

Water Use Conservation Plan
for
Hayden Lake Irrigation District

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Introduction

The purpose of this document is to establish a formal water conservation plan for the Hayden Lake Irrigation District in accordance with the Rathdrum Prairie Groundwater Management Plan adopted by the Idaho Water Resource Board on September 15, 2005.

System Profile

Hayden Lake Irrigation District was originally formed in 1914; during its history the District has evolved into a drinking water supplier. Historic water source was Hayden Lake, however that source has been replaced entirely by the Rathdrum Prairie Aquifer (RPA).

The District pumps groundwater under various water rights. These rights are included in Appendix A.

Currently the District utilizes four deep wells for its supply. A recently drilled, cased and screened well will add one additional source once completed and equipped. Due to proximity of the local airport the District predominantly uses the aquifer as its storage. The four wells have a pumping capacity of approximately 9000 gallons per minute (gpm) and are controlled using variable frequency drives on three of the four wells.

This supply provides water through a distribution network consisting of one pressure zone with pipe sizes from 24" to 4" and types including concrete lined steel, asbestos cement and PVC. Age of the distribution network ranges from approximately 60 years old to current construction. The distribution system provides water to approximately 2500 connections with approximately 80% of those connections representing residential use. The remainder consists of commercial and seasonal irrigation use. The prior 15 years have resulted in District growth exceeding 100% which added significant connections and distribution network. During the same period the District has been able to reduce production per connection by approximately 40%. This reduction is discussed in more detail in the Resource Conservation section. Growth took place primarily during the recent early 21st century residential boom observed throughout the US. One additional source was added during that time.

All sources are metered as are all connections. Meters are read monthly or more frequently and the District utilizes automated meter reading equipment and software. Reliable consumption meter reading and analysis is limited to a six year period from 2009 to current.

Water Use

Analysis of production trends over the past 15 years yields the following: Average day demand (ADD) ranges from a low of 640 gallons per day per connection (g/d/c) to a high of 1150 g/d/c with an overall average of 650 g/d/c for the past 6 years. Peak day demand (PDD) ranges from a low of 1445 to a high of 3950 g/d/c/ with an overall average for the past 6 years of 1840 g/d/c. Peak hourly demand ranges from approximately 9000 gpm to 7000 gpm with 2014 exceeding 9000 gpm. Tables depicting these and the following trends are included in Appendix B

Analysis of consumption trends over the past 6 years yields the following: Average minimum daily per

meter use ranges from a low of 130 g/d/c to a high of 180 g/d/c. Average maximum daily per meter use ranges from a low of 1330 to a high of 2150 g/d/c with six year averages of 155 and 1640 g/d/c respectively. Low use typically occurs during the winter months and high use occurring during the summer months. Seasonal use variation is recognized as a multiplier of approximately ten from low to high use. The District has conducted studies of residential use in recently constructed subdivisions which confirm these seasonal variations.

Water loss is demonstrated to be generally within the industry guidelines of 10% or less; annualized unaccounted for water ranges from 7% to 20% over the past 6 years with an average of 10.6%. Unaccounted for water includes pump to waste during startup, seasonal distribution system flushing (un metered); construction flushing, and potential distribution system leaks. A leak survey was conducted in 2014 which identified one minor leak (repaired). The District analyzes daily production with increased emphasis during wintertime low flows for consistency, trending and flow rate quantity as one of its methods for analyzing water loss potential.

Resource Conservation

The District has employed several measures to reduce water production and encourage conservation through wise use of water by its customers. These current practices consume approximately $\frac{1}{4}$ to $\frac{1}{2}$ of a staff FTE. Proposed future conservation measures follow a discussion of current practices.

The District has reduced its annual production per connection by approximately 40% over the past 15 years. These reductions appear to be the result of two technological advancements; the first included installing variable frequency drives on two of its pumps (a third drive was added later when the fourth well was constructed) and installation of a control system (SCADA system). These changes resulted in significant reductions of tank overflow and once the control systems were understood and able to be fully utilized they resulted in increased overall system operational efficiency reducing production by approximately 20% total. The second advancement included replacing all consumption meters with automated meters and associated reading equipment and software.

The second improvement has enabled the District to read meters accurately, reliably and on an increased frequency and more importantly to analyze and subsequently use the information gained to notify customers of leaks and high use. The District notifies customers of these parameters on a monthly basis. Results of this effort illustrate a sharp 20% decrease in production with continued, less significant, reduction trends since.

The District constructed a demonstration garden in 2010 to illustrate a landscape alternative to lawn grasses. The District can use this garden to demonstrate the per square foot reduction in water use.

The District routinely provides information encouraging conservation to its customers in the form of meter readings and reminders on the billing statement, newsletters included with the quarterly water bill, annual consumer confidence report, District website information and personal communication with customers by office and field staff. A leak credit program is utilized to encourage quick repair of leaks.

Water rates are annually reviewed and generally increased each year by a small amount. The District finds its water pricing to be midpoint on a comparison of local providers.

Each of these measures provides a consistent message of the importance of water, its management as a

resource and everyone's responsibility in preserving the resource.

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Future measures may include

- Continuation of the existing educational and field programs with improvements and enhancements as they become available, and are implementable.
- Conversion to a consumption based water rate rather than an allocation based rate as currently employed. Consumption based rates have a demonstrated effect of reducing consumption.
- Odd/Even watering schedules for seasonal irrigation.
- Encouragement of soil amendments to increase water holding capacity which is shown to reduce rapid dewatering of the top soil as well as reduce surface evaporation retaining more water near the root zone.
- Encouraged use of technological advancements both indoors and for outside irrigation.
- Support of technology to use rain and soil moisture sensors, AgriMet stations and other methods to increase efficiency of irrigation of larger plots with potential for use on residential lots.

The Districts future goals for water use will be based on a per connection basis; with desired results to reduce the seasonal peaks and develop stable, consistent water use patterns. The District has significant involvement in a regional organization which is discussing conservation on a region wide basis. It is anticipated that organization will establish goals for water use and conservation which the District will then tailor its conservation programs to meet.

Conclusion

It must be noted, and understood, the Districts primary responsibility is to provide safe drinking water of high quality. Efforts spent on conservation, while embraced by the District as an important component of resource management, must be manageable, implementable and affordable to both the District staff and its members. As evidenced by its significant current efforts the District is committed to realistic conservation, however it also recognizes future conservation measures are unlikely to yield returns as high as previously observed.

The District Administrator participates significantly in the larger regional (bi-state) resource management discussions towards regional solutions to current and future resource challenges. Conservation is recognized as a significant, and logical part of that discussion. It is also recognized that the region will not 'conserve' its way out of these challenges; and conservation in many ways simply paves the road towards additional growth.

To provide greater context of the Districts current water use patterns; recent studies completed by the Idaho Water Resources Research Institute (IWRRI) and the USGS demonstrate the District's per capita use as it compares to local and national trends. The IWRRI study concluded the District as having the 2nd lowest per capita water use (87 g/d) of the regional (Idaho) purveyors supplying information. A recent USGS national study (completed every 5 years) showed a national average of 88 g/d/person and illustrated Idaho as the highest per capita water user in the nation at 168 g/d (District use shown at 87 g/d/p). These comparisons demonstrate the effectiveness of the Districts current work.

The District believes the results discussed in this report, and a comparison to regional and national trends illustrate District water use trends significantly influenced by its conservation efforts, its customer's willingness to use water wisely and the Districts commitment to manage the resource appropriately.

Hayden Lake Irrigation District
Conservation Plan
Appendix A

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Rights Held by District

Right #	Priority Date	Cfs Annual	Cfs 3-15 11-15	AF Annual	AF Irr Season
95-7800 ¹	11/16/77	3.8	3.8	2751.1	
95-8581 ¹	4/25/88	10.92	12.92	4237	300
95-9212	8/7/02	1.34	1.34	968.3	
Total		16.06	18.06	7288.1	8256.4

Irrigation season is March 15 to November 15

Notes

1. Rights 95-7800 & 95-8581 have an instantaneous withdraw limitation of 16.72 cfs and a combined annual limit of 7288.1 Ac. Ft. Cfs Annual allocation is for Municipal use.

Rights Held in Deed by District

Right #	Priority Date	CFS Annual	Cfs 3-15 11-15	AF Annual	AF Irr Season
95-8279 ¹	4/1/83		3		553
95-8273 ¹	3/16/83		2		374.5
95-9242 ²	3/9/66		1.26		371
95-8269 ³	3/11/83		1.56		273
			5.94 ⁴		1571.5

Notes:

1. Sunshine Meadows and Strawberry Fields development water rights deeded to District September 2004 instruments 1929155 & 1929156
1. Rights 95-8279 & 8273 have a combined limit of 3.12 cfs
2. Broad Moore development water right
3. Carrington Meadows water right. Section 16 T51 R4 beneficial use continues to be to this land.
4. Represents total cfs where rights 8279 & 8273 have a combined total of 3.12

Hayden Lake Irrigation District

Conservation Plan

Appendix B

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Water Production 2009 to 2014

Source: Rathdrum Prairie Aquifer
Source wells 1 through 4 Quantity in gallons

	Year					
	2009	2010	2011	2012	2013	2014
January	20,939,000	18,283,900	18,692,000	16,836,600	17,233,000	16,265,100
February	17,493,000	16,523,000	16,315,000	15,769,100	15,088,000	14,907,800
March	19,342,000	18,745,000	17,426,000	16,491,000	16,962,300	16,746,000
April	22,340,900	21,868,000	17,801,600	19,657,100	20,202,200	20,130,100
May	66,111,100	47,361,400	25,633,400	53,419,400	64,335,600	52,075,100
June	118,205,700	51,482,300	46,146,300	53,462,300	101,967,200	86,757,900
July	159,272,500	126,110,800	106,825,500	106,365,200	155,398,400	140,461,200
August	131,389,200	142,174,100	135,640,300	140,108,500	128,065,100	129,746,900
September	98,456,600	73,579,700	125,910,400	111,912,500	68,260,400	97,459,300
October	28,802,500	32,058,900	44,800,900	34,580,700	24,059,100	40,068,100
November	17,065,400	18,592,000	17,223,400	16,620,000	16,525,300	19,241,100
<u>December</u>	<u>17,776,000</u>	<u>18,480,000</u>	<u>17,143,300</u>	<u>17,122,400</u>	<u>17,948,500</u>	<u>17,866,900</u>
Total	717,193,900	585,259,100	589,558,100	602,344,800	646,045,100	651,725,500

Water Use 2009 to 2014

Consumption from monthly meter readings (in gallons)

	2009	2010	2011	2012	2013	2014
January		13,196,000	15,641,000	13,712,000	14,120,000	13,976,000
February	33,978,000	12,360,000	18,828,000	12,288,000	12,722,000	11,853,000
March	13,587,000	13,734,000	11,499,000	9,961,000	12,278,000	12,301,000
April	18,960,000	18,096,000	13,490,000	14,913,000	14,414,000	18,468,000
May	39,432,000	37,565,000	29,379,000	40,299,000	56,566,000	40,821,000
June	71,709,000	40,459,000	40,706,000	37,660,000	61,048,000	66,032,000
July	114,596,000	85,785,000	107,925,000	72,859,000	117,718,000	109,998,000
Irrigation		45,461,000	26,519,000	18,721,000	44,694,000	36,247,000
August	74,682,000	99,234,000	118,167,000	109,406,000	96,615,000	92,681,000
September	157,511,000	81,871,000	100,533,000	140,584,000	94,662,000	122,807,000
October	22,538,000	61,024,000	35,349,000	48,779,000	18,702,000	32,343,000
November	13,940,000	13,793,000	15,551,000	13,925,000	18,326,000	12,300,000
December	12,137,000	21,750,000	11,729,000	23,607,000	12,267,000	15,260,000
	573,070,000	544,328,000	545,316,000	556,714,000	574,132,000	585,087,000

Unaccounted for Water

Unaccounted for water (in gallons)						
	2009	2010	2011	2012	2013	2014
Production	717,193,900	585,259,100	589,558,100	602,344,800	646,045,100	651,725,500
Use	573,070,000	544,328,000	545,316,000	556,714,000	574,132,000	585,087,000
Unaccounted	144,123,900	40,931,100	44,242,100	45,630,800	71,913,100	66,638,500
Percentage	20.10%	6.99%	7.50%	7.58%	11.13%	10.22%

Minimum and Maximum consumption

Minimum and Maximum gallons per day per connection (from consumption meter readings)						
	2009	2010	2011	2012	2013	2014
Minimum g/d/conn	160	181	149	128	152	163
Average Minimum	156					
Maximum g/d/conn	2149	1328	1512	1838	1462	1540
Average Maximum	1638					

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Production trends

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Jan	11,884,800	10,981,100	10,172,700	10,619,500	13,251,700	15,232,300	16,773,000	19,809,600	18,439,400	20,939,000	18,283,900	18,692,000	16,836,600	17,233,000	16,265,100
Feb	9,799,100	9,957,600	8,792,100	9,845,900	11,758,600	12,922,300	15,342,400	18,188,000	18,902,700	17,493,000	16,523,000	16,315,000	15,769,100	15,088,000	14,907,800
Mar	10,549,200	11,616,200	10,744,400	11,103,500	12,852,500	16,266,900	18,250,700	18,762,000	18,154,900	19,342,000	18,745,000	17,426,000	16,491,000	16,962,300	16,746,000
Apr	13,181,800	12,698,400	13,056,000	11,339,200	17,779,000	19,601,500	21,375,600	24,901,200	19,222,000	22,340,900	21,868,000	17,801,600	19,657,100	20,202,200	20,130,100
May	22,405,600	27,917,500	21,237,700	25,023,700	32,747,400	39,645,600	66,606,400	63,155,400	52,148,900	66,111,100	47,361,400	25,633,400	53,220,700	64,335,600	52,075,100
Jun	45,398,800	41,434,600	48,141,500	67,973,500	60,657,000	50,520,900	80,073,068	87,797,300	75,168,700	118,205,700	51,482,300	46,410,300	53,164,400	101,967,200	86,757,900
Jul	111,573,100	91,616,800	109,350,300	146,466,400	124,548,300	113,960,400	168,217,266	172,911,800	153,376,200	159,272,500	126,110,800	121,156,200	97,951,900	155,398,400	140,461,200
Aug	131,661,800	108,666,300	114,476,000	119,173,600	97,439,800	129,295,900	161,301,300	152,898,600	137,233,900	131,389,200	142,174,100	155,316,100	114,270,800	128,065,100	129,746,900
Sep	41,213,500	74,873,400	56,995,300	57,109,700	36,607,300	73,388,200	97,904,000	92,611,200	90,165,200	98,456,600	73,579,700	105,674,800	126,754,000	68,260,400	97,459,300
Oct	12,623,100	16,238,000	15,512,700	22,742,000	21,379,000	24,346,900	39,026,200	24,957,000	30,358,800	28,802,500	32,058,900	30,784,800	52,012,100	24,059,100	40,068,100
Nov	10,877,500	11,054,200	10,251,400	14,812,700	11,569,900	16,791,400	18,057,300	17,574,000	18,322,000	17,065,400	18,592,000	17,204,600	19,094,700	16,525,300	19,241,100
Dec	11,082,300	10,961,400	10,442,300	11,796,400	16,707,400	16,581,100	19,181,900	18,504,000	20,368,000	17,776,000	18,480,000	17,143,300	17,122,400	17,948,500	17,866,900
Total	432,250,600	428,015,500	429,172,400	508,006,100	457,297,900	528,553,400	722,109,134	712,070,100	651,860,700	717,193,900	585,259,100	589,558,100	602,344,800	646,045,100	651,725,500
Total conn (metered)	1076	1076	1129	1212	1402	1636	2259	2363	2409	2443	2479	2521	2549	2600	2659
daily avg (gallons)	1,101	1,090	1,041	1,148	894	885	876	826	741	804	647	641	647	681	672
change yr to yr		-0.98%	-4.44%	10.26%	-22.18%	-0.95%	-1.06%	-5.73%	-10.20%	8.49%	-19.58%	-0.94%	1.05%	5.15%	-1.36%
change current yr to 2000		-0.98%	-5.37%	4.34%	-18.81%	-19.58%	-20.43%	-24.99%	-32.64%	-26.92%	-41.23%	-41.79%	-41.18%	-38.15%	-38.99%