



THE STATE OF WYOMING

Water Development Office

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TECHNICAL MEMORANDUM

TO: Water Development Commission

DATE: April, 2013

FROM: Water Resources Data System,
University of Wyoming

REFERENCE: Snake/Salt River Basin Plan
Update, 2012

SUBJECT: Water Conservation – *Tab XV (2012)*

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1.0 Introduction

In the 2002 *Snake/Salt River Basin Plan Water Conservation Technical Memorandum*, Sunrise Engineering, Inc. focused on water conservation practices in the agriculture, municipal, and industrial sectors as well as potential future conservation opportunities. This update to that technical memorandum reexamines future water conservation practices primarily in the agricultural and municipal sectors.

Appendix A presents an updated major ditch inventory for the Basin and also presents an updated municipal and community system inventory.

2.0 Agricultural Conservation

Since agricultural is the largest water use sector in the basin, as well as the state, conservation practices related to this use may have the greatest impact on water availability. The previous plan inventoried 37 major conveyance facilities (e.g. canals, ditches, and pipelines) along with associated irrigation methods. In this memorandum, these facilities were reexamined to see if any conservation practices, methods, or improvements have been made since that original inventory.

Only major irrigation diversions with adequate accompanying data were updated and addressed in this memorandum. Major ditches were classified for this basin plan as those which supply 10 cubic feet per second of water or more. As a result, only about 60 percent of the irrigated land in the entire Snake/Salt River Basin is included in these calculations.

For updated data on changes to conveyance and irrigation methods, the Wyoming State Engineer’s Office (SEO) was first contacted. Bodean Barney, the SEO Hydrographer Commissioner responsible for the Upper and Lower Snake, provide information related to

irrigated acreages in the Snake River Basin (Appendix A, Table 1). Gary Blazejewski, from the Natural Resource Conservation Service in Afton, WY provided some updates to irrigated lands in the Salt River Basin (Appendix A, Table 1).

Of the 37 entities in the original inventory, 24 used sprinklers to a varying degree. All entities in the Teton Basin and most in the Upper and Lower Salt River Basins used sprinkler irrigation methods, while only one of 13 facilities in the Upper and Lower Snake River Basin used sprinkler irrigation. No changes to irrigation practices have occurred in the Upper Snake River Basin, and all irrigated lands are still under flood irrigation practices. Alternatively, some changes have occurred in the Lower Snake River Basin (LSR). There have been minor changes from flood irrigation to sprinkler in the Upper and Lower Salt River Basin, and most entities use sprinkler irrigation.

Only one entity in the LSR used sprinkler irrigation in 2002; whereas in 2013, four entities in the LSR use sprinkler irrigation. Formerly the LSR had 331 acres in sprinkler irrigation, and with this change, there are now approximately 902 acres in sprinkler irrigation (2.7 times as much). Three canals/ditches in the LSR underwent minor changes in irrigation practices: Enterprise Ditch, Spring Gulch Irrigation, and Granite Creek Supplemental. Many of these changes are related to sprinkler irrigation practices and to irrigation practices at golf courses and their associated subdivisions. Additionally, two ditches in the LSR are no longer in use: Hobo Ditch was incorporated into Enterprise Ditch, and Hot Springs Ditch is no longer in use.

In the previous plan, Sunrise Engineering, Inc. (2002) estimated the amount of water conserved with conversion from flood to sprinkler irrigation. Using crop irrigation requirements (CIR) developed for this update and the acres under flood irrigation, the following formulas were developed and applied to Table 1.

1. Flood Water Used (in) = Crop Irrigation Requirement * 2
2. Sprinkler Water Used (in) = Flood Water Used (in) * 0.6667
3. Water Conserved (in) = Flood Water Used (in) – Sprinkler Water Used (in)
4. Water Conserved(AF) = $\frac{\text{Water Conserved (in)}}{12}$ * Acres Flood Irrigated

Table 1 - Updated Irrigation Method Potential Conservation

Sub-Basin	Acres Flood Irrigated	2012 CIR (inches)	Water Used (inches)		Water Conserved	
			Flood	Sprinkler	(inches)	(AF)
Upper Salt River	5,987	13.11	26.22	17.48	8.74	4,360
Lower Salt River	3,016	13.33	26.66	17.77	8.89	2,233
Upper Snake River	2,927	11.21	22.42	14.95	7.47	1,823
Lower Snake River	12,349	14.04	28.08	18.72	9.36	9,631
Teton River	0	12.44	24.88	16.59	8.29	0
Total	24,279					18,047

There were 26,063 acres under flood irrigation in the previous plan. Using updated data, the number of acres in flood irrigation has been reduced to 24,279 acres. Following the same methodology as the previous plan, 18,047 acre-feet of water would be saved if all 24,279 acres were converted from flood to sprinkler irrigation.

There are several problems with this method for determining water savings as a result of changing irrigation methods. The first is the assumption that the number of total irrigated acres remains constant and that acreage is not taken out of production for other reasons. A second problem is comparing the total amount of water saved using different CIR values. CIR values change across time-periods depending upon changing hydrologic and climate conditions thus changing the amount “saved” from year to year. A third problem is as acreage is converted from flood irrigation to sprinkler irrigation the amount of water saved increases, but the amount of water that can potentially be conserved is decreased.

3.0 Municipal and Domestic Conservation

Water for municipal and domestic use in the Snake/Salt River Basin is derived entirely from groundwater sources. To monitor and curb groundwater depletions, the use of water meters has been implemented by many municipalities in the basin.

In order to determine if any changes were made in municipal water conservation practices, the 50 entities identified in the previous plan were contacted to see what changes have occurred to the population served, the average daily water use (per capita), maximum day water use (per capita), and if the system has implemented the use of meters. Thirty-seven of the entities responded with updates, accounting for 95 percent of the population in the basin (Appendix A, Table 2). In the previous plan, 11 of the 50 public water systems surveyed used meters; in 2013, 24 systems are metered. Several entities gave updated population numbers, stating that the previous estimates may have been overinflated as a result of seasonal occupancy and projected occupancy of newly platted subdivisions. As a result, it is difficult to compare average daily use and maximum day use numbers between plans.

The Wyoming Department of Environmental Quality (WDEQ) reports that an average person in Wyoming uses approximately 100 gallons per day indoors (WDEQ 2013). This means a household with three people would use 300 gallons per day for indoor use. In the Snake/Salt River Basin, the average daily use, reported by 20 entities with comparable data (reported as gallons per capita per day (gpcpd)), increased from 251 gpcpd in 2002 to 349 gpcpd in 2013. These amounts include both indoor and outdoor (lawn, garden and landscape watering) uses. For peak daily use, 16 entities had comparable data, and the maximum day gpcpd amount decreased from 718 gpcpd to 663 gpcpd for indoor and outdoor use. There were three entities that reported peak day gpcpd that were magnitudes greater and were not counted in this comparison (Melody Ranch, Spring Creek Improvement District, and Etna Water & Sewer District).

Several Wyoming Water Development Commission (WWDC) projects have been completed in the basin that should improve municipal water conservation. For example, the Afton Well project, and a rehabilitation project completed in 2008 for the North Alpine Improvement and Service District, included new wells, buried storage transmission lines, a control house, and a pump station. Additionally, the Alpine Water Supply project, completed in 2012, added flow metering to the system. Records of meter readings are regularly used across the state to identify changes in water use and possible problems in a system.

Other reported water conservation measures in place include:

- Afton: limiting watering to night time watering when necessary
- Osmond Pipeline Company: monitoring for leaks
- Targhee Towne Water District: informational newsletter to customers on water use.
- Squaw Creek Water District: tiered water rates
- Indian Paintbrush Homeowners Association: provides a list of recommended conservation practices.

In addition to metering, other potential avenues for municipalities conserving water include:

- Submetering: a method to meter water use in units such as apartments, condominiums, and trailer homes to indicate water use by those individual units; the entire complex of units is metered by the main supplier.
- Leak Detection
- Water Main Rehabilitation
- Water Reuse: the use of wastewater or reclaimed water from one application for another application
- Tiered Pricing: increasing per-unit charges for water as the amount used increases.
- Time-of-Day Pricing: water rates increase during peak use periods.
- Water Surcharges: imposes a higher rate on excessive water use by establishing a threshold level for excess consumption based on average daily per capita or per-household consumption.

References

Sunrise Engineering, Inc. 2002. *Snake/Salt River Basin Plan Water Conservation Technical Memorandum*. <http://waterplan.state.wy.us/plan/snake/techmemos/conserv.pdf>.

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Wyoming Water Development Office, 2013. *Snake/Salt River Basin Plan Update, 2012. Crop Water Requirements Technical Memorandum*.

Wyoming Water Development Commission, 2012 Irrigation System Survey Report, Website 4/1/2013, <http://wwdc.state.wy.us/irrsys/2012/raterept.html>.

APPENDIX A

TABLES 1 AND 2

- Table 1: Updated Major Ditch Inventory
- Table 2: Updated Municipal and Community System Inventory

Table 1: Updated Major Ditch Inventory, Conveyance and Irrigation Methods by Sub-Basin.
Entities with updated data are represented in italics.

UPPER SALT RIVER	% Flood	% Sprinkler	Flood Acres	Sprinkler Acres
Afton Canal	0	100	0	1,816
Cottonwood Creek Irrigation District Pipeline	0	100	0	4,608
<i>Crow Creek Canal</i>	<i>89</i>	<i>11</i>	<i>1,629</i>	<i>201</i>
Dry Creek Irrigation District Pipeline	0	100	0	3,502
Halling Ditch	80	20	824	206
Idaho Boundary Line Ditch	50	50	540	540
<i>North Canal</i>	<i>79</i>	<i>21</i>	<i>2,220</i>	<i>574</i>
<i>Salt River Canal</i>	<i>30</i>	<i>70</i>	<i>774</i>	<i>1,806</i>
Subtotal	41	59	5,987	13,253
LOWER SALT RIVER				
Alto Canal	32	68	301	641
Ames & Gould Canal	100	0	1,089	0
Barker & Heap Canal	10	90	63	563
Dana Ditch	0	100	0	718
<i>East Side Canal</i>	<i>9</i>	<i>91</i>	<i>432</i>	<i>4,460</i>
Freedom Canal	40	60	328	491
Hardman Canal	0	100	0	1,623
Kirkbride Canal	5	95	74	1,409
Porto Canal	0	100	0	1,535
Stewart Creek Pipeline	0	100	0	1,084
Strawberry North Canal	30	70	729	1,701
Subtotal	21	79	3,016	14,225
UPPER SNAKE RIVER				
Black Rock	100	0	734	0
Gaffney	100	0	770	0
Wolff	100	0	1,423	0
Subtotal	100	0	2927	0
LOWER SNAKE RIVER				
Adams	100	0	1,336	0
Cyclone	50	50	331	331
<i>Enterprise</i>	<i>95</i>	<i>5</i>	<i>1,868</i>	<i>101</i>
<i>Spring Gulch Irrigation</i>	<i>13</i>	<i>87</i>	<i>1,725</i>	<i>250</i>
South Park Supply	100	0	3,494	0
Last Chance	100	0	615	0
Pioneer	100	0	667	0
<i>Granite Creek Supplemental</i>	<i>77</i>	<i>23</i>	<i>712</i>	<i>220</i>
Iron Rock	100	0	884	0
Prosperity	100	0	717	0
Subtotal	84	17	12,349	902
TETON				
Todd Ditch	0	100	0	2,227
South Side Canal	0	100	0	1,421
North Side Canal	0	100	0	1,666
Wyoming & Darby Bench Canal	0	100	0	1,828
Squirrel Creek Irrigation	0	100	0	1,600
Subtotal	0	100	0	8,742

Table 2: Updated Municipal & Community System Inventory

Name	Population Served	Avg Day Use (gpcpd)	Peak Day Use (gpcpd)	Percent Metered
Alpine	750	267	267	100
Alta Community Pipeline Spring	40	NA	NA	0
Alton	1,818	754	2,514	100
Aspens I/II Water and Sewer District	1,200	571	1,333	33
Bar-B-Bar Subdivision	100	659	NA	0
Bedford Water and Sewer District	1,200	333	625	100
Buffalo Valley Water District	60	4,110	333	0
Etna Water & Sewer District	150	1,151	1,333	100
Evans Mobile Home Court	150	NA	NA	0
Fairview Water & Sewer District	250	NA	NA	100
Freedom Water and Sewer District	120	583	833	100
Gros Ventre North Subdivision	200	750	2,000	0
Grover Water and Sewer District	400	151	375	99
Happy Valley Pipeline Co.	80	NA	NA	100
Indian Paintbrush	150	295	624	0
Jackson	12,000	179	583	98
Melody Ranch (~300 lots)	500	640	1,736	91
Osmond	250	2,016	100	99
Rafter J	1,500	166	660	99
South Park Village Subdivision	80	130	NA	0
Spring Creek Improvement District	500	525	1,200	100
Squaw Creek	155	103	258	100
Star Valley Ranch Association	1,500	NA	867	100
Star Valley Ranch RV Park/Bridger View	900	75	190	0
Star Valley Trailer Court	90	NA	133	98
Targhee Towne	135	NA	NA	100
Teton Shadows	250	NA	NA	100
Teton Village Water and Sewer District	1,000	NA	NA	100
Thayne	351	765	1,168	95
Westview Village	125	NA	NA	0
Wilson Meadows	180	175	634	100
Gros Ventre (west) Butte	170			0
J-W Subdivision	50	48	54	0
Smoot Water & Sewer District	NA	NA	NA	NA
Kennington Springs Pipeline Company	NA	NA	NA	NA
North Alpine Special Service District	120	150	929	100
Snake River Mobile Home Park	NA	NA	NA	NA
Total	26,524			
Average		635	815	65