Steps**										
1.1	Drought Planning Task Force	4		36	2					8	50
1.2	Detailed Work Plan	8		24	2					4	38
1.3	Communication and Outreach Plan	8		16	2		4	40		4	74
2	**Background and Plan Area Description**										
2.1	Plan Area			16	2				4	8	30
2.2	Background			12	2				4	2	20
2.3	Review Plans			8						2	10
2.4	Drought History			12	2				8	2	24
3	**Water Supplies and Demands**										
3.1	Review Data and Models	4		4		4					12
3.2	Water Supplies (Surface, Ground, Other for M&I and ag)	4		4		6					14
3.5	Urban Demands	2		4		6					12
3.6	Ag and Other Demands	8		16		8					32
3.7	Conservation Programs	2		4		6	4	12			28
3.8	Supply to Demand Comparison	6		6		12			8		32

Task/subtask		Assistant General Manager/Chief Engineer	Assistant General Manager of Supply and	Project Manager/Engineer	Engineering Department Manager	Senior Business Data Analyst	Communication Department Manager	Public Information Manager	Engineering Intern	Administrative Services	Total
4	**Drought Monitoring Process**										
4.1	Drought Indicators	8	8	24					4		44
4.2	Drought Triggers	8	8	16					4		36
5	**Vulnerability Assessment**										
5.1	Assess Supply Vulnerability	4		4	2						10
5.2	No Action Consequences	2		2	2						6
5.3	Climate Change Impacts	2	16	2		20					40
6	**Mitigation Actions**										
6.1	Drought Mitigation Measures	8		4	2						14
6.2	Initial List of Drought Projects	8		6	6						20
6.3	Short List of Drought Projects	8		4	4						16
6.4	Benefits of Projects	8		4	4						16
6.5	Implementation	8		3	1						12
7	**Response Actions**	**2**		**8**	**1**						**11**
8	**Operational and Administrative Framework**										
8.1	Drought Response Organization	2		4			4	24			34
8.2	Member Agencies Process	2		4			4	16			26

Task/subtask		Assistant General Manager/Chief Engineer	Assistant General Manager of Supply and	Project Manager/Engineer	Engineering Department Manager	Senior Business Data Analyst	Communication Department Manager	Public Information Manager	Engineering Intern	Administrative Services	Total
8.3	Stakeholder Process	2		8			4	8			22
9	**Plan Development and Update Process**	**8**		**8**			**8**				**24**
10	**Drought Contingency Plan Document**										
10.1	First Draft	2	4	16	8		2	2		8	42
10.2	Second Draft	2	2	12	4		2	2		4	28
10.3	Final Report	2	2	12	4		2	2		4	28
11	**Project Management and Meetings**										
11.1	Project Management			60						48	108
11.2	Progress Meetings	16	16	44	12	12	4	12			116
	Task Force Workshop 1 (Monitoring and Vulnerability)	8		12			8	8			36
	Task Force Workshop 2 (Mitigation and Response)	8		12			8	8			36
	Task Force Workshop 3 (Implementation and Update Process)	8		12			8	8			36
	Outreach Group Meeting 1 (Risks and Vulnerabilities)	8		12			8	8			36
	Outreach Group Meeting 2 (Draft DCP)	8		12			8	8			36

Task/subtask		Assistant General Manager/Chief Engineer	Assistant General Manager of Supply and	Project Manager/Engineer	Engineering Department Manager	Senior Business Data Analyst	Communication Department Manager	Public Information Manager	Engineering Intern	Administrative Services	Total
	Total Hours	188	56	467	62	74	78	158	32	94	1029
	Labor Rate per Hour	$67.37	$78.32	$32.90	$52.10	$32.90	$51.03	$39.87	$10.47	$23.24	--
	Salaries and Wages	$12,666	$4,386	$15,364	$3,230	$2,435	$3,980	$6,299	$335	$2,185	$50,880
	Fringe Benefits per Hour (includes substitute Social Security, URS Pension, 457, Medicare, Annual Leave, Sick Leave Insurance, Admin (10%))	$47.79	$53.93	$26.32	$38.60	$27.29	$37.43	$32.33	$8.22	$21.77	
	Fringe Benefits	$8,985	$3,020	$12,291	$2,393	$2,019	$2,920	$5,108	$263	$2,046	$39,046
	Travel	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Materials/Supplies	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Contractual - Direct (See Table 2)										$244,301
	Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total Direct Costs										$334,227
	Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Total Project Costs										$334,227

Table 2: Detailed Budget by Task – Consultant

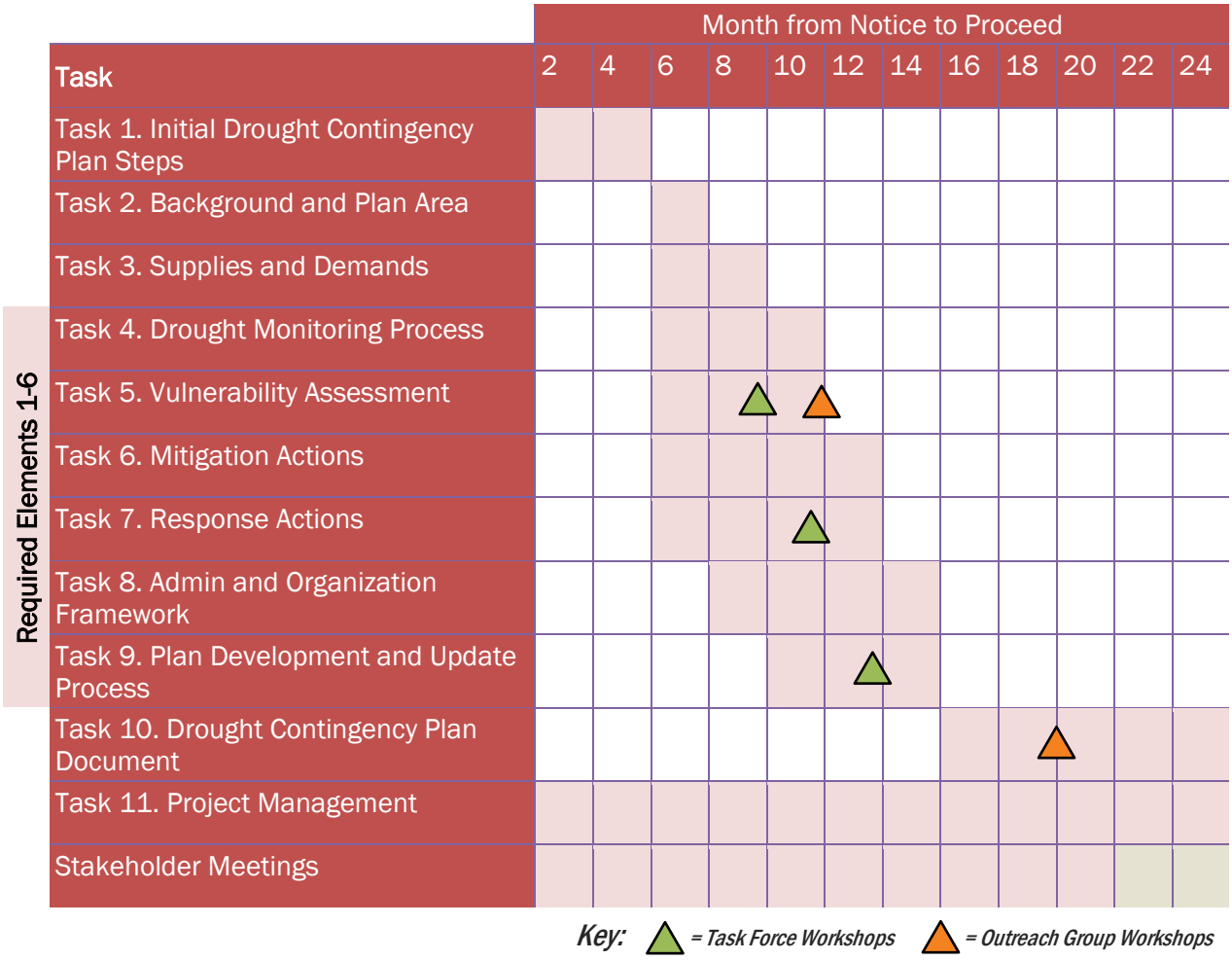
Table 2. Contracted Costs												
Task/subtask		Project Manager	Project Administrator	Project Engineer	QA/QC Reviewer	Staff Engineer	Infrastructure Engineer	Graphics	Principal/ oversight	Labor Hours	Materials and Travel, $	Total, $
1	Initial Drought Contingency Plan Steps											
1.1	Drought Planning Task Force	8	0	0	0	4	0	0	0	12	$ -	$ 2,261
1.2	Detailed Work Plan	10	0	8	0	4	0	0	0	22	$ -	$ 4,445
1.3	Communication and Outreach Plan	8	0	2	0	2	0	0	0	12	$ -	$ 2,457
2	Background and Plan Area Description											
2.1	Plan Area	2	0	0	0	0	0	0	0	2	$ -	$ 446
2.2	Background	2	0	0	0	0	0	0	0	2	$ -	$ 446
2.3	Review Plans	2	0	0	0	0	0	0	0	2	$ -	$ 446
2.4	Drought History	2	0	0	0	0	0	0	0	2	$ -	$ 446
3	Water Supplies and Demands											
3.1	Review Data and Models	0	0	0	0	0	0	0	0	0	$ -	$ -
3.2	Surface Water Supplies	0	0	0	0	0	0	0	0	0	$ -	$ -
3.3	Groundwater Supplies	0	0	0	0	0	0	0	0	0	$ -	$ -
3.4	Other Supply Sources	0	0	0	0	0	0	0	0	0	$ -	$ -
3.5	Urban Demands	0	0	0	0	0	0	0	0	0	$ -	$ -
3.6	Ag and Other Demands	0	0	0	0	0	0	0	0	0	$ -	$ -
3.7	Conservation Programs	0	0	0	0	0	0	0	0	0	$ -	$ -
3.8	Supply to Demand Comparison	4	0	8	0	8	0	0	0	20	$ -	$ 3,585
4	Drought Monitoring Process											

Table 2. Contracted Costs												
Task/subtask		Project Manager	Project Administrator	Project Engineer	QA/QC Reviewer	Staff Engineer	Infrastructure Engineer	Graphics	Principal/ oversight	Labor Hours	Materials and Travel, $	Total, $
4.1	Drought Indicators	2	0	4	0	6	0	0	0	12	$ -	$ 2,031
4.2	Drought Triggers	2	0	4	0	6	0	0	0	12	$ -	$ 2,031
5	Vulnerability Assessment											
5.1	Assess Supply Vulnerability	16	2	32	2	32	0	8	0	92	$ -	$ 16,116
5.2	No Action Consequences	16	0	20	0	24	0	4	0	64	$ -	$ 11,253
5.3	Climate Change Impacts	16	0	0	0	4	0	0	0	20	$ -	$ 4,044
6	Mitigation Actions											
6.1	Drought Mitigation Measures	8	0	16	2	20	0	0	0	46	$ -	$ 8,277
6.2	Initial List of Drought Projects	8	0	12	2	24	8	0	0	54	$ -	$ 9,589
6.3	Short List of Drought Projects	10	0	12	2	24	8	40	0	96	$ -	$ 14,796
6.4	Benefits of Projects	8	0	12	0	28	8	0	0	56	$ -	$ 9,437
6.5	Implementation	8	0	12	0	20	8	0	0	48	$ -	$ 8,482
7	Response Actions	**8**	**0**	**12**	**4**	**24**	**0**	**0**	**0**	**48**	$ -	$ 8,515
8	Operational and Administrative Framework											
8.1	Drought Response Organization	2	0	4	0	4	0	0	0	10	$ -	$ 1,792
8.2	Member Agencies Process	2	0	4	0	4	0	0	0	10	$ -	$ 1,792
8.3	Stakeholder Process	2	0	4	0	4	0	0	0	10	$ -	$ 1,792
9	Plan Development and Update Process	**6**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**10**	**$ -**	**$ 2,207**
10	Drought Contingency Plan Document											
10.1	First Draft	16	24	48	6	60	6	16	0	176	$ -	$ 28,571

Table 2. Contracted Costs												
Task/subtask		Project Manager	Project Administrator	Project Engineer	QA/QC Reviewer	Staff Engineer	Infrastructure Engineer	Graphics	Principal/ oversight	Labor Hours	Materials and Travel, $	Total, $
10.2	Second Draft	12	16	32	0	48	0	8	0	116	$ -	$ 17,871
10.3	Final Report	12	16	32	0	48	0	8	0	116	$ -	$ 17,871
11	Project Management											
11.1	Project Management	24	48	0	0	0	0	0	12	84	$ -	$ 13,079
	Meetings and Workshops											
	Progress Meetings	48	0	24	2	24	0	0	0	98	$ 550	$ 19,959
	TF Workshop 1	10	1	8	0	10	0	4	0	33		$ 5,735
11.2	TF Workshop 2	10	1	8	0	10	0	4	0	33		$ 5,735
	TF Workshop 3	10	1	8	0	10	0	4	0	33		$ 5,735
	Outreach Group Mtg 1	8	1	6	0	8	0	2	0	25		$ 4,378
	Outreach Group Mtg 2	8	1	6	0	8	0	2	0	25		$ 4,378
TOTAL hours		310	111	342	20	468	38	100	12	1,401	--	--
Labor rate per hour		$ 222.92	$ 97.56	$ 217.25	$ 314.87	$ 119.38	$ 212.94	$ 119.04	$ 253.86	--	--	--
Total		**$ 69,106**	**$ 10,829**	**$ 74,300**	**$ 6,297**	**$ 55,871**	**$ 8,092**	**$ 11,904**	**$ 3,046**	**--**	**$ 550**	**$ 244,301**

Schedule

The project schedule for the Jordan Valley Water Conservancy District (JVWCD) DCP 2-year program is shown below:



Narrative Description of Project Tasks

The following tasks describe the specific activities to complete the elements of a DCP and several required procedural steps. The DCP will incorporate the supply and demand planning work done by JVWCD and the other stakeholders.

Task 1: Complete Initial Drought Contingency Planning Steps

Following finalization of the financial assistance agreement, JVWCD will work with Reclamation to establish a Drought Planning Task Force (Task Force) and finalize the Work Plan and Communication and Outreach Plan, before development of the DCP begins:

- **Establish the JVWCD Drought Planning Task Force (Task Force):**

  - Confirm each of the Task Force members as listed in the JVWCD DCP grant application
  - Once the Task Force is formed and approved, detailed work plan accepted and a consultant hired, a kickoff meeting will be held which will include a summit session defining the objectives, timeline, and financial obligations of each participating agency and/or organization represented
- **Develop a detailed work plan:**
  - Initiate the Work Plan tasks included in the DCP
  - Provide a final detailed project schedule
  - Identify data needs from the agencies and schedule contact as needed to follow up on data requests for each agency
- **Develop a Communication and Outreach Plan:**
  - Develop a distribution list that includes additional interests not specifically represented on the Task Force to be informed of and review Task Force proposals and provide vital feedback. Identify who these initial key stakeholders are and acquire their contact information.
  - Develop and schedule relevant topical Workshops or Public Informational meetings to inform stakeholders, the public, and local media of project progress and highlights from the studies.
  - Work with JVWCD to post DCP related content to their existing website for easy access by stakeholders and public.

Task 2: Compile Background and Plan Area Description

The purpose of this task is to fully define the Plan Area, existing water facilities, key water resources, and drought planning and analysis conducted to date to provide a critical foundation for the DCP. To achieve this objective, JVWCD will:

- Compile the background data and sections of this work plan and add relevant detail as identified with the other stakeholders.
- Review and summarize other relevant background information relevant water contingency and drought plans, water management plans, Reclamation drought planning guidelines, and Utah Division of Water Resources drought management guidelines.
- Collect, review and summarize existing relevant water contingency and drought planning documents for review, such as drought plans, response policies, emergency response plans, urban water management plans, surface and groundwater water management plans, general plans, California Department of Water Resources and Reclamation drought planning guidelines, and other relevant information.
- Review and summarize the history of drought in the area, current drought situation, severity of drought conditions, recent drought experiences, and the period of time that the area has been experiencing drought conditions.
- Historical drought frequency and magnitude, including multi-year droughts and seasonal droughts will be described.
- Highlight historical drought trends.

Task 3: Summarize Water Supplies and Demands

This task documents baseline and projected conditions to determine the most appropriate future conditions for the vulnerability analysis. JVWCD will:

- Extract this information for all M&I users from its *Demand, Supply, and Major Conveyance Study* update that is currently underway.
- Gather and add similar information from the stakeholders representing agricultural water users through face-to-face meetings.
- Identify the impacts drought would have to each purveyor's water supply and water quality and compare the affected supply to demand.
- Review and summarize existing water supply and demand data for all pertinent water agencies and end users. Describe the availability and quality of existing data and models applicable to the DCP.
- Describe existing water supplies and the key water supply facilities. These sources include river surface water, groundwater, recycled water, wastewater, stormwater, agricultural return water, and interconnections with neighboring systems. Quantify minimum, average, and maximum stream flows, reservoir storage levels and yield, water quality, historic flow patterns, and flow requirements, including magnitude and timing of release.
- Define the drought impacts to each water purveyor's water supply, water quality, and the vulnerability of the existing water supply sources. Describe water quality impacts of drought conditions. The water supply and demand comparison will compare the water supply sources available in normal and dry periods to the projected water demands.

Task 4: Define the Drought Monitoring Process | Required Element 1

This task describes how water supply conditions are monitored at the local level. To achieve this objective, JVWCD will:

- Identify drought indicators and trigger levels that are currently being used by each participating agency of the Plan Area to signal pending drought conditions and severity. Summarize current drought monitoring strategies used by each major user and water agency.
- Select the indicators, classifications, and triggers that are most appropriate for the stakeholder group by reviewing the drought monitoring procedures that are currently being used in the region.
- Establish a process for monitoring near- and long-term water availability of JVWCD supplies based on the selected indicators, classifications, and triggers.
- Develop a process for the collection, analysis, and dissemination of water availability and other drought-related data. Explain how this data will be used to predict, confirm, and mitigate droughts, including identifying the metrics and triggers to be used to define stages of drought, trigger mitigation or response actions, and define the various levels of severity of drought. Create a framework for predicting the probability of future droughts and confirming an existing drought.

- Develop, as necessary, specific parameters and triggers to monitor for drought conditions. Provide recommendations for drought indicators and triggers to use for deciding when a drought starts and when it ends.

Task 5: Perform a Vulnerability Assessment | Required Element 2

The purpose of this task is to determine how a drought affects the resources of JVWCD and various other sectors within the Plan Area. It will describe the reliability and vulnerability of the water supply to seasonal or climatic shortage including the effects of climate change and uncertainties related to changing hydrologic conditions. Specific threats to the region's critical water resources that may reduce availability and reliability of existing and future water supplies must be understood for effective drought contingency planning. Specifically, JVWCD will:

- Define the uncertainty factors and risks to determine the likelihood of shortages in each source.
- Quantify the consequence of each vulnerability.
- Summarize the range of possible climate change scenarios and their resulting impact on supply planning.
- Define drought impacts across various sectors (e.g. M&I, agriculture, recreation, public heath, commerce).
- Evaluate the vulnerability of water supplies to drought. Describe the reliability and vulnerability of the water supply and water quality to historical seasonal or climatic shortage.
- Review and summarize the climate change work being done by JVWCD, Reclamation, the State of California, and other federal and state agencies.
- Calculate future water demands and compare water supply and water quality vulnerabilities with a range of future climatic conditions, including the effects of climate change.
- Describe the severity of the consequences to water supplies if no action is taken and drought risks are not addressed. Describe existing or potential risks to human health and safety including water quality risks; endangered, threatened, or candidate species; agricultural water supplies; hydropower production; fish and wildlife habitat; recreation; and any other significant areas of risk. The consequences of saltwater intrusion will be identified.
- Provide an analysis of the drought impacts from climate change and the resulting practical implications for drought planning for the DCP area. Identify future impacts to water supplies and water quality for a range of possible drought and climate change scenarios.
- Prepare agenda and presentation, notify attendees, and conduct DCP Task Force meetings to discuss background documentation and the vulnerability assessment.

Task 6: Identify Mitigation Projects and Actions | Required Element 3

This task identifies, evaluates, and prioritizes drought projects and mitigation that will build long-term resilience to drought, mitigate the risks posed by drought, decrease sector vulnerabilities, and reduce the need for response actions. The prioritized list of mitigation projects and actions will be developed through the following:

- Research and identify the best practices and most effective measures used for drought mitigation in the Western states.
- Identify drought mitigation actions, responses, programs, and strategies of each participating agency. Identify and evaluate additional potential responses for use at each stage of drought. Provide recommendations to improve the consistency of the region's drought response.
- Identify potential mitigation projects that would build long-term resilience to drought and reduce the need for emergency response actions; focusing on those projects that make use of existing resources, facilities, and infrastructure. Work with the participating agencies to include projects that have been previously identified and discussed, regardless of the level of planning and development that has been done to date.
- Develop a list of screening criteria to evaluate mitigation projects and actions. This criteria list will be compiled into a matrix with weighted factors and used to develop a prioritized short list of the best projects and actions along with their associated triggers, steps for implementation, potential barriers, cost, anticipated timeline, and opportunities to partner with participating agencies.
- Prepare agenda and presentation, notify attendees, and conduct stakeholder outreach meetings to discuss mitigation projects and actions analysis and screening approach.

Task 7: Identify Response Actions | Required Element 4

The purpose of this task is to identify, evaluate, and prioritize near-term drought response actions that can be triggered during specific stages of drought to manage the limited supply and decrease the severity of immediate impacts. Response actions will be developed through the following:

- Establish a staged approach that consider the best way to equitably allocate drought water resources to the various types of water needs.
- Estimate water savings, impact to various users, lead time to activate response actions, implementation costs, and procedural requirements.
- Identify, evaluate, and prioritize drought response actions and activities that can be implemented quickly during a drought to mitigate the impacts and provide rapid benefits.
- Establish a staged approach to implementing response actions, depending on the severity of the drought. Use the metrics and triggers developed in Task 4 that define stages of drought, when mitigation or response actions are triggered, and the various levels of severity of drought. Further define the stages of drought when the response actions are triggered to manage the limited supply and decrease the severity of immediate impacts.
- Develop bundles of response actions that would be implemented at each stage of a drought. Estimate the expected ability each stage of response actions is expected to have on reducing water demands on a temporary basis. If necessary, redefine or update the metrics and triggers from Task 4 to deliver better short-term benefits.

Task 8: Develop the Operational and Administrative Framework | Required Element 5

This task develops an operational and administrative framework to identify who is responsible for undertaking the actions necessary to implement each element of the DCP, including communicating with the public about those actions. This will be accomplished by:

- Defining a water shortage response team and protocol for public communications, interagency coordination, and cost sharing.
- Identifying roles, responsibilities, and procedures necessary to conduct drought monitoring and to initiate response and implement mitigation actions.
- Develop an operational and administrative framework to identify who is responsible for undertaking the actions necessary to implement each element of the DCP plan, including communicating with the public about those actions.
- Review the organizational structure currently used by each of the participating agencies to respond to a drought, and suggest any update, if appropriate.
- The participating agencies process for the development of the Drought Contingency Plan will consist of having regular progress meetings, providing status reporting, and conducting workshops.
- Prepare agenda and presentation, notify attendees, and conduct DCP Task Force meetings to discuss organizational and implementation framework and responsibilities moving forward.

Task 9: Document the Plan Development and Update Process | Required Element 6

The purpose of this task is to document the approach taken to develop the DCP and how the DCP will be kept current and used as a dynamic plan in the future. JVWCD will define the frequency/triggers for DCP updates and the organizational framework and process that will be followed for those updates.

- Develop an organizational framework and process to routinely update the Drought Contingency Plan. This includes a schedule for monitoring, evaluating, and updating the DCP.
- Develop guidelines to determine what triggers will identify when an update needs to be done.

Task 10: Develop the Drought Contingency Plan Document

This task summarizes all task efforts and findings into a DCP document. The DCP document and associated appendices, maps, figures, tables, and computer models will be developed and reviewed through the following process:

- Present task results to the Task Force and Outreach Group at milestones to gather input.
- Submit the initial draft of the DCP for review and comment by the Task Force.
- Submit the updated draft of the DCP for public and JVWCD Board of Directors review and comment.
- Submit the most up-to-date draft of the DCP to Reclamation at least 6 months from the end of the 2-year project period.
- Incorporate review comments from Reclamation and submit the final DCP to Reclamation for review and acceptance at least 1 month from the end of the 2-year project period.
- Summarize all task efforts and findings into a Drought Contingency Plan document. Prepare the Drought Contingency Plan document and associated appendices, maps, figures, tables, and computer models.

- Submit first draft for agency review and second draft of the Drought Contingency Plan for public and Reclamation review and comment. Based on the results of agency and Reclamation input, a final submittal will be prepared.
- Present the final version of the Drought Contingency Plan to the JVWCD Board of Directors to make a motion for adoption of the DCP.

Task 11: Project Management

Provide regular updates of project status to Reclamation; quality control checks on project deliverables; and management of progress against budget and schedule commitments.

- Provide updates at the interval specified by Reclamation of project status, issues, and concerns to the fiscal agent.
- Maintain project schedule.
- Provide project documentation, quality control checks on project deliverables, management of progress against budget and schedule commitments, and submittal of monthly invoices and monthly project status reports.
- Prepare for and meet with drought Task Force to kick off the DCP project.
- Prepare agenda and presentation, notify attendees, and conduct stakeholder outreach meeting to present the draft DCP.

Planning and Oversight Structure

The DCP will primarily be developed by JVWCD staff along with its engineering consultant. To ensure that the plan developed meets the needs and interest of the plan area the expertise or the Task Force will be heavily relied upon. The Task Force is comprised of variety of individuals with specific interest within the plan area, their input in the form of meetings and review of DCP will allow the product of this effort to consider interests that the JVWCD may unintentionally overlook. JVWCD will also rely heavily upon Reclamation's expertise as they have been involved in the creation of many drought contingency plans.

Decision Making Process

To make the DCP as comprehensive as possible, JVWCD has organized a Task Force to represent interests outside of its own. JVWCD's project manager, Travis Christensen, will lead the project and be responsible for gaining consensus from the Task Force as well as interested stake holders. While ultimately is the project manager's role to guide the project, Travis Christensen has successful coordinated the efforts of many stake holders on various projects. He understands the need of gaining buy-in from all interested parties and is able to facilitate conversions and come to resolution when the decision-making process stalls.

Roles and Responsibilities

JVWCD's Travis Christensen will have project manager responsibility. As project manager he will participate in regular conference calls and meetings, contract consultant management, budget and schedule tracking, performance and documentation of project progress and

success, overseeing and advising on technical complexities and local data needs, and reviewing contracted work products. He will lead the coordination with the other public agencies comprising the Task Force. Travis will also be the lead for the Background and Plan Area Description and the Drought Monitoring Process and will provide support to Alan Packard in his work in the Supplies and Demand section.

Other key JVWCD staff who will participate on this DCP project are as follows:

- Alan Packard, Assistant General Manager/Chief Engineer: Alan Packard will be the technical lead of the Water Supplies and Demands task and will represent the interests of JVWCD's 17 member agencies.
- Shane Swensen, Engineering Department Manager: Shane Swensen will provide project oversight.
- Bart Forsyth, Assistant General Manager of Supply and Operations: Bart Forsyth will provide feedback on the drought monitoring process and will be the lead of the Climate Change Impacts subtask.
- Todd Schultz, Senior Business Data Analyst: Todd Schultz will aid with the Water Supplies and Demands analysis and will assist Bart Forsyth in his work in the Climate Change Impacts subtask.
- Matt Olsen, Communication Department Manager: Matt Olsen will lead the Conservation Programs subtask and will also be the primary reviewer of Linda Townes' efforts on communication outreach.
- Linda Townes, Public Information Manager: Linda Townes will lead the development of the Communication and Outreach Plan and develop the drought response organization description and participating agencies process.
- Franco Horcato, Engineering Intern: JVWCD will use its engineering intern to support the efforts on DCP tasks including data gathering and information processing.
- Jessica Morgan, Administrative Services: Jessica Morgan will support JVWCD staff in this DCP project regarding project administrative and bookkeeping, word processing, and graphics development.

The Task Force who will participate in the DCP consists of the following individuals:

- Alan Packard, Assistant General Manager/Chief Engineer, JVWCD: Alan Packard will be the technical lead of the Water Supplies and Demands task and represent M&I interests within the plan area. An aspect of Alan's role as Assistant General Manager is to remain in close contact with JVWCD's 17 member agencies. He will represent their interests and coordinate outreach when their input is needed.
- Bart Forsyth, Assistant General Manager of Supply and Operations, JVWCD: Bart Forsyth will provide feedback on the drought monitoring process and will be the lead of the Climate Change Impacts subtask and determine how climate change will impact the M&I interests within the plan area.
- Wade Tuft, Board Member, Utah Lake Water Users Association: Wade Tuft will provide input as to how drought scenarios would impact agricultural interest and their ability to reduce water use in various scenarios.

- Eric Ellis, Executive Director, Utah Lake Commission: Eric Ellis will represent the environmental and recreational interest of the Utah Lake. Utah Lake shares many of the same sources with the JVWCD. Eric will provide assistance to ensure the needs of the lake are met in various drought scenarios.
- Soren Simonsen, Executive Director, Jordan River Commission: Soren Simonsen will represent the environmental and recreational interest of the Jordan River. Like Utah Lake, the Jordan River shares many of the same sources with the JVWCD as it is fed from Utah Lake. Soren will provide assistance to ensure the needs of the river are met in various drought scenarios.
- Laura Vernon, Sovereign Lands Planner/Coordinator, State Division of Forestry, Fire, and State Lands: Laura Vernon will represent the environmental and industrial interest of the Great Salt Lake. The Great Salt Lake has several industries which rely on lake level and salinity being kept at a certain level. Laura will be able to ensure that during drought scenarios the industrial and recreational interests of the lake are considered.
- Laura Haskell, Jordan River Specialist and State Drought Coordinator, State Division of Water Resources: Laura Haskell manages a water model for the Salt Lake Valley and is very familiar with drought planning. She will be a great resource in being able to represent how drought can affect the plan area as well as providing input on the environmental and industrial interest of the Great Salt Lake.

Coordination

Coordination for the DCP will be led by the project manager, Travis Christensen. Travis Christensen will be responsible for managing the combined efforts of JVWCD staff, consultant, and Task Force and ensure that tasks are completed in a timely manner. The Task Force is comprised of a diverse group of individuals from the community who represent a variety of interest. The Task Force will be responsible for providing draft versions of the DCP to stake holder groups that they represent for comment and then to return those comments to Travis Christensen so they can be incorporated into the DCP.

Documentation and Reporting

This project summarizes all task efforts and findings into a DCP document. The DCP document and associated appendices, maps, figures, tables, and computer models will be developed and reviewed through the following process: Present task results to the Task Force and Outreach Group at milestones to gather input. Submit the initial draft of the DCP for review and comment by the Task Force. Submit the draft of the DCP to Reclamation and the public for review at least 6 months from the end of the 2-year project period. Incorporate review comments from the public and Reclamation and submit the final DCP to Reclamation for review and acceptance at least 1 month from the end of the 2-year project period.

Communication and Outreach Plan

Community Outreach

Community input for the DCP will allow for interests and concerns to be considered prior to its completion. JVWCD intends on hosting two workshops in which members of the

community will have an opportunity to discuss the work being performed for the DCP with members of the Task Force. Comments received from these workshops will be recorded and reviewed by the Task Force and incorporated into the DCP. JVWCD will host these workshops in the Conservation Garden Park, a meeting place owned by JVWCD which has a capacity of 150 people and would allow for presentation of material related to the DCP as well as one-on-one discussions. The JVWCD Communication Department, lead by Matt Olsen, will coordinate with the project manager and Task Force to determine the most effective way to notify and make materials available to the public. It is anticipated that the workshops and DCP material will be posted on the websites and Facebook pages of entities represented by the Task Force and the 17 Member Agencies' websites. Depending on the public's interest on providing comments to JVWCD's DCP, more workshops can be scheduled.

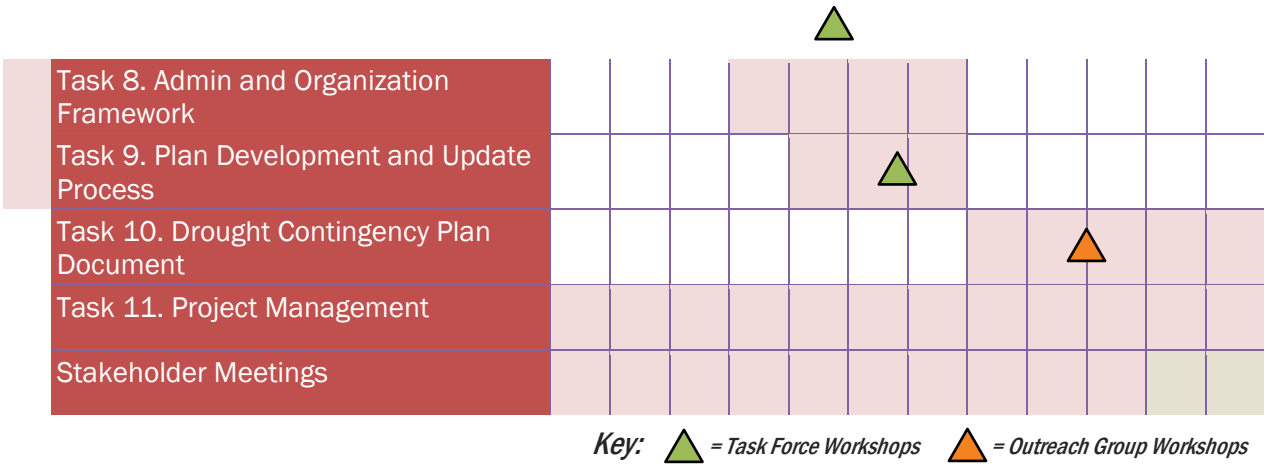
Member Agency Outreach

JVWCD recognizes that the ability to implement the DCP during a drought scenario hinges upon feedback and acceptance from its 17 Member Agencies. Alan Packard, JVWCD Assistant General Manager, will represent the interests of these agencies on the Task Force and will be the JVWCD liaison to share measures, actions, and responses and receive their feedback. JVWCD recognizes that the logistics of bringing a representative from each of the member agencies to Task Force meetings to discuss DCP details would be difficult. Reaching out to each agency as needed to discuss information pertinent to their area will streamline the development of the Plan and allow the Task Force to create actions and responses that uniquely fit each agency. Each member agency will be given a chance to review the draft DCP and provide comments prior being submitted to the USBOR for their preliminary review.

Schedule

The project schedule for the JVWCD DCP 2-year program is shown in Figure 5 below. The schedule identifies when the Task Force will meet and when the public will have the opportunity to provide comment as well in the form outreach group workshops.

	Task	Month from Notice to Proceed											
		2	4	6	8	10	12	14	16	18	20	22	24
Required Elements	Task 1. Initial Drought Contingency Plan Steps												
	Task 2. Background and Plan Area												
	Task 3. Supplies and Demands												
	Task 4. Drought Monitoring Process												
	Task 5. Vulnerability Assessment				▲	▲							
	Task 6. Mitigation Actions												
	Task 7. Response Actions												


Task 8. Admin and Organization Framework
Task 9. Plan Development and Update Process
Task 10. Drought Contingency Plan Document
Task 11. Project Management
Stakeholder Meetings
Key:
= Task Force Workshops
= Outreach Group Workshops

Appendix B: Full Mitigations Measures List

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Appendix B: Full list of Mitigation Measures Considered

A preliminary list of mitigation measures was developed for further screening and evaluation and is included below as a reference for future DCP updates. The 49 initial measures were ranked for comparison before being narrowed to a shortlist of 15 final drought mitigation measures for this DCP. The scores based off the assessment criteria are listed in Table 5-2. The total score cutoff for consideration for the final mitigation measure short list was 2.15 and are shown in the table below in blue. As described in the body of the report, mitigation measures that are currently in progress and/or do not require additional funding were identified as ongoing drought planning activities that should be continued. Designated drought planning activities are highlighted in green in the table below.

Further information on the selection process for the final list can be referenced in Section 5.3. An electronic copy of the spreadsheet with the detailed scoring for each criterion is provided to facilitate future DCP updates.

No.	Mitigation Measure Category	Mitigation Measure Number	Mitigation Measure Name	Total Score
1	Conservation & Demand Management	Cons&DM-01	Leak mitigation and replacement of leaking infrastructure	2.15
2	Conservation & Demand Management	Cons&DM-02	Strategic Water Management (CII water audit and custom incentive program)	1.8
3	Conservation & Demand Management	Cons&DM-03	Secondary Water Metering	2.35
4	Conservation & Demand Management	Cons&DM-04	Enhanced AMI program analytics	2.5
5	Conservation & Demand Management	Cons&DM-05	Water Efficiency Standards (outdoor landscaping requirements and indoor fixture recommendations)	2.65
6	Conservation & Demand Management	Cons&DM-06	Customer Rebate Programs	2.35
7	Conservation & Demand Management	Cons&DM-10	Landscape Leadership Grant Program	2.2
8	Conservation & Demand Management	Cons&DM-11	Member Agency Grant Program (multiple funding tiers)	2.25
9	Conservation & Demand Management	Cons&DM-12	Transitionary Member Agency Grant funding program (to be used for a short time, 3 years, while adopting WES)	2
10	Education & Outreach	Ed&Outrch-01	Member Agency staff and governing board training on drought levels and independent mitigation measures and response actions.	2.1

No.	Mitigation Measure Category	Mitigation Measure Number	Mitigation Measure Name	Total Score
11	Education & Outreach	Ed&Outrch-02	Slow the Flow (water conservation educational materials and campaigns)	2.4
12	Education & Outreach	Ed&Outrch-03	Conservation Garden Park (incl. classes, tours, educational exhibits, field trips, work and learn workshops, immersive learning, garden events, plant database, online education)	2.1
13	Education & Outreach	Ed&Outrch-04	Customer feedback tools for JVWCD & MA's (e.g. personalized web portals, water use alerts, reports)	1.9
14	Education & Outreach	Ed&Outrch-05	Landscape Consultation (landscape audits and customized water saving information for homeowners)	1.9
15	Education & Outreach	Ed&Outrch-06	Public Web Dashboard (provide widespread information on drought status and resources)	2
16	Education & Outreach	Ed&Outrch-07	Drought Plan Results (provide information to all water users about key elements of the final Drought Contingency Plan)	2.4
17	Education & Outreach	Ed&Outrch-08	Annual Member Agency drought assessment, coordination, and planning	2.2
18	Education & Outreach	Ed&Outrch-09	Preparation of media campaign assets and resources to be used during drought	2.2
19	Conveyance	Conv-02	Enclose canals to reduce seepage and evaporation losses	2.3
20	Conveyance	Conv-03	Identify and correct inadequate or inefficient system connections or features (e.g. SE collection pipeline & Middle Fork diversion)	1.5
21	Conveyance	Conv-04	Aqueduct expansion (S.W. Aqueduct - future reaches) Will need to be completed as part of the JVWTP expansion to use ULS allocation (see NewSup-08).	1.5
22	Conveyance	Conv-05	Member Agency expansion of secondary irrigation distribution systems	1.85
23	Groundwater Management	GWMgnt-02	JVWCD Aquifer Storage & Recovery (ASR) operational expansions	2.4
24	Groundwater Management	GWMgnt-03	Full development of JVWCD deep groundwater water rights	1.6
25	Groundwater Management	GWMgnt-04	Evaluate and develop expanded conjunctive use of surface water & groundwater	1.9
26	Groundwater Management	GWMgnt-05	Indirect Potable Reuse (IPR) via Groundwater Recharge (GWR) or Surface Water Augmentation (SWA)	1.4
27	Groundwater Management	GWMgnt-06	New shallow groundwater wells	2.2
28	New Water Supplies	NewSup-01	Add treatment process to dry creek/casto springs (increase supply approx 1,000 AF)	1.95

No.	Mitigation Measure Category	Mitigation Measure Number	Mitigation Measure Name	Total Score
29	New Water Supplies	NewSup-02	Develop shallow gw and/or deep gw to support SWGWTP 3rd treatment train (increase supply approx 2,000 AF)	1.85
30	New Water Supplies	NewSup-03	Develop high quality groundwater wells	2.25
31	New Water Supplies	NewSup-04	Acquire additional Provo River supplies (e.g. purchase company stock, direct rights, etc. to increase supply 1,000 AF +)	1.75
32	New Water Supplies	NewSup-05	Member Agency secondary irrigation supplies/systems improvements for better quality & reliability	1.75
33	New Water Supplies	NewSup-06	Member Agency wastewater reuse projects for secondary irrigation water	2.2
34	New Water Supplies	NewSup-07	Member Agency wastewater reuse projects for direct potable use	1.9
35	New Water Supplies	NewSup-08	Begin taking delivery of ULS supply by 2030 or earlier	2.25
36	New Water Supplies	NewSup-09	Continue planning and early development work (property acquisition, water rights applications, etc.) for new supplies in 2040-2050 period (e.g. Bear River Project, expand SWGWTP, new northern groundwater treatment plant, etc.)	1.8
37	Agreements & Regulatory	Agr&Reg-01	Stand-by or short term water purchase contracts with applicable water suppliers (e.g. MWDSLS, CUWCD, etc.)	2
38	Agreements & Regulatory	Agr&Reg-02	Defining actions for drought contingency provisions in wholesale water purchase agreements and retail water service agreements	2.25
39	Agreements & Regulatory	Agr&Reg-03	Evaluate development of a water market or water banking program	2.05
40	Agreements & Regulatory	Agr&Reg-04	Secure agreements using WARN and private contractors for assistance in making system repairs in other emergencies	1.65
41	Agreements & Regulatory	Agr&Reg-06	Update ordinances and policies with needed response actions for drought (could include drought surcharge)	1.75
42	Agreements & Regulatory	Agr&Reg-07	Evaluate effectiveness of using conservation based water rates in the service area.	2.15
43	Supply Storage	Stor-01	Evaluate storage for secondary irrigation systems using Provo River spring runoff	2.15
44	Supply Storage	Stor-02	Evaluate feasibility of storage for local mountain streams	1.95
45	Supply Storage	Stor-04	Evaluate in-stream flow limit structures, beaver dam analog (BDA), or ponds. Keeps water in the mountains longer into the warm months.	2.1

No.	Mitigation Measure Category	Mitigation Measure Number	Mitigation Measure Name	Total Score
46	Treatment Process	Tre-01	Process improvements to improve reliability of treatment plants (e.g. increase floc/sed capacity at JVWTP, feed wells mechanical improvements for SWGWTP)	1.8
47	Watershed Protection & Management	WSPro&Mngt-01	Continue as a sponsor of the Provo River Watershed Council	2.4
48	Watershed Protection & Management	WSPro&Mngt-02	Participate with stakeholders in wildfire prevention projects that prioritize drinking water sources	2.05
49	Watershed Protection & Management	WSPro&Mngt-03	Watershed based management with stakeholders	2.35

Appendix C: JVWCD Response Actions Detailed Analysis

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Jordan Valley Water Conservancy District Drought Response Actions Planning Tool

General Information	
Member Agency	Jordan Valley Water
2018 Delivery from JVWCD (AF)	8,975
2021 Contract Amount (AF)	-
Required Reduction (AF): Drought Level 1	449
Required Reduction (AF): Drought Level 2	897
Required Reduction (AF): Drought Level 3	1,795
Required Reduction (AF): Drought Level 4	2,692

User Key	
	User Input Required
	Auto Calculated Value

Acronyms
Acre-feet (AF)
Acre-feet per year (AF/yr)

Water Use by Sector, AF/yr								
Residential	Commercial	Industrial	Institutional	Non Revenue Water	Total Retail Customers	Metered Secondary	Estimated Secondary	Wholesale
6,375	1,709	715	-	176	8,975	-	-	98,765
Source: Monthly data from 2018 (7795 connections)	Source: Monthly data from 2018 (999 connections)	Source: Monthly data from 2018 (88 connections)		calculated				Source: Monthly data from 2018

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Activation Trigger Level (1-4)	Drought Response Actions	Additional Explanation or Reference *(optional)*	How much is this going to reduce the shortage gap in each Drought Level? AF/yr				Percent Water Use Reduction by Sector						
			1	*2*	*3*	*4*	Wholesale	Residential	Commercial	Industrial	Institutional	Non Revenue Water	Reference/assumption
0	Customer leak detection using AMI and billing software (encourage customer account creation)		227	227	227	227		2%	5%	2%			Assumes customers are not currently being notified of leaks [ask District how they currently use AMI data to notify customers of leaks]
1	Notify public of diminished water supply and request **voluntary** rationing of water as applicable for drought level		176					2%	2%	2%	2%		Assume minimal reduction. Primary use is begin drought messaging.
2	Activate drought level 2 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, schools, parks, etc.)		-	12	-	-			0.5%	0.5%	0.5%		Large water users are <7% of all AMI data available using July/Aug 2020 data. A 10% reduction results in a 0.6% reduction in all AMI users demand (3.1 ac-ft for July/Aug 2020). Extrapolated for a yearly savings total. Included considerations for summer lawn watering
2	Residential and commercial lawn water restricted to even/odd days		-	528	-	-		6%	6%	6%			Outdoor water use in Utah is 64% of residential use. Outdoor = 105 gpcd, indoor = 60 gpcd (Utah DWR 2009). Assume watering restriction would reduce additional 10% of outdoor use.
2	Rely on ASR (Aquifer Storage and Recovery) banked water	Input as a volumetric amount, not as percent	50	70									Assuming only part of ASR goes to Retail Customers. ASR projecting 500-700 AF of water (JVWCD June 2019 Board Meeting).
2	"Drought Drive-Thrus" Customers pick up pre-made water wise conservation kits		-	23	23	23		0.4%					Assumes 1% indoor water use reduction. Outdoor water use in Utah is 64% of residential use. Outdoor = 105 gpcd, indoor = 60 gpcd (Utah DWR 2009)
2	Notify public of diminished water supply and request voluntary rationing of water (at least 10%)		-	44	-	-		0.5%	1%	1%			Assume minimal reduction because there is no incentive. Works in tandum with all other response actions for Level 2.
3	Incentivize timely repair for customer leaks		-	-	88	88		1%	1%	1%			Assumes incentive provides an additional 1% above notifying customers of leaks
3	Notify public of diminished water supply and request voluntary rationing of water (at least 20% with increase of tier 4 rate)		-	-	1,284	-		15%	15%	10%			Assumes that JVWCD sets a 2 day per week watering mandate (July-Aug) resulting in a about a 20% outdoor use reduction
3	Use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss due to splashing		-	-	6	-		0.1%					Estimate. Pools only used for part of year.
3	Residential or commercial lawn watering limited to certain days based on a schedule set forth by JVWCD		-	-	1,284	-		15%	15%	10%			Assumes that Drought Task sets a 2 day per week watering mandate (July-Aug) resulting in a about a 20% outdoor use reduction
3	Activate drought level 3 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, schools, parks, etc.)		-	-	24	-			1%	1%	1.0%		Additional 10% reduction (20% total) from level 2 assumptions resulting in the savings doubling
4	Residential or commercial lawn watering limited to certain days based on a schedule set forth by JVWCD		-	-	-	1,724		20%	20%	15%			Assumes that JVWCD sets a 1 day per week watering mandate (July-Aug) resulting in about a 30% outdoor use reduction
4	No water use for purpose of refilling private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds		-	-	-	32		0.5%					
4	Notify public of diminished water supply and request voluntary rationing of water (at least 30-50% with increase of tiers 2, 3, and 4 rate depending upon drought severity)		-	-	-	916		10%	10%	15%			Combines with other response actions for a total of 30-50% decrease in retail customers

Activation Trigger Level (1-4)	Drought Response Actions	Additional Explanation or Reference *(optional)*	How much is this going to reduce the shortage gap in each Drought Level? AF/yr				Percent Water Use Reduction by Sector						
			1	*2*	*3*	*4*	Wholesale	Residential	Commercial	Industrial	Institutional	Non Revenue Water	Reference/assumption
4	Activate drought level 4 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, schools, parks, etc.)		-	-	-	36			1.5%	1.5%	1.5%		Additional 10% reduction (30% total) from level 3 assumptions. Savings is only a slight increase.

NOTES: Shortage levels for demand reduction actions are based on the applicable stage. When demand reduction actions are superseded by demand reductions implemented in a later stage, they are not shown to be applicable to the later stages so as to avoid double counting of volume expected to be saved by later stage demand reduction actions.

Appendix D: Member Agencies Response Actions Development Template

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JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Brown AND Caldwell

Jordan Valley Water Conservancy District Drought Response Actions Planning Tool

Importance of Drought Response Actions:
Drought Contingency Planning helps communities and regions become more resilient and pursue a proactive approach to drought management. Table 1 shows Jordan Valley Water Conservancy District's (JVWCD) triggering criteria for each drought level. Table 2 shows the criteria used to determine the required demand reduction for each drought level. This planning tool is provided to JVWCD's Member Agencies to help guide drought response actions to meet reduction levels and ensure reliability at various drought stages.

The accuracy of the tool's output will depend on the data quality available and confidence in agency assumptions. This planning tool should be used as a guide. Decisions to implement specific drought response actions should also consider other factors such as funding sources, cost of implementation, monitoring, and enforcement.

Data Required to Use Response Actions Tool:
Some Member Agency data has been prepopulated in this sheet based on data previously submitted to Jordan Valley. The Tool requires the following inputs:

1. Typical Yearly Delivery from JVWCD (prepopulated)
2. Wholesale Contract Amount (AF) (prepopulated)
3. Annual water use amount by customer sector (Residential, Commercial, Industrial, Institutional, Non Revenue Water, Metered Secondary, Estimated Secondary)
   Note: Metered Secondary and Estimated Secondary reductions will not count toward targeted Jordan Valley Reduction Goals (prepopulated)
4. Drought Response Actions that agencies intend to implement (Suggested list available in "Example Response Actions" tab)
5. Assumptions on percent water demand reductions that would come from implementing Drought Response Actions

How to Use Response Actions Tool:
Member Agencies will populate the Response Actions Tool with actions to be taken at each drought stage. The light yellow cells shown in the next two tabs require user input while the white cells automatically fill with calculations.

JV Response Actions Tool - 1: Member Agencies received a copy of this tool that has been prepopulated with water use data submitted to Jordan Valley. Agencies are asked to validate the accuracy of this data, updating if more representative data is available.

JV Response Actions Tool - 2: Member agencies should start by selecting response actions that the agency will adopt in each drought stage.

For each action chosen to reduce demand (column F), agencies will fill in the following information:
- which stage the action will be triggered in (column E),
- whether the action will remain active in multiple drought stages (columns A-D),
- any additional explanation for the action (column G), and
- the assumed annual reduction the agency would expect to see from each water use sector from implementing the action (columns L-R).

Table 1. Jordan Valley Water Conservancy District's Triggering Criteria Applied to Drought Levels

			Triggering Criteria Applied to Drought Levels		
Drought Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
Level 0	Blue	Normal	at least [illegible] supply availability	at least an [illegible] supply allocation	3 yr. average discharge less than safe yield
Level 1	Yellow	Moderate	at least a 95% supply availability	75-80% supply allocation	IV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 yr. average exceeds safe yield
Level 2	Orange	Severe	at least 90-95% supply availability	75-80% supply allocation	[illegible]
Level 3	Dark Orange	Extreme	at least 80-85% supply availability	<75% supply allocation	[illegible]
Level 4	Red	Critical/Exceptional	less than 80% supply availability	less than 45% supply allocation	[illegible]

Drought Level	Advisory Code	Water Shortage Description	Impacts to Contract Amounts
Level 0	Blue	Normal	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	Yellow	Moderate	5% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120% of wholesale contract amounts
Level 2	Orange	Severe	10% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110% of wholesale contract amounts.
Level 3	Dark Orange	Extreme	20% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts.
Level 4	Red	Critical/Exceptional	30% reduction in typical use for wholesale member agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e. 90%, 85%, etc.) at the time that this level of drought is established.

Jordan Valley Water Conservancy District Drought Response Actions Planning Tool

General Information	
Member Agency	
2018 Delivery from JVWCD	
2021 Contract Amount (AF)	
Required Reduction (AF): Drought Level 1	
Required Reduction (AF): Drought Level 2	
Required Reduction (AF): Drought Level 3	
Required Reduction (AF): Drought Level 4	

User Key	
	Data Validation Required
	Auto Calculated Value

Acronyms
Acre-feet (AF)
Acre-feet per year (AF/yr)

Water Use by Sector, AF/yr								
Residential	Commercial	Industrial	Institutional	Non Revenue Water	Total Culinary Water	Metered Secondary	Estimated Secondary	Total Secondary Water

Note: Water use data by sector is based off of 2018 data provided by Member Agencies to JVWCD

Activation Trigger Level (1-4)	Drought Response Actions	Additional Explanation or Reference *(optional)*	How much is this going to reduce the shortage gap in each Drought Level? (AF/yr)				Percent Water Use Reduction by Sector							
			1	*2*	*3*	*4*	Residential	Commercial	Industrial	Institutional	Non Revenue Water	Metered Secondary (not included in reductions)	Estimated Secondary (not included in reductions)	Reference/Assumption
			-	-	-	-								
			-	-	-	-								
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NOTES: Shortage levels for demand reduction actions are based on the applicable stage. When demand reduction actions are superseded by demand reductions implemented in a later stage, they are not shown to be applicable to the later stages so as to avoid double counting of volume expected to be saved by later stage demand reduction actions.

Example Response Actions
Interim water recycling
Increase production from wells to compensate for sources more susceptible to drought
Implement short term transfer agreements with water right owners (e.g. fallowing agreements setup before drought)
Rely on ASR (Aquifer Storage and Recovery) banked water
Shorten irrigation season to reduce secondary water use
Establish individual service agreements for large water users (e.g. golf courses, car washes, data centers, schools, parks, etc.) that require reductions tied to each drought level.
Implement drought surcharge fees on secondary water. Fees are used to pay for costs associated with purchasing emergency water supplies
Increase water rates for certain existing water rate tiers. Rates increase as drought level increases.
Global temporary rate increase/drought surcharges to reduce use
Commercial and residential lawn watering rotations: Watering on even/odd days, or number of days of the week watering can take place
Allow residential lawns to go dormant (reduce watering to minimum amount needed to keep grass, trees and gardens alive)
Allow lawns at parks, athletic fields, and schools to go dormant (reduce watering to minimum amount need to keep grass, trees and gardens alive).
Customer leak detection using AMI and billing software
Incentivize timely repair for customer leaks
Require one-day fixes for customer leaks
Irrigation system maintenance-no damaged, misaligned, or missing sprinkler heads; minimize sprinkler spray on walks, drives and gutters (enforcement linked to drought level)
Media campaigns. Notify public of diminished water supply and request voluntary rationing of water
Provide conservation tips and public education through drought level dashboard
“Drought Drive-Thrus” allow residents and business to drive into the event and pick up pre-made water wise conservation kits
Water Wise Workshops
Mobile water treatment facility for meeting non-discretionary water demands (e.g., sanitation, health, and safety requirements)
Meet with habitat advisory groups or similar groups as drought levels increase
Hold regular drought committee meetings during drought to coordinate efforts
Prohibitions for new service connections
Reduce washing of vehicles
Vehicle washing prohibited unless at a certified carwash
Use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss due to splashing
Operation of private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds prohibited
Restrictions on fountains, waterfalls, and ponds - recirculation pump required, or complete feature shut off.
Golf course superintendents voluntary program. Develop group before drought and set voluntary irrigation limits.
Required reductions in golf course watering
Implement water patrols
Enforcement of published best management practices related to water use for industries - lodging, car wash, food services, public swimming pools
Discontinue service to the customer after proper notice for neglect, failure, or refusal to comply

Appendix E: Task Force and Outreach Group Meeting

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Pre-Workshop MS Teams Support

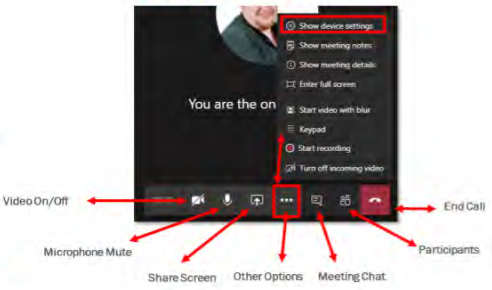
Part 1

Summarized tips and control taskbar

1. Use video (particularly when presenting or engaging in discussion), if possible
2. Use your computer microphone and speakers for audio (not your phone) if possible, and mute when not speaking to limit disruptive background noise

   If participating by phone, press: *6 to mute/unmute, or *1 for more options
3. Use the meeting chat to "raise your hand" if you'd like to speak
4. If experiencing bandwidth issues, turn off video camera and incoming video (access the latter via "..." in meeting control taskbar)

Meeting control taskbar



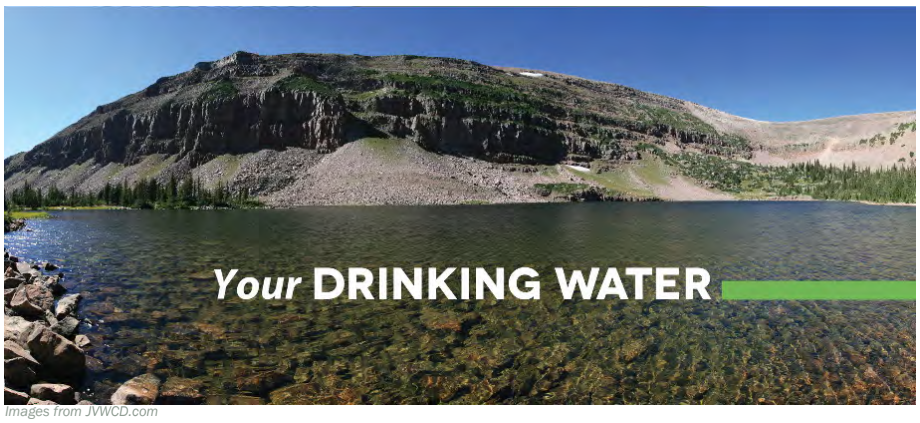
Brown and Caldwell

Brown AND Caldwell

Jordan Valley Water Conservancy District

District Drought Contingency Plan Task Force Meeting #1

August 26, 2020



Images from JVWCD.com

Meeting Topics

1. Project Overview
2. Vulnerability Assessment Approach
3. In-depth Review of Vulnerability Assessment
4. Drought Monitoring
5. Mitigation Measures

Meeting Objectives

- Introduce Task Force members
- Background & project progress
- Get Task Force input & insight on:
  - Risk Factors
  - Vulnerability Assessment
- Drought monitoring & mitigation intro
- Discuss next steps

Task Force Members:

Please respond in the MS Teams chat:
What personal item on your work desk (or in your office) are you most fond of? [icebreaker question]

Interests	Name	Organization	Position/Role
M&I	Alan Packard	Jordan Valley Water Conservancy District	Assistant General Manger & Chief Engineer
M&I	Travis Christensen	Jordan Valley Water Conservancy District	Registered Staff Engineer & DCP Project Manager
M&I (City Perspective)	Jason Rasmussen	South Jordan City	South Jordan City Public Works Director
M&I (Improvement District Perspective)	Greg Anderson	Kearns Improvement District	KID Public Works Director
M&I (Secondary Water Provider Perspective)	David Gardener	WaterPro/Draper Irrigation	Assistant General Manager
M&I and Agricultural	Laura Haskell	State Division of Water Resources	Jordan River Specialist & State Drought Coordinator
Agricultural & Water Rights	John Larsen	Utah Lake Water Users Association & Utah Division of Water Rights	Utah Lake and Jordan River Distribution System Commissioner
Environmental & Recreational	Eric Ellis	Utah Lake Commission	Executive Director
Environmental & Recreational	Soren Simonsen	Jordan River Commission	Executive Director
Environmental & Industrial	Laura Vernon	State Division of Forestry, Fire, and State Lands	Sovereign Lands Planner/ Coordinator

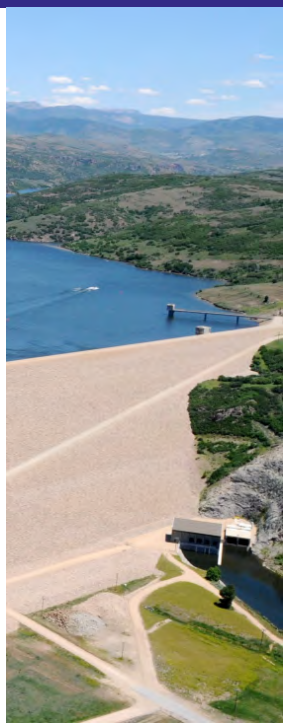
Project Team

Jordan Valley Water Conservancy District:

- Alan Packard
- Travis Christensen
- Bart Forsyth
- Shane Swensen
- Linda Townes
- Matt Olson
- Jessica Morgan

Brown and Caldwell:

- Jacob Young
- Tess Sprague
- Adam Jones
- Melanie Holton



Please respond in the MS Teams chat:
What personal item on your work desk (or in your office) are you most fond of? [icebreaker question]

What words come to mind when you think of the consequences of drought?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

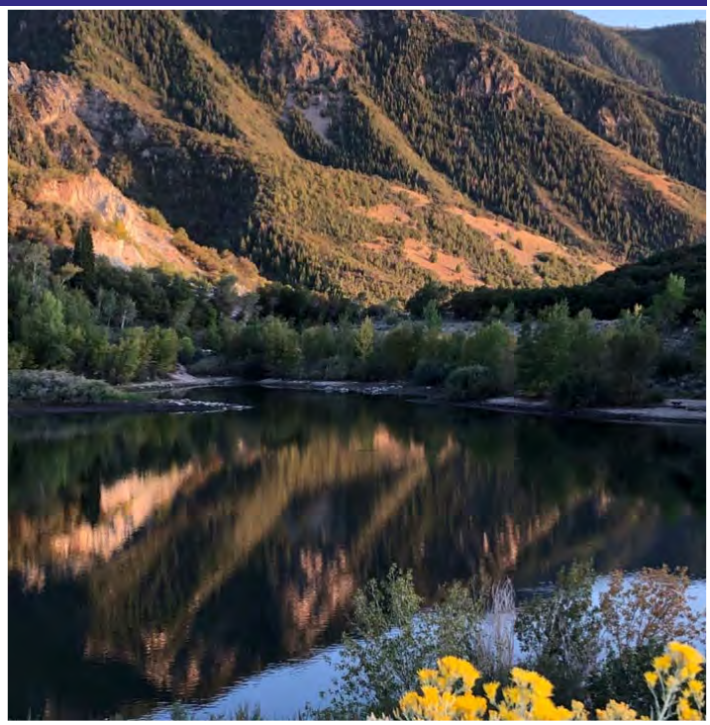
What words come to mind when you think of drought mitigation actions?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

What words come to mind when you think of response actions?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

What is a Drought Contingency Plan?



What is a Drought Contingency Plan?

- Proactive approach for non-Federal partners to prepare for and respond to drought.
- Funded through the U.S. Bureau of Reclamation Drought Response Program
  - Reclamation provides a DCP "How to" guidance through the WaterSMART Drought Response Program Framework (we are following this framework)
- Drought Contingency Planning
  - Addresses:
    - How will we recognize the next drought in the early stages?
    - How will drought affect us?
    - How can we protect ourselves from the next drought?

What is a Drought Contingency Plan?

- Funding for Drought Planning and for Drought Resiliency Projects
- Drought Resiliency Projects
  - Drought Resiliency is defined as the capacity of a community to cope with and respond to drought.
  - Reclamation provides grant assistance for drought resiliency projects to prepare for and respond to drought.
  - These projects are referred to as "mitigation actions" in a DCP.

What is a Drought Contingency Plan?

- Collaborative planning approach to building long-term resiliency to drought
- Requires stakeholders process to plan development
- Stakeholder Process:
  - Addresses agricultural, municipal, and environmental issues
  - Develops broad support for mitigation and response actions

- Must include consideration of climate change impacts to water supplies to support long term resiliency
- Mitigation and Response actions are projects that could compete for implementation funding under WaterSMART

The Six Elements of a DCP

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
Mitigation Actions	• Identify, evaluate and prioritize actions and activities that will build **long-term** water supply resiliency and mitigate risks
Response Actions	• Identify, evaluate and prioritize actions and activities that can be implemented in a drought and triggered during different stages of drought to provide **quick benefits**
Operational and Administrative Framework	• **Determine local responsibility** for undertaking the actions necessary to implement the DCP.
Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

I'm most interested in learning more about and engaging in this part of the DCP:

A) Drought Monitoring

B) Vulnerability Assessment

C) Mitigation Actions

D) Response Actions

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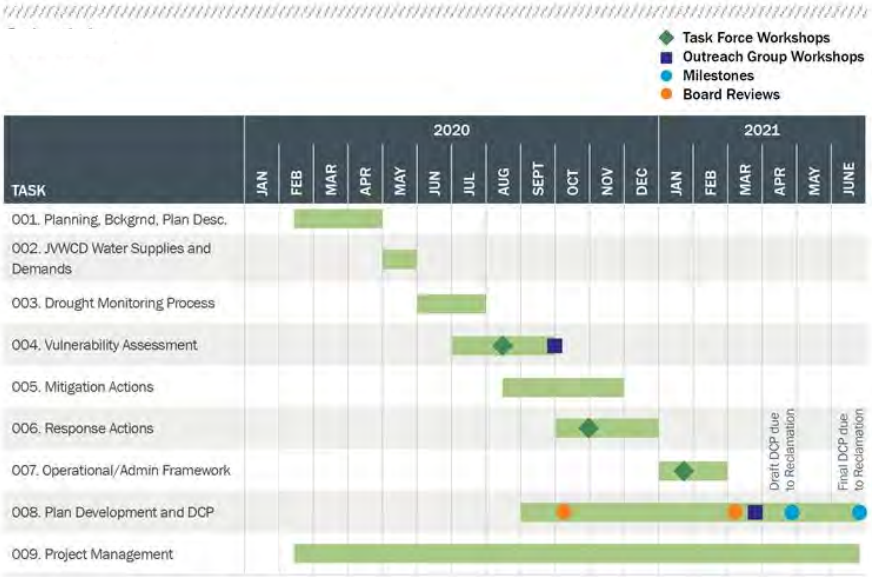
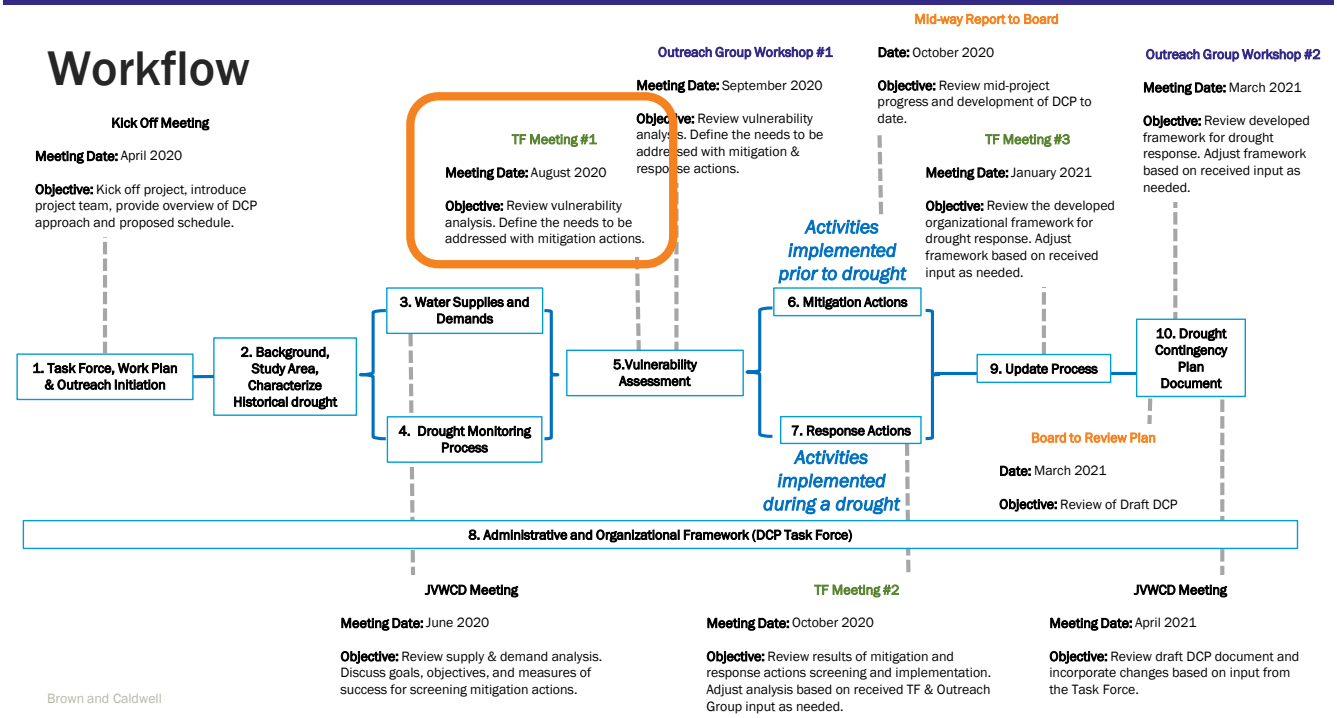
Schedule

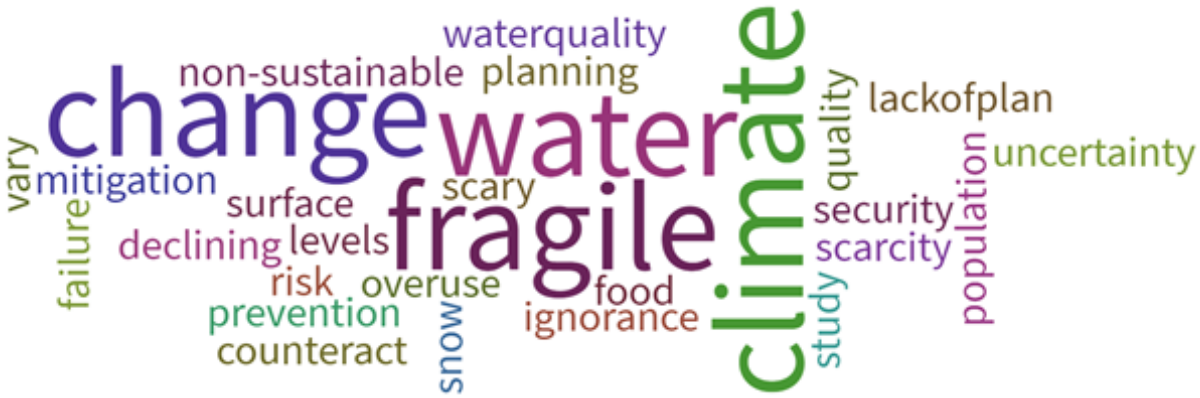


Workflow



Vulnerability Assessment Approach

What word(s) do you think of when you think of vulnerability of water supplies?



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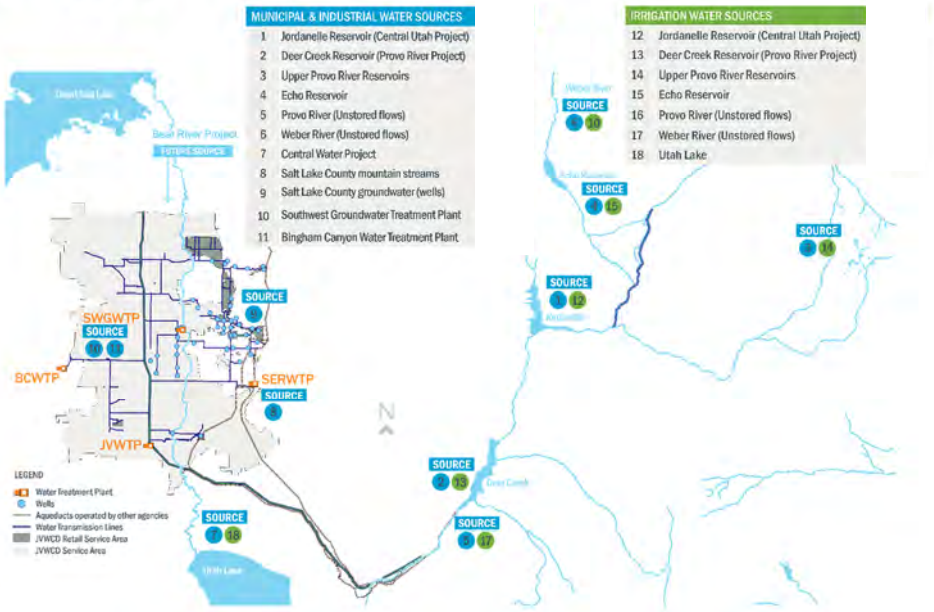
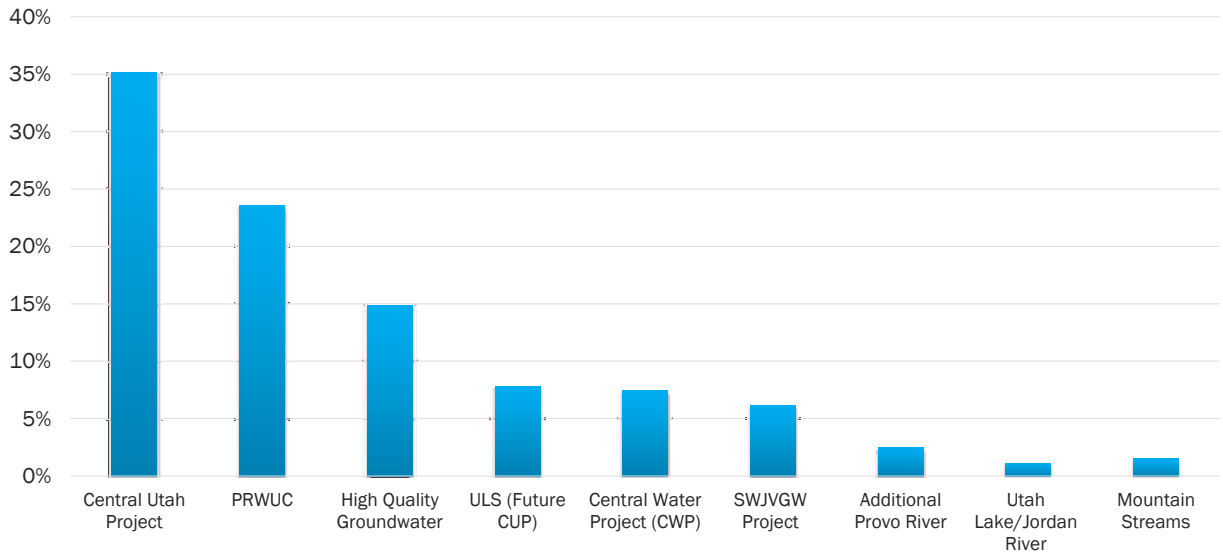
Vulnerability Assessment: General Approach

Identify Supply Resources → Conduct Vulnerability Analysis: Likelihood → Conduct Vulnerability Analysis: Consequence

Identify Supply Sources: map



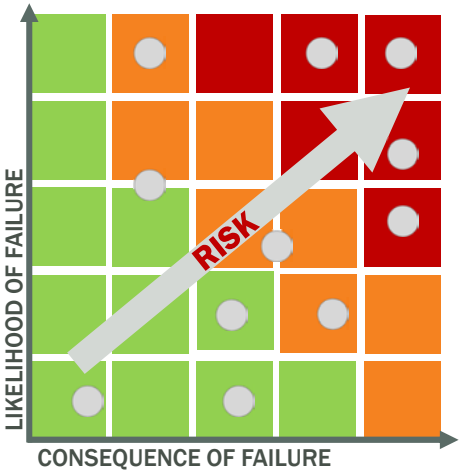
Identify Supply Resources: 2030 Sources



**Understanding of canal company resources to be added post-Task Force workshop

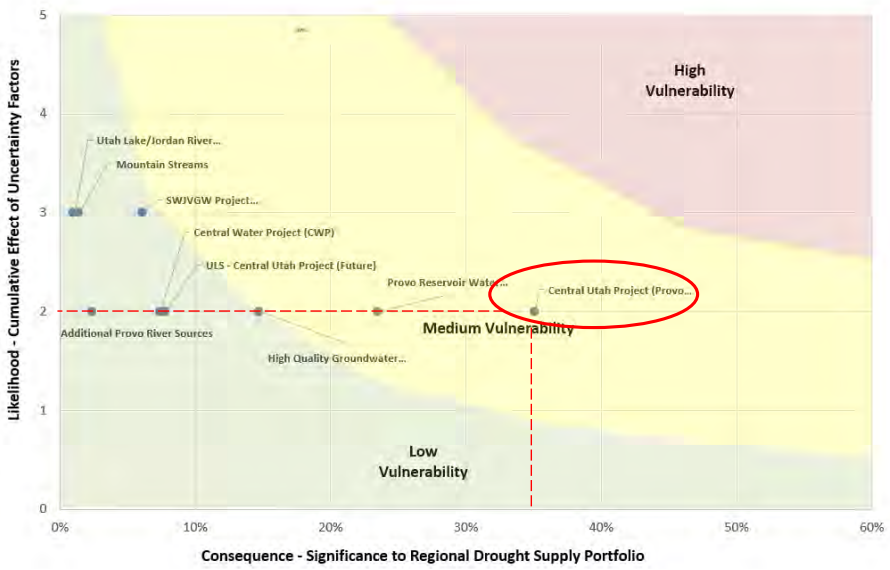
Vulnerability Assessment: General Approach

- Risk = Likelihood of reduced supply x Consequence of reduced supply
  - Likelihood – qualitative score based on uncertainty factors that contribute to reduced supply
  - Consequence – quantitative score based significance of supply source
- Risk results indicate the supplies on which drought mitigation measures should focus
- Risk is used to analyze how drought mitigation measures will reduce regional vulnerability to drought



Risk Matrix - Example

- Matrix demonstrates vulnerability of resources
- Consider for prioritizing measures
- Drought mitigation measures should focus on reducing consequence and/or reducing likelihood



In-Depth Review of Risk Analysis

Vulnerability Assessment: Likelihood – Risk Factors

Risk Factor	Description
1. Dry year supply limitations	• Limitations due to in-stream/downstream flow requirements • Groundwater production capacity limitations • More severe, longer duration droughts than historical record are possible
2. Climate Change	• Altered or extreme precipitation patterns • More frequent and or severe droughts • Higher water temperatures • Reduced snowpack and earlier runoff patterns
3. Regulatory, environmental, and water rights constraints	• Water rights and contract limitations • More stringent water quality regulations (State and Federal) • More stringent environmental protection regulations

Vulnerability Assessment: Likelihood – Risk Factors

Risk Factor	Description
4. Cost constraints and affordability	• Aging infrastructure & rising costs for infrastructure improvements • Pumping costs • Increasing treatment requirements
5. Source water quality degradation	• Algae by-products • Salinity and nutrients • Constituents of concern • Groundwater contamination • Differing water quality • Contamination spill • Forest/Rangeland wildfires
6. Asset/Facility Susceptibility to Disruption	• Potential for disruption through asset failure • Susceptibility to hazards (incl. seismic, flooding, land subsidence) • Lack of redundancy for critical facilities

Which risk factor do you see as most important or impactful to your sector, and why?

a. water rights constraints
b. climate change impacts
c. asset failure and susceptibility
e. cost constraints
f. dry year supply limitations

Vulnerability Matrix walk through…

Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources
(scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Each critical supply source listed

Risk factors

Supply Sour	Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	ost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	1	3	1	2	2	2		
Central Utah Project (CUP) Federal pr… administer… CUWCD, st… in Jordan… Reservoir	• Limitatio…s due to in-stream/…wnstream flow requ…ments • Dr… supply	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adv… relia…	• Increased environmental regulations • Unforeseen changes in release requirements and sto… rights • I… tial changes in cu… …ter rights …for … (maintaining average over 5-7yr period)	• Failure due to aging infrastructure • Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements) • Gravity systems have lowered costs	• Algal by-products/ blooms during drought • Salinity and nutrients • Water quality impacts from wildfires • Misc. manmade events (e.g. diesel spill)	• Conveyance lines cross fault lines (e.g. Wasatch Fault Zone) • Jordanelle Reservoir & Dam built to withstand 7.5 Richter scale magnitude at Wasatch Fault Zone, and 6.5 magnitude for local earthquake (directly …	2	37%

Likelihood ranking

Descriptions of impact of factor for each supply source

Cumulative effect through average likelihood here

Consequence derived from overall supply % reliability per source

Drought Monitoring

Drought Monitoring

This process typically addresses:

- What are our “Drought Levels?”
- What are we measuring? And what are the “triggers” to determining we are at these levels?
- How are we monitoring this information over time?

The above is used to:

1) anticipate drought and
2) inform response actions to reduce drought impacts

Drought Monitoring: drought levels

Current Draft Drought Levels: four levels of increasing severity

Drought Level	Advisory Code	Water Shortage Description
Level 0	Blue	Normal: Normal or near normal water supply conditions exist
Level 1	Yellow	Moderate: Water supplies are moderately below normal
Level 2	Orange	Severe: Water supplies are severely below normal
Level 3	Dark Orange	Extreme: Water supplies are extremely below normal
Level 4	Red	Critical/Exceptional: Water supplies are exceptionally and critically below normal

Drought Monitoring: measuring drought levels

Current Draft Measurements: snowpack, runoff, and groundwater

Between April 1st and May 15th each calendar year, the District will assess:

- **Snowpack** conditions and **runoff** forecasts for CUWCD and PRWUA
- Conditions of the Salt Lake Valley deep principle **aquifer water level**

- ***Why this time of year?*** → period in which we have reasonable confidence in this data to determine water supply availability

Goals for collaboration with Utah Lake Water User's Association (ULWUA):

- Consult with the Utah Lake Water User's Association (ULWUA) as drought conditions are established
- Develop consistent and complementary responses to drought level conditions
- Anticipated that ULWUA will primarily determine its response actions based on the level of Utah Lake

Drought Monitoring: establishing triggering criteria

Example of triggering criteria for drought levels: When reached, these could trigger response actions to reduce impact.

			Triggering Criteria Applied to Drought Levels*		
Drought Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	90-day moving average groundwater (selected District wells)
Level 0	Blue	Normal	at least 95% supply availability	at least a 75% supply allocation	at least 4,300 ft above MSL
Level 1	Yellow	Moderate	at least a 95% supply availability	65-75% supply allocation	at least 4,290 ft above MSL
Level 2	Orange	Severe	at least 90-95% supply availability	55-65% supply allocation	at least 4,270 ft above MSL
Level 3	Dark Orange	Extreme	at least 90-95% supply availability	45-55% supply allocation	at least 4,270 ft above MSL
Level 4	Red	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	below 4,270 ft above MSL

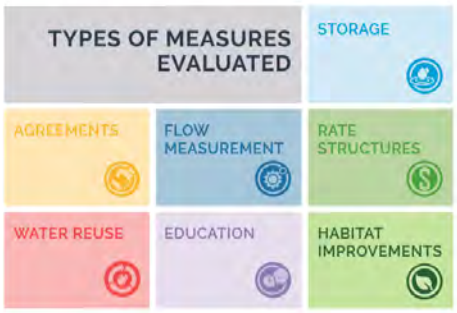
*Please note: These are placeholder estimates. The District is in process of refining these numbers.

Mitigation Measures

Mitigation Measure Examples

Weber Basin:

- Internet Water Supply Dashboard
- Drought Surcharge Fees
- WBWCD Secondary Water Metering
- Short-Term Transfer Agreements
- Other Systems Secondary Water Metering
- Drought Surcharge Fees Education
- Continued meetings with habitat stakeholders



Mitigation Measures Approach: Potential examples

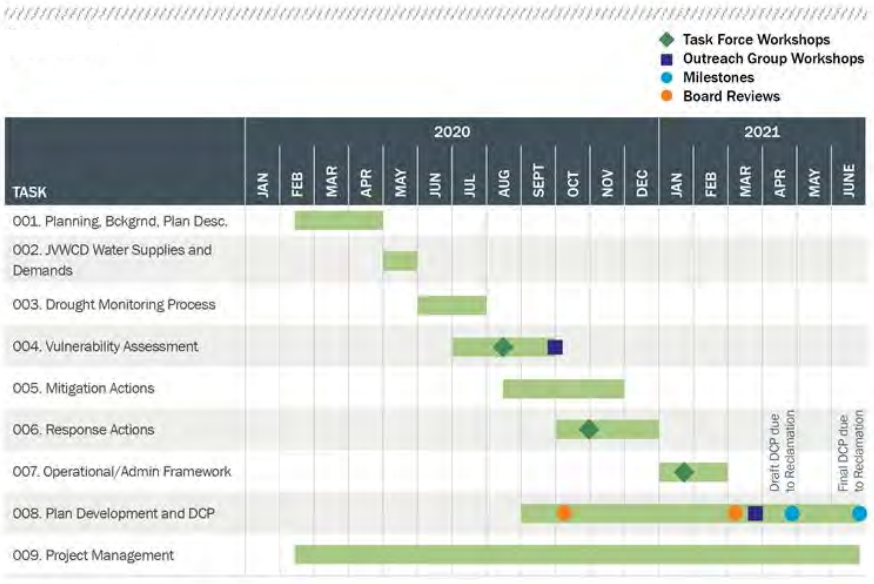
- Implementation of water efficiency standards
- Wholesale block rate structure
- Additional Jordan River/Utah Lake M&I Treatment
- Develop Excess Provo River Direct Flow for M&I Use
- Realize Additional Groundwater
- Direct Potable Reuse
- Casto and Dry Creek Springs Treatment
- Design Bear River Project for firm yield of 50k AF/yr, under drought and adverse climate conditions, or build in drought supply storage
- Leak Mitigation
- Strategic Water Management

Next Steps

Next Steps

- Vulnerability matrix comments & input
- Further comments for DCP Sections 1 and 2

**Please provide comments by September 16th



Thank you!

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- Slide 6: image from 2016 Water Quality Report https://jvwcd.org/file/9899a865-ce3a-4fe8-905e-f452b3e136b0/WQR2016.pdf
- Slide 10: image from 2019 Water Quality Report https://jvwcd.org/file/32b72455-26ff-434e-8113-cd94d65af2fe/WQR2019-FINAL.pdf
- Slide 30 Drought Monitoring: image of Jordanelle Reservoir from 2017 Water Quality Report https://jvwcd.org/file/e415758a-45c5-41cc-b876-98d6f60ee4b3/water-quality-report-2017-web.pdf

Pre-Workshop MS Teams Support

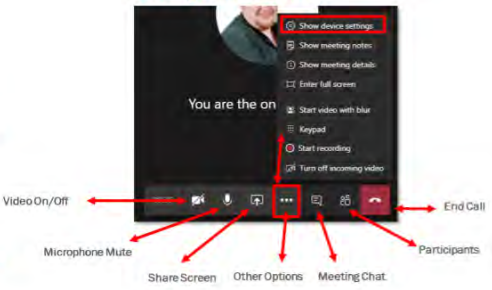
Part 1

Summarized tips and control taskbar

1. Use video (particularly when presenting or engaging in discussion), if possible
2. Use your computer microphone and speakers for audio (not your phone) if possible, and mute when not speaking to limit disruptive background noise

   If participating by phone, press: *6 to mute/unmute, or *1 for more options
3. Use the meeting chat to "raise your hand" if you'd like to speak
4. If experiencing bandwidth issues, turn off video camera and incoming video (access the latter via "..." in meeting control taskbar)

Meeting control taskbar



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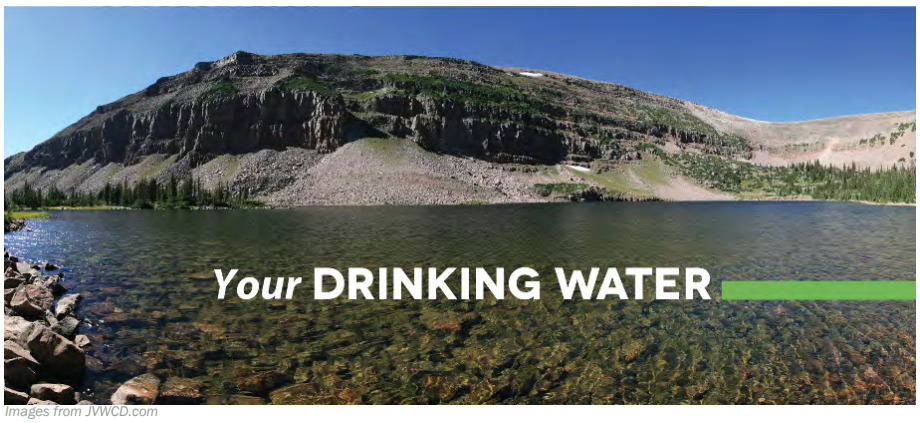
Jordan Valley Water Conservancy District

District Drought Contingency Plan Outreach Group Meeting #1

October 29, 2020



Images from JVWCD.com

Meeting Topics

1. Project Background
2. Vulnerability Assessment
3. Outreach Group Input for Risk Analysis
4. Drought Monitoring
5. Mitigation Measures
6. Response Actions

Meeting Objectives

- Introduce Outreach Group members
- Project background (incl. vulnerability and drought monitoring process)
- Get Outreach Group input & insight on:
  - Sector-specific vulnerabilities
  - Mitigation Measures
  - Response Actions
- Discuss next steps

Outreach Group Members:

Please respond in the MS Teams chat:
Name, role with your organization, favorite pre-COVID pastime [icebreaker question]

Name	Organization
Keith Ludwig	City of Midvale
Mark Reid	City of Bluffdale
Brien Maxfield	Draper City
Justun Edwards	Herriman City
Duane Green	Riverton City
Tim Heyrend	City of West Jordan
Dennis Pay	City of South Salt Lake
Clint Dilley	Magna Water District
Dan McDougal	Taylorsville-Bennion Improvement District
Ryan Johnson	White City Water Improvement District
Jason Helm	Granger-Hunter Improvement District
Jerry Nielson	WaterPro/Draper Irrigation
Jared Carling	Hexcel Corporation
Alex Nicolaidis	Willow Creek Country Club

Task Force Members:

Please respond in the MS Teams chat:
Name, role with your organization, favorite pre-COVID pastime [icebreaker question]

Interests	Name	Organization	Position/Role
M&I	Alan Packard	Jordan Valley Water Conservancy District	Assistant General Manger & Chief Engineer
M&I	Travis Christensen	Jordan Valley Water Conservancy District	Registered Staff Engineer & DCP Project Manager
M&I (City Perspective)	Jason Rasmussen	South Jordan City	South Jordan City Public Works Director
M&I (Improvement District Perspective)	Greg Anderson	Kearns Improvement District	KID Public Works Director
M&I (Secondary Water Provider Perspective)	David Gardener	WaterPro/Draper Irrigation	Assistant General Manager
M&I and Agricultural	Laura Haskell	State Division of Water Resources	Jordan River Specialist & State Drought Coordinator
Agricultural & Water Rights	John Larsen	Utah Lake Water Users Association & Utah Division of Water Rights	Utah Lake and Jordan River Distribution System Commissioner
Environmental & Recreational	Eric Ellis	Utah Lake Commission	Executive Director
Environmental & Recreational	Soren Simonsen	Jordan River Commission	Executive Director
Environmental & Industrial	Laura Vernon	State Division of Forestry, Fire, and State Lands	Sovereign Lands Planner/ Coordinator

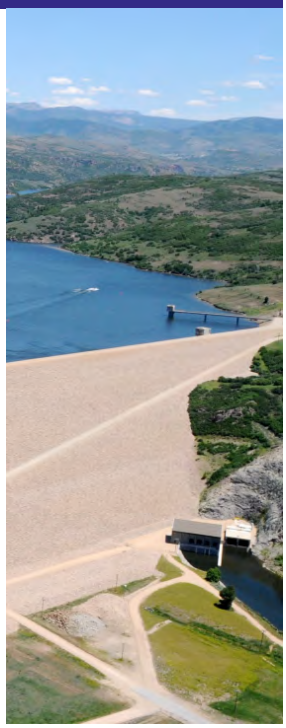
Project Team

Jordan Valley Water Conservancy District:

- Alan Packard
- Travis Christensen
- Bart Forsyth
- Shane Swensen
- Linda Townes
- Matt Olson
- Jessica Morgan

Brown and Caldwell:

- Jacob Young
- Tess Sprague
- Adam Jones
- Melanie Holton

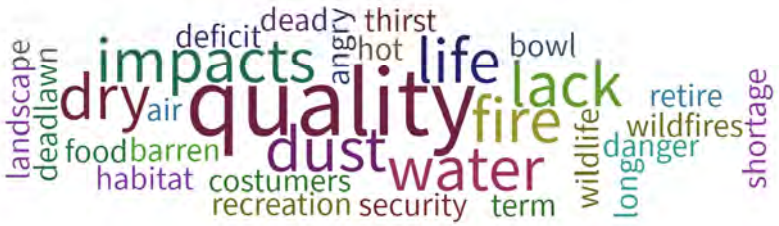


Please respond in the MS Teams chat:
Name, role with your organization, favorite pre-COVID pastime [icebreaker question]

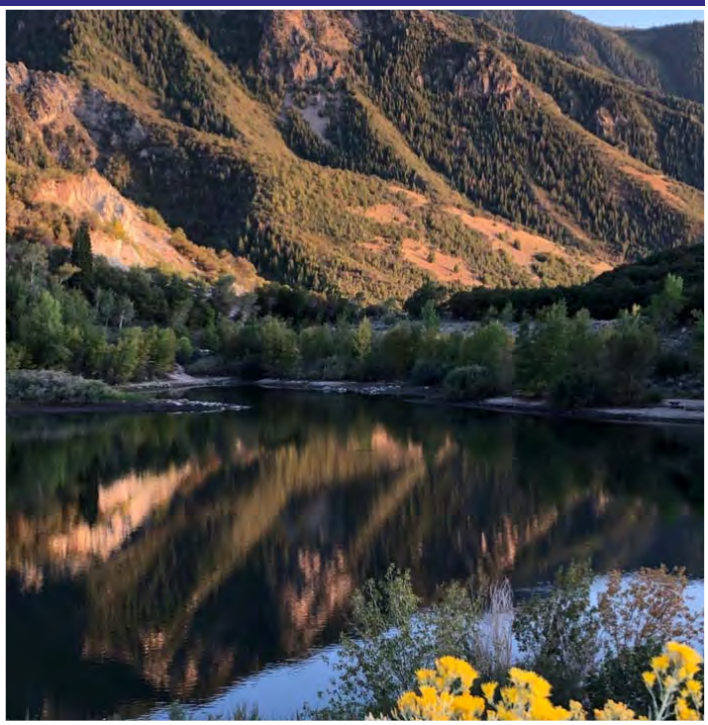
What words come to mind when you think of the consequences of drought?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

Word cloud from Task Force Workshop #1:



What is a Drought Contingency Plan?



What is a Drought Contingency Plan?

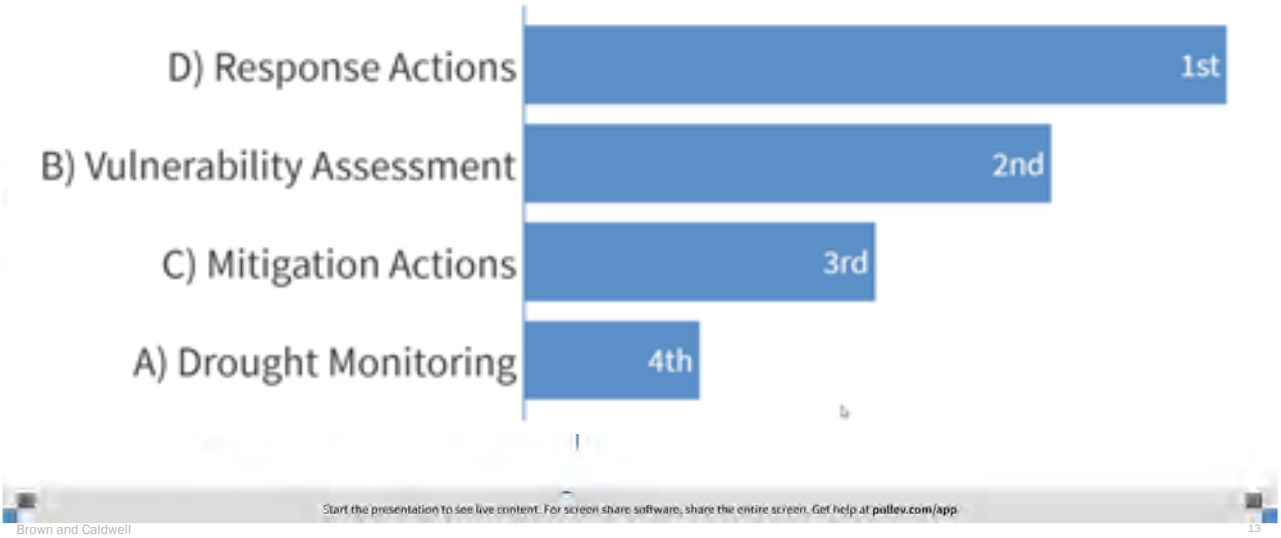
- Collaborative planning approach to building long-term resiliency to drought
- Requires stakeholders process to plan development
- Stakeholder Process:
  - Addresses agricultural, municipal, and environmental issues
  - Develops broad support for mitigation and response actions

- Must include consideration of climate change impacts to water supplies to support long term resiliency
- Mitigation and Response actions are projects that could compete for implementation funding under WaterSMART

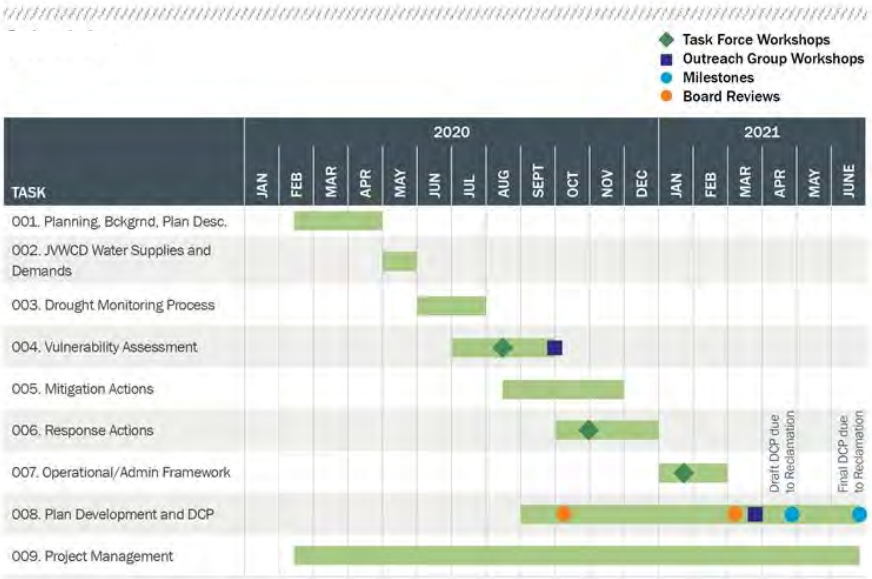
The Six Elements of a DCP

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
Mitigation Actions	• Identify, evaluate and prioritize actions and activities that will build **long-term** water supply resiliency and mitigate risks
Response Actions	• Identify, evaluate and prioritize actions and activities that can be implemented in a drought and triggered during different stages of drought to provide **quick benefits**
Operational and Administrative Framework	• **Determine local responsibility** for undertaking the actions necessary to implement the DCP.
Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

I'm most interested in learning more about and engaging in this part of the DCP:



Schedule



Vulnerability Assessment Approach

Brown AND Caldwell

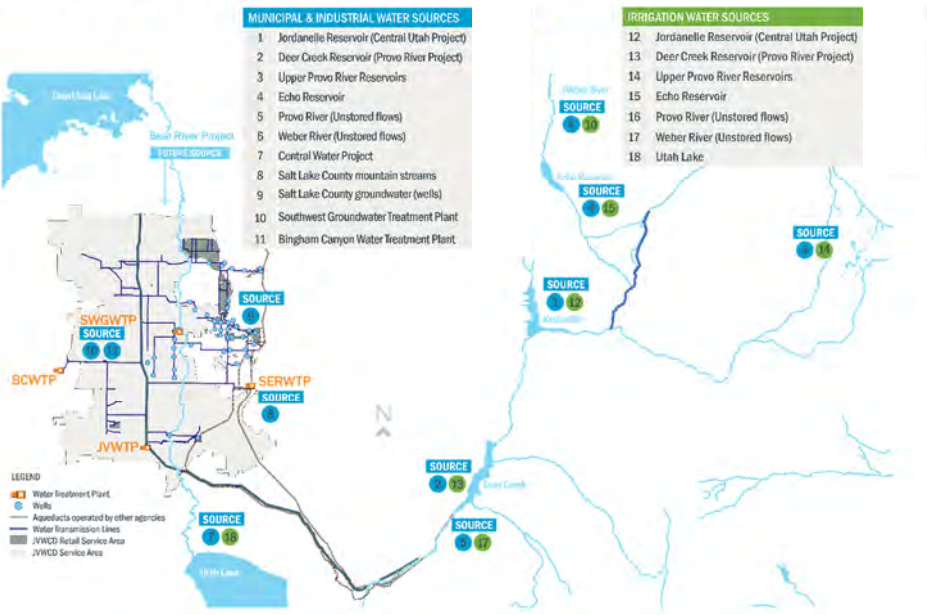
What word(s) do you think of when you think of vulnerability of water supplies?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

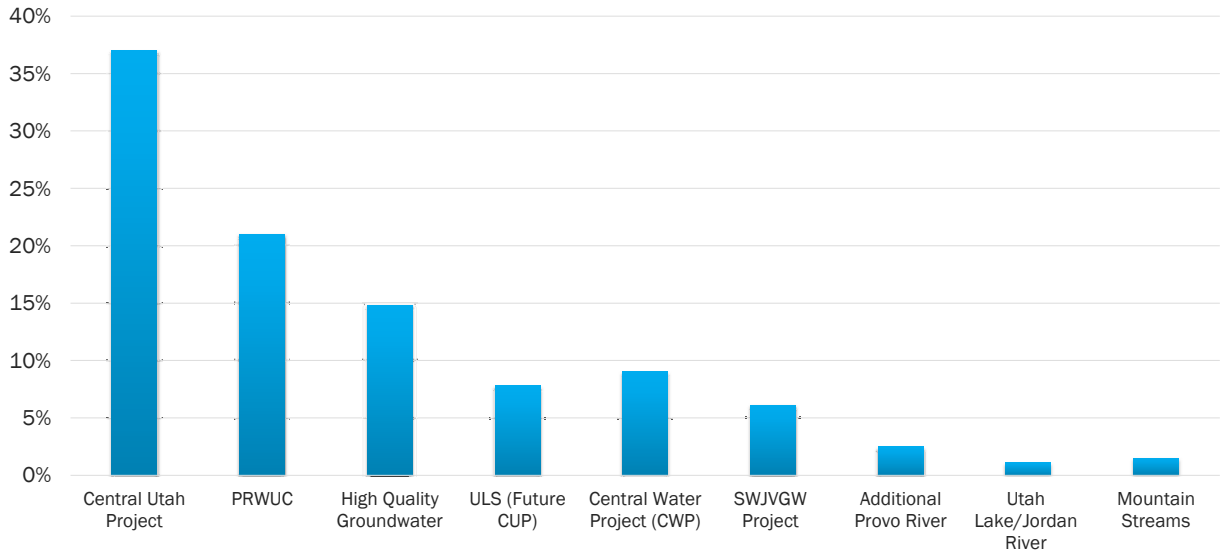
Vulnerability Assessment: General Approach

Identify Supply Resources → Conduct Vulnerability Analysis: Likelihood → Conduct Vulnerability Analysis: Consequence

Identify Supply Sources: map



Identify Supply Resources: 2030 Sources



*** Canal company resources: Not direct critical JVWCD portfolio supply. However, they are included in the analysis due to impacts as agricultural and secondary irrigation source.**

Vulnerability Assessment: General Approach

- Risk = Likelihood of reduced supply x Consequence of reduced supply
  - Likelihood – qualitative score based on uncertainty factors that contribute to reduced supply
  - Consequence – quantitative score based significance of supply source
- Risk results indicate the supplies on which drought mitigation measures should focus
- Risk is used to analyze how drought mitigation measures will reduce regional vulnerability to drought

Vulnerability Assessment: General Approach

Summary of Risk Factors Contributing to Potential Reduction or Loss of Critical Resources
(scale of 1 to 5, low to high likelihood of impairment beyond a 1 in 50 year, 5-year drought in 2030)

Supply Source	Limitations	Climate Change	Regulatory, Environmental, and Water Rights Constraints	Cost Constraints and Affordability	Source Water Quality Degradation	Asset/Facility Susceptibility to Disruption	Likelihood – Cumulative Effect of Factors	Consequence – Significance to Drought Supply Portfolio
Likelihood	1	3	1	2	2	2		
Central Utah Project (CUP) Federal pr… administer… CUWCD, st… in Jordan… Reservoir	• Limitati…s due to in-stream/…wnstream flow requ…ments • Dr… supply	• Altered/extreme precipitation patterns (less in spring, higher-intensity storms in winter) • Premature snowmelt and reduced snowpack • More frequent and severe droughts (adv… relia…	• Increased environmental regulations • Unforeseen changes in release requirements and sto… rights • I… tial changes in cu… …er rights (e.g. …for (maintaining average over 5-7yr period)	• Failure due to aging infrastructure • Customer affordability issues with rising cost of water (e.g. potential cost of infrastructure improvements) • Gravity systems have lowered costs	• Algal by-products/ blooms during drought • Salinity and nutrients • Water quality impacts from wildfires • Misc. manmade events (e.g. diesel spill)	• Conveyance lines cross fault lines (e.g. Wasatch Fault Zone) • Jordanelle Reservoir & Dam built to withstand 7.5 Richter scale magnitude at Wasatch Fault Zone, and 6.5 magnitude for local earthquake (directly	2	37%

Each critical supply source listed

Risk factors

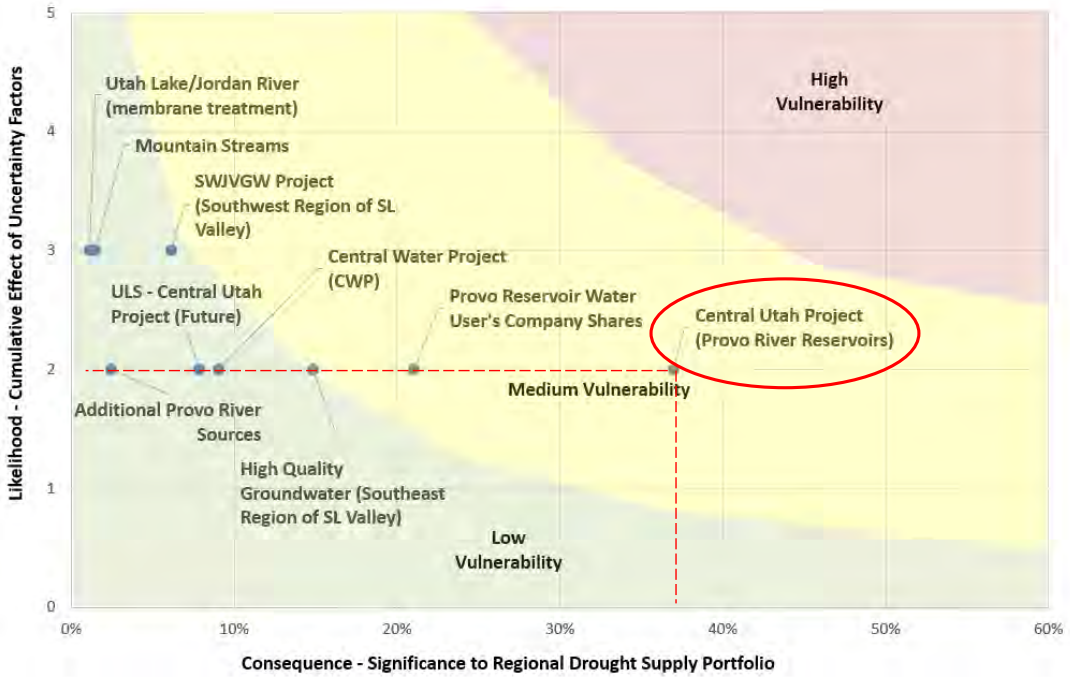
Likelihood ranking

Descriptions of impact of factor for each supply source

Consequence derived from overall supply % reliability per source

Cumulative effect through average likelihood here

Risk Matrix Results



Outreach Group Input for Risk Analysis

Vulnerability Assessment: Risk Factors & Sector Impacts

Six risk factors were developed to support the vulnerability assessment:

1. Dry year supply limitations
2. Climate Change
3. Regulatory, environmental, and water rights constraints
4. Cost constraints and affordability
5. Source water quality degradation
6. Asset/Facility Susceptibility to Disruption

Vulnerability Assessment: Risk Factors & Sector Impacts

...We'd like to get your input!

Drought Impacts Across Sectors

Risk Factor & Drought Impact	Municipal & Industrial (M&I)	Environmental	Agriculture	Recreation
Dry Year Supply Limitations				
Supply limitations due to in-stream flow requirements	x	x	x	x
Groundwater production capacity limitations & supply reduction	x		x	
Climate Change				
Early runoff pattern	x	x	x	x
Reduced reservoir levels	x	x	x	x
Reduced stream flows	x	x	x	x
Increased evapotranspiration	x	x	x	x
Regulatory, environmental, and water rights constraints				
Reduction of contracted water exchanges	x		x	
Increased State and Federal regulation on supply sources to support environmental flows	x	x	x	x
Cost constraints and affordability				
Rising water rates	x		x	
Source water quality degradation				
Water quality impacts from anthropogenic sources (chemical spill, urbanization)	x	x	x	x
Water quality impacts from wildfires	x	x		
Increased occurrence of algal blooms and algae by-products	x	x	x	x
Increased nutrient levels	x	x	x	
Increased water temperatures	x	x		x
Asset/Facility Susceptibility to Disruption				
Asset damage from seismic events	x		x	x
Asset failure due to aging infrastructure	x		x	

Which risk factors most impact your sector? (i.e. dry year limitations, climate change, regulatory/enviro/water rights, water quality, costs/affordability, asset susceptibility)

a. Dry year limitations (7)
b. Climate change (2)
c. Cost-affordability (5)
d. All (1)
e. Water quality (1)

What are some specific examples of how your sector has been impacted during the last drought?

a. habitat impacts
b. struggle to reduce waste (ie outdoor sprinkler neglect)
c. we basically just increased our purchase of water from JVWCD
d. high water demands
e. educating the public
f. concern for the future
g. increased groundwater usage from multiple jurisdictions
h. decreased economic output
i. enhanced conservation emphasis
j. water quantity

Drought Monitoring

Drought Monitoring

This process typically addresses:

- What are our “Drought Levels?”
- What are we measuring? And what are the “triggers” to determining we are at these levels?
- How are we monitoring this information over time?

The above is used to:

1) anticipate drought and
2) inform response actions to reduce drought impacts

Drought Monitoring: establishing triggering criteria

Example of triggering criteria for drought levels: When reached, these could trigger response actions to reduce impact.

			Triggering Criteria Applied to Drought Levels*		
Drought Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
Level 0	Blue	Normal	at least 95% supply availability	at least an 80% supply allocation	3 yr. average diversions less than safe yield
Level 1	Yellow	Moderate	at least a 95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 yr. average exceeds safe yield
Level 2	Orange	Severe	at least 90-95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 16,000 AF, or 3 yr. average exceeds safe yield
Level 3	Dark Orange	Extreme	at least 90-95% supply availability	<75% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield
Level 4	Red	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield

Drought Monitoring: measuring drought levels

Current Measurements: snowpack, runoff, and groundwater

Between April 15th and June 15th each calendar year, the District will assess:

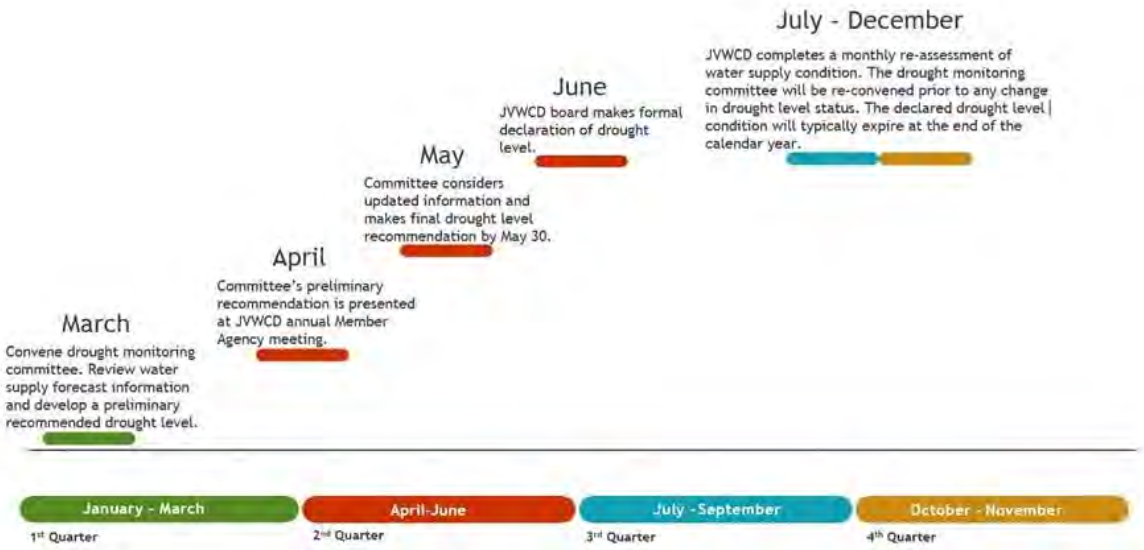
- **Snowpack** conditions and **runoff** forecasts for CUWCD and PRWUA for water supply availability
- Conditions of the Salt Lake Valley deep principle **aquifer water level**

- ***Why this time of year?*** → period in which we have reasonable confidence in this data to determine water supply availability

Drought Monitoring Committee (timeline on next slide):

- **JVWCD will convene annual drought monitoring committee** which will include one representative from each member agency and applicable JVWCD staff
- **During meeting: Present M&I water supply forecast information and Utah Lake conditions** affecting the Utah Lake Water User's Association (ULWUA) supply
- **Committee will determine a preliminary drought level** recommendation based on a majority vote of the committee members
- **Preliminary level presented at the JVWCD annual member agency meeting** in April of each calendar year, feedback considered, and **final recommendation by May 30th**
- JVWCD will establish the **drought level by formal action of Board of Trustees**

Drought Monitoring Process Timeline



Mitigation Measures

What words come to mind when you think of drought mitigation measures?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

Word cloud from Task Force Workshop #1:

What words come to mind when you think of drought mitigation measures?

Mitigation Measures

Mitigation Measures - Preemptive actions put in place before drought to reduce risk and impacts of drought

Examples

- Develop additional water sources
- Direct potable reuse
- Strategic water management
- Internet water supply dashboard
- Drought tolerant landscaping at schools
- Leak Mitigation
- Strategies to make river habitat more drought resilient
- Conservation Programs

What drought mitigation measures do you currently have in place? (None is okay!)

Top

a. water efficiency standards
b. lake shoreline restoration (phrag removal) to reduce water consumption
c. basic water curtailment code and ability to restrict usage based on declarations
d. water conservation projects and leak detection
e. rework of water rate structure to promote conservation
f. installation of meters on secondary system
g. plant selection for restorative work. Phragmites on the Jordan River too! We also work with other agencies on water conservation

What are some other ideas you have for drought mitigation measures?

a.Piping of canals
b.Public relationship campaigns…. IE: public service announcements
c.Water restrictions
d.Park strip landscaping efficiency
e.Work with school districts and SLCo parks on water usage education
f.Individual tailoring of the water provider drought mitigation measures in coordination with JVWCD to provide a united approach to the drought declaration
g.Localscapes
h.LID technology to better recharge aquifer
i.Keep storm water onsite
j.Water efficient landscaping friendly municipal codes/ CCRs
k. Continue automation of sprinklers to respond to weather

Mitigation Measures Approach: Potential examples

Already implemented:

- Implementation of water efficiency standards
- Wholesale block rate structure

Potential future measures:

- Additional Jordan River/Utah Lake M&I Treatment
- Develop Excess Provo River Direct Flow for M&I Use
- Develop Additional Groundwater
- Wastewater Reuse
- Casto and Dry Creek Springs Treatment
- Design Bear River Project for firm yield of 50k AF/yr, under drought and adverse climate conditions, or build in drought supply storage
- Leak Mitigation
- Strategic Water Management

Response Actions

What words come to mind when you think of drought response actions?

Word cloud from Task Force Workshop #1:

Response Actions

Response Actions- Reactive actions enacted during drought to decrease the severity of immediate drought impacts. These are triggers tied to specific drought stages

Examples

- Drought condition messaging
- Leak mitigation
- Reduced washing of vehicles
- Limiting irrigation
- Restricted watering of parks or golf courses
- Increasing water rates
- Water rationing
- Interim water recycling

What plans for drought response actions do you currently have in place? (None is okay!)

Top

a. City Ordinance allows Mayor to impose irrigation restrictions and other usage restrictions in the event of a declared drought
b. Basic water curtailment code and ability to restrict usage based on declarations

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

What are some other ideas for drought response actions?

a. Water waste restrictions
b. Outdoor restrictions
c. Sprinkler schedules
d. Irrigation reminders from a municipal source; weekly suggestions for frequency and duration
e. Smart controllers
f. Billing rate adjustments
g. Public education
h. Outdoor use restrictions
i. Subsidies for the purchase of smart controllers
j. Water budget plan requirements
k. Smart meters
l. AMI – automated metering infrastructure with customer engagement portal for usage
m. Identify where water demand can be reduced
n. Improve system efficiency

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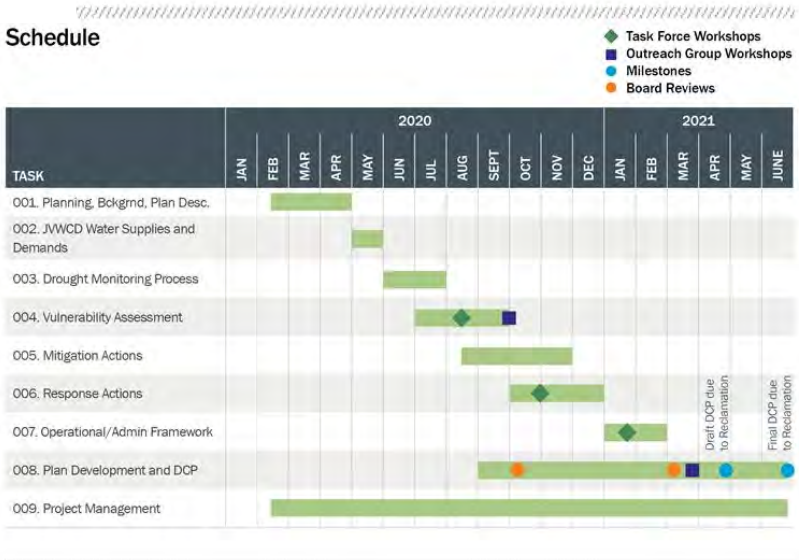
Next Steps

Next Steps

Input from Outreach Group for DCP Sections 1-4

**Please provide comments by November 6th



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- Slide 6: image from 2016 Water Quality Report https://jvwcd.org/file/9899a865-ce3a-4fe8-905e-f452b3e136b0/WQR2016.pdf
- Slide 10: image from 2019 Water Quality Report https://jvwcd.org/file/32b72455-26ff-434e-8113-cd94d65af2fe/WQR2019-FINAL.pdf
- Slide 30 Drought Monitoring: image of Jordanelle Reservoir from 2017 Water Quality Report https://jvwcd.org/file/e415758a-45c5-41cc-b876-98d6f60ee4b3/water-quality-report-2017-web.pdf

Pre-Workshop MS Teams Support

Part 1

Summarized tips and control taskbar

1. Use video (particularly when presenting or engaging in discussion), if possible
2. Use your computer microphone and speakers for audio (not your phone) if possible, and mute when not speaking to limit disruptive background noise

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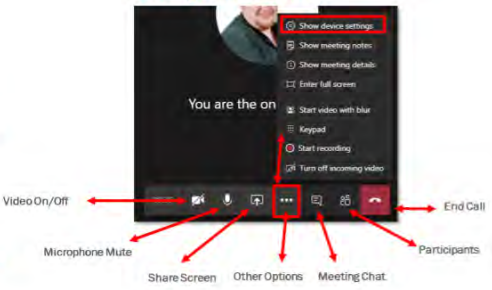
Meeting control taskbar



Brown and Caldwell

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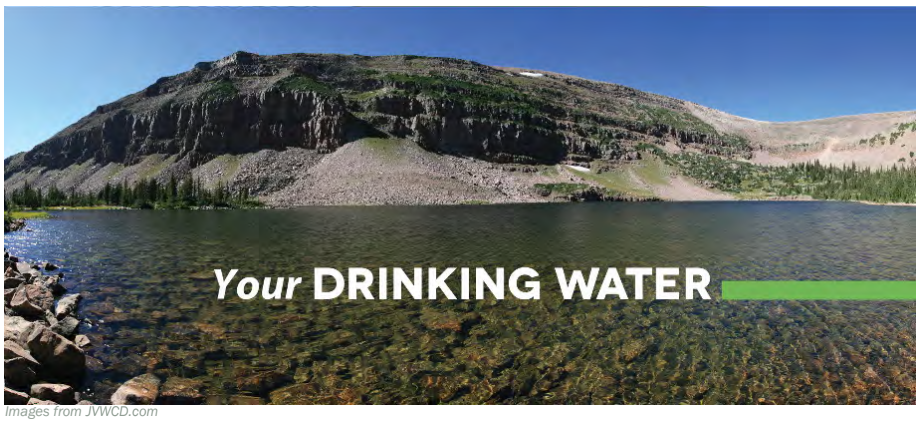
Jordan Valley Water Conservancy District

District Drought Contingency Plan Task Force Meeting #2

January 21, 2020



Images from JVWCD.com

Meeting Topics

1. Project Status
2. Approach to Drought Mitigation Measures
3. Feedback on Preliminary Analysis for Drought Mitigation Measures
4. Approach to Drought Response Actions
5. Brainstorm Drought Response Actions
6. Next Steps

Meeting Objectives

- Project progress update
- Background for DCP mitigation and response:
  - Guidance & approach
  - Input from Outreach Group Workshop
- Collect Task Force input & ideas on:
  - Drought Mitigation Measures
  - Drought Response Actions
- Discuss next steps

Task Force Members: Welcome back!

Ice Breaker: What is your favorite body of water?

Interests	Name	Organization	Position/Role
M&I	Alan Packard	Jordan Valley Water Conservancy District	Assistant General Manger & Chief Engineer
M&I	Travis Christensen	Jordan Valley Water Conservancy District	Registered Staff Engineer & DCP Project Manager
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Environmental & Recreational	Soren Simonsen	Jordan River Commission	Executive Director
Environmental & Industrial	Laura Vernon	State Division of Forestry, Fire, and State Lands	Sovereign Lands Planner/ Coordinator

Project Status

Project Status

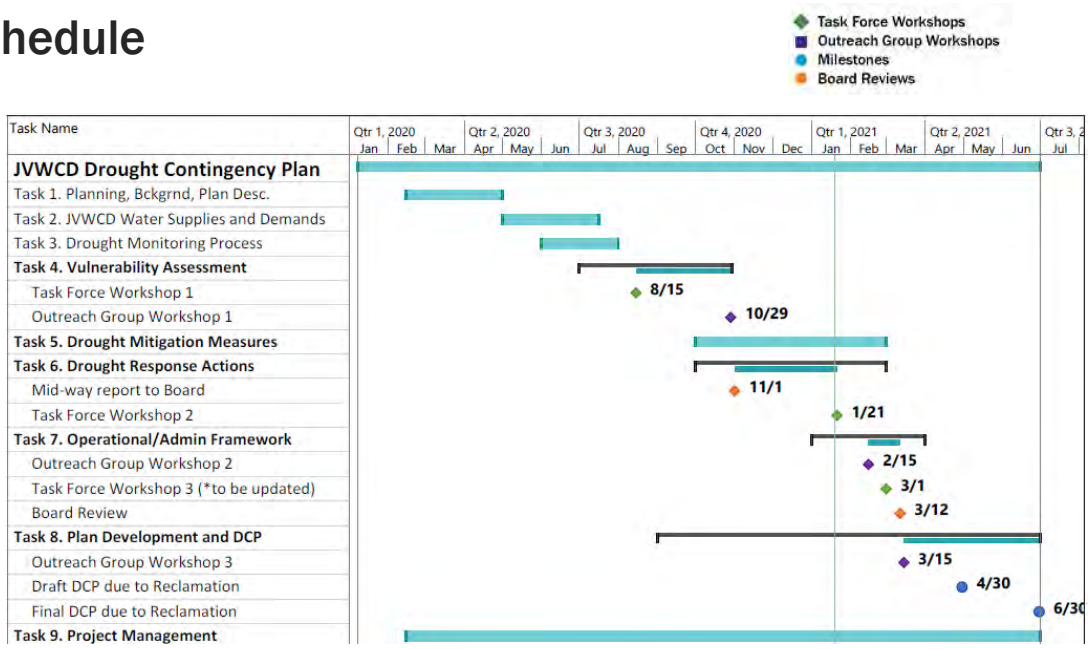
Interim milestones completed:

- 8-26-2020: Task Force Workshop 1 (input received and integrated into DCP contents)
- 10-9-2020: Drought monitoring first draft developed (levels, metrics, and triggers developed)
- 10-9-2020 Vulnerability assessment conducted and first draft developed (risk factors, likelihood, consequence, and impacts by sector developed)
- 10-29-2020: Outreach Group Workshop 1 conducted (input received, will be used in developing mitigation measures and response actions)

Today's Focus: Steps 4 and 5 of the DCP process

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
Mitigation Measures	• Identify, evaluate and prioritize actions and activities that will build **long-term** water supply resiliency and mitigate risks
Response Actions	• Identify, evaluate and prioritize actions and activities that can be implemented in a drought and triggered during different stages of drought to provide **quick benefits**
Operational and Administrative Framework	• **Determine local responsibility** for undertaking the actions necessary to implement the DCP.
Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

Schedule



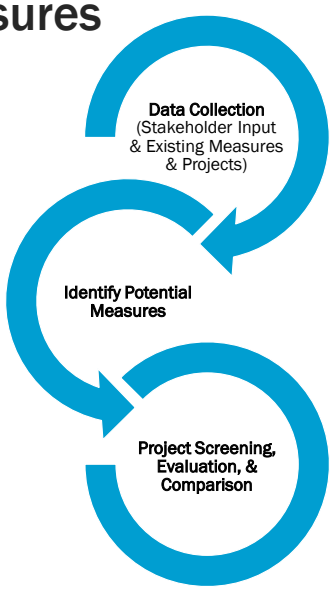
Approach to Drought Mitigation Measures

Approach to Drought Mitigation Measures

Definition: Preemptive actions put in place before drought to reduce risk and impacts of drought

Approach:

- Data Collection
- Measure Identification
- Screening, Evaluation & Comparison



Approach to Drought Mitigation Measures

Data collection

Measures developed and considered within DCP based on:

- **Vulnerability Assessment:**
  - Risk results indicate the supplies on which drought mitigation measures should focus
- **Input from Task Force and Outreach Group:**
  - Input for risk factors & sector impacts help identify areas of focus for developing drought mitigation measures
- **Current projects and examples:**
  - Input from existing plans and studies

Summary of Key Risks from Vulnerability Assessment

Most vulnerable supply sources include:

- Central Utah Project
- Provo Reservoir Water User's Company Shares
- High Quality Groundwater

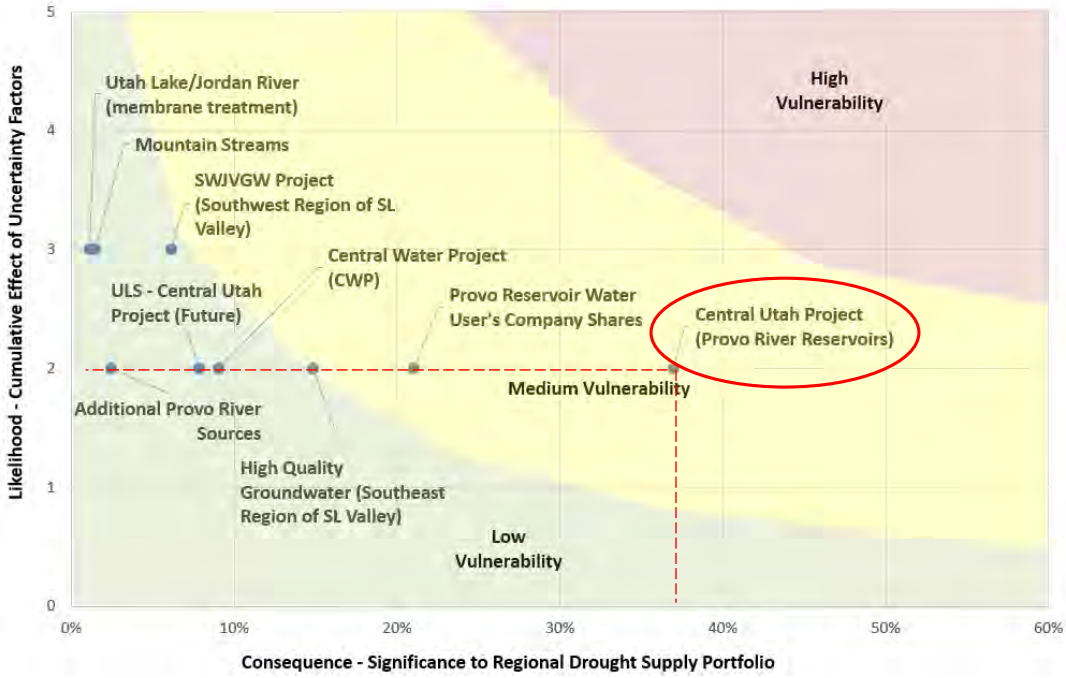
Higher likelihood risk factors:

- Climate Change
- Asset/Facility Susceptibility to Disruption
- Source Water Quality Degradation

Notable sector impacts:

- Supply limitations due to in-stream flow requirements
- Early runoff pattern
- Increased occurrence of algal blooms and algae by-products

Vulnerability Assessment: Risk Matrix Results



Task Force & Outreach Group Workshop Summary

Task Force 1

- Review of DCP purpose and goals
- Review drought monitoring levels
- Review Vulnerability Assessment approach
- Collect input on vulnerability of sources
- Collect Input on DCP draft sections:
  - Water System Overview
  - Drought Monitoring
  - Vulnerability assessment

Outreach Group 1

- Review of DCP purpose and goals
- Review drought monitoring levels
- Collect input on vulnerability sources
- Brainstorm Drought Mitigation Measures
- Brainstorm Drought Response Actions
- Collect Input on DCP draft sections:
  - Water System Overview
  - Drought monitoring
  - Vulnerability assessment

Input from Task Force Workshop #1 (word cloud)

Input from Outreach Group Workshop #1

Which risk factors most impact your sector?

- Dry year limitation (7)
- Climate change (2)
- Cost-affordability (5)
- All (1)
- Water quality (1)

How was your sector impacted during the last drought?

- Habitat impacts
- Struggle to reduce waste
- Educating the public
- Decreased economic output
- Enhanced conservation emphasis

What are some ideas for drought mitigation measures?

- Piping of canals
- Localscapes
- Smart sprinkler controllers
- Improve system efficiency
- Keeping stormwater onsite

Drought Mitigation Measures Evaluation Criteria (handout Table 2)

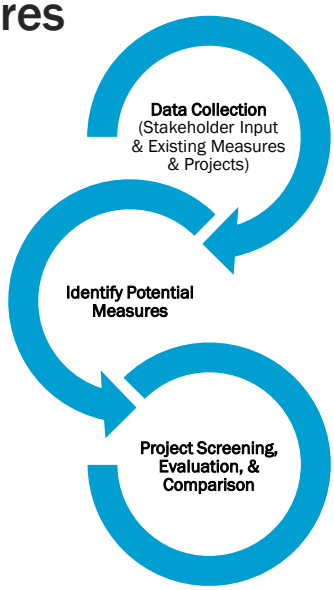
Criterion	Weight	Score = 1	Score = 2	Score = 3
1. Project yield (AFY)/Availability	20%	Yield is < 1,000 AFY	Yield is between 1,000 and 5,000 AFY	Yield > 5,000 AFY
2. Project timing (concept, feasibility, design, construction)	15%	Implementation in > 10 years	Implementation in 5 to 10 years	Implementation in 0 to 5 years
3. Regional benefit to drought mitigation/resiliency	20%	No	For JVWCD and its MAs.	For JVWCD and its MAs, and other peer-agencies.
4. Institutional considerations (stakeholder support, technical complexity, regulatory, reliance on other projects)	15%	Complex project/ significant stakeholder considerations	Moderate project complexity/ some stakeholder considerations	Relatively simple project/broad stakeholder support
5. Other ancillary benefits realized outside of drought response periods (environmental, recreational, social)	10%	None	Localized benefit	Regional benefit
6. Funding sources - are there matching funds available to fund the project	10%	No	State or Federal Loan Programs, Shared cost with partner agencies	Grants (including Water Smart)/Funding in place
7. Addresses multiple vulnerabilities	10%	Addresses one vulnerability for one source	Addresses one vulnerability for two separate sources; or Addresses more than one vulnerability for one source	Addresses one vulnerability for more than two separate sources; or Addresses multiple vulnerabilities for multiple sources

Feedback: Preliminary Analysis for Drought Mitigation Measures

Feedback: Drought Mitigation Measures

Rank Potential Measures

- Review highest ranked mitigation measures
- Interactive ranking activity
- Polling and discussion on top/bottom ranked measures



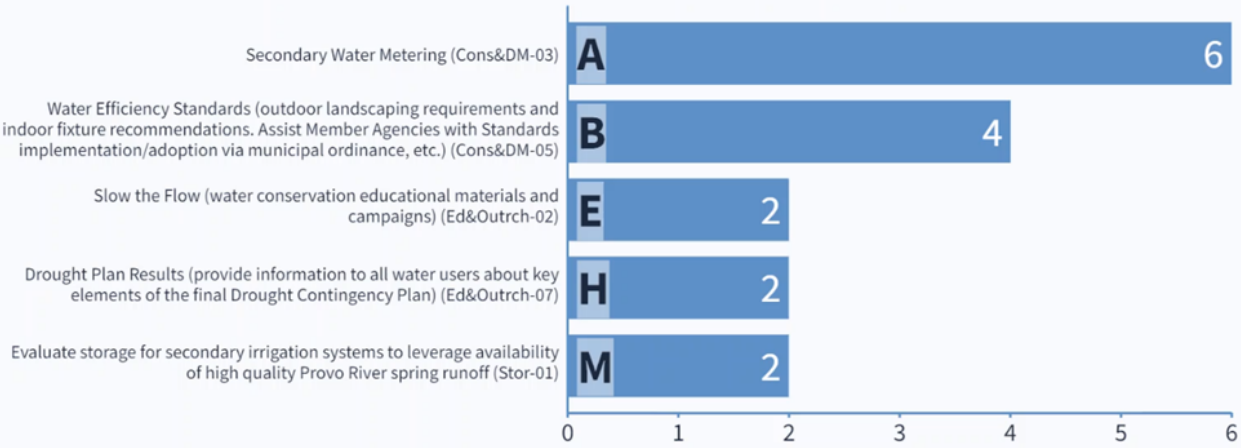
Highest Ranked Drought Mitigation Measures (handout Table 1)

Mitigation Measure Number	Mitigation Measure Name	Weighted Total
Cons&DM-03	Secondary Water Metering	2.15
Cons&DM-05	Water Efficiency Standards (outdoor landscaping requirements and indoor fixture recommendations. Assist Member Agencies with Standards implementation/adoption via municipal ordinance, etc.)	2.2
Cons&DM-06	Flip Your Strip (park strip replacement and incentive program)	2.3
Cons&DM-11	Member Agency Grant Program (multiple funding tiers)	2.15
Ed&Outrch-02	Slow the Flow (water conservation educational materials and campaigns)	2.4
Ed&Outrch-04	Customer feedback tools for JVWCD & MA's (e.g. personalized web portals, water use alerts, reports)	2.2
Ed&Outrch-06	Public Web Dashboard (provide widespread information on drought status and resources)	2.3
Ed&Outrch-07	Drought Plan Results (provide information to all water users about key elements of the final Drought Contingency Plan)	2.4
Ed&Outrch-08	Annual Member Agency drought assessment, coordination, and planning	2.2
GWMgnt-02	JVWCD Aquifer Storage & Recovery (ASR) operational expansions	2.4
Agr&Reg-01	Stand-by or short term water purchase contracts with applicable water suppliers (e.g. MWDSLS, CUWCD, etc.)	2.15
Agr&Reg-07	Update water rate structures to promote conservation (JVWCD service area includes MA's)	2.15
Stor-01	Evaluate storage for secondary irrigation systems to leverage availability of high quality Provo River spring runoff	2.3
WSPro&Mngt-01	Work with stakeholders to fund and support habitat restoration projects that protect drinking water sources within the watershed (continue as a sponsor of the Provo River Watershed Council).	2.4
WSPro&Mngt-06	Collaborate with local partners and stakeholders to improve water quality and reduce algal bloom events for Utah Lake	2.2

Respond at **PollEv.com/jordanvalley705**

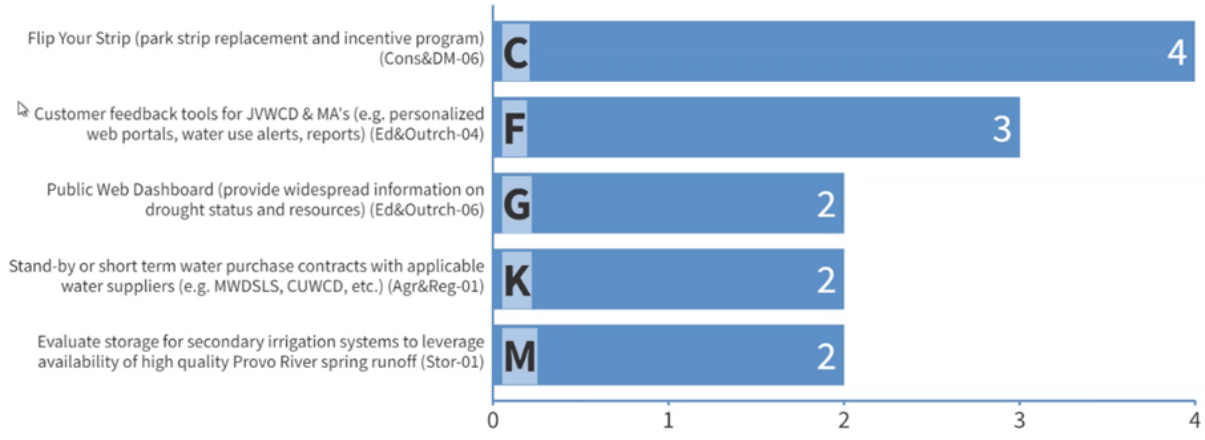
Text **JORDANVALLEY705** to **22333** once to join, then **A, B, C, D, E...**

Select Your Top 3 Drought Mitigation Measures



Poll Everywhere

Select Your Bottom 3 Drought Mitigation Measures



Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

What Drought Mitigation Measures would you like to see that are not on this list?

a. In-stream flow limit structures, BDA's, ponds, to keep our water in the mountains or longer into the warm months.
b. Strategic Water Management (CII water audits and customer incentive program) for large water users.

Are there any Drought Mitigation Measures you're concerned about or do not want to see implemented?

a. more of an emphasis on effects on downstream flows and drought impacts on habitat

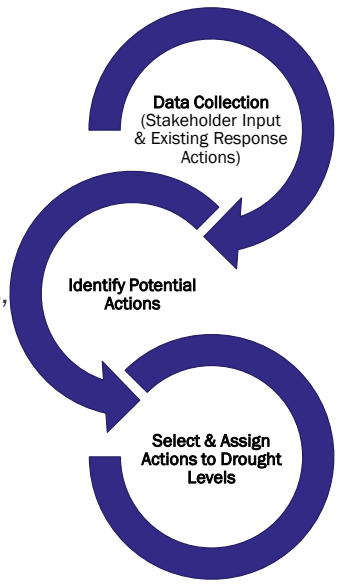
Approach to Drought Response Actions

Approach to Drought Response Actions

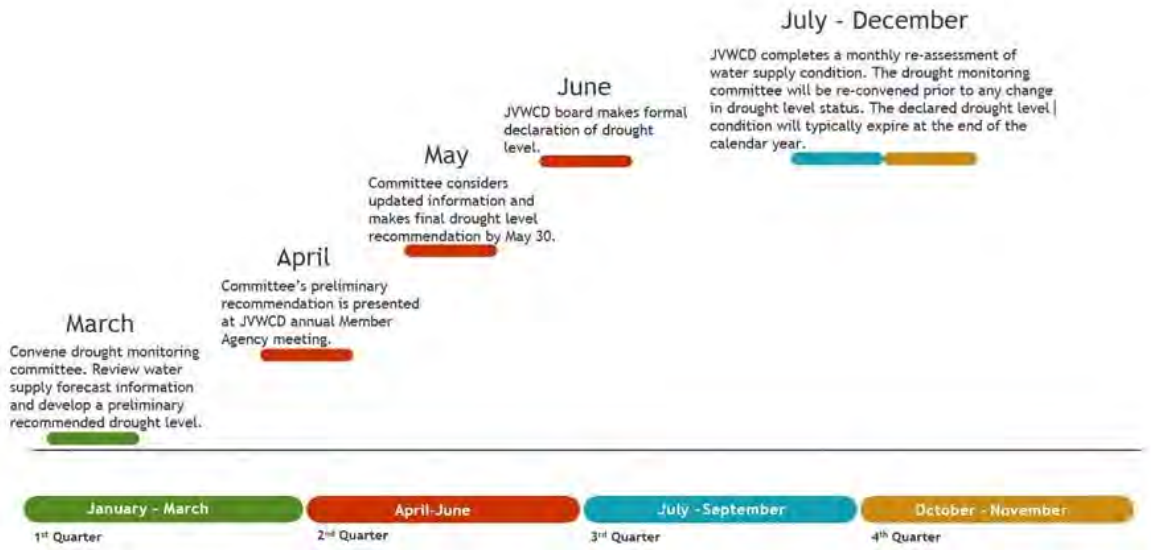
Definition: Reactive actions enacted during drought to decrease the severity of immediate drought impacts. Drought Response Actions are tied to specific drought stages.

Approach:

- Data Collection: Consider established drought levels, metrics, and triggers as well as Task Force & Outreach Group input
- Identify Potential Drought Response Actions: Consider by specific levels & triggers
- Select & Assign Actions
  - Note: **Goal to have agreed upon Drought Response Actions for JVWCD retail customers. Member Agencies operate within contract limits and have option to follow JVWCD retail Drought Response Actions if applicable.**
- Reminder: Levels determined by committee



Drought Committee Timeline
(process to confirm drought levels)



Existing Draft Drought Levels & Triggering Criteria

Example of triggering criteria for drought levels: When reached, these could trigger response actions to reduce impact.

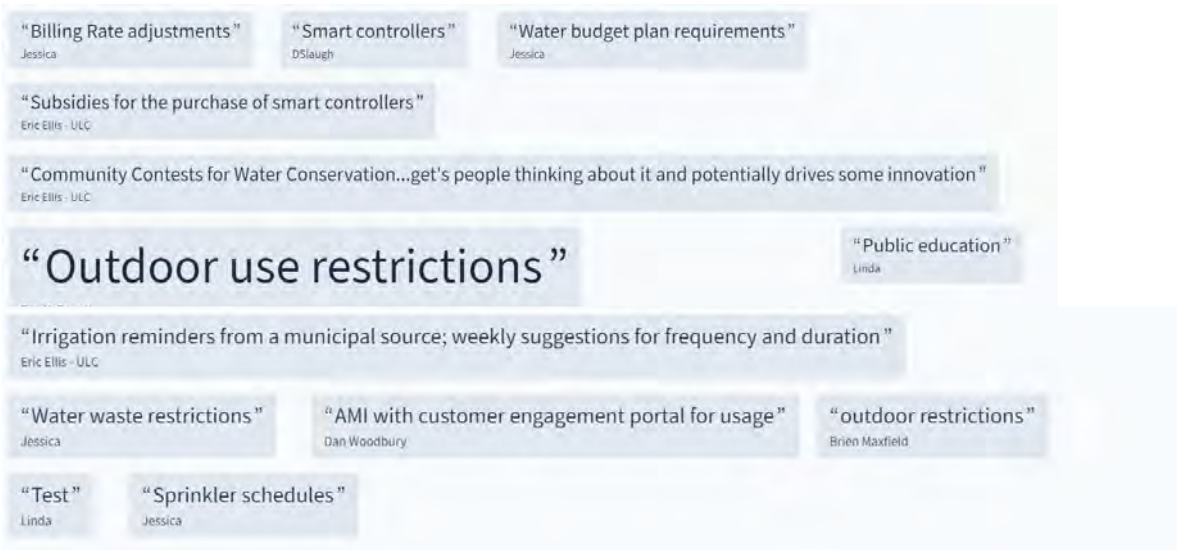
			Triggering Criteria Applied to Drought Levels*		
Drought Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
Level 0	Blue	Normal	at least 95% supply availability	at least an 80% supply allocation	3 yr. average diversions less than safe yield
Level 1	Yellow	Moderate	at least a 95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 yr. average exceeds safe yield
Level 2	Orange	Severe	at least 90-95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 16,000 AF, or 3 yr. average exceeds safe yield
Level 3	Dark Orange	Extreme	at least 90-95% supply availability	<75% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield
Level 4	Red	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield

Contract Amount Impacts by Drought Level

Drought Level	Advisory Code	Water Shortage Description	Recurrence Interval (Example Drought)	Impacts to Contract Amounts
Level 0	Blue	Normal	-	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	Yellow	Moderate	1 in 7-10 year (e.g., 2013 and 2003)	wholesale minimum contract amounts plus 20%, but will likely be unable to provide any deliveries beyond the minimum contract amount plus 20%
Level 2	Orange	Severe	1 in 15-20 year (e.g., 2004, 1991/1992)	wholesale minimum contract amounts plus modest amounts (5 – 10%) beyond minimum contract amounts
Level 3	Dark Orange	Extreme	1 in 50 year (e.g., 1977)	adequate supplies to provide for restricted retail customer needs, and wholesale deliveries restricted to minimum contract amounts
Level 4	Red	Critical/Exceptional	1 in 100 year (e.g.,1930s)	adequate supplies to support essential needs of its retail and wholesale customers, unable to deliver wholesale minimum contract purchase amounts

Today: Consider what kinds of response actions help address needs at different drought levels…

Outreach Group Brainstorm of Response Actions



Summary from Past Examples

Supply Management	Demand Management
Adjusting water purchase contracts based on drought levels	Media and educational campaigns to promote voluntary reductions in use of water.
Develop parallel structure for retail service areas.	Outdoor landscaping restrictions.
Shorten irrigation season.	Residential water use restrictions.
Implement short term transfer agreements between District and water right owners (aka fallowing agreements setup before drought).	Enhanced Water Loss program.
Obtain additional water from other water suppliers.	Building moratorium.
Interim water recycling.	Municipal and commercial water use restrictions. E.g. Discontinued watering of parks, athletic fields, or golf courses
Mobile water treatment facility ("for meeting non-discretionary water demands (e.g., sanitation, health, and safety requirements))".	Increasing rates or introducing drought surcharge fees on secondary water.
Meet more frequently with habitat advisory group as drought levels increase.	Reduce washing of vehicles.
Rely on ASR (Aquifer Storage and Recovery) banked water.	Golf course superintendents' voluntary program. Develop group before drought and set voluntary irrigation limits.
Utilize wells more in drought for indoor water needs.	Reduce secondary water use.

Brainstorm: Response Actions

Brainstorm: Drought Response Actions

Identify Potential Drought Response Actions

- Initial Drought Response Actions list split up by type:
  - Initial list for District
  - Initial list for Retail Customers
- Task Force brainstorming goals:
  - Generate additional Drought Response Actions ideas
    - (No idea is a bad one!)
  - Discuss applicability of drought levels
  - Approach to help MA's develop response actions

Drought Response Actions: District Action Focused

Drought Response Action / Drought Level	0 Normal	1 Moderate	2 Severe	3 Extreme	4 Critical
Reduced delivery: (e.g. contract amount plus 20%)		X	X	X	X
Rely on ASR (Aquifer Storage and Recovery) banked water		X	X	X	X
Obtain additional water from other water suppliers				X	X
Interim water recycling				X	X
Implement short term transfer agreements between District and water right owners (aka fallowing agreements setup before drought)					X
Drought Task Force meetings	X	X	X	X	X
Public Web Dashboard	X	X	X	X	X
More frequent meeting with the Great Salt Lake Advisory Council and/or the Utah Lake Commission	X	X	X	X	X
Slow the Flow (water conservation educational materials and campaigns	X	X	X	X	X

What would you add to the District's Drought Response Actions List?

a. Work with local media outlets and use social media to get the message out on water curtailment.

Level 1-2 Drought Response Actions: Retail Customer Focused

Drought Response Action / Drought Level	0 Normal	1 Moderate	2 Severe	3 Extreme	4 Critical
Customer leak detection using AMI and billing software		X	X	X	X
Golf course superintendents' voluntary program. Set voluntary irrigation limits		X	X		
Watering rotations: Watering on even/odd days, or limit days of the week watering can take place			X		
Reduce washing of vehicles			X	X	
"Drought Drive-Thrus" Customers pick up pre-made water wise conservation kits			X	X	X
Increasing rates, drought surcharges			X	X	X

“Drought Drive-Thrus” Water Wise Conservation Kits

Example from Ogden City

What would you add to Drought Response Actions that initiate at Level 1-2?

Level 3-4 Drought Response Actions: Retail Customer Focused

Response Action / Drought Level	0 Normal	1 Moderate	2 Severe	3 Extreme	4 Critical
No residential or commercial lawn watering (trees and gardens yes)				X	X
Use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss due to splashing				X	
Golf course - watering greens and tees allowed by permit; no watering of roughs and fairways				X	
Repair mandate: Incentivize timely repair for customer leaks				X	X
No watering of parks, athletic fields, or golf courses					X
No water use for purpose of refilling private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds					X
Vehicle washing prohibited unless at a certified carwash					X
Prohibitions for approval during the development process of new service connections					X

What would you add to Drought Response Actions that initiate at Levels 3-4?

Are there any additional Drought Response Actions that should be considered?

Next Steps

Next Steps

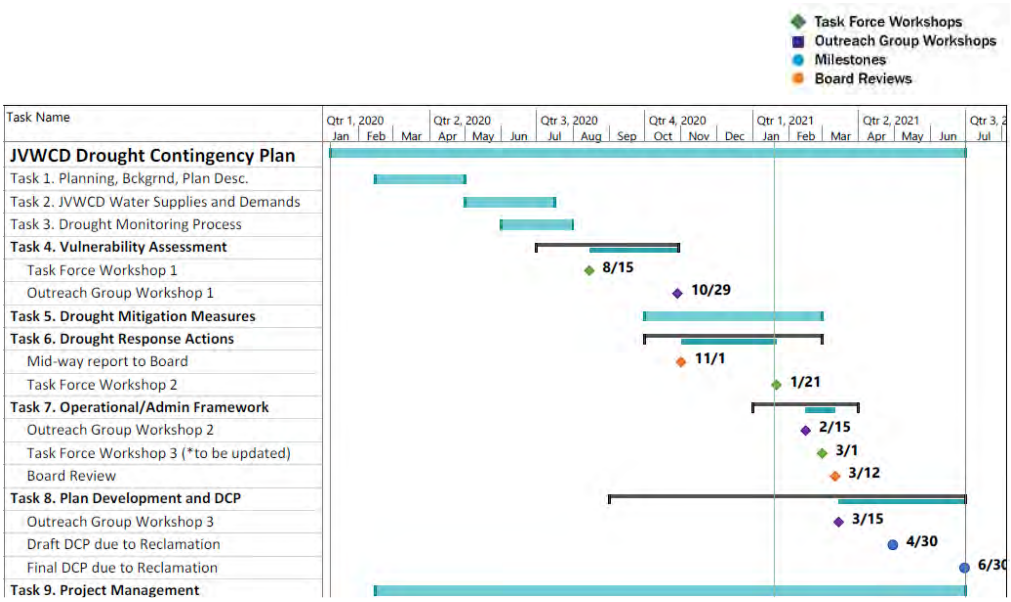
Development of Drought Mitigation Measures and Response Actions DCP sections

Organizational framework development

Outreach Group Workshop February 2021

Next Task Force Workshop March 2021

**Have further comments on response actions? Please provide comments by Jan. 28th



Thank you!

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- Slide 38 “Drought Drive Thru” kits” image of drive thru kits from Ogden City https://www.ogdencity.com/516/Free-Soil-Moisture-Meter-Indoor-Conserva

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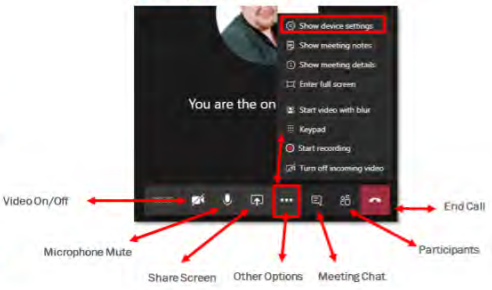

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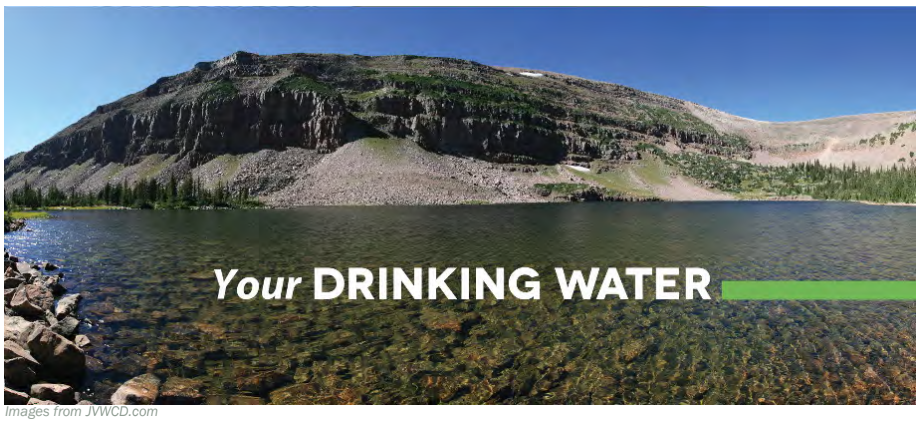
Jordan Valley Water Conservancy District

District Drought Contingency Plan Outreach Group Meeting #2

March 18, 2021



Images from JVWCD.com

Meeting Objectives

- Project progress update
- Gather feedback on the selected Mitigation Measures
- Gather feedback on the selected JVWCD response actions
- Request development of Member Agency response actions

Meeting Topics

1. Project Status
2. Approach to Drought Mitigation Measures
3. Drought Mitigation Measures Shortlist
4. Approach to Drought Response Actions
5. Drought Response Actions Discussion
6. Next Steps

Outreach Group Members:

Please respond in the MS Teams chat:
Name, role with your organization, favorite body of water? [icebreaker question]

Name	Organization
Keith Ludwig	City of Midvale
Mark Reid	City of Bluffdale
Brien Maxfield	Draper City
Justun Edwards	Herriman City
Duane Green	Riverton City
Tim Heyrend	City of West Jordan
Dennis Pay	City of South Salt Lake
Clint Dilley	Magna Water District
Dan McDougal	Taylorsville-Bennion Improvement District
Ryan Johnson	White City Water Improvement District
Jason Helm	Granger-Hunter Improvement District
Jerry Nielson	WaterPro/Draper Irrigation
Jared Carling	Hexcel Corporation
Alex Nicolaidis	Willow Creek Country Club

Task Force Members:

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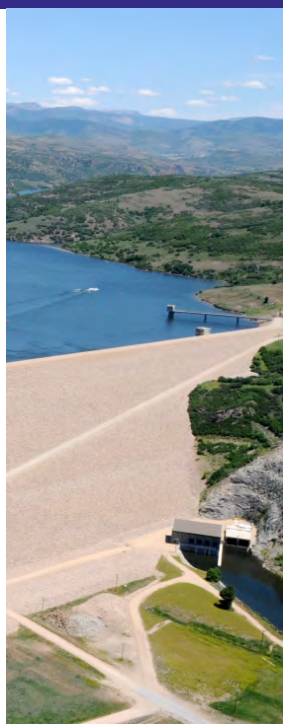
Project Team

Jordan Valley Water Conservancy District:

- Alan Packard
- Travis Christensen
- Bart Forsyth
- Shane Swensen
- Linda Townes Cook
- Matt Olsen
- Jessica Morgan

Brown and Caldwell:

- Jacob Young
- Tess Sprague
- Adam Jones
- Tiffany Tran
- Melanie Holton



Please respond in the MS Teams chat:
Name, role with your organization, favorite body of water?
[icebreaker question]

Project Status

Project Status

Interim milestones completed:

- 8-26-2020: Task Force Workshop 1 (input received and integrated into DCP contents)
- 10-9-2020: Drought monitoring first draft developed (levels, metrics, and triggers developed)
- 10-9-2020 Vulnerability assessment conducted and first draft developed (risk factors, likelihood, consequence, and impacts by sector developed)
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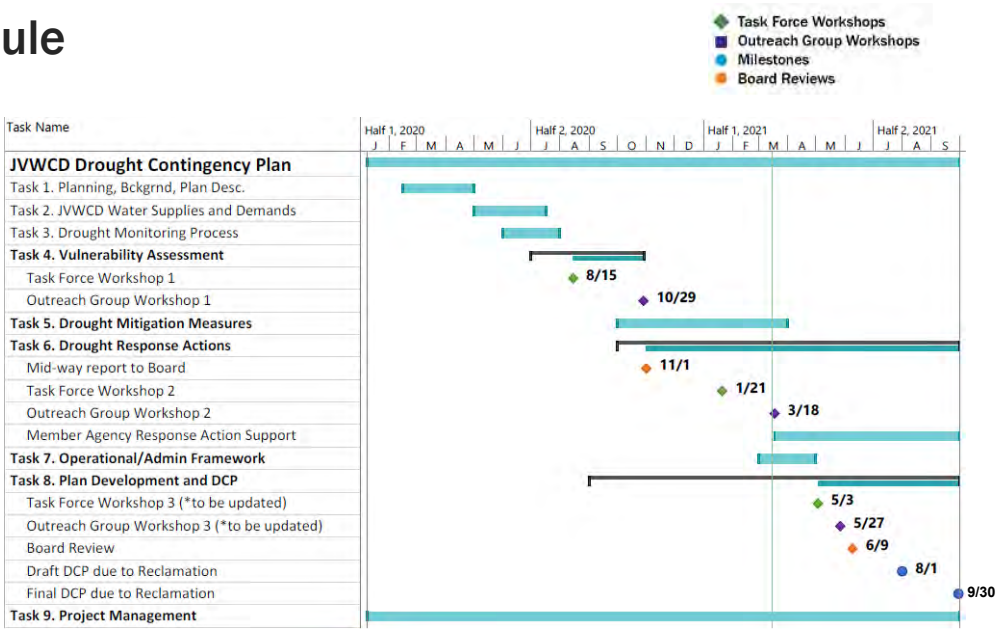
- 11-2020 to 12-2020: Analysis and updates for mitigation measures and response actions
- 1-21-2021: Task Force Workshop 2 (input and refinements for drought mitigation measures and response actions)

Today's Focus: Steps 4 and 5 of the DCP process

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
Mitigation Measures	• Identify, evaluate and prioritize actions and activities that will build **long-term** water supply resiliency and mitigate risks
Response Actions	• Identify, evaluate and prioritize actions and activities that can be implemented in a drought and triggered during different stages of drought to provide **quick benefits**
Operational and Administrative Framework	• **Determine local responsibility** for undertaking the actions necessary to implement the DCP.
Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

Schedule



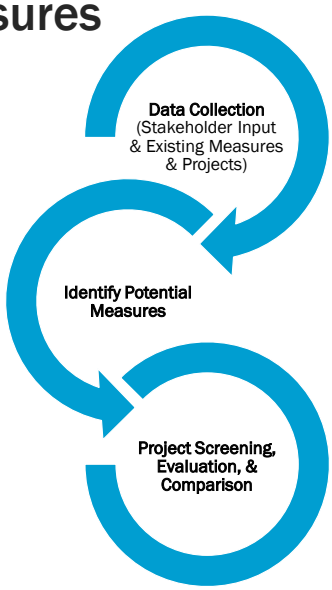
Approach to Drought Mitigation Measures

Approach to Drought Mitigation Measures

Definition: Preemptive actions put in place before drought to reduce risk and impacts of drought

Approach:

- Data Collection
- Measure Identification
- Screening, Evaluation & Comparison



Approach to Drought Mitigation Measures

Data collection

Measures developed and considered within DCP based on:

- **Vulnerability Assessment:**
  - Risk results indicate the supplies on which drought mitigation measures should focus
- **Input from Task Force and Outreach Group:**
  - Input for risk factors & sector impacts help identify areas of focus for developing drought mitigation measures
- **Current projects and examples:**
  - Input from existing plans and studies

Summary of Key Risks from Vulnerability Assessment

Most vulnerable supply sources include:

- Central Utah Project
- Provo Reservoir Water User's Company Shares
- High Quality Groundwater

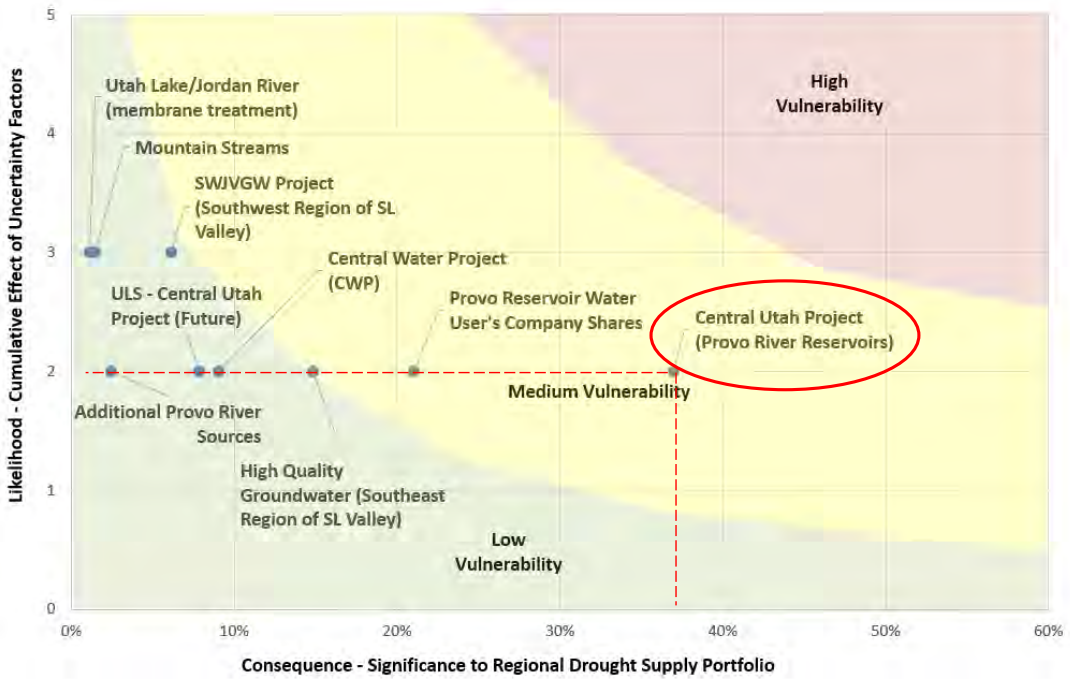
Higher likelihood risk factors:

- Climate Change
- Asset/Facility Susceptibility to Disruption
- Source Water Quality Degradation

Notable sector impacts:

- Supply limitations due to in-stream flow requirements
- Early runoff pattern
- Increased occurrence of algal blooms and algae by-products

Vulnerability Assessment: Risk Matrix Results



Task Force & Outreach Group Workshops Summary

Task Force 1
- Review of DCP purpose and goals
- Review drought monitoring levels
- Review Vulnerability Assessment approach
- Collect input on vulnerability of sources
- Collect Input on DCP draft sections:
  - Water System Overview
  - Drought Monitoring
  - Vulnerability assessment

Outreach Group 1
- Review of DCP purpose and goals
- Review drought monitoring levels
- Collect input on vulnerability sources
- Brainstorm Drought Mitigation Measures
- Brainstorm Drought Response Actions
- Collect Input on DCP draft sections:
  - Water System Overview
  - Drought monitoring
  - Vulnerability assessment

Task Force 2
- Detailed analysis of Drought Mitigation Measures initial list
- Review Drought Response Actions initial list

Input from Task Force Workshop #1 (word cloud)

Input from Outreach Group Workshop #1

Drought Mitigation Measures Evaluation Criteria

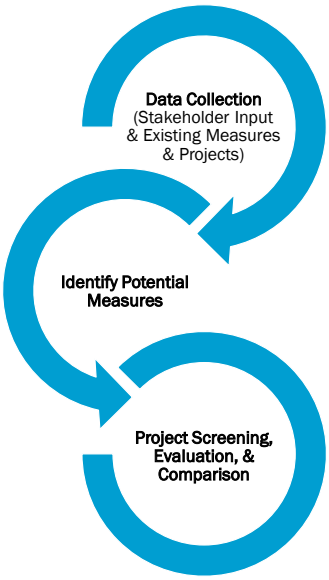
Criterion	Weight	Score = 1	Score = 2	Score = 3
1. Project yield (AFY)/Availability	20%	Yield is < 1,000 AFY	Yield is between 1,000 and 5,000 AFY	Yield > 5,000 AFY
2. Project timing (concept, feasibility, design, construction)	15%	Implementation in > 10 years	Implementation in 5 to 10 years	Implementation in 0 to 5 years
3. Regional benefit to drought mitigation/resiliency	20%	No	For JVWCD and its MAs.	For JVWCD and its MAs, and other peer-agencies.
4. Institutional considerations (stakeholder support, technical complexity, regulatory, reliance on other projects)	15%	Complex project/ significant stakeholder considerations	Moderate project complexity/ some stakeholder considerations	Relatively simple project/broad stakeholder support
5. Other ancillary benefits realized outside of drought response periods (environmental, recreational, social)	10%	None	Localized benefit	Regional benefit
6. Funding sources - are there matching funds available to fund the project	10%	No	State or Federal Loan Programs, Shared cost with partner agencies	Grants (including Water Smart)/Funding in place
7. Addresses multiple vulnerabilities	10%	Addresses one vulnerability for one source	Addresses one vulnerability for two separate sources; or Addresses more than one vulnerability for one source	Addresses one vulnerability for more than two separate sources; or Addresses multiple vulnerabilities for multiple sources

Drought Mitigation Measures Shortlist

Drought Mitigation Measures

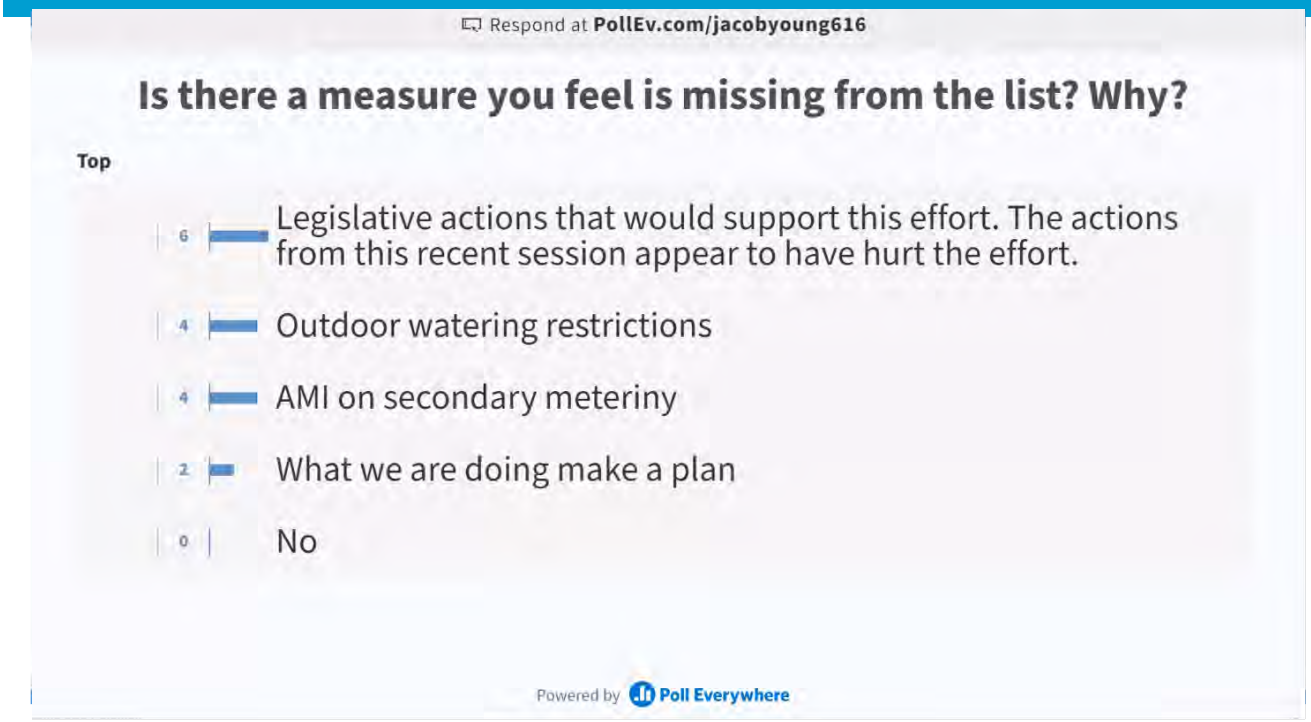
Process for Shortlist

- Review highest ranked mitigation measures
- Interactive ranking activity
- Polling and discussion on top/bottom ranked measures



Drought Mitigation Measures Shortlist

Mitigation Measure Number	Mitigation Measure Name	Weighted Total
Cons&DM-03	Secondary Water Metering	2.35
Cons&DM-04	AMI - automated metering infrastructure for JVWCD & MA's (to enable real-time information sharing and increased user awareness) Develop AMI analytics for customer leak detection and watering schedule monitoring	2.5
Cons&DM-06	Rebate Programs. Includes: Flip Your Strip (park strip replacement and incentive program); Localscapes Rewards (water-efficient landscaping incentive program for homeowners, designers, contractors, and homebuilders); Toilet Rebates; Smart Controller Rebates	2.35
Cons&DM-10	Landscape Leadership Grant Program (specific to CII landscapes)	2.2
Cons&DM-11	Member Agency Grant Program (multiple funding tiers)	2.25
GWMgnt-02	JVWCD Aquifer Storage & Recovery (ASR) operational expansions (sources include: Provo River and treated finished water)	2.4
NewSup-03	Develop high quality groundwater wells (e.g. Etienne Way, Murray Holliday Road, etc.)	2.2
NewSup-08	Begin taking delivery of ULS supply by 2030 or earlier if needed (16,400 AF)	2.25
Agr&Reg-02	Wholesale water purchase agreements and retail water service agreements revisions to include drought contingency provisions	2.25
Agr&Reg-07	Evaluate the effectiveness of conservation-oriented rate structures throughout the service area. Update rate structures to promote further conservation (JVWCD service area includes MA's)	2.15
Stor-01	Evaluate storage for secondary irrigation systems to leverage availability of high quality Provo River spring runoff	2.15
WSPro&Mngt-03	Work with stakeholders on stormwater planning projects and enforcement of best management practices in the watershed. Includes collaboration with local partners and stakeholders to improve water quality and reduce algal bloom events for Utah Lake	2.35



Approach to Drought Response Actions

Existing Draft Drought Levels & Triggering Criteria

Example of triggering criteria for drought levels: When reached, these could trigger response actions to reduce impact.

			Triggering Criteria Applied to Drought Levels		
Drought Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
Level 0	Blue	Normal	at least 95% supply availability	at least an 80% supply allocation	3 yr. average diversions less than safe yield
Level 1	Yellow	Moderate	at least a 95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 yr. average exceeds safe yield
Level 2	Orange	Severe	at least 90-95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 16,000 AF, or 3 yr. average exceeds safe yield
Level 3	Dark Orange	Extreme	at least 90-95% supply availability	<75% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield
Level 4	Red	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield

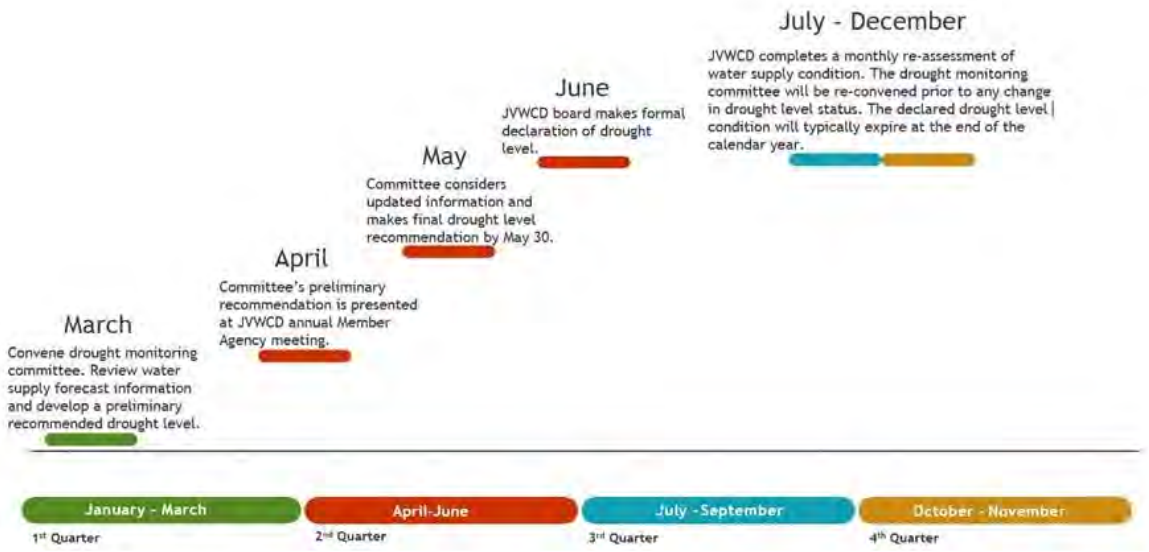
Contract Amount Impacts by Drought Level

Drought Level	Advisory Code	Water Shortage Description	Impacts to Contract Amounts
Level 0	Blue	Normal	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	Yellow	Moderate	wholesale minimum contract amounts plus 20%, but will likely be unable to provide any deliveries beyond the minimum contract amount plus 20%
Level 2	Orange	Severe	wholesale minimum contract amounts plus modest amounts (5 – 10%) beyond minimum contract amounts
Level 3	Dark Orange	Extreme	adequate supplies to provide for restricted retail customer needs, and wholesale deliveries restricted to minimum contract amounts
Level 4	Red	Critical/Exceptional	adequate supplies to support essential needs of its retail and wholesale customers, unable to deliver wholesale minimum contract purchase amounts

Revise Drought Level Impacts

Drought Level	Advisory Code	Water Shortage Description	Impacts to Contract Amounts
Level 0	Blue	Normal	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	Yellow	Moderate	5% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120% of wholesale contract amounts
Level 2	Orange	Severe	10% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110% of wholesale contract amounts.
Level 3	Dark Orange	Extreme	20% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts.
Level 4	Red	Critical/Exceptional	30% reduction in typical use for wholesale member agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e. 90%, 85%, etc.) at the time that this level of drought is established.

Drought Committee Timeline
(process to confirm drought levels)

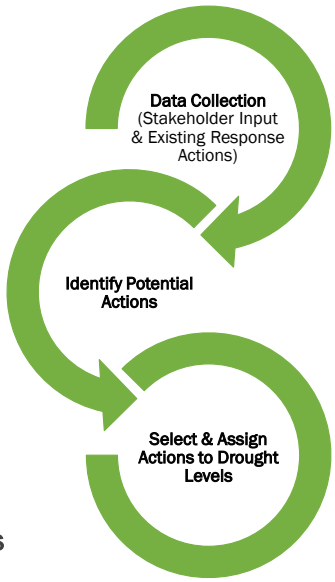


Approach to Drought Response Actions

Definition: Reactive actions enacted during drought to decrease the severity of immediate drought impacts. Drought Response Actions are tied to specific drought stages.

Approach:

- Data Collection: Consider established drought levels, metrics, and triggers as well as Task Force & Outreach Group input
- Identify Potential Drought Response Actions: Consider by specific levels & triggers
- Select & Assign Actions
  - Note: Goal to have agreed upon Drought Response Actions for JVWCD retail customers. Member Agencies operate within contract limits and have option to follow JVWCD retail Drought Response Actions if applicable.



Summary from Past Examples

Supply Management	Demand Management
Adjusting water purchase contracts based on drought levels	Media and educational campaigns to promote voluntary reductions in use of water.
Develop parallel structure for retail service areas.	Outdoor landscaping restrictions.
Shorten irrigation season.	Residential water use restrictions.
Implement short term transfer agreements between District and water right owners (aka fallowing agreements setup before drought).	Enhanced Water Loss program.
Obtain additional water from other water suppliers.	Building moratorium.
Interim water recycling.	Municipal and commercial water use restrictions. E.g. Discontinued watering of parks, athletic fields, or golf courses
Mobile water treatment facility ("for meeting non-discretionary water demands (e.g., sanitation, health, and safety requirements))".	Increasing rates or introducing drought surcharge fees on secondary water.
Meet more frequently with habitat advisory group as drought levels increase.	Reduce washing of vehicles.
Rely on ASR (Aquifer Storage and Recovery) banked water.	Golf course superintendents' voluntary program. Develop group before drought and set voluntary irrigation limits.
Utilize wells more in drought for indoor water needs.	Reduce secondary water use.

Outreach Group - Brainstorm of Response Actions

"Billing Rate adjustments" Jessica

"Smart controllers" DSlaugh

"Water budget plan requirements" Jessica

"Subsidies for the purchase of smart controllers" Eric Ellis - ULC

"Community Contests for Water Conservation...get's people thinking about it and potentially drives some innovation" Eric Ellis - ULC

"Outdoor use restrictions"

"Public education" Linda

"Irrigation reminders from a municipal source; weekly suggestions for frequency and duration" Eric Ellis - ULC

"Water waste restrictions" Jessica

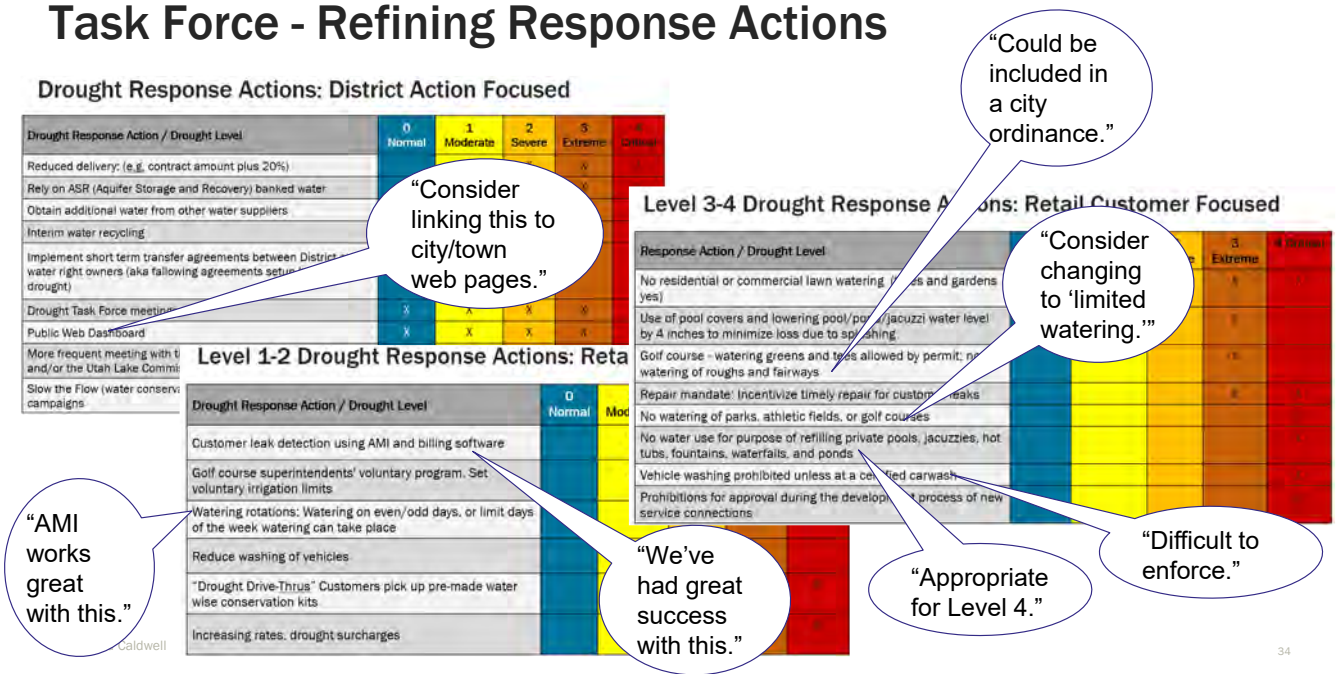
"AMI with customer engagement portal for usage" Dan Woodbury

"outdoor restrictions" Brien Maxfield

"Test" Linda

"Sprinkler schedules" Jessica

Task Force - Refining Response Actions



Drought Response Actions Shortlist

Drought Response Actions: Level 0

- Conservation Garden Park classes and events
- Slow the Flow (Provide water conservation educational material and campaigns)
- Meet with Great Salt Lake Advisory Council and/or the Utah Lake Commission as drought levels increase
- Customer leak detection using AMI and billing software (encourage customer account creation)
- Annual Drought Committee meetings. Drought Committee meeting during drought

Note: Level 0 activities will continue throughout all drought levels

Drought Response Actions: Level 1

- Required reduction: wholesale minimum contract amounts plus 20%
- Golf course superintendents' voluntary program. Develop before drought and set voluntary irrigation limits
- Notify public of diminished water supply and request **voluntary** rationing of water as applicable for drought level
- Conservation education material distribution

Note: Level 0 activities will continue throughout all drought levels

Drought Response Actions [mini-discussion]

- Which response actions do you think would be difficult to enforce?
- Which response actions do you have questions about?
- Which response actions do you have experience with?
- Which response actions are you hesitant to implement?

Drought Response Actions: Level 2

- Required reduction: wholesale minimum contract amounts plus modest amounts (5 – 10%) beyond minimum contract amounts
- Customer leak detection using AMI and billing software
- Activate drought level 2 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, etc.)
- Residential and commercial lawn water restricted to even/odd days (enhanced notification process)
- Notify public of diminished water supply and request **voluntary** rationing of water (at least 10%)
- Rely on ASR (Aquifer Storage and Recovery) banked water
- "Drought Drive-Thru" Customers pick up pre-made water wise conservation kits

***Light green indicates new drought response actions occurring at this level**

Drought Response Actions [mini-discussion]

- Which response actions do you think would be difficult to enforce?
- Which response actions do you have questions about?
- Which response actions do you have experience with?
- Which response actions are you hesitant to implement?

Drought Response Actions: Level 3

- Required reduction: Wholesale deliveries restricted to minimum contract amounts
- Incentivize timely repair (or penalize untimely repair) for customer leaks
- Customer leak detection using AMI and billing software
- Rely on ASR (Aquifer Storage and Recovery) banked water
- "Drought Drive-Thru" Customers pick up pre-made water wise conservation kits
- Notify public of diminished water supply and request **voluntary** rationing of water (at least 20% with increase of tier 4 rate)
- Residential or commercial lawn watering limited to certain days based on a schedule developed by JVWCD
- Use of pool covers and lowering pool/pond/jacuzzi water level by 4 inches to minimize loss due to splashing
- Activate drought level 3 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, etc.)

Drought Response Actions [mini-discussion]

- Which response actions do you think would be difficult to enforce?
- Which response actions do you have questions about?
- Which response actions do you have experience with?
- Which response actions are you hesitant to implement?

Drought Response Actions: Level 4

- Required reduction: Unable to deliver wholesale minimum contract purchase amounts (percentage reduction variable depending upon drought severity)
- Incentivize timely repair (or penalize untimely repair) for customer leaks
- Customer leak detection using AMI and billing software
- Rely on ASR (Aquifer Storage and Recovery) banked water
- "Drought Drive-Thrus" Customers pick up pre-made water wise conservation kits
- Notify public of diminished water supply and request **voluntary** rationing of water (at least 30-50% with increase of tiers 2, 3, and 4 rate depending upon drought severity)
- Residential or commercial lawn watering limited to certain days based on a schedule set forth by JVWCD
- No water use for purpose of refilling private pools, jacuzzies, hot tubs, fountains, waterfalls, and ponds
- Activate drought level 4 water delivery reductions stipulated in large water users' service agreements (e.g. golf courses, car washes, data centers, etc.)

Drought Response Actions [mini-discussion]

- Which response actions do you think would be difficult to enforce?
- Which response actions do you have questions about?
- Which response actions do you have experience with?
- Which response actions are you hesitant to implement?

Residential and Commercial Lawn Watering

Drought Level 3 Example

Month	Interval
April	Thursday
May	Monday/Friday
June	Monday/Wednesday/Friday
July	Monday/Wednesday/Friday
August	Monday/Wednesday/Friday
October	Thursday

Drought Level 4 Example

Month	Interval
April	Thursday
May	Monday/Friday
June	Monday/Friday
July	Monday/Friday
August	Monday/Friday
October	Thursday

***Intervals determined by Drought Task Force Committee**

Residential and Commercial Lawn Watering

Alternative example visual (simple check/box table view):

Month	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
April					X		
May		X				X	
June		X		X		X	
July		X		X		X	
August		X		X		X	
October					X		

“Drought Drive-Thrus” Water Wise Conservation Kits

Example from Ogden City

Drought Response Actions Discussion

Implementing Drought Response Actions

All Member Agencies will have required reductions at each drought level

Drought Level	Impacts to Contract Amounts
Level 0	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	minimum contract amounts plus 20%
Level 2	minimum contract amounts plus (5 – 10%)
Level 3	minimum contract amounts
Level 4	unable to deliver wholesale minimum contract purchase amounts

Response actions "bridge" the gap during water shortages

Implementing Drought Response Actions

- Goal: Within the next six months, Member Agencies to develop response actions
- Member Agency Drought Response Planning Tool developed
- Review approach…

Drought Response Actions Discussion

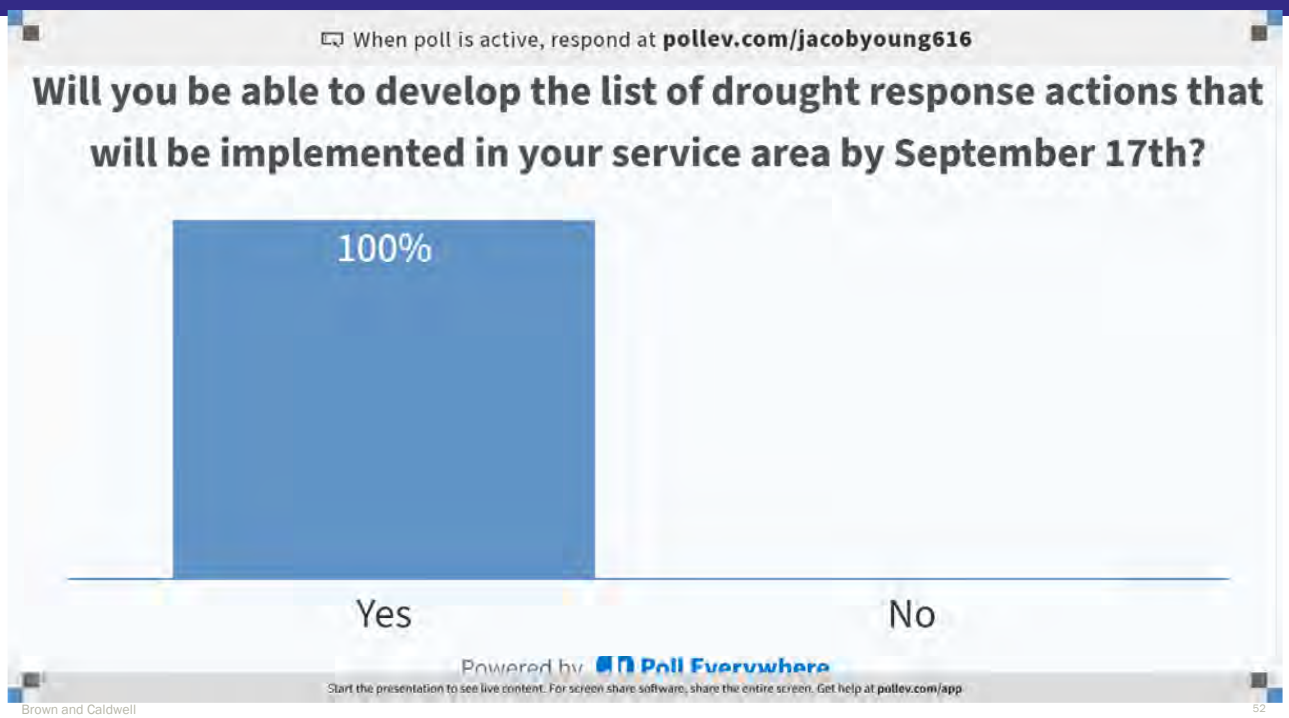
Approach:

Requesting each Member Agency to identify potential response actions using excel tool via the following steps

Step 1: Validate water use data

Step 2: Identify drought response actions

Step 3: Estimate savings



When poll is active, respond at **pollev.com/jacobyoung616**

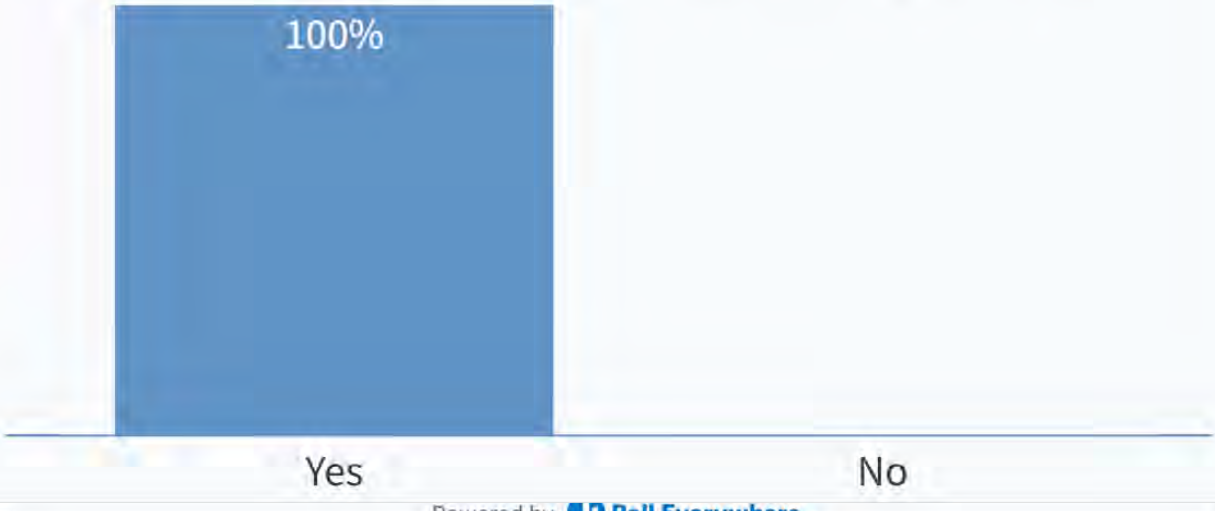
Will this tool be helpful in selecting and/or prioritizing your response actions?

Powered by Poll Everywhere

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

When poll is active, respond at **pollev.com/jacobyoung616**

Will you use this tool to select response actions?



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Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

Would would keep you from using this tool to select response actions?

Top

2	Will you give us a contact if we have questions
0	Will data for other reference years be available?
0	Tool would be more helpful if it provided some reasonable expectations on each example response as a guidance, i.e. other system results or studies documenting...
0	Will you please attach the drought stage declarations when you are sending out the tool as a reference

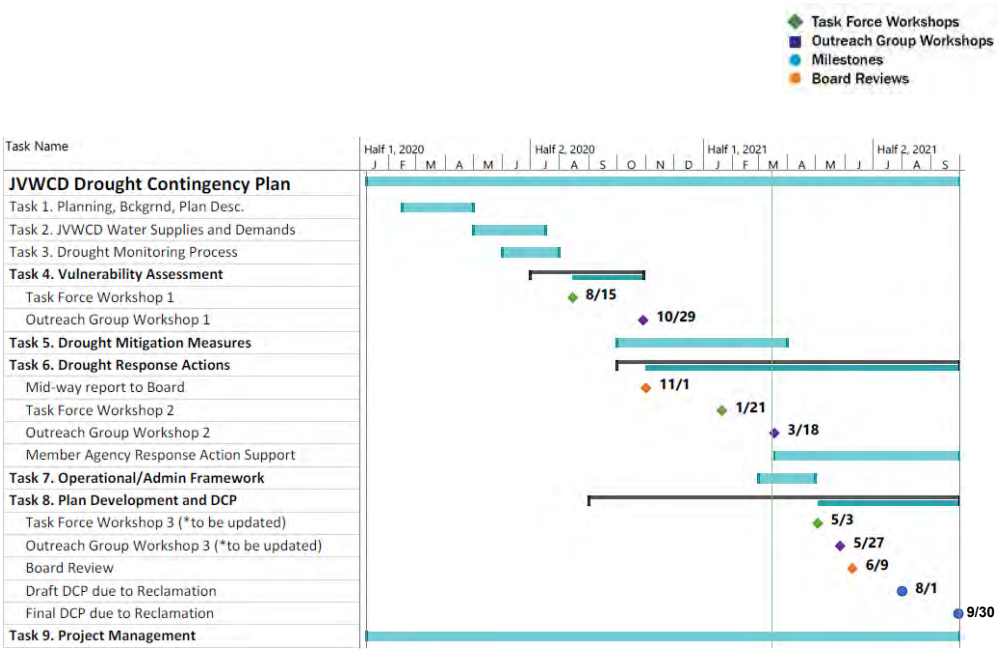
Next Steps

Next Steps

Development of Drought Mitigation Measures and Response Actions DCP sections

Organizational framework development

Task Force and Outreach Group Workshops (#3)



Thank you!

it's about connecting

Brown AND Caldwell essential ingredients®

Photo credits

- Slide 6: image from 2016 Water Quality Report https://jvwcd.org/file/9899a865-ce3a-4fe8-905e-f452b3e136b0/WQR2016.pdf
- Slide 10: image from 2019 Water Quality Report https://jvwcd.org/file/32b72455-26ff-434e-8113-cd94d65af2fe/WQR2019-FINAL.pdf
- Slide 30 Drought Monitoring: image of Jordanelle Reservoir from 2017 Water Quality Report https://jvwcd.org/file/e415758a-45c5-41cc-b876-98d6f60ee4b3/water-quality-report-2017-web.pdf
- Slide 47 Implementing Drought Response Actions https://www.flickr.com/photos/relajateconana/37459522664/in/photostream/

Pre-Workshop MS Teams Support

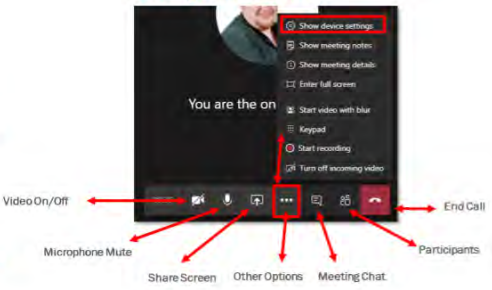
Part 1

Summarized tips and control taskbar

1. Use video (particularly when presenting or engaging in discussion), if possible
2. Use your computer microphone and speakers for audio (not your phone) if possible, and mute when not speaking to limit disruptive background noise

   If participating by phone, press: *6 to mute/unmute, or *1 for more options
3. Use the meeting chat to "raise your hand" if you'd like to speak
4. If experiencing bandwidth issues, turn off video camera and incoming video (access the latter via "..." in meeting control taskbar)

Meeting control taskbar



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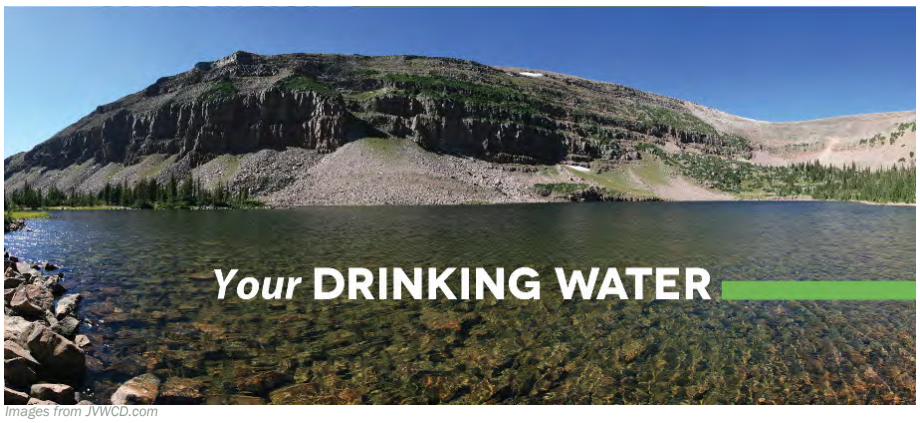
Jordan Valley Water Conservancy District

District Drought Contingency Plan Task Force Meeting #3

May 27, 2021



Images from JVWCD.com

Meeting Topics

1. Objectives
2. Project Status
3. Approach to Operational and Administrative Framework
   - Implementation
   - DCP Update Process
5. Next Steps

Meeting Objectives

- Project progress update
- Background for Operational and Administrative Framework
- Collect Task Force input & ideas on:
  - Implementation
  - DCP Update Process
- Discuss next steps

Task Force Members: Welcome back!

Ice Breaker: What's your first real vacation you're planning to take? (or have taken)

Interests	Name	Organization	Position/Role
M&I	Alan Packard	Jordan Valley Water Conservancy District	Assistant General Manger & Chief Engineer
M&I	Travis Christensen	Jordan Valley Water Conservancy District	Registered Staff Engineer & DCP Project Manager
M&I (City Perspective)	Jason Rasmussen	South Jordan City	South Jordan City Public Works Director
M&I (Improvement District Perspective)	Greg Anderson	Kearns Improvement District	KID Public Works Director
M&I (Secondary Water Provider Perspective)	David Gardener	WaterPro/Draper Irrigation	Assistant General Manager
M&I and Agricultural	Laura Haskell	State Division of Water Resources	Jordan River Specialist & State Drought Coordinator
Agricultural & Water Rights	John Larsen	Utah Lake Water Users Association & Utah Division of Water Rights	Utah Lake and Jordan River Distribution System Commissioner
Environmental & Recreational	Eric Ellis	Utah Lake Commission	Executive Director
Environmental & Recreational	Soren Simonsen	Jordan River Commission	Executive Director
Environmental & Industrial	Laura Vernon	State Division of Forestry, Fire, and State Lands	Sovereign Lands Planner/ Coordinator

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- 1-21-2021: Task Force Workshop 2 (input and refinements for drought mitigation measures and response actions)
- 3-18-2021: Outreach Group Workshop 2 (input received on mitigation measures and response actions lists, Member Agency response actions discussion)

Project Status

Update on Member Agency Response Action discussion:

All Member Agencies will have required reductions at each drought level

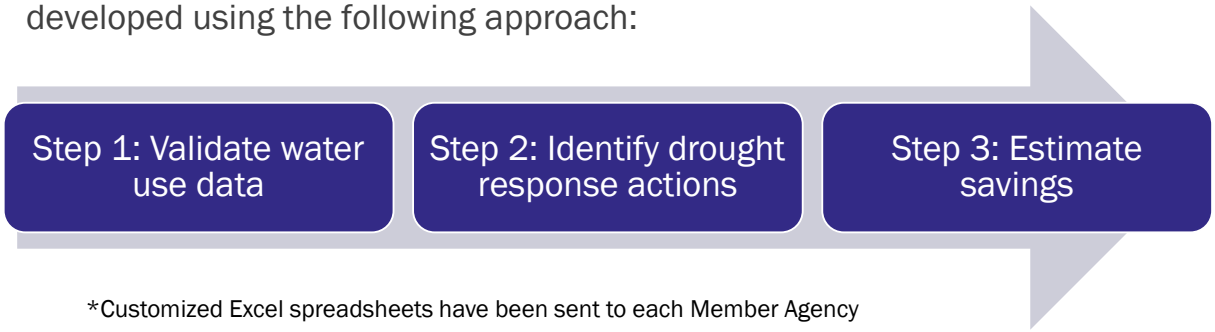
Drought Level	Impacts to Contract Amounts
Level 0	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	5% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120% of wholesale contract amounts
Level 2	10% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110% of wholesale contract amounts
Level 3	20% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts
Level 4	30% reduction in typical use for wholesale member agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e. 90%, 85%, etc.) at the time that this level of drought is established.

Response actions "bridge" the gap during water shortages

Project Status

Update on Member Agency Response Action discussion:

- Goal: By September 2021, Member Agencies to develop response actions
- Member Agency Drought Response Planning Tool (Excel spreadsheet*) developed using the following approach:



*Customized Excel spreadsheets have been sent to each Member Agency

Today's Focus: Steps 6 and 7 of the DCP process

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
Mitigation Measures	• Identify, evaluate and prioritize actions and activities that will build **long-term** water supply resiliency and mitigate risks
Response Actions	• Identify, evaluate and prioritize actions and activities that can be implemented in a drought and triggered during different stages of drought to provide **quick benefits**
Operational and Administrative Framework	• **Determine local responsibility** for undertaking the actions necessary to implement the DCP.
Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

Approach to Operational and Administrative Framework

Approach to Operational and Administrative Framework

Definition: defines the responsibilities, the critical tasks and procedures, and the person or group that will perform or oversee the identified tasks

This applies to the following main components:

- Implementation of drought monitoring, mitigation measures, and response actions
- DCP Update Process

Approach to Operational and Administrative Framework

Drought Monitoring Implementation		
Person or Workgroup	Responsibilities	Critical Tasks and Procedures
JVWCD Assistant General Managers (Chief Engineer and Operations/Maintenance)	Monitor snowpack, stream flow forecast, reservoir storage conditions, and Salt Lake Valley deep principle aquifer groundwater levels.	Prepare a monthly report which documents the applicable parameters and compares these parameters to historical period average, dry, and wet years.
Drought Monitoring Committee [a]	Review water supply forecast data and recommend drought severity level in accordance with triggering criteria.	Meet as a committee at least once each spring to review data, drought level criteria, and develop a recommendation to be presented by the JVWCD committee member at the JVWCD annual member agency meeting. Each member agency will have one voting member of the committee and JVWCD will have one voting member of the committee. The committee will re-convene as necessary to re-evaluate any potential changes to an established drought level.
JVWCD General Manger	Report applicable information to the JVWCD Board of Trustees and recommend applicable policy changes that require approval by Board of Trustees.	Provide a monthly water supply report to JVWCD Board of Trustees based on report from Assistant General Manager. Provide guidance to JVWCD staff regarding potential policy changes associated with the DCP.
JVWCD Board of Trustees	Provide governing oversight of JVWCD organization and all its operation.	As part of the regular monthly meeting, receive reports on current water supply conditions. Consider and establish the drought severity level based on Drought Monitoring Committee recommendations, and supplemental information from JVWCD General Manager.
Note: a) The Drought Monitoring Committee will consist of one voting member representative from each JVWCD wholesale member agency, and one voting member from JVWCD (Assistant General Manager/Chief Engineer). Other applicable JVWCD staff may serve as non-voting members of the committee. Other interested parties may participate as advisory non-voting members of the committee.		

Approach to Operational and Administrative Framework

Drought Mitigation Measure Implementation		
Person or Workgroup	Responsibilities	Critical Tasks and Procedures
JVWCD Assistant General Managers (Chief Engineer, Operations/Maintenance, and Communications/Technology)	Incorporate drought mitigation measures into the JVWCD 10-year capital plan and other associated planning documents. Develop and modify mitigation measures as conditions and regulations change. Oversee the JVWCD Department Managers implementation of drought mitigation measures.	Annually update the 10-year capital plan and other associated planning documents to include mitigation measures from the DCP. Actively work with JVWCD member agencies, peer agencies, and the public to promote mitigation measure implementation and compliance. Obtain mitigation funding assistance from local, state, and federal entities.
JVWCD Engineering Department Manager and Communications Department	Implement drought mitigation measures.	Manage and direct the implementation of selected drought mitigation measures.
JVWCD General Manger	Present or oversee the presentation of mitigation measures to the Board of Trustees.	Review selected drought mitigation measures with the Assistant General Managers and include them in the annual budget which is presented to the JVWCD Board of Trustees each year.
JVWCD Board of Trustees	Authorize implementation of drought mitigation measures.	Approve drought mitigation measures during the annual budget meeting. Approve the expenditure of funds and authorize drought mitigation projects as they are presented to the Board of Trustees throughout the year.

Approach to Operational and Administrative Framework

Drought Response Actions		
Person or Workgroup	Responsibilities	Critical Tasks and Procedures
JVWCD Operations Department Manager, Distribution System Division Manager, and Water Supply System Manager	Implement restrictions on water deliveries as set forth by the Drought Monitoring Committee and as approved by the JVWCD Board of Trustees.	Monitor overall water use trends in the retail service area and for each member agency. Ensure that contractual restrictions are not exceeded and communicate status with applicable member agency staff. Meet regularly with Assistant General Managers to provide updates and receive direction.
JVWCD Communications Department and Operations Meter Section	Implement drought response actions in the retail service area as approved by the JVWCD Board of Trustees.	Notify retail customers of drought conditions and make necessary adjustments to messaging, billing, and operational procedures to implement response actions. Meet regularly with Assistant General Managers to provide updates and receive direction.
JVWCD General Manager, Assistant General Manager (Communications/Technology), Public Information Manager, and Communications Department	Notify member agencies of drought status. Manage public drought messaging, media relations, press releases, website updates, and social media posts.	Coordinate drought messaging tactics and strategies. Review with JVWCD Board of Trustees as needed.
JVWCD General Manger	Present or direct presentation of drought response actions to the JVWCD Board of Trustees and manage overall effort.	Review needed response actions with the JVWCD Board of Trustees for approval prior to implementation.
JVWCD Board of Trustees	Consider approval of proposed response actions.	Review response actions recommended by the JVWCD General Manager. Approve implementation as needed.

Approach to Operational and Administrative Framework

DCP Update Process

- **Schedule:**
  - DCP will be updated at least every 5 years
  - Formal update of the DCP will generally require approximately 10-14 months
- **Responsible person/group:**
  - JVWCD Assistant General Manager/Chief Engineer
- **Content:** Relevant studies and conditions will be monitored and used to inform updates
  - May include: may include climate change, dendrochronology, new water supply projects, new water conservation projects, etc.

Approach to Operational and Administrative Framework

DCP Update Process

- Continued Outreach & Communication:
  - Task Force and Outreach Group to be organized by JVWCD
  - Assumed to have similar representation on the DCP update Task Force and Outreach Group as are serving on the original DCP

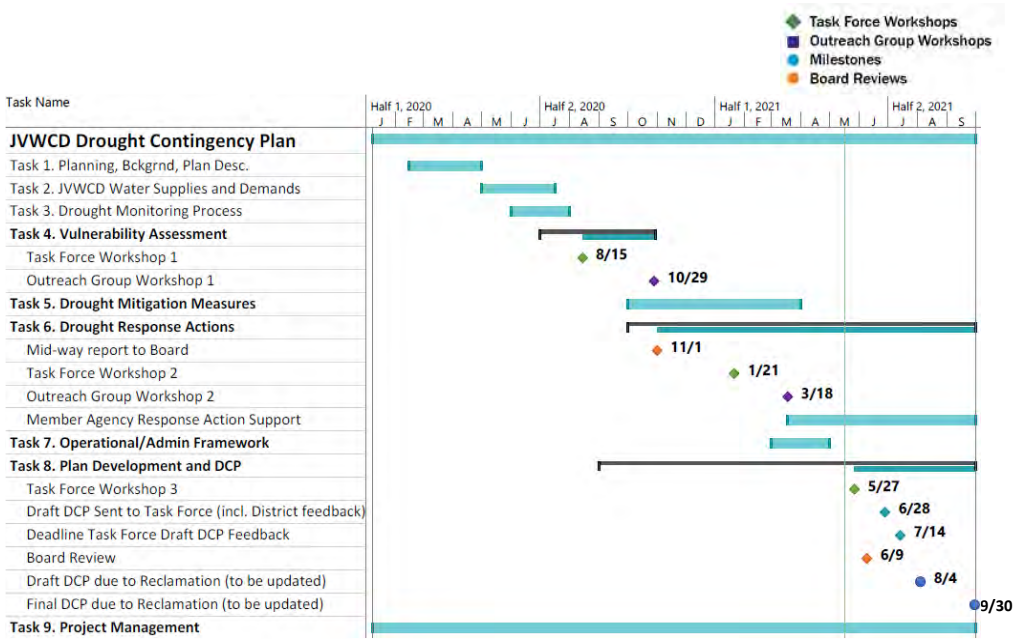
Next Steps

Next Steps

Finalize:
- Drought Mitigation Measures
- Response Actions
- Send to TF for input

Finalize:
- Draft Operational and Administrative Framework

****Comments on final Mitigation Measures and Response Actions sections deadline 7/14/2021**



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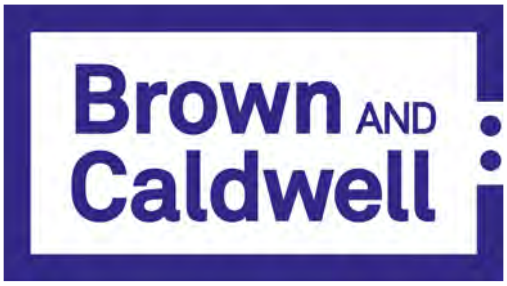
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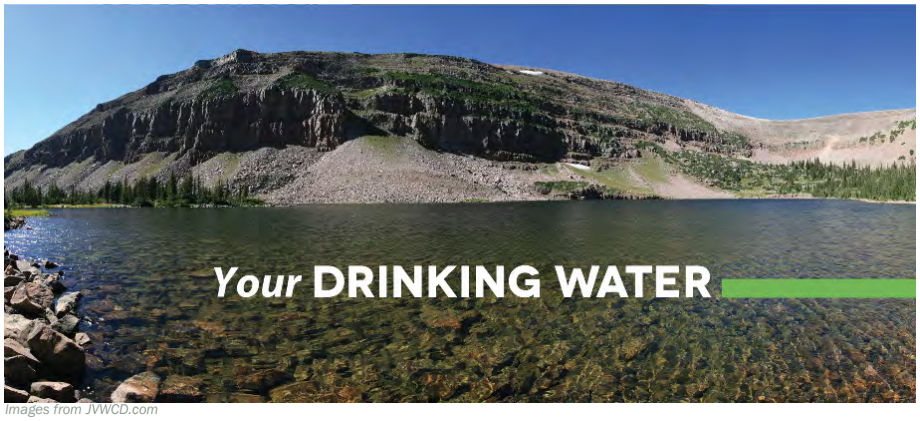
JVWCD Outreach Workshop

Report on Drought Contingency Plan

August 16, 2021



Images from JVWCD.com

DCP Development Team

Project Team	Task Force	Outreach Group
Jordan Valley Water Conservancy District	South Jordan	City of Midvale
Brown and Caldwell	Kearns Improvement District	City of Bluffdale
	WaterPro	Draper City
	State Division of Water Resources	Herriman City
	Utah Lake Water Users Association & Utah Division of Water Rights	Riverton City
	Utah Lake Commission	City of West Jordan
	Jordan River Commission	City of South Salt Lake
	State Division of Forestry, Fire, and State Lands	Magna Water District
		Taylorsville-Bennion Improvement District
		White City Water Improvement District
		Granger-Hunter Improvement District
		WaterPro/Draper Irrigation
		Hexcel Corporation
		Willow Creek Country Club

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Effective Drought Contingency Plan

Brown and Caldwell

The Six Elements of a DCP

Element	Purpose
Drought Monitoring	• Establish a **process for monitoring** water availability, and a **framework** for predicting the probability of future droughts or confirming an existing drought. • The collection, analysis, and dissemination of data to **define stages of drought**, mitigation and response actions.
Vulnerability Assessment	• Evaluate and assess the **risks and impacts of drought** and the contributing factors that could impact critical resources in the Plan area. • This supports development of potential mitigation and response actions.
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Plan Update Process	• Develop a process and schedule for monitoring, evaluating and updating the Plan.

Drought Monitoring: Triggering Criteria

			Triggering Criteria Applied to Water Supply Availability Levels*		
Water Supply Availability Level	Advisory Code	Water Shortage Description	CUWCD Supply Availability (Jordanelle storage of Central Utah Project)	PRWUA Supply Allocation (in the Provo River Project)	Salt Lake Valley Groundwater Conditions
Level 0	Blue	Normal	at least 95% supply availability	at least an 80% supply allocation	3 yr. average diversions less than safe yield
Level 1	Yellow	Moderate	at least a 95% supply availability	75-80% supply allocation	JV gw diversions to compensate for shortage exceeds 12,000 AF, or 3 yr. average exceeds safe yield
Level 2	Orange	Severe	at least 90-95% supply availability	75-80%supply allocation	JV gw diversions to compensate for shortage exceeds 16,000 AF, or 3 yr. average exceeds safe yield
Level 3	Dark Orange	Extreme	at least 90-95% supply availability	<75%supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield
Level 4	Red	Critical/Exceptional	less than 90% supply availability	less than 45% supply allocation	JV gw diversions to compensate for shortage exceeds 20,000 AF, or 3 yr. average exceeds safe yield

*All three criteria need to be satisfied to establish a water shortage level condition

Drought Monitoring

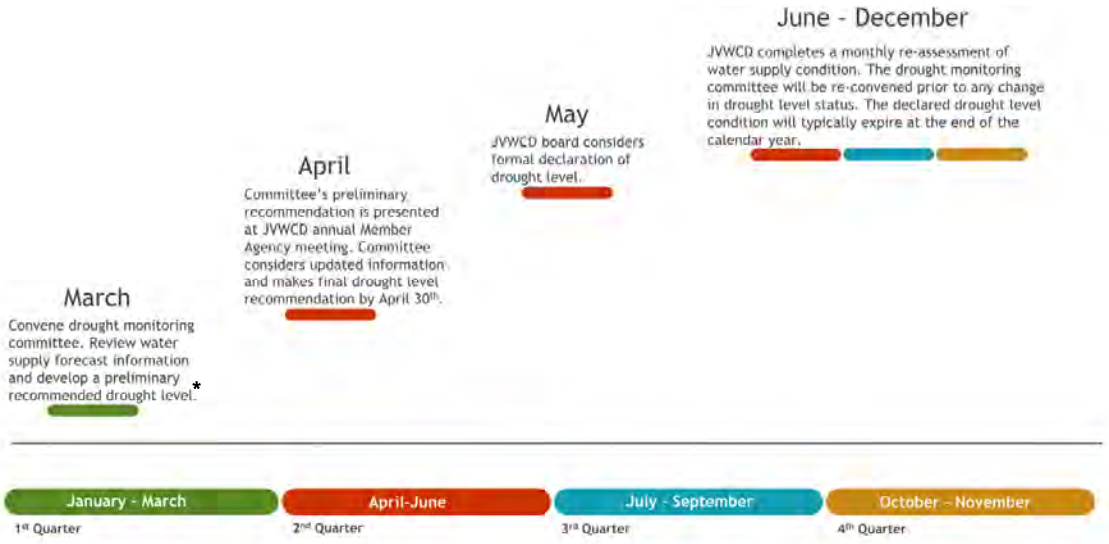
Drought Monitoring Committee: Recommends a water supply availability level

↓

JVWCD Board: Formally declares the water supply availability level

Water Supply Availability Level			
Water Supply Availability Level	Advisory Code	Water Shortage Description	Water Demand Reduction Target
Level 0	Blue	Normal	None
Level 1	Yellow	Moderate	5%
Level 2	Orange	Severe	10%
Level 3	Dark Orange	Extreme	20%
Level 4	Red	Critical/Exceptional	30 - 50%

Drought Committee Timeline
(process to confirm water supply availability levels)



*drought level here refers to the water supply availability level

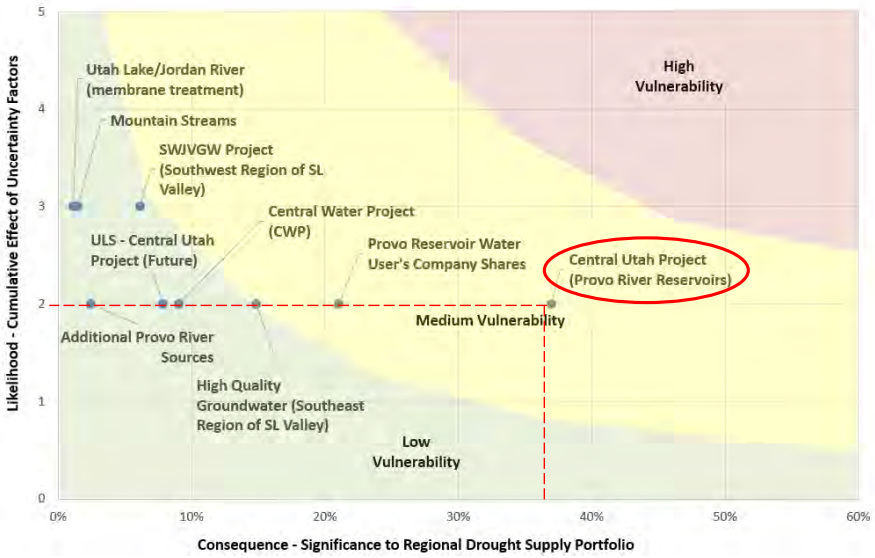
Vulnerability Assessment: Risk Matrix Results

Risk factors:

- Climate change
- Asset/facility susceptibility to disruption
- Source water quality degradation
- Dry year supply limitations
- Regulator environmental, and water rights constraints
- Cost constraints and affordability

Notable sector impacts

- Supply limitations due to in-stream flow requirements
- Early runoff patterns
- Increased occurrence of algal blooms and algae by-products



Drought Mitigation Measures

Conservation & Demand Management	• Secondary Water Metering • Enhanced Advanced Metering Infrastructure (AMI) program analytics • Customer Rebate Programs • Landscape Leadership Grant Program • Member Agency Grant Program (multiple funding tiers)
Conveyance	• Enclose canals to reduce seepage and evaporation losses
Ground Water Management	• JVWCD Aquifer Storage and Recovery (ASR) operational expansions • New shallow groundwater wells
New Supplies	• New high-quality groundwater wells • Begin taking delivery of ULS supply by 2030 or earlier • Member Agency wastewater reuse projects for secondary irrigation water

61 Original Mitigation Measures

15 Final Mitigation Measures

Drought Mitigation Measures (continued)

Agreements & Regulatory	• Drought contingency provisions for wholesale water purchase agreements and retail water service agreements • Evaluate effectiveness of using conservation-based water rates in the service area
Supply Storage	• Evaluate storage for secondary irrigation systems using Provo River spring runoff
Watershed Protection & Management	• Watershed-based management with stakeholders

61 Original Mitigation Measures

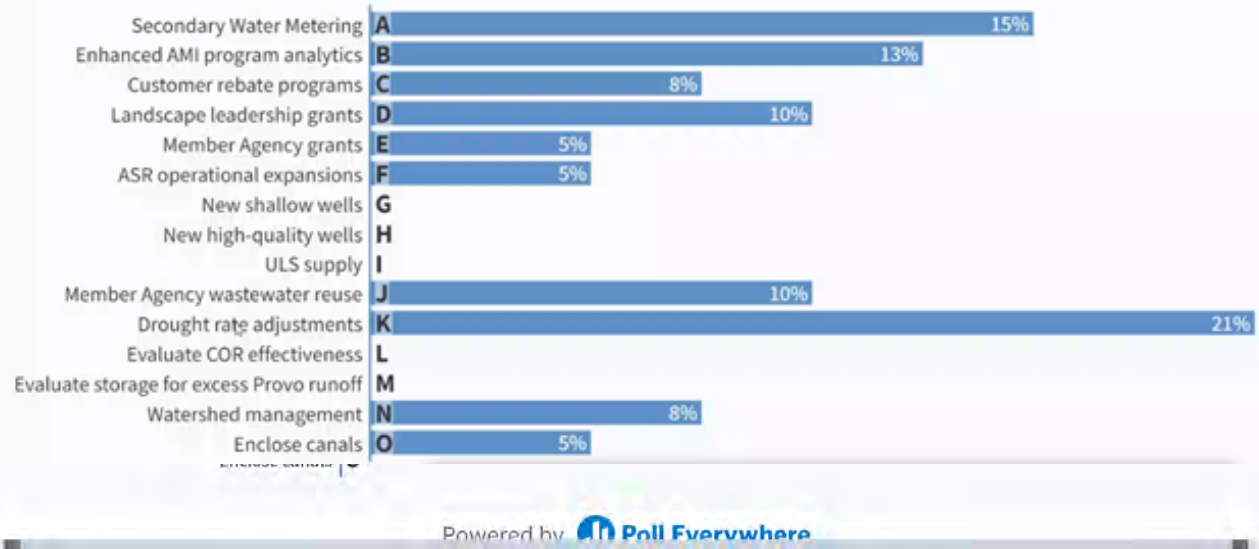
15 Final Mitigation Measures

Which mitigation measures would you like to know more about?

Secondary Water Metering	A
Enhanced AMI program analytics	B
Customer rebate programs	C
Landscape leadership grants	D
Member Agency grants	E
ASR operational expansions	F
New shallow wells	G
New high-quality wells	H
ULS supply	I
Member Agency wastewater reuse	J
Drought rate adjustments	K
Evaluate COR effectiveness	L
Evaluate storage for excess Provo runoff	M
Watershed management	N
Enclose canals	O

Total Results: 0

Which mitigation measures would you like to know more about?



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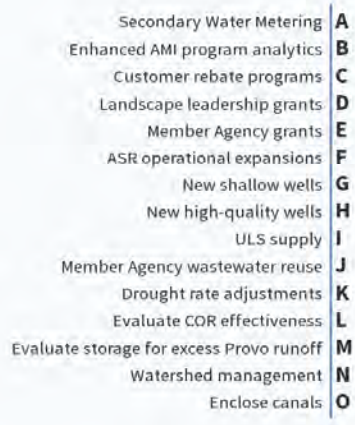
Which mitigation measures would you like to know more about?



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What kind of mitigation measures are you working on for your service area?

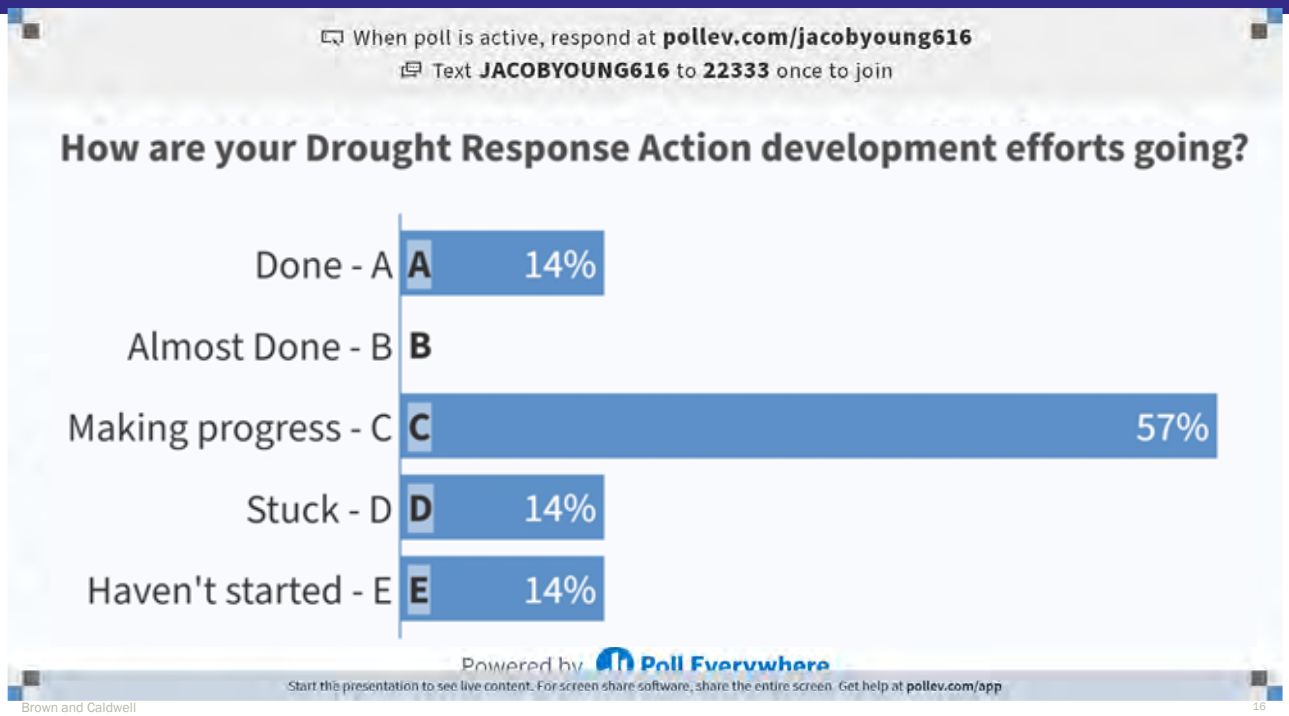
- Landscape requirements
- AMI metering, landscape requirements, drought pricing
- KID has no enforcement ability rather than mitigation through tier higher rated based on JVWCD declarations.
- Drought pricing, public awareness, higher tiered rates
- Evident water usage reduction simultaneous with community education
- Rate structure
- Drought service messages through website postings, portable signs on water saving actions posted throughout the District neighborhoods and key visual sites
- Because reduced water levels concentrate pollutants in the watershed, we are focused on water quality measures to keep pollutants – organic matter, chemicals, and litter – out of our storm water system

Drought Response Actions

ID	Drought Response Action / Water Supply Availability Level	0 Normal	1 Moderate	2 Severe	3 Extreme	4 Critical
DIST-A	Conservation Garden Park classes and events	x	x	x	x	x
DIST-B	Public Web Dashboard	x	x	x	x	x
DIST-C	Slow the Flow	x	x	x	x	x
DIST-D	Meetings with the Great SL Advisory Council and/or the ULC	x	x	x	x	x
DIST-E	Annual Drought Committee meetings	x	x	x	x	x
RTL-A	Customer leak detection using AMI and billing software	x	x	x	x	x
DIST-F	Wholesale customer water delivery reduction		x	x	x	x
DIST-G	Using ASR banked water		x	x	x	x
RTL-B	Public notification of diminished water supply and seek reduction in typical use (Increase in tier 4 rate at level 2/3. Increase of tier 3 and 4 at level 3 and/or 4)		5% reduction	10% reduction	20% reduction	30%-50% reduction
RTL-C	Water delivery reductions to large water users			x	x	x
RTL-D	Residential and commercial lawn watering restrictions			x	x	x
RTL-E	Dispense "Drought Drive-Thrus" Water Wise kits			x	x	x
RTL-F	Incentivize timely repair for customer water leaks				x	x
RTL-G	Pool and water fixture restrictions					x

Response Actions Demand Reduction

Summary of Retail and Wholesale Customers Demand Reduction and Supply Augmentation by Level					
Retail Customers	Water Supply Availability Level				
	0	1	2	3	4
2018 Retail Customer Demand[a] (AFY)	8,975				
Retail Customers Demand Reduction (AFY)	-	400	835	2,940	3,045
Retail Customers Supply Augmentation[b] (AFY)	-	50	70	-	-
Total Retail Customer Demand Reduction and Supply Augmentation (AFY)	-	450	905	2,940	3,046
Demand Reduction Percentage (Retail Customers)	0	5%	10%	33%	34%
Wholesale Customers	Water Supply Availability Level				
	0	1	2	3	4
2018 Wholesale Deliveries[a] (AFY)	98,765				
Wholesale Customers Demand Reduction (AFY)	-	9,030	14,530	22,430	30,335
Wholesale Customers Supply Augmentation[b] (AFY)	-	TBD	TBD	TBD	TBD
Demand Reduction Percentage (Wholesale Customers)	0	10%	16%	24%	33%



What three response actions do you anticipate will generate the greatest reduction in your service area?

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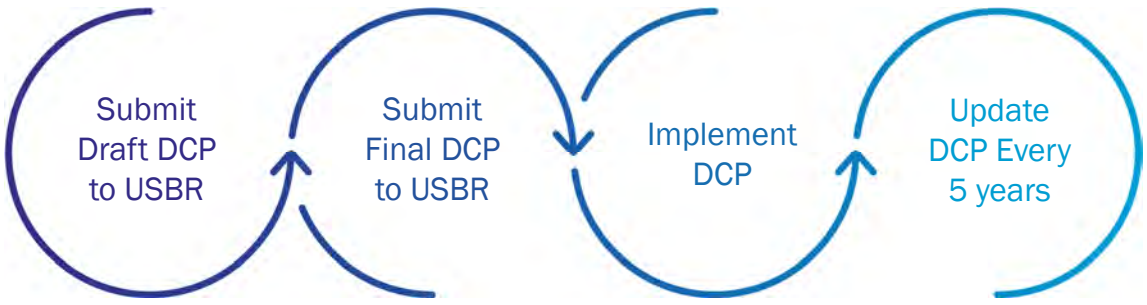
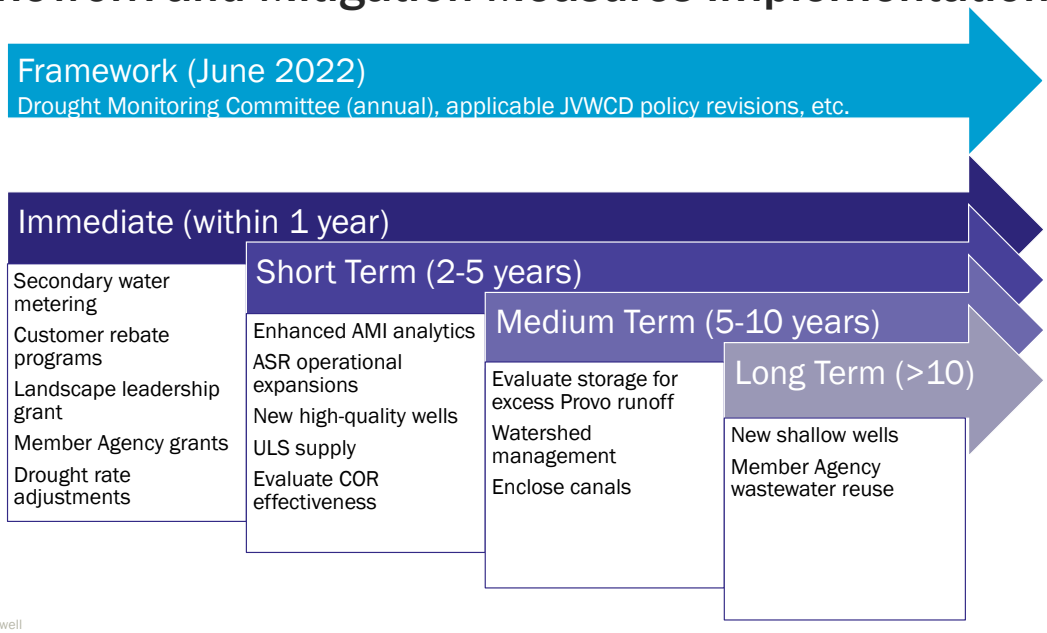
Next Steps



Framework and Mitigation Measures Implementation



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Appendix F: Member Agency Response Actions

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September 2021

Water Shortage Management Plan

SOUTH JORDAN
UTAH

What is the Water Shortage Management Plan?

The South Jordan City Water Management Plan is intended to preserve and protect public health and safety during periods of drought, temporary water shortage and supply interruption. This plan is used to support current water efficient ordinances and South Jordan City's Water Conservation Plan.

It is necessary for South Jordan City water users to know what action is needed to protect our water supply during times of shortages and drought. This document outlines the needs for water conservation and when watering restrictions are needed, along with how restriction provisions will be enforced. South Jordan City has a water purchase contract with Jordan Valley Water Conservancy District (JVWCD) for 100% of its culinary water; JVWCD also determines its own level of conservation measures that will be enforced due to supply shortage. The provisions of this plan apply to all persons, customers, and property utilizing culinary water provided by South Jordan City. For restrictions and use of secondary water please see the secondary water shortage management plan.

The Water Conservation Plan along with current water efficient ordinances can be found at…

For further questions please contact the City's Water Conservation Coordinator at (801)253-5230.

Water Shortage Phases

South Jordan City along with Jordan Valley Water Conservancy District carefully monitors its water supply and use by City water customers. Through careful monitoring the City will use this data in coordination with JVWCD to determine current drought and water supply conditions. Based on current levels of water supply and current conditions, the City in coordination with JVWCD will implement the water shortage phase for a given time frame.

Each phase will be enacted by the City Manager as authorized in section 13.04.280 of the South Jordan Municipal Code. The level of water shortages has been categorized into three phases according to the level of water available. Each phase is labeled and color coded to illustrate when a phase is in effect. The three phases are as follows:

Phase I: Normal Water Condition (Green)

Phase II: Moderate Water Shortage (Yellow)

Phase III: Severe Water Shortage (Red)

South Jordan City water users will be informed of which phase is in effect through all available communication channels. Each phase includes voluntary and/or mandatory water conservation actions to assist in preserving water supply as circumstances require.. The following section outlines each section and provides detail on required action for all phases of the management plan. Triggers for each phase are identified along with intended objectives.

Actions	Phase I	Phase II	Phase III
Lawn Watering	Voluntary	Mandatory	Mandatory
Hard Surface Washing	Voluntary	Voluntary	Mandatory
Swimming Pools, Jacuzzi, Ponds	Voluntary	Mandatory	Mandatory
Washing Vehicles	Voluntary	Voluntary	Voluntary
Recreation Sprinklers and Outdoor Water Toys	Voluntary	Voluntary	Voluntary
Commercial Water Reduction	Voluntary	Voluntary	Mandatory

Water Shortage Response and Actions

Phase I: Normal Water Condition

During this phase water users are not required to make water use changes but are encouraged to take steps to conserve water. Under this phase South Jordan City and JVWCD have determined water supply is enough to meet demand but may not be as healthy as historic levels. Tactics used will be advertisement of rebates, incentives for grass removal and increased drought messaging.

Trigger: Total reservoir storage is not projected to be at standard operating capacity by April 1, due to low snow pack, precipitation, and/or lack of carryover storage from the previous year. Other total reservoir storage and predicted inflows are significantly below historic levels for the specific time of year and demands may not be met.

Objective: To prepare City water utility for future shortages as well as water users therefore allowing all parties time for planning and coordination.

Phase II: Moderate Water Shortage

Water users may not use sprinkler irrigation on consecutive days. There must be at least one day between each cycle. Reduction of pool and Jacuzzi levels will be reduced 4” and pool covers will be used to prevent evaporation. Requests will be made to reduce water use in high use commercial properties. Previous actions such as leak detection and worsening drought messaging will be continued.

Trigger: Supply levels from the advisory stage have not improved. Demand levels indicate the need for more systematic response to manage current water supply. Water levels are at 95% of average annual supply.

Objective: Reduction of demand to meet target consumption levels achieved by voluntary conservation measures. Postpone the advancement to the subsequent stage and more stringent action. Minimize the

Phase III: Severe Water Shortage

impact to water users while meeting the targeted water use. Maintain highest water quality through reduction of use.

Water users must follow mandatory Lawn watering of 2 days per week. Hard surface washing and refilling of pools, ponds and Jacuzzis is prohibited. Mandatory water use reduction will also be issued to commercial properties such as schools, golf courses and car washes. All previously enacted water savings tactics will be continued.

Trigger: The City Manager will approve the progression to this phase if the objectives of phase II have not been met and additional action is needed. For the moderate to severe phase the specific restrictions will be determined based on season, target demand levels and other considerations. Considerations include if water supply is 90% of the average supply. If supply levels from Phase II have not improved, or if demand levels require a greater need for a systematic response to manage the situation.

Objective: Achieve targeted consumption levels and goals by restricting outlined water use. Ensure adequate water supply during the period of restrictions to protect public safety. Minimize disruption to water users while meeting consumption goals and maintain highest water quality through periods of shortages.

Termination of phase: The City Manager may revert to Phase II (Moderate Water Shortage) when the conditions and triggers listed have ceased to exist for a reasonable period of time. Upon termination of Phase III, Phase II becomes effective unless otherwise stated.

Enforcement

In order to conserve water in times of water shortage and ensure that supply is enough to meet demand, the City has established a progressive enforcement strategy. Enforcement measures are intended to educate water users about proper water conservation and reserves punitive action for repeat violators.

First Violation: Hand-delivered written notice of violation and instructions on necessary corrective action.

Second Violation: $100 fine and warning of actions consequent to a third violation. The violator may receive a full reimbursement of the fine by attending a water conservation seminar provided by the City.

Third Violation: $500 fine

Exceptions are made for new lawn's that require frequent irrigation within 30 days for establishment purposes. Exceptions are also made for short cycles required for repairing and maintaining irrigation systems.

Public Notification and Education

Notifying and educating South Jordan City water users is vital to the success of the water management plan. As such, South Jordan City will focus on notifying and educating the public through the following sources:

Websites and Social Media – The City will rely heavily on both the City website as well as the Watersmart website to communicate with the public regarding current phases of the plan. Social media handles will also be heavily used to assist in getting the information out as effectively and efficiently as possible.

Direct Email – The City will use its direct email system to notify water users regarding water shortage and conservation information.

Newsletter – The City will supplement its communication efforts through its newsletter with applicable information including water shortage phases and ways to help conserve water.

City Marquee Signs – The City will place current water shortage phases on its roadside marquees throughout the City.

Direct Mail – When necessary, the City will use direct mail to notify its water users of necessary water shortage and conservation measures. This method will only be pursued if all other methods have proved insufficient.

City of Bluffdale Water Conservation Plan

Normal through dry water years

BLUFFDALE

Water Facts

- Water is an essential element for life on our planet
- All living organisms depend on water
- The average annual precipitation in Utah is about 12 inches
- The average annual precipitation can change year to year depending on conditions in the south Pacific Ocean
- At times, low precipitation conditions can be present for many years in a row

Water Facts

- The average basic water need is **27 gallons** per person per day and 50 gallons for normal water use
- The average domestic water use in Utah is 167 gallons per person per day
- The average daily household use of water for irrigation is 450 gallons
- Households connected to Bluffdale's water system use about 1,800 gallons on peak summer day
- Bluffdale purchases all its drinking water from Jordan Valley Water Conservancy District (JVWCD)
- Raw water is stored in Jordanelle and Deer Creek Reservoirs
- In a drought year, the reservoir empties faster than it can replenish itself from snowpack
- Multiple years of drought are particularly problematic

Water conservation Plan

- This plan provides direction to the City and Residents on how to use drinking water and irrigation water in normal, drought, and severe drought conditions.
- Bluffdale is participating in JVWCD's Drought Monitoring Committee, which meets every spring to recommend a drought level that will guide water use decisions for the year
- JVWCD's drought conditions are defined as:
  - *Normal – At least 95% allocation available from Jordanelle system; at least 80% allocation available from Provo River system; local groundwater diversions below safe yield*
  - *Moderate – At least 95% allocation available from Jordanelle system; at least 75% allocation available from Provo River system; local groundwater exceeds safe yield*
  - *Severe – At least 90% allocation available from Jordanelle system; at least 75% allocation available from Provo River system; local groundwater exceeds safe yield*
  - *Extreme – At least 90% allocation available from Jordanelle system; less than 75% allocation available from Provo River system; local groundwater exceeds safe yield*
  - *Critical – Less than 90% allocation available from Jordanelle system; less than 45% allocation available from Provo River system; local groundwater exceeds safe yield*

Water Conservation/ Drought Action Plan

Each Level is Enacted by the Mayor and City Council

Water Year Supply	Indoor Water	Residential Outdoor Water	City Parks and Recreational Facilities	Water for Industrial and Agricultural Use
Normal	Water conservation encouraged*. *Apply Normal Water rates*	Water conservation encouraged*.	*Monitor water use. Continue to improve irrigation systems using smart sensors and other means to conserve.*	Water conservation encouraged*.
Moderate drought	Household water conservation plan.** *Apply Normal Water rates*	Recommend: Grass watering every other day. No watering during the day.**	*Water grassed areas three times week. Reduce water to trees. No watering during the day.*	Recommend: irrigating fields twice a week.
Severe drought	Household water conservation plan. ** ***Apply Severe Drought Water rates***	Recommend: water grassed areas watered twice a week. ***Apply Severe Drought Water rates***	*Water grassed areas once a week. Reduce water to trees.*	Recommend: irrigating fields once a week. No car washing.
Extreme drought	***- Apply Extreme and Critical Drought water rates***	Recommend: water grassed areas once a week. ***- Apply Extreme and Critical Drought water rates***	*No watering of grassed areas. Reduce tree watering to once a week.*	Recommend : limiting irrigation. No car washing.
Critical drought	***Apply Extreme and Critical Drought water rates***	Recommend: Cease any outdoor irrigation. ***Apply Extreme and Critical Drought water rates.***	*Cease irrigation.*	Recommend: Cease irrigation. No car washing.

*Conservation in normal years allows for increased reservoir storage in future years.

** Recommended water use conservation practices.

** Recommended conservation practices

- Check toilets for leaks
- Take shorter showers
- Install water-saving shower heads or flow restrictors
- Turn off water while brushing your teeth
- Turn off water while shaving
- Check faucets and pipes for water leaks
- Use your automatic dishwasher for full loads only
- Use automatic washing machine for full load only
- Do not let the water sun while washing vegetables
- Keep a bottle of drinking water in the refrigerator
- Use broom to clean driveways

September 27, 2021

MEMORANDUM

To: Board of Trustees
From: Greg Anderson, P.E.
General Manager/CEO

RE: Drought Response Actions

Last month the Board of Trustees reviewed the Jordan Valley Water Conservancy District (JVWCD) Drought Contingency Plan and its impact on KID. Based on the initial review and comments from the Board of Trustees the current language from the KID Policy Manual, Section 3.1.17, Water Conservation, describing the water conservation policy measures to be taken during a declared drought has been revised to coordinate with the JVWCD Drought Response Manual. It is recommended that the Board of Trustees consider the changes and approve the revisions as outlined.

Drought Level	Advisory Code	Water Shortage Description	Impacts to Contract Amounts
Level 0	Blue	Normal	adequate supplies to satisfy all retail customer needs and all wholesale minimum contract amounts
Level 1	Yellow	Moderate	5% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 120% of wholesale contract amounts
Level 2	Orange	Severe	10% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than 110% of wholesale contract amounts.
Level 3	Dark Orange	Extreme	20% reduction in typical use for wholesale member agencies and JVWCD retail customers, but in any event, JVWCD will not supply more than wholesale contract amounts.
Level 4	Red	Critical/Exceptional	30% reduction in typical use for wholesale member agencies and JVWCD retail customers. JVWCD will determine the water supply availability as a ratio to wholesale contract amounts (i.e. 90%, 85%, etc.) at the time that this level of drought is established.

3.1.17. WATER CONSERVATION

Customers shall prevent unnecessary waste of water and shall be required to keep their sprinklers, hydrants, faucets, valves, hoses and all apparatus in good condition at their own expense and closed or turned off when not in use. Whenever it shall be found that any fixture on the customer's premises is broken or not in a serviceable condition, the customer shall be notified at once of that fact, and should said customer fail to remedy the defect, water shall be shut off and will not be turned on again until such apparatus is put in a serviceable condition. A reconnection fee as required by Subsection 3.1.13.D. shall be paid by the customer for thereafter turning on the water. Customers shall not use water for purposes other than those for which they have applied, or use water in violation of the District's rules and regulations.

A. **Emergency Water Rationing Program:** Upon receipt of notification from the Jordan Valley Water Conservancy District, that water supplies will be curtailed and/or upon receipt of other relevant information that indicates a shortage of available water supplies, the Board of Trustees and/or the General Manager of the District shall have the power and authority to declare a drought and the District shall implement a water rationing program as determined by the Board and/or the General Manager.

1. **Drought Levels :** The Board of Trustees and/or the General Manager may declare one of the following stages of drought.

Drought Level 1: Advisory Code - Yellow, Water Shortage Description Moderate.

Drought Level 2: Advisory Code - Orange, Water Shortage Description - Severe.

Drought Level 3: Advisory Code - Dark Orange, Water Shortage Description - Extreme.

Drought Level 4: Advisory Code - Red, Water Shortage Description - Critical Exceptional

2. **Actions for Drought Condition:** The Board and/or the General Manager may authorize the implementation of the following actions to curtail water supply in response to drought conditions:

a. **Drought Level 1:** (a) limit watering times to 6:00 p.m. to 8:00 a.m. and (b) notify customer of broken and misdirected sprinkler heads. Goal: at least a 5% reduction in typical water use.

b. **Drought Level 2** (a) limit watering times to 8:00 p.m. to 8:00 a.m.,

(b) limit outside watering to two times a week (c) increase watering service charges to Emergency Conservation Rates Level 2, (d) notify customer of broken and/or misdirected sprinkler heads, and notify customers of water use violations Goal: at least a 20% reduction in typical water use.

c. **<u>Drought Level 3</u>:** (a) limit watering times to 8:00 p.m. to 8:00 a.m., (b) limit outside watering to two times a week for trees and shrubs only, and no watering of grass, gardens or other plants, (c) increase watering service charges to Emergency Conservation Rates Level 3, and (d) turn off a customer's water after the second notice of broken and/or misdirected sprinkler heads, and/or of a water use violation. Goal: at least a 20% reduction in typical water use.

d. **<u>Drought Level 4</u>:** (a) limit watering times to 8:00 p.m. to 6:00 a.m., (b) limit outside watering to one time a week for trees and shrubs only, and no watering of grass, gardens or other plants, (c) increase watering service charges to Emergency Conservation Rates Level 4, and (d) turn off a customer's water after the second notice of a water use violation. Goal: at least a 30% to 50% reduction in typical water use.

e. **Emergency Conservation Rates**

(A=Cost per thousand gallons Block 1)
(B= Cost per thousand gallons Block 2)
(C=Cost per thousand gallons Block 3)
(D=Cost per thousand gallons Block 4)
(E=Basic Water Fee each meter)
(F= Special Water Fee each meter)

Residential, including multi-family				
Current				
Description	**Level 0 & 1**	**Level 2**	**Level 3**	**Level 4**
Block 1 "Life Water"	$A	$A	$A	$A
Block 2 "Conservation"	$B	$(2 x B)	$(3 x B)	$(4 x B)
Block 3 "Irrigation"	$C	$(2 x C)	$(3 x C)	$(4 x C)
Block 4 "Waste"	$D	$(2 x D)	$(3 x D)	$(4 x D)
Basic Water Fee ea. meter	$E	$E	$E	$(1.04 x E)
Special Water Fee ea. meter	$F	$F	$F	$(1.04 x F)

3. **Additional Restrictions:** The water conservation effort may, in the District's discretion, include additional elements such as curtailing outside water use by large water users such as schools, churches, parks and recreation areas, or requiring them to use outside water only during off-peak times such as after 10:00 p.m. and prior to 8:00 a.m.; curtailing all outside watering; and/or curtailing all industrial and commercial use of water; etc.

4. **Board Discretion:** The District Board of Trustees shall have discretion to determine the propriety of implementing an emergency water rationing program and shall direct the imposition of such restrictions and actions as the Board, in its discretion and based upon available facts and information, deems expedient. In the event that the General Manager declares a drought emergency and/or implements an emergency water rationing program, that declaration and the water rationing program shall be placed upon the agenda of the next regular or special meeting of the Board of Trustees for review, ratification and/or modification.

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Appendix G: DWR Weekly Lawn Watering Example

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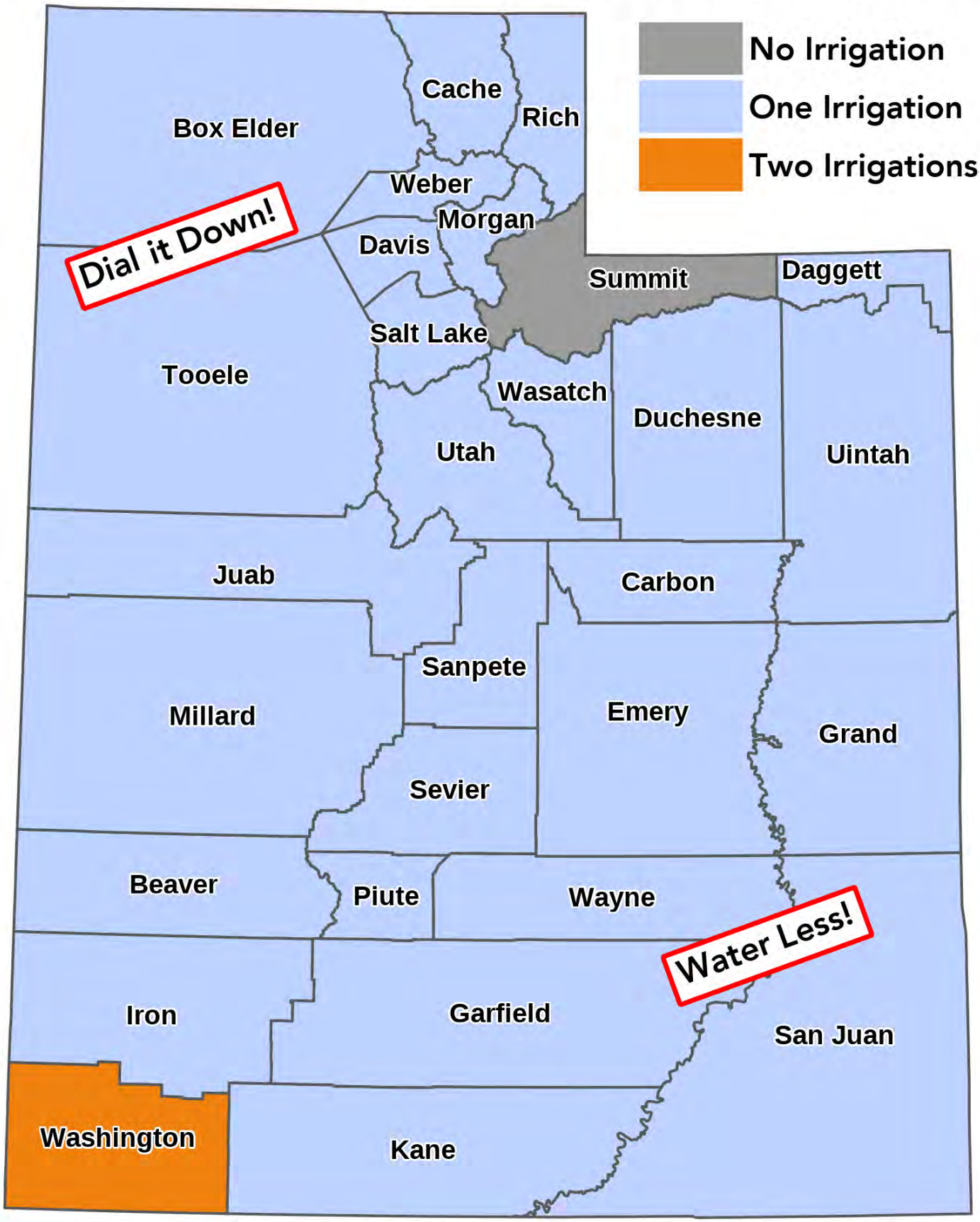
Extreme Drought Watering Guide
For the week of: Sept 24, 2021 to Sept 30, 2021



One irrigation is equivalent to 20 minutes with pop-up spray heads and 40 minutes with impact rotor sprinklers

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