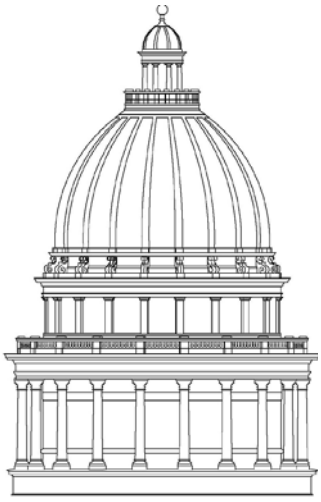
REPORT TO THE

UTAH LEGISLATURE

Number 2015-01



A Performance Audit of Projections of Utah's Water Needs

May 2015

Office of the
LEGISLATIVE AUDITOR GENERAL
State of Utah

STATE OF UTAH

Office of the Legislative Auditor General

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JOHN M. SCHAFF, CIA
AUDITOR GENERAL

May 2015

TO: THE UTAH STATE LEGISLATURE

Transmitted herewith is our report, **A Performance Audit of Projections of Utah's Water Needs** (Report #2015-01). A digest is found on the blue pages located at the front of the report. The objectives and scope of the audit are explained in the Introduction.

We will be happy to meet with appropriate legislative committees, individual legislators, and other state officials to discuss any item contained in the report in order to facilitate the implementation of the recommendations.

Sincerely,

John M. Schaff, CIA
Auditor General

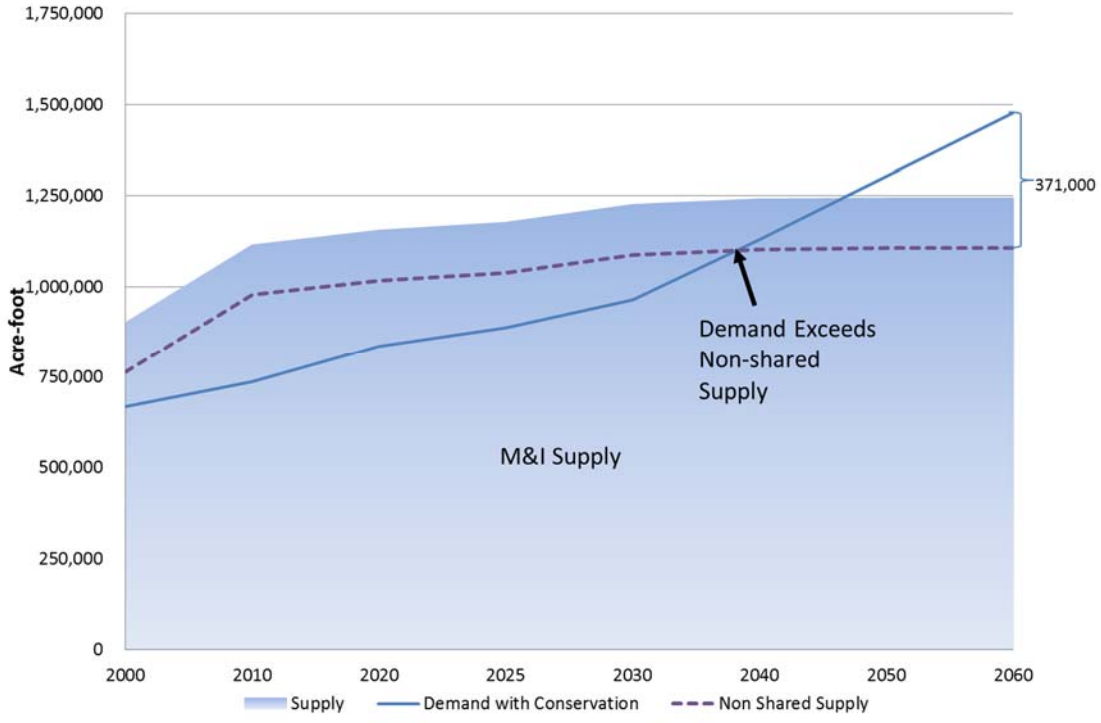
JMS/lm

Digest of
A Performance Audit of
Projections of Utah's Water Needs

The Division of Water Resources' projections indicate that Utah's statewide demand for water will outstrip the currently developed supply in about 25 years. Some believe the state can address its growing demand for water through conservation and by developing local supplies, including the conversion of agriculture water to municipal use. Others believe the state's growing demand for water will require the development of major new sources of supply that will cost billions of dollars. Considering the importance of water to the health, social and the economic well-being of our state's residents, it is essential that the division provide the best possible data to guide water planning decisions.

Our assignment was to determine the reliability of the division's data in the figure shown below and assess the accuracy of the division's projections of water demand and supply. We were also asked to review options for extending Utah's currently developed water supply.

Figure 1. Utah's Projected Municipal and Industrial Water Demand and Supply. The division projects that the demand for water in Utah will exceed the current non-shared supply by about 2040.



Source: Adapted from a Division of Water Resources figure.

Chapter II
Reliability of Water Use Data Needs to Improve

The Division Does Not Have Reliable Local Water Use Data. In order to effectively manage the state's water resources and plan for future water needs, accurate water use data is critical. The Division of Water Resources relies on water use data submitted by local water systems to the Division of Water Rights as the starting point for projecting future water needs. Unfortunately, we found that the submitted data contains significant inaccuracies. State water agencies as well as local water systems operators also acknowledge these inaccuracies.

The Division Needs an Improved Process for Ensuring Water Data Is Reliable. In response to the problems with water use data, the Division of Water Resources attempts to verify data accuracy and correct any mistakes by contacting all local water providers every five years. Besides this process being inefficient, we question the effectiveness of the division's efforts to validate the data. The Department of Natural Resources needs to take a leading role in coordinating efforts between Division of Water Resources and The Division of Water Rights to improve the process of gathering accurate water use data. To support this effort, the legislature should consider giving the Division of Water Resources statutory authority to validate water use information from local water systems.

We Question the Reliability of the Division's Baseline Water Use Study. We also have concerns about the 2000 water study, which the division uses as a baseline to project Utah's future water needs. We could not confirm the study's results because of the lack of documentation of the source data and the steps used to prepare the report. In addition, the 2000 water study relies on a compilation of water studies performed between 1992 and 1999, which may not be representative of the year 2000. Finally, because secondary water systems are not typically metered, much of the reported outdoor water use is based on estimates.

Chapter III
Conservation and Policy Choices Can Reduce Demand for Water

Conservation Will Lead to Less Water Use. We question the division's projected demand for water, which assumes Utah residents will consume on average 220 gallons per day through the year 2060. The accuracy of this projection appears overstated for a number of reasons. First, the projected amount of water use, 220 gpcd, is based on a 2000 baseline water study, which, as described in Chapter II, may be unreliable. Second, other western states appear to use less water than Utah, indicating Utah residents may be able to further reduce their water use. Third, ongoing trends towards conservation should continue to

reduce per capita water use beyond the state's 25 percent conservation goal. The division stated that they intend to update the state goal once it has been met.

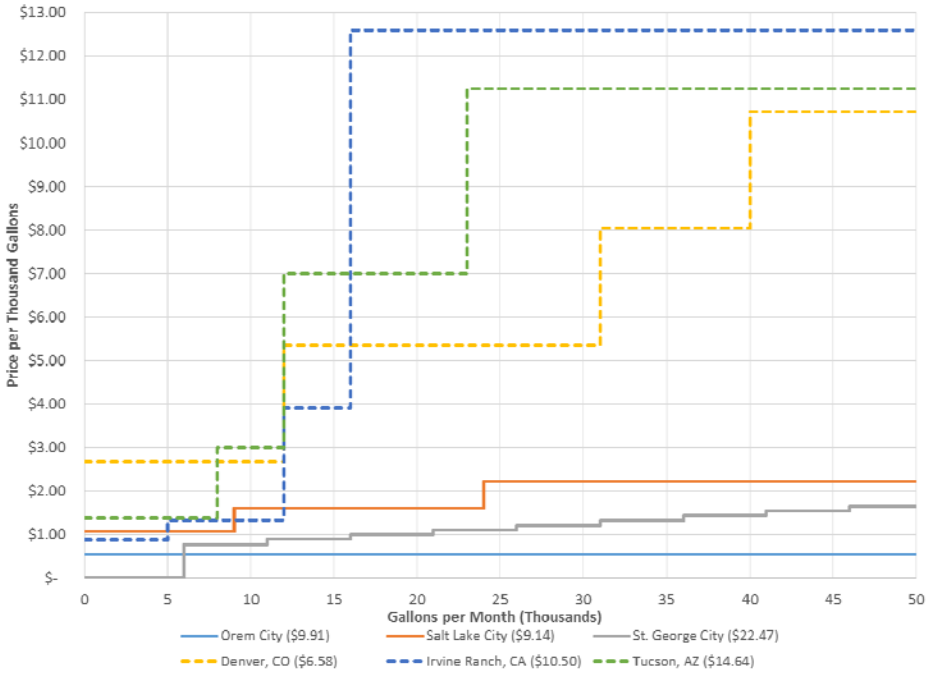
Some Regions Can Reduce Water Use More Than the Statewide Goal of 25 Percent. Some river basins have the ability to reduce water use well beyond the state conservation goal of 25 percent. In fact, two river basins already met that goal by 2010, and two other regions had nearly met the goal. This is another reason why we think the long-term projected use of 220 gallons statewide (as shown in Figure 1) is too high. Rather than applying the same 25 percent conservation goal to all basins, the division should work with local water providers to establish a new set of conservation goals that reflect each region's unique conditions and ability to conserve.

State Policies on Metering and Pricing Can Affect Water Demand. Utah's relatively low water costs appears to contribute to higher per capita water use when compared with other states. Unless per capita water use is reduced, new, more costly sources of supply will need to be developed. As pressures on Utah's currently developed supply intensify, local and state policymakers will need to consider policy options to reduce demand, including universal metering and water pricing.

- One option is to require the metering of all water service connections including those for secondary water customers. Universal metering provides water managers with the data needed to effectively manage their systems. Metering can also be used to provide consumers with information regarding their use. Finally, metering allows water providers the ability to charge water users based on their actual use. The Legislature should consider adopting policies that will require the phasing in of universal metering.

- Policymakers should also consider the way water is priced in Utah. Utah's existing price structure does not adequately encourage conservation. For example, the use of property tax to subsidize the cost of water may lead to an increase in use. In addition, rather than using relatively flat pricing structures, water systems should adopt conservation pricing, or increasing block rates, to incentivize efficient water use. As shown in Figure 2, cities with block rate structures charge consumers an increasingly higher price as consumption increases. The Legislature should consider changes to pricing policies that will encourage efficient water use.

Figure 2. Comparison of City Water Rate Structures. A selected group of Utah Cities are shown to have flatter block rate structures when compared to those of other major western cities. More pronounced block rates tend to encourage conservation.



Source: City Water Departments.

Chapter IV
Growth in Future Water Supply Should Be Reported to Policy Makers

Division Projections Should Include Expected Local Water Development. The division's projections of future water use do not include growth in the state's water supply beyond what was already developed in 2010, with a few exceptions. Those exceptions include the additional supply from a few new water projects. In contrast to division projections, Utah's developed water supply will grow incrementally as agricultural water becomes available for municipal use and as municipalities develop their remaining sources of supply. By excluding much of the growth in local water supplies, the division's projections accelerate the timeframe in which costly new water projects appear to be needed.

Good Basin Plans Should Be the Basis for Better Statewide Planning. As with the statewide projections, most of the division's basin plans do not estimate the growth in the region's water supply. The basin plans also understate the amount of agriculture water available for municipal use. We recommend the division update its basin plans on a more regular basis. We also recommend that they estimate the incremental growth in supply that will occur as municipalities develop additional sources of water.

REPORT TO THE
UTAH LEGISLATURE

Report No. 2015-01

A Performance Audit of Projections of Utah's Water Needs

May 2015

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Chapter I
Introduction

Water is a vital resource that is essential to the health, social and economic well-being of the every resident in the state of Utah. It is also becoming an increasingly scarce resource. By 2060, the state's population is projected to double to nearly 6 million people. This jump in population will strain our currently developed water supply, which has sparked a debate about the need and time frames for developing additional sources of supply. Careful management and planning is critical for ensuring a reliable water supply for future generations.

Although most water use in Utah is for agriculture, this report only addresses Utah's municipal and industrial (M&I) water needs. To avoid future M&I water shortages, state and local water managers project that Utah will need to spend $33 billion[1] over the next several decades to repair existing water systems and add additional supply. These costly investments have prompted the Legislature to ask our office to evaluate the accuracy of the state's projected demand and supply for water and to investigate options for extending Utah's currently developed water supply.

State and local water managers project that Utah will need to spend $33 billion to repair existing water systems and add additional supply.

Planning Utah's Water Future Is Increasingly Important

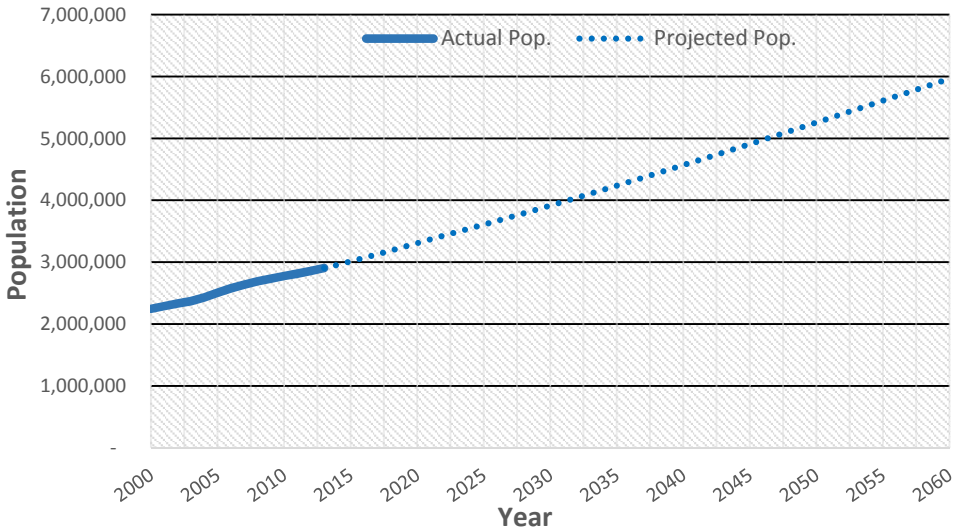
Planning is becoming increasingly important for identifying and evaluating options for meeting Utah's future water needs. The Division of Water Resources (the division) is the state's water planning authority. The division predicts that water demand by Utah's growing population will exceed the state's currently developed water supply sometime around 2040. However, questions have been raised regarding the accuracy of the division's predictions. This debate highlights the need for a more sophisticated approach to forecasting Utah's future water needs.

[1] Prepare 60, "Statewide Water Infrastructure Plan"

Utah's Population Is Expected To Grow to 6 Million by 2060

The division uses population projections to plan for Utah's future water needs. According to population projections prepared by the Governor's Office of Management and Budget (GOMB), Utah's population will double by 2060 to nearly 6 million people, as shown in Figure 1.1.

Figure 1.1 Utah's Projected Population. Utah's population is expected to double to 6 million by 2060.



Source: Governor's Office of Management and Budget

Much of this growth is expected to occur in urban areas along the Wasatch Front, resulting in more dense living arrangements, which could lower per capita water use. GOMB's population projections assume water availability will not constrain growth.

The Division Is the State's Water Planning Authority

Comprehensive water planning is one of the division's critical responsibilities.

Comprehensive water planning is one of the division's primary responsibilities. The ***Utah Code*** 73-10-18 describes the Division of Water Resources as "the water resource authority for the state" and gives the director authority to "make studies, investigations, and plans for the full development and utilization and promotion of water and power resources of the state." Furthermore, the division reports its mission is "to plan, conserve, develop and protect Utah's water."

The division has a challenge to balance the competing elements of its mission. To some extent promoting the full development and utilization of water in the state is at odds with promoting conservation. In fact, in a legislative committee, one member questioned whether Utah should wait to promote conservation until after the state has developed its full allocation of interstate waters. Other policymakers hold the competing view that more focused conservation efforts are needed before investing in large-scale infrastructure projects. It was beyond our audit scope to consider such issues. Instead, we focused on the division's planning role including estimates of future water demand and supply.

This audit focuses on the division's planning role including estimates of future water demand and supply.

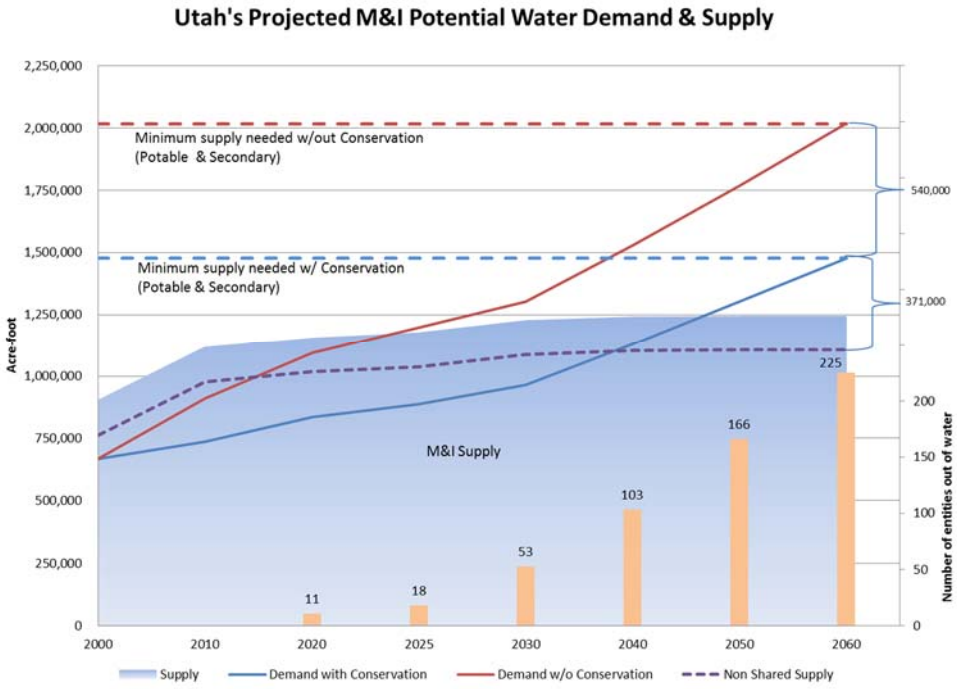
To fulfill this planning objective, the division has prepared a number of documents, including a statewide water plan as well as individual water plans for each of the state's eleven major hydrologic river basins. These documents identify water use trends and make projections about future water demand.

Division Projections Indicate Utah's Current Water Supply Will Not Meet Future Water Needs

The division's analysis indicates Utah's demand for water will outstrip its currently developed supply in about 25 years. Figure 1.2 shows the graphic used by the division to illustrate potential water shortages. The important aspects of Figure 1.2 are explained in the bullets below.

The statewide demand for water is projected to exceed the currently developed non-shared supply of water by 2040.

Figure 1.2 DWRe Analysis of Utah's Projected M&I Potential Water Demand and Supply. The Audit Subcommittee directed auditors to review the reliability the division's analysis.



Source: Division of Water Resources

Figure 1.2 is somewhat confusing with two different vertical scales and a non-linear horizontal scale. However, the main points of interest are as follows:

- **Projected water demand.** The red line shows projected water use without conservation. It is based on estimated use of 293 gallons per capita per day (gpcd) in 2000. The blue line shows projected water use with conservation. It assumes a gradual reduction in water use to 220 gpcd in 2025 (25 percent conservation goal), with no further reductions thereafter.

- **Water supply.** The blue area shows the state's currently developed reliable M&I supply of water. Unlike demand, growth in supply is not projected. The currently developed supply includes some growth for four large water conservancy districts. However, all other water providers' supply is held constant at 2010 levels. The blue shaded area above the dashed purple line shows supply that cannot be shared from one region to another.

- **Projected water shortages.** The brackets on the right side of the figure show the benefits of conservation and the difference between projected demand and the non-shared supply. The figure also shows that, even with conservation, there will be a water shortfall of 371,000 acre-feet per year in 2060. The vertical bars show the estimated number of local water entities that are projected to run out of water at various times in the future.

The division projects a water deficit of 371,000 acre-feet in 2060.

While everyone agrees that Utah cannot afford to run out of water, the situation portrayed by the division in Figure 1.2 has led to differences of opinion regarding how to meet Utah's future water demand. One viewpoint is that through increased conservation, the development of local water projects, and the conversion of agriculture water to municipal use, the state should be able to accommodate the water needs of its growing population. Contrasting views hold that these actions alone will not meet the states growing water needs and that major water development projects are necessary. The division has stated that conservation, agricultural conversion, and water development are needed to meet the state's growing water demand.

In fact, the division is statutorily charged with planning for the development of two large-scale water projects: the Lake Powell Pipeline and the Bear River Project. Existing interstate compacts grant Utah more water than is currently developed so the projects contribute to the division's goal "to defend and protect Utah's rights to develop and use its entitlement to interstate streams." The estimated cost of these two projects alone is $2.5 billion. The huge expense of the proposed projects highlights the need for a reliable forecast of water demand and supply.

The estimated cost of Utah's two major proposed water projects totals $2.5 billion.

Detailed analysis of basin level information would have been required for us to evaluate the need for these two major water projects, which was beyond the scope of this audit. Instead, our assignment was to assess the accuracy of state-level data presented to policymakers by the division.

Questions about Accuracy of Division's Projections Led to Audit Request

Legislators have expressed concern over the accuracy of the Division of Water Resource's projections.

In response to requests for costly, large-scale water development projects, legislators asked for an audit of the accuracy of the division's projections of demand and supply. Specifically, House of Representatives leaders asked that we review the reliability of "data used to make predictions that look out 20 and 40 and 50 years" into the future. Senate leaders asked that we review whether the division had adjusted its projections to reflect "development being more dense that it was years ago." Other legislators asked whether the state is making adequate progress towards conservation and whether the division is considering future conversions of agricultural water to M&I use.

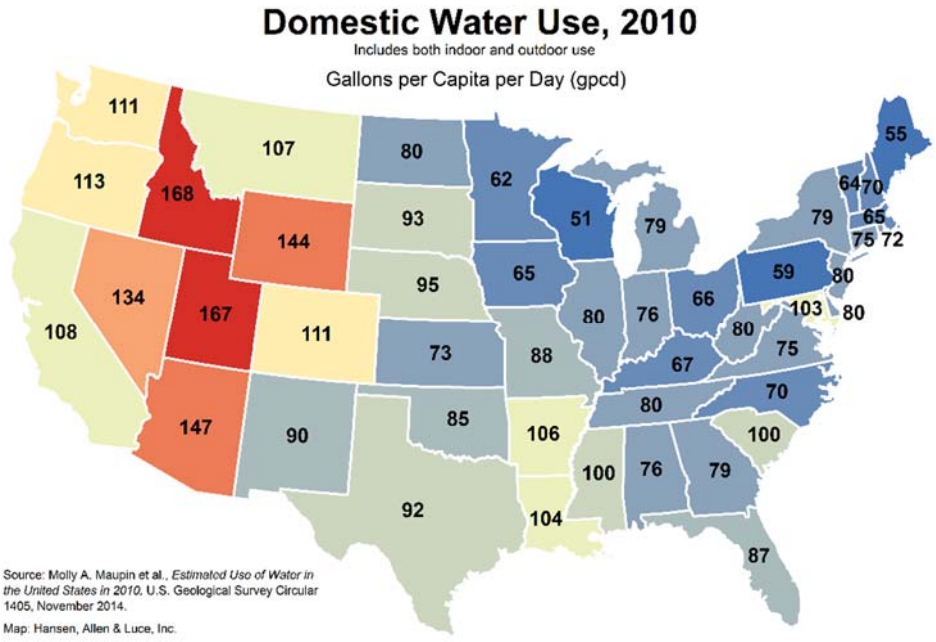
Is the Data Used to Predict Utah's Future Water Needs Reliable?

Division projections of future water demand rely on the division's estimate of the state's municipal and industrial water use in 2000. This baseline study reported that the average annual amount of water used by residential, commercial, industrial, and institutional water users in the year 2000 was 293 gallons per capita per day (gpcd). Because projections of future water demand are based on 293 gpcd, it is important that this per capita water use rate is accurate. If 293 gpcd is not accurate, then it casts doubt on the reliability of the projections derived from it. For this reason, verifying the accuracy of the 2000 baseline study was one of our primary audit objectives.

Has the Division Fully Considered Water Conservation?

Data published in national sources suggest that Utah residents consume relatively large amounts of water when compared to other states. Such comparisons should be regarded with caution. According to the US Geological Survey, state water use data "will have varying levels of accuracy" due to the differences in how each state accounts for their water use. In a 2010 US Geological Survey report, Utah has the second highest rate of residential water use. Figure 1.3 describes the results of state-level water use.

Figure 1.3 United States Domestic Water Use in 2010. Utah's combined indoor and outdoor water use exceeds nearly every other state.



Utah residents consume more water than residents in other Western states.

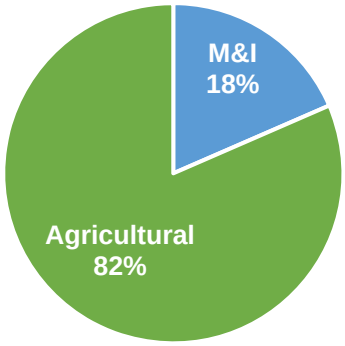
Figure 1.3 shows that Utah's per capita residential water use (which does not include commercial, industrial, and institutional uses) was 167 gpcd in the year 2010. Utah was second only to Idaho at 168 gpcd, suggesting that our state can better manage its water use. Legislators specifically asked us to examine the state's efforts to reduce water demand through conservation.

Is Agricultural Water Available for Alleviating Water Supply Shortages?

Agricultural water has the potential to address some of Utah's future M&I water needs. Utah does not actively pursue a policy of transferring agriculture water rights to cities that are in need of water. However, as land is converted from farms to urban development, the water rights attached to the farmland are typically made available for M&I uses. Figure 1.4 shows that agriculture, at 82 percent, is the largest user of the state's developed water supply.

Figure 1.4 Utah's Agricultural, Municipal, and Industrial Water Use. The vast majority of the state's developed water is used for agricultural purposes.

The majority of the developed water in the state is used for agricultural purposes, a portion of which could be made available to meet future municipal water needs.



Source: Division of Water Resources

Agriculture water, once made available, could become a significant source of new water for municipal and industrial use. Legislators have asked if the division's projections fully account for this source of additional water supply.

Audit Scope and Objectives

The primary audit objective was the accuracy of the division's projections of Utah's future water needs.

Members of the Legislative Audit Subcommittee asked for a performance audit of the Division of Water Resources. Their primary concern was that we verify the accuracy of the division's projections of Utah's future water needs. The committee also requested that we investigate whether division projections account for the potential effects of water conservation and the conversion of agricultural water as options for extending and increasing our state's water supply. Our response to these audit issues are addressed in the following chapters:

- Chapter II – Reliability of Water Use Data Needs to Improve
- Chapter III – Conservation and Policy Choices Can Reduce the Demand for Water
- Chapter IV – Growth in Future Water Supply Should Be Reported to Policy Makers

Chapter II
Reliability of Water Use Data Needs to Improve

Accurate water use data is essential for water management, planning, and policy decisions. State policy makers need assurances that when they support costly, large-scale water projects, the need for additional supply is real and the state's investment is sound. The Division of Water Resources (the division) uses the Division of Water Right's data as the foundation for its analysis of the state's water use. However, water use data reported by public water systems to the Division of Water Rights contains significant inaccuracies. While the division strives to verify the accuracy of the data before using it in its planning process, a lack of documentation and changes in methodology raise doubts about the reliability of the division's water use studies.

Chapter II reviews the reliability of Utah's water use data.

According to Utah statute, "All waters of this state, whether above or under the ground, are hereby declared to be the property of the public." In order to protect the public's interest, the state is dedicated to a) conserving its scarce water resources, b) providing adequate water supplies, c) ensuring the availability of the state's streams for meeting its needs, and d) controlling its water resources. To meet these objectives accurate water data is critical. Unfortunately, the accuracy of Utah's water use data is not commensurate with its importance to the division's planning effort and needs to improve.

The accuracy of Utah's water use data is not commensurate with its importance to the division's planning effort and needs to improve.

The Division Does Not Have Reliable Local Water Use Data

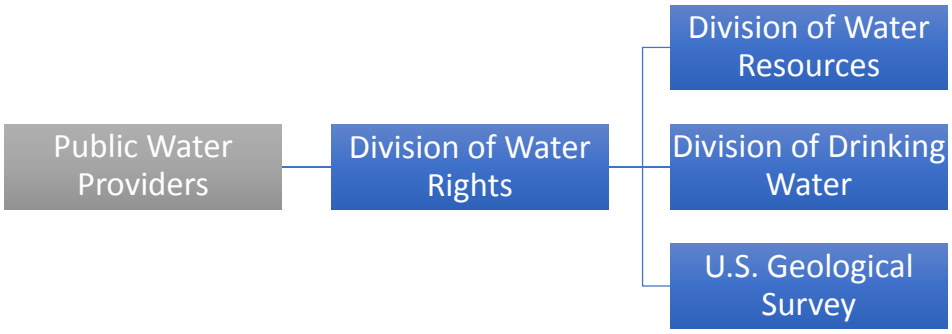
In order to effectively manage the state's water resources and plan for future water needs, accurate water use data is critical. The Division of Water Resources relies on water use data submitted to the Division of Water Rights as the starting point for projecting future water needs. Unfortunately, we found that the data submitted to the Division of Water Rights contains significant inaccuracies. State water agencies as well as local water systems also acknowledge these inaccuracies.

Division of Water Resources Relies on Water Use Data Submitted by Water Providers to the Division of Water Rights

The Division of Water Rights collects water use data from public water providers throughout the state of Utah. This data is used by many state and federal water agencies for a variety of purposes, which includes water resource studies and water policy decisions. Our review revealed significant inaccuracies in the water use data reported by local water entities.

Division of Water Rights Is the Primary Source for Water Use Data in Utah. Each year, the Division of Water Rights submits a water data form to all 468 community public water providers throughout the state requesting information about their water use. The data form requires public water providers to submit information regarding the monthly amount of water diverted from each water source, the monthly amount of water billed, and other water system information. This water use form is the primary source of data used by the Division of Water Resources for water planning purposes.

Figure 2.1 Flowchart of Local Water Use Data. The Division of Water Rights collects water use data from public water providers and shares this data with other state water divisions as well as U.S. Geological Survey.



The Division of Water Rights collects annual water use data from all 468 public water providers in the state and shares this data with other water agencies.

As shown in Figure 2.1, data from public water providers is compiled by the Division of Water Rights and shared with the Division of Water Resources, the Division of Drinking Water, and U.S. Geological Survey for each agency's specific data needs.

Unfortunately, the submitted data is subject to inaccuracies. The Division of Water Rights website reads, "In many cases the data submitted by water providers are estimated and the reliability of these

data are unknown." The next section will discuss some of the data errors we encountered in our audit tests.

Local Water Use Data Contains Significant Inaccuracies

Our review of local water use data revealed significant errors. Some errors were obvious. Some local water systems reported large swings in their water use, indicating that the data was not reliable. For example, one city's reported water use data in 2013 was more than double the amount reported for 2012. We also surveyed the data for inconsistencies and found a number of specific examples of data inaccuracies. For example, instead of reporting total metered use as recorded at each connection, the city reported its total source production at the well, which was a much higher figure. We also found several instances in which the water use data reported to the Division of Water Rights did not match the amount reported in other, internal city reports. Additionally, one city's reported water use for 2012 was the water use of another city with an identical name in the state of New York.

Our review of local water use data revealed significant errors. For example, one city's reported water use for 2012 was sourced to a city with an identical name in the state of New York.

After detecting the above data errors, many local and state water managers told us that they found the data submitted to the Division of Water Rights unreliable. For this reason, we concluded that it was not necessary for us to conduct a systematic review of the data. As the following section suggests, it is widely recognized that there are fundamental problems with the way the state's water use data is gathered and submitted by local water providers.

State Water Agencies and Local Water System Operators Know Water Use Data Is Unreliable

Management in the Division of Water Rights, The Division of Water Resources, and the Division of Drinking Water validated our concerns with the reliability of the state's water use data. They told us that the data is unreliable. Many local water system operators also reported concerns about the accuracy of the water use data.

State Water Agencies Participate in the Annual Water Use Surveys But Do Not Trust the Data. Management from all three agencies expressed concern about the accuracy of the water use data. For example, the Division of Water Resources stated, "the data received by the Division of Water Rights was simply not accurate

enough to make sound future water planning decisions." For this reason, the Division of Water Resources has attempted to compile more accurate water use data since the early 1990's.

The Division of Drinking Water stated that the data collection process invites inaccurate data. When asked about the cause of these inaccuracies, the manager responsible for overseeing the reporting function at the Division of Water Rights acknowledged that they have not devoted sufficient resources towards monitoring the accuracy of the reports, correcting mistakes, and auditing local water system data.

Division of Water Rights acknowledges that they do not have sufficient staff to monitor accuracy of water use data.

Local Water Systems Report Concerns with the Process for Collecting Water Use Data. We contacted staff at a number of water systems about their process for submitting water use data. These discussions revealed several reasons why local entities are not submitting accurate water use reports.

- **The purpose of the data and instructions for collecting the data are unclear.** Staff at several water systems we contacted reported that they were unclear about how the data is used. Consequently, it appears the reporting process is not always taken seriously. They also reported that the instructions are inadequate and subject to misinterpretation.

- **Feedback is not provided when errors are identified.** Water systems operators reported that they did not receive any feedback after submitting the data. As one water system operator stated, "We would like to know if the submitted data is inaccurate or incomplete."

- **The person responsible for submitting the data does not always have the training or expertise to report the data accurately.** For example, one water system manager explained that large differences in their water use from one year to the next were due to misunderstandings by city staff regarding how to interpret the city's water metering systems.

- **There is a perception that a city's unused water rights may be revoked.** Municipalities may intentionally overstate their water use because they are concerned that if they do not report using their full allotment of water rights, the state engineer may someday revoke any unused rights. Although state law allows cities to retain

their unused water rights to meet future water needs, this perception could add to data inaccuracies.

Given the concerns raised by local water systems staff, it is not surprising that state agencies and other interested parties consider the data submitted to Division of Water Rights unreliable. The following section will discuss the validation process the division uses to improve the reliability of the state's water use data.

The Division Needs an Improved Process For Ensuring Water Data Is Reliable

In response to the problems with water use data, the Division of Water Resources attempts to verify data accuracy and correct any mistakes by contacting all water providers every five years. Besides this process being inefficient, we question the effectiveness of the division's efforts to validate the data. The Department of Natural Resources needs to take a leading role in coordinating efforts between Division of Water Resources and The Division of Water Rights to improve the process of gathering accurate water use data. To support this effort, the Legislature should consider giving the Division of Water Resources statutory authority to gather water use information directly from local water providers.

Unreliable Water Use Data Has Resulted In an Inefficient Verification Practice

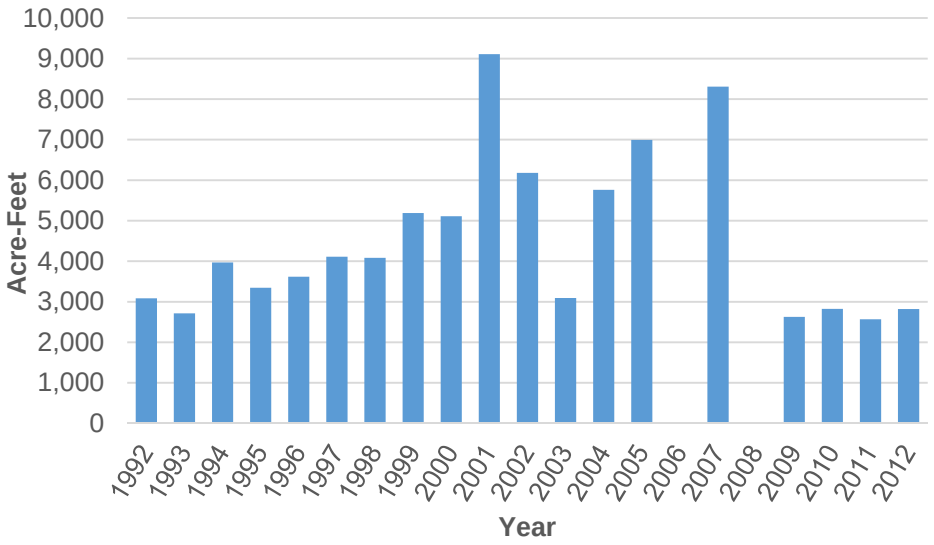
The Division of Water Resources uses an inefficient practice of contacting individual water systems to verify water use data.

Because the Division of Water Resources cannot rely on the Division of Water Rights' water use data, they have developed a process for verifying the data. The process involves contacting nearly every regulated drinking water systems in the state, every five years, in each of the 11 hydrological basins to verify the accuracy of submitted data and to obtain data from water systems that did not submit use data. This verification process is inefficient. A better process would be to ensure that the data submitted by water providers is accurate to begin with and is reviewed on an annual basis.

The effectiveness of the division's data verification process is also a concern because much of the submitted data is accepted at face value. The division reports that if a water system states that its data is accurate and appears reasonable, then the division "has no other alternative than to accept that data." The problem with this approach

is that inaccurate data can still be submitted. Another concern is that by verifying the data every five years, the division is unable to perform annual trend analysis, which would help in detecting inconsistencies in water use from year to year. The following figure illustrates the value of annual data.

Figure 2.2 One City Reported Large Differences in Water Use From One Year to the Next. Over a period of just a few years, one city's reported water use went from 9000 acre-feet to just 3000 acre-feet. This type of information led us to question the reliability of the data submitted to the Division of Water Rights.



Source – Division of Water Rights.

One city reported large swings in its water use indicating something was wrong with their data.

Figure 2.2 shows how annual water use data can help the division to identify inconsistencies in the data from year to year. This city's large swings in water use indicated something was wrong with their data. We asked the city's Public Works Director to explain the extreme volatility in his city's water use numbers. He told us that for several years before he was hired there were serious problems with the way the staff were reporting the city's water use. He recommended that we not trust any of the data submitted prior to the year 2009. Nonetheless, the division did not recognize the problems with the data and used it in their 2000, 2003, 2005 and 2010 M&I studies. Had the division reviewed the data year by year, they too would have been alerted to the problems with the data. The following section discusses the need for the division to work with local entities to improve the accuracy of the data they submit.

The Department of Natural Resources Can Improve Data Accuracy by Working with Local Entities

The Division of Water Resources and the Division of Water Rights both acknowledge that the accuracy of the data reported by local water systems must improve. Since our audit focused on how water use data is incorporated in the Division of Water Resources' plans, we think that the division should have a role in ensuring data is accurate. However, both divisions, as well as the Department of Natural Resources managers told us they think data collection should remain primarily the responsibility of the Division of Water Rights.

Regardless of which division collects the data, we think the Department of Natural Resources should develop a way to ensure accurate data is collected. First, local water managers should be held accountable for submitting accurate data by signing off on the water use form. Second, a greater effort should be made to verify the accuracy of the data as it is received. Third, water use data should be compared with local sources of data such as a water system master plan, rate study, or impact fee study to identify and resolve data inconsistencies. Finally, audits can be used to validate and educate local entities about accurately collecting and reporting water use data.

Local Water Managers Should be Held Accountable for Submitting Accurate Water Use Data. In recognition of the need for more accurate data, managers from the three state water agencies began a working group this past year resulting in several recommendation for improvements to the water use form and collection process. The proposed form would require "water system personnel with direct knowledge of flow measurements" collect the data and fill out the form. This person would certify that the information is correct, sign the report, and provide their water operator certification number. By placing their professional credentials on the line, local water operators may take greater responsibility for the accuracy of the data they submit. We support this approach and recommend that this change in reporting process be implemented.

By placing their professional credentials on the line, local water operators may take greater responsibility for the accuracy of the data they submit.

The new focus on accountability should improve the quality of the information reported by local entities. This effort should also be combined with an effort to better educate local water managers regarding the importance of submitting accurate data.

Although the Division of Water Resources says it verifies the data before using it, we found errors that were included in the reports they use for planning purposes.

The Division of Water Resources Should Do More to Identify Inaccuracies in the Water Use Data. Although the Division of Water Resources says it verifies the data before using it, we found that some of the errors in the Division of Water Rights data had been included in the M&I studies. This suggests the division needs to develop additional methods for efficiently verifying water use data.

To test for errors in the division's water use reports, we examined those water systems that experienced extremely large drops in water use from 2005 and 2010. We found inaccuracies in the data reported for several of these water systems. For example, the division reported a 48 percent decline in American Fork City's water use between 2005 and 2010. We discovered that this decline was due to the installation of a new pressurized irrigation system. Since water systems are not required to report secondary water use, which is generally unmetered, American Fork's reduced use of its culinary system reflected the increased use of that separate, secondary system for its outdoor watering.

Although the division contacted American Fork City to verify their data, this effort to verify the data did not uncover that city's actual water use. Instead of declining by 48 percent, the data we obtained from the city suggests water use actually increased after residents began to use the secondary water system. The amount of increase is unclear because we do not have an accurate estimate of past secondary water use in American Fork City.

Evaluating water use data every five years, as is currently done, is not sufficient for identifying unusual data trends during the intervening years.

This example indicates that more validation efforts are needed to ensure accurate water use data. Evaluating water use data every five years, as is currently done, is not sufficient for identifying unusual data trends during the intervening years. Instead, by analyzing an entity's water use annually, the division would be more likely to spot errors in the data and identify entities needing follow-up contact.

Inconsistencies with Locally Reported Data Should Be Identified and Resolved. Another method for testing water use data for errors is to compare the data with a variety of sources such as an entity's water master plan, water conservation plans, rate study, or impact fee study. By comparing the data with municipal plans and studies, we identified several inconsistencies.

For example, by comparing Sandy City's 2010 Water System Master Plan with the division's water reports we found a mismatch in

the reported data. In some years, the difference was small, but in 2010, the difference was significant. In 2010, the division reported that Sandy City residents used 208 gpcd. The city's internal reports show a 12 percent difference in per capita water use at 234 gpcd. This discrepancy highlights the need for better controls, including a comparison of locally reported data to check for inconsistencies.

Validity Checks, Audits, and Training Should Be Used to Improve the Accuracy of Locally Reported Data. Local entities have the option of submitting water use reports online. With a few improvements to the programming, the online form could be used to validate the data as it is entered and to check for errors in the data. For example, we found that Salt Lake City's reported 2013 water use was more than double the amount reported for prior years. This error would have been caught as it was entered into the system, if a validation feature had been included in the online form.

When data errors are found, through either validity checks or audits, staff can visit local entities and provide training to improve their reporting practices.

Periodic audits of water use data can also improve the accuracy of reporting by pinpointing errors. When data errors are found, through either validity checks or audits, staff can visit local entities and provide training to improve their reporting practices. Additionally, the division could use local water conferences to provide training to local water systems on how to accurately report water use data.

More Resource Need to Be Dedicated to Collecting and Analyzing Accurate Water Data Annually. Currently, the Division of Water Rights has one staff person responsible for overseeing the reporting of local water use data. This person acts as an educator and auditor by attempting to obtain accurate water use data and by verifying the accuracy of the data. This is not a sufficient level of investment. To improve data reliability, which is essential for water management and planning, the Department of Natural Resources needs to devote more staff and resources to the state's water use database. A request to the Legislature for additional resources will be necessary to satisfy this important objective.

The Division of Water Resources does not have statutory authority nor have they adopted administrative rules requiring local water systems to submit water use data.

Division of Water Resources Should Be Given Statutory Authority to Validate Water Supply and Use Data

While ***Utah Code*** 73-10-15 requires state agencies to "cooperate with the Division of Water Resources in the formulating their state water plan," the division does not collect its own water use data. Instead, the Division of Water Resources relies on the Division of

Water Rights to gather the data it needs to perform its statewide planning responsibilities. The Division of Water Resources cited their lack of regulatory authority as one reason that they "must accept data submitted by each water system." They said, "the only verification that [the division] can do is utilize its engineering personnel and expertise to question some of the submitted data that looks suspect."

Because gathering accurate water use data is essential for managing and planning purposes, we recommend that the Legislature consider granting the Division of Water Resources statutory authority to validate the data submitted to the Division of Water Rights. Requiring local entities to submit accurate data should not be overly burdensome, as they should already be generating this information for their own purposes. The Division of Water Resources should have a role in improving this important data.

We Question the Reliability of the Division's Baseline Water Use Study

While the division's methods for estimating water use have improved in recent years, it still relies on its 2000 M&I study as a baseline for evaluating the state's conservation efforts.

In addition to our concerns about the source data, we also question the reliability of the division's 2000 M&I study. One concern is the lack of documentation of the methods used to prepare the report. In addition, the 2000 water study does not include any data for 2000, which is acknowledged in their report. Instead, the report consists of data from studies conducted during the prior eight years. Finally, because secondary water systems are not metered, much of the reported outdoor water use is based on estimates.

After issuing its 2000 M&I study, the division began to improve its methods for reporting water supply and use in the state. While the 2010 M&I study showed marked improvements in its methodology, the division still uses the 2000 study as the baseline for estimating future water use and evaluating the state's conservation efforts. We believe good data and a sound methodology should be used in studies that drive projections of future water use in the state.

Methods Used to Prepare Baseline Report Are Poorly Documented

Division staff were unable to adequately document their methodology or provide source documentation for the data used in their baseline 2000 M&I report. According to one division manager, "some staff members in the past just entered M&I use data into a spreadsheet as they would talk to people on the phone." Therefore, the manager reports the source data was not documented. Division management stated that while they trusted staff to enter the correct data, the accuracy of the study depends on the ability of local water system staff to report the data accurately.

Division staff were unable to document their methodology or provide us with source documentation for the data used in their baseline 2000 M&I report.

Because division staff were unable to document the source of the data used in their baseline study, we could not verify the accuracy of the reported data. Additionally, the methodology used was also difficult to document. For example, the division requires its staff to estimate the amount of secondary water used by some entities. However, without documentation of the methodology, we were unable to verify whether a reasonable and consistent method was used to estimate secondary water use. In addition, without proper documentation, the division's managers and supervisors would have been unable to verify if staff followed consistent procedures as they gathered the data.

2000 Baseline Study Contains Data That May Not Be Representative of 2000

The division's 2000 baseline study includes water use data from reports that span a period of seven years between 1992 through 1999. Variability in the weather and growing conservation efforts over these years, suggests that prior basin studies may not be representative of water use in 2000.

The 2000 M&I study is based on data from 1992 through 1999, which may not be representative of water use in 2000.

The division's 2000 baseline study acknowledges that the data used in the study was a combination of basin studies performed during the prior eight years. The preface of the 2000 study states:

> The Municipal and Industrial Water Supply Studies were completed for the eleven hydrologic basins with data collected for 1992 and up to the year 2000 from each of the over 450 water systems of the state. This statewide summary is a compilation of the data and can

> be considered, for reference purposes, to be representative of the statewide municipal and industrial water usage for the calendar year 2000.

Although the statement "up to the year 2000" suggests some of the data gathered was from 2000, we verified that all the data used in the study came from prior studies from 1992 through 1999. Even so, the division concluded that the basin studies conducted during the prior eight years were representative of the state's water use during 2000 and a per capita use of 293 gallons per day was reasonable. They said one reason they felt confident in their results was that 293 gpcd closely matches similar figures reported for Utah during the year 2000 by U.S. Geological Survey. However, the U.S. Geological Survey told us that their figures were based on the water production in the state, not metered use, and that the source production is normally higher than the use.

We question whether prior water studies are "representative of the …usage for the calendar year 2000." For example, water use data for Davis, Morgan, and Weber counties was gathered in 1992 but reported as if it were the use in 2000. During the eight years the data was gathered, the increased use of low flow appliances and a growing interest in water conservation should have led to a decline in water use. In fact, the division's own studies show a decline in potable water use of 6 percent between 1992 and 2001. In addition, during the 1990s, there was variability in the average temperature and rainfall from year to year, which would have affected outdoor water use. This variability in the weather in addition to growing conservation efforts suggest that prior basin studies may not be representative of the water use in 2000.

The divisions own studies show potable water use declined by 6 percent between 1992 and 2001.

The division's use of the 2000 study as a baseline measure is important for understanding of each river basin's performance. For example, in 2010, the division reported that the Weber River Basin had reduced its water use by 24 percent. That is a remarkable achievement in just ten years. However, it appears to be less of an accomplishment once we understand the reduction in water use actually occurred over 18 years.

Secondary Water Is Estimated Due to a Lack of Metered Data

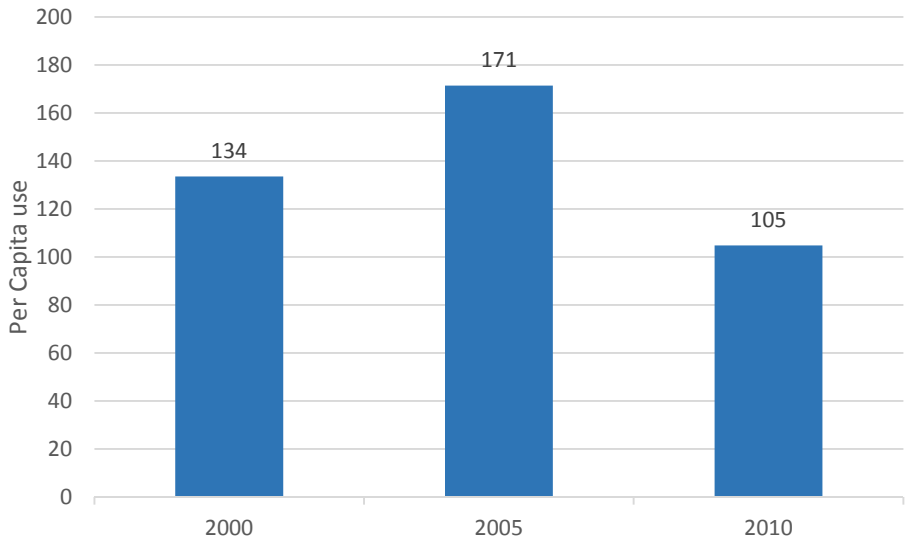
Due to the lack of metered data, the need to estimate secondary water use and the changes in methodology over the years, the accuracy of some of the division's secondary water use estimates are questionable. Swings in the water use figures described for the Weber River Basin are typical of many communities whose secondary water use was estimated by the division.

Secondary users are generally charged a flat rate for unlimited water use because secondary water is typically unmetered.

Secondary Water Use Is Based Largely on Estimates Rather than Actual Metered Water Use Data. More than half of Utah's public water systems offer secondary water. In about 30 percent of the systems, secondary water is the primary source of outdoor irrigation water. Secondary water connections are typically not metered and users often receive unlimited use for a flat fee. Because most secondary water use is unmetered, the division relies on its staff to estimate the amount of secondary water used in each community. This practice means about 23 percent of the water use reported by the division is not based on actual data but on staff estimates.

Changes in Methodology Undermine the Accuracy of Unmetered Water Use Estimates. An evolving methodology for estimating secondary water use has resulted in large swings in the reported data. The water use data reported for the Weber River Basin offers a good example of how changes in the methodology can affect water use estimates. The data, shown in Figure 2.3, shows large swings in secondary water use from one study to the next.

Figure 2.3 Estimates of the Weber River Basin's Secondary Water Use Show Inconsistencies. The reported secondary water use, which is not metered, shows large swings in the data.



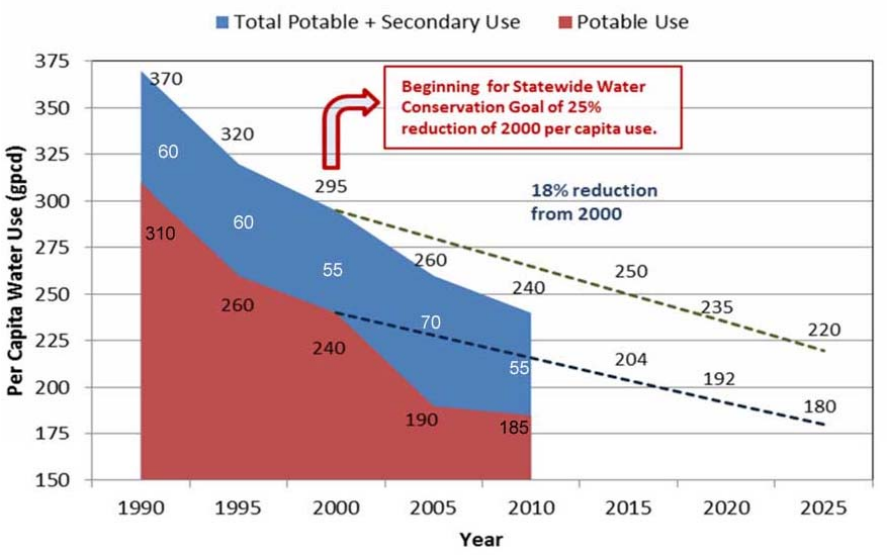
Source: Division of Water Resources' 2000, 2005, 2010 Municipal and Industrial Water Supply and Use Studies.
**Weber River Basin's data for the 2000 M&I study was gathered in 1992.*

Estimates of secondary water in Weber Basin show large swings in water use due to methodological changes.

Figure 2.3 shows the division's estimates of Weber Basin's secondary water use over the years. According to the division's estimates, secondary water use increased 28 percent in 2005 and then declined 39 percent in 2010. Because these numbers are not based on actual metered data, are not affected by wet or dry years or by changes in the population served, we attribute these swings to changes in the methodology used to estimate secondary water use. Such large swings are common in the division's water use studies, casting doubt on the accuracy of the division's secondary water data.

Methods Used for Estimating Secondary Water Add Uncertainty in the Accuracy of Utah's Water Use Projections. Figure 2.4 is a chart often used by the division to show the state's progress toward its water conservation goal. The goal is to reduce water use at least 25 percent below the level of use in 2000 by 2025.

Figure 2.4 Utah's Water Use Since 1990. Volatility in the reported secondary water use raises doubts about the comparability of past water studies. It also raises questions about the accuracy of the report that water use has declined by 18 percent from 2000.



Source: Division of Water Resources

Figure 2.4 shows large fluctuations in secondary water use (shown in blue) during 2000, 2005, and 2010. It shows that the secondary water use in 2000 was 55 gpcd. This is the difference between year 2000's total water use of 293 gpcd and the potable use of 240 gpcd. In 2005, that reported secondary water use rose to 70 gpcd. Then it declined to 55 gpcd in 2010. These swings in the reported use are explained, in part, by the use of different methods to estimate secondary water use.

Over the years, the division has improved its methods for estimating secondary water use. We believe the most recent estimates are more accurate than prior year estimates. Unfortunately, by changing the methods used, the division has made it difficult to compare the results of different M&I studies. For example, Figure 2.4 shows that from 2000 to 2005 secondary water use increased 27 percent from 55 to 70 gpcd at the same time that potable use declined by 21 percent from 240 to 190. These results suggest contradictory trends in water use. Due to concerns about changing methodologies, we do not know the extent to which the changes in reported use were due to the new estimating methods or whether they were due to actual changes in water use.

Over the years, the division has improved its methods for estimating secondary water use.

A consistent methodology and accurate water use data are both necessary to prepare a reliable baseline estimate of the state's future water demand. The current projections are based on a 2000 M&I study which indicates that water was used at a rate of 293 gpcd. Due to concerns with the accuracy of the source data as well as methodology used, we cannot validate the accuracy of 293 gpcd or the projections of future water demand, which is as discussed in the next chapter.

Recommendations

1. We recommend that the Division of Water Resources review water use data annually to perform trend analysis.

2. We recommend that the Department of Natural Resources work with state water agencies to develop an efficient and effective system of collecting accurate water use data from public water providers. Methods that should be considered include:

    a. Making local water managers responsible for submitting accurate water use data more accountable by requiring them to sign their report and identify their position and credentials.

    b. Incorporating a routine data edit check feature in the online data collection form that is used to validate the accuracy of the data submitted by public water providers.

    c. Validating the accuracy of water use data by comparing it to other sources with similar information.

    d. Conducting data validity checks, periodic audits, and training of local water systems to verify the accuracy of water supply and use data.

    e. Committing additional staff and resources to improving the state's water use database.

3. We recommend that the Legislature consider giving statutory authority to the Division of Water Resources to validate the annual water use reported by public water providers.

Chapter III
Conservation and Policy Choices Can Reduce Demand for Water

Chapter III examines the division's estimates for future water use.

The Division of Water Resources (the division) projects that Utah's demand for water will exceed its currently developed supply by 2040. This projection is based on the assumption that per capita water use will not decline after the year 2025 when the state is expected to reach its current goal to reduce water use by 25 percent. However, we believe, current trends suggest per person water use in Utah should continue to decline for the next several decades. If use does decline further, then the date when water demand exceeds supply may be delayed. In addition, water demand can be further reduced depending on how policy makers respond to certain policy choices. For example, policymakers should consider whether to require universal metering of secondary water and whether to further promote pricing structures that encourage conservation.

Conservation Will Lead To Less Water Use

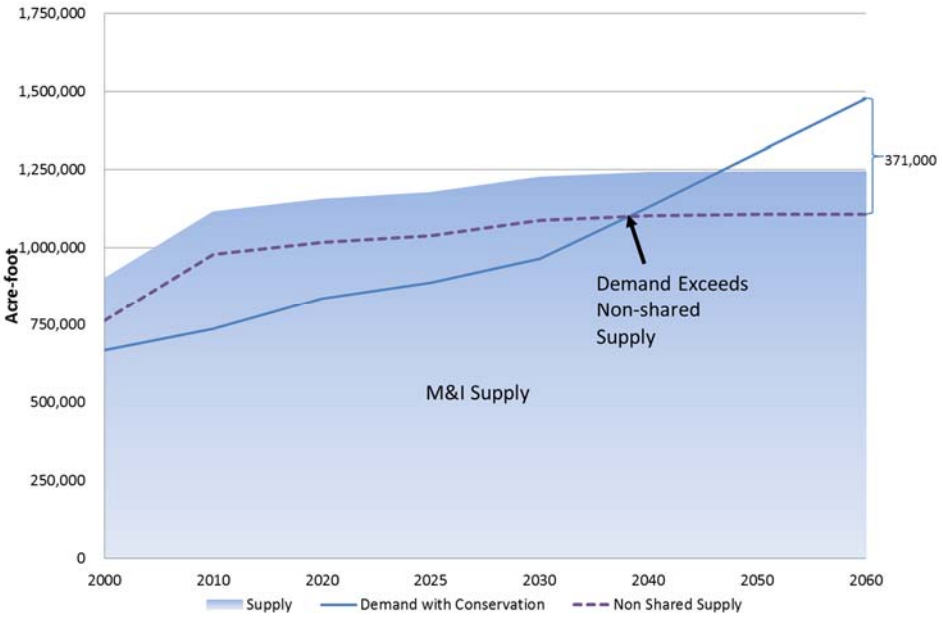
We question the division's projected demand for water, which assumes the average Utah resident will consume 220 gallons per day through the year 2060. The accuracy of this projection is uncertain for a number of reasons. First, the projected water use of 220 gpcd is based on a 2000 baseline water study, which, as described in Chapter II, may not be reliable because of a lack of documentation and methodological concerns. Second, other western states use less water than Utah, suggesting that Utah residents may be able to reduce their water use. Third, ongoing trends towards conservation should continue to reduce per capita water use by more than the state's 25 percent conservation goal. The division has stated they intend to update the goal once it has been met.

Accuracy of Water Demand Projections Are Uncertain

The division relies on its 2000 M&I study as the basis for projecting the state's future demand for water. The study was based on a survey of all public water systems between 1992 and 1999. Based on

those surveys, the division determined that statewide water consumption was about 667,000 acre-feet in 2000. That equals about 293 gallons per person per day (gpcd). The division's projection of future water demand assumes that each river basin will achieve the state's conservation goal. That is, each basin will reduce water use by 25 percent by 2025, which will equal a statewide average use of 220 gpcd. When projected out to 2060, when the state's population is expected to be 6 million, statewide demand for water will be nearly 1.5 million acre-feet per year. See Figure 3.1.

Figure 3.1 Utah's Projected Municipal and Industrial Water Demand and Supply. The division projects that the demand for water in Utah will begin to exceed the current non-shared supply by about 2040.



Source: Adapted from a Division of Water Resources' figure.

According to division projections, the water supply deficit will grow to 371,000 acre-feet by 2060.

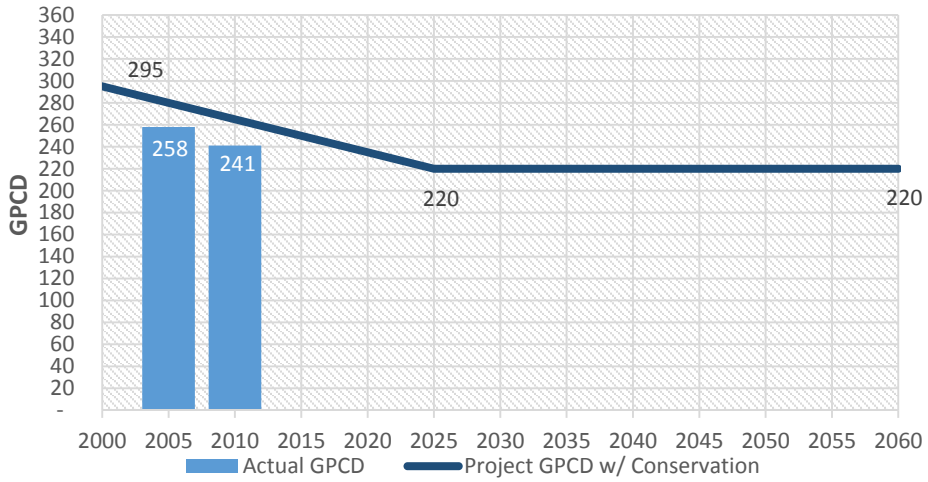
According to the above figure, even if the state's conservation goals are achieved, the state's currently developed supply will run out around 2040. From that point, the water supply deficit is projected to grow to 371,000 acre-feet by 2060. Concerns about the reliability of the state's water use data, as discussed in Chapter II, not only undermine the reliability of the division's water demand projections, but also contribute to uncertainty about progress toward the statewide conservation goal.

We Question Whether 220 GPCD Is a Reasonable Goal. As reported in Chapter II, the accuracy of the division's baseline water demand projection of 293 gpcd could not be validated. Because the state's conservation goal assumes a 25 percent reduction of that amount by the year 2025, we are equally unsure if the statewide conservation goal is reliable. While we agree that water consumption rates have and will continue to decline, without reliable water use data, we question whether 220 gpcd actually is a reasonable goal. Better water use data would help us to conclude whether a lower or higher goal is achievable.

The Division's Current Goal Assumes Future Water Demand Will Not Continue to Decline after 2025. Using the state's current conservation goal of reducing water use by 25 percent, the projection assumes that once this goal is achieved, no further reductions will occur after 2025. We disagree with this assumption. Figure 3.2 shows the division's projection of daily per capita water use through 2060.

The division assumes that once the state's water conservation goal is achieved, and water use is reduced by 25 percent, no further reductions will occur after 2025.

Figure 3.2 Utah's Per Capita Water Use Projection by Year. The division assumes the state's per capita water use will gradually decline to 220 gpcd by 2025 and remain at that level through 2060.



Source: Division of Water Resources 2000, 2005, 2010 Municipal and Industrial Water Supply and Use Studies.

Figure 3.2 shows water consumption rates declining until 2025, when the state conservation goal of 220 gpcd is projected to be reached, at which point, per capita water use will continue at that rate through 2060. Also shown (in blue bars) is the actual water use, as reported by the division, for 2005 and 2010, which shows the state is progressing well ahead of its conservation goal. Based on this data, the

Actual water use indicates that the state is progressing well ahead of its conservation goal.

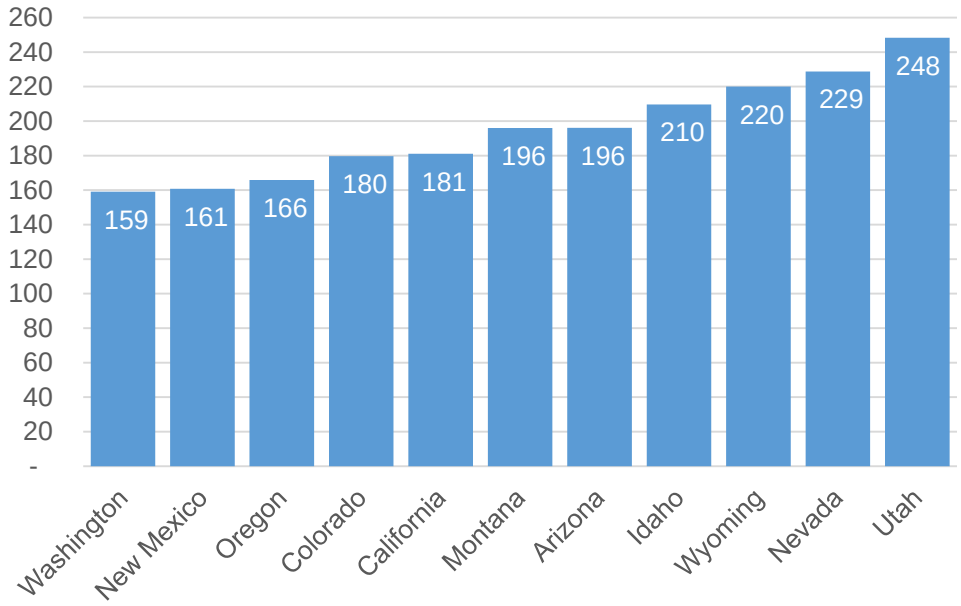
division appears overly cautious in projecting that water use will drop no lower than 220 gpcd for 35 years. Other states' water use also supports the likelihood of future use reductions below 220 gpcd.

Neighboring States Use Less Water and Have Lower Conservation Goals than Utah

According to the U.S. Geologic Survey, Utah has the highest per capita water use in the nation. Figure 3.3 compares M&I and residential water use in Utah to that of other western states.

Utah has the highest per capita water use of western states.

Figure 3.3 A Comparison of Water Use Among the Western States. At 248 gpcd, Utah's municipal and industrial water use, as well as residential water use, is reported to be the highest of these 10 western states.



Source: Estimated use of water in the United States in 2010: U.S. Geological Survey Circular 1405, 2014
Note: Use only includes water from public providers.

Most western states are at or below Utah's goal of 220 gpcd.

We recognize there are unique climate conditions, different reporting methods, and other factors that can lead to different rates of water use from one state to another. However, the differences in water use shown in Figure 3.3 are so large that they raise questions about why the division should expect Utah residents to consume so much more water than the residents of neighboring states. If per capita water use in most other states is already well below 220 gpcd, it is difficult to justify the division's current projection that Utah's water use will not drop below 220 gpcd after 2025.

We could not find many other states with conservation goals to compare to Utah's projected demand of 220 gpcd in 2060. Only California has a statewide conservation goal which is to reduce water use to 154 gpcd by the year 2020. However, we find one regional comparison that is insightful. The Southern Nevada Water Authority, which serves the Las Vegas region, has a goal to reduce water use to 199 by 2035. In contrast, the communities in Southwestern Utah, which have a climate that similar to that of Southern Nevada, have a goal to reduce water use to 292 gpcd by the year 2060.

Conservation Trends Will Continue To Reduce Utah's Water Use

Trends towards greater conservation suggest that per capita water use will continue to decline after Utah has reached its current water conservation goal of 220 gpcd. Research suggests outdoor water use in Utah is not very efficient. In addition, declines in residential lot sizes indicate a trend towards lower per-household use of outdoor water. Similarly, improved efficiencies of low-flow appliances suggest indoor water use can achieve further declines as well. Besides these examples, the division has identified an array of other conservation practices that will continue to reduce water use.

Landscapes Still Receive Too Much Water. Even though the state's "Slow the Flow" campaign seems to have helped reduce wasteful watering practices, USU researchers suggest there is still opportunity to reduce outdoor water use. The USU Center for Water-Efficient Landscaping conducted a 10-year study of outdoor watering practices in Salt Lake City. The researchers found that, as recently as 2010, residents were applying twice as much water as needed for their plants to be healthy. If instead, they were to use the efficient watering techniques recommended by the USU Center, the amount of water used for outdoor irrigation could be reduced by 26 percent.

USU researchers found that residents were applying twice as much water as needed for their plants to be healthy.

Trend Towards Smaller Lot Sizes Should Reduce Outdoor Water Use. Envision Utah is a regional planning organization that promotes quality growth in the state. It reports that, since 1998, the average lot size along the Wasatch Front has declined from 0.32 acres to 0.25 acres. Smaller lots should result in less irrigated landscaping. According to one of Envision Utah's urban planners, the trend towards smaller lots should continue as the state's population grows.

Declines in average lot size should result in less irrigated landscaping and a decline in outdoor water use.

Because 44 percent of M&I water use is for residential outdoor watering, a decline in average lot size will likely reduce the overall demand for water. However, a trend towards reduced household size may offset some of this reduction in per capita use.

Low-Flow Fixtures and Appliances Will Continue to Reduce Water Use. The use of low-flow fixtures and appliances is one of several factors that led to the division's belief that water use would decline by 25 percent. Based on a 1994 study, the division predicted a 7.5 percent decline in water use would be achieved as Utah residents installed low-flow toilets and showerheads. Recent information suggests that the water saved through use of low-flow fixtures and appliances may be even more than the division's original estimate.

Recent information suggests that the water saved through use of low-flow fixtures and appliances may be exceed the division's original estimate.

Since 1994, other appliances, such as washing machines and dishwashers have also become more efficient. For example, the EPA reports that washing clothes represents nearly 22 percent of indoor water use and that new high-efficiency washers can reduce water use for clothes washing by nearly half. This means that, as outdated household appliances are replaced, indoor water use will continue to decline. This information is not reflected in the state's current water conservation goal. In addition, the division's original estimate of a 7.5 percent reduction in water use was based on a 1994 study of low-flow toilets and showerheads.

Other Conservation Best Practices Will Continue to Reduce Water Use. The division's water conservation plan identifies best management practices that include: outdoor watering guidelines and ordinances, commercial and residential water audits, retrofit, rebates, universal metering, incentive programs, and leak detection and repair programs. Although difficult to quantify, we believe these practices will continue to be implemented throughout the state and continue to reduce water use.

Conservation efforts suggests a strong possibility that Utah's per person water use will continue to decline after 2025 and could be less than 220 gallons per person per day in 2060.

In conclusion, opportunities to continue reducing per capita water use remain abundant. This information suggests a strong possibility that Utah's per person water use will continue to decline after 2025 and could be less than 220 gallons per person per day in 2060. Better data, thoroughly analyzed, is needed to inform policymakers.

Some Regions Can Reduce Water Use Beyond the Statewide Goal of 25 Percent

Some river basins have the ability to reduce water use much more than the state goal of 25 percent. In fact, two river basins already met that goal by 2010, and two other regions have nearly met the goal. This is another reason we think the state's long-term projected use of 220 gallons statewide is too high. Rather than applying the same 25 percent conservation goal to all basins, the division should establish a new set of conservation goals that reflect each region's unique conditions and ability to conserve.

Division Has Already Established New Goals for Some Regions

When the division completed its 2010 M&I study, two river basins had already achieved the state's conservation goal to reduce water use by 25 percent. Those basins are the Kanab Creek/Virgin River Basin and the Cedar/Beaver Basin. In response, the division established a new conservation goal for both of those two basins. The new goal is to reduce water use by another 10 percent by 2060.

Two basins have already met the 25 percent water conservation goal prior to 2025 resulting in new conservation goals.

The 2010 M&I study also showed that the Sevier River Basin and the Weber River basin had reduced their water use by 24 percent. However, even though those two basins nearly accomplished the statewide conservation goal, the division decided not to revise their goals until they had fully completed the goal to reduce water use by 25 percent. Thus, the division continues to project that these two river basins will reduce their water use by 25 percent by the year 2060.

We believe these examples raise questions about the division's approach to setting conservation goals and its use of those goals as the basis for projecting future water use in the state. The division began by applying the same statewide conservation goal to all river basins. Once a region met the goal, a new goal was set for that region. However, the statewide projection of water demand, which is based on the conservation goal, was not adjusted. In order to provide better long range projection of the state's future water needs, the conservation goal should be established based on the best, most recent information available and then regularly adjusted as new information becomes available. The projected demand should then be updated to reflect the new goal as well. The division maintains that once the

state's goal has been met they will revise the goal and update water use projections.

Water Use Projections Do Not Account for Each Region's Unique Ability to Conserve

We are concerned that the division's conservation goals do not reflect the unique ability of each region's ability to conserve. Rather than applying the same 25 percent goal to each region, the division should establish conservation goals on the unique conditions that drive water use in each river basin.

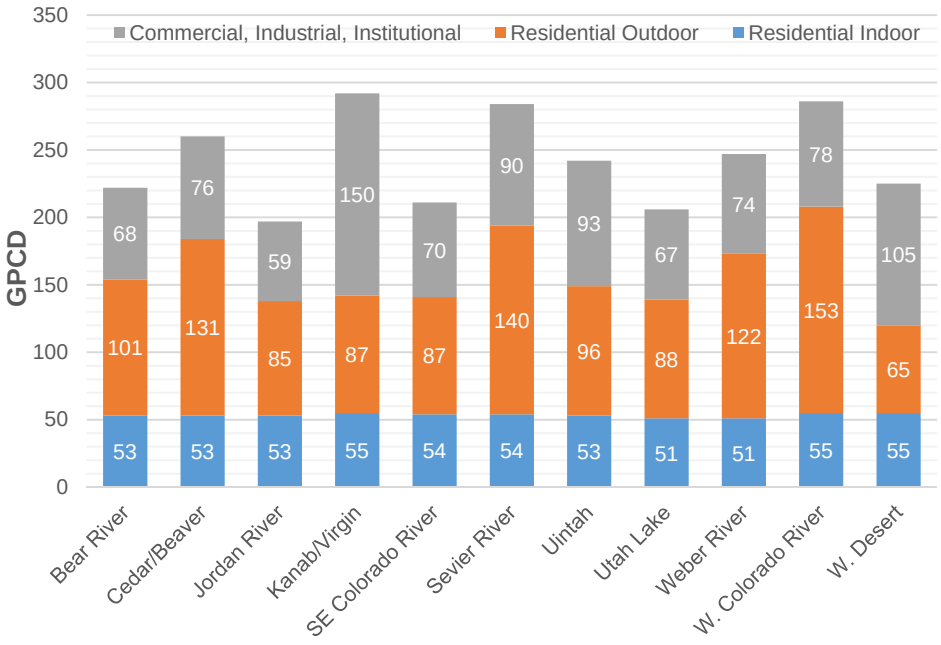
Each river basin will have a different demand for water and a different capability to reduce that demand.

Some River Basins Have a Greater Ability to Conserve than Others. By 2060, the division projects that some basins will still have much higher rates of water use than others. The reason is that the division assumes that each river basin should reduce its levels of water use by the same 25 percent goal, rather than considering each river basin's unique circumstances and ability to conserve. Due to differences in climate conditions, types of industry, and outdoor watering practices, each river basin will have a different demand for water and a different capability to reduce that demand.

Figure 3.4 shows the daily per capita water use each river basin will achieve in 2060 if it meets the state's goal to reduce water use by 25 percent. The water use is broken down into three categories: (1) residential indoor, (2) residential outdoor, and (3) commercial, industrial, and institutional (CII) water use. The indoor use (in blue) is about the same for each region. Larger differences are observed in the residential outdoor use (in orange). In that category, West Desert Basin uses the least at 65 gpcd, while the West Colorado Basin uses the most at 153 gpcd.

The third water category shown in Figure 3.4 is the water use by commercial, industrial and institutional users (in grey). The chart shows that water use by CII users is the lowest in the Jordan Valley Basin at 59 gpcd, while the Virgin River/Kanab Creek region has the highest at 150 gpcd. It should be noted that the Virgin River/Kanab Creek basin is the only one that includes water use at second homes in the CII category.

Figure 3.4 By 2060, the Division Projects Large Differences in the Per Capita Water Use Among the River Basins. For most river basins, the projected water demand represents a reduction by 25 percent of each basin's water use in the year 2000. For some basins, the goal has been increased to a 35 percent reduction of the 2000 water use.



Source: Prepare 60, "Roadmap of Utah's Future Water Development and Infrastructure."

Some regional differences in water use should be expected. For example, one river basin may have larger residential lots, or a climate that requires more outdoor watering than others. However, there is also evidence that some of the differences point to greater opportunities to conserve.

Weber River Basin Should Be Able to Make Additional Reductions in Its Water Use beyond the State Conservation Goal. The Weber River Basin is a region which appears to have a much greater opportunity to conserve than others. For this reason, the division should consider setting a more aggressive conservation goal for that river basin.

Weber River Basin use much more residential outdoor water than surrounding basins.

The outdoor residential water use in the Weber River Basin is quite high when compared to other regions, mainly because of the region's high rate of secondary water use. The division reports that 70 percent of total outdoor water use in Weber River Basin is provided by secondary water systems. The users of those secondary systems

water pay a flat fee for virtually unlimited use of irrigation water. This practice has led to higher residential outdoor water use than in neighboring river basins. As shown in Figure 3.4, per capita residential outdoor water use in the Weber River Basin is 122 gpcd compared to 88 gpcd in Utah County and 85 gpcd in Salt Lake County.

Because they have a greater opportunity to conserve, we think the division should expect a greater reduction in water use in the Weber River Basin than the Salt Lake or Utah Lake basins. In fact, the general manager of the Weber Basin Water Conservancy District agrees. He reports that unmetered secondary water use is the main reason water use is much higher in that river basin than in other basins along the Wasatch Front. Furthermore, he said that the district has begun to install meters on its secondary connections. As it does so, he predicts that the basin's outdoor residential water use will drop below the current projections.

Goals for the Kanab Creek/Virgin River Basin Should Be Based on an Analysis of Unique Conditions in That Region. The Kanab Creek/Virgin River Basin is another region that has unique conditions driving water use. As shown in Figure 3.4, the Kanab/Virgin River basin has high commercial, industrial and institutional use (or CII, shown in grey). The division's water conservation goals and projected use should reflect these unique conditions.

Water use in the Kanab Creek/Virgin River Basin is affected by the large number of tourists who visit the area and by the prevalence of second homes.

According to a local water district manager, the high rate of water use by visitors to the region is the main cause of the high CII water use in the Kanab/Virgin River Basin. Washington County has a large number of hotels, restaurants, golf courses, and second homes. Those facilities serve visitors who consume water but do not permanently reside in the area. The division should consider whether visitors' water use will grow at same pace as use by the region's permanent population. Ideally, the division's projection for the demand in the Kanab/Virgin River Basin should reflect a separate analysis of the likely growth in the CII category, rather than just assuming it will be proportionate to the growth in the permanent residential population. By considering the unique conditions that drive water use in a region, the division can improve the accuracy of its projections of Utah's future demand for water.

Division Should Not Wait to Update Its Projections of Future Water Use

The division has acknowledged that water use will likely decline after the current conservation goal is met. The division reports, "it appears the 25% conservation goal will be met soon…." The division also reports that they plan to wait until the current goal is "reached [before] another goal will be implemented…." However, we believe if the goal does not reflect their current expectations for the state's future water use, then the division should update its projections.

The division will wait to change the state's conservation goal once the current goal has been reached.

State policy makers have recently been presented with a proposal that the state establish financing for billions in new infrastructure projects. The division should provide them with the most up-to-date, accurate projections regarding the state's future water needs. Next year, the division will conduct a new statewide water study for 2015. The 2015 M&I study should be used to establish new water conservation goals that reflect each basin's ability to reduce its water use as well as new projections of each river basin's water needs.

The timing for developing costly new infrastructure projects is uncertain and depends on changing water use patterns, and population estimates. Climate change is also an important consideration, according to the division. As new water use information and population estimates become available, the division should update its projections of future water demand accordingly. A range of projections, as recommended in the 2014 Utah Foundation Report[2], could help the division better plan for Utah's future water needs by anticipating future water demand under a range of different population projections and water use levels. Scenario forecasting will improve planning efforts by pinpointing when costly projects that add additional water supply are needed.

State Policies on Metering and Pricing Can Affect Water Demand

Utah is fortunate to have some of the lowest-priced water in the nation. Historically this is due, in part, to a favorable climate and a gravity fed delivery system that is relatively close to much of Utah's

[2] Utah Foundation, "Flowing Towards 2050," September 2014

population. Pressures on Utah's currently developed water supply are projected to intensify with population growth. Unless water demand is reduced, new sources of supply will need to be developed and delivered from greater distances, resulting in increased costs. Given these costs, policies aimed at reducing per capita water use need to be prioritized.

Policymakers have a variety of options for reducing per capita water use. One option is to require the metering of all water service connections, including secondary connections. Metering promotes water savings through better water management and the ability to charge water users according to their use. Another option is for policymakers to alter the way water is priced. In additional to being relatively inexpensive, Utah's existing price structure does not adequately encourage conservation.

In additional to being relatively inexpensive, Utah's existing price structure does not adequately encourage conservation.

Metering Secondary Use Will Reduce Water Demand

Many Utah communities rely on unmetered secondary water systems for outdoor irrigation. Secondary water use is generally not metered. Two water systems that have placed meters on their secondary connection are finding that metering lowers water use. State and local policymakers should consider requiring metering of all secondary connections, as other states have done.

Twenty-three percent of the states total water use is from secondary water users, which use is generally not metered.

Metering Secondary Water Use Has the Potential to Greatly Reduce Utah's Water Use. Because 23 percent of water use is secondary water and is generally unmetered, it can have a large impact on future water demand. In its 2014 water conservation plan, the division recommended adopting universal metering "as soon as economical technology permits." Metering secondary water reduces water demand and promotes water management by encouraging:

- Accounting for water produced and delivered
- Providing consumers with information regarding use
- Detecting unaccounted water, such as leaks and waterline breaks
- Identifying possible water waste

When connections are unmetered and unlimited use is offered for a flat fee, residents generally have much higher rates of consumption. A 2011 study on Weber Basin Water Conservancy District's (WBWCD)

supply and demand indicated that per capita water use in unmetered secondary service areas resulted in 47 percent more water consumption than in metered potable service areas. In addition, those regions where secondary water is widely available tend to use more total water than those regions where secondary water is not available.

Utah Water Systems Are Moving Toward Metering. The City of Saratoga Springs plans to install meters on all its secondary connections by the end of 2015. Similarly, the WBWCD reported installing nearly 2,000 meters on some of its secondary connections. Three years after the first secondary meters were installed, WBWCD reported that water use declined by about 25 percent on the metered connections. This result was achieved without changing the flat rate pricing structure for their secondary water use. However, there is a significant cost to install meters on secondary connections. According to WBWCD's cost-benefit analysis, metering secondary connections is cost effective because reductions in water demand delay the costs of adding new water development.

Weber Basin Water Conservancy District has installed nearly 2,000 metered since 2010 resulting in a 25 percent reduction from metered users.

Some States Have Laws Requiring Metering. Arizona, California, Colorado, and Washington have adopted laws requiring that all use of public water systems be metered.

- Arizona requires all municipal service connections within active management areas to be metered, allowing for some exemptions.
- California requires meters to be installed on all connections by 2025 and fees to be based on the volume of water used.
- Colorado law requires "Every water supplier providing water in this state shall provide a metered water delivery and billing service" and allows for total cost of providing such services to be reflected in water rate increases.
- Washington implemented a water use efficiency program, which required production meters to be installed by 2007 and all service meters to be installed by 2017.

Many surrounding states have passed legislation to ensure all water connections are metered.

While secondary systems are not as common in these other states, Utah's Legislature should consider requiring metering all service connections, including secondary connections. If secondary water use

is metered, it can be more effectively controlled and possibly priced, as discussed in the next section.

Pricing Policies Will Impact Utah's Future Demand for Water

Utah residents pay some of the lowest water prices in the nation and consume more water than residents in other states. Because pricing influences the demand for water, policymakers should examine water-pricing policies as well as how water systems are funded. Tiered pricing structures have been used effectively in other states to reduce the demand for water, and if implemented, could reduce demand in Utah. Policymakers should also review current tax subsidies, which reduce water rates but also affect demand for water.

The cost of water in Utah is expected to increase as new water projects are constructed and ailing water infrastructure is repaired and replaced. As these projects are undertaken, imposing higher prices on ratepayers, policymakers should consider designing a rate structure, such as conservation pricing, that shifts the bulk of those costs to high volume users.

Salt Lake City's water rates are lower than nearly every other city surveyed.

Utah Residents Pay Relatively Low Water Rates. Circle of Blue, an independent, non-partisan journalism organization, compared the price of water in 30 major U.S. cities (see Appendix A). Salt Lake City's water rates are lower than nearly every other city surveyed. When comparing the average monthly bill for a family of four using 100 gallons of water per person per day, Phoenix charges 30 percent more, Las Vegas charges 36 percent more, and Santa Fe charges 82 percent more than Salt Lake City for water. Because Salt Lake City's rates are average for Utah, the data suggests Utah residents pay relatively little for their water.

According to the division's 2010 report titled *The Cost of Water in Utah,* several factors contribute to Utah's relatively low water costs:

> Utah's climate and geography make it possible for high quality water to be gravity fed into the larger urbanized areas of the state. After Utah was settled, there were several large water development projects funded by the state, as well as the federal government. These, coupled with water use conversion from agricultural irrigation to

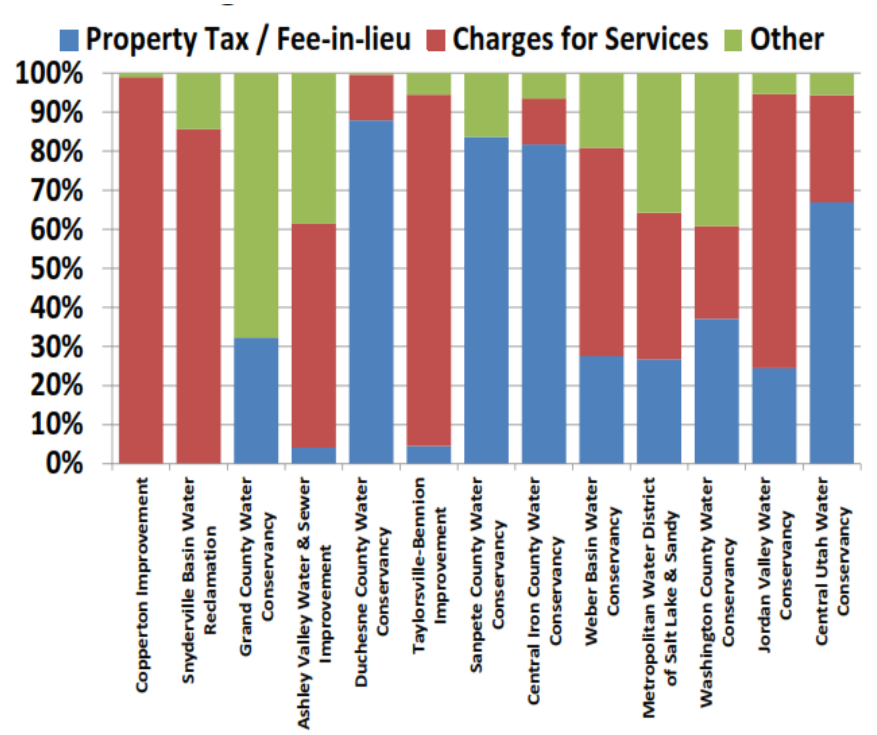
Municipal and Industrial (M&I) and low energy costs, have all contributed to low water costs in Utah.

This report also cites Utah's impact fees and property taxes as additional reasons why Utah water rates are low.

Similarly, a report by the Office of Legislative Research and General Counsel (OLRGC) also describes the common use of property taxes to subsidize water use. In a 2010 briefing paper titled How Utah Water Works, OLRGC includes the following figure describing the revenue sources for various water conservancy districts. The figure includes three categories: property tax/fee-in-lieu, charges for services, and other. The other category includes grants and interest.

Several factors, such as climate, geography, federally funded water development projects, and tax subsidies contribute to Utah's relatively low water costs.

Figure 3.5 Property Taxes and Charges for Service as a Percent of Total Budget, Selected Local Entities. One reason water prices in Utah are low is that many water conservancy districts rely heavily on local property taxes and other fees unrelated to water use.



Source: Office of Legislative Research and General Counsel from the District Financial Statements Submitted to Utah State Auditor.

Property tax revenue made up 70 percent of the income for Central Utah Water Conservancy District in 2012.

OLRGC reports that "since higher prices tend to influence consumer behavior by reducing the quantity demanded, use of a general tax like the property tax is more likely to increase the amount of water used, compared to a system relying only on user fees." For example, Central Utah Water Conservancy District received $48 million from property taxes in fiscal year 2012 equating to nearly 70 percent of the district's total revenue. While water providers prefer the existing pricing structure, because it provides a stable revenue source, the existing structure promotes the overuse of water.

Infrastructure Repair and Replacement Costs Need to Be Funded. Another reason the price of water in Utah is low is that water users are not paying the full cost of maintaining the system's infrastructure. Local and regional water managers describe a growing deficit in major system repairs and replacements with an estimated total cost of $18 billion. It is unclear which portion of these costs will be paid for by existing sources of revenue and which portion will require new sources of revenue. The cause of this problem, according to two consultants that perform water rate studies, is that most cities have not created sufficient capital reserve funds to repair and replace their aging water systems.

Most cities have not created sufficient capital reserve funds to repair and replace their water systems.

Given the importance of maintaining the public water infrastructure, good plans and polices are needed. Ideally, water providers should establish restricted reserve accounts to repair and replace existing infrastructure when needed. However, water prices must be set high enough to adequately fund these restricted accounts. If not, alternative funding sources will be needed.

One such funding source was identified in the 2015 General Session. Senate Bill 281 established the "Water Infrastructure Restricted Account" that can be used for the "repair, replacement, or improvement of federal water projects for local sponsors in the state of Utah when federal funds are not available." While this account only addresses maintenance costs associated with federal water projects, it acknowledges a funding need. In addition, the bill does not address the gap between water user fees and repair and replacement costs.

In conclusion, a number of factors contribute to Utah's low water prices. These include the low cost sources of water, the tendency to subsidized water use through property taxes, and underfunded repair and replacement needs. Pricing water below cost prevents normal market forces from taking effect; no strong pricing signal leads consumers to use the resource efficiently. As a result, according to the most recent U.S. Geological Survey in 2010, Utah ranks highest among all the states in per capita residential water use (see Figure 3.3). Existing price structures also contribute to Utah's high water use, as described in the next section.

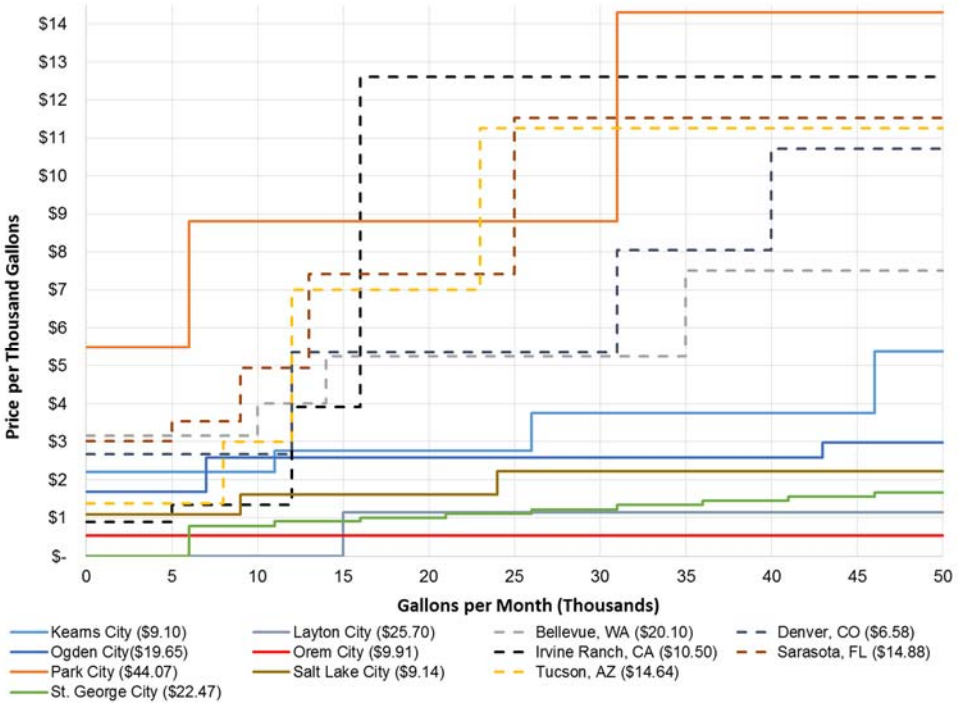
Pricing water below cost prevents normal market forces from taking effect; without a strong pricing signal, consumers are not led to use the resource efficiently.

Utah's Existing Price Structure Does Not Adequately Encourage Conservation. Conservation pricing, or increasing block rates, is a form of water pricing that incentivizes efficient water use through water price signals. For example, the first block rates are kept relatively low and cover basic water needs. The price paid for each additional block of water increases as residential water usage increases resulting in higher rates for excessive water use. The Division of Water Resources acknowledges in their 2014 water conservation plan, "very positive results for agencies that have implemented [conservation pricing]." In fact water systems receiving state water loan funds implement an incentive pricing structure to their rates.

We found that the majority of current rate structures used in Utah do not adequately encourage water conservation. Figure 3.6 shows the rates for a select number of Utah cities. It shows that some Utah cities charge a flat fee for water use. For comparison purposes, we have included the pricing structures for a few cities in Utah (solid lines) and other western states (dashed lines) that use more pronounced block rate structures to incentivize conservation.

Utah cities have less pronounced block rate structures compared to cities in other states. The solid line indicates cities in Utah and the dashed line indicates cites outside of Utah.

Figure 3.6 Comparison of City Water Rate Structures. Some Utah cities have increasing block rate structures, but the rate increases are relatively flat when compared to cities in other states.



Source: City Water Departments
Note: Monthly base fee in parentheses next to city name.

Figure 3.6 shows that, with a few exceptions, Utah cities tend to have relatively flat rate structures. Orem City's rate structure (in solid red) is completely flat. Flat rate structures do little to encourage conservation because higher water use is not penalized with significantly higher fees. In contrast, Park City's rate structure (in solid orange) offers a greater incentive for water users to conserve. The figure also shows several cities from other states with more pronounced block rate structures. Of course, comparing water rate structures across cities and states is difficult because differences in climate and geography affect the use and cost of water.

Research indicates that conservation pricing can be an effective tool for reducing water demand.

Research indicates that conservation pricing can be an effective tool for reducing water demand. For example, California's Irvine Ranch Water Conservancy District, which is well known for its water conservation efforts, implemented a block rate water pricing structure with large incremental increases in the rates charged. Irvine Ranch reports that since the pricing structure was adopted, per capita water consumption has dropped by 50 percent. Similarly, the Southwest Florida Water Management District reports that its block rate

structure reduced water consumption. The district found that after adopting a block pricing structure, consumers who could not access secondary water source reduced their water use by 13 percent.

Before pricing structure are altered in Utah, it is important that policymakers consider the potential effect that water rate structures can have on have on water system revenues. Planning for conservation pricing's effect on water demand must be done carefully to avoid subjecting a water system to unstable revenues.

Policymakers Can Alter Water Demand Through Pricing Policies. State legislators and other policymakers should study the potential benefits of policies that promote the efficient use of water in the state. The Governor proposed, for fiscal year 2016, a study of water pricing:

State legislators and other policymakers should study the potential benefits of policies that promote the efficient use of water in the state.

> Utah should conduct a comprehensive water funding, pricing, and usage study to understand the full costs of water in the state; how those costs are allocated among water users and taxpayers; state budget considerations; and how potential changes in water pricing and infrastructure could affect future water use, system planning and development.[3]

Policy recommendations found in the Utah Foundation's 2014 report echo the need to study pricing policy options. Specifically the report recommends that policymakers "Re-examine the role of property tax funding for water agencies, with a goal of reducing tax support and increasing water rates" and "Create more significant price gradations in block-rate water plans."

We agree with the Governor and the Utah Foundations recommendations that a study of pricing policies is needed to manage water demand. We suggest a review of the following questions:

- **Should Property Tax Subsidies of Water Be Eliminated or Reduced to Help Control Water Use?** Property taxes provide a stable source of revenue to some water districts. However, if water rates do not represent the full cost of water service, users may overuse the resource. By reducing

[3] Investing in the Future of Utah, Budget Recommendations, Fiscal Year 2016, Page 63.

property taxes for water and increasing prices on water use to be revenue neutral, consumers would be empowered to make market-based decisions. Policymakers will need to weigh the benefits of market-based pricing against the risk of subjecting water districts to less stable sources of revenue.

- **Should Water Rates Cover the Full Cost of Repair and Replacement of Existing Water Facilities?** Without question, existing public water infrastructure must be maintained. However, the source of funding for major infrastructure repairs and replacements is unclear. Policymakers should consider the extent to which these costs should be included in the prices charged to water users. To accomplish this objective, water systems may need to make regular contributions to a capital facilities replacement account.

- **Should Conservation Pricing Be Used to Promote Efficient Water Use?** A well-crafted conservation pricing structure can ensure that efficient water users are rewarded with relatively low rates, while high volume users pay a larger share of water system costs.

Considering the effect water pricing can have on the future demand for water, we recommend that the Legislature examine the pricing policy options discussed above. Such a review by policymakers is timely. With water costs expected to increase, decisions must be made about how to reduce water use and how costs should be shared between water users and taxpayers.

Recommendations

1. We recommend that the Division of Water Resources work with local water providers to create conservation goals for each river basin. The new goals should reflect each basin's individual capacity to conserve and account for their unique mix of residential, commercial, industrial, and institutional uses.

2. We recommend that the Division of Water Resources regularly update its projections of future demand as new information becomes available and provide a range of options that includes

investment, conservation, or supply development under a range of demand scenarios.

3. We recommend that the Legislature consider adopting policies that will require the phasing in of universal metering.

4. We recommend that the Legislature consider the following pricing policies to encourage efficient water use:

    a. Reduce water provider reliance on property taxes currently used to subsidize water system costs.

    b. Require that water providers create reserve funds to cover the cost of infrastructure repair and replacement.

    c. Promote the use of conservation pricing structures.

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Chapter IV
Growth in Future Water Supply Should Be Reported to Policy Makers

The Division of Water Resources understates the growth in the water supply when estimating Utah's future water needs. Its projections of future supply only includes the growth from the new water projects of four water conservancy districts. The division has not attempted to identify the incremental growth in supply that will occur as municipalities develop additional sources of water. That additional supply will mainly come from agriculture water that is converted to municipal use as farmland is developed. Local supplies may also grow as cities develop the remaining capacity of existing groundwater and surface water sources. By excluding this added water supply, the projections accelerate the timeframes for developing costly, large-scale water projects. We recommend the division prepare better regional plans that include the growth in supply from all sources, including locally developed supplies. If they do this, state policymakers will be better equipped to determine when to proceed with major water projects.

This chapter identifies two major sources of additional water supply that are not included in division projections.

Division Projections Should Include Expected Local Water Development

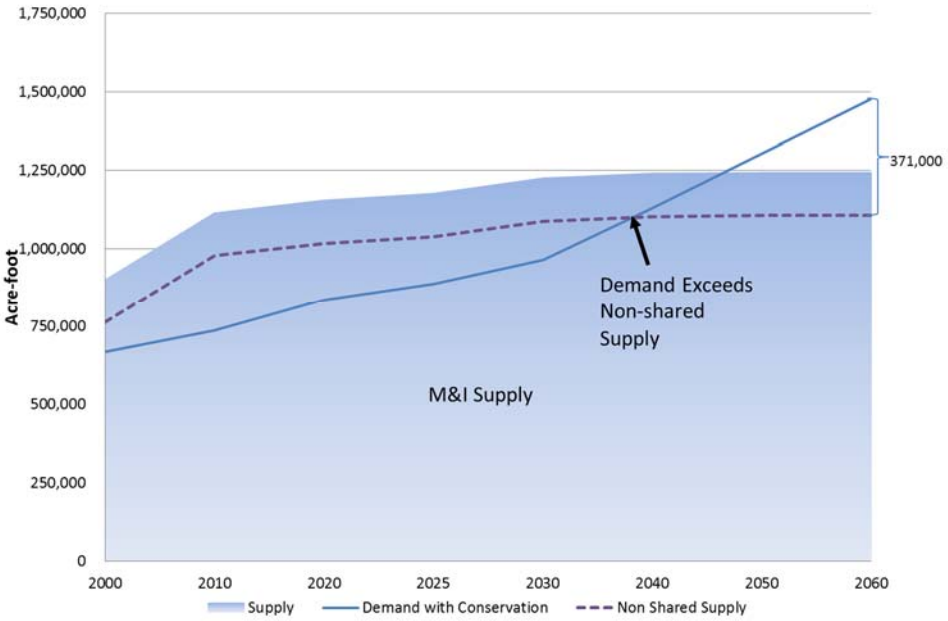
Currently, the division's projections compare the growth in the demand for municipal water with only a few sources of new supply. To improve its estimates, the division's projections should include the additional supply to be gained through the conversion of agriculture water to municipal use and through the development of the remaining local water supplies.

Division's Projection's Understate the Growth in Public Water Supplies

Division's projections understate Utah's future water supply by only identifying the new water to be provided by four water conservancy districts. The projections do show the growth in local water supplies up to the year 2010 but then assume that local waters supplies will remain constant through the year 2060. As shown in Figure 4.1, the division's projections compare the growing demand

for water to what the division describes as the state's currently developed supply.

Figure 4.1 Utah's Projected Municipal and Industrial Potential Water Demand and Supply. Projected demand is compared to the 2010 developed supply plus the new supply to be added by three water conservancy districts. Growth in supply from other sources is not included.



Source: Adapted form a Division of Water Resources' figure.

Division projections compare the growing demand for water to the state's currently developed supply in 2010 with a few exceptions.

The figure above only shows the growth in supply from water projects currently under development by four water conservancy districts. Those projects are listed in Appendix B and are expected to add an additional 128,000 acre-feet to the state's municipal water supplies. They include the additional water to be developed from new wells, surface water rights and reclaimed water. What is missing is the same type of growth in supply from similar projects that are being planned by municipalities and other local waters providers.

The division's analysis does not recognize the ability of cities and water districts expand their capacities.

In a separate chart, the division also identifies the number of entities that will be out of water over the next several decades. See Figure 1.2 in Chapter 1. Entities included in those counts are expected to have growth in demand for water that exceeds their currently developed water supply. However, the division's analysis does not account for the ability of local cities and water districts to expand their own water supplies. In fact, some entities, which the division identifies

as soon to be out of water, report that they have sufficient undeveloped water rights to meet their needs for many decades to come. They plan to develop additional water supply as the local demand for water grows. Ultimately, the state engineer will need to review these rights before they can be developed.

Municipal Water Supplies in Utah Grow as Demand Increases

The state's municipal water supply routinely grows each year. The main source of additional supply for M&I will come from converting agriculture water to municipal use, however, some water providers also have the ability to expand their current capacity. For example, between 2000 and 2010, local and district water supplies increased by over 200,000 acre-feet, an increase of 24 present. While the division's latest projections recognize past growth, they do not anticipate future growth in water supply. The following describes evidence that local water supplies may have the ability to grow as their population grows.

Cities Require Developers to Transfer Water Rights from Land Being Developed. As shown previously in Chapter I, Figure 1.4, 82 percent of Utah's developed water is used for agriculture. As cities grow, some farmland is sold and developed. This development means water rights previously used for agricultural purposes can be put towards municipal use. In fact, it is common for cities to require water rights to be transferred to the city as irrigated farmland is developed.

It is common for cities to require water rights to be transferred to the city as irrigated farmland is developed.

Springville City is an example of a city requiring water rights to be transferred to new development. According to the Springville City Code **11-3-307**, "At any time development occurs on any property annexed, the owner or developer of the property must tender water shares to the City in accordance with Springville City Code." Many Utah cities have similar requirements.

Springville City requires developers to transfer to the public water system any agricultural water rights associated with the property being developed.

Springville City is just one example of a community that requires developers to transfer to the public water system any agricultural water rights associated with the property being developed. In fact, some of the division's more recent basin plans contain estimates of future agricultural water that will be available by 2060. The division has estimated that 100,000 acre-feet of water in the Utah Lake Basin, 95,000 acre-feet in the Weber River Basin, and 25,000 acre-feet in the Jordan River Basin will be available for transfer. While the division's

plan acknowledges agriculture water will play a role in meeting the state's future water needs, it is not reflected in the division's projections of the future water supply.

Local Water Providers Have the Ability to Expand their Own Sources of Supply. In addition to converting agricultural water, some local water providers may have the ability to develop their water supplies to help meet demand. We recognize that most water sources in Utah are over-appropriated[5] and consequently, some local water providers may not be able to take full advantage of their approved water rights. In addition, as local water providers develop their water rights, it may negatively affect water supplies of other water providers. However, this does not preclude a local water provider from expanding capacity from at least a portion of its undeveloped sources of supply.

Many local water providers develop their water rights as demand grows.

Although, we did not conduct a systematic review of the untapped supplies claimed by local water entities, we did obtain several local water supply and demand studies that indicated that some cities have an ability to expand their capacity. We also interviewed several local water managers who said they had undeveloped supplies that they plan to draw from as the demand for water increases. In fact, the Division of Drinking Water approved the drilling of 25 new wells for drinking water purposes during 2014. In addition, Centerville, Herriman, Pleasant View, Provo, Salt Lake, Sandy, St. George, and West Bountiful are all cities that report having at least some additional sources of supply available for future development as their water need grows.

Provo City reports that it has the capacity to expand its reliable water supply to 56,000 acre-feet, supporting the city's growing needs well beyond 2060.

For example, Provo City reports that it has the capacity to expand its reliable water supply to 56,215 acre-feet. This amount should be sufficient to meet the city's water needs well beyond the year 2060. In contrast, the division supply and demand model assumes Provo City's reliable water supply will remain fixed at 31,550 acre-feet through 2060. For this reason, the division predicts the city's water supply will be exhausted in 2020. At that point it was assumed the city would

[5] In the divisions "Conjunctive Management of Surface and Ground Water in Utah," they define over-appropriation as when the approved water rights exceed the amount of natural recharge physically available.

purchase water from outside sources such as the Central Utah Water Conservancy District.

These examples stress the need for the division to work with cities and other local water providers to estimate the amount of water supply available for future development in both state and local plans. Although difficult to quantify, better understanding of current and future water capacity will help local and state water managers plan for a reliable supply to meet future water needs of the state.

As illustrated in the division's statewide projected demand and supply figure (Figure 4.1), the water supply is largely limited to the currently developed supply plus some growth due to a few water projects that are currently underway. Although cities and districts may have the ability to expand their water supply incrementally as population growth occurs, the division's projections do not include this growth in supply. As a result, the charts appear to overstate the supply deficits and predict that the state's developed water supply will be exhausted sooner than it would be if had included the local growth in supply. As the following section illustrates, some updated basin plans have begun to provide a more complete estimate of the growth in the water supply. This supply analysis is needed to plan the timing of large statewide development projects.

Although cities and districts expand their water supply incrementally as population growth occurs, the division's projections do not include this growth in supply.

Good Basin Plans Should Be the Basis for Better Statewide Planning

As described in the previous section, the division's projections of the supply and demand do not include estimates of locally developed water supplies. Most of the division's past basin plans also provide no estimate for future sources of supply. We are also concerned that the division's estimate of the amount of M&I water to be made available from agriculture is overly conservative.

Many Water Basin Plans Are Out of Date or Incomplete

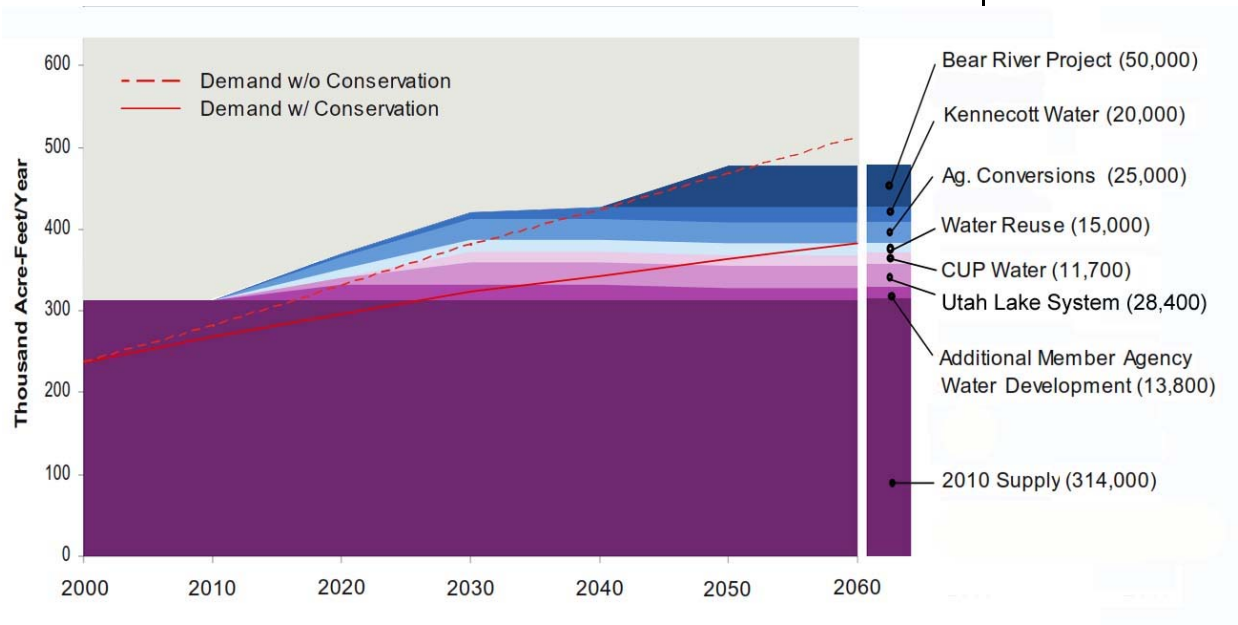
The division periodically updates plans for the state's 11 hydrologic basins. These plans examine the water needs at the basin level. The following is a list of the river basin reports and when they were last updated:

- Uintah Basin – 2015
- Utah Lake – 2014
- Jordan River – 2010
- Weber River – 2009
- Bear River – 2004
- West Desert Basin – 2001
- Southeast Colorado – 2000
- West Colorado – 2000
- Sevier River – 1999
- Cedar/Beaver – 1995
- Kanab Creek/Virgin River – 1993

Seven of the eleven basin plans are over a decade old.

The above list shows that seven of the eleven basin plans are over a decade old. In two of the recent basin plans, Utah Lake and Jordan River, the division has provided estimates for future supply as well as demand for water indicating the basin's ability to meet future water needs within the basin. The additional projected supply shown in these updated plans is not included in projections for future water demand at the statewide level. For example, the Jordan River Basin Plan offers a chart that compares the growth in both supply and demand for water. See Figure 4.2. The figure offers specific growth estimates for agricultural conversions, water reuse, and other planned water development projects in the basin.

Figure 4.2 Jordan River Basin's Projected Supply and Demand. The following figure illustrates how conservation and expanding supply affect the need for water in the future.



Source: Division of Water Resources, "Jordan River Basin Planning for the Future," 2010.

By identifying the potential new sources of supply, the division can provide a more realistic view of how the growing demand for water can be met.

The chart shows the benefits of projecting both the future supply and demand for water. If the chart did not identify the growth in supply, one might assume the region will run out of water in 2025, when the projected demand exceeds the 2010 supply. However, by identifying new sources of supply, the chart shows the basin has 164 thousand acre-feet or 34 percent more new water available to meet its needs through 2060.

In our view, Figure 4.2 offers a more realistic view than the division's statewide projections of how the growth demand can be met. We recommend that the division prepare charts that project both the growth in demand as well as the growth in supply for each river basin and the state as a whole. This information will be the useful to policy makers as they make important decisions regarding the state's water system needs.

Division's Agricultural Conversion Estimates Are Understated

When the growth in supply is not shown, the division's charts imply an impending water shortage.

Although the division provides estimates for future supply in some of the more recent basin plans, we are concerned that some of these estimates are overly conservative. We were specifically asked to assess

the validity of the division's estimates of the conversion of agricultural water. As mentioned, the division estimates that agricultural water available from the Utah Lake and Weber River Basins alone will be 195,000 acre-feet of water. We think the division's estimates actually understate the amount of agricultural water that will be available.

Division Should Base Agricultural Water Estimates on Actual Water Rights Conversion Data. The division's estimates show that only a fraction of agricultural water will be converted to municipal use. For example, in the Weber River Basin, the division assumes only a portion of an acre-foot of agricultural water can be converted to municipal use. According to the division, this limit is required by the state engineer in order to maintain stream flow. However, in the last decade the state engineer has not limited water right transfers. Figure 4.3 compares the division's estimated amount of agricultural water that will be converted to municipal use with the amount of water agriculture used for farming.

Although division estimates assume only a fraction of agricultural water will be converted to municipal use.

Figure 4.3 Division Understates the Amount of Agricultural Water to Be Converted to Municipal Use in the Weber River Basin by 2060. The Division estimates that only a portion of the state's agricultural water will be available for municipal use.

County	Water Now Used on Farmland to Be Converted to Municipal Use	Water DWRE Predicts Will Be Converted to Municipal Use	Difference
Davis	42,700	27,623	15,077
Morgan	15,300	9,896	5,404
Summit	37,000	23,965	13,035
Weber	52,600	34,008	18,592
Weber Basin Total	**147,600 af***	**95,492 af**	**52,108 af**

Source: Division of Water Resources, "Weber River Basin Planning for the Future," 2004.
** Acre-feet*

The division projects that, by the year 2060, 147,600 acre-feet of agricultural water in the Weber River Basin will no longer be needed for agricultural purposes. Of that amount, the division estimates that about 65 percent, or 95,491 acre-feet, of water will be available for municipal use, attributing the reduction to the state engineer's limiting the water available for conversion. However, our review of actual transfers shows the state engineer typically approves the conversion of 100 percent of agricultural water to municipal use.

Our review of actual transfers shows the state engineer typically approves the conversion of 100 percent of agricultural water to municipal use.

We reviewed the records for 326 cases in which agricultural water was converted to municipal use. We found only 34 instances in the last decade in which the Division of Water Rights granted a transfer of less than 100 percent of the historic water rights. Those were mostly cases in which the water rights were in dispute. As a result, we concluded that the actual rate of conversion appears to be about one acre-foot of agricultural water to an acre-foot of municipal water.

If we assume instead that 100 percent of the agriculture water will be converted in the Weber River Basin (where development is expected), an additional 52,000 acre-feet of water will be available by 2060. This additional water is shown in the fourth column of Figure 4.3. This is a 35 percent increase in agricultural water in Weber Basin alone. In fact, 52,000 acre-feet is roughly equivalent to the amount that the Weber River Basin expects to obtain from the proposed Bear River Project.

Assuming 100 percent of the Weber Basin's converted agriculture water will be available for municipal use, an additional 52,000 acre-feet of water will be available by 2060.

In other river basins, the division has taken an even more cautious stance. For example, in the Utah Lake Basin, the division assumes that just 50 percent of agricultural water will be available once it is converted to municipal use. Statewide, there appears to be far more water available for agricultural conversions than anticipated in the division's water plans.

Recommendations

1. We recommend that the Division of Water Resources begin estimating added supply in their M&I studies to account for water made available through the conversion of agricultural water and other locally developed sources of supply.

2. We recommend that the Division of Water Resources update state and basin plans on a regular basis as new information is gathered to ensure plans are relevant.

3. We recommend that the Division of Water Resources base its future estimates of the agricultural water available for municipal use on the actual historic data of past transfers.

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Appendices

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Appendix A

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Circle of Blue's 2014 Water Pricing Survey

City	Service Area Population (in thousands)	Average Monthly Bill for Family of Four Using 50 gallons/person/day	% change from 2013 bill (50 gpd)	Average Monthly Bill for Family of Four Using 100 gallons/person/day	% change from 2013 bill (100 gpd)	Average Monthly Bill for Family of Four Using 150 gallons/person/day	% change from 2013 bill (150 gpd)
Uniform Seasonal							
Phoenix	1600	11.55	0.0%	38.75	0.0%	68.45	0.0%
Uniform							
Fresno	122	19.38	30.2%	28.26	43.1%	37.14	50.9%
Memphis	583	12.04	2.1%	24.08	2.1%	36.12	2.1%
Chicago	N/A	19.86	14.9%	39.72	14.9%	59.58	24.9%
New York	8360	28.64	5.6%	57.28	5.6%	85.92	7.5%
Indianapolis	800	33.01	5.2%	57.32	8.1%	81.62	10.2%
Seasonal Increasing Block							
San Antonio	1000	22.65	5.2%	43.66	6.0%	74.25	6.5%
Salt Lake City	380	17.22	4.0%	27.19	4.1%	37.79	4.1%
Los Angeles	4000	36.53	19.0%	75.98	14.5%	122.41	8.0%
Seattle	630	55.25	8.1%	98.77	9.3%	153.22	8.1%
Santa Fe	78	54.78	0.0%	153.78	0.0%	284.10	0.0%
Increasing Block							
Denver	1300	22.66	3.6%	41.42	3.6%	73.58	3.5%
Tucson	775	24.40	12.0%	51.65	11.2%	111.01	9.4%
Dallas	1306	19.39	4.4%	44.87	5.3%	81.74	5.6%
Jacksonville	614	23.11	0.0%	43.30	0.0%	63.49	0.0%
Las Vegas	2000	25.68	3.6%	42.27	2.8%	62.90	2.2%
Charlotte	774	19.33	7.7%	53.73	10.9%	107.81	12.2%
Fort Worth	625	24.76	6.4%	47.16	3.3%	72.56	2.5%
San Jose	107	32.20	8.0%	56.43	8.0%	83.49	8.0%
Columbus	1115	28.91	0.0%	52.00	0.0%	75.08	0.0%
Houston	2060	30.62	1.2%	58.94	1.1%	105.62	1.1%
Austin	796	29.74	14.3%	79.64	10.3%	140.24	8.5%
Boston	609	37.81	4.8%	77.73	4.8%	118.40	4.8%
San Francisco	2400	48.50	6.4%	92.50	6.1%	136.50	6.0%
San Diego	1300	49.77	2.6%	89.37	10.6%	150.15	29.4%
Atlanta	1200	42.64	0.0%	91.92	0.0%	141.20	0.0%
Decreasing Block							
Milwaukee	661	20.81	3.0%	34.65	3.0%	48.49	3.0%
Detroit	740	22.08	4.4%	38.65	4.4%	55.21	4.4%
Baltimore	1800	36.77	15.0%	58.83	15.0%	88.25	15.0%
Philadelphia	1672	36.14	5.0%	65.83	5.0%	92.76	5.1%
Total Average Percent Change			6.1%		6.2%		6.6%

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Appendix B

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Appendix B: Water Projects Under Development for Four Water Conservancy Districts

District	Additional Water						
	2020	2025	2030	2040	2050	2060	Total
Central Utah Water Conservancy District							
Central Water Project	5,300	-	15,000	15,000	6,300	-	41,600
Utah Lake System	-	-	21,500	-	-	-	21,500
Total	5,300	-	36,500	15,000	6,300	-	63,100
Jordan Valley Water Conservancy District							
Provo River Purchases	1,100	-	-	-	-	-	1,100
Central Water Project	11,680	-	-	-	-	-	11,680
Southwest Jordan Valley Ground Water Project	8,000	-	-	-	(3,500)	-	4,500
Castro Springs Project	400	-	-	-	-	-	400
Utah Lake System	-	16,400	-	-	-	-	16,400
Waste Water Recycling (Secondary Water)	-	-	13,000	-	-	-	13,000
Total	21,180	16,400	13,000	-	(3,500)	-	47,080
Metropolitan Water District of Salt Lake and Sandy							
Utah Lake System	-	5,000	-	-	-	-	5,000
Total	-	5,000	-	-	-	-	5,000
Washington County Water Conservancy District							
Ash Creek Pipeline	2,840	-	-	-	-	-	2,840
Cottom Well	600	-	-	-	-	-	600
Sullivan Well	750	-	-	-	-	-	750
Diamond Valley Well	400	-	-	-	-	-	400
Pintura Well	600	-	-	-	-	-	600
Sandhollow Recharge	3,000	-	-	-	-	-	3,000
Gunlock Well	5,000	-	-	-	-	-	5,000
Total	13,190	-	-	-	-	-	13,190
Total Additional New M&I Supply	39,670	21,400	49,500	15,000	2,800	-	128,370

Source: Division of Water Resources

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Agency Response

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GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCE

MICHAEL R. STYLER
Executive Director

April 28, 2015

Dear Mr. Schaff,

We acknowledge and appreciate the Legislative Auditor General staff's considerable efforts in assessing the effectiveness and appropriateness of Division of Water Resources (DWRe) data practices. We recognize the great lengths taken to gather and analyze this information.

The responsibility to ensure Utah's families, environment and businesses have enough water is one we take very seriously. We believe the audit results will strengthen our processes. We agree with many of these results and look forward to improving the processes used to determine Utah's current and future water use and supply data.

Over the next 45 years, as our population doubles, we will press the limits of our developed water supplies. We encourage a balanced combination of responsible conservation, agricultural conversion, water infrastructure and development projects, and persistent innovation to proactively address Utah's water challenges.

As Utah moves into the future, the data needed to make important decisions will need to be increasingly sophisticated. Our division will combine applicable audit recommendations with our own innovative ideas to achieve the highest standard of data gathering, education and analysis processes. We appreciate the opportunity to respond to the audit recommendations and submit the following comments on behalf of the Department of Natural Resources and DWRe. Please note that additional resources will be needed in order to accomplish these recommendations.

Chapter 2 Recommendation Responses: Reliability of Water Use Data (Page 24)

Recommendation 1: We agree. Reviewing water use data annually will allow us to perform trend analysis.

Recommendation 2: We agree with all water use data collection recommendations and will consider the list of methods. We also recognize that in order to accomplish some of these recommendations legislative action will be needed.

Recommendation 3: We agree with the Legislature giving the Division of Water Resources statutory authority to validate the annual water use reported by public water providers.

Chapter 3 Recommendation Responses: Conservation and Policy Choices Can Reduce Demand for Water (Pages 44-45)

Recommendation 1: We agree to work with local water providers to create conservation goals for each river basin, taking into consideration each basin's unique attributes. These regional goals will be combined to determine a statewide goal.

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Recommendation 2: We agree, and will continue to regularly update projections and future demand as information becomes available.

Recommendation 3: We agree with this recommendation and offer to work with the Legislature in adopting policies that will require the phasing in of universal metering.

Recommendation 4: We agree with the recommendation that the Legislature research innovative pricing policies to encourage efficient water use.

Chapter 4 Recommendations: Growth in Future Water Supply Should Be Reported to Policy Makers (Page 55)

Recommendation 1: We understand the intent behind adding supply in M&I studies to account for water made available through the conversion of agricultural water and other locally developed sources of supply. We have estimated this in the past, but feel the accuracy is only useful for short-term projections. While we feel this recommendation is oversimplified, we will work with the State Engineer to perform a rigorous technical analysis to more accurately determine potential conversions and supplies.

Recommendation 2: We agree to update state and basin plans on a regular basis as new pertinent information is gathered.

Recommendation 3: We agree to base future estimates of agricultural water available for municipal use on the historic data of past transfers. We will work with the State Engineer's office and local providers to determine the appropriate estimates.

We are confident that our continued dedication in these areas, combined with the additional required resources, will result in ever improving processes, projections and communication. We appreciate your efforts to define opportunities for improvement. Thank you for the report and helpful recommendations.

Sincerely,

Eric L. Millis, P.E.
Director
Utah Division of Water Resources

Michael R. Styler
Executive Director
Utah Department of Natural Resources