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Highlights

- Metropolitan areas in the Intermountain West vary greatly in water use. Data compiled by the U.S. Geological Survey for 2000 indicate that out of 25 Intermountain metropolitan areas, St. George, Utah leads in per capita daily water use at 391 gallons, followed by Logan, Utah (370 gallons), Las Vegas-Paradise, Nevada (337 gallons) and Carson City, Nevada (328 gallons). The average for the 25 areas examined was 243 gallons per person per day. The areas with the lowest water consumption were Yuma, Arizona (180 gallons); Albuquerque, New Mexico (178 gallons) and Lewiston, Idaho (154 gallons). These data include all water delivered through public water supply systems, including residential, commercial, and industrial use.
- Of five Utah areas examined, four were above average in daily per capita water use. St. George had the highest water consumption with a daily per capita water consumption of 391 gallons, followed by Logan (370 gallons), Salt Lake City (288 gallons), and Provo-Orem (281 gallons). Only the Ogden-Clearfield area at 221 gallons per person per day used less than the average 243 gallons per person per day. The lower use in the Ogden-Clearfield area can be attributed to an extensive secondary water system. If use through this secondary system was accounted for, water use in the Ogden-Clearfield area would be higher.
- Looking at the 38 utilities that serve half the areas' population reveals a variety of different residential rate structures. The most common attribute was an increasing water rate as use increased - 21 of the 38 utilities raise the rate with the amount of water used. Fourteen water utilities have a flat rate. Two utilities charge a flat rate during the winter and have an increasing rate structure during the summer months. One utility charges a set monthly fee irrespective of the amount of water used.
- Marginal water rates ranged from $0.48 per 1,000 gallons for all water use in Provo, Utah to $7.04 per 1,000 gallons for customers of the Cheyenne Board of Public Utilities who reside outside of the Cheyenne, Wyoming city limits and use more than 42,000 gallons in a month.
- Utah residents have responded well to calls for water conservation. The Utah Division of Water Resources determined that from 1999 to 2003, per capita water consumption in Salt Lake City dropped by 17 percent. Similarly, from 1998 to 2003, per capita water consumption in the Logan area decreased by 19 percent although over the same time period water consumption in the Provo-Orem area dropped by only 1.4 percent. The Ogden-Clearfield area reduced per capita water consumption by 15 percent from 2001 to 2003.

Water Use and Residential Rate Structures in the Intermountain West

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The Intermountain West has experienced rapid growth during the past several decades. This rapid growth combined with drought, has focused attention on the area's water supply, especially that which supplies the public with drinking water. This growth has been focused in the metropolitan areas in the Intermountain West with 25 metropolitan areas accounting for 74 percent of the area's population growth from 1990 to 2000 while occupying only 9 percent of the land.

Meeting the increasing demand for drinking water in the west's metropolitan areas has forced water agencies to examine water supplies that would not have been considered several decades ago. In Salt Lake County, the Jordan Valley Water Conservancy District is looking at decontaminating groundwater impacted by mining operations with an eye to adding to the water supply. Both the state of Arizona and the Southern Nevada Water Authority are charging water into aquifers for banking against future demand. The Washington County Water Conservancy District is planning for an eventual pipeline from Lake Powell to supply water to southwestern Utah. Similarly, the Southern Nevada Water Authority is also studying building a pipeline into White Pine County in east-central Nevada to tap deep aquifers in the area. Several areas, notably the Colorado Front Range, have imposed unusually high water rates as a means of curtailing water use during droughts. While the 2004-2005 winter may have broken the current drought, increasing population in the Intermountain West's metropolitan areas will continue to pressure the current public water supply

Clarification of Terminology

In the March/April 2005 edition of the *Utah Economic and Business Review* entitled 'Water Use and Residential Rate Structures in the Intermountain West" the geographic areas studied were metropolitan areas. The U.S. Office of Management and Budget has named metropolitan areas after major cities in the county or multi-county area. Unfortunately, the use of the metropolitan area name in the article has caused some confusion and misunderstanding. On page 2, Figure 1, *Per Capita Daily Water Use in Selected Intermountain Metropolitan Areas* the metropolitan areas are listed on the X axis. Consistent with the title of the chart, Salt Lake City in Figure 1 refers to the Salt Lake City Metropolitan Area, not Salt Lake City proper. The per capita daily use for the Salt Lake City Metropolitan Area as shown in Figure 1 was 288 gallons in 2000, considerably higher than the per capita daily use for Salt Lake City proper of 252 gallons.

Furthermore, the *Highlights* for the article, as in the case of Figure 1, presents only metropolitan area water use not city water use. As stated in the first two sentences of the *Highlights*, "*Metropolitan areas (*emphasis) in the Intermountain West vary greatly in water use. Data compiled by the U.S. Geological Survey for 2000 indicate that out of 25 Intermountain *metropolitan areas (*emphasis*)* St. George leads in per capita daily water use at 391 gallons." The water use refers to the St. George Metropolitan Area (all of Washington County) not St. George City.

BEBR regrets any confusion or misunderstanding created by the use of metropolitan area terminology.

system, necessitating new water sources and increased efficiency and conservation.

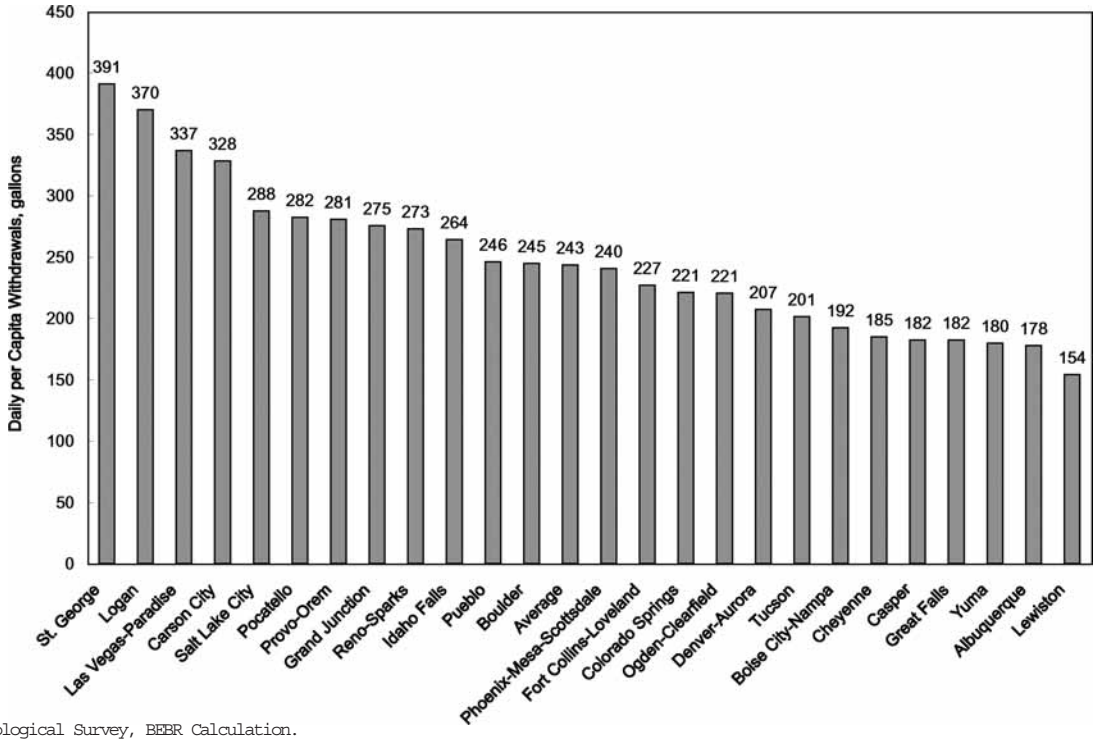
This report examines water use in 25 Intermountain metropolitan areas with a focus on water delivered through public water supply systems. Water rate schedules for the utilities that serve half the population of the 25 areas are discussed and future water sources for metropolitan areas within Utah are noted.

Water Use

While metropolitan areas in the Intermountain West have all experienced increased population and water consumption over the past years, they vary widely in per capita water use (Figure 1 and Table 1). St. George, Utah leads in the 25 areas examined (Figure 2) in per capita water use with 391 gallons per person per day, 61 percent greater than the average of 243 gallons per person per day for the 25 areas. The area with the lowest water use was Lewiston, Idaho at 154 gallons per person per day, or 63 percent of the 25 area average. The Lewiston Orchards Irrigation District, the largest water utility in Nez Perce County, Idaho operates a dual system which supplies pressurized irrigation water to each residence the district serves. The presence of this irrigation system results in little drinking water being used for landscape watering during the summer months.

Metropolitan areas in Utah and Nevada tend to have higher than average water use. Utah and Nevada account for seven of the top ten areas in per capita water consumption and four of the five Utah areas examined and all three of the Nevada areas examined are in the top ten areas. Of the five Utah areas examined, only the Ogden-Clearfield area at 221 gallons per person per day was not in top ten areas for water consumption and was actually below the average. The lower consumption can be attributed to

Figure 1
Per Capita Daily Water Use in Selected Intermountain Metropolitan Areas
(gallons)



Source: U.S. Geological Survey, BEBR Calculation.

Table 1
Public Water Use in Selected Intermountain Metropolitan Areas in 2000

Area	State	Population	Public Water Supply Withdrawals, acre-feet	Daily Per Capita Withdrawals, gallons	Per Capita Withdrawals, rank
Albuquerque	New Mexico	622,830	124,022	178	24
Boise City-Nampa	Idaho	300,904	64,778	192	19
Boulder	Colorado	291,288	79,866	245	12
Carson City	Nevada	52,457	19,289	328	4
Casper	Wyoming	66,533	13,587	182	21
Cheyenne	Wyoming	81,607	16,903	185	20
Colorado Springs	Colorado	516,929	127,943	221	15
Denver-Aurora	Colorado	2,109,282	489,839	207	17
Fort Collins-Loveland	Colorado	251,494	63,915	227	14
Grand Junction	Colorado	116,255	35,856	275	8
Great Falls	Montana	80,357	16,399	182	22
Idaho Falls	Idaho	82,522	24,419	264	10
Las Vegas-Paradise	Nevada	1,375,765	518,974	337	3
Lewiston	Idaho	37,410	6,452	154	25
Logan	Utah	91,391	37,872	370	2
Ogden-Clearfield	Utah	435,527	107,590	221	16
Phoenix-Mesa-Scottsdale	Arizona	3,072,149	827,282	240	13
Pocatello	Idaho	75,565	23,893	282	6
Provo-Orem	Utah	368,536	115,823	281	7
Pueblo	Colorado	141,472	38,992	246	11
Reno-Sparks	Nevada	339,486	103,748	273	9
Salt Lake City	Utah	898,387	289,434	288	5
St. George	Washington	90,354	39,586	391	1
Tucson	Arizona	843,746	190,212	201	18
Yuma	Arizona	160,026	32,204	180	23
Twenty-five Area Total	Various	12,502,272	3,408,878	243	na

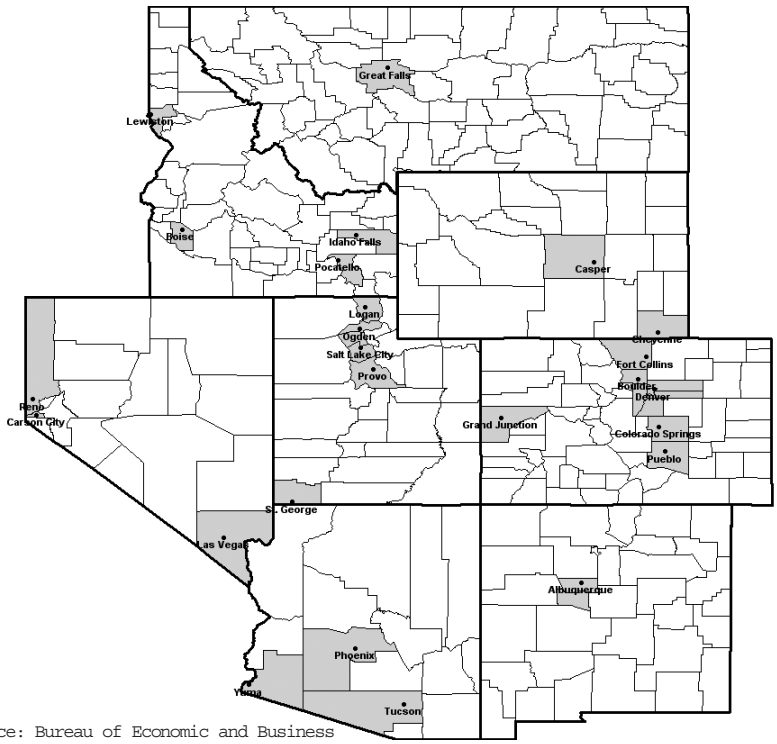
Source: 2000 Decennial Census, U.S. Bureau of the Census. U.S. Geological

a fairly extensive secondary water system in the area, which many residents use for landscape watering. If this secondary water system was considered, reported water use for the Ogden-Clearfield area would undoubtedly be higher.

Several factors affect water consumption. As indicated earlier, the presence of secondary water systems can dramatically affect the amount of water delivered through the culinary water system, although this is mainly a change in how the water use is accounted for and not an actual reduction in the amount of water used. Climate and weather have an obvious influence on water consumption, especially for landscape watering during the summer months with water consumption in Salt Lake City during July being about four times what it is during the winter.

The 25 areas examined vary greatly in climate with July high temperatures ranging from 82.5 °F in Cheyenne, Wyoming to 107.0 °F in Yuma, Arizona (Table 2). The effect of climate and weather is less obvious when comparing different geographical areas (Figure 3). Other factors have a greater influence across different areas than does climate. For example,

Figure 2
Intermountain Metropolitan Areas



Source: Bureau of Economic and Business

St. George, Las Vegas, Phoenix, Tucson, and Yuma have noticeably higher summer temperatures than the other areas examined, but St. George and Las Vegas rank near the top of per capita water use, while Phoenix is near the middle of the rankings, Tucson in the lower half and Yuma near the bottom of the 25 areas in per capita water consumption.

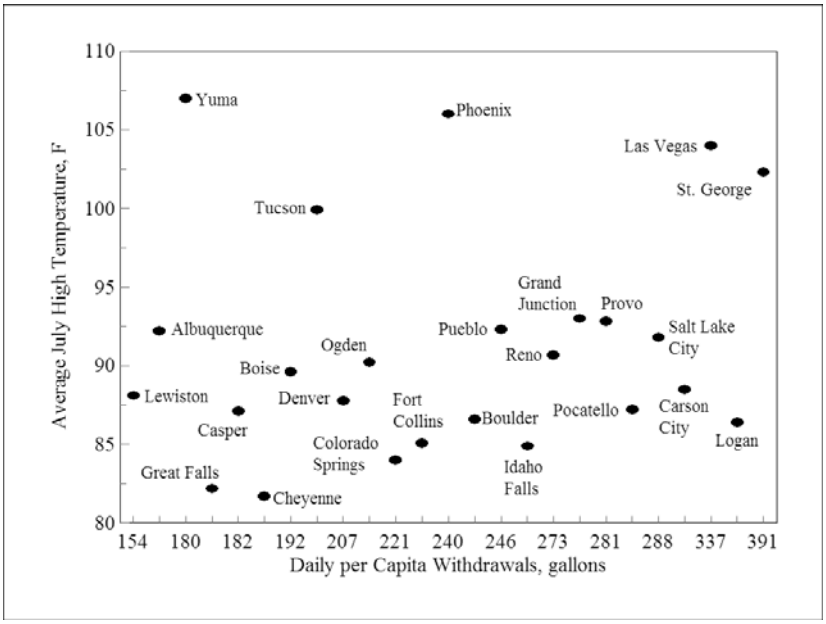
St. George is the site of numerous golf courses and as is usual in Utah, individual residences commonly have lawns, requiring landscape watering during the summer. Las Vegas is largely supplied by Colorado River water which combined with the southern

Table 2
Climate Data for the Selected Metropolitan Areas

Area	Weather Station	Average Annual Precipitation, inches	Average Annual Temperature, F		Average July Temperature, F		Average July Afternoon Relative Humidity, percent	Average Annual Pan Evaporation Rate, inches
			High	Low	High	Low		
Albuquerque	Albuquerque WSFO Airport, New Mexico (290234)	8.62	69.9	43.1	91.8	64.6	27	89.1
Boise City-Nampa	Boise WSFO Airport, Idaho (101022)	11.73	62.9	39.4	90.4	58.3	21	64.0
Boulder	Boulder, Colorado (050848)	19.03	65.2	38.4	87.6	58.7	na	na
Carson City	Carson City, Nevada (261485)	10.49	66.3	34.5	89.0	50.8	na	na
Casper	Casper WSO Airport, Wyoming (481570)	11.94	58.8	32.1	87.5	54.2	26	63.7
Cheyenne	Cheyenne WSFO Airport, Wyoming (481675)	15.17	57.9	33.2	82.5	54.5	28	62.8
Colorado Springs	Colorado Springs WSO Airport, Colorado	16.11	62.1	35.4	84.8	57.0	39	67.2
Denver-Aurora	Denver WSFO Airport, Colorado (052220)	15.46	64.4	36.7	88.1	59.0	34	65.7
Fort Collins-Loveland	Fort Collins, Colorado (053005)	15.09	62.1	34.0	85.1	55.9	na	41.2
Grand Junction	Grand Junction Walker, Colorado (053488)	8.67	65.3	40.2	92.7	64.1	22	78.8
Great Falls	Great Falls WSCMO Airport, Montana (243751)	14.79	56.4	33.2	83.1	53.7	29	57.4
Idaho Falls	Idaho Falls FAA Airport, Idaho (104457)	10.03	56.8	30.9	85.8	50.8	na	na
Las Vegas-Paradise	Las Vegas WSO Airport, Nevada (264436)	4.19	80.0	53.7	104.4	76.0	15	119.4
Lewiston	Lewiston WSO Airport, Idaho (105241)	12.72	63.1	41.7	89.0	58.8	25	na
Logan	Logan Utah State University, Utah (425186)	16.40	60.2	33.3	89.2	54.1	na	40.9
Ogden-Clearfield	Ogden Pioneer Power House, Utah (426404)	17.05	63.8	38.1	92.0	59.7	28	na
Phoenix-Mesa-Scottsdale	Phoenix WSFO Airport, Arizona (026481)	7.53	85.8	59.6	105.4	80.8	20	106.9
Pocatello	Pocatello WSO Airport, Idaho (107211)	11.46	59.6	33.8	88.3	53.2	24	61.1
Provo-Orem	Provo Brigham Young University, Utah (427064)	20.07	66.4	40.1	93.6	60.1	na	50.0
Pueblo	Pueblo WSO Airport, Colorado (056740)	11.78	68.6	36.3	92.8	60.3	32	66.7
Reno-Sparks	Reno WSFO Airport, Nevada (266779)	7.26	67.1	33.8	91.2	50.0	18	59.4
Salt Lake City	Salt Lake City NWSFO, Utah (427598)	15.72	63.9	40.3	92.6	62.8	22	70.7
St. George	Saint George, Utah (427516)	8.20	77.8	44.5	101.7	66.5	na	74.7
Tucson	Tucson WSO Airport, Arizona (028820)	11.49	82.6	54.7	99.2	73.7	28	111.5
Yuma	Yuma WSO Airport, Arizona (029660)	2.91	88.2	60.6	107.0	80.4	22	122.5

Source: Regional Western Climate Center

Figure 3
Relationship Between Summer Temperature and Water Use



Source: Western Regional Climate Center, BEBR

Nevada tourist industry results in comparatively high water consumption. By contrast, most residences in Phoenix and Tucson use desert landscaping with very little grass, lowering water use during the summer months. Phoenix benefitted from the proximity of the Salt River and more recently Colorado River water delivered through the Central Arizona Project resulting in water use higher than in Tucson. By contrast, Tucson is far removed from surface water supplies and relied entirely on local groundwater until the arrival of Central Arizona Project water in the last decade which historically limited its water consumption. Tucson also has very high water rates imposed specifically to discourage use.

The supply and use of water is also intertwined with the rates charged by the various utilities supplying water and the philosophy behind setting the rates.

Water Rates

Residential rate structures utilized by the various utilities supplying drinking water reveals several different philosophies towards pricing water. The 25 areas are served by over 1,100 different water utilities, although in most of the areas a handful of utilities serve the majority of population. For each area, residential rate structures were obtained for the largest utilities that cumulatively serve at least half the population in that area. In 17 of the 25 areas examined, one utility serves over half of the population. Overall, 38 utilities provide water to over half the population in the 25 areas.

These 38 water providers have different rate structures that vary with season, geography, and amount of water used (Table 3). Most utilities bill monthly although a few bill bimonthly or quarterly.

The simplest resident rate structure was that of the City of Idaho Falls, Idaho. For a single family residence, the city charges a flat monthly fee of $11.00, irrespective of the amount of water used. In addition to the monthly fee, the city bills an additional $9.20 during August for a seasonal water fee and $3.00 during September for a water test fee.

Other than the City of Idaho Falls, all of the utilities charge by the amount of water used. Fourteen of these provide a fixed amount of water with the periodic service charge while the other 23 utilities charge for all water consumed.

Most of the utilities have an increasing rate structure, with the per unit charge for water increasing as the amount of water used increases. Increasing rate structures are usually adopted to curtail extremely high water use, especially during the summer months. A minority have flat rate structures and

Table 3
Water Rate Schedules for the Largest Utilities in Selected Metropolitan Areas

Metropolitan Area / Utility	Population Served	Rate Structure	Water Included with Monthly Service Fee, 1,000 gal	Highest Marginal Rate, $ per 1,000 gallons	Consumption Level for Highest Marginal Rate, 1,000 gal per month
Albuquerque, New Mexico					
City of Albuquerque	453,000	Flat	0	1.64	0
Boise City-Nampa, Idaho					
United Water Idaho, Inc.	186,000	Flat, Seasonal	0	1.31 / 1.64	0
Boulder, Colorado					
City of Boulder	163,000	Increasing, Geographical	0	5.50	Variable
Carson City, Nevada					
Carson City Utilities	54,000	Increasing	0	1.30	50
Casper, Wyoming					
Casper Board of Public Utilities	54,500	Flat, Geographical	3	2.25 / 3.12	1.5
Cheyenne, Wyoming					
Cheyenne Board of Public Utilities	55,608	Increasing, Geographical	0	4.69 / 7.04	42
Colorado Springs, Colorado					
Colorado Springs Utilities	412,518	Winter, Flat; Summer, Increasing	0	4.13	22
Denver-Aurora, Colorado					
Denver Water Board	1,000,000	Increasing, Geographical	0	2.45 / 3.81	30
City of Aurora	260,000	Increasing	0	6.68	Variable
Fort Collins-Loveland, Colorado					
City of Fort Collins	125,500	Increasing	0	3.07	20
Grand Junction, Colorado					
City of Grand Junction	25,500	Increasing	3	2.15	20
Clifton Water District	34,500	Increasing, Geographical	3	2.15	10
Ute Water Conservation District	70,000	Increasing	3	3.15	21.5
Great Falls, Montana					
City of Great Falls	60,000	Increasing	0	1.26	2.2
Idaho Falls, Idaho					
City of Idaho Falls	51,000	Monthly Fee	NA	NA	NA
Las Vegas-Paradise, Nevada					
Las Vegas Valley Water District	947,642	Increasing	0	3.02	20
Lewiston, Idaho					
Lewiston Orchards Irrigation District	18,000	Flat	2.24	2.54	0.748
City of Lewiston	14,052	Flat	0	2.26	0
Logan, Utah					
City of Logan	38,793	Increasing	0	1.10	10
Smithfield City	7,415	Increasing	6	0.70	20
Ogden-Clearfield, Utah					
Ogden City	65,000	Increasing	0	1.64	200
Layton City	65,000	Flat	7	0.99	7
Bountiful	37,500	Flat, Geographical	5	0.90 / 1.00	5
Roy	32,325	Increasing	0	1.41	20
Clearfield City	26,640	Increasing	10	0.95	80
Phoenix-Mesa-Scottsdale, Arizona					
City of Phoenix	1,200,000	Flat, Seasonal, Geographical	4.49 / 7.48	2.78 / 4.17	4.49 / 7.49
City of Mesa	350,000	Increasing, Geographical	0	2.77	12
Pocatello, Idaho					
City of Pocatello	52,351	Flat, Geographical	0	1.85 / 2.78	0
Provo-Orem, Utah					
Provo City	110,000	Flat	0	0.48	0
Orem City	90,000	Flat	0	0.50	0
Pueblo, Colorado					
Pueblo Board of Water Works	104,340	Flat, Geographical	2	1.64 / 2.46	2
Reno-Sparks, Nevada					
Truckee Meadows Water Authority	212,760	Increasing	0	2.90	28
Salt Lake City, Utah					
Salt Lake City Water System	312,000	Winter, Flat; Summer, Increasing;	0	1.58 / 2.14	21.7
Granger-Hunter Improvement District	106,000	Flat	10	1.45	10
Sandy City	88,000	Flat, Seasonal, Geographical	8	1.79 / 1.97	8
Saint George, Utah					
City of Saint George	48,000	Increasing	5	1.41	45
Tucson, Arizona					
Tucson Water	673,847	Increasing	0	9.58	60
Yuma, Arizona					
City of Yuma	103,264	Increasing, Geographical	0	1.00 / 1.34	40

Boulder Colorado has declared drought surcharges that may take the highest marginal cost up to $13.50 per 1,000 gallons in a Stage IV drou
Boulder and Aurora, Colorado determines individual rate blocks depending upon the account's past use.
Sources: Environmental Protection Agency, Various Utilities.

charge the same incremental amount for all water used. Twenty-one of the utilities have increasing rate structures, 14 have flat rates, and two have increasing rate structures during the high use summer months and a flat rate structure during the winter months.

Seasonal rates are imposed by five of the 38 utilities. Salt Lake City and Colorado Springs utilities have flat rates during the winter months and an increasing rate structure during the summer months. United Water Idaho, which serves most of the Boise, Idaho area, and Sandy City, Utah both raise their marginal rates during the summer but maintain the same monthly service fee. The City of Phoenix has three seasonal rates, charging the highest marginal rate during the summer months, an intermediate rate during the spring and fall months and the lowest marginal rate during the winter months. Interestingly, while Phoenix charges a higher marginal rate during the high-use summer months, the city also provides a larger amount of water with the monthly service fee from June through September than from October to May.

A number of the utilities are operated by municipal governments but also serve areas outside of the city limits. The city-owned utilities commonly charge a higher rate for service outside of the city limits. Two of the city-owned utilities charge various rates within the city. Bountiful, Utah charges a higher rate for higher elevations within the city to compensate for additional pumping costs. Similarly, Mesa, Arizona has several rate structures within the city limits, depending on pumping costs. Salt Lake City imposes higher water fees for customers outside of the city limits, but residents of Salt Lake City and Sandy pay property tax to the Metropolitan Water District of Salt Lake and Sandy. The Metropolitan Water District provides wholesale water from the Provo River to the Salt Lake City and Sandy water utilities.

Primary Water Sources for Intermountain Metropolitan Areas as of 2000

Albuquerque, New Mexico: Essentially all groundwater (0.1 percent surface water and 99.9 percent groundwater).

Boise City-Nampa, Idaho: Mostly groundwater with some Boise River water (16.4 percent surface water and 83.6 percent groundwater).

Boulder, Colorado: Local streams and Colorado River headwaters (99.6 percent surface water and 0.4 percent groundwater).

Carson City, Nevada: Groundwater, local streams and the Carson River (39.3 percent surface water and 60.7 percent groundwater).

Casper, Wyoming: Groundwater and the North Platte River (31.6 percent surface water and 68.4 percent groundwater).

Cheyenne, Wyoming: Local streams and groundwater (31.6 percent surface water and 68.2 percent groundwater).

Colorado Springs, Colorado: Colorado River headwaters and local streams (95.9 percent surface water and 4.1 percent groundwater).

Denver-Aurora, Colorado: The Blue and South Platte Rivers, headwaters of the Colorado River, and other local streams (96.0 percent surface water and 4.0 percent groundwater).

Fort Collins-Loveland, Colorado: The Cache la Poudre River, headwaters of the Colorado River and Michigan River (97.8 percent surface water and 2.2 percent groundwater).

Grand Junction, Colorado: The Colorado River and streams on Grand Mesa (99.2 percent surface water and 0.8 percent ground water).

Great Falls, Montana: The Missouri River and groundwater (94.4 percent surface water and 5.6 percent groundwater).

Idaho Falls, Idaho: Local groundwater (100 percent groundwater).

Las Vegas-Paradise, Nevada: Colorado River and local wells (86.7 percent surface water and 13.3 percent groundwater).

Lewiston, Idaho: The Clearwater River and groundwater (83.3 percent surface water and 13.3 percent groundwater).

Logan, Utah: Mostly groundwater and one local stream (3.4 percent surface water and 96.6 percent groundwater).

Ogden-Clearfield, Utah: The Weber River, local streams and wells (44.5 percent surface water and 55.5 percent groundwater).

Phoenix-Mesa-Scottsdale, Arizona: The Salt River, Colorado River, and wells (79.1 percent surface water and 20.9 percent groundwater).

Pocatello, Idaho: Local groundwater (100 percent groundwater).

Provo-Orem, Utah: Local wells and springs and some Provo River water (16.7 percent surface water and 83.3 percent groundwater).

Pueblo, Colorado: Arkansas River and Colorado River headwaters (97.7 percent surface water and 2.3 percent groundwater).

Reno-Sparks, Nevada: The Truckee River drainage and local groundwater (71.3 percent surface water and 28.7 percent groundwater).

Salt Lake City, Utah: The Provo River drainage, local streams, and groundwater (70.0 percent surface water and 30.0 percent groundwater).

St. George, Utah: Wells, springs and the Virgin River (38.0 percent surface water and 62.0 percent groundwater).

Tucson, Arizona: Local groundwater, including Central Arizona Project water recharged into local aquifers (100 percent groundwater).

Yuma, Arizona: The Colorado River and groundwater (69.8 percent surface water and 30.2 percent groundwater).

Table 4
Monthly Fee at Sumer Rate Schedules
(22,000 gallons)

Metropolitan Area/Utility	Monthly Price for 22,000 gallons, $[1]	Rank
Albuquerque, New Mexico		
City of Albuquerque	42.18	19
Boise City-Nampa, Idaho		
United Water Idaho, Inc.	43.40	16
Boulder, Colorado		
City of Boulder	73.96	2
Carson City, Nevada		
Carson City Utilities	21.91	34
Casper, Wyoming		
Casper Board of Public Utilities	51.79	11
Cheyenne, Wyoming		
Cheyenne Board of Public Utilities	66.14	4
Colorado Springs, Colorado		
Colorado Springs Utilities	58.23	9
Denver-Aurora, Colorado		
Denver Water Board	43.75	15
City of Aurora	43.00	18
Fort Collins-Loveland, Colorado		
City of Fort Collins	62.17	6
Grand Junction, Colorado		
City of Grand Junction	43.30	17
Clifton Water District	49.80	12
Ute Water Conservation District	60.80	7
Great Falls, Montana		
City of Great Falls	39.39	23
Idaho Falls, Idaho		
City of Idaho Falls	11.00	38
Las Vegas-Paradise, Nevada		
Las Vegas Valley Water District	41.95	20
Lewiston, Idaho		
Lewiston Orchards Irrigation District	66.75	3
City of Lewiston	53.99	10
Logan, Utah		
City of Logan	35.45	26
Smithfield City	18.10	37
Ogden-Clearfield, Utah		
Ogden City	28.29	28
Layton City	24.40	32
Bountiful	25.42	31
Roy	27.10	30
Clearfield City	21.95	33
Phoenix-Mesa-Scottsdale, Arizona		
City of Phoenix	47.36	13
City of Mesa	59.00	8
Pocatello, Idaho		
City of Pocatello	44.70	14
Provo-Orem, Utah		
Provo City	21.23	35
Orem City	18.16	36
Pueblo, Colorado		
Pueblo Board of Water Works	39.95	22
Reno-Sparks, Nevada		
Truckee Meadows Water Authority	63.04	5
Salt Lake City, Utah		
Salt Lake City Water System	35.68	25
Granger-Hunter Improvement District	31.90	27
Sandy City	40.83	21
Saint George, Utah		
City of Saint George	27.44	29
Tucson, Arizona		
Tucson Water	79.51	1
Yuma, Arizona		
City of Yuma	36.77	24

[1]Monthly bills were calculated for inside city limits, higher rates commonly apply to areas served outside of city limits.
Source: Various utilites, BEBR calculation.

The highest marginal rate, or the rate for the last drop of water consumed during a billing period, ranges from less then $1 per 1,000 gallons to over $7 per 1,000 gallons. The lowest marginal rate was $0.48 per 1,000 gallons charged by Provo, Utah. Provo also has a flat fee structure, charging the same amount irrespective of the amount of water used. The highest marginal rate observed under normal operating conditions was $7.04 per 1,000 gallons, imposed by the Cheyenne Board of Public Utilities on customers outside the Cheyenne city limits. Cheyenne has an increasing rate structure and the highest marginal rate is effective after 42 thousand gallons have been consumed. Additionally, the City of Boulder, Colorado has declared drought surcharges that may increase the highest marginal rate up to $13.50 per 1,000 gallons.

An average household in Salt Lake City, Utah consumes about 22,000 gallons of water monthly during the summer months. For comparison, the monthly bill for 22,000 gallons of water was calculated for each of the 38 utilities (Table 4). These monthly bills were calculated using summer rate schedules that apply within the city limits. All of the utilities serving areas in Utah ranked in the lower half. The lowest monthly bill for this amount of water was the flat fee of $11.00 charged by Idaho Falls, Idaho. Of the 37 utilities that charge by the amount of water used, the lowest bill was $18.10, charged by Smithfield, Utah near Logan. The highest monthly bill for 22,000 gallons was $79.51, charged by Tucson City Water. Of the Utah-based utilities, Sandy City billed the highest amount for 22,000 gallons at $40.83. Most of the city-owned water utilities that also serve areas outside of the city limits charge higher rates outside of the city limits. When looking at rates charged outside the city limits, the highest amount charged for 22,000

gallons was $99.21, imposed by the Cheyenne Board of Public Utilities.

Recent Utah Water Use

Although Utah residents tend to have high water consumption, calls for conservation during the recent drought have noticeably reduced water use. Data compiled by the Utah Division of Water Resources indicate daily per capita water consumption in Salt Lake City dropped from 250 gallons to 208 gallons, a decrease of 17 percent. Similarly, daily per capita water consumption in the Logan area dropped from 248 gallons in 1998 to 200 gallons in 2003, a decrease of 19 percent, although over the same time use in the Provo-Orem area dropped by only 1.4 percent, from 217 gallons per person per day to 214 gallons per person per day. The Ogden-Clearfield area is also observing a drop in water use, with daily per capita consumption dropping from 180 gallons to 153 gallons from 2001 to 2003.

Even with the lower water consumption observed in recent years, increasing population will continue to strain the available water sources serving metropolitan areas in Utah and the other Intermountain states. Current U.S. Bureau of the Census projections indicate the population of the eight Intermountain states will reach 29.9 million by 2030, a 51 percent increase from the July 1, 2004 population estimate of 19.9 million. As has happened over the past several decades, most of this population increase is expected to occur in the metropolitan areas. Providing water to this rising population will continue to challenge the areas's water supplies, forcing them to look at new water sources.

Future Utah Water Sources

Most water sources readily available to Utah metropolitan areas are close to fully appropriated. Surface water in the Provo and Weber River drainages, major suppliers to Salt Lake City, Ogden, and Provo, are closed to new water rights and groundwater in the area is limited. In the Logan area, there is available groundwater, but due to the strong relationship between surface water and groundwater, applications for groundwater must document there will be no effect on prior water rights, especially surface water. The Virgin River drainage supplies most of the water used in the St. George area. This drainage is considered fully appropriated except for one area west of Hurricane and south of the Virgin River and the area tributary to Beaver Dam Wash.

Future water supply for Utah's metropolitan areas will, to a large extent, depend on trans-basin diversions. Final approval was recently obtained for construction of the Utah Lake Drainage Water Delivery System by the Central Utah Water Conservancy District. This system is the last of six original systems planned for the Bonneville Unit of the Central Utah Project. The system will consist of pipelines to transport water from Strawberry Reservoir to users in Utah, Salt Lake, and Juab counties. The system will deliver 101,900 acre-feet of water annually, including water destined to maintain flows in streams tributary to Utah Lake for environmental reasons. About 30,000 acre-feet would be delivered annually to Salt Lake County. Design work on the system is expected to commence in 2006 and construction will take place over about 10 years, depending on annual funding.

The Bear River is one of the few areas in Utah with a developable water supply. Legislation passed in the early 1990s reserved water from the Bear River for the Bear River Water Conservancy District (60,000 acre-feet), the Jordan Valley Water Conservancy District (50,000 acre-feet), the Weber Basin Water Conservancy District (50,000 acre-feet) and various entities in Cache County (60,000 acre-feet). Current plans call for piping Bear River water from somewhere below Cutler Dam to Willard Bay Reservoir and from Willard Bay, building conveyance

Table 5
The Intermountain Metropolitan Areas Examined

Area	State	Counties	Population	Population, percent Urban	Area, square miles	Area, percent Urban
Albuquerque	New Mexico	Bernalillo,	622,830	94.0	2,234	9.5
Boise City-Nampa	Idaho	Ada	300,904	93.2	1,055	10.6
Boulder	Colorado	Boulder	291,288	90.7	742	12.3
Carson City	Nevada	Carson City	52,457	94.0	143	14.2
Casper	Wyoming	Natrona	66,533	86.8	5,340	0.5
Cheyenne	Wyoming	Laramie	81,607	83.6	2,686	1.3
Colorado Springs	Colorado	El Paso	516,929	90.5	2,126	9.4
Denver-Aurora	Colorado	Adams, Arapahoe, Denver, Douglas,	2,109,282	96.0	3,760	14.4
Fort Collins-Loveland	Colorado	Larimer	251,494	86.3	2,601	3.7
Grand Junction	Colorado	Mesa	116,255	84.8	3,328	1.8
Great Falls	Montana	Cascade	80,357	80.1	2,698	1.1
Idaho Falls	Idaho	Bonneville	82,522	81.2	1,868	1.7
Las Vegas-Paradise	Nevada	Clark	1,375,765	97.7	7,910	3.8
Lewiston	Idaho	Nez Perce	37,410	82.7	849	1.9
Logan	Utah	Cache	91,391	83.4	1,165	3.3
Ogden-Clearfield	Utah	Davis, Weber	435,527	95.9	880	20.4
Phoenix-Mesa-Scottsdale	Arizona	Maricopa	3,072,149	97.1	9,203	9.2
Pocatello	Idaho	Bannock	75,565	82.7	1,113	2.7
Provo-Orem	Utah	Utah	368,536	93.9	1,998	5.3
Pueblo	Colorado	Pueblo	141,472	87.2	2,389	2.3
Reno-Sparks	Nevada	Washoe	339,486	92.8	6,342	2.0
Salt Lake City	Utah	Salt Lake	898,387	98.8	737	14.2
Saint George	Utah	Washington	90,354	80.1	2,427	9.5
Tucson	Arizona	Pima	843,746	91.6	9,186	3.6
Yuma	Arizona	Yuma	160,026	86.9	5,514	1.0

Source: U.S. Bureau of the Census.

and treatment facilities to deliver water to the Wasatch Front. Although construction of the Utah Lake Water Deliver System will probably delay the need for Bear River water until 2025 or later, the Jordan Valley Water Conservancy District has purchased rights-of-way for piping water from Willard Bay to Salt Lake County.

The Washington County Water Conservancy District has plans to construct a pipeline from Lake Powell to Washington County to accommodate expected growth. Current plans call for a pipeline approximately 120 miles long. The pipeline would originate at Lake Powell one mile north of Lone Rock Road (7 miles north of Glen Canyon Dam) and deliver water to Sand Hollow Reservoir about 10 miles north of St. George. The pipeline route would generally follow existing highways. The pipeline would deliver 70,000 acre-feet annually to Sand Hollow Reservoir and 10,000 acre-feet to the Kane County Water Conservancy

District in Kanab, Utah. The current cost estimate for the project is in excess of $400 million and the anticipated completion date is 2018.

Technical Notes

Metropolitan areas examined in this report were modified versions of the Metropolitan Statistical Areas defined by the U.S. Office of Management and Budget. Data from the 2000 decennial census in the eight Intermountain states were the original basis for defining the metropolitan areas for this study. The Metropolitan Statistical Areas are defined along county lines and must contain an urban cluster that contains at least 50,000 people. Outlying counties are also included in the Metropolitan Statistical Area if they meet certain criteria for commuting to or from the urbanized counties. The focus of this report was to examine water use in urbanized areas, so counties in which less than 80 percent of the population live in urban areas according to the 2000 Census data were excluded from the Metropolitan Statistical Areas. The 25 metropolitan area defined for this report are listed in Table 5. Although several of these areas are quite large and contain sizable amounts of undeveloped land, the population in each is concentrated in the urban core. In 13 of the 25 areas, over 90 percent of the population resides in the urban core.

Water consumption data presented in this report were derived from data on water withdrawals compiled by the U.S. Geological Survey. Every five years, the USGS compiles nationwide data on water use and issues a report detailing water withdrawals by type and use at the state level. Data to the county level are released as data files. Each USGS state office compiles data from available sources, which may vary from state to state. Data comparing water use in 2003 to that in the late 1990s was compiled by the Utah Division of Water Resources based on utility billings and may not be directly comparable to data provided by the U.S. Geological Survey.

Utilities charge for water by the 1,000 gallons or 100 cubic feet (100 cubic feet = 748 gallons), depending on how the water meters are calibrated. For this report, all data was presented in terms of 1,000 gallons for ease of comparison. For utilities that bill bimonthly, the monthly price for 22,000 gallons was calculated by determining the price for 44,000 gallons and then dividing by two.

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