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Attorneys for Applicant SUEZ Water Idaho Inc.

BEFORE THE IDAHO DEPARTMENT OF WATER RESOURCES

IN THE MATTER OF INTEGRATED MUNICIPAL APPLICATION PACKAGE ("IMAP") OF SUEZ WATER IDAHO INC., BEING A COLLECTION OF INDIVIDUAL APPLICATIONS FOR TRANSFERS OF WATER RIGHTS AND APPLICATIONS FOR AMENDMENT OF PERMITS.

THIRTEENTH AFFIDAVIT OF JACK W. RELF (RATHDRUM PRAIRIE AQUIFER FUTURE WATER DEMAND)

State of Idaho)
) ss.
County of Ada)

JACK W. RELF, being first duly sworn upon oath, deposes and states:

1. I am an associate attorney with the above-captioned firm, Givens Pursley LLP. I am one of the attorneys representing SUEZ Water Idaho Inc. in the above-entitled action and am duly licensed to practice law in the state of Idaho.

2. I make this affidavit based upon my personal knowledge of the facts set forth in this affidavit and to the best of my information and belief.

3. A true and accurate copy of the Rathdrum Prairie Aquifer Future Water Demand (December 2014, revised April 2, 2015), as obtained from the University of Idaho official website,[1] is attached hereto as Exhibit A.

4. This document is also available at http://digital.lib.uidaho.edu/cdm/ref/collection/idahowater/id/546?_ga=2.215703572.2005514383.1522860345-1465171088.1522860345.

[1] https://vivo.nkn.uidaho.edu/vivo/display/n100917

DATED this 4th day of April, 2018.

GIVENS PURSLEY LLP

By _____
Jack W. Relf

Subscribed and sworn to before me this 4th day April, 2018.

LISA A. HUGHES NOTARY PUBLIC STATE OF IDAHO

Notary Public for Idaho
Residing at: Boise Idaho
My Commission Expires: 3-22-2019

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 4th day of April, 2018, the foregoing was filed, served, and copied as shown below. Service by email is authorized by the Hearing Officer's Order of September 11, 2017 at page 3. Due to the size of the exhibit, a courtesy copy of the foregoing without the exhibit attached was emailed to all parties noted below, and a physical copy of the same with the exhibit has been placed on a disk and mailed as indicated below.

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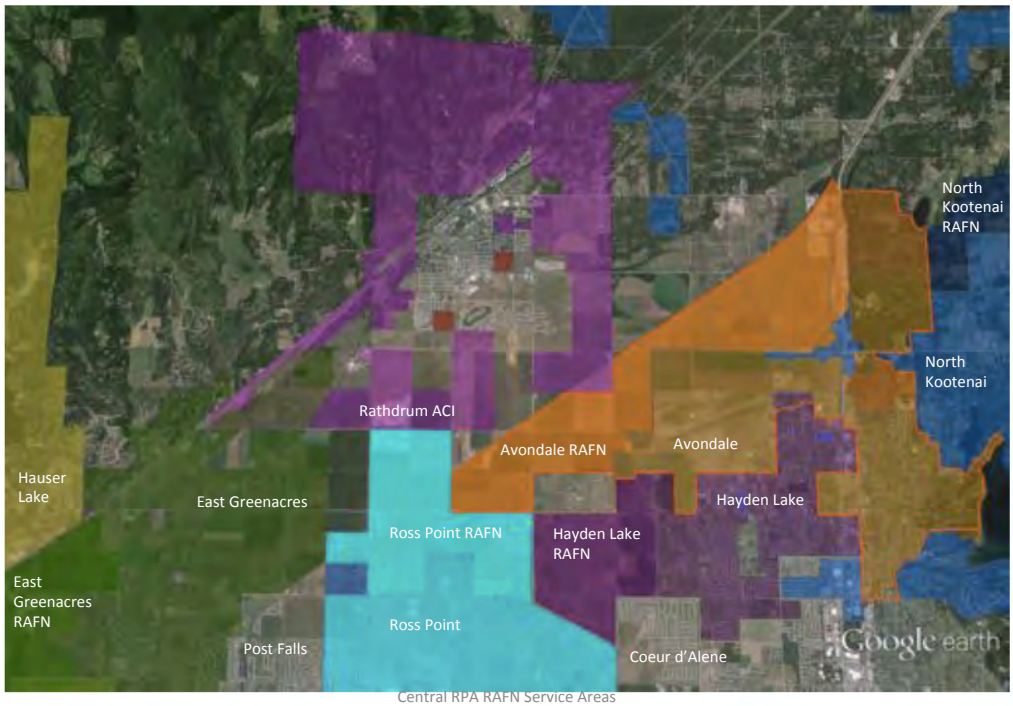
Exhibit A **RATHDRUM PRAIRIE AQUIFER FUTURE WATER DEMAND**

RATHDRUM PRAIRIE AQUIFER FUTURE WATER DEMAND



Central RPA RAFN Service Areas

December 2014
Rev. 4/2/15

Idaho Water Resources Research Institute
Report #201404: Mark Solomon and Elizabeth Scott

Report to the Idaho Water Resources Board providing information for evaluation of Rathdrum Prairie Aquifer Reasonably Anticipated Future Need municipal provider water right applications.

Rathdrum Prairie Aquifer Future Water Demand

IDAHO WATER RESOURCES RESEARCH INSTITUTE REPORT #201404: MARK SOLOMON AND ELIZABETH SCOTT

EXECUTIVE SUMMARY

Thirty-one municipal water providers deliver groundwater to 107,660 people over and adjoining the Rathdrum Prairie Aquifer (RPA) in northern Idaho. In 2014, the Idaho Legislature appropriated $500,000 to the Idaho Water Resources Board (IWRB) "to conduct joint water need studies in coordination with Northern Idaho communities to ensure water availability for future economic development". The Idaho Water Resources Research Institute (IWRRI) was contracted to conduct the studies and report to IWRB and RPA municipal providers. The goal of the contract and this report is to provide underlying information necessary to support potential Reasonably Anticipated Future Need (RAFN) water right applications from RPA municipal providers.

Idaho Code authorizes municipal water providers to hold RAFN water rights to provide for future growth and economic development. There are four components of an application for a RAFN right: delineation of the future service area, a planning horizon, a future water demand projection, and a water right gap analysis to determine the extent of the RAFN right to be applied for.

Approximately 85,000 acre foot (AF) annually is withdrawn from the RPA for municipal, domestic, commercial, industrial, and agricultural use. Of that, 36,400 AF is withdrawn by RPA municipal providers with eleven providers supplying water to 95% of the RP population. Ten providers anticipate either applying for RAFN rights, or identified potential service area overlaps with other providers. After mediated resolution of overlaps and terms of service, a Memorandum of Understanding identifying future RPA municipal water provider service areas was negotiated and signed by all ten municipal providers.

Population served by the eleven major RPA municipal providers is projected to increase by 87,671 over the 30-year planning horizon. The area served will increase from 78.9 square miles to 156.9 square miles. Relatively low to medium density (<1-4 units/acre) development of both ACI and rural areas is likely to constitute roughly 80-85% of new residential development. Existing cities and their Areas of City Impacts (ACI), along with urban reserves, will likely see a small amount (up to 5%) of higher intensity, compact development both within the city centers and at nodes along existing arterial and collector corridors within ACIs and in rural portions of the county. The Maximum Daily Demand will increase by 61.56 cfs, and the Peak Hourly Demand will increase by 159.41 cfs.

RAFN rights totaling 56.61 cfs are required to meet the 2045 MDD of six RPA municipal providers. The rights are offset by a decrease of 103.74 in MDD required rights among five other RPA municipal providers. RAFN rights totaling 107.78 cfs are required to meet the 2045 PHD of ten RPA municipal providers. The RAFN rights are offset by a decrease of 43.74 cfs in PHD required rights for one RPA municipal provider. Storage may offset some or all of the PHD RAFN needs of four providers with above ground storage capacity depending on individual provider water storage Management Policy.

IWRRI December 2014, Rev. 4/2/15

ACKNOWLEDGEMENTS

This report is made possible through funding provided by the Idaho Water Resources Board. The authors wish to acknowledge the technical assistance provided by SPF Water Engineering, Idaho Water Engineering and Welch-Comer Engineers, the municipal providers of the Rathdrum Prairie for their vision, support, and supply of water production and demand data, and the University of Idaho – CDA Community Water Resource Center.

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INTRODUCTION

Idaho Code authorizes municipal water providers to hold unperfected water rights to provide for future growth and economic development. The statute and relevant guidance from the Idaho Department of Water Resources (IDWR) outlines four components of an application for a Reasonably Anticipated Future Need (RAFN) right: the future service area, a planning horizon, future water demand projection, and a water right gap analysis to determine the extent of the RAFN right to be applied for.

Thirty-one water providers deliver groundwater to municipal customers over and adjoining the Rathdrum Prairie Aquifer (RPA) in northern Idaho. Legally defined in §42-202B(5)) I.C. as municipal providers, the four incorporated cities, eight water districts, eleven water associations, four irrigation districts and four other corporations are distinguished by service-areas more reflective of incremental growth, geography and customer location than service areas arrived at through a planning process. Several of the providers' service-areas are bounded by others while the rest continue to expand as development occurs and requests for service are made. Market forces have served the providers adequately in the past to settle which would provide service to developments outside existing service area boundaries. The market approach is not compatible, however, with the needs of a RAFN application and its projected population and water demand requirements.

In 2014, the Idaho Legislature appropriated $500,000 to the Idaho Water Resources Board (IWRB) "to conduct joint water need studies in coordination with Northern Idaho communities to ensure water availability for future economic development". The Idaho Water Resources Research Institute (IWRRI) was contracted by IWRB through IDWR to conduct those joint water need studies. The goal of the contract and this report is to provide the underlying information necessary to support potential RAFN applications from municipal providers on the Rathdrum Prairie.

Driving this report's completion timeline has been Washington Department of Ecology's proposed Spokane River instream flow rule, projected to be adopted in mid-December 2014 and to become effective 31 days later. While neither Washington or Idaho consider water rights conflict across the state line a likely scenario, there is still a distinct advantage given to the entity with the earliest appropriation date should unanticipated conflict over water use of the shared aquifer and river resource surface.

To build this report, IWRRI addressed the four RAFN components by: (1) convening water providers in a mediation environment to establish mutually agreed upon provider service areas for developable land likely to be served by groundwater from the Rathdrum Prairie Aquifer (RPA); (2) updating the existing demand section of the 2010 water demand study to reflect current demand for RPA groundwater; (3) developing a thirty-year (2045) Population Projection and Water Demand Projection for the RPA based on the updated existing demand study, current population and economic data, population and economic projections, and developing defensible correlations for projection of future water demand; and (4) establishing an existing water rights portfolio and demand projection based water right gap analysis for RPA service providers.

This report details the findings of IWRRI and its technical consultants. Structurally, it will address each of the four RAFN components and the methodologies utilized to produce each components outcome: service area, planning horizon, future water demand, and gap analysis. Appendices include the full technical reports, Memorandum of Understanding, and a provider-by-provider breakout of information. Much of this reports information has been assembled as Geographic Information System (GIS) layers and will be made publicly available through the Inside Idaho GIS portal.

IWRRI December 2014, Rev. 4/2/15

STUDY 1: SERVICE AREA

SUMMARY: A MEMORANDUM OF UNDERSTANDING IDENTIFYING FUTURE RPA MUNICIPAL WATER PROVIDER SERVICE AREAS WAS SIGNED BY ALL PARTIES AFTER MEDIATED RESOLUTION OF SERVICE AREA OVERLAPS AND TERMS OF SERVICE.

Approximately 35,000 acres of undeveloped RP agricultural and timber land is situated outside incorporated municipal boundaries or municipal provider service areas, land that could be potentially served by one or more of thirty-one different RPA municipal water providers.

Idaho Code §42-˝202B (9) defines the service area for a municipality as follows:

> "Service area" means that area within which a municipal provider is or becomes entitled or obligated to provide water for municipal purposes. For a municipality, the service area shall correspond to its corporate limits, or other recognized boundaries, including changes therein, after the permit or license is issued. The service area for a municipality may also include areas outside its corporate limits, or other recognized boundaries, that are within the municipality's established planning area if the constructed delivery system for the area shares a common water distribution system with lands located within the corporate limits. For a municipal provider that is not a municipality, the service area shall correspond to the area that it is authorized or obligated to serve, including changes therein after the permit or license is issued.

IDWR RAFN Guidance (2013) states, "For a municipal provider Idaho code requires the RAFN service area to be contained within the municipality's "established planning area" (I.C. §42-˝202B (9)) minus "areas overlapped by conflicting comprehensive land use plans" (I.C. §42-˝202B (8)). "

The intent of the statute and guidance appears to be two-fold: to ensure that there are no double allocations of RAFN rights, and to utilize statutorily required land use planning processes for the establishment of service areas. Meeting the intent of no overlaps is procedurally simple although not necessarily straightforward. Achieving the intent of the second purpose is less direct.

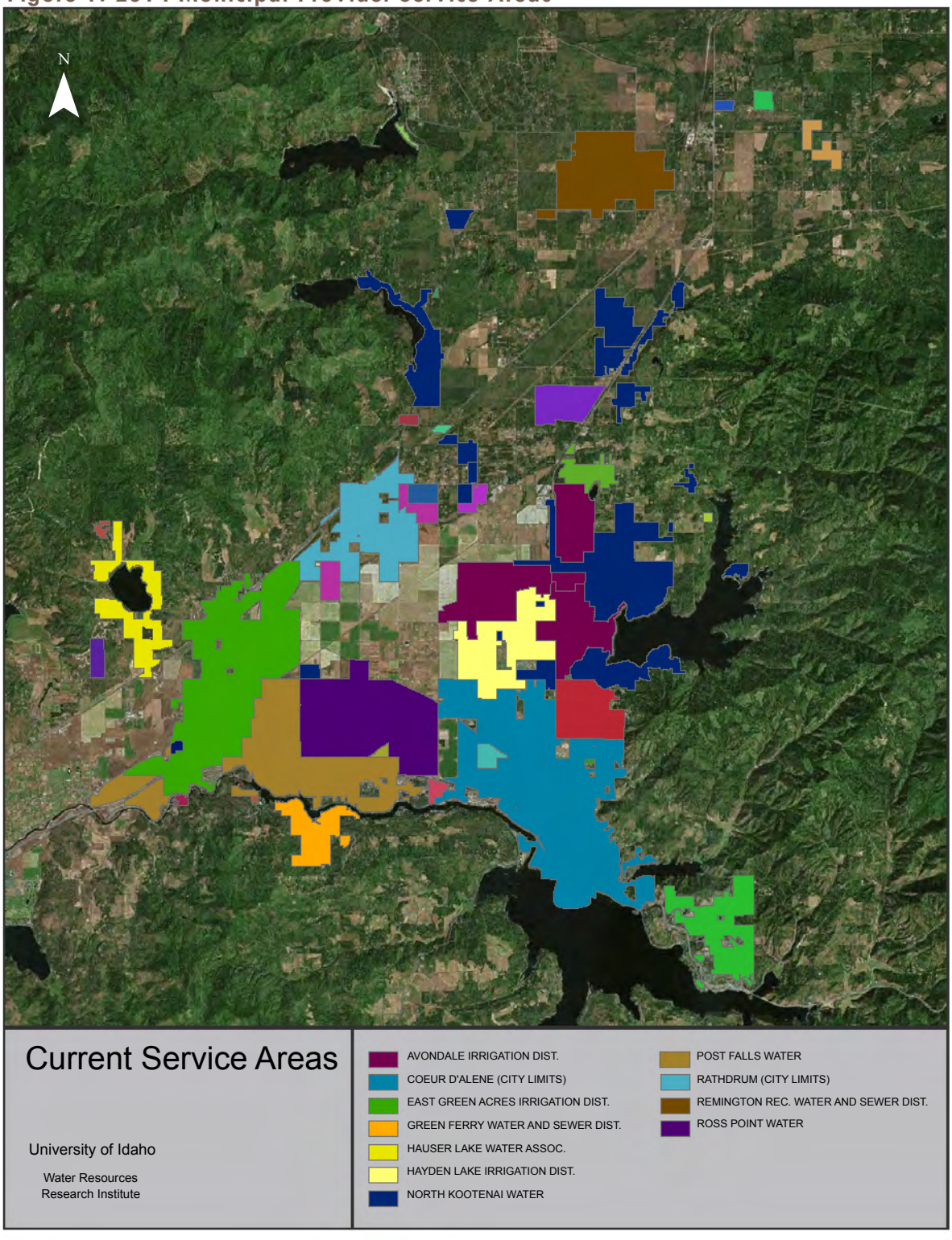
For municipal providers that are incorporated cities, Idaho Code provides several public planning processes that can serve to meet §42-202B (9), most notably the Area of City Impact section of the Local Land Use Planning statute §67-˝6526. There are, however, no similar public planning process requirements for municipal providers who are not incorporated cities to rely on.

To address this procedural gap, IWRRI proposed to identify existing and projected RPA municipal service area overlaps, mediate resolution of identified overlaps, and complete a consensus Memorandum of Understanding between municipal service providers memorializing the mediated solutions and the future service areas of all providers who identified expanded service areas.

Of the thirty-one RPA municipal providers, nine self-identified as planning to expand their service areas or anticipating increased demand within existing service areas over the next thirty years: City of Post Falls, City of Rathdrum, Avondale Irrigation District, East acres Irrigation District, Greenferry Water and Sewer District, Hauser Lake Water Association, Hayden Lake Irrigation District, North Kootenai Water and Sewer District, Remington Recreational Water and Sewer District, and Ross Point Water District. Each of the providers agreed to participate in IWRRI mediated resolution of existing service area overlaps and potential overlaps in projected future service areas on a 30-year planning horizon. IWRRI mediator Dr. Mark Solomon met individually with each of the providers to determine where overlaps might exist and the nature of the overlap, i.e. incorporated city versus irrigation district or irrigation district versus irrigation district. After further IWRRI

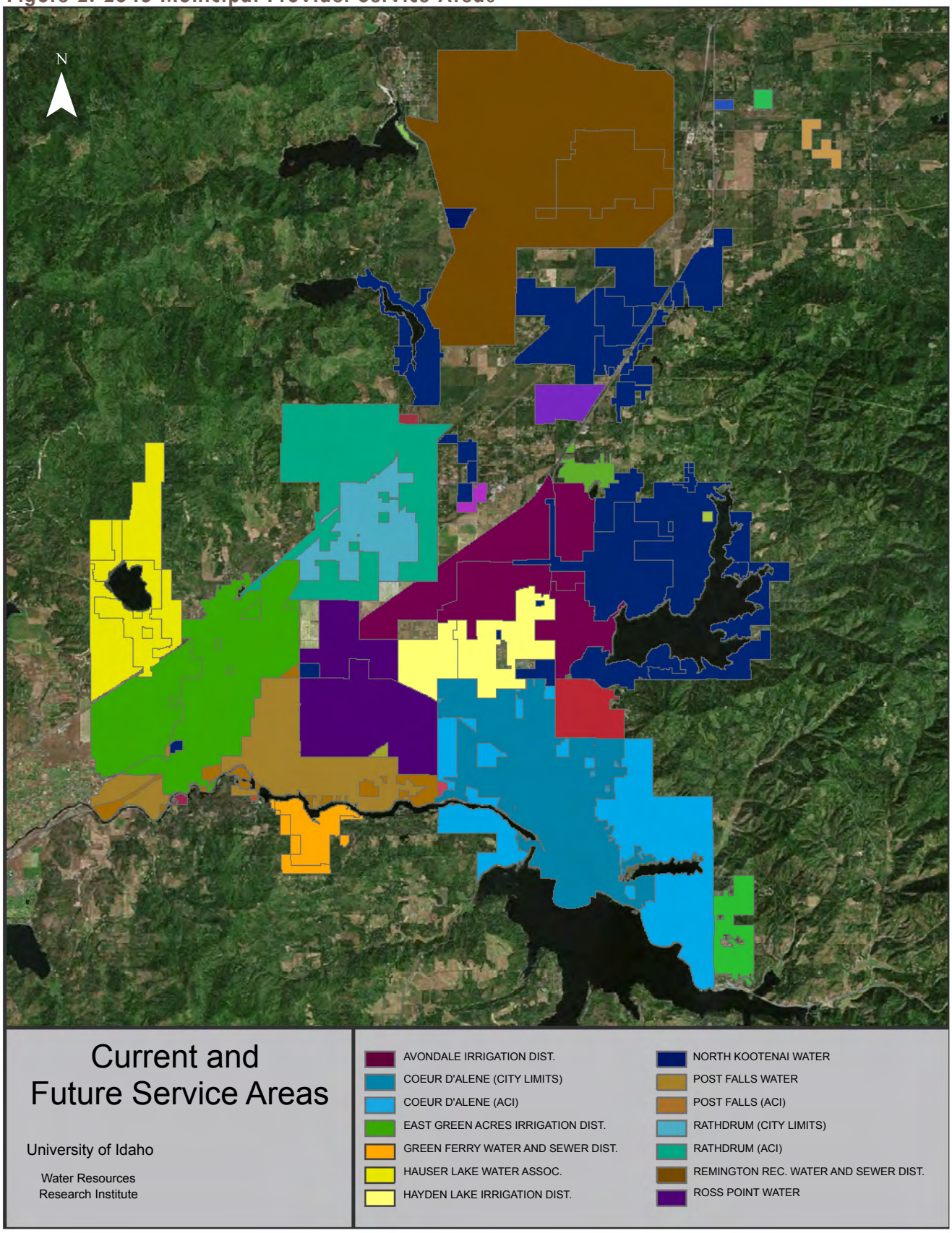
fact-finding, duly authorized representatives of overlapping providers engaged in mediated resolution of the overlaps. All overlaps were resolved and are memorialized in the signed Memorandum of Understanding, see Appendix A.

Figure 1. 2014 Municipal Provider Service Areas



IWRRI December 2014, Rev. 4/2/15

Figure 2. 2045 Municipal Provider Service Areas



IWRRI December 2014, Rev. 4/2/15

STUDY 2: CURRENT WATER DEMAND

SUMMARY: APPROXIMATELY 85,000 ACRE FOOT (AF) ANNUALLY IS WITHDRAWN FROM THE RPA FOR ALL USES: MUNICIPAL, DOMESTIC, COMMERCIAL, INDUSTRIAL, AND AGRICULTURAL. OF THAT, 36,400 AF IS WITHDRAWN BY RPA MUNICIPAL PROVIDERS.

Water demand on the RPA includes diversion for municipal and self-supplied domestic, commercial, industrial, and agricultural uses. Total current demand for RPA water was estimated as part of the development of the 2010 Rathdrum Prairie Comprehensive Aquifer Management Plan (RPCAMP) as Idaho does not require reporting of annual diversion rates or volumes. RPCAMP includes updating of the total demand estimate as one of the plans continuing action items. The author of the original RPCAMP estimate, SPF Water Engineering, was contracted under this study to update the total current demand estimate. The total accounting aspects of the SPF study set the context for the municipal demand assessment used in the later sections of this report.

Table 1. Total RPA Water Use

Estimated Total Rathdrum Prairie Water Use			
Sector	Non-Irrigation Use (AFA)	Irrigation Use (AFA)	Total Use (AFA)
Purveyor Areas	13,600	22,800	36,400
Self-Supplied Domestic	3,100	8,400	11,500
Self-Supplied Commercial and Industrial	8,300	Assumed Negligible	8,300
Agriculture	Assumed Negligible	28,800	28,800
Estimated Total Ground Water Diversion	25,000	60,000	85,000

SPF also analyzed the current demand for the individual municipal service providers. SPF was tasked to:

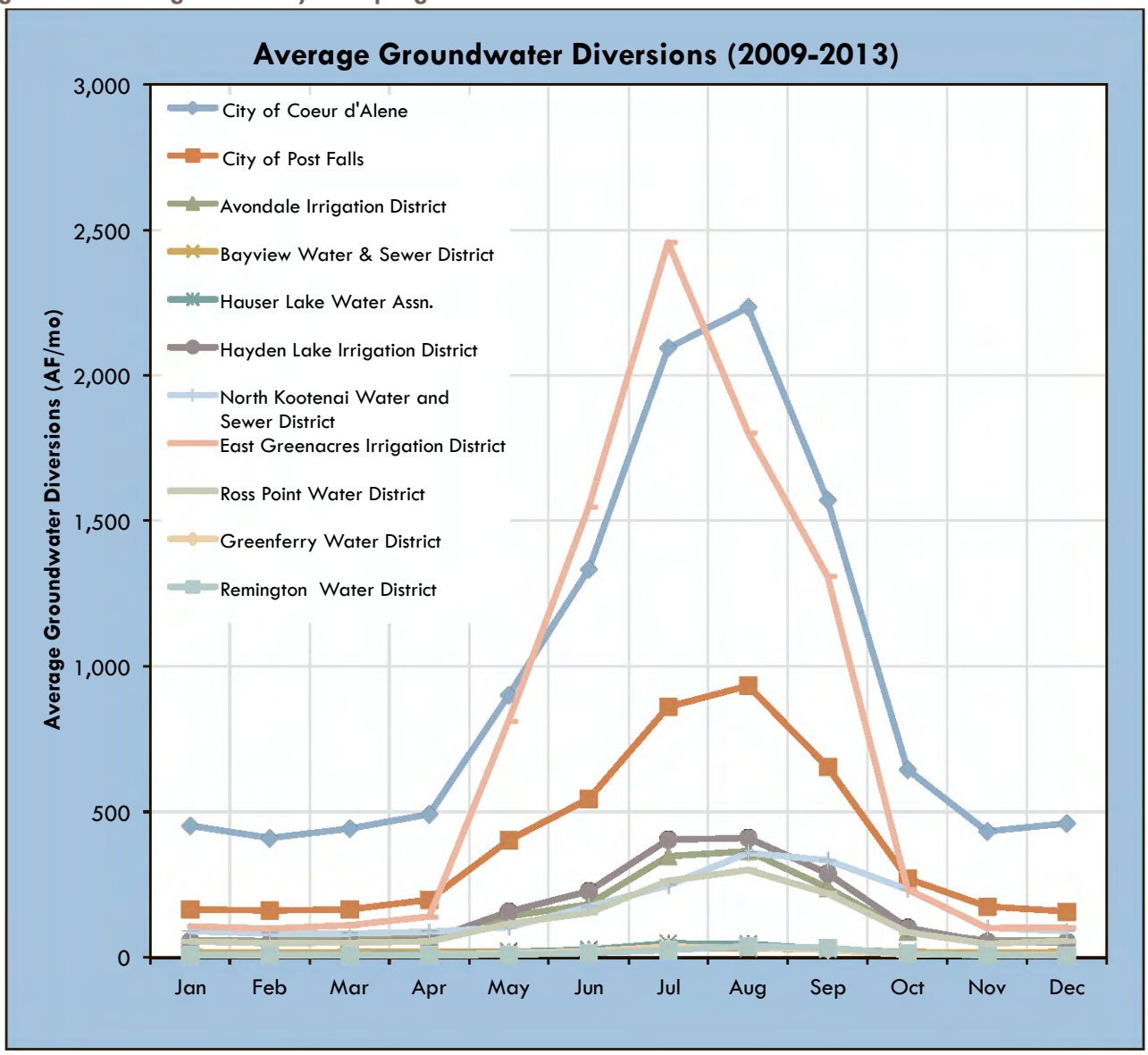
1. Request water-diversion data from Rathdrum Prairie water purveyors (list provided by IWRRI);
2. Compile water purveyor production data from 2009 to 2013;
3. Estimate current indoor (e.g., potable) and outdoor (i.e., irrigation) water use within purveyor service areas;
4. Develop estimates of total per-capita and indoor per-capita water use;
5. Estimate the amount of water use outside of purveyor boundaries for domestic, irrigation, commercial, and industrial purposes based on water- right information;
6. Estimate agricultural irrigation withdrawals outside of purveyor-supplied areas based on water-right information and/or other data;
7. Develop general estimates of "unaccounted-for" system losses based on provider information and national averages.

Eleven providers reported in sufficient detail to be included in their study, representing 89% of the RP population supplied by municipal providers. The City of Rathdrum, accounting for 6% of the RPA population, supplied data to IWRRI after SPF's study was completed. Rathdrum's data is utilized in the next section of this report. SPF's findings are summarized below. Their full study is included in this report as Appendix B. *(Note: revised population data for Greenferry and Remington water districts received after*

the SPF report was completed are incorporated in this report.)

The first aspect of municipal demand needed to build a RAFN forecast is identification of the peak monthly demand (Maximum Monthly Demand). Water rights are not built on average demand, but rather, on the maximum diversion rate necessary to meet the beneficial use demand. For the Rathdrum Prairie municipal providers that equates to the hot days of summer when agricultural and landscape irrigation demand can create hourly demand spikes 5-6 times greater than normal daily demand.

Figure 3. Average Monthly Pumping



The variety in purpose, organizational structure, geographical size, location, and population across the RPA municipal providers makes accurate determination of existing demand by individual water providers a critical component in building a RAFN forecast where the size, location and population variables are likely to change. Per capita demand by provider is the independent variable most useful in forecasting demand. Per capita total, indoor and outdoor use by the eleven providers submitting data is listed in Table 2.

Table 2. Per Capita Water Use

Estimated Per Capita Total and Indoor Use							
Municipal Provider	Population	Average Diversion (MGA)	Average Diversion (AFA)	Average Indoor Use (based on average winter diversions) (AFA)	Estimated Average Irrigation use (AFA)	Estimated Total Use (gpd)	Estimated Indoor Use (gpd)
North Kootenai Water and Sewer District	11,179	652	2,001	1,082	919	160	86
City of Coeur d'Alene	41,240	3,738	11,472	5,250	6,224	248	114
Bayview Water and Sewer District	1,000	91	279	231	48	249	206
Hayden Lake Irrigation District	6,604	628	1,928	646	1,282	261	87
City of Post Falls	16,006	1,531	4,699	1,970	2,725	262	110
Avondale Irrigation District	5,643	567	1,739	710	1,029	275	112
Hauser Lake Water Association	677	81	248	113	135	328	150
Ross Point Water District	3,942	477	1,465	635	830	332	144
East Greenacres Irrigation District	8,632	2,877	8,830	1,231	7,599	913	127
Greenferry Water District	990	68	209	117	92	188	105
Remington Water District	909	63	194	102	91	190	100
Totals	95,912	10,773	33,063	12,087	20,973		
Population Weighted Average without East Greenacres Irrigation District						245	
Population Weighted Average with East Greenacres Irrigation District						305	111

East Greenacres Irrigation District supplies a significant volume of agricultural irrigation water alongside the municipal water they provide the 8632 people in their service area. Population weighted average per capita demand is presented with and without inclusion of East Greenacres.

"Unaccounted-For" Water

A portion of water system production is generally unaccounted for in metered deliveries. This "unaccounted-for" water may result from production or delivery measurement error or water-system leaks. Similarly, many irrigation entities also experience conveyance losses as a result of system linkage, meter variability, and/or evapotranspiration.

Table 3. Unaccounted-For Water

Reported "Unaccounted-For" Production		
Provider	Unaccounted Water	Source of Data or Reported Time Period
Avondale Irrigation District	15-20%	estimated by District
Bayview Water & Sewer District	none provided	
City of Coeur d'Alene	> 10%	2009-2013
City of Post Falls	5.91%	2009 Water System Conservation Plan
East Geenacres Irrigation District	8-12%	estimated by District
Greenferry Water & Sewer District	none provided	
Hauser Lake Water Association	5.59%	2013
Hayden Lake Irrigation District	10-25%	estimated by District
North Kootenai Water District	none provided	
Remington Water District	15%	estimated by District
Ross Point Water District	none provided	

The term "unaccounted-for" water is being redefined by the American Water Works Association (AWWA) as "non-revenue" water. AWWA defines this water as the volume of distributed water that is not reflected in customer billings. It specifically includes the sum of unbilled "authorized consumption" (water for firefighting, flushing, etc.) plus "apparent losses" (customer meter inaccuracies, unauthorized consumption and systematic data handling errors) plus "real losses" (system leakage, storage tank overflows). While there is no comprehensive national policy that limits water loss from a public water supply's distribution system, most states set limits that fall within the range of 10 to 15 percent as the maximum acceptable value for the amount of water that is lost or "unaccounted-for" (USEPA, 2010). The amount of unaccounted-for water reported by the 11 purveyors supplying data ranged from 5 to 25 percent of water- system production.

STUDY 3: FUTURE WATER DEMAND

SUMMARY: POPULATION SERVED BY THE ELEVEN MAJOR RPA MUNICIPAL PROVIDERS IS PROJECTED TO INCREASE BY 87,671 OVER THE 30-YEAR PLANNING HORIZON. THE AREA SERVED WILL INCREASE FROM 78.9 SQUARE MILES TO 156.9 SQUARE MILES. THE MAXIMUM DAILY DEMAND WILL INCREASE BY 58.86 CFS, AND THE PEAK HOURLY DEMAND WILL INCREASE BY 264.69 CFS. INCREASED MUNICIPAL PROVIDER WITHDRAWAL WILL LARGELY BE OFFSET BY A REDUCTION IN AGRICULTURAL WITHDRAWAL AND DECREASES IN OUTDOOR LANDSCAPE IRRIGATION DEMAND AS POPULATION DENSITY INCREASES.

To accurately estimate future municipal water demand, the forecaster needs a planning horizon and data on the current water demand, population and economic growth projections, future service areas, and the temporal resolution of the diversion rate. The SPF Water Engineering report in the previous section identified the current monthly and annual demand for the entire RPA and by selected provider service areas. Demographic and spatial analysis of existing data was developed to determine current and population and economic statistics and future population and economic projections. As will be more fully detailed later in this section, these two data sets (current water demand, population/economic statistics and projections) were correlated and combined to produce the RPA future municipal water demand.

IDWR's RAFN guidance recommends a 20-year planning horizon as appropriate for RAFN applications. Municipal providers, however, may currently apply for a well permit with a 5-year proof of use period that may be extended by IDWR for up to an additional ten years. They contended that the additional five years offered by a 20-year planning horizon was not sufficient to justify the considerable expenditure of resources involved with applying for RAFN rights. The 30-year planning horizon utilized in this forecast provides the necessary incentive for RPA providers to engage in the resource intensive task of preparing and submitting RAFN applications, while protecting IDWR's obligation to protect Idaho's water resources from speculative use.

POPULATION AND ECONOMIC PROJECTION

Population growth and employment growth projections are necessary components for estimating future water needs. This report updates projections recorded in the 2010 Rathdrum Prairie Aquifer Water Demand Projections report and Comprehensive Aquifer Management Plan (RPCAMP 2010), utilizing a similar hybrid method, but with some important differences. This report uses projections established in the 2010 report as a base. It refines those projections based upon updated information, and applies the projections to water service areas in the following way:

1. Current population estimates for each current water provider service area are calculated from census data (American Community Survey 2012) at the block group level within service provider areas, and at the census tract level outside of service areas. The population distribution is further refined using GIS data for existing land use and parcel information, and aerial photo verification of housing distribution.

2. Current employment estimates are made at the block group and zip code level, using most current data available from American Community Survey (2012), Idaho Department of Labor (2013), US Bureau of Economic Analysis (2013), and Woods and Poole data pamphlet (2014) for the Coeur d'Alene metropolitan statistical area.

3. Population projections for future service areas are based on a cohort component projection model at the census block group level, using data for 2000, 2010, and 2012. Block group projections are then applied to future service areas using a weighted average for census block distribution. Future land use or zoning maps provide another level of detail to determine where future growth is likely to be more intensely concentrated than is suggested by the weighted average distribution method.

4. Employment projections utilize output from the Idaho Economic Forecasting Model presented in the 2010 Rathdrum Prairie Aquifer Water Demand Projections report, but update the projections using ACS 2012, Idaho Department of Labor, US Bureau of Economic Analysis, and Woods & Poole information for years 2008 – 2013. National and regional employment trends through 2040 are extrapolated to 2045.

Future land use and zoning as described in municipal and regional comprehensive and infrastructure plans is also analyzed here to determine areas of increased development intensity as it may affect population distribution or future employment growth.

Population Projections and Growth Distribution

Population growth projections are necessary to perform future water needs analyses. The 2010 RPCAMP report provides baseline projections for both population growth and employment growth. This report updates those projections to include the most recent census and employment information available. Unlike the previous report, this report applies the population forecasts to future water service areas.

As indicated in the 2010 RPCAMP, the Rathdrum Prairie has experienced major growth in the past few decades due to an overall growing economy and increasing employment opportunities in sectors such as healthcare and tourism related industries. The region's reputation for livable communities and rural lifestyles has led to an influx of new residents, and increasing demands for services and amenities to support their needs. Communities such as Post Falls, Hayden and Coeur d'Alene have experienced construction of new residential and commercial developments despite the recent recession. This report discusses key areas for future development potential, building on findings of the 2010 report. This discussion takes into consideration updates to comprehensive and major infrastructure plans, as well as input from stakeholders involved with land planning, management and development within the Rathdrum Prairie Aquifer water service areas.

CURRENT POPULATION ESTIMATES

Kootenai County has been one of the fastest growing areas of Idaho for several decades. The bulk of this growth has and continues to be from migration into the region for the quality of life and employment opportunities it offers. Table 4 shows growth in selected cities in the Rathdrum Prairie Aquifer service area over the past 50 years. The annual growth rate throughout Kootenai County for the period 2008-2012 averaged 1.5%, down from an average annual rate of 3.0% for the period 1980-2007. Although the recent recession may explain slower growth over the period of 2008-2012, growth has continued, and is likely to continue at moderate rates of 1.4 – 1.8% for the next 30 years.

Estimates of current population distribution in current water provider service areas is given in Table 5, and shown in Figure 4. Table 6 provides an estimate of the total population of the Rathdrum Prairie that lies outside of the listed provider areas. These estimates are derived from population distribution at the census tract level (American Community Survey 2012), and further refined by comparison to existing parcel and land use maps, and aerial photos. Figure 5 shows population density in the census tracts listed in Table 6 in relation

to current service areas. The estimate for population lying outside of current service areas may be slightly higher than expected because it takes into account a small number of people living in rural areas not served by the RPA. There may also be a small amount of overlap with existing service areas.

Table 4. 50-Year Population Growth for Communities as Percentage of Total Kootenai County Population

Population Growth in Kootenai County Communities							
County/City	Year						
	1950	1960	1970	1980	1990	2000	2010
Kootenai County	24,947	29,556	35,332	59,770	69,795	108,685	138,494
Athol	0.9%	0.7%	0.5%	0.5%	0.5%	0.6%	0.5%
Coeur d'Alene	48.9%	48.4%	45.9%	33.3%	35.2%	31.8%	31.9%
Dalton Gardens		3.7%	4.4%	3.0%	2.8%	2.1%	1.7%
Fernan Lake		0.5%	0.5%	0.3%	0.2%	0.2%	0.1%
Harrison	1.3%	0.8%	0.7%	0.4%	0.3%	0.2%	0.1%
Hauser	0.3%	0.4%	1.0%	0.5%	0.5%	0.6%	0.5%
Hayden		3.0%	3.6%	4.3%	5.4%	8.4%	9.6%
Hayden Lake	0.2%	0.8%	0.7%	0.5%	0.5%	0.5%	0.4%
Huetter	0.3%	0.4%	0.1%	0.1%	0.1%	0.1%	0.1%
Post Falls	4.3%	6.7%	6.7%	9.6%	10.5%	15.9%	19.9%
Rathdrum	2.4%	2.4%	2.1%	2.3%	2.9%	4.4%	4.9%
Spirit Lake	3.3%	2.3%	1.8%	1.4%	1.1%	1.3%	1.4%
State Line	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Balance of Kootenai County	**37.0%**	**28.9%**	**31.1%**	**43.4%**	**38.0%**	**33.7%**	**28.8%**
Source: U.S. Census Bureau and American Community Survey.							

Table 5. Current Population Estimates for Water Provider Service Area

Population Estimates by Provider Service Area			
Provider	Service Area (SqMi)	Population Density (per SqMi)	Service Area Population Estimate
Alpine Meadows Water And Sewer District	0.860	102	88
Avondale Irrigation District	6.270	900	5643
Bayview Water And Sewer District	1.225	490	600
Coeur D'Alene (ACI)	13.473	250	3368
Coeur D'Alene (City Limits)	15.993	2368	37872
Diagonal Road Water District No. 1	0.079	152	12
Dry Acres Water And Sewer District	0.318	245	78
East Greenacres Irrigation District	11.449	754	8632
Emerald Estates Water Association, Inc.	0.126	2850	358
Forest Nursery Water	0.332	12	4
Greenferry Water And Sewer District	1.771	229	990
Hackney Water And Sewer District	0.254	485	123
Harborview Water System, Inc.	0.001	133	10
Hauser Lake Water Association	2.142	316	677
Hayden Lake Irrigation District	3.983	1658	6604
Highway 54 Water Association, Inc.	0.563	149	84
Huetter (ACI And City Limits)	0.209	490	102
Idaho Irrigation, Inc.	1.131	26	29
North Kootenai Water and Sewer District	11.818	946	11179
Ohio Match Road Water	1.443	93	134
Parkview Water Association	0.019	3771	73
Pineview Estates Water	0.127	2998	382
Post Falls Water	8.167	1960	16006
Rathdrum (ACI)	12.845	222	2852
Rathdrum (City Limits)	5.170	1357	7016
Remington Recreational Water And Sewer	4.951	118	909
Rocky Beach Water And Sewer District	0.097	897	87
Ross Point Water	7.167	550	3942
Royal Highlands Water (Valley Water	0.100	2802	280
Russell Water Association, Et Al	0.129	186	24
Schaeffer Additions Water Association, Inc.	0.062	1244	77
Singer Ranch Water Association	0.376	122	46
Troy Hoffman Water Corp, Inc.	0.108	2400	259
Westwood North Water Association	0.125	232	29
TOTAL			**107,660**

Figure 4. Current Water Provider Service Areas

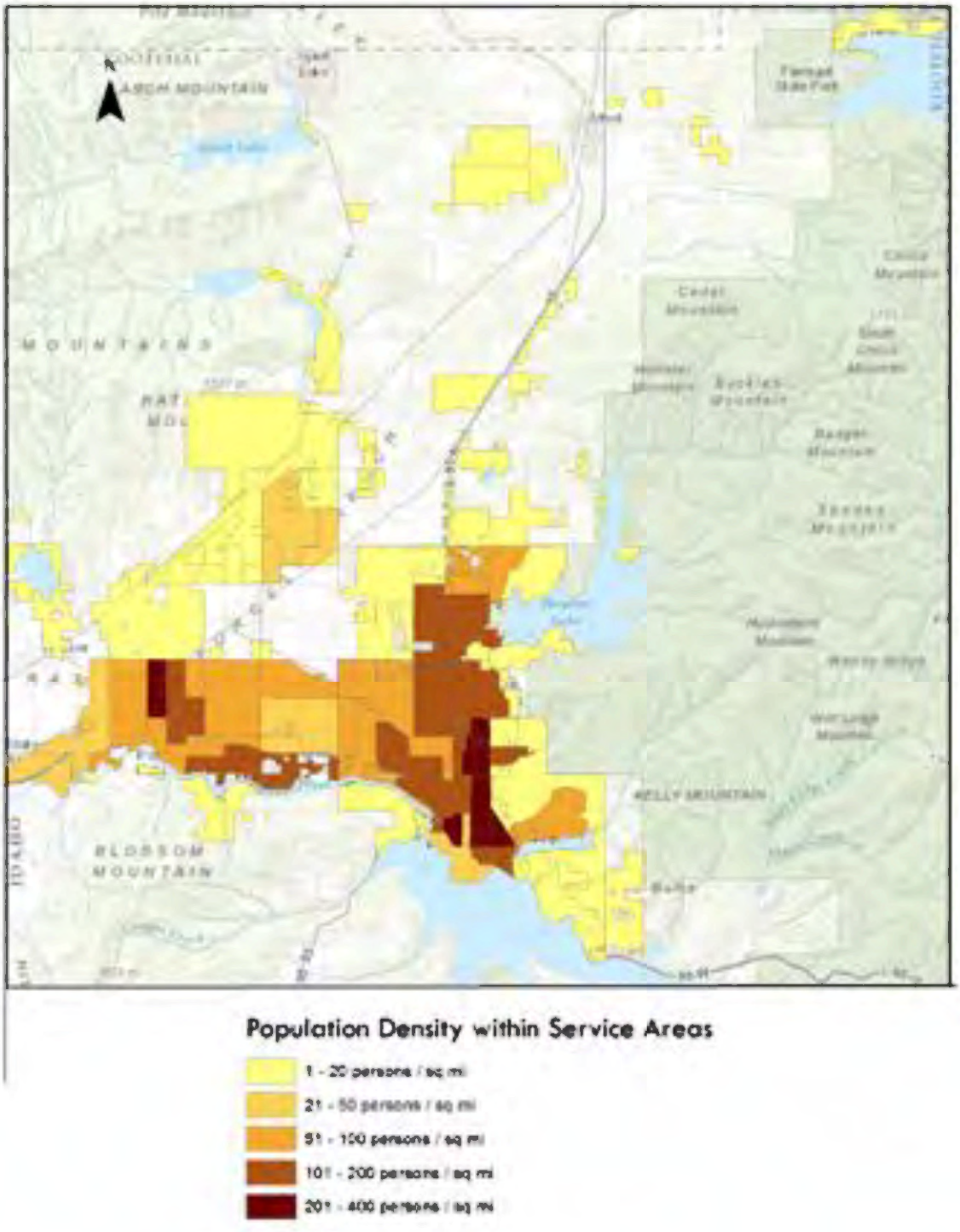


Figure 5. RPA Census Tracts with Population Outside Current Service Areas

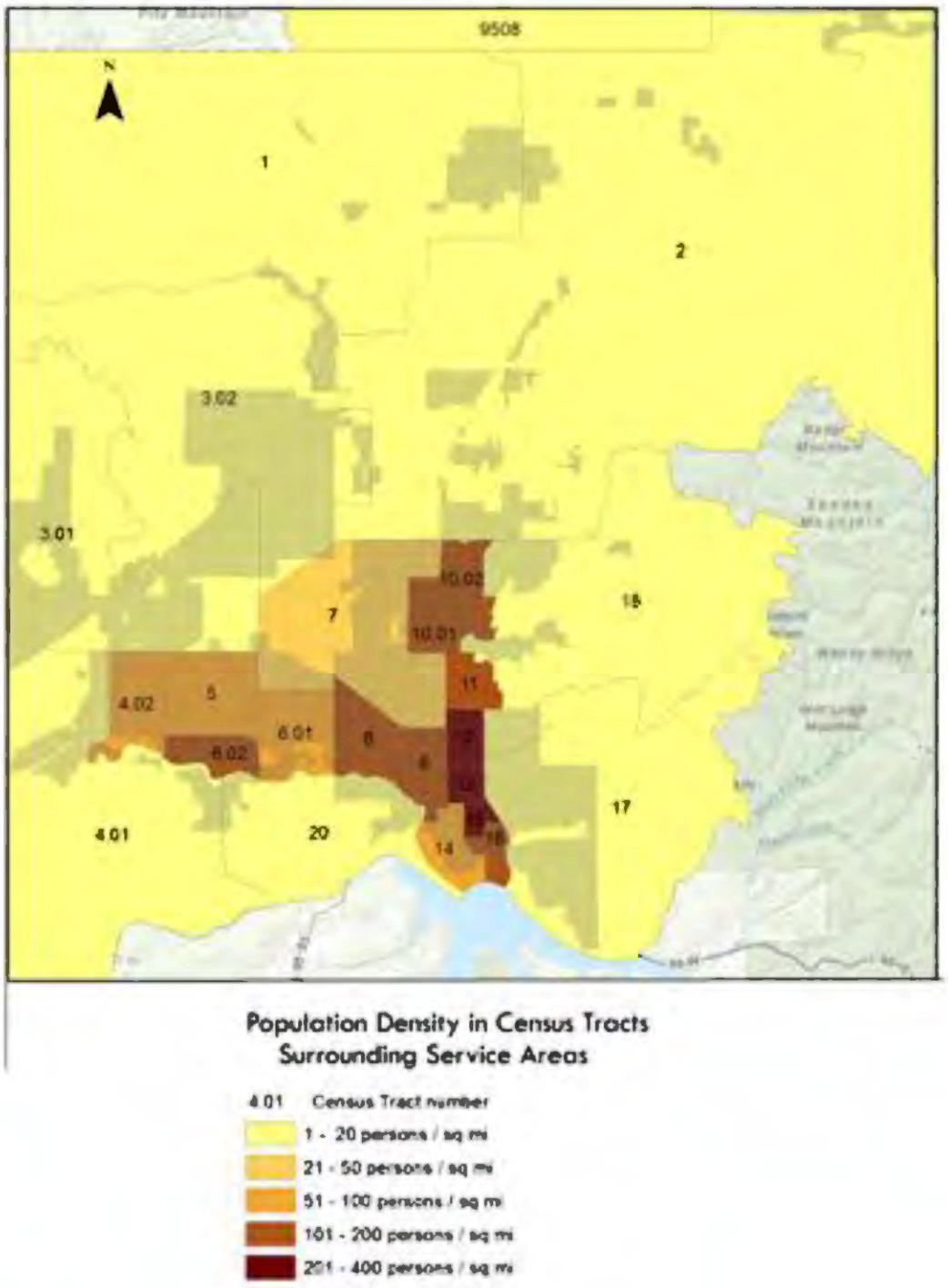


Table 6. Estimated Population Outside of Current Service Area

Population Outside Current Service Area		
Census Tract	Block Group	2012 ACS Population
1		5,174
2		6,065
3	1	335
3	2	562
4	1	2,340
4	2	444
6	1	1,381
6	2	701
7		2,082
10	1	148
17	1	61
18	1	988
20		1,658
Total Population		**21,939**
Percentage of Kootenai County Population		**15.5%**

Population Projections

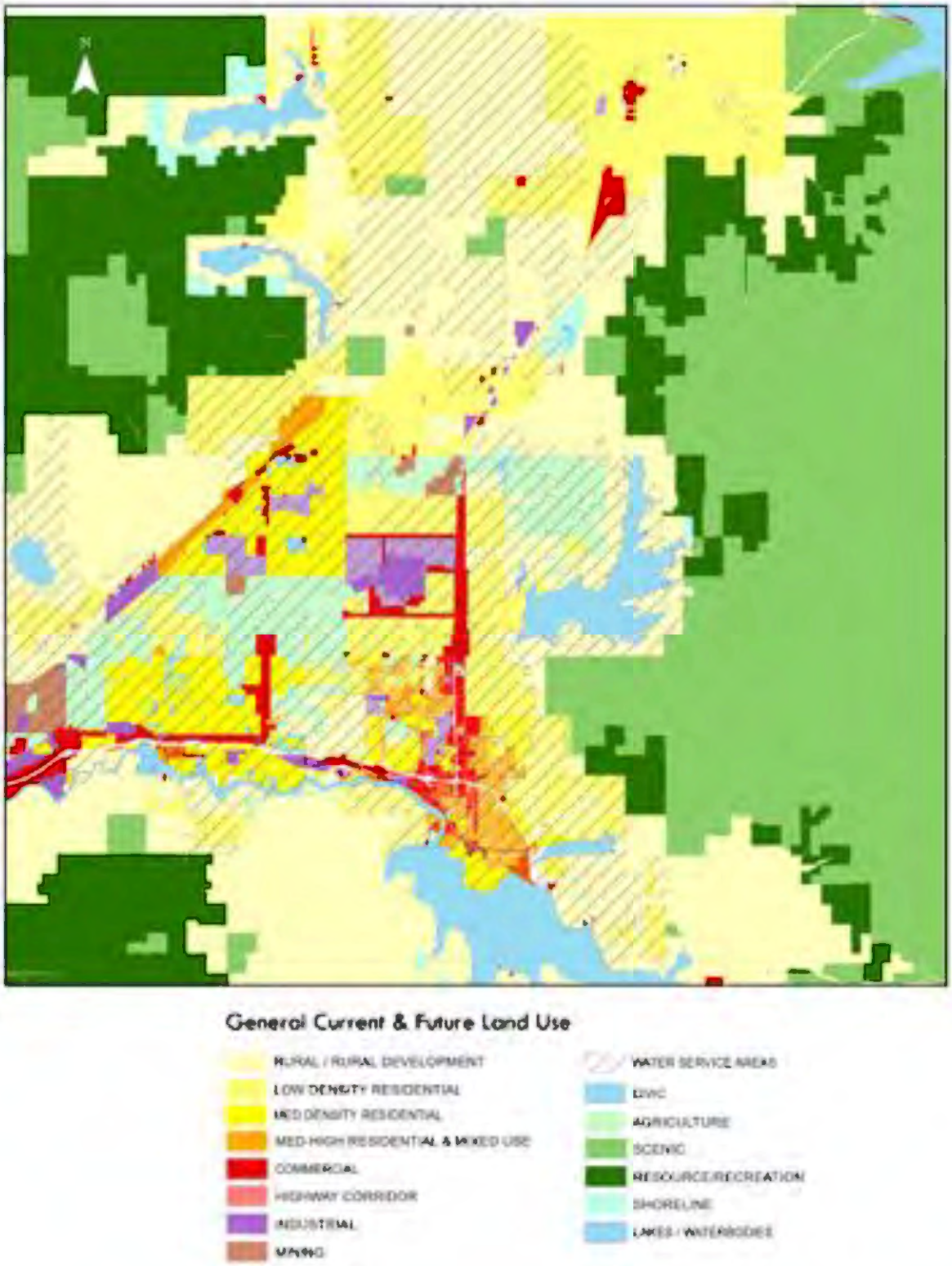
Population projections for future service needs are dependent on the definition of new service area boundaries. Population growth for these regions is first calculated at the census block group level, using a cohort component method. This method takes into account natural birth and death rates, and net migration rates for 5-year age cohorts. The cohort component model uses observed values from 2000 and 2010 decadal census data, and 2012 American Community Survey data. The population is projected through 2045 using this method. As with current population estimates, service area population projections are derived from weighted averages of block group estimates, refined by analysis of future land use and infrastructure planning designations.

Table 7 summarizes population projections for the future service areas shown in Figure 6. Growth rates vary somewhat from area to area, from an average mid-term (through 2025) low of about 0.9% per year to a high of about 1.8% per year. However, most of the area reflects a moderate overall growth rate of 1.4 – 1.7% per year through 2045. Areas of faster growth are anticipated in regional transportation corridors and other priority growth areas defined in municipal comprehensive plans. These will be discussed in more detail below.

Table 7. Population Estimates for Future Water Provider Service Areas

Total Populations by Year								
Service Area	2010	2015	2020	2025	2030	2035	2040	2045
Avondale	6236	6588	6777	7037	7278	7499	7669	7838
Coeur d'Alene	45641	49162	51385	54175	56779	59246	61621	64027
East Greenacres	9535	10338	10945	11581	12215	12873	13564	14299
Greenferry	586	909	1087	1512	2158	3231	4800	4800
Hauser Lake	1961	2095	2192	2311	2415	2502	2575	2647
Hayden Lake	7132	7690	8168	8717	9295	9913	10549	11216
North Kootenai	9699	11519	13232	15554	18313	21501	25156	29435
Post Falls	18474	19530	20304	21210	22057	22867	23666	24523
Rathdrum	7528	7926	8191	8538	8871	9150	9363	9545
Remington	3479	3701	4071	4399	4757	5139	5555	5989
Ross Point	3502	4866	5540	6907	8527	10518	13018	16190
Total	**113773**	**122400**	**131892**	**141938**	**152666**	**164438**	**172735**	**190509**

Figure 6. Kootenai County Future Land Use



Employment

Population forecasts also take into account economic trends. As with the Idaho Economic Forecasting Model used in the 2010 RPCAMP, the economic model used for employment projections is based on a simultaneous equation method that interprets regional and national economic trends. Some sectors of the economy are more dependent on national or international trade, including mining and manufacturing (basic industries). Sectors that rely on regional or local trade are considered secondary industries. The majority of current and projected future employment is attributable to these secondary industries. National and regional trend information is available through 2040. This information was extrapolated through 2045 for the purposes of this report.

CURRENT EMPLOYMENT

Table 8 summarizes current employment by zip code and municipal area through 2012 (ACS 2012). These reflect differences from base employment forecasts reported in the 2010 RPCAMP that are related to effects of the recent recession. Industry sectors that showed slower than expected growth or declines in the 2008-2012 period include:

- Agriculture, Forestry, Fishing, Mining
- Arts, Entertainment, Accommodation and Food services
- Construction
- Information
- Other services

The biggest dip in employment occurred in 2010, and most sectors showed improvement starting in 2011. Arts, entertainment, and related industries showed slower recovery, but recent reports (Idaho Dept. of Labor) indicate a steady increase in these areas as well.

Employment Forecasts

Employment forecasts provided by state and national agencies (Idaho Department of Labor, US Bureau of Economic Analysis) for the Coeur d'Alene metropolitan statistical area were used as the basis for employment forecasts for the RPA future service areas. These are compared to other forecasts (Woods & Poole 2014), as well as information from local planning agencies, to assess overall industry trends for the region. Table 9 shows employment projections by industry sector through 2045.

Table 8. Current Employment by Zip Code and Municipal Area for Major Industry Sectors

Current Employment by City and Zip Code											
Employment Sector	Industry Code	Athol 83801	Bayview 83803	Coeur d'Alene 83814	Dalton Gardens 83815	Hayden 83835	Hauser 83854	Hayden Lake 83835	Post Falls 83854	Rathdrum 83858	Spirit Lake 83869
All Occupations	00	264	251	21008	935	5883	389	214	13065	2921	703
Agriculture, Forestry, Fishing, Mining	11, 21	11	12	285	28	181	9	4	140	20	17
Construction	23	41	12	2260	106	632	40	5	1346	366	60
Manufacturing	31	44	24	1317	72	380	42	15	1305	377	72
Wholesale Trade	42	0	11	575	7	263	16	5	657	167	23
Retail Trade	44	44	14	2810	129	931	71	28	1755	286	141
Transportation, Warehousing, Utilities	48, 22	14	19	690	18	157	10	8	451	179	48
Information	51	0	12	380	22	45	13	6	145	39	27
Finance, Insurance, Real Estate	52 -53	0	41	1571	62	367	8	24	1284	69	16
Professional, Scientific, Management, Administrative, Waste Mgt.	54 - 56	7	24	2159	72	614	47	23	1072	115	31
Educational, Health Care and Social	61, 62	26	34	4129	280	1245	61	60	2737	720	105
Arts, Entertainment, Recreation, Accom., Food Service	71, 72	44	67	3129	70	555	56	16	1356	295	93
Other Services	81	13	46	1047	30	209	7	6	283	115	61
Public Administration	82	20	0	656	39	304	9	14	537	173	9

Table 9. Employment Forecast for the Coeur d'Alene Metropolitan Statistical Area by Industry, 2015-2045

Employment Forecasts by Industry							
Employment Sector	2015	2020	2025	2030	2035	2040	2045
All Occupations	79,648	86,388	93,674	101,555	110,089	119,332	129,188
Agriculture, Forestry, Fishing, Mining	1,695	1,769	1,844	1,921	1,998	2,074	2,1727
Construction	5,650	5,908	6,163	6,414	6,660	6,900	7,164
Manufacturing	4,925	5,069	5,204	5,327	5,439	5,539	5,655
Wholesale Trade	1,715	1,770	1,862	1,955	2,047	2,139	2,230
Retail Trade	10,468	11,061	11,655	12,248	12,838	13,423	14,070
Transportation, Warehousing, Utilities	1,417	1,48	1,541	1,601	1,660	1,718	1,787
Information	930	943	954	964	972	978	986
Finance, Insurance, Real Estate	9,000	9,893	10,846	11,858	12,929	14,059	15,326
Professional, Scientific, Management, Administrative, Waste Mgmt.	10,120	10,921	11,764	12,651	13,582	14,561	15,469
Educational, Health Care and Social	9,342	11,032	12,981	15,221	17,788	20,718	24,449
Arts, Entertainment, Recreation, etc.	8,939	9,726	10,558	11,433	12,355	13,321	14,282
Other Services	4,605	5,575	6,717	8,054	9,611	11,414	13,611
Public Administration	10,787	11,149	11,492	11,816	12,118	12,397	12,484

Although all industries show absolute growth through the forecast period, there is a decrease in federal civilian employment, with essentially flat or very low growth in agriculture/forestry/mining and information sectors.

Taking into account the relative distribution of service areas, a normalized projection of total employment for the same period by service area is given in Table 10. This normalization is based in part on current population distribution, and may over or underestimate the allocation of employment to portions of service areas that fall in or near a shared municipal boundary. Examples of this include East Greenacres and Ross

Point (Post Falls municipal area) and Avondale and Hayden Lake (Hayden municipal area).

Table 10. Normalized Distribution of Future Employment by Future Service Area

Total Employment Projection by Future Service Area							
Service Area	2015	2020	2025	2030	2035	2040	2045
Avondale	3,891	4,100	4,303	4,505	4,702	4,870	5,018
Coeur d'Alene	29,036	31,088	33,125	35,142	37,146	39,131	40,991
East Greenacres	6,106	6,622	7,081	7,561	8,071	8,614	9,154
Greenferry	348	390	411	432	450	463	474
Hauser Lake	1,237	1,326	1,413	1,495	1,568	1,635	1,695
Hayden Lake	4,542	4,942	5,330	5,753	6,215	6,699	7,181
North Kootenai	6,803	8,005	9,510	11,334	13,481	15,975	18,845
Post Falls	11,535	12,284	12,969	13,652	14,337	15,029	15,700
Rathdrum	4,681	4,956	5,221	5,491	5,737	5,945	6,111
Remington	2,223	2,413	2,594	2,789	2,980	3,159	3,320
Ross Point	2,874	3,351	4,223	5,278	6,595	8,267	10,365
Total - all areas	**73,276**	**79,477**	**86,180**	**93,431**	**101,282**	**109,785**	**118,853**

Spatial Distribution of Growth within the RPA

Analysis of growth for municipal and unincorporated areas within the RPA area utilized comprehensive plans from municipal planning agencies and Kootenai County, as well as major infrastructure plans. Although existing and future land use or zoning maps are useful in determining areas of future growth, they do not represent ongoing new construction. To address this issue, aerial imagery and existing parcel boundaries were used to refine understanding of existing conditions. Discussions with regional planners, developers, and land managers provided insight to growth trends in various parts of the region.

ANALYSIS METHOD FOR RESIDENTIAL DENSITY, FUTURE COMMERCIAL/INDUSTRIAL LAND USE

Zoning Ordinances: County and municipal zoning ordinances associated with the most recent available comprehensive plans are used as the basis of build-out projections. The principal focus for analysis is residential use and densities allowed by each jurisdiction's zoning code. The future land use map provided here (Figure 6) shows simplified land use designations for residential, commercial, and industrial uses. It gives a sense of where the greatest amount of new development is likely to occur over the next 30 years.

Future Land Uses: The compiled future land use maps utilize data and imagery provided by the County and municipal planning agencies, Google Earth, and *Inside Idaho*. GIS files were created to represent undeveloped parcels zoned as residential. The potential density range for each area was calculated based on the associated zoning or use code. In keeping with approaches used in other planning documents, a projection of three (3) people per unit was used to determine population increases of each city and adjacent identified growth area. Densities of 12 persons per acre and 20 persons per acre were used in areas not covered by comprehensive plans, but identified as growth areas in the regional wastewater and transportation plans. In remaining rural areas not associated with identified growth potential, rural densities

as defined in the Kootenai County Comprehensive plan were used. Identified commercial or industrial growth areas use a simplified aggregate range of land uses based on future or adjacent zoning codes.

Aerial Imagery: Aerial imagery used in this study comes from *Inside Idaho* geospatial data portal and Google Earth.

Future Growth Areas

The 2010 RPCAMP reviewed existing planning documents, and identified changing land use and growth areas in the following locations:

1. Existing city boundaries and Areas of City Impact (ACI)
2. Exclusive Tier and Shared Tier areas in Kootenai County adjacent to Post Falls, Hayden, and Rathdrum
3. Along transportation corridors within and extending outward from city ACIs, particularly within the Exclusive Tier areas, as well as into unincorporated portions of the county
4. Rural Dispersed Villages (e.g. Bayview on Lake Pend Oreille)
5. Low density residential/rural development in areas not served by municipal water treatment facilities

Figure 6 shows a simplified distribution of future residential, rural and commercial/industrial land uses as depicted in existing planning documents. Several growth areas identified on this map are worth noting. Major commercial and mixed uses allowed under various versions of smart codes are indicated primarily along major arterial and collector roads including Highway 95 extending northward from Hayden, Highway 41 between Post Falls and Rathdrum, Huetter Road between I-90 and Hayden Avenue, and Highway 53 between Hauser (state line) and Rathdrum. At this point in time, major development is expected primarily along the US 95 and SH 41 corridors, with development along the other routes concentrated primarily at major intersections and similar high-use nodes. However, planned communities are likely to extend outside of existing ACI boundaries, particularly in the following areas:

- Between Spirit Lake and Athol, as indicated by the expanded Remington and North Kootenai service areas
- North and east of Hayden/Hayden Lake
- On the margins of Post Falls and Rathdrum

Residential growth within ACIs or municipal boundaries is expected to follow patterns of development seen in the early 2000s. Some exceptions to this include areas covered by recent "smart code" or similar designations that allow for mixed residential and a variety of commercial or other uses, in some cases at slightly higher densities than typically seen in the area. One example is an area along Prairie Avenue, west of Idaho Road in Post Falls. Existing plans anticipate nodal development here with a mix of uses and housing types that may reach densities of 20 dwelling units per acre (approximately 60 persons per acre). However most of the smart code or similarly identified areas lie within the city centers of Coeur d'Alene, Post Falls and Hayden. It is unlikely that extensive higher intensity residential development will occur outside of current ACIs.

An area that may experience intensification of commercial/industrial development lies within the Shared Tier designation west of the Coeur d'Alene airport. This area is primarily covered by Avondale, Hayden Lake, and Ross Point future service areas. It is entirely possible that growth pressures over the next 30 years will increase the pressure for this currently unincorporated area to be annexed by one or more of the adjacent cities. In part because of its location with respect to current and future infrastructure, it is one of the more attractive areas for future commercial or industrial development.

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In summary, relatively low to medium density (<1 – 4 units per acre) development of both ACI and rural areas is likely to constitute roughly 80-85% of new residential development over the next 30 years. However, existing cities and their ACIs, along with urban reserves, will likely see a small amount (5%-10%) higher intensity compact development both within the city centers and at nodes along existing arterial and collector corridors within ACIs and in rural portions of the county. This is a growing national trend, reflecting a changing demographic distribution with a desire to be near health care and urban amenities, as well as access to a range of transportation choices. It is also likely that ongoing economic recovery will drive new development of second homes and other high-end residential development in rural areas with access to recreation and scenic resources. Some of this may be medium density (up to 3 units per acre) as individual planned communities (PUDs and similar) are approved. However, this type of development will likely constitute no more than approximately 5% of total development for the area over the next 30 years.

FUTURE WATER DEMAND

RAFN Rights: Maximum Daily Demand or Peak Hourly Demand?

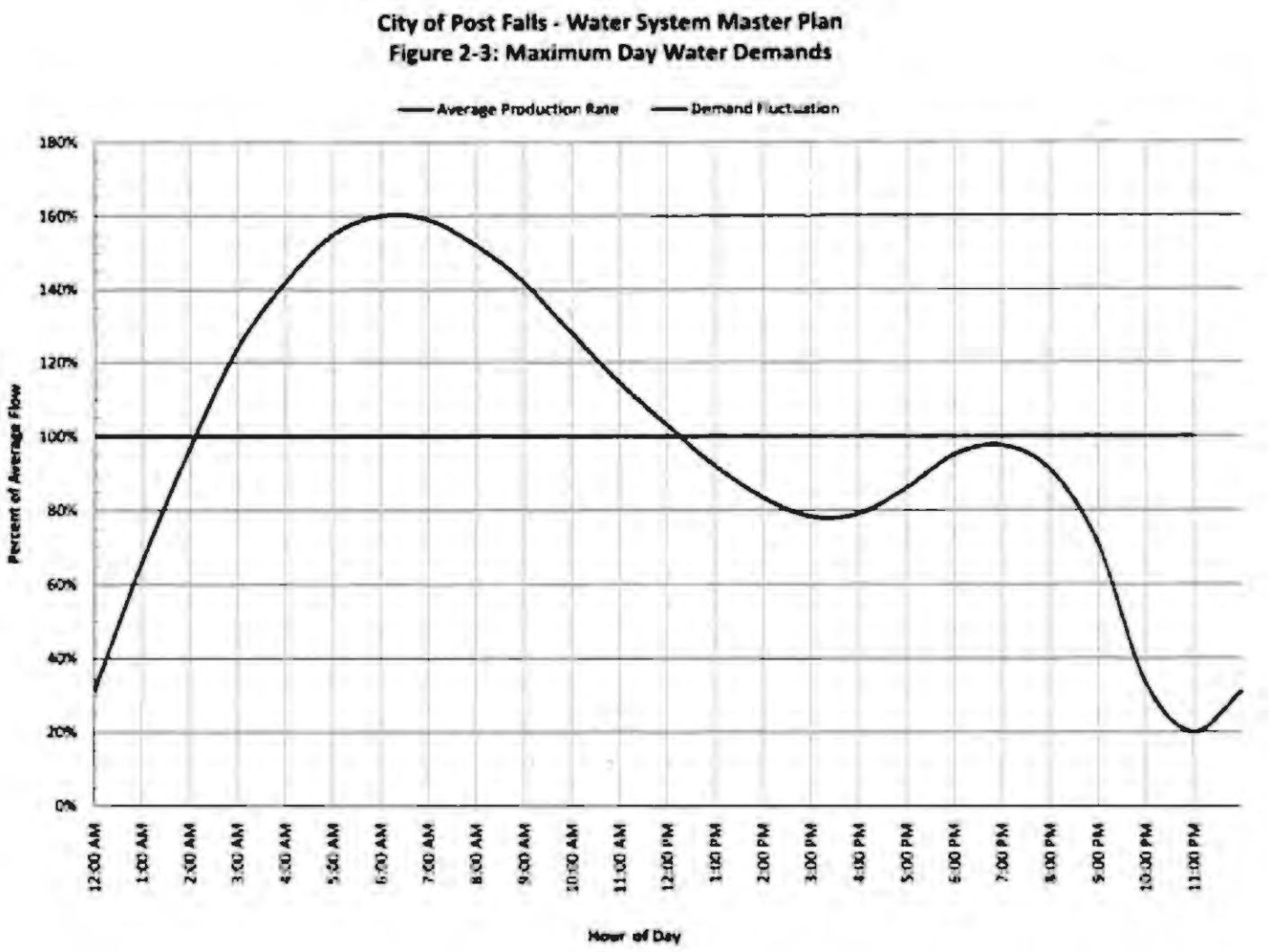
RECOMMENDATION: IDWR SHOULD CONSIDER APPROVING RPA RAFN RIGHTS AT MDD FLOW RATES WITH PERIOD-OF-USE RESTRICTED HIGHER PHD FLOW RATES.

RATIONALE: THE UNIQUE HYDROGEOLOGIC ATTRIBUTES OF THE RPA COMBINED WITH THE EXPENSE TO THE PUBLIC OF PUMPING VERSUS ABOVE GROUND STORAGE PROVIDE THE BASIS FOR DIVERGENCE FROM IDWR GUIDANCE.

IDWR is charged with appropriating the state's water to maximize their beneficial use. As such, the amount of water appropriated must match its intended use - no more no less - preserving the state's option to appropriate remaining water for future beneficial uses while protecting senior users. New applications for water rights in Idaho are generally reviewed with four questions in mind: (1) is the proposed diversion a beneficial use of the state's water, (2) is the flow proposed for diversion the minimum necessary to support the beneficial use, (3) is the water resource available for appropriation, and (4) will diversion injure a senior water user. The Legislature has declared RAFN rights to be a beneficial use of the state's waters, affirmatively answering Question 1. USGS estimates over 758,000 AF recharge annually to the RPA, well over the estimated 85,000 AF annual withdrawal, affirmatively answering Question 3. Question 4 is largely moot as RAFN rights are inchoate rights not tied to a specific location. The unique hydrogeological attributes of the RPA militate against injury. Question 2 then becomes the de facto review criteria for RPA RAFN applications and will be discussed in detail below.

Water demand rates generally exhibit temporal variability. Agricultural irrigation demand characteristically peaks in the early morning hours of hot summer days as producers move water to crops prior to the heat of the day. Municipal providers with a large landscape irrigation component of their demand see a similar pattern. See Figure 7.

Figure 7. Peak Hourly Demand



IDWR RAFN guidance recommends basing RAFN applications on the applicant's Maximum Daily Demand (MDD), with the Peak Hourly Demand (PHD) component of the daily cycle supplied by drawing from storage rather than diversion. The assumption appears to be that permitting municipal water rights based on the Peak Hourly Demand would be injurious to the conservation of the state's water for other beneficial uses, and possibly be injurious to senior water users though well interference. In most other locations in the state, these assumptions are appropriate. The Rathdrum Prairie Aquifer, however, is atypical with both sufficient flow and hydraulic conductivity to merit IDWR consideration of utilizing the aquifer itself as storage.

Total diversion for all RP uses is 85,000 AF annually with 36,400 AF withdrawn by RP municipal providers. 22,800 AF of the municipal withdrawals is used for irrigation at 60% efficiency, returning 9,120 AF to the aquifer (USGS, 2007b)). Annual recharge of the RPA from surface water and precipitation exceeds 758,000 AF (RPCAMP). The hydraulic conductivity in the primary municipal production well zone is 12,100-22,100

ft./day (USGS, 2007b). Approximately 90% of RPA water flows across the state line to the State of Washington.

Four municipal providers have constructed above ground storage: City of Post Falls - 6.25 MG; City of Coeur d'Alene - 6 MG; City of Rathdrum – 1 MG; Ross Point Water District - 1 MG. Ross Point's 1 MG tank was recently completed at a cost of $2.6M to Ross Point water users. The remaining providers rely on the aquifer for storage, sizing their production wells, pumps and electrical back-up systems to handle peak hourly demand and utilizing small, elevated tanks for system pressure equalization.

Water Demand Forecasting Methodology

A commonly accepted method of forecasting future water demand is application of per capita usage to the projected population number. Utilization of per capita population change to underpin future municipal water demand forecasting, however, misses an important driver of municipal water demand: change in outdoor irrigation use. There is a direct relationship between increasing population density and decreasing absolute and per capita water demand (Shawley 2008; Grayman et al 2012). Irrigation makes up 63% of the RPA annual demand and is the primary factor in daily and hourly peak demand flows, yet the per capita approach to demand forecasting is unable by itself to capture change in irrigation demand created by changes in building pattern and density.

This report advances the per capita forecasting method by correlating per capita demand and population density. First, current per capita MDD was calculated from those providers who submitted actual MDD production data. Population density was obtained using government census data manipulated as shaped Geographic Information System (GIS) files overlain on current service provider areas.

Table 11. Rathdrum Prairie Aquifer Future Municipal Water Provider Population Summary

RPA Future Municipal Water Provider Population Summary						
Provider	2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
Remington	909	5989	5.0	34.9	186	159
Hauser Lake	677	2647	2.1	8.7	316	304
Greenferry	990	4800	1.8	2.5	552	1920
Avondale	5643	7838	6.3	12.8	900	612
Rathdrum	7016	9545	5.2	18	1357	530
East Greenacres	8632	14299	11.5	17.2	754	831
North Kootenai	11179	29435	11.8	29.6	946	994
Ross Point	3942	16190	7.2	10.3	550	1572
Hayden Lake	6604	11216	4.0	6	1658	1869
Post Falls	16006	24523	8.2	8.4	1960	2919
Coeur d'Alene	41240	64027	16.0	17.2	2368	3722
Totals	**102838**	**190509**	**78.9**	**165.6**		

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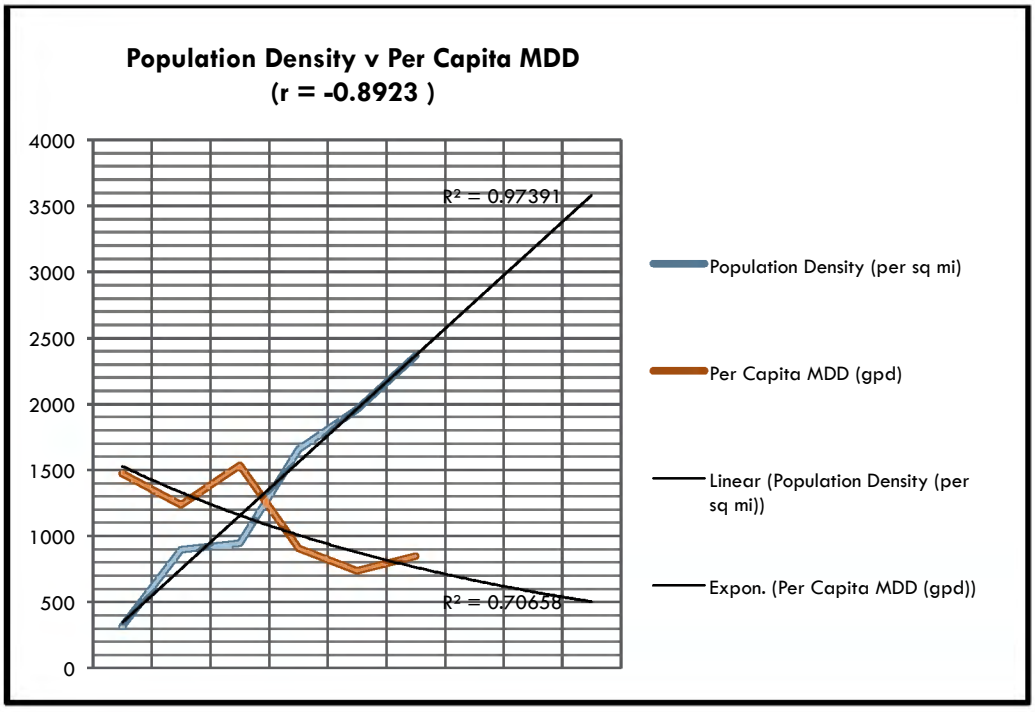
Provider specific per capita MDD and population density was then graphed and correlated (r= -0.8923).

Table 12. Maximum Daily Demand Correlation

Population Density v Per Capita MDD				
Provider	2012 Population Density (SqMi)	Per Capita MDD (gpd)	MDD Source	r value
Hauser	316	1477	Water System Master Plan 2011, Welch-Comer Engineers	-0.8923305
Avondale	900	1240	SCADA	
North Kootenai	946	1539	Welch-Comer Engineers 2014	
Hayden Lake	1658	909	SCADA	
Post Falls	1960	737	Water System Master Plan 2011, J-U-B Engineers	
Coeur d'Alene	2368	850	Comprehensive Plan, 2011	

Trend lines were fitted to the curves allowing for estimation of the per capita MDD of providers that were not able to submit actual MDD production data.

Figure 8. Population Density v Per Capita MDD



Once established, the correlation was applied to the 2045 population density from the population projection report to derive the 2045 MDD.

Table 13. Maximum Daily Demand

Maximum Daily Demand (MDD)							
Provider	2045 Population	2045 Density (per SqMi)	2045 Derived Per Capita MDD (gpd)	2045 MDD (MGD)	2014 MDD (MGD)	Δ MDD (MGD)	Δ MDD (cfs)
Remington	5989	159	1560	9.34	1.60	7.74	11.98
Hauser Lake	2647	304	1510	4.00	1.0	3.00	4.64
Greenferry	4800	1920	900	4.32	1.44	2.88	4.46
Avondale	7838	612	1400	10.97	7.0	3.97	6.15
Rathdrum	9545	530	1430	13.65	7.58	6.07	9.40
East Greenacres	14299	831	1300	19.16	41.96	-22.80	-35.28
North Kootenai	29435	994	1230	37.09	17.2	19.89	30.77
Ross Point	16190	1572	1000	16.19	5.68	10.51	16.27
Hayden Lake	11216	1869	940	10.54	6.0	4.54	7.03
Post Falls	24523	2919	650	15.94	11.8	4.14	6.41
Coeur d'Alene	64027	3722	500	32.01	32.19	-0.18	-0.27
Total				**173.22**	**133.44**	**39.78**	**61.56**

A similar process was used to establish the correlation between population density and per capita PHD. Per capita PHD was multiplied by a factor of 24 to create comparable scale between the two data sets for graphing purposes.

Table 14. Peak Hourly Demand Correlation

Population Density v Per Capita PHD				
Provider	Population Density (SqMi)	Per Capita PHD x 24 (gpd)	PHD Source	r value
Hauser	316	3191	Water System Master Plan, 2011, Welch-Comer Engineers	-0.9771158
Avondale	900	2127	SCADA, 2014	
Hayden Lake	1658	1635	SCADA, 2014	
Post Falls	1960	1200	Water System Master Plan, 2011, J-U-B Engineers	

The correlations were validated by checking derived values against engineering reports submitted by the City of Post Falls identifying a MDD to PHD ratio of 1:1.60 (Figure 8). The actual value for Post Falls per capita MDD (normalized to a one-hour period) is 30.7 gpd and the derived value for Post Falls per capita PHD is 49.7 gpd, a ratio of 1:1.62. Trend lines were fitted to the curves allowing for estimation of the per capita PHD of providers that were not able to submit actual PHD production data.

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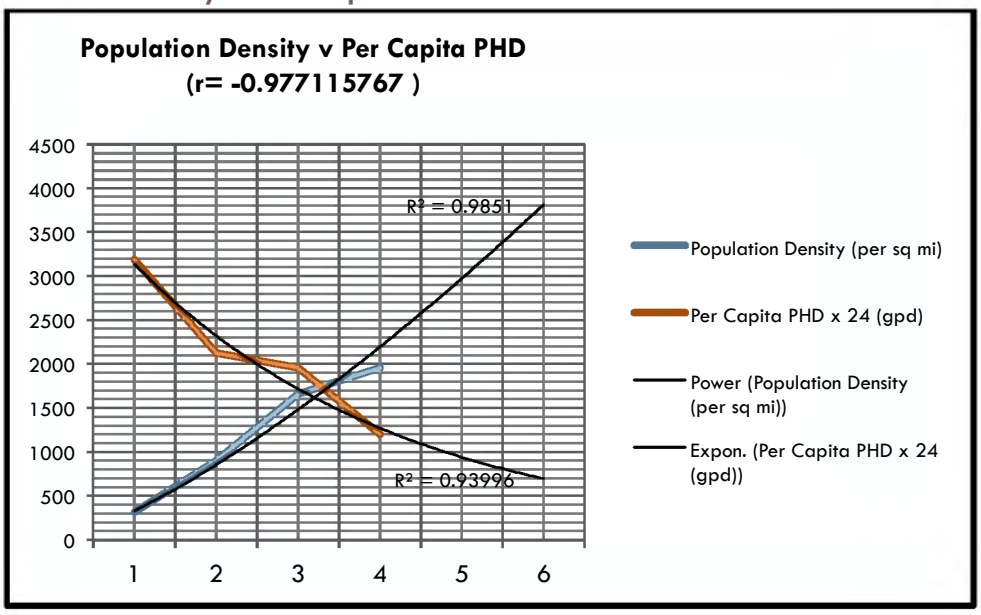
Figure 9. Population Density v Per Capita PHD



Once established, the correlation was applied to the 2045 population density from the population projection report to derive the 2045 PHD.

Table 15. Peak Hourly Demand

Peak Hourly Demand (PHD)							
Provider	2045 Population	2045 Density (per SqMi)	2045 Derived Per Capita PHD (gph)	2045 PHD (MGH)	2014 PHD (MGH)	Δ PHD (MGH)	Δ PHD (cfs)
Remington	5989	159	142	0.74	0.13	0.61	22.52
Hauser Lake	2647	304	128	0.34	0.09	0.25	9.24
Greenferry	4800	1920	74	0.36	0.13	0.23	8.36
Avondale	7838	612	112	0.88	0.5	0.38	14.03
Rathdrum	9545	530	117	1.12	0.52	0.60	22.16
East Greenacres	14299	831	102	1.46	2.39	-0.93	-34.59
North Kootenai	29435	994	97	2.86	1.07	1.78	66.24
Ross Point	16190	1572	66	1.07	0.45	0.62	22.97
Hayden Lake	11216	1869	62	0.70	0.45	0.25	9.11
Post Falls	24523	2919	44	1.08	0.80	0.28	10.35
Coeur d'Alene	64027	3722	31	1.98	1.74	0.24	9.01
Total				**12.59**	**8.27**	**4.31**	**159.41**

Future RPA municipal water demand for the eleven major providers is summarized below.

Table 16. RPA Future Municipal Water Demand Summary

Rathdrum Prairie Aquifer Future Municipal Provider Water Demand Summary											
Provider	2014 Annual Volume (MGY)	2045 Annual Volume (MGY)*	2014 MDD (MGD)	2045 MDD (MGD)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
Remington	63	415	1.60	9.34	14.45	0.13	0.74	27.35	352	11.98	22.52
Hauser Lake	81	317	1.0	4.00	6.18	0.09	0.34	12.58	236	4.64	9.24
Greenferry	68	330	1.44	4.32	6.68	0.13	0.36	13.19	262	4.46	8.36
Avondale	567	788	7.0	10.97	16.98	0.5	0.88	32.60	221	6.15	14.03
Rathdrum	566	770	7.58	13.65	21.12	0.52	1.12	41.47	204	9.40	22.16
East Greenacres	2877	4766	41.96	19.16	29.64	2.39	1.46	54.16	1889	-35.28	-34.59
North Kootenai	652	1717	17.2	37.09	57.39	1.07	2.86	106.02	1065	30.77	66.24
Ross Point	477	1959	5.68	16.19	25.05	0.45	1.07	39.68	1482	16.27	22.97
Hayden Lake	628	1067	6.0	10.54	16.31	0.45	0.70	25.82	439	7.03	9.11
Post Falls	1531	2346	11.8	15.94	24.66	0.80	1.08	40.07	815	6.41	10.35
Coeur d'Alene	3738	5803	32.19	32.01	49.53	1.74	1.98	73.70	2065	-0.27	9.01
Totals	**11248**	**20278**	**133.45**	**173.21**	**267.99**	**8.27**	**12.59**	**466.64**	**9030**	**61.56**	**159.41**

*Calculated by applying 2014 per capita use to 2045 population data. Does not account for change in per capita use over time.

Future RPA municipal water demand will increase by approximately 9000 MGY. It is likely that much of the increase will be offset by conversion of irrigation water to municipal water as agricultural land is converted to municipal use. Additional offset will occur due to decreases in outdoor landscape irrigation use as population densification reduces the amount of irrigable area in the City of Coeur d'Alene and select areas of the City of Post Falls and City of Hayden.

STUDY 4: WATER RIGHT GAP ANALYSIS

SUMMARY: ADDITIONAL RAFN RIGHTS TOTALING 52.3 CFS ARE REQUIRED TO MEET THE 2045 MDD OF FIVE RPA MUNICIPAL PROVIDERS. THE ADDITIONAL RIGHTS ARE OFFSET BY A DECREASE OF 104.45 IN MDD REQUIRED RIGHTS AMONG SIX OTHER RPA MUNICIPAL PROVIDERS. ADDITIONAL RAFN RIGHTS TOTALING 247.83 CFS ARE REQUIRED TO MEET THE 2045 PHD OF TEN RPA MUNICIPAL PROVIDERS. THE ADDITIONAL RAFN RIGHTS ARE OFFSET BY A DECREASE OF 32.86 CFS IN PHD REQUIRED RIGHTS FOR ONE RPA MUNICIPAL PROVIDER. STORAGE MAY OFFSET SOME OR ALL OF THE PHD RAFN NEEDS OF FOUR PROVIDERS WITH ABOVE GROUND STORAGE CAPACITY DEPENDING ON INDIVIDUAL PROVIDER WATER STORAGE MANAGEMENT POLICY.

The information for assembling the water rights portfolio for each provider was taken from searching the Idaho Department of Water Resources (IDWR) website for water right records in the name of the respective provider. Because of the ongoing adjudication of water rights in the basin, some possible uncertainty may exist with regard to some of the rights. With the single exception of 95-4027 in the name of North Kootenai Water District, all rights claimed by the various providers were taken at face value. 95-4027 is a Statutory Claim to a Water Right which states a priority date that would have required it to have been established by first obtaining a Permit to Appropriate Water from IDWR. This was not done and this claim will likely be rejected in the adjudication process. In the process of evaluating the water rights for the Avondale Irrigation District what appears to be an error the combined limits for licenses 95-8687, 95-8774, 95-8867 and 95-8909 was discovered. Avondale has petitioned IDWR to modify the combined limits from 13.94cfs to 19.09cfs. Since IDWR has indicated a willingness to consider amending those licenses, 19.09cfs was assigned as the combined limit for purposes of the Gap Analysis.

Table 17. Water Right Gap Analysis

Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Remington	5.90	14.45	8.55	27.35	21.45	~
Hauser Lake	4.90	6.18	1.28	12.58	7.68	~
Greenferry	2.05	6.68	4.63	13.19	11.14	~
Avondale	19.09	16.98	-2.11	32.60	13.51	~
Rathdrum	16.90	21.12	4.22	41.47	24.57	1.0
East Greenacres	97.90	29.64	-68.26	54.16	-43.74	0.325
North Kootenai	28.20	57.39	29.19	106.02	77.82	~
Ross Point	16.31	25.05	8.74	39.68	23.37	1.0
Hayden Lake	24.00	16.31	-7.69	25.82	1.82	~
Post Falls	38.89	24.66	-14.23	40.07	1.18	6.25
Coeur d'Alene	60.98	49.53	-11.45	73.70	12.72	6.0
Total	**315.12**	**267.99**	**-47.13**	**466.64**	**151.52**	**12.25**

The purpose of some of the water rights in this analysis is other than municipal and, as such, the conditions on those rights may carry a volume limitation. If a provider has irrigation rights in their portfolio, the assumption in this analysis is made that the provider will have at least as many acres to which water is applied as the sum total for the acres of irrigation in the original water rights.

Unaccounted-for-water is embedded in the future demand projections in this analysis as the projections are derived from production, not consumption, data. Consequently, no adjustment to the demand and water right analysis is necessary.

Four providers - Coeur d'Alene, Post Falls, Rathdrum and Ross Point – have above ground storage capacity that may offset their need for additional water rights based on PHD. This analysis did not investigate the storage management policies of the four providers and draws no conclusions whether or how much of above ground storage is available for peak flow supply.

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Rathdrum Prairie Aquifer Future Water Demand

Appendix A:

RPA RAFN SERVICE AREA MEMORANDUM OF UNDERSTANDING

Memorandum of Understanding

Between

City of Post Falls, City of Rathdrum, Avondale Irrigation District, East Greenacres Irrigation District, Greenferry Water and Sewer District, Hauser Lake Water Association, Hayden Lake Irrigation District, North Kootenai Water and Sewer District, Remington Recreational Water and Sewer District, and Ross Point Water District

This Memorandum of Understanding (MOU) sets forth the terms and understanding between the above named Rathdrum Prairie Aquifer municipal water providers to assign service areas in support of applications for Reasonably Anticipate Future Need (RAFN) water rights.

Background

42-202 Idaho Code permits municipal providers of water to apply for RAFN water rights to support future municipal development within projected service areas. Idaho Code §42-▫202B (9) defines the service area for a municipality as follows:

> "Service area" means that area within which a municipal provider is or becomes entitled or obligated to provide water for municipal purposes. For a municipality, the service area shall correspond to its corporate limits, or other recognized boundaries, including changes therein, after the permit or license is issued. The service area for a municipality may also include areas outside its corporate limits, or other recognized boundaries, that are within the municipality's established planning area if the constructed delivery system for the area shares a common water distribution system with lands located within the corporate limits. For a municipal provider that is not a municipality, the service area shall correspond to the area that it is authorized or obligated to serve, including changes therein after the permit or license is issued.

At the request of Rathdrum Prairie Aquifer (RPA) municipal water providers, the Idaho Water Resources Board authorized a contract between Idaho Department of Water Resources and the Idaho Water Resources Research Institute (IWRRI) to conduct research and mediate service area boundaries necessary to support possible RAFN applications from providers withdrawing water from the RPA. Agreement on provision of service for all identified overlap areas was reached on November 11, 2014.

Purpose

The purpose of this MOU is to satisfy the requirements of Idaho Code §42-▫202B (9) by creating a common future service area planning document for municipal water providers withdrawing water from the RPA. This MOU will establish municipal water provider service areas for the 30-year planning period requested by the signatory providers as basis for anticipated RAFN applications. The service areas are generally described on the maps in Appendix A. Specific areas of overlap between an incorporated city's Area of City Impact planning boundary and other municipal providers' service areas, and the agreements reached through the mediation process as to who will provide service to those areas, are more specifically described as follows:

City of Rathdrum/East Greenacres Irrigation District

East Greenacres will provide water service to the area generally described as the SW corner of Rathdrum's Area of City Impact (ACI) and the NE corner of East Greenacres service area north of Wyoming Ave, south of Lancaster Rd and east of Highway 53. RAFN Service Area Mediation Report included as Appendix B describes terms of service agreed to by both parties.

City of Post Falls/East Greenacres Irrigation District

East Greenacres will provide water service to all areas within district boundaries in the City of Post Falls, within district boundaries in the City of Post Falls ACI, and in East Greenacres future service area generally described as

west of the existing district boundary, north of West Seltice Way, south of Highway 53, and east of the Idaho state line.

City of Post Falls/Hayden Lake Irrigation District

Hayden Lake will provide water service to the triangle area within the City of Post Falls ACI generally described as south of W. Prairie Ave, west of N. Huetter Rd, east of N. Meyer Rd, and northeast of the railroad track.

City of Post Falls/Ross Point Water District

Ross Point will provide water service to all areas within its district boundaries in the City of Post Falls, within district boundaries in the City of Post Falls ACI, and in the area generally described as north of the existing district boundary and bounded by a line that runs north on Meyer Rd, west on Hayden Ave, north on Highway 41, west on Wyoming Ave, south on N. Greensferry Rd to the RR tracks, and west to the boundary of East Greenacres Irrigation District.

City of Rathdrum/Avondale Irrigation District:

No overlap. RAFN Service Area Mediation Report included as Appendix C describes terms of service agreed to by both parties.

Future service areas described in Appendix A for Greenferry, Hauser Lake, North Kootenai and Remington do not overlap with any other known RAFN applicants current or future planning boundaries or service areas. The area bounded by N. Huetter Road on the east, N. Meyer Road on the west, W. Hayden Avenue on the south, and W. Emmanuel Avenue on the north is excluded from adjoining Avondale or Hayden Lake's RAFN service areas by mutual agreement as described in Appendix D.

Duration

This MOU shall become effective upon signature by the authorized officials of the municipal providers. This MOU is at-will and may be modified by mutual consent of those signatory providers whose service areas adjoin the area to be modified. The duration of this MOU shall be the same as the provider requested 30-year planning horizon for the IWRRI RAFN research. This MOU shall end on December 31, 2044.

RAFN Service Area MOU

Municipal Water Provider Future Service Area MOU Signature Page

_____ Date: 12/3/14
City of Post Falls: signature, title

_____ Date: 12/11/14
City of Rathdrum: signature, title

_____ District Manager Date: 12/3/2014
Avondale Irrigation District: signature, title

_____ District Manager Date: 11-24-14
East Greenacres Irrigation District: signature, title

_____ District Manager/Accountant Date: 12/1/2014
Greenferry Water and Sewer District: signature, title

_____ Date: 12/8/14
Hauser Lake Water Association: signature, title

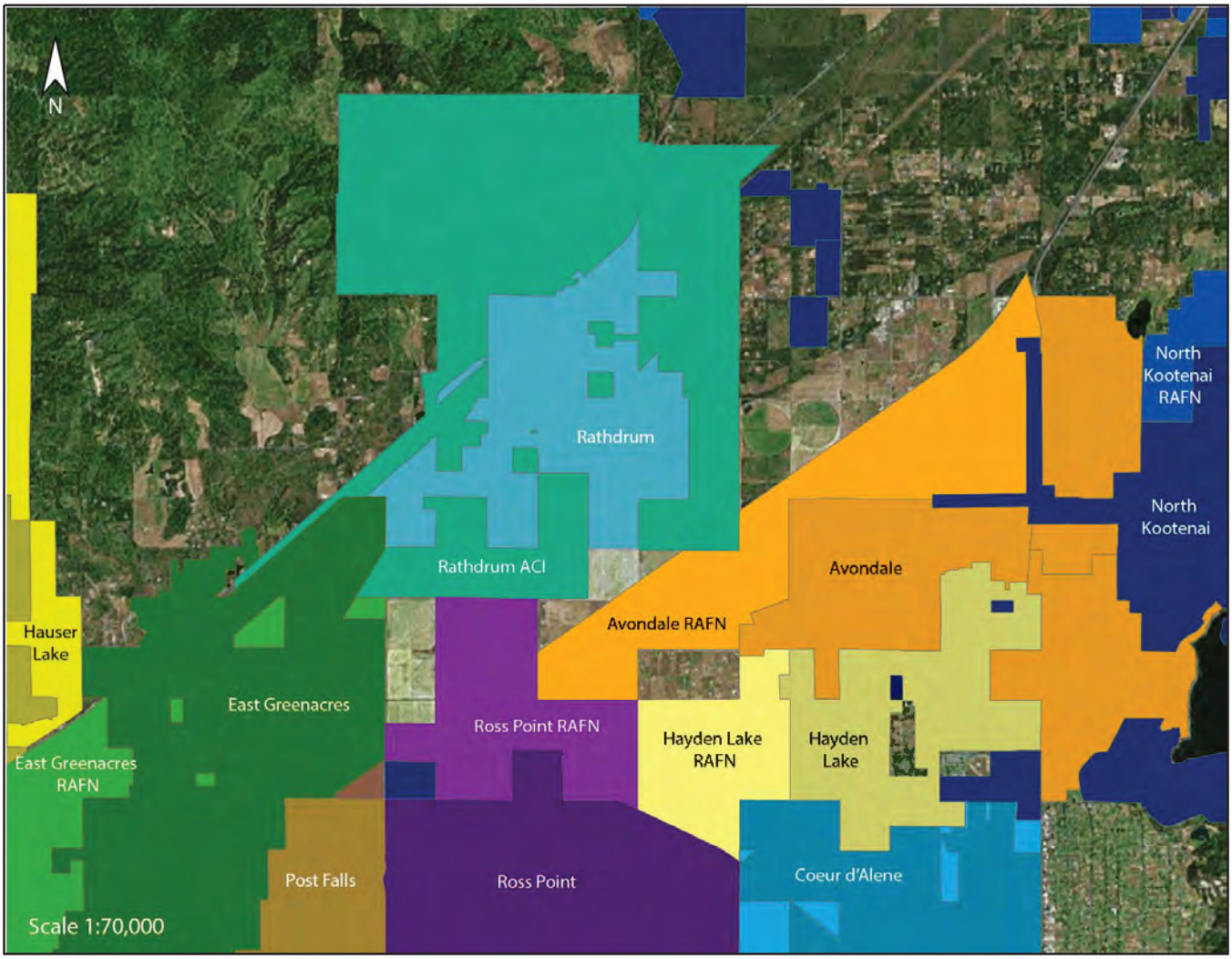
_____ Date: 12/3/14
Hayden Lake Irrigation District: signature, title

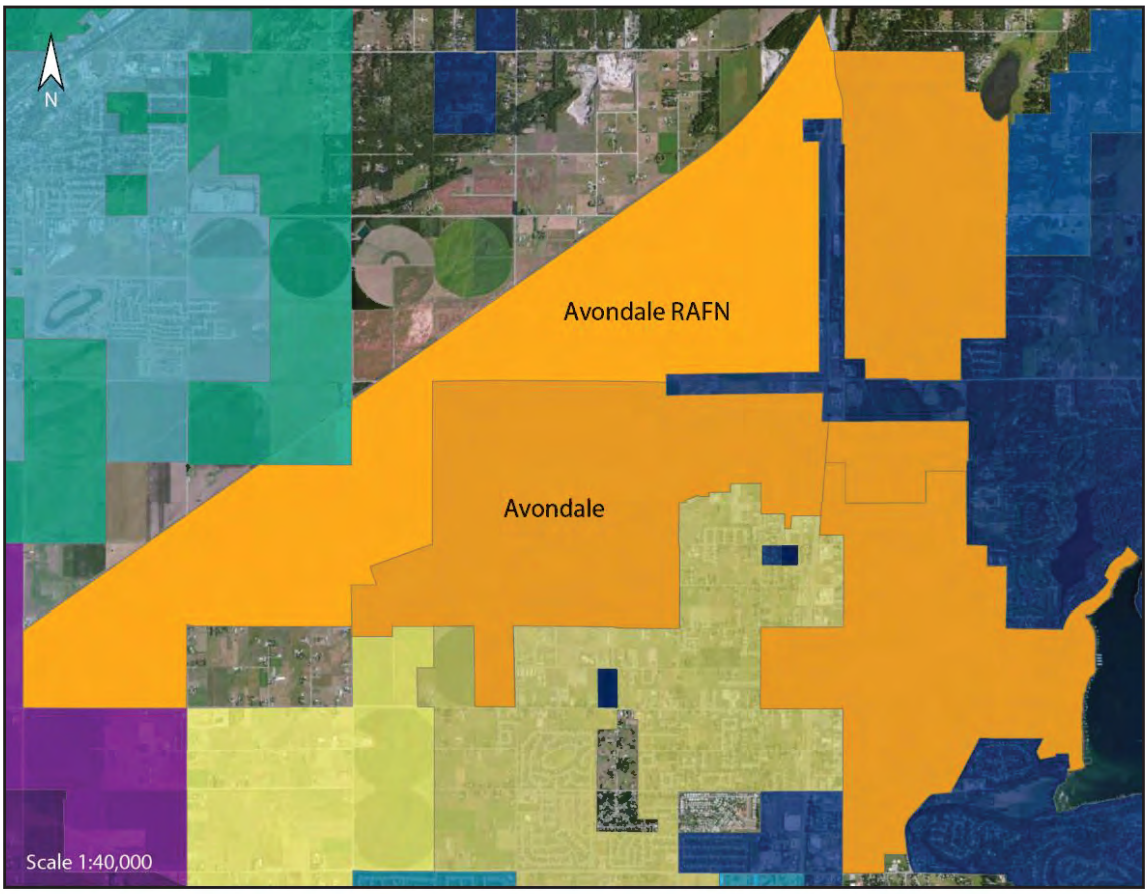
_____ District Manager Date: 11/24/14
North Kootenai Water and Sewer District: signature, title

_____ District Manager/Accountant Date: 12/1/2014
Remington Rec. Water and Sewer District: signature, title

_____ Date: 11-24-14
Ross Point Water District: signature, title

Appendix A: Municipal Water Provider Future Service Area Maps

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Avondale
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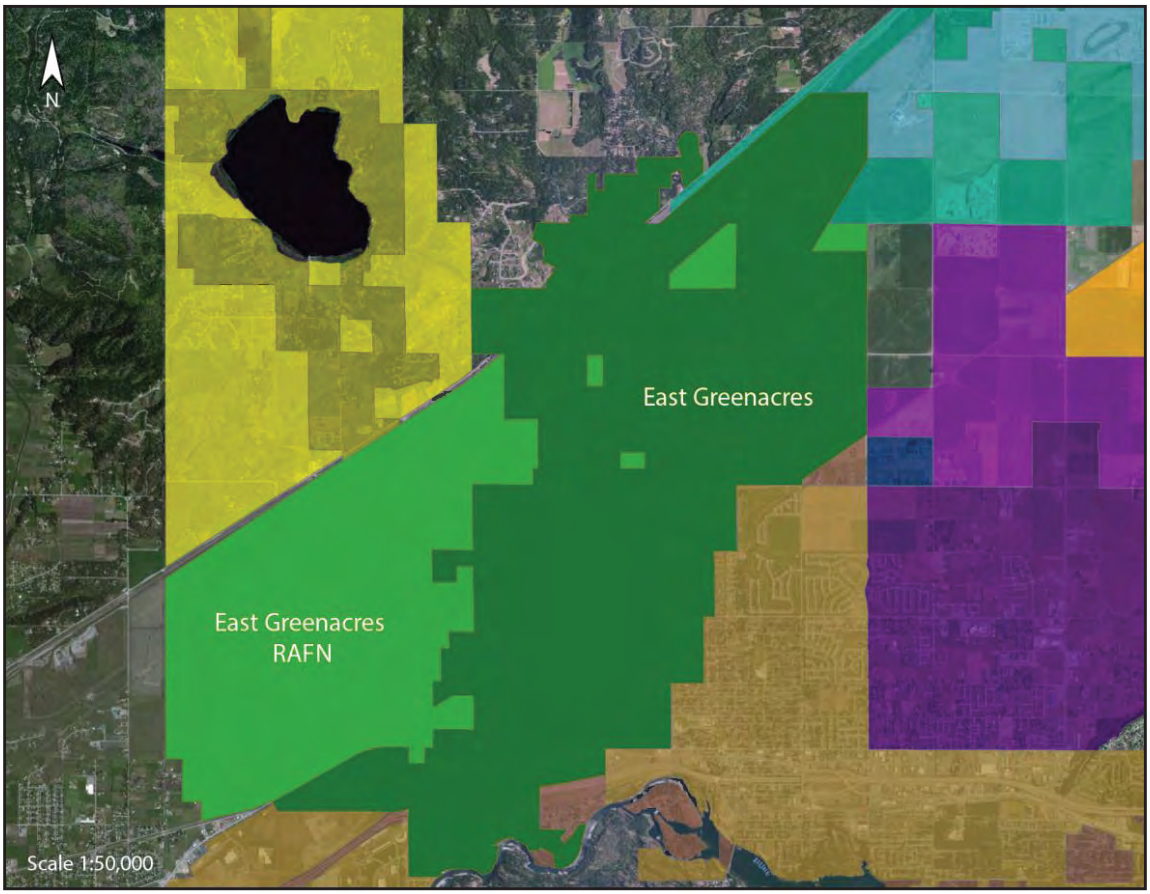
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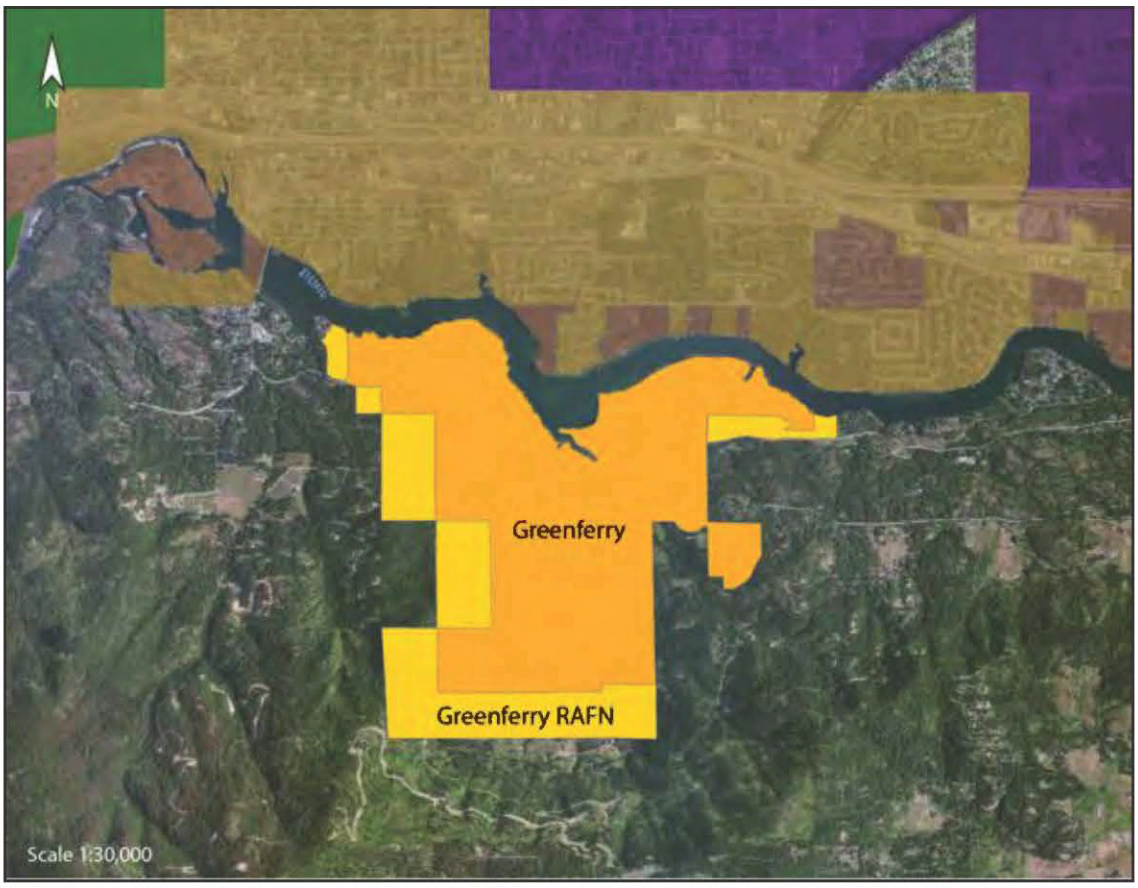
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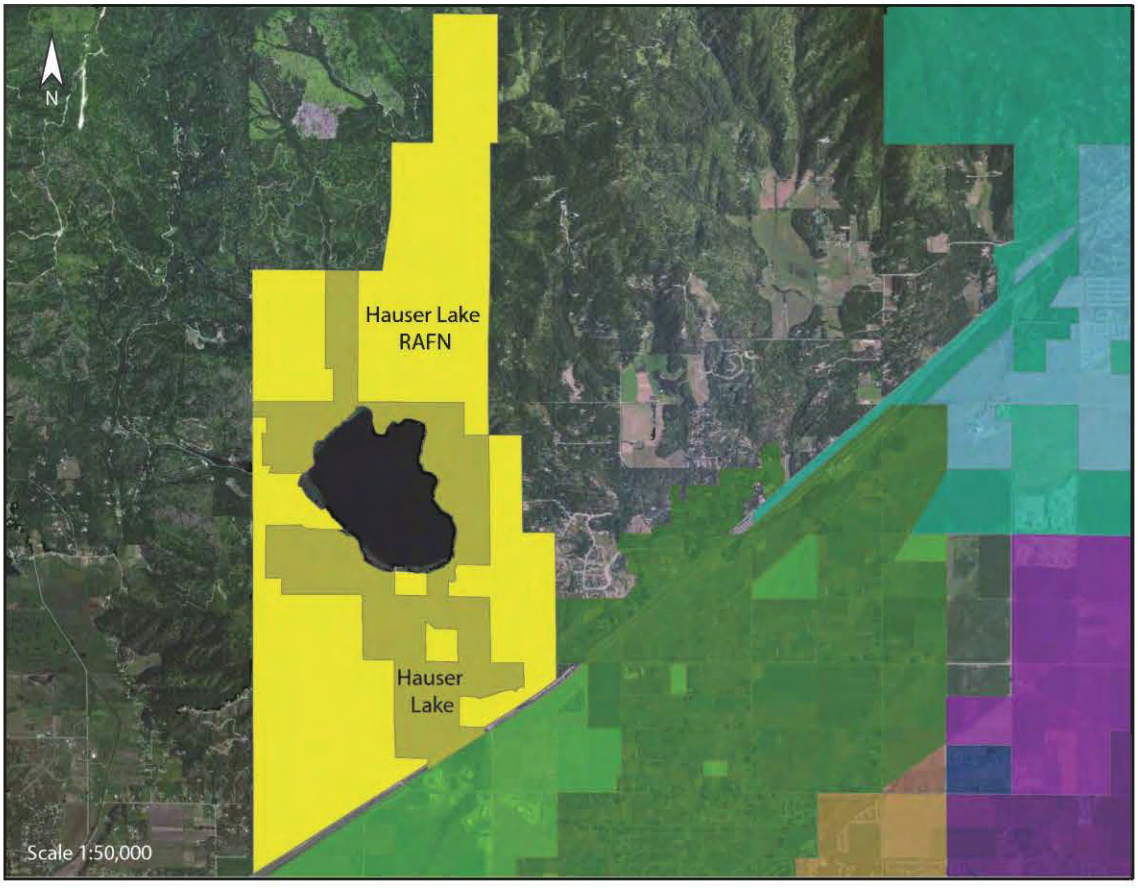
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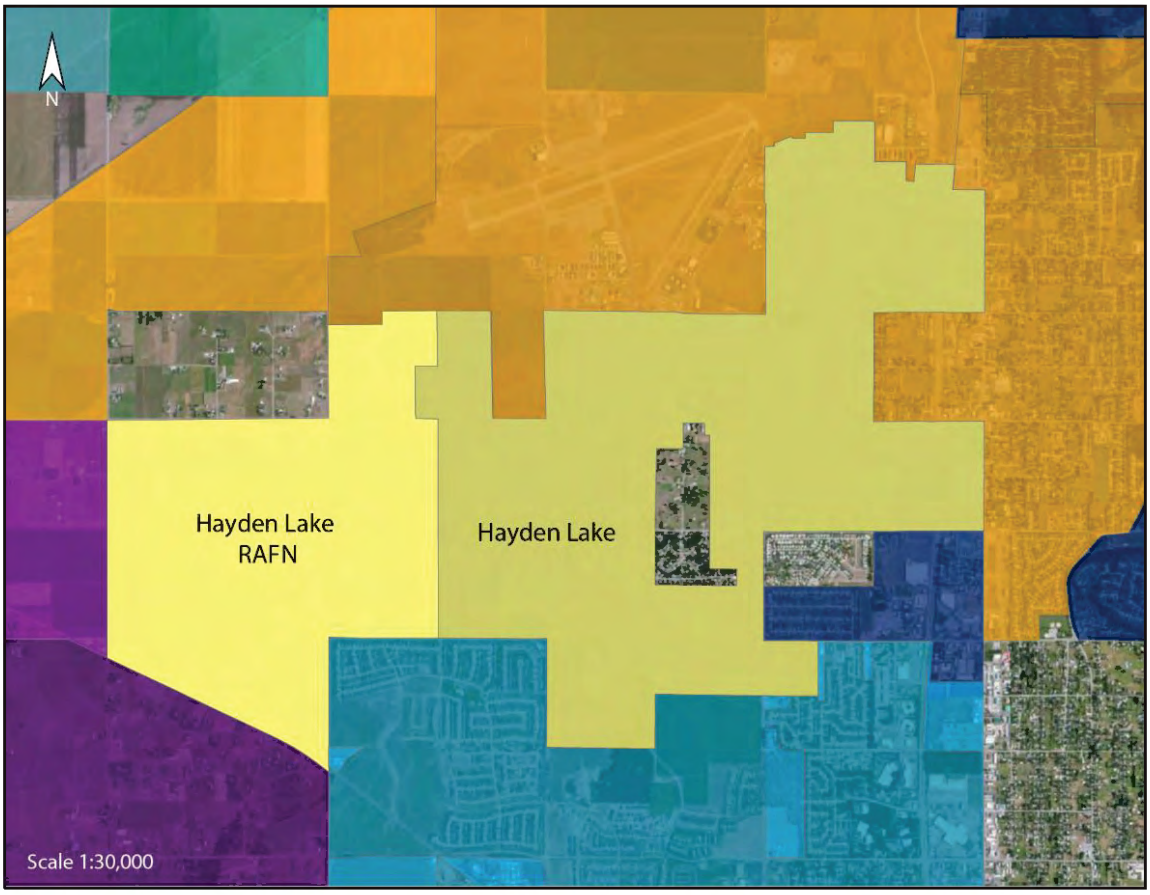
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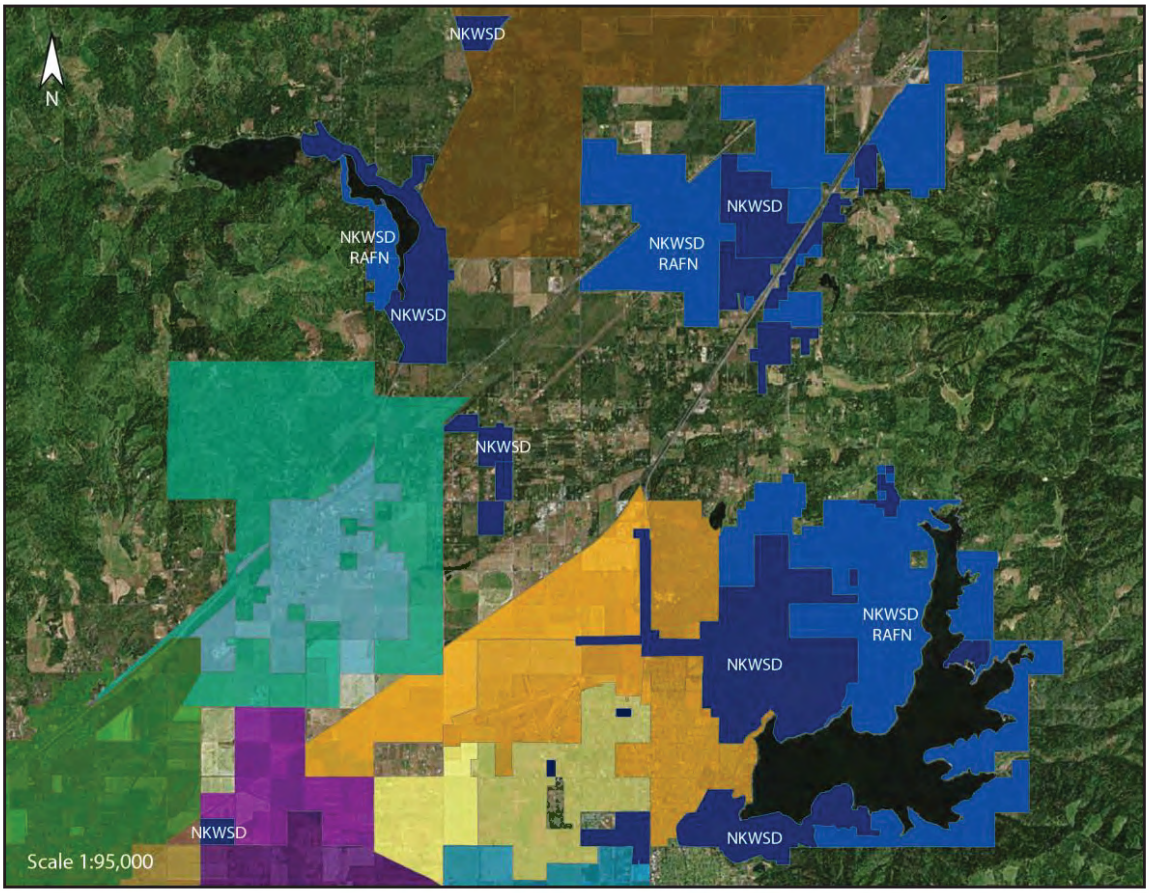
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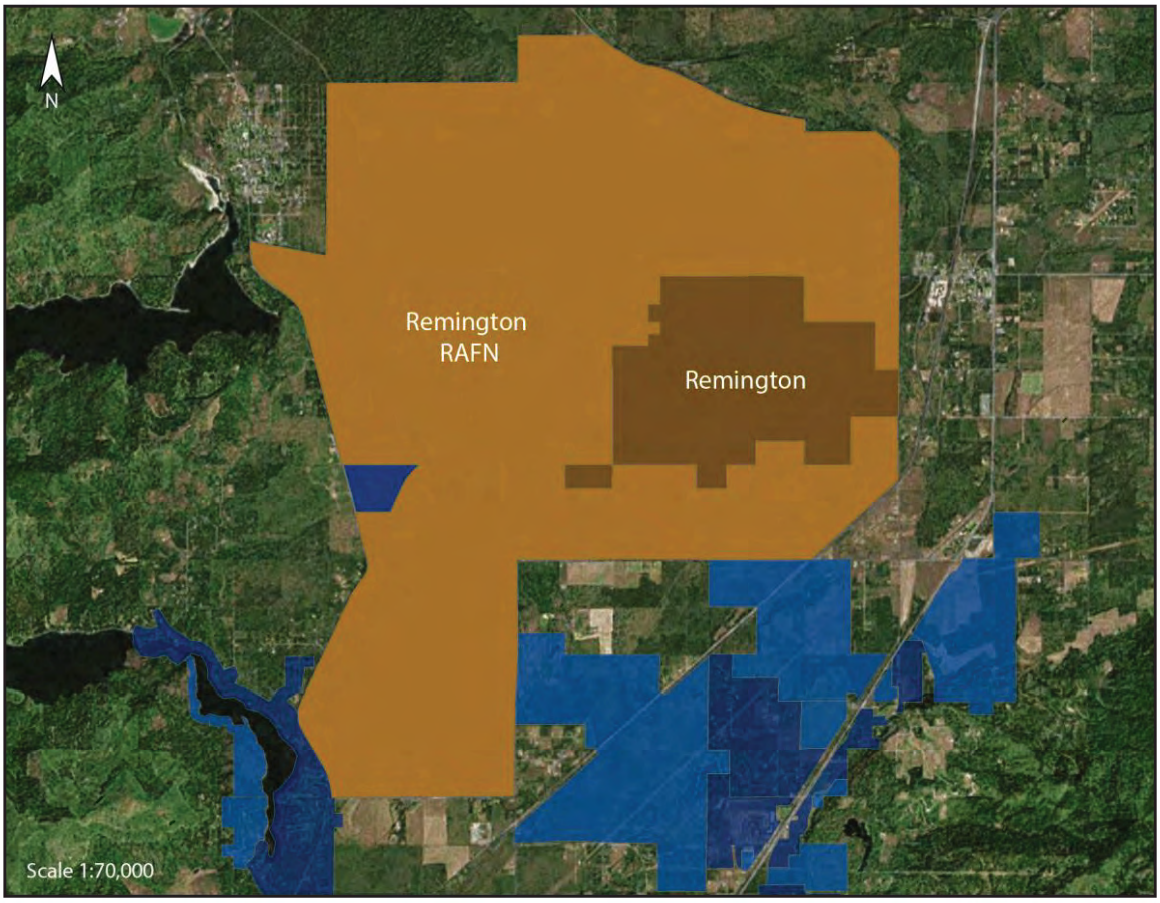
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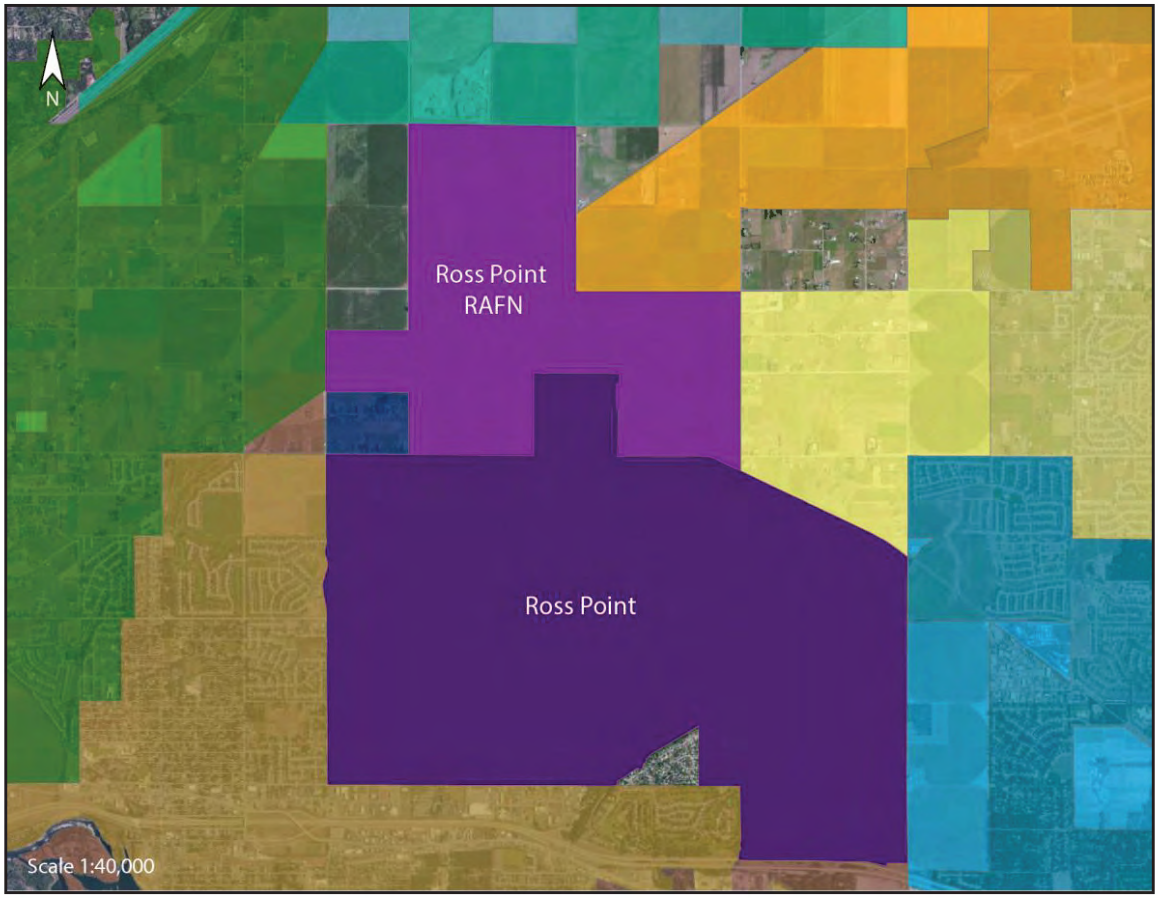
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RAFN
Ross Point
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Appendix B: City of Rathdrum/East Greenacres Irrigation District Mediators Report

Idaho Water Resources Research Institute

Coeur d'Alene
1031 N. Academic Way
Room 216
Coeur d'Alene, ID 83844
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Boise
322 Front Street
Suite 242
Boise, ID 83720
(208) 332-4422

Idaho Falls
1776 Science Center Drive
Suite 306
Idaho Falls, ID 83402
(208) 282-7985

November 5, 2014

To: Brett Boyer, City of Rathdrum
Ron Wilson, East Greenacres Irrigation District

Re: RAFN Service Area Mediator's Report

This memo memorializes the discussions, findings and agreements resulting from IWRRI mediation of an overlap in projected future municipal water provider service areas between the City of Rathdrum (Rathdrum) and East Greenacres Irrigation District (EGID). Authorized representatives of EGID and Rathdrum met separately with the IWRRI mediator on September 8, 2014, October 23, 2014, and October 30, 2014 to discuss resolution of the service area overlap. The area in question is generally described as the SW corner of Rathdrum's Area of City Impact (ACI) and the NE corner of EGID's service area. See map below. Each party has had an opportunity to review and comment on this report. No changes were requested.

Findings:

- 42-202(B) Idaho Code restricts type (a) municipal provider (incorporated city) Reasonably Anticipated Future Need (RAFN) service areas to the area included within a planning boundary adopted through public process such as an Area of City Impact.
- 42-202(B) Idaho Code restricts type (b) and (c) municipal providers (water associations, irrigation districts, etc.) RAFN service areas to those areas that such providers are "authorized or obligated" to serve.
- The overlap area is inside Rathdrum's current Area of City Impact planning boundary.
- The overlap area is within EGID's federally designated service area.
- EGID currently provides water service in the overlap area.
- Rathdrum does not currently provide water service in the overlap area.
- Rathdrum prefers that Rathdrum provide all city services within city limits, including water service.

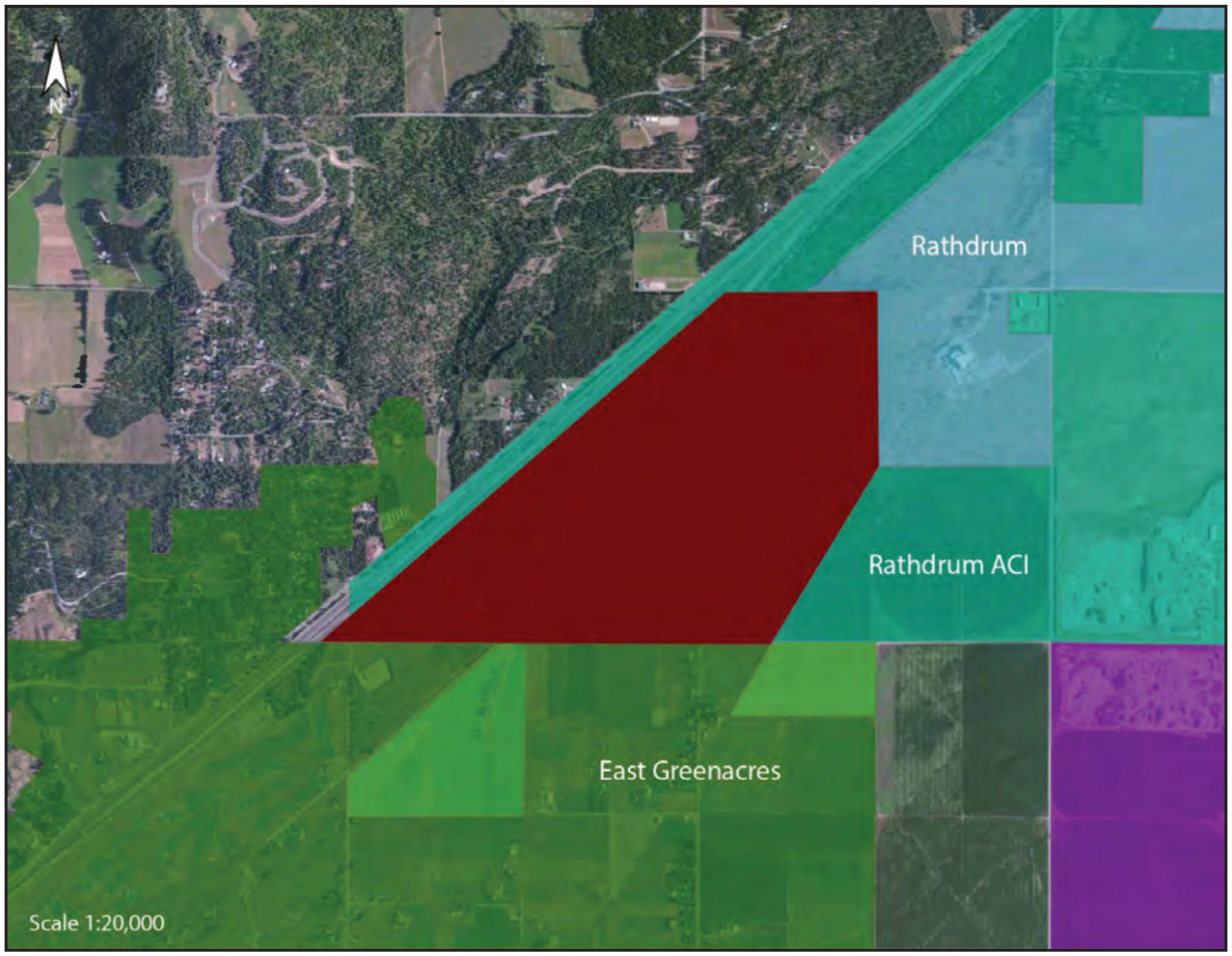
Agreements:

- Rathdrum agrees that the overlap area is within EGID's service area.
- Rathdrum recognizes EGID's authorization to serve water in the subject area.

- EGID recognizes Rathdrum's exercise of planning and zoning powers in the subject area.
- EGID recognizes the responsibility of Rathdrum to provide city services other than water in the subject area upon annexation by Rathdrum.
- EGID agrees that it will in good faith enter into negotiations with Rathdrum to provide a mechanism for curtailment of EGID water service to an EGID water customer who is delinquent on payment of their Rathdrum utility bill.

Sincerely

Mark Solomon



Appendix C: City of Rathdrum/Avondale Irrigation District Mediation Report

Idaho Water Resources Research Institute

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Idaho Falls
1776 Science Center Drive
Suite 306
Idaho Falls, ID 83402
(208) 282-7985

November 5, 2014

To: Brett Boyer, City of Rathdrum
Bob Chandler, Avondale Irrigation District

Re: RAFN Service Area Mediation Report

This memo memorializes the discussions, findings and agreements resulting from IWRRI mediation of an overlap in projected future municipal water provider service areas between the City of Rathdrum (Rathdrum) and Avondale Irrigation District (Avondale). Authorized representatives of Rathdrum and Avondale met to discuss resolution of the service area overlap with the IWRRI mediator on October 23, 2014 and October 28, 2014. The area in question is generally described as west of Heutter Ave., east of Highway 41, and southeast of the railroad tracks. See map below. Each party has had an opportunity to review and comment on this report. No changes were requested.

Findings:

- 42-202(B) Idaho Code restricts type (a) municipal provider (incorporated city) Reasonably Anticipated Future Need (RAFN) service areas to the area included within a planning boundary adopted through public process such as an Area of City Impact.
- 42-202(B) Idaho Code restricts type (b) and (c) municipal providers (water associations, irrigation districts, etc.) RAFN service areas to those areas that such providers are "authorized or obligated" to serve.
- The overlap area is outside Rathdrum's current Area of City Impact planning boundary.
- Avondale has a signed letter of commitment from the majority landowner in the overlap area requesting that Avondale provide water service to his property at such time that it is developed.

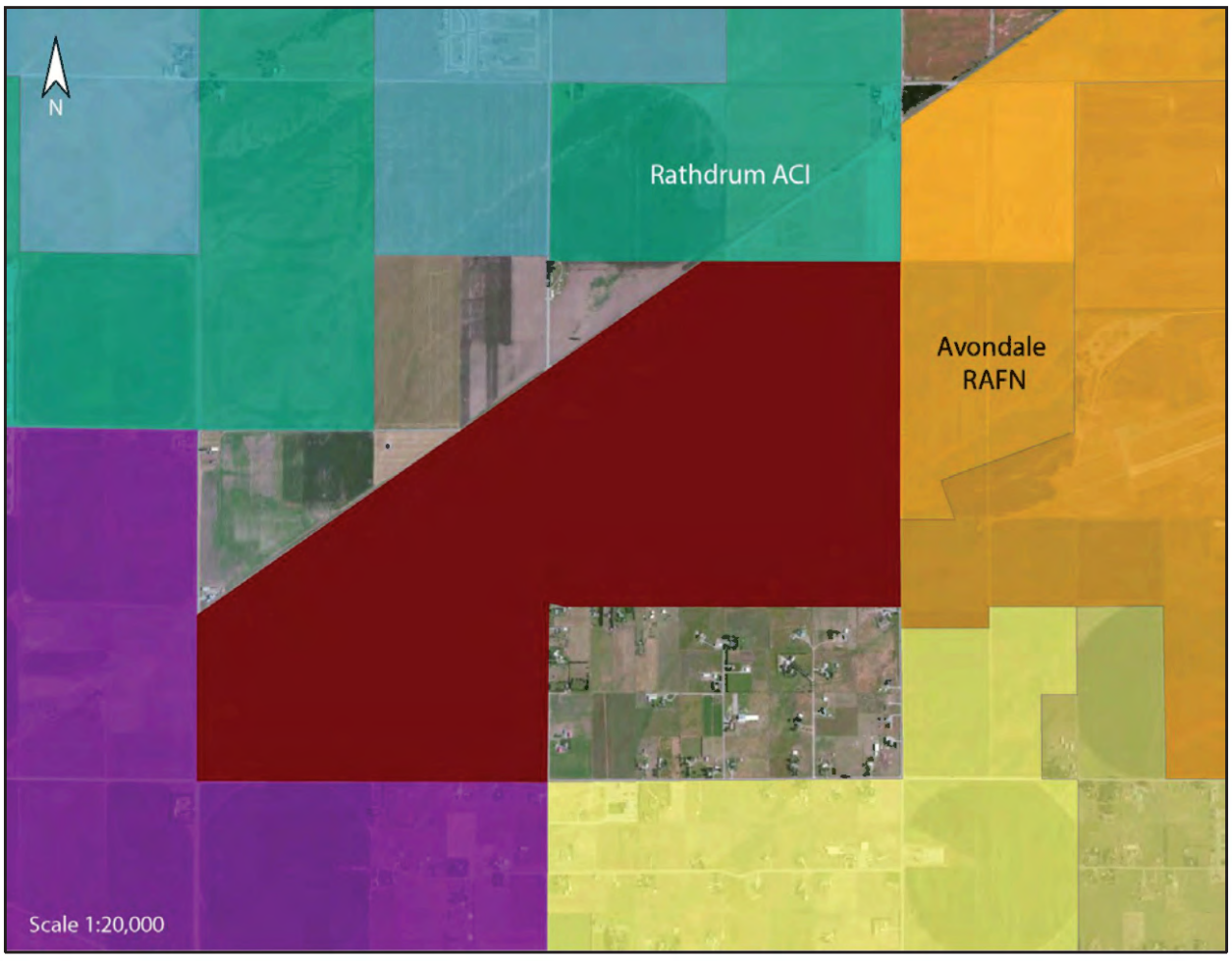
Agreements:

- Rathdrum agrees that the overlap area is outside its current ACI.
- Rathdrum recognizes Avondale's authorization to serve water in the subject area as evidenced by the letter of commitment from the majority landowner.
- Rathdrum prefers that Avondale not include the subject area in Avondale's service area.
- Rathdrum prefers that Rathdrum provide all city services within city limits, including water service.
- Avondale recognizes the potential for the subject area to be included in Rathdrum's ACI and/or to be annexed into Rathdrum prior to extension of Avondale water service to the subject area.

- Avondale is willing to negotiate transfer of RAFN water rights that may accrue to the subject property to Rathdrum in the event that the subject area is included in Rathdrum's ACI and/or is annexed into Rathdrum prior to extension of Avondale water service to the subject area.
- Rathdrum recognizes that Avondale may extend water service in the subject area prior to the subject areas inclusion in Rathdrum's ACI or annexation into Rathdrum.
- Avondale agrees that if it extends water service to the subject area and that the subject area is subsequently annexed into Rathdrum, that it will in good faith enter into negotiations with Rathdrum to provide a mechanism for curtailment of Avondale water service to an Avondale customer who is delinquent on payment of their Rathdrum utility bill.

Sincerely

Mark Solomon



Appendix D: Avondale Irrigation District/Hayden Lake Irrigation District Mediation Report

Idaho Water Resources Research Institute

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(208) 332-4422

Idaho Falls
1776 Science Center Drive
Suite 306
Idaho Falls, ID 83402
(208) 282-7985

November 5, 2014

To: Alan Miller, Hayden Lake Irrigation District
Bob Chandler, Avondale Irrigation District

Re: RAFN Service Area Mediator's Report

This memo memorializes the discussions, findings and agreements resulting from IWRRI mediation of an overlap in projected future municipal water provider service areas between Hayden Lake Irrigation District (Hayden) and Avondale Irrigation District (Avondale). Authorized representatives of Hayden and Avondale met with the IWRRI mediator on September 9, 2014 to discuss resolution of the service area overlap. The area in question is generally described as bounded by N. Huetter Road on the east, N. Meyer Road on the west, W. Hayden Avenue on the south, and W. Emmanuel Avenue on the north, otherwise known as the Happy Trails subdivision . See map below. Each party has had an opportunity to review and comment on this report. No changes were requested.

Findings:

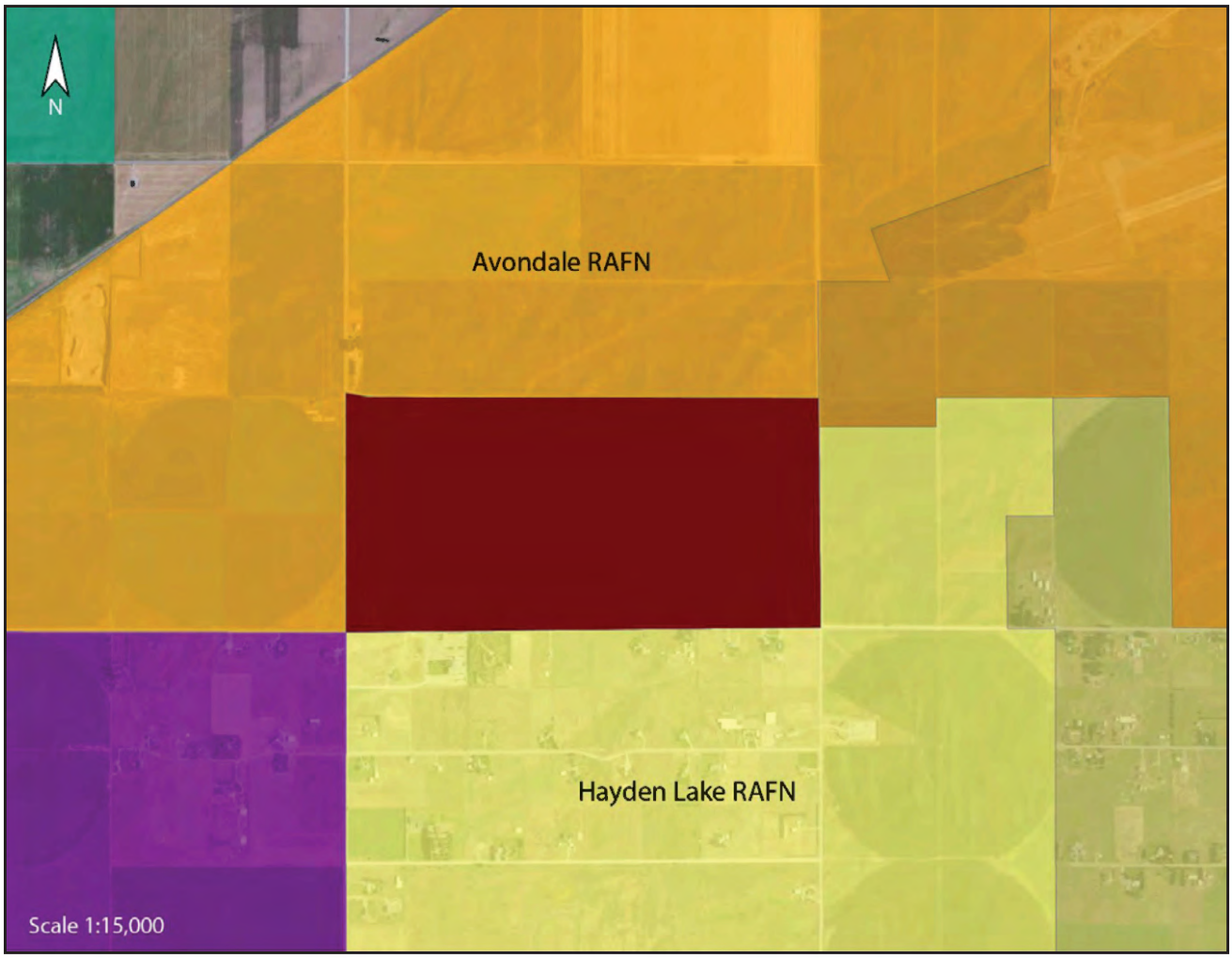
- 42-202(B) Idaho Code restricts type (b) and (c) municipal providers (water associations, irrigation districts, etc.) RAFN service areas to those areas that such providers are "authorized or obligated" to serve.
- The overlap area is not within either Hayden's or Avondale's current service area.
- Water service in the subject area is currently provided by individual private wells.
- Neither Hayden or Avondale has a letter or other instrument from landowners in the subject area requesting water service or annexation.

Agreements:

- Hayden and Avondale withdraw the subject area from their respective projected service areas until such time as either entity secures letters of commitment or other instruments from subject area landowners expressing desire for provision of water service.

Sincerely,

Mark Solomon



Rathdrum Prairie Aquifer
Future Water Demand

Appendix B:

Rathdrum Prairie Aquifer 2014 Demand Update

RATHDRUM PRAIRIE AQUIFER
2014 WATER DEMAND UPDATE

Prepared for

Idaho Water Resources Research Institute
University of Idaho
875 Perimeter Drive, MS 3003
Moscow, Idaho 83844-3006

Prepared by

SPF Water Engineering, LLC
300 East Mallard, Suite 350
Boise, Idaho 83706
(208) 383-4140

November 2014

SPF WATER ENGINEERING

Executive Summary

This report presents an update of water-demand projections prepared for the Rathdrum Prairie Comprehensive Aquifer Management Plan (CAMP) in 2010. The update was based on (1) 2009-2013 water-production data provided by Rathdrum Prairie water purveyors, (2) water-right information, (3) land-use data, and (4) other supporting information.

Primary conclusions from this demand update include the following:

1. Water users in the Rathdrum Prairie area have withdrawn an average of approximately 85,000 acre-feet of groundwater per year for in-home domestic, irrigation, commercial, and industrial needs between 2009 and 2013.
2. In aggregate, water purveyors produced approximately 36,400 acre-feet of groundwater per year for in-home domestic, irrigation, commercial, and industrial needs.
3. Self-supplied commercial and industrial users pumped an estimated 8,300 acre-feet of groundwater per year between 2009 and 2013.
4. Water purveyors supplied an average of approximately 22,800 acre-feet per year for agricultural and residential irrigation. Approximately 28,800 acre-feet of groundwater are diverted for agricultural irrigation outside of purveyor-supplied areas, and 8,400 acre-feet are pumped for residential irrigation outside of purveyor boundaries. Estimates of irrigation demand outside of purveyor-supplied boundaries are less reliable than estimates of irrigation demand inside purveyor-supplied boundaries.
5. The estimate of average annual groundwater pumping (85,000 acre-feet) is approximately 11,000 acre-feet more than was estimated in 2010. The difference likely reflects (a) increases in water use as a result of increased population over recent years, (b) differences in estimating methodology, and (c) inherent data uncertainty.

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1. INTRODUCTION

1.1. Background

The Rathdrum Prairie Comprehensive Aquifer Management Plan (CAMP) identified studies necessary to support Reasonably Anticipated Future Needs (RAFN) water-right applications. The Idaho Water Resources Research Institute (IWRRI) is assisting the Idaho Water Resource Board (IWRB) with some of this work. Specifically, IWRRI has contracted with the IWRB to (1) delineate current and future water-provider service areas, (2) update existing Rathdrum Prairie Aquifer water demand projections, and (3) assist water purveyors in the Rathdrum Prairie Aquifer (RPA) area of northern Idaho with water right applications for reasonably anticipated future needs. As part of this effort, IWRRI retained SPF Water Engineering, LLC (SPF) to update existing water-demand estimates they prepared for the CAMP in 2010 (SPF et al., 2010). This report presents updated estimates of current RPA water demand.

1.2. Purpose and Objectives

The purpose of these water-demand estimates was to provide a basis for projecting future water demand. The general objective was to quantify existing water demand (i.e., production) within participating water purveyor service areas and for the RPA in general. Specific objectives included the following:

1. Request water-diversion data from 31 Rathdrum Prairie water purveyors (list provided by IWRRI);
2. Compile water purveyor production data from 2009 to 2013;
3. Estimate current indoor (e.g., potable) and outdoor (i.e., irrigation) water use within purveyor service areas;
4. Develop estimates of total per-capita and indoor per-capita water use;
5. Estimate the amount of water use outside of purveyor boundaries for domestic, irrigation, commercial, and industrial purposes based on water-right information;
6. Estimate agricultural irrigation withdrawals outside of purveyor-supplied areas based on water-right information and/or other data;
7. Develop general estimates of “unaccounted-for” system losses based on provider information and national averages; and
8. Prepare updated estimates of current total water use within the Rathdrum Prairie area.

1.3. Rathdrum Prairie Aquifer

The RPA consists of the Idaho portion of the Spokane Valley-Rathdrum Prairie Aquifer (Figure 1). The RPA is present under a large portion of Kootenai County and a small portion of Bonner County. Most land within the RPA study area is privately owned.

Urban development in the RPA area is concentrated in the southern portion of the aquifer area along Interstate 90 and Highway 95 and includes the cities of Post Falls, Coeur d'Alene, Hayden and Rathdrum (Figure 2). Areas outside of urban areas are dominated by agricultural and rural residential land uses, with isolated industrial uses, with the exception of small communities such as Spirit Lake, Bayview, and Athol.

1.4. Nature of Water Use

Water is pumped from the RPA for domestic, commercial, municipal, industrial, fire-protection, and other uses. Water purveyors (consisting of municipalities, quasi-governmental districts, homeowner associations, private entities, etc.) supply most of the potable water for Rathdrum Prairie residents via public water systems, although a substantial amount of water is also self-supplied from individual wells, especially in rural areas. Water purveyors in urban areas supply most of the irrigation water in residential areas. Much of the water serving commercial, institutional, and industrial users is also supplied via purveyors' water systems, although several large users pump water authorized under individual water rights. Water withdrawn from the aquifer to irrigate agricultural crops (consisting primarily of hay, grass seed, and grain crops) is provided by Rathdrum Prairie water purveyors and/or diverted under individual water rights.

1.5. Report Organization

The next section (Section 2) provides estimates of current Rathdrum Prairie water use. The section is divided into subsections that summarize (1) water-purveyor data, (2) domestic use outside of purveyor areas, (3) self-supplied industrial and commercial diversions, and (4) self-supplied agricultural irrigation diversions. Diversions for all of these uses are summarized in the Executive Summary and Section 2.7. Supporting purveyor-supplied water-use data are provided in Appendix A. Supporting water right information is provided in Appendix B.

Figure 1. Spokane Valley - Rathdrum Prairie Aquifer area.

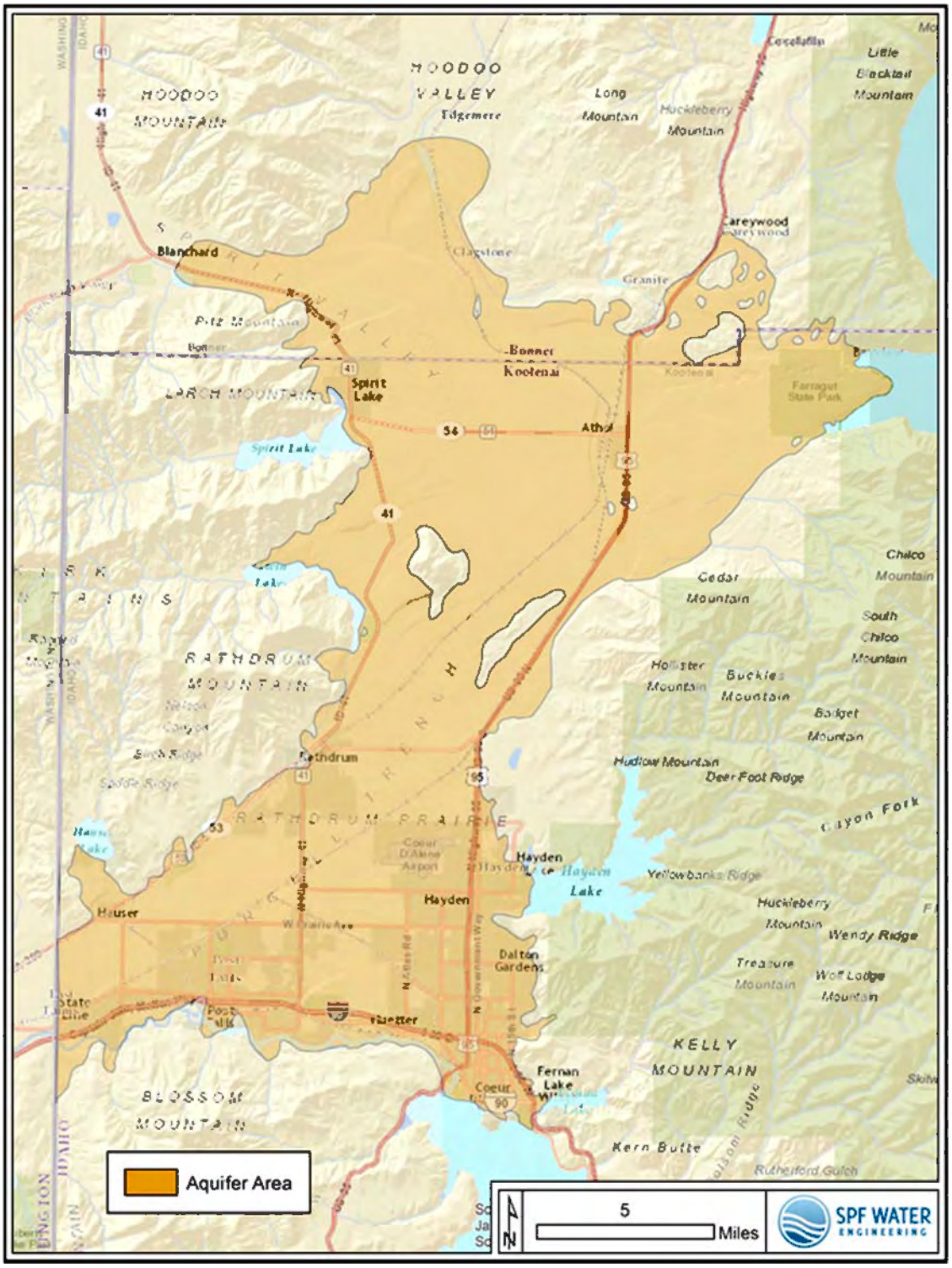

Figure 2. Rathdrum Prairie Aquifer area.

2. ESTIMATES OF CURRENT RATHDRUM PRAIRIE WATER USE

2.1. Introduction

This section provides estimates of Rathdrum Prairie water use based on (1) data provided by water purveyors, (2) water-right information, and (3) agricultural crop data. Water-use estimates for purveyors not providing data were extrapolated based on per-capita water use in the purveyor areas for which data was received. Diversion rates and annual volumes authorized under existing water rights were used to estimate water use for large, self-supplied users. Irrigation diversions were estimated based on purveyor data, agricultural crop acreage and precipitation deficit data,[1] and/or water-right information.

2.2. Groundwater Diversions by Water Purveyors

IWRRI identified 31 water purveyors that pump water from wells within the RPA study area (Figure 3), and provided contact information and population data for these purveyors (Table 1). These water purveyors supply water for domestic, commercial, municipal, and industrial uses (referred to herein as "DCMI" uses). Many of the purveyors also supply water for fire protection. The population within the purveyor boundaries is 81.5% of the estimated RPA study-area population.

Historic water use data were obtained from 11 of the 31 IWRRI-identified RPA water purveyors (Appendix A). Purveyors providing data included the City of Coeur d'Alene, City of Post Falls, Avondale Irrigation District, Bayview Water and Sewer District, Hauser Lake Water Association, Hayden Lake Irrigation District, North Kootenai Water and Sewer District, East Greenacres Irrigation District, Ross Point Water District, Greenferry Water District, and Remington Water District. Two additional purveyors, Dalton Water Association and the City of Athol, provided summary data that is reported in Appendix A, but not used in the analysis. An estimated population of approximately 95,912 people is served by the 11 water purveyors providing data. This population represents 89% of the total population within purveyor boundaries, and 72% of the total RPA study-area population.

[1] *Precipitation deficit* is the difference between potential evapotranspiration and the combined amount of precipitation infiltration and water residing in the zone. In essence, precipitation deficit is the net irrigation water requirement. Monthly precipitation deficit data are compiled by the University of Idaho (http://www.kimberly.uidaho.edu/ETIdaho/) for various crop types and based on data collected at various Idaho weather stations.

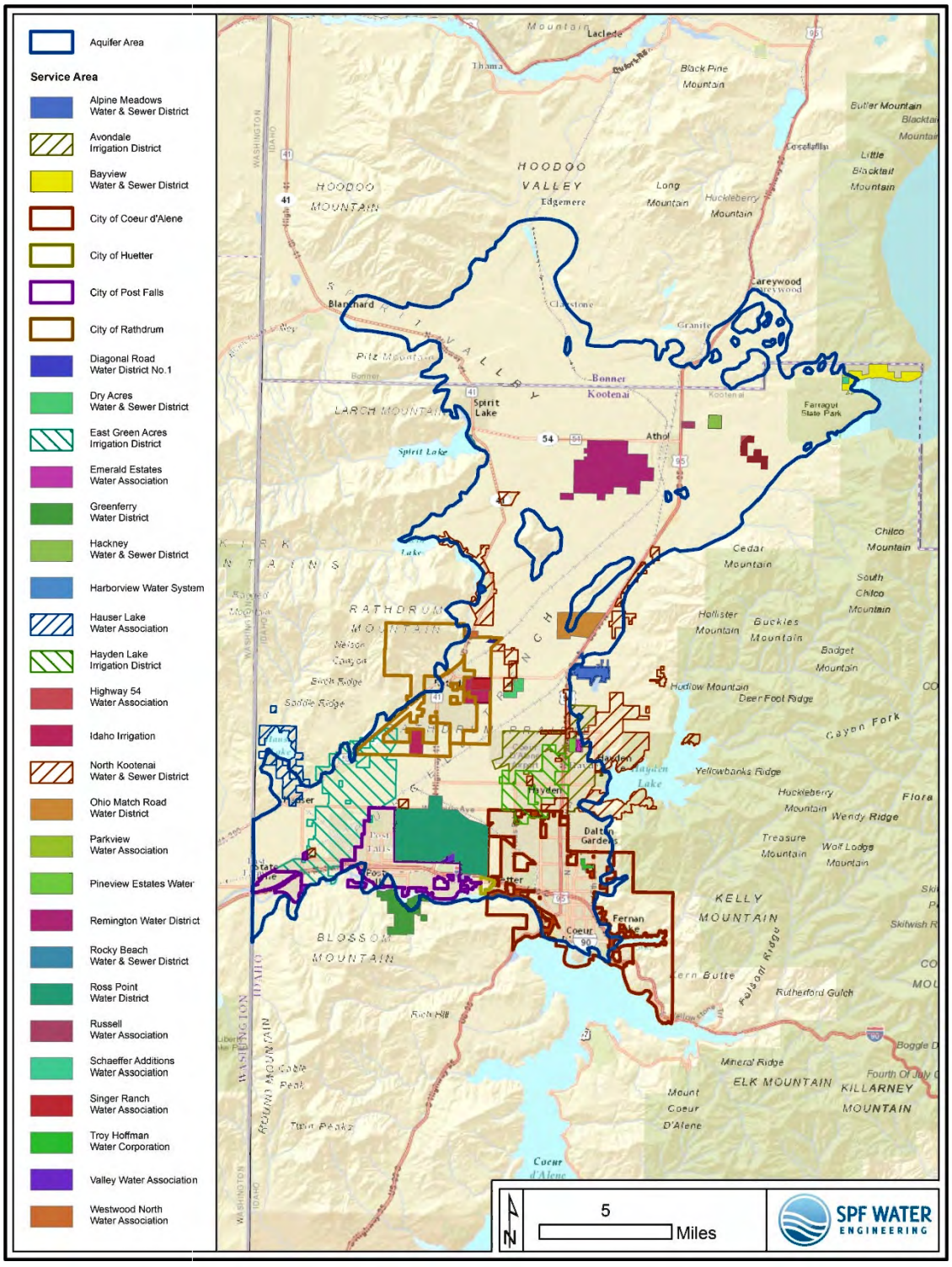

Figure 3. Purveyor service areas.

WATER PURVEYOR AND POPULATION	
WATER PURVEYOR	**POPULATION**
Alpine Meadows Water and Sewer District	88
Avondale Irrigation District	5,643
Bayview Water and Sewer District	1,000
City of Coeur d'Alene	41,240
Diagonal Road Water District No. 1	12
Dry Acres Water and Sewer District	78
East Green Acres Irrigation District	8,632
Emerald Estates Water Association, Inc.	358
Greenferry Water District	405
Hackney Water and Sewer District	123
Harborview Water System, Inc.	10
Hauser Lake Water Assocociation	677
Hayden Lake Irrigation District	6,604
Highway 54 Water Association, Inc.	84
City of Huetter	102
Idaho Irrigation Inc.	29
North Kootenai Water & Sewer District	11,179
Ohio Match Road Water District	134
Parkview Water Association	73
Pineview Estates Water	382
City of Post Falls	16,006
City of Rathdrum	9,868
Remington Water District	584
Rocky Beach Water and Sewer District	87
Ross Point Water District	3,942
Royal Highlands Water (Valley Water Association)	280
Russell Water Association	24
Schaeffer Additions Water Association, Inc.	77
Singer Ranch Water Association	46
Troy Hoffman Water Corporation, Inc.	259
Westwood North Water Association	29
Total Population inside Purveyor Boundaries	**108,056**
Total Population outside Purveyor Boundaries	**24,599**
Total Study Area Population	**132,655**
Water purveyor and population data provided by Idaho Water Resources Research Institute (IWRRI).	

Table 1. Water purveyors and population (2012 data).

In general, the water purveyors provided monthly production data for the period 2009 to 2013. These production data include water that is used for domestic, commercial, industrial, and irrigation uses, as well as "unaccounted for" water.

In aggregate, the 11 water purveyors providing diversion data pumped an average of approximately 33,100 acre-feet per year (AFA), or 10,800 million gallons per year (MGA), from the Rathdrum Prairie Aquifer between 2009 and 2013 (Table 2). There is a substantial seasonal variation in purveyor water production (Table 3 and Figure 4) reflecting primarily differences in irrigation demand. The aggregate average winter use (based on production in the months of November, December, January, and February) was approximately 12,100 AF (3,900 MG) per year, or approximately 37% of the 33,100-AF total (Table 3). Most of the winter diversions are for in-home, domestic uses, although a portion of winter diversions is likely used for commercial and/or industrial purposes. The average irrigation use within service areas supplied by the above-listed purveyors was approximately 21,000 AF (6,900 MGA) per year between 2009 and 2013, or approximately 63% of the 33,100-AFA total.

Estimates of average water use for the 11 purveyor systems providing data ranged from approximately 160 to 913 gallons per capita per day (gpcd) (Table 4 and Figure 5). This includes water used for domestic, irrigation, commercial, and industrial purposes.

The population-weighted, per-capita average annual water use for the 95,912 people served by these water systems was 308 gpcd. Calculating a population-weighted average without including East Greenacres Irrigation District (which provides substantial irrigation water) resulted in 248 gpcd.

The average winter water use, calculated by averaging November through February data, represents indoor potable (and possibly some minor commercial/industrial) water use (Table 4 and Figure 6). Average per-capita winter water use in these 11 water systems ranged from 86 to 257 gpcd. This range reflects differences in in-home, commercial, and industrial uses. The population-weighted average winter water use was 113 gpcd.

Bayview and Greenferry had higher calculated per-capita winter water use than other purveyors (Table 4 and Figure 6). The apparent elevated per-capita winter use could be the result of incorrect population assumptions, meter error, system leaks, and/or commercial or industrial use. IWRRI data suggested that Bayview serves approximately 600 people, but system operators believe the population to be approximately 1,000 with potential summer-time populations as high as 2,000. A population of 1,000 was used in the analysis, but an inaccurate population assumption could explain the higher-than-average Bayview winter water use. Similarly, Greenferry's population was reported as 405 people, but the Greenferry operator believes population served is closer to 900. The Greenferry population was not changed from 405 for the analysis, but the potential discrepancy is noted here.

Data collected from the 11 water purveyors providing data were also used to estimate water use for the water systems served by purveyors that did not provide data. Purveyors not providing data vary in size, serving from 12 people (Diagonal Road Water District No. 1) to 9,868 people (City of Rathdrum) for an estimated total of about 12,142 people.

Summary of Annual Production, Indoor Use, and Irrigation Use[1]

Water purveyor	Average Diversion (MG)	Average Diversion (AFA)	Estimated Average Indoor Use[2] (AFA)	Estimated Average Irrigation Use[3] (AFA)
City of Coeur d'Alene	3,738	11,472	5,250	6,224
City of Post Falls	1,531	4,699	1,970	2,725
Avondale Irrigation District	567	1,739	710	1,029
Bayview Water & Sewer District	91	279	231	48
Hauser Lake Water Association	81	248	113	135
Hayden Lake Irrigation District	628	1,928	646	1,282
North Kootenai Water and Sewer District	652	2,001	1,082	919
East Greenacres Irrigation District [4]	2,877	8,830	1,231	7,599
Ross Point Water District	477	1,465	635	830
Greenferry Water District	68	209	117	92
Remington Water District	63	194	102	91
Total	**10,773**	**33,063**	**12,087**	**20,973**

Notes:
(1) Unless otherwise noted, averaging period is 2009-2013.
(2) Based on average monthly production in November through February.
(3) Average monthly production less average indoor use.
(4) East Greenacres based on 2009, 2010, 2012, and 2013 data. Indoor and Irrigation use estimates based on extrapolated 2009 monthy data.

Table 2. Summary of annual production, indoor use, and irrigation use.

Average Monthly Water Production, 2009-2013 (AF) for RPA Purveyors Providing Data											
Month	City of Coeur d'Alene	City of Post Falls	Avondale Irrigation District	Bayview Water & Sewer District	Hauser Lake Water Assn.	Hayden Lake Irrigation District	North Kootenai Water and Sewer District	Ross Point Water District	Greenferry Water District	Remington Water District	East Greenacres Irrigation District (1)
Jan	453	165	60	20	9	56	91	57	9	9	107
Feb	411	162	57	17	10	50	83	50	9	10	99
Mar	443	166	64	20	11	55	83	52	10	9	112
Apr	492	200	67	20	12	63	89	57	10	9	140
May	901	404	143	22	20	158	105	116	17	11	813
Jun	1,334	545	184	24	28	228	176	155	22	17	1,548
Jul	2,094	861	349	34	49	405	249	264	37	25	2,459
Aug	2,234	934	366	33	48	412	361	301	37	40	1,804
Sep	1,572	656	241	29	30	290	335	220	26	34	1,309
Oct	645	271	89	21	12	103	235	87	11	14	235
Nov	432	175	59	19	8	54	103	48	10	8	101
Dec	461	159	60	21	10	54	91	58	11	8	103
Total	11,472	4,699	1,739	279	248	1,928	2,001	1,465	209	194	8,830
(1) East Greenacres Irrigation District data extrapolated from 2009 monthly data and annual totals for 2010, 2012, and 2013.											

Table 3. Average monthly water production, 2009-2013.

Three methods were considered for extrapolating water use to water systems for which data were unavailable. The first two methods, using (1) regression equations or (2) averages for systems of certain sizes (e.g., less than 2,500 people, 2,500 to 10,000 people, and greater than 10,000 people), were not deemed reliable given that only 11 data points were available. Instead, a population-weighted average was used to extrapolate water use in water systems for which data were unavailable based on population-weighted estimates from the 11 purveyors that did provide production data. Based on this approach, the total estimated annual water production for purveyors that did not provide data was 3,400 AFA (Table 5). This includes an estimated indoor use of 1,530 AFA and estimated irrigation use of 1,840 AFA.

In aggregate, the water purveyors within the study area delivered an aggregate average of approximately 36,400 AFA between 2009 and 2013. Of this amount, approximately 22,800 AFA was used for irrigation and 13,600 AFA was used for indoor domestic (and possibly some commercial, industrial, and/or institutional[2] purposes). These totals

[2] Distinguishing between domestic, commercial, industrial, and/or institutional uses during winter months based on purveyor data was outside of the scope of this analysis.

include “unaccounted-for” water (i.e., system losses, fire flow, system flushing, meter error) because the purveyor pumping data are derived from well production records.

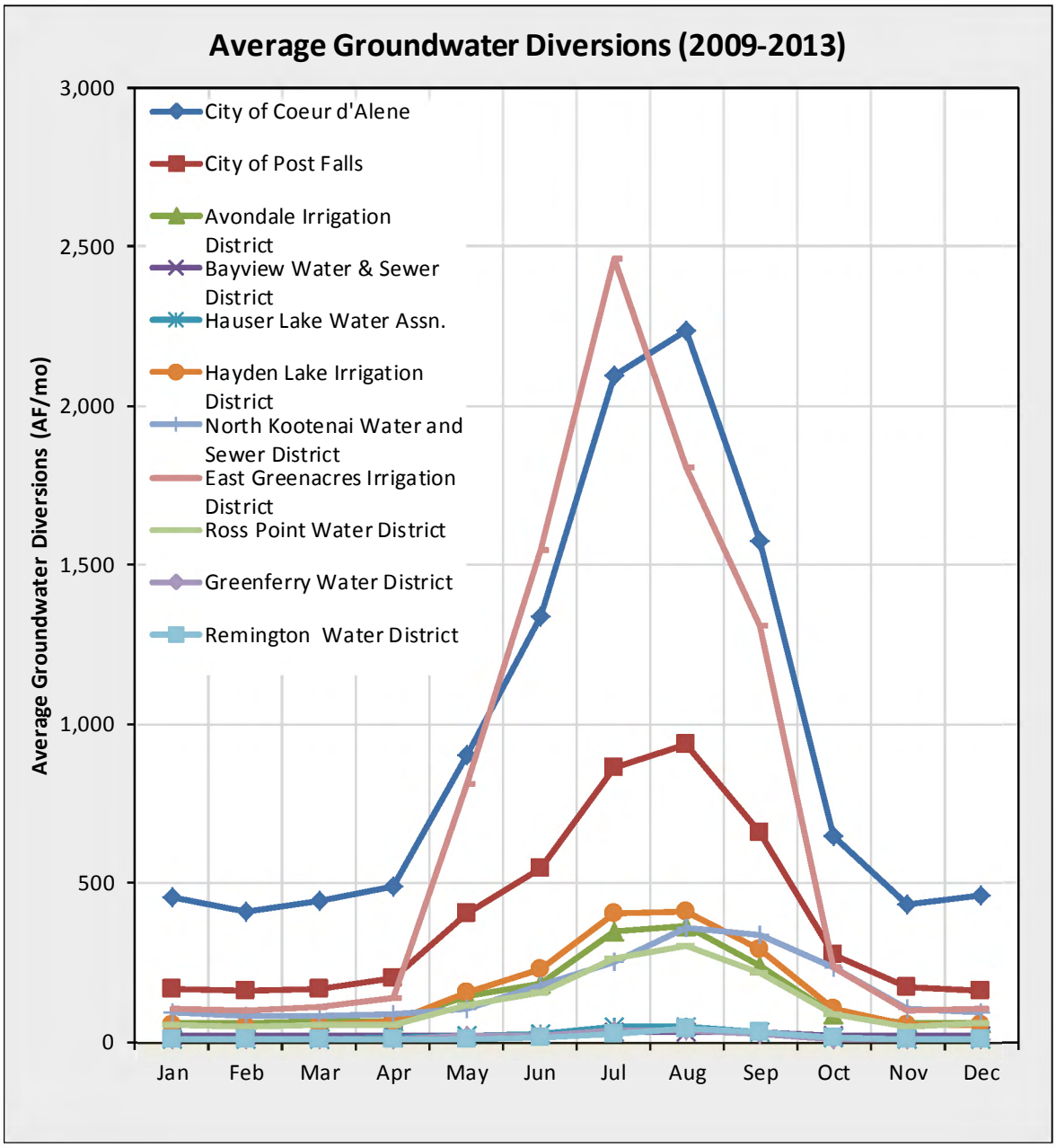

Figure 4. Average groundwater diversion, 2009-2013.

Estimated Per Capita Total and Indoor Use							
City	**Population**	**Average Diversion (MGA)**	**Average Diversion (AFA)**	**Average Indoor Use (based on average winter diversions) (AFA)**	**Estimated Average Irrigation use (AFA)**	**Estimated Total Use gal/per/day**	**Estimated Indoor Use gal/per/day**
North Kootenai Water and Sewer District	11,179	652	2,001	1,082	919	160	86
City of Coeur d'Alene	41,240	3,738	11,472	5,250	6,224	248	114
Bayview Water & Sewer District	1,000	91	279	231	48	249	206
Hayden Lake Irrigation District	6,604	628	1,928	646	1,282	261	87
City of Post Falls	16,006	1,531	4,699	1,970	2,725	262	110
Avondale Irrigation District	5,643	567	1,739	710	1,029	275	112
Hauser Lake Water Association	677	81	248	113	135	328	150
Ross Point Water District	3,942	477	1,465	635	830	332	144
East Greenacres Irrigation District	8,632	2,877	8,830	1,231	7,599	913	127
Greenferry Water District	405	68	209	117	92	460	257
Remington Water District	584	63	194	102	91	296	156
Totals	95,912	10,773	33,063	12,087	20,973		
Population Weighted Average without East Greenacres Irrigation District						248	
Population Weighted Average with East Greenacres Irrigation District						308	113

Table 4. Estimated per capita total and winter diversions.

2.3. “Unaccounted-For” Water

A portion of water system production is generally unaccounted for in metered deliveries. This "unaccounted-for" water may result from production or delivery measurement error or water-system leaks. Similarly, many irrigation entities also experience conveyance losses as a result of system linkage, meter variability, and/or evapotranspiration.

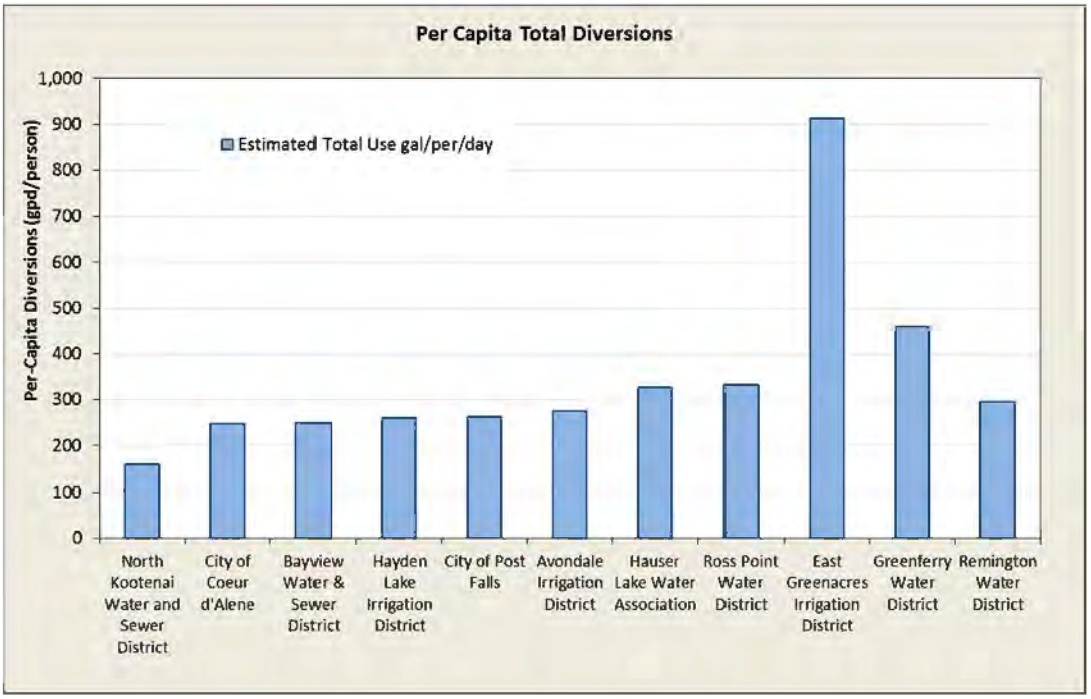

Figure 5. Per capita total diversions.

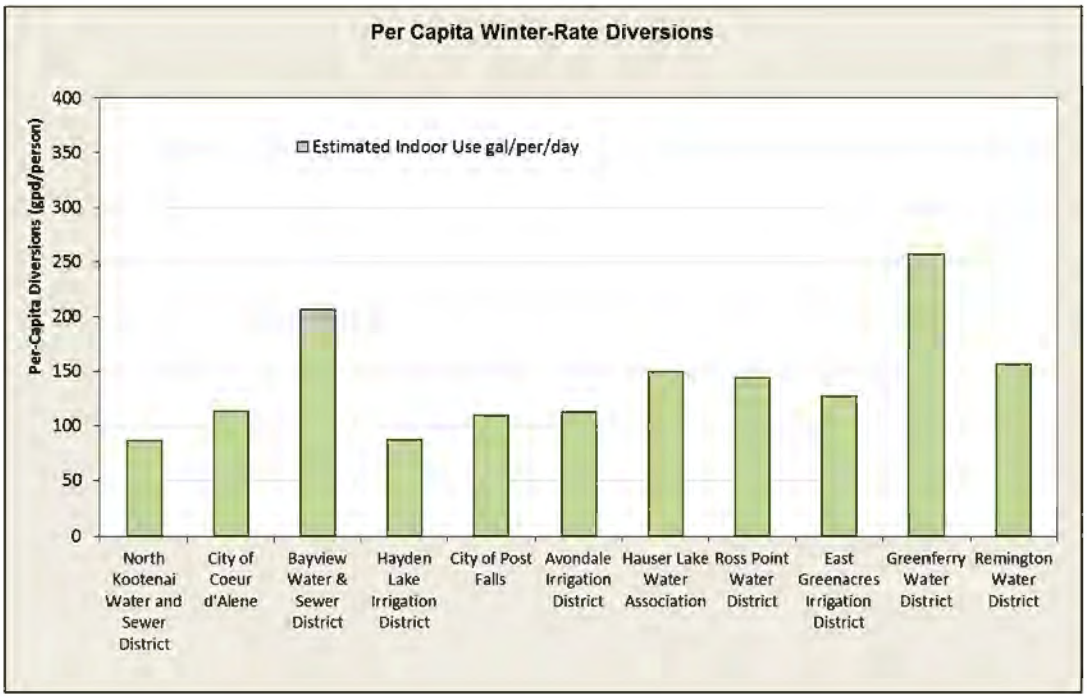

Figure 6. Per capita winter-rate diversions.

Summary of Annual Production, Indoor Use, and Irrigation Use Projected for Water Purveyors Not Providing Data					
Water Purveyor	**Population**	**Average Diversion (MGA)**	**Average Diversion (AFA)**	**Average Indoor Use (based on average winter diversions) (AFA)**	**Estimated Average Irrigation Use (AFA)**
Alpine Meadows Water and Sewer District	88	8	24	11	13
Diagonal Road Water District No. 1	12	1	3	2	2
Dry Acres Water and Sewer District	78	7	22	10	12
Emerald Estates Water Association, Inc.	358	32	99	45	54
Hackney Water and Sewer District	123	11	34	15	19
Harborview Water System, Inc.	10	1	3	1	2
Highway 54 Water Association, Inc.	84	8	23	11	13
City of Huetter	102	9	28	13	15
Idaho Irrigation Inc.	29	3	8	4	4
Ohio Match Road Water District	134	12	37	17	20
Parkview Water Association	73	7	20	9	11
Pineview Estates Water	382	35	106	48	58
City of Rathdrum	9,868	893	2,740	1,240	1,500
Rocky Beach Water and Sewer District	87	8	24	11	13
Royal Highlands Water (Valley Water Association)	280	25	78	35	42
Russell Water Association	24	2	7	3	4
Schaeffer Additions Water Association, Inc.	77	7	21	10	12
Singer Ranch Water Association	46	4	13	6	7
Troy Hoffman Water Corporation, Inc.	259	23	72	33	39
Westwood North Water Association	29	3	8	4	4
Total	12,142	1,099	3,371	1,530	1,840

Table 5. Estimated production and use for RPA purveyors not providing data.

Reported "Unaccounted-For" Production		
Purveyor	**Unaccounted Water**	**Source of Data or Reported Time Period**
Avondale Irrigation District	15-20%	estimated by District
Bayview Water & Sewer District	none provided	
City of Coeur d'Alene	> 10%	2009-2013
City of Post Falls	5.91%	2009 Water System Conservation Plan
East Geenacres Irrigation District	8-12%	estimated by District
Greenferry Water & Sewer District	none provided	
Hauser Lake Water Association	5.59%	2013
Hayden Lake Irrigation District	10-25%	estimated by District
North Kootenai Water District	none provided	
Remington Water District	15%	estimated by District
Ross Point Water District	none provided	

Table 6. Reported “unaccounted-for” production.

The term “unaccounted-for” water is being redefined by the American Water Works Association (AWWA) as “non-revenue” water. AWWA defines this water as the volume of distributed water that is not reflected in customer billings. It specifically includes the sum of unbilled “authorized consumption” (water for firefighting, flushing, etc) plus “apparent losses” (customer meter inaccuracies, unauthorized consumption and systematic data handling errors) plus “real losses” (system leakage, storage tank overflows). While there is no comprehensive national policy that limits water loss from a public water supply’s distribution system, most states set limits that fall within the range of 10 to 15 percent as the maximum acceptable value for the amount of water that is lost or “unaccounted-for” (USEPA, 2010). The amount of unaccounted-for water reported by the 11 purveyors supplying data ranged from 5 to 25 percent of water-system production (Table 6).

2.4. Water Purveyor Peak-Production Rates

The previous sections summarized annual and monthly average water production volumes to provide the basis for future water-demand forecasts. Also relevant for infrastructure and water-right planning are peak-day and peak hour-diversion rates. Some of the 11 purveyors supplying monthly data also provided current and/or projected

peak-day and/or peak-hour diversion-rate data. These data are summarized in Table 7.

2.5. Domestic Use Outside Purveyor Boundaries

In 2012, an estimated 24,599 people lived outside of the provided water purveyor boundaries (Figure 3). Assuming an average of 2.72 people per residence (calculated from the IWRRI provided population data and number of residential connections provided by the eleven water purveyors providing data), we estimate that there are approximately 9,050 households outside of purveyor boundaries.

Domestic use for residences outside of the provided purveyor boundaries was estimated using the population-weighted domestic use calculated from the data provided by the eleven purveyors (113 gpcd).[3] Using this figure, annual volume for in-home domestic use outside purveyor boundaries is estimated to be approximately 3,100 AFA.

Pumping for residential irrigation in areas outside of purveyor boundaries was estimated based on an assumed irrigated area and an estimated irrigation demand. The irrigated area for residences outside of purveyor boundaries is approximately 2,700 acres, assuming 9,050 households (see above) and 0.3 irrigated acres per home. Annual irrigation demand for this amount of irrigated area is approximately 5,890 AFA, based on a precipitation deficit of 2.18 ac-ft for irrigated turf grass (Coeur d'Alene National Weather Service station).[4] Precipitation deficit (assumed to be equivalent to irrigation demand) is the amount of water needed to meet potential evapotranspiration rates. Delivering 5,890 AFA, assuming a 70% irrigation efficiency, would require an aggregate aquifer withdrawal of approximately 8,400 AFA.

Based on this approach, self-supplied residential water use in the study area (but outside of purveyor-supplied areas) was estimated to be 11,500 acre-feet per year. This includes 3,100 AFA for in-home domestic use and 8,400 AFA for residential irrigation[5].

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[3] This is a conservatively high estimate as 113 gpcd includes unaccounted for water and commercial uses.

[4] Precipitation deficit data obtained from the University of Idaho's ET_{Idaho} 2012 program at http://www.kimberly.uidaho.edu/ETIdaho.

[5] Some residential irrigation, especially for larger residential parcels (e.g., 5-acre lots), occurs under individual water rights. Estimates of irrigation demand for such parcels is included in Section 2.6.2.

Peak Production Rates						
Purveyor	**Year**	**Average Day (MGD)**	**Peak Day (MGD)**	**Peak Hour (MGD)**	**Peak Hour (gpm)**	**Comment**
City of Coeur d'Alene	2011	10.05	32.19	57.94		Source: 2011 Comprehensive Plan
	2016	11.32	35.77	64.38		
	2021	12.50	39.50	71.10		
	Build-out	13.80	43.60	78.48		
City of Post Falls	2011		11.8			Source: 2011 Water System Master Plan Update (J-U-B Engineers)
	2016	5.4	14			
	2021	6.2	16.1			
	Build-out	9.4	24.5			
Hauser Lake Water Association	2010	0.244	0.976		1,428	Source: 2011 Water System Master Plan (Welch-Comer Engineers)
	2011	0.249	0.995		1,456	
	2012	0.254	1.015		1,458	
	2013	0.259	1.035		1,514	
	2014	0.264	1.054		1,543	
Hayden Lake Irrigation District	2014		6.0		9,000	The District anticipates higher peak-production rates in the future; large irrigators currently are asked to stop irrigating during peak-demand periods.
East Greenacres Irrigation District	2014				39,873	SCADA system data

Notes:
1. Data for North Kootenai Water and Sewer District are being compiled but were not available in time for this report.
2. Peak production data were not available for Avondale Irrigation District, Bayview Water & Sewer District, Ross Point Water District, Greenferry Water District, and Remington Water District.
3. "Average day" or "peak day" use typically reflects production rates. "Peak hour" rates may reflect demand, a portion of which is met from storage.

Table 7. Peak production rate data.

2.6. Self-Supplied Non-Domestic Water Use

2.6.1. Industrial, Commercial, Heating, and/or Cooling Uses

Self-supplied, non-domestic water use includes water used for commercial, industrial, heating, and/or cooling purposes that is not provided by the purveyors listed in previous sections. Estimates of self-supplied, non-domestic water use were made based on information from water right licenses, permits, and IDWR's adjudication claim recommendations for water rights with groundwater points of diversion located in the RPA study area. Claims based on Idaho Code § 42-243 ("statutory claims") were excluded from the data.[6] Rights authorizing diversions for "fire protection" use were not included in the totals because these diversions are made only on an emergency basis.

Sixty-six commercial, industrial, heating and/or cooling water rights, water right adjudication claims, and water right permits held by individuals or entities not listed in Table 1 were identified as authorizing diversions from the Rathdrum Prairie Aquifer (Appendix B). Diversion rates reported in Appendix B were taken directly from the most current IDWR record of the water right. Annual volumes reported in Appendix B were taken from IDWR records (when available). Annual volumes were estimated for the rights that did not report this component, based on reported purpose of use (e.g. cooling) and IDWR's findings for similar uses.

Rights, claims, and permits for industrial, commercial, heating and/or cooling uses authorized a cumulative maximum instantaneous diversion rate of 41.82 cubic feet per second (cfs) and a cumulative maximum annual diversion volume of 11,851 AF (Table 8). However, based on experience, water users do not typically divert at maximum rates at the same time, nor do they typically divert the maximum volumes authorized under commercial and industrial water rights. Thus, for the purposes of this report, actual water use in was assumed to be approximately 70% of the maximum authorized volumes listed in Table 8, or approximately 8,300 AF.

2.6.2. Agricultural Water Use

Agricultural water use within the study area is supplied by groundwater and surface water from springs, lakes, rivers, and streams. Agricultural irrigation occurs in purveyor-supplied areas and outside of purveyor-supplied areas. Water purveyors supplied an average of approximately 22,800 AFA for irrigation purposes between 2009 and 2013

[6] Claims filed pursuant to Idaho Code § 42-243 have not been verified in any way. These claims simply record a water user's estimate of water use.

(Section 2.1), although this includes diversions for irrigation of non-agricultural land (e.g., residential irrigation).

An estimate of agricultural irrigation in areas outside of those served by water purveyors was made by multiplying (1) an estimated aggregate irrigated area by (2) the precipitation deficit for a typical crop rotation and (3) assumed irrigation efficiency. The irrigated acreage within the RPA outside of purveyor areas was based on water-right information and data obtained from the USDA National Agricultural Statistics Service (USDA-NASS).

Self-Supplied Commercial and Industrial Groundwater Use			
Water Use	**Authorized Maximum Diversion Rate (cfs)**	**Authorized Annual Diversion Volume (AF)**	**Estimated Annual Use (AF)**
Commercial	17.54	2,706	1,894
Industrial	8.86	1,759	1,232
Heating/Cooling	15.42	7,386	5,170
Total	41.82	11,851	8,296

Table 8. Self-supplied commercial and industrial groundwater uses.

Acreages authorized for irrigation under water rights, permits, and recommended adjudication claims were determined using place-of-use GIS shapefiles downloaded from the Idaho Department of Water Resources' on-line water rights database on October 28, 2014. Irrigation water rights and permits owned by the purveyors listed in Section 2.1 were eliminated from the dataset because water use associated with these rights was already included in the water-use estimates within purveyor areas (Section 2.1). Water rights, claims, and permits for self-supplied irrigation owned by other entities located within purveyor water system service areas (i.e. homeowners' associations, school districts, churches, etc.) were retained in this dataset. Water-right records for statutory claims were eliminated from the data because of the unconfirmed status of the claims.

Places of use irrigated by groundwater were overlain in a GIS platform to screen irrigation water rights with potential overlapping places of use. Several overlaps were identified, and these were individually evaluated to identify and eliminate overlapping

acreage. Most apparent overlaps were created by adjudication claims splitting an existing water right (known as a "parent" right) by ownership. In these cases, the record of the parent right was maintained in the data and the adjudication claims eliminated.

This analysis indicates that 389 water rights (recorded as licenses, permits, or adjudication claims) authorize use of groundwater for the irrigation of 26,481 acres within the RPA area. Ninety-five percent of the 389 water rights for non-overlapping, self-served irrigation use are represented by water right licenses. Of the 389 water rights, 71 water right permits (rights that have not yet been licensed) authorize use of groundwater for 709 acres (approximately 3% of the total). Seventeen claims filed in the adjudication based solely on beneficial use account for 520 acres (approximately 2% of the total).

These estimated irrigated acreages were compared with estimates of irrigated acreage using publicly-available crop data. First, USDA-NASS GIS cropland data were clipped to the RPA area and analyzed to determine irrigated area outside of purveyor areas. These data suggest that there were approximately 11,900 acres of active agricultural cropland outside of all purveyor boundaries in 2013 (Figure 7).

Second, USDA-NASS also prepares a *Census of Agriculture* every five years. The *Census* results are based on self-reported information from farmers and ranchers nationwide. The most current *Census* (2012) indicates that Kootenai County had 124,240 acres of farmland (within and outside of purveyor areas). Of this amount, 47,018 acres were reported as harvested cropland in 2012, of which 13,778 acres were reported as irrigated.

The estimate of 11,900 acres irrigated outside of purveyor areas based on 2013 USDA-NASS GIS cropland data was used for this analysis for two reasons. First, the USDA-NASS GIS cropland data are based on satellite imagery and may be more reliable than water right or census data. Second, estimates of irrigated area based on water rights are uncertain (and likely high) because of changes in land use over recent decades. This uncertainty will be reduced during the course of the adjudication.

Given an estimate of irrigated acreage outside of purveyor areas, the agricultural water use was estimated using precipitation deficit data obtained from the University of Idaho "ET_{Idaho} 2012" website. Estimates of precipitation deficit for this site were based on 1961-2003 National Weather Service data (Coeur d'Alene 1E station). A weighted average precipitation deficit for major crop types was calculated for the irrigated acres located in the RPA study area using crop data from the 2012 *Census of Agriculture* (Table 9). Based on an estimated irrigated acreage of 11,870 acres and an estimated precipitation deficit of 1.70 feet per year, the estimated consumptive use for agricultural irrigation in 2013 was 20,200 AF. The estimated groundwater diversion for agricultural irrigation, assuming 11,870 irrigated acres and an irrigation efficiency of 70%, is approximately 28,800 AFA outside of purveyor boundaries.

Weighted Average Precipitation Deficit		
Crop Type	**Percentage of Irrigated Acreage in Study Area**	**Precipitation Deficit (ft)**
Barley	4%	1.4
Oats	3%	1.4
Wheat	32%	1.23
Forage (alfalfa)	40%	2.11
Irrigated Pasture	21%	1.72
Weighted average	100%	1.7

Table 9. Weighted average precipitation deficit for the RPA study area.

Combined, irrigation inside and outside of purveyor boundaries is estimated to be approximately 60,000 AFA. Of this amount, approximately 22,800 AFA is supplied by purveyors for all forms of irrigation (including residential and institutional irrigation), 8,400 is self-supplied residential irrigation outside of purveyor boundaries and 28,800 AFA is self-supplied agricultural irrigation outside purveyor boundaries.

This estimate of Rathdrum Prairie irrigation use (60,000 AFA) is approximately 7,900 AFA greater than that estimated in 2010 (SPF et al., 2010, Table 22). This difference likely reflects (1) uncertainty in USDA-NASS GIS cropland data, (2) errors in assumptions regarding irrigated cropland portions, crop mix, and crop rotations, and average precipitation deficit, and (3) possible increases in irrigated ground.

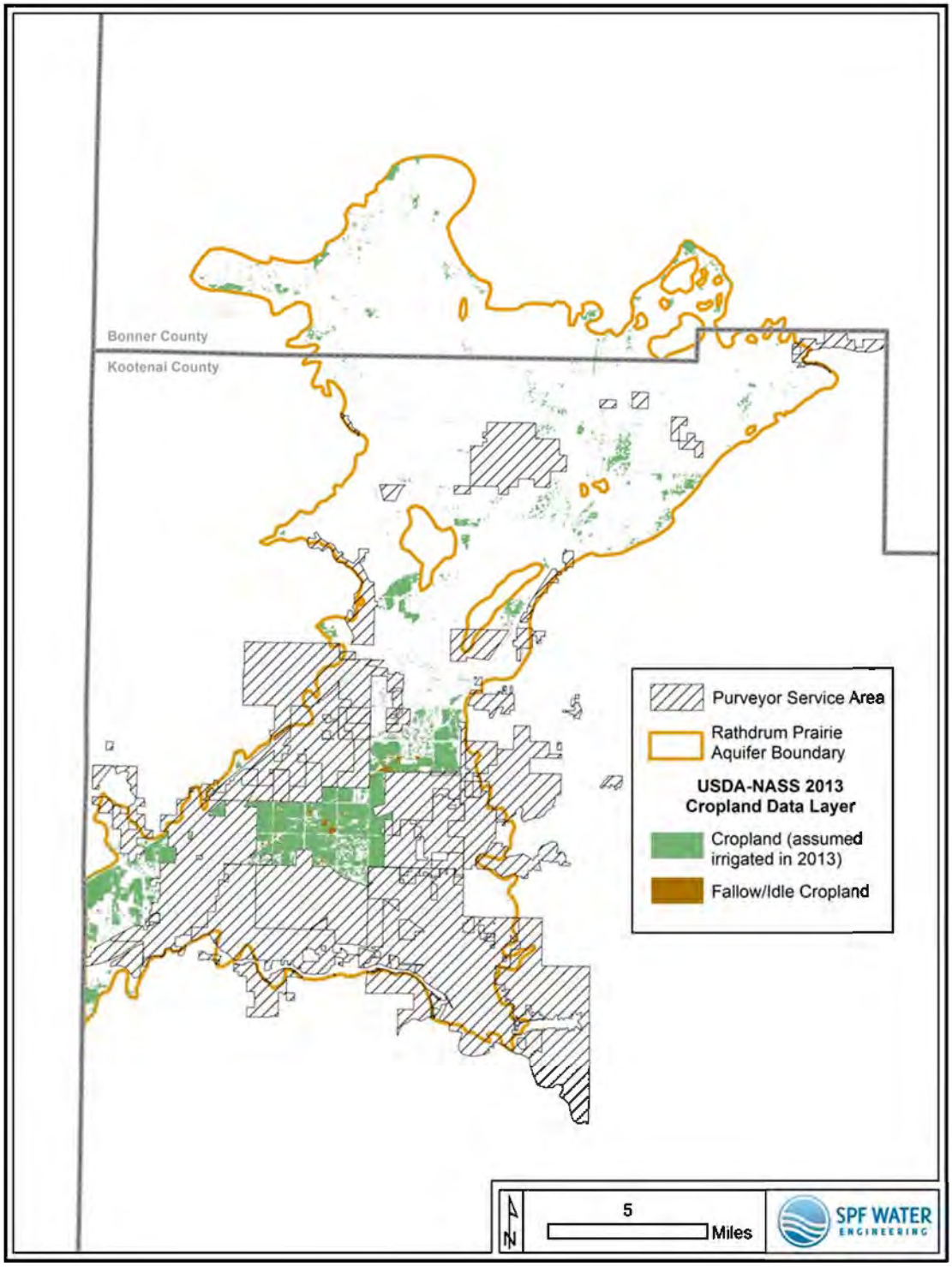


Figure 7. Irrigated agricultural land within the Aquifer study area, 2013.

2.7. Current Rathdrum Prairie Water Use Estimates

The preceding sections provide estimates of groundwater production (1) by water purveyors for indoor potable and irrigation uses, (2) for self-supplied residential use, (3) for self-supplied commercial and industrial use, and (4) for agricultural irrigation use outside of purveyor-supplied areas. Combined, based on the data and approaches outlined above, we estimate that an annual average of approximately 85,000 AFA (Table 10) has been diverted from the RPA during recent years.

This amount is approximately 11,000 AFA more than the total water use estimated in 2010 (see Table 22 in SPF et al., 2010). Given the recent 3.2% increase in population – from approximately 128,500 people in 2007 to approximately 132,700 in 2012 – some increase in water use is not surprising. The 36,400-AFA purveyor diversions and 11,500 AFA self-supplied domestic diversions are, in aggregate, approximately 4,700 AFA greater than the previous estimate.

However, the 11,000-AFA apparent increase also reflects differences in which water demand was estimated in this and the previous study. For example, the 8,300-AFA estimate of self-supplied commercial and industrial use is greater than the 2010 estimate (4,200 AFA), but this study included non-consumptive heating and cooling diversions (approximately 5,170 AFA). Ultimately, a portion of the 11,000-AFA difference between the 2010 analysis and the current one likely falls within the margin of error of either analysis.

Estimate of Total Rathdrum Prairie Water Use			
Sector	**Non-Irrigation Use (AFA)**	**Irrigation Use (AFA)**	**Total Use (AFA)**
Purveyor Areas	13,600	22,800	36,400
Self-Supplied Domestic	3,100	8,400	11,500
Self-Supplied Commercial and Industrial	8,300	Assumed Negligible	8,300
Agriculture	Assumed Negligible	28,800	28,800
Estimated Total Ground Water Diversion	25,000	60,000	85,000

Table 10. Estimated current average annual water production in RPA study area.

3. REFERENCES

SPF et al., 2010. Rathdrum Prairie Aquifer Water Demand Projections, prepared by SPF Water Engineering, LLC, AMEC Earth and Environmental, John Church (Idaho Economics), and Taunton Consulting for the Idaho Water Resource Board and the Idaho Department of Water Resources as part of the Comprehensive Aquifer Management Planning (CAMP) process).

USEPA, 2010. Control and Mitigation of Drinking Water Losses in Distribution Systems. Office of Water. November 2010.

Appendix A: Purveyor Water Production Data

Table of Contents

List of Tables

1. INTRODUCTION

1.1. Overview

This Appendix provides a summary of monthly production data (2009-2013) provided by the City of Coeur d'Alene, City of Post Falls, Avondale Irrigation District, Bayview Water & Sewer District, Hauser Lake Water Association, Hayden Lake Irrigation District, North Kootenai Water and Sewer District, East Greenacres Irrigation District, Ross Point Water District, Greenferry Water District, and Remington Water District. In addition, Dalton Water Association and the City of Athol provided summary information that is reported, but not used in the overall data analysis.

2. CITY OF COEUR D'ALENE

2.1. Water Use[1]

The City of Coeur d'Alene's water system includes 10 water-supply wells: Clayton (high arsenic levels, not currently used by the City, but anticipated to be in the future), Annie, Landings, Linden, Locust, 4th Street, Honeysuckle, Prairie, Hanley, and Atlas. The City serves 16,502 connections including 14,109 residential connections, 503 irrigation connections, and 1,890 commercial and other connections. Self-supplied users within the service area include the Coeur d'Alene Resort golf course (which uses surface water for irrigation), the Forest Service nursery (groundwater), and the Coeur d'Alene public golf course (groundwater). A portion of Hayden Lake Irrigation District is within the city limits. Hoffman Water (a small private water system) is also within City limits.

Unaccounted for water is reported at less than 10%, with annual data of 7.1% (Water Year 2009), 7.3% (WY 2010), 15% (WY 2011), 8.8% (WY 2012), and 4.2% (WY 2013).

[1] City of Coeur d'Alene water data provided by Jim Markley, P.E., Water Superintendent.

2.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Coeur d'Alene Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	3,964	12,166
2010	3,714	11,397
2011	3,471	10,652
2012	3,727	11,437
2013	3,815	11,707
Average	3,738	11,472
Maximum	3,964	12,166
Minimum	3,471	10,652

Table 1. City of Coeur d'Alene annual groundwater production, 2009-2013.

2009 Coeur d'Alene Water Production		
Month	**Production (MG)**	**Production (AF)**
	Total	**Total**
Jan	144.98	444.9
Feb	126.69	388.8
Mar	142.95	438.7
Apr	163.58	502.0
May	337.86	1,036.8
Jun	569.21	1,746.8
Jul	774.57	2,377.1
Aug	666.44	2,045.2
Sep	546.72	1,677.8
Oct	210.74	646.7
Nov	141.37	433.8
Dec	139.32	427.5
Total	3,964.4	12,166

Table 2. City of Coeur d'Alene average monthly groundwater withdrawals, 2009.

2010 Coeur d'Alene Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	152.95	469.4
Feb	133.56	409.9
Mar	145.58	446.8
Apr	173.93	533.8
May	348.37	1,069.1
Jun	408.78	1,254.5
Jul	650.16	1,995.3
Aug	746.13	2,289.8
Sep	432.01	1,325.8
Oct	218.46	670.4
Nov	141.28	433.6
Dec	162.56	498.9
Total	3,713.8	11,397

Table 3. City of Coeur d'Alene average monthly groundwater withdrawals, 2010.

2011 Coeur d'Alene Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	146.95	451.0
Feb	128.53	394.4
Mar	140.25	430.4
Apr	139.89	429.3
May	22.02	67.6
Jun	332.34	1,019.9
Jul	655.73	2,012.4
Aug	807.13	2,477.0
Sep	595.50	1,827.5
Oct	215.12	660.2
Nov	140.73	431.9
Dec	146.93	450.9
Total	3,471.1	10,652

Table 4. City of Coeur d'Alene average monthly groundwater withdrawals, 2011.

2012 Coeur d'Alene Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	145.28	445.8
Feb	139.19	427.1
Mar	143.52	440.5
Apr	151.83	465.9
May	334.96	1,028.0
Jun	363.80	1,116.5
Jul	576.53	1,769.3
Aug	747.73	2,294.7
Sep	584.36	1,793.3
Oct	251.23	771.0
Nov	144.23	442.6
Dec	144.06	442.1
Total	3,726.7	11,437

Table 5. City of Coeur d'Alene average monthly groundwater withdrawals, 2012.

2013 Couer d'Alene Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	147.33	452.2
Feb	140.96	432.6
Mar	149.54	458.9
Apr	171.81	527.3
May	424.40	1,302.4
Jun	499.94	1,534.2
Jul	755.40	2,318.2
Aug	672.78	2,064.7
Sep	402.97	1,236.7
Oct	154.74	474.9
Nov	136.84	420.0
Dec	158.08	485.1
Total	3,814.8	11,707

Table 6. City of Coeur d'Alene average monthly groundwater withdrawals, 2013.

Average Monthly Coeur d'Alene Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	147	453	469	445	0	453
Feb	134	411	433	389	0	411
Mar	144	443	459	430	4	439
Apr	160	492	534	429	53	439
May	294	901	1,302	68	462	439
Jun	435	1,334	1,747	1,020	895	439
Jul	682	2,094	2,377	1,769	1,655	439
Aug	728	2,234	2,477	2,045	1,795	439
Sep	512	1,572	1,828	1,237	1,133	439
Oct	210	645	771	475	206	439
Nov	141	432	443	420	0	432
Dec	150	461	499	428	22	439
Total	3,738	11,472	—	—	6,224	5,250
* Indoor use is represented by average water use in November through February.						

Table 7. City of Coeur d'Alene aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

3. CITY OF POST FALLS

3.1. Water Use[2]

The City of Post Falls' water system consists of the following wells: No. 1 (offline in October 2012), No. 2A (online in January 2013), No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, No. 9, and Majestic (fire pump, only used in emergency situations). The City has 7,001 total connections including 5,914 residential connections and 1,087 commercial connections. Other users within the service area include Idaho Veneer, which has its own well for process water. Unaccounted for water was estimated in the City's 2009 Water System Conservation plan to be 5.91% of total production.

3.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Post Falls Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	1,661	5,099
2010	1,501	4,607
2011	1,452	4,455
2012	1,524	4,676
2013	1,517	4,656
Average	1,531	4,699
Maximum	1,661	5,099
Minimum	1,452	4,455

Table 8. City of Post Falls annual groundwater production, 2009-2013.

[2] City of Post Falls water data provided by John Beacham, Environmental Manager.

2009 Post Falls Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	50.57	155.2
Feb	50.09	153.7
Mar	59.15	181.5
Apr	74.46	228.5
May	159.39	489.2
Jun	302.10	927.1
Jul	276.75	849.3
Aug	262.26	804.8
Sep	244.86	751.5
Oct	64.26	197.2
Nov	62.30	191.2
Dec	55.18	169.3
Total	1,661.4	5,098.5

Table 9. City of Post Falls average monthly groundwater withdrawals, 2009.

2010 Post Falls Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	52.61	161.5
Feb	54.59	167.5
Mar	64.79	198.8
Apr	68.51	210.2
May	154.21	473.3
Jun	166.76	511.8
Jul	285.82	877.1
Aug	340.68	1,045.5
Sep	158.10	485.2
Oct	65.60	201.3
Nov	39.73	121.9
Dec	49.90	153.1
Total	1,501.3	4,607

Table 10. City of Post Falls average monthly groundwater withdrawals, 2010.

2011 Post Falls Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	50.81	155.9
Feb	50.04	153.6
Mar	57.25	175.7
Apr	48.74	149.6
May	81.02	248.6
Jun	97.55	299.4
Jul	233.68	717.1
Aug	349.79	1,073.5
Sep	269.69	827.6
Oct	102.59	314.8
Nov	62.15	190.7
Dec	48.49	148.8
Total	1,451.8	4,455

Table 11. City of Post Falls average monthly groundwater withdrawals, 2011.

2012 Post Falls Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	57.13	175.3
Feb	61.19	187.8
Mar	42.28	129.7
Apr	78.99	242.4
May	114.59	351.7
Jun	150.37	461.5
Jul	288.15	884.3
Aug	273.56	839.5
Sep	214.07	657.0
Oct	134.14	411.6
Nov	62.80	192.7
Dec	46.38	142.3
Total	1,523.6	4,676

Table 12. City of Post Falls average monthly groundwater withdrawals, 2012.

2013 Post Falls Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	58.51	179.6
Feb	47.71	146.4
Mar	46.74	143.4
Apr	55.18	169.3
May	149.53	458.9
Jun	170.61	523.6
Jul	318.68	978.0
Aug	295.80	907.8
Sep	181.90	558.2
Oct	75.74	232.5
Nov	57.89	177.7
Dec	58.96	180.9
Total	1,517.3	4,656

Table 13. City of Post Falls average monthly groundwater withdrawals, 2013.

Average Monthly Post Falls Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	54	165	180	155	0	165
Feb	53	162	188	146	0	162
Mar	54	166	199	130	0	166
Apr	65	200	242	150	35	165
May	132	404	489	249	239	165
Jun	177	545	927	299	379	165
Jul	281	861	978	717	696	165
Aug	304	934	1,073	805	769	165
Sep	214	656	828	485	491	165
Oct	88	271	412	197	106	165
Nov	57	175	193	122	10	165
Dec	52	159	181	142	0	159
Total	1,531	4,699	—	—	2,725	1,970
* Indoor use is represented by average water use in November through February.						

Table 14. City of Post Falls aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

4. AVONDALE IRRIGATION DISTRICT

4.1. Water Use[3]

Avondale Irrigation District's water system includes the following wells: Miles #1, Miles #2, Miles #3, Airport #1, Airport #2, and Finucane. The District has 2,575 connections, including 550 domestic only connections, 1,825 domestic and irrigation connections, and 200 commercial connections. Unaccounted for water is estimated by the District at 15 to 20 percent.

4.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Avondale Irrigation District Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	623	1,913
2010	544	1,671
2011	537	1,647
2012	551	1,690
2013	578	1,774
Average	567	1,739
Maximum	623	1,913
Minimum	537	1,647

Table 15. Avondale Irrigation District annual groundwater production, 2009-2013.

[3] Avondale Irrigation District water data provided by Bob Chandler, District Manager.

2009 Avondale Irrigation District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	19.630	60.24
Feb	19.960	61.25
Mar	20.277	62.23
Apr	24.874	76.34
May	57.781	177.32
Jun	95.192	292.14
Jul	129.305	396.82
Aug	106.408	326.56
Sep	83.222	255.40
Oct	27.787	85.27
Nov	18.588	57.04
Dec	20.294	62.28
Total	623.32	1,912.9

Table 16. Avondale Irrigation District average monthly groundwater withdrawals, 2009.

2010 Avondale Irrigation District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	23.361	71.69
Feb	21.253	65.22
Mar	24.074	73.88
Apr	25.659	78.74
May	41.547	127.50
Jun	48.789	149.73
Jul	105.166	322.74
Aug	119.554	366.90
Sep	66.942	205.44
Oct	29.622	90.91
Nov	19.776	60.69
Dec	18.689	57.35
Total	544.43	1,670.8

Table 17. Avondale Irrigation District average monthly groundwater withdrawals, 2010.

2011 Avondale Irrigation District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	17.140	52.60
Feb	16.745	51.39
Mar	19.669	60.36
Apr	19.860	60.95
May	24.976	76.65
Jun	44.453	136.42
Jul	106.514	326.88
Aug	131.071	402.24
Sep	92.848	284.94
Oct	26.658	81.81
Nov	18.098	55.54
Dec	18.800	57.70
Total	536.83	1,647.5

Table 18. Avondale Irrigation District average monthly groundwater withdrawals, 2011.

2012 Avondale Irrigation District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	18.645	57.22
Feb	17.472	53.62
Mar	19.032	58.41
Apr	19.468	59.74
May	43.787	134.38
Jun	46.621	143.07
Jul	93.207	286.04
Aug	123.638	379.43
Sep	95.126	291.93
Oct	34.944	107.24
Nov	19.216	58.97
Dec	19.458	59.71
Total	550.61	1,689.8

Table 19. Avondale Irrigation District average monthly groundwater withdrawals, 2012.

2013 Avondale Irrigation District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	19.701	60.46
Feb	17.623	54.08
Mar	21.232	65.16
Apr	18.848	57.84
May	64.782	198.81
Jun	65.389	200.67
Jul	133.651	410.16
Aug	114.978	352.86
Sep	54.984	168.74
Oct	25.754	79.04
Nov	20.111	61.72
Dec	21.051	64.60
Total	578.10	1,774.1

Table 20. Avondale Irrigation District average monthly groundwater withdrawals, 2013.

Average Monthly Avondale Irrigation District Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	20	60	72	53	0	60
Feb	19	57	65	51	0	57
Mar	21	64	74	58	5	59
Apr	22	67	79	58	8	59
May	47	143	199	77	84	59
Jun	60	184	292	136	125	59
Jul	114	349	410	286	289	59
Aug	119	366	402	327	306	59
Sep	79	241	292	169	182	59
Oct	29	89	107	79	30	59
Nov	19	59	62	56	0	59
Dec	20	60	65	57	0	60
Total	567	1,739	—	—	1,029	710
* Indoor use is represented by average water use in November through February.						

Table 21. Avondale Irrigation District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

5. BAYVIEW WATER & SEWER DISTRICT

5.1. Water Use[4]

Bayview Water & Sewer District's water system consists of two wells: Wells 7 and 8. The District has 503 total connections, including 491 residential connections and 12 commercial connections. Other water systems (supplied separately) within the District include McKinley, Bayview Heights, Silver, and Schaeffer Additions Water Association.

An estimate of the percentage of unaccounted for water was not provided. However, system operators believe that unaccounted-for water may be specifically associated with use at the Bayview Community Center, Bayview Community Center Garden, County park, County Bathroom, Naval Research Station, the Fire Department checking hydrants and flushing dead-end mains, and system leaks.

5.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Bayview Water & Sewer District Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	88	270
2010	80	246
2011	89	274
2012	96	296
2013	101	310
Average	91	279
Maximum	101	310
Minimum	80	246

Table 22. Bayview Water & Sewer District annual groundwater production, 2009-2013.

[4] Bayview Water & Sewer District water data provided by Neil Peck, System Operator.

2009 Bayview WSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	5.318	16.32
Feb	5.649	17.34
Mar	6.686	20.52
Apr	6.084	18.67
May	6.890	21.14
Jun	8.928	27.40
Jul	11.386	34.94
Aug	9.547	29.30
Sep	8.318	25.53
Oct	7.081	21.73
Nov	5.326	16.35
Dec	6.860	21.05
Total	88.072	270.28

Table 23. Bayview Water & Sewer District average monthly groundwater withdrawals, 2009.

2010 Bayview WSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	5.809	17.83
Feb	4.790	14.70
Mar	5.304	16.28
Apr	5.304	16.28
May	6.880	21.11
Jun	6.854	21.04
Jul	11.210	34.40
Aug	10.385	31.87
Sep	6.836	20.98
Oct	5.747	17.64
Nov	4.349	13.35
Dec	6.845	21.01
Total	80.315	246.48

Table 24. Bayview Water & Sewer District average monthly groundwater withdrawals, 2010.

2011 Bayview WSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	6.272	19.25
Feb	5.366	16.47
Mar	6.415	19.69
Apr	6.503	19.96
May	5.940	18.23
Jun	6.935	21.28
Jul	9.891	30.36
Aug	12.248	37.59
Sep	9.759	29.95
Oct	6.884	21.13
Nov	6.632	20.35
Dec	6.402	19.65
Total	89.248	273.89

Table 25. Bayview Water & Sewer District average monthly groundwater withdrawals, 2011.

2012 Bayview WSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	7.140	21.91
Feb	6.325	19.41
Mar	6.687	20.52
Apr	6.859	21.05
May	7.735	23.74
Jun	7.158	21.97
Jul	9.900	30.38
Aug	11.652	35.76
Sep	12.397	38.04
Oct	7.476	22.94
Nov	7.273	22.32
Dec	5.849	17.95
Total	96.452	296.00

Table 26. Bayview Water & Sewer District average monthly groundwater withdrawals, 2012.

2013 Bayview WSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	8.253	25.33
Feb	6.039	18.53
Mar	8.222	25.23
Apr	7.203	22.10
May	8.236	25.28
Jun	9.180	28.17
Jul	12.658	38.85
Aug	10.007	30.71
Sep	9.333	28.64
Oct	7.214	22.14
Nov	7.030	21.57
Dec	7.799	23.94
Total	101.173	310.49

Table 27. Bayview Water & Sewer District average monthly groundwater withdrawals, 2013.

Average Monthly Bayview WSD Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	6.6	20	25	16	0	20
Feb	5.6	17	19	15	0	17
Mar	6.7	20	25	16	1	19
Apr	6.4	20	22	16	0	20
May	7.1	22	25	18	3	19
Jun	7.8	24	28	21	5	19
Jul	11.0	34	39	30	15	19
Aug	10.8	33	38	29	14	19
Sep	9.3	29	38	21	9	19
Oct	6.9	21	23	18	2	19
Nov	6.1	19	22	13	0	19
Dec	6.8	21	24	18	0	21
Total	91.1	279	—	—	48	231
* Indoor use is represented by average water use in November through February.						

Table 28. Bayview Water & Sewer District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

6. HAUSER LAKE WATER ASSOCIATION

6.1. Water Use[5]

Hauser Lake Water Association's water system consists of two wells: Wells 1 and 2. The Association has 421 total connections, including 410 residential connections, and 11 commercial connections.

The Association provided data from their billing software for unaccounted water for the years 2010 through 2013 (and a portion of 2014). However, production data was not tracked in the billing system prior to 2012 and the Association does not believe unaccounted water calculations provided for 2010, 2011 and 2012 are accurate (0%, -168%, and 2.51%, respectively). Unaccounted water is reported to be 5.59% for 2013, which is the only full year reported that is believed to be accurate.

6.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Hauser Lake Water Assn. Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	99	303
2010	83	254
2011	79	242
2012	71	219
2013	73	223
Average	81	248
Maximum	99	303
Minimum	71	219

Table 29. Hauser Lake Water Association annual groundwater production, 2009-2013.

[5]Hauser Lake Water Association water data provided by Necia Maiani, P.E., Welch Comer.

2009 Hauser Lake WA Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.090	9.5
Feb	3.644	11.2
Mar	5.195	15.9
Apr	6.065	18.6
May	9.059	27.8
Jun	17.432	53.5
Jul	17.763	54.5
Aug	12.913	39.6
Sep	11.975	36.7
Oct	4.019	12.3
Nov	2.755	8.5
Dec	4.851	14.9
Total	98.761	303.1

Table 30. Hauser Lake Water Association average monthly groundwater withdrawals, 2009.

2010 Hauser Lake WA Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.646	11.2
Feb	3.534	10.8
Mar	3.455	10.6
Apr	4.751	14.6
May	6.301	19.3
Jun	7.600	23.3
Jul	16.429	50.4
Aug	17.453	53.6
Sep	7.979	24.5
Oct	4.338	13.3
Nov	3.717	11.4
Dec	3.679	11.3
Total	82.882	254.4

Table 31. Hauser Lake Water Association average monthly groundwater withdrawals, 2010.

2011 Hauser Lake WA Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.444	10.6
Feb	3.279	10.1
Mar	3.740	11.5
Apr	3.635	11.2
May	3.695	11.3
Jun	6.587	20.2
Jul	15.054	46.2
Aug	18.919	58.1
Sep	11.635	35.7
Oct	3.555	10.9
Nov	2.598	8.0
Dec	2.843	8.7
Total	78.985	242.4

Table 32. Hauser Lake Water Association average monthly groundwater withdrawals, 2011.

2012 Hauser Lake WA Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.503	7.7
Feb	2.625	8.1
Mar	2.549	7.8
Apr	2.569	7.9
May	5.854	18.0
Jun	5.166	15.9
Jul	13.045	40.0
Aug	16.645	51.1
Sep	11.799	36.2
Oct	3.935	12.1
Nov	2.362	7.2
Dec	2.385	7.3
Total	71.436	219.2

Table 33. Hauser Lake Water Association average monthly groundwater withdrawals, 2012.

2013 Hauser Lake WA Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.758	8.5
Feb	2.761	8.5
Mar	2.919	9.0
Apr	3.034	9.3
May	6.873	21.1
Jun	9.157	28.1
Jul	18.160	55.7
Aug	12.302	37.8
Sep	5.736	17.6
Oct	3.770	11.6
Nov	2.058	6.3
Dec	3.090	9.5
Total	72.618	222.9

Table 34. Hauser Lake Water Association average monthly groundwater withdrawals, 2013.

Average Monthly Hauser Lake Water Assn. Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	3.1	9	11	8	0	9
Feb	3.2	10	11	8	0	10
Mar	3.6	11	16	8	2	9
Apr	4.0	12	19	8	3	9
May	6.4	20	28	11	10	9
Jun	9.2	28	53	16	19	9
Jul	16.1	49	56	40	40	9
Aug	15.6	48	58	38	39	9
Sep	9.8	30	37	18	21	9
Oct	3.9	12	13	11	3	9
Nov	2.7	8	11	6	0	8
Dec	3.4	10	15	7	0	10
Total	80.9	248	—	—	135	113
* Indoor use is represented by average water use in November through February.						

Table 35. Hauser Lake Water Association aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

7. HAYDEN LAKE IRRIGATION DISTRICT

7.1. Water Use[6]

Hayden Lake Irrigation District's water system includes four wells: Wells 1, 2, 3, and 4. The District has 2,522 total connections, including 2,288 residential connections, 188 commercial connections, 15 residential/commercial, 31 multi-family, and approximately 245 irrigation connections. There is a self-supplied commercial user (an aluminum foundry) within the District, and approximately 12 self-supplied residences. The District owns 80 acres of irrigated agriculture supplied by a separate well (not included in water use estimates here). The District estimates a total of 1,322.4 acres of irrigation between 2,975 connections.

The District estimates unaccounted for water between 10 and 25 percent per year. This would include meter inaccuracies, time of meter reading, routine system flushing, construction flushing, and leaks.

There are five separate public water systems also located within district boundaries: Sun Aire Estates (the District serves a portion of this subdivision), Mountain View Park (District provides irrigation), North Kootenai Water District's Hayden Orchards and Valley Green areas (North Kootenai provides irrigation to both of these areas, Hayden Lake Irrigation District provides water for domestic use to these areas), Hacienda Hills Water Company, and Chateaux Water Association.

7.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Hayden Lake Irr. District Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	717	2,201
2010	585	1,796
2011	590	1,809
2012	602	1,849
2013	646	1,983
Average	628	1,928
Maximum	717	2,201
Minimum	585	1,796

Table 36. Hayden Lake Irrigation District annual groundwater production, 2009-2013.

[6]Hayden Lake Irrigation District water data provided by Alan Miller, Administrator

2009 Hayden Lake ID Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	20.94	64.3
Feb	17.49	53.7
Mar	19.34	59.4
Apr	22.34	68.6
May	66.11	202.9
Jun	118.21	362.8
Jul	159.27	488.8
Aug	131.39	403.2
Sep	98.46	302.2
Oct	28.80	88.4
Nov	17.07	52.4
Dec	17.78	54.6
Total	717.19	2,201.0

Table 37. Hayden Lake Irrigation District average monthly groundwater withdrawals, 2009.

2010 Hayden Lake ID Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	18.28	56.1
Feb	16.52	50.7
Mar	18.75	57.5
Apr	21.87	67.1
May	47.36	145.3
Jun	51.48	158.0
Jul	126.11	387.0
Aug	142.17	436.3
Sep	73.58	225.8
Oct	32.06	98.4
Nov	18.59	57.1
Dec	18.48	56.7
Total	585.26	1,796.1

Table 38. Hayden Lake Irrigation District average monthly groundwater withdrawals, 2010.

2011 Hayden Lake ID Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	18.69	57.4
Feb	16.32	50.1
Mar	17.43	53.5
Apr	17.80	54.6
May	25.63	78.7
Jun	46.41	142.4
Jul	121.16	371.8
Aug	155.32	476.6
Sep	105.67	324.3
Oct	30.78	94.5
Nov	17.20	52.8
Dec	17.14	52.6
Total	589.56	1,809.3

Table 39. Hayden Lake Irrigation District average monthly groundwater withdrawals, 2011.

2012 Hayden Lake ID Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	16.84	51.7
Feb	15.77	48.4
Mar	16.49	50.6
Apr	19.66	60.3
May	53.22	163.3
Jun	53.16	163.2
Jul	97.95	300.6
Aug	114.27	350.7
Sep	126.75	389.0
Oct	52.01	159.6
Nov	19.09	58.6
Dec	17.12	52.5
Total	602.34	1,848.5

Table 40. Hayden Lake Irrigation District average monthly groundwater withdrawals, 2012.

2013 Hayden Lake ID Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	17.23	52.9
Feb	15.09	46.3
Mar	16.96	52.1
Apr	20.20	62.0
May	64.34	197.4
Jun	101.97	312.9
Jul	155.40	476.9
Aug	128.07	393.0
Sep	68.26	209.5
Oct	24.06	73.8
Nov	16.53	50.7
Dec	17.95	55.1
Total	646.05	1,982.6

Table 41. Hayden Lake Irrigation District average monthly groundwater withdrawals, 2013.

Average Monthly Hayden Lake Irr. District Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	18	56	64	52	0	56
Feb	16	50	54	46	0	50
Mar	18	55	59	51	0	55
Apr	20	63	69	55	9	54
May	51	158	203	79	104	54
Jun	74	228	363	142	174	54
Jul	132	405	489	301	351	54
Aug	134	412	477	351	358	54
Sep	95	290	389	209	236	54
Oct	34	103	160	74	49	54
Nov	18	54	59	51	0	54
Dec	18	54	57	53	0	54
Total	628	1,928	—	—	1,282	646
* Indoor use is represented by average water use in November through February.						

Table 42. Hayden Lake Irrigation District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

8. NORTH KOOTENAI WATER AND SEWER DISTRICT

8.1. Water Use[7]

North Kootenai Water and Sewer District's water system includes 25 wells: Ohio Match 1, Finucane, Hayden Well 1, Hayden Well 2, Hayden Pines, GTE 1, GTE 2, Tree Farm 1, Tree Farm 2, Echo Beach, Lancaster 1, Lancaster 2 (abandoned), Lancaster 3, Lancaster 4, Hayden Orchard, Chilco 1, Chilco 2, Atlas Acres, Selkirk Meadows, Elk Street, Echo Street, Meadowland Acres, Valley Green, East Seasons Acres, and Ranch Valley.

The District serves 4,811 total connections. This includes 4,641 residential accounts and 170 commercial accounts. Two systems within the District are supplied by surface water – Gozzer Ranch and Hayden Haven/Gem Shores. These two systems include 574 total connections (561 residential and 13 commercial), a large portion of the residences in these two systems are second-homes.

No percentage of unaccounted for water was provided by the District, but system operators acknowledged that there are leaks in the system.

8.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

North Kootenai WSD Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	684	2,100
2010	557	1,710
2011	653	2,005
2012	658	2,021
2013	706	2,166
Average	652	2,001
Maximum	706	2,166
Minimum	557	1,710

Table 43. North Kootenai Water & Sewer District annual groundwater production, 2009-2013.

[7]Hayden Lake Irrigation District water data provided by Alan Miller, Administrator

2009 NKWSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	33.15	101.7
Feb	31.44	96.5
Mar	29.78	91.4
Apr	22.91	70.3
May	33.91	104.1
Jun	69.82	214.3
Jul	104.25	319.9
Aug	116.44	357.3
Sep	105.57	324.0
Oct	74.90	229.9
Nov	24.47	75.1
Dec	37.75	115.9
Total	684.39	2,100.3

Table 44. North Kootenai Water & Sewer District average monthly groundwater withdrawals, 2009.

2010 NKWSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	26.27	80.6
Feb	30.10	92.4
Mar	25.62	78.6
Apr	34.04	104.5
May	38.44	118.0
Jun	57.65	176.9
Jul	67.98	208.6
Aug	115.92	355.7
Sep	77.62	238.2
Oct	35.64	109.4
Nov	18.31	56.2
Dec	29.57	90.8
Total	557.16	1,710

Table 45. North Kootenai Water & Sewer District average monthly groundwater withdrawals, 2010.

2011 NKWSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	20.97	64.3
Feb	25.03	76.8
Mar	24.97	76.6
Apr	34.90	107.1
May	26.08	80.0
Jun	33.47	102.7
Jul	66.97	205.5
Aug	116.60	357.8
Sep	126.46	388.1
Oct	128.10	393.1
Nov	27.64	84.8
Dec	22.26	68.3
Total	653.44	2,005

Table 46. North Kootenai Water & Sewer District average monthly groundwater withdrawals, 2011.

2012 NKWSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	40.36	123.9
Feb	24.82	76.2
Mar	30.06	92.2
Apr	25.64	78.7
May	28.13	86.3
Jun	61.95	190.1
Jul	62.73	192.5
Aug	101.94	312.8
Sep	125.61	385.5
Oct	82.24	252.4
Nov	46.55	142.8
Dec	28.40	87.1
Total	658.43	2,021

Table 47. North Kootenai Water & Sewer District average monthly groundwater withdrawals, 2012.

2013 NKWSD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	28.08	86.2
Feb	23.66	72.6
Mar	25.35	77.8
Apr	27.19	83.4
May	44.86	137.7
Jun	63.36	194.4
Jul	104.11	319.5
Aug	136.61	419.2
Sep	109.91	337.3
Oct	61.55	188.9
Nov	51.16	157.0
Dec	30.06	92.3
Total	705.91	2,166

Table 48. North Kootenai Water & Sewer District average monthly groundwater withdrawals, 2013.

Average Monthly North Kootenai WSD Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	30	91	124	64	0	91
Feb	27	83	96	73	0	83
Mar	27	83	92	77	0	83
Apr	29	89	107	70	0	89
May	34	105	138	80	13	92
Jun	57	176	214	103	84	92
Jul	81	249	320	193	157	92
Aug	118	361	419	313	269	92
Sep	109	335	388	238	243	92
Oct	76	235	393	109	143	92
Nov	34	103	157	56	11	92
Dec	30	91	116	68	0	91
Total	652	2,001	—	—	919	1,082
* Indoor use is represented by average water use in November through February.						

Table 49. North Kootenai Water & Sewer District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

9. EAST GREENACRES IRRIGATION DISTRICT

9.1. Water Use[8]

East Greenacres Irrigation District's water system includes 14 wells: 1A, 1B, 1C, 1D, 1E, 1F, 2A, 2B, 2C, 2D, 2E, 3A, 3B, and 3C. The District has 3,930 total connections including 2,900 residential connections (serving a total of 3,470 units), 110 commercial connections, and 920 irrigation connections.

The District estimates unaccounted for water at 8 to 12 percent.

The District provided monthly production totals for 2009, and annual totals with monthly data for January, February, and March for 2010 through 2013. A meter-read error was noted in the 2011 data and after consulting with the District it was deemed appropriate to not use 2011 data for this analysis. The remaining years (2009, 2010, 2012, and 2013) have been used in the production calculations. The monthly percentages for 2009 were used to estimate monthly production in 2010, 2012, and 2013.

9.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, excluding 2011, and aggregate average monthly use with estimates for irrigation and indoor use, estimated for this Purveyor using 2009 percentages.

East Greenacres Irr. District Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (ac-ft)**
2009	3,823	11,733
2010	2,557	7,846
2011*		
2012	2,473	7,588
2013	2,656	8,151
Average	2,877	8,830
Maximum	3,823	11,733
Minimum	2,473	7,588
* Meter reading error in 2011. 2011 data not used.		

Table 50. East Greenacres Irrigation District annual groundwater production, 2009-2013.

[8]East Greenacres Irrigation District water data provided by Ron Wilson, District Manager

2009 East Greenacres Irr. District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	46.40	142.4
Feb	42.90	131.7
Mar	48.39	148.5
Apr	60.74	186.4
May	352.12	1,080.6
Jun	670.16	2,056.6
Jul	1,064.63	3,267.2
Aug	781.02	2,396.9
Sep	567.00	1,740.1
Oct	101.55	311.7
Nov	43.79	134.4
Dec	44.59	136.8
Total	3,823.29	11,733.3

Table 51. East Greenacres Irrigation District average monthly groundwater withdrawals, 2009.

2010 East Greenacres Irr. District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	41.93	128.7
Feb	32.03	98.3
Mar	43.67	134.0
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Total	2,556.53	7,845.7

Table 52. East Greenacres Irrigation District average monthly groundwater withdrawals, 2010.

2011* East Greenacres Irr. District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	29.50	90.5
Feb	29.50	90.5
Mar	32.23	98.9
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Total	4,697.96	14,417.6
*Meter reading error noted for 2011, data for this year not used.		

Table 53. East Greenacres Irrigation District average monthly groundwater withdrawals, 2011.

2012 East Greenacres Irr. District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	41.31	126.8
Feb	35.61	109.3
Mar	25.44	78.1
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Total	2,472.60	7,588.2

Table 54. East Greenacres Irrigation District average monthly groundwater withdrawals, 2012.

2013 East Greenacres Irr. District Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	37.28	114.4
Feb	32.39	99.4
Mar	38.30	117.5
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Total	2,656.04	8,151.1

Table 55. East Greenacres Irrigation District average monthly groundwater withdrawals, 2013.

Average Monthly East Greenacres Irr. District Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	35	107	142	91	0	107
Feb	32	99	132	91	0	99
Mar	36	112	148	78	9	103
Apr	46	140	186	186	38	103
May	265	813	1,081	1,081	711	103
Jun	504	1,548	2,057	2,057	1,445	103
Jul	801	2,459	3,267	3,267	2,356	103
Aug	588	1,804	2,397	2,397	1,701	103
Sep	427	1,309	1,740	1,740	1,207	103
Oct	76	235	312	312	132	103
Nov	33	101	134	134	0	101
Dec	34	103	137	137	0	103
Total	2,877	8,830	—	—	7,599	1,231

* Indoor use is represented by average water use in November through February. Monthly Flow Pattern for 2009 (only year with full monthly data) extrapolated to all years. 2011 data not used due to meter reading error.

Table 56. East Greenacres Irrigation District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

10. ROSS POINT WATER DISTRICT

10.1. Water Use[9]

Ross Point Water District has five wells: Horsehaven, 20th Street, Syringa Street, Primrose, and Foxtail. The District has 2,154 total connections including 1,982 single family residences, 32 apartments, 23 duplexes, 5 trailer parks, 52 commercial connections, and 60 irrigation connections. No estimate of unaccounted for water was provided by the District.

10.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Ross Point WD Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	472	1,450
2010	456	1,399
2011	470	1,441
2012	480	1,473
2013	510	1,564
Average	477	1,465
Maximum	510	1,564
Minimum	456	1,399

Table 57. Ross Point Water District annual groundwater production, 2009-2013.

[9]Ross Point Water District water data provided by electronic facsimile from the District office.

2009 Ross Point WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	24.77	76.0
Feb	17.70	54.3
Mar	14.86	45.6
Apr	20.98	64.4
May	34.62	106.2
Jun	72.35	222.0
Jul	96.32	295.6
Aug	67.03	205.7
Sep	52.31	160.5
Oct	33.87	103.9
Nov	16.32	50.1
Dec	21.26	65.2
Total	472.39	1,449.7

Table 58. Ross Point Water District average monthly groundwater withdrawals, 2009.

2010 Ross Point WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	16.38	50.3
Feb	17.01	52.2
Mar	17.27	53.0
Apr	21.73	66.7
May	31.19	95.7
Jun	31.31	96.1
Jul	93.87	288.1
Aug	93.20	286.0
Sep	71.27	218.7
Oct	24.56	75.4
Nov	15.78	48.4
Dec	22.16	68.0
Total	455.73	1,398.6

Table 59. Ross Point Water District average monthly groundwater withdrawals, 2010.

2011 Ross Point WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	16.44	50.5
Feb	16.07	49.3
Mar	20.09	61.7
Apr	16.41	50.4
May	20.59	63.2
Jun	43.50	133.5
Jul	83.19	255.3
Aug	96.87	297.3
Sep	96.70	296.8
Oct	24.80	76.1
Nov	14.88	45.7
Dec	20.00	61.4
Total	469.53	1,440.9

Table 60. Ross Point Water District average monthly groundwater withdrawals, 2011.

2012 Ross Point WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	16.65	51.1
Feb	15.55	47.7
Mar	18.43	56.6
Apr	16.48	50.6
May	45.03	138.2
Jun	39.47	121.1
Jul	65.84	202.1
Aug	113.37	347.9
Sep	82.19	252.2
Oct	34.23	105.0
Nov	17.98	55.2
Dec	14.75	45.3
Total	479.97	1,473.0

Table 61. Ross Point Water District average monthly groundwater withdrawals, 2012.

2013 Ross Point WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	17.99	55.2
Feb	14.77	45.3
Mar	14.78	45.4
Apr	16.69	51.2
May	58.18	178.5
Jun	65.81	202.0
Jul	91.55	281.0
Aug	119.90	368.0
Sep	56.42	173.2
Oct	24.52	75.2
Nov	12.95	39.8
Dec	15.95	49.0
Total	509.52	1,563.7

Table 62. Ross Point Water District average monthly groundwater withdrawals, 2013.

Average Monthly Ross Point WD Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	18	57	76	50	0	57
Feb	16	50	54	45	0	50
Mar	17	52	62	45	0	52
Apr	18	57	67	50	4	53
May	38	116	179	63	63	53
Jun	50	155	222	96	102	53
Jul	86	264	296	202	211	53
Aug	98	301	368	206	248	53
Sep	72	220	297	161	167	53
Oct	28	87	105	75	34	53
Nov	16	48	55	40	0	48
Dec	19	58	68	45	0	58
Total	477	1,465	—	—	830	635
* Indoor use is represented by average water use in November through February.						

Table 63. Ross Point Water District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

11. GREENFERRY WATER DISTRICT

11.1. Water Use[10]

Greenferry Water District's water system has two wells: Well 1 and Well 2. The District has 332 residential connections. There are no commercial connections, and no self-supplied water users within District boundaries.

No percentage of unaccounted for water was provided by the District, but it was noted that there are numerous 40-year-old meters that may under-report the amount of water consumed, making it difficult to estimate unaccounted water. Aging meters are being replaced.

11.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Greenferry WD Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	72	220
2010	67	207
2011	67	207
2012	62	190
2013	72	220
Average	68	209
Maximum	72	220
Minimum	62	190

Table 64. Greenferry Water District annual groundwater production, 2009-2013.

[10]Greenferry Water District water data provided by Bob Kuch, Water System Manager.

2009 Greenferry WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.279	6.99
Feb	2.256	6.92
Mar	2.576	7.91
Apr	3.145	9.65
May	6.471	19.86
Jun	10.107	31.02
Jul	13.895	42.64
Aug	9.725	29.85
Sep	9.197	28.22
Oct	4.049	12.43
Nov	3.161	9.70
Dec	4.731	14.52
Total	71.592	219.71

Table 65. Greenferry Water District average monthly groundwater withdrawals, 2009.

2010 Greenferry WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.666	8.18
Feb	3.186	9.78
Mar	3.258	10.00
Apr	3.573	10.97
May	4.649	14.27
Jun	5.349	16.42
Jul	12.097	37.12
Aug	12.509	38.39
Sep	7.970	24.46
Oct	4.164	12.78
Nov	4.655	14.29
Dec	3.338	10.24
Total	67.414	206.89

Table 66. Greenferry Water District average monthly groundwater withdrawals, 2010.

2011 Greenferry WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.997	12.27
Feb	3.329	10.22
Mar	3.477	10.67
Apr	3.586	11.01
May	4.273	13.11
Jun	6.127	18.80
Jul	11.586	35.56
Aug	13.764	42.24
Sep	8.759	26.88
Oct	3.108	9.54
Nov	2.669	8.19
Dec	2.803	8.60
Total	67.478	207.08

Table 67. Greenferry Water District average monthly groundwater withdrawals, 2011.

2012 Greenferry WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.347	10.27
Feb	2.527	7.76
Mar	2.745	8.42
Apr	2.262	6.94
May	5.742	17.62
Jun	5.686	17.45
Jul	9.468	29.06
Aug	11.946	36.66
Sep	9.658	29.64
Oct	2.921	8.96
Nov	2.555	7.84
Dec	3.071	9.42
Total	61.928	190.05

Table 68. Greenferry Water District average monthly groundwater withdrawals, 2012.

2013 Greenferry WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	3.057	9.38
Feb	3.022	9.27
Mar	3.530	10.83
Apr	3.600	11.05
May	7.009	21.51
Jun	8.787	26.97
Jul	13.923	42.73
Aug	12.358	37.93
Sep	6.139	18.84
Oct	3.539	10.86
Nov	3.151	9.67
Dec	3.511	10.77
Total	71.626	219.81

Table 69. Greenferry Water District average monthly groundwater withdrawals, 2013.

Average Monthly Greenferry WD Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	3.1	9	12	7	0	9
Feb	2.9	9	10	7	0	9
Mar	3.1	10	11	8	0	10
Apr	3.2	10	11	7	0	10
May	5.6	17	22	13	8	10
Jun	7.2	22	31	16	12	10
Jul	12.2	37	43	29	28	10
Aug	12.1	37	42	30	27	10
Sep	8.3	26	30	19	16	10
Oct	3.6	11	13	9	1	10
Nov	3.2	10	14	8	0	10
Dec	3.5	11	15	9	0	11
Total	68.0	209	—	—	92	117
* Indoor use is represented by average water use in November through February.						

Table 70. Greenferry Water District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

12. REMINGTON WATER DISTRICT

12.1. Water Use[11]

Remington Water District's water system includes Well 1 and Well 2. The District has 303 metered residential connections, and one connection for the local fire station which uses less than 1,000 gallons per month. There are no commercial connections to the system (except the fire station). There are no large self-supplied users within District boundaries.

The District estimates unaccounted for water is approximately 800,000 gallons per month (an average 15% of reported production). The District believes this figure likely reflects 35 service connections with 2" meters that do not accurately measure flows at rates less than 2 gallons per minute, in addition to other typical reasons for unaccounted for water such as leaks and flushing.

12.2. Tables

The following tables present an annual summary of 2009 to 2013 groundwater diversions, monthly diversion data for 2009 to 2013, and aggregate average monthly use with estimates for irrigation and indoor use.

Remington WD Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	71	219
2010	58	177
2011	63	194
2012	58	179
2013	65	199
Average	63	194
Maximum	71	219
Minimum	58	177

Table 71. Remington Water District annual groundwater production, 2009-2013.

[11] Remington Water District water data provided by Bob Kuch, Water System Manager.

2009 Remington WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	4.17	12.8
Feb	5.03	15.4
Mar	3.98	12.2
Apr	3.75	11.5
May	5.20	16.0
Jun	8.84	27.1
Jul	9.61	29.5
Aug	13.23	40.6
Sep	8.54	26.2
Oct	4.54	13.9
Nov	2.30	7.1
Dec	2.28	7.0
Total	71.46	219.3

Table 72. Remington Water District average monthly groundwater withdrawals, 2009.

2010 Remington WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.69	8.2
Feb	2.67	8.2
Mar	3.24	9.9
Apr	2.76	8.5
May	3.47	10.7
Jun	4.47	13.7
Jul	6.60	20.2
Aug	13.40	41.1
Sep	9.60	29.5
Oct	3.63	11.1
Nov	2.52	7.7
Dec	2.57	7.9
Total	57.61	176.8

Table 73. Remington Water District average monthly groundwater withdrawals, 2010.

2011 Remington WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.77	8.5
Feb	2.85	8.7
Mar	2.58	7.9
Apr	2.91	8.9
May	2.83	8.7
Jun	3.48	10.7
Jul	7.81	24.0
Aug	12.91	39.6
Sep	15.42	47.3
Oct	4.80	14.7
Nov	2.47	7.6
Dec	2.35	7.2
Total	63.18	193.9

Table 74. Remington Water District average monthly groundwater withdrawals, 2011.

2012 Remington WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.54	7.8
Feb	2.52	7.7
Mar	2.38	7.3
Apr	2.69	8.2
May	2.96	9.1
Jun	4.47	13.7
Jul	7.04	21.6
Aug	10.67	32.8
Sep	10.99	33.7
Oct	7.08	21.7
Nov	2.56	7.8
Dec	2.41	7.4
Total	58.30	178.9

Table 75. Remington Water District average monthly groundwater withdrawals, 2012.

2013 Remington WD Water Production		
Month	Production (MG)	Production (AF)
	Total	Total
Jan	2.53	7.8
Feb	2.97	9.1
Mar	2.41	7.4
Apr	2.60	8.0
May	4.05	12.4
Jun	6.02	18.5
Jul	10.31	31.6
Aug	14.88	45.7
Sep	10.23	31.4
Oct	3.16	9.7
Nov	2.85	8.7
Dec	2.75	8.4
Total	64.76	198.7

Table 76. Remington Water District average monthly groundwater withdrawals, 2013.

Average Monthly Remington WD Water Production, 2009-2013						
Month	Average (MG)	Average (AF)	Maximum (AF)	Minimum (AF)	Average Estimated Irrigation Use (AF)	Average Estimated Indoor Use (AF)
Jan	2.9	9	13	8	0	9
Feb	3.2	10	15	8	1	9
Mar	2.9	9	12	7	0	9
Apr	2.9	9	11	8	0	9
May	3.7	11	16	9	3	9
Jun	5.5	17	27	11	8	9
Jul	8.3	25	32	20	17	9
Aug	13.0	40	46	33	31	9
Sep	11.0	34	47	26	25	9
Oct	4.6	14	22	10	6	9
Nov	2.5	8	9	7	0	8
Dec	2.5	8	8	7	0	8
Total	63.1	194	—	—	91	102
* Indoor use is represented by average water use in November through February.						

Table 77. Remington Water District aggregate monthly groundwater withdrawal data, and estimate of irrigation and indoor use.

13. DALTON WATER ASSOCIATION

Dalton Water Association provided information[12] from their most recent master plan, which was prepared in 2008. Dalton was not able to provide monthly production data for the 2009-2013 timeframe, thus we were unable to include Dalton in our analysis of data. However, we are including pertinent information provided about their water delivery system, and monthly production data for the time period December 2006 through November 2007.

Dalton Water Association's water system includes Well 1 and Well 2. The Association had 1,014 metered connections in 2008, including 79 commercial accounts. Approximately 70% of the area within Dalton's boundary is also served by independent irrigation systems, including Dalton Gardens Irrigation District (diverting from Hayden Lake, not the RPA), and Schloss Homeowner's Association. The Association's facility master plan estimates unaccounted water was approximately 6% of production in 2008.

2007 Dalton Water Association Production		
Month	Production (MG)	Production (AF)
	Total	Total
Dec-06	6.9	21.3
Jan	7.0	21.5
Feb	6.3	19.4
Mar	6.7	20.5
Apr	7.9	24.3
May	13.5	41.3
Jun	17.9	54.8
Jul	28.4	87.2
Aug	24.7	75.7
Sep	17.7	54.3
Oct	7.1	21.8
Nov-07	6.2	18.9
Total	150.2	461.0

Table 78. Dalton Water Association average monthly groundwater withdrawals, 2007.

[12] Dalton Water Association data provided by Paul A. Klatt, P.E., J-U-B Engineers, Incorporated.

14. CITY OF ATHOL

The City of Athol provided total annual water use[13] for 2009 to 2013. The data is reported here, but not used in the analysis.

Athol's water system includes the Grove Street and Bennett wells. Athol has 306 total connections including 260 residential, 43 commercial, and 3 light industrial. No estimate of unaccounted water was provided.

City of Athol Annual Diversions, 2009-2013		
Year	**Annual Volume (MG)**	**Annual Volume (AF)**
2009	56	172
2010	43	131
2011	47	143
2012	39	120
2013	41	126
Average	45	138
Maximum	56	172
Minimum	39	120

Table 79. City of Athol annual groundwater production, 2009-2013.

[13] City of Athol data provided by Stephen J. Williams, Public Works Director

Appendix B: Water Rights for Self Supplied Commercial, Industrial, and Heating/Cooling Use

Commercial and Industrial Users				
Water Right No.	**Water Use**	**Maximum Diversion Rate (cfs)**	**Maximum Diversion Volume (ac-ft)**	**Owner**
95-2188	Industrial	1.00		Diamond National Corp
95-4520	Commercial	0.22		Beacon West LLC
95-7023	Industrial	0.25	0.8	Western Farmers Assn
95-7033	Industrial	1.21	878.3	Idaho Forest Group LLC
95-7141	Commercial	0.69	294.0	Idaho Veneer Co
95-7145	Commercial	0.02	2.4	Nilson, Ronald D
95-7187	Industrial	0.09	19.0	Interstate Plastic Inc.
95-7201	Commercial	0.16	26.4	El Arr Investments
95-7697	Commercial	0.36	75.3	Daugharty, D A; Ratliff, James V
95-7781	Commercial, Irrigation	0.07	8.3	Smith, D L
95-7899	Commercial	0.04	8.3	Daugharty, D A; Ratliff, James V
95-7983	Commercial	0.51	26.3	United States of America
95-8022	Commercial	0.04	0.2	Jones, Carol; Jones, Don
95-8030	Commercial	0.04	0.5	Horne, Don L
95-8049	Commercial	0.27	55.9	Terra5 LLC
95-8151	Domestic, Industrial	0.14	3.6	Mesenbrink, Chris; Mesenbrink Valerie
95-8181	Commercial, Domestic	0.06	5.4	Shockley, C Norman; Shockley, Mary
95-8183	Commercial, Domestic	0.16	3.8	Huetter Speedway
95-8232	Commercial	0.53	106.2	Gilman, Larry W
95-8234	Domestic, Industrial	0.11	10.6	M & M Investment Corp
95-8246	Domestic, Industrial	0.20	13.2	Idaho Asphalt Supply Inc.
95-8295	Commercial, Domestic, Irrigation	0.11	0.6	Davisson, Lisa A ; Davisson, Richard D
95-8354	Fire Protection, Industrial	0.14	3.7	Idaho Forest Group LLC
95-8463	Commercial	0.15	18.1	Grannis, Ray

Commercial and Industrial Users				
Water Right No.	**Water Use**	**Maximum Diversion Rate (cfs)**	**Maximum Diversion Volume (ac-ft)**	**Owner**
95-8480	Cooling, Domestic, Heating	0.07	4.2	Bernhart, Janet; Bernhart, Stanton L
95-8510	Industrial	0.50	13.1	Curtis Construction Co
95-8617	Commercial, Domestic, Irrigation	0.18	1.8	Coeur d'Alene Memorial Gardens Inc.
95-8620	Commercial, Irrigation	0.09	0.6	Northland Nursery
95-8794	Cooling, Heating	0.85	462.0	Coeur d'Alene School District #271
95-8801	Industrial	0.79	61.5	Central Premix Concrete Co
95-8805	Domestic, Fire Protection, Industrial, Irrigation	0.11	31.4	Interstate Concrete & Asphalt Co
95-8821	Commercial	2.00	343.7	Acme Materials & Construction Co
95-8860	Commercial	0.12	13.3	Poe Asphalt Paving Inc.
95-8880	Commercial	0.94	199.1	Idaho Veneer Co
95-8921	Commercial, Domestic, Irrigation	0.12	27.3	Beacon West LLC
95-8924	Domestic, Industrial, Irrigation	4.49	1475.0	Rathdrum Power LLC
95-8964	Cooling, Heating	1.00	544.0	Coeur d'Alene School District #271
95-9028	Cooling, Heating	1.00	544.0	Coeur d'Alene School District #271
95-9042	Commercial	2.23	384.8	Cpm Development Co
95-9089	Commercial	3.63	408.0	Knife River Corp Northwest
95-9091	Industrial, Irrigation	1.25	140.5	Spokane Rock Products Inc.
95-9229	Cooling, Heating	1.50	816.0	Coeur d'Alene School District #271
95-9260	Commercial, Domestic	0.20	43.8	Milestone Investments LLC
95-9365	Cooling, Heating	0.78	424.3	Riverfront House Coa Inc.
95-9468	Cooling, Heating	1.60	870.4	Salvation Army Kroc Center
95-9474	Commercial	1.70		Silverwood Inc.
95-9484	Cooling, Heating	2.00	1088.0	Kootenai Medical Center
95-9530	Commercial, Domestic	0.16	20.0	Dedmon, Suanne ; Grubb, Fred

Commercial and Industrial Users				
Water Right No.	**Water Use**	**Maximum Diversion Rate (cfs)**	**Maximum Diversion Volume (ac-ft)**	**Owner**
95-9935	Commercial, Domestic	0.06	5.4	Spirit Valley Industrial Park
95-9940	Commercial	0.80	169.5	Silverwood Inc.
95-10411	Commercial, Irrigation	0.15	50.0	Stateline Stadium Speedway
95-10587	Commercial, Fire Protection	0.20		Mc Intosh, Mary R
95-10634	Cooling, Heating	0.47	255.7	Lct Development LLC
95-10706	Commercial	0.06	0.1	Wilson, Bob
95-10922	Commercial, Domestic, Irrigation	0.10		Hatley , Tammy; Hatley, Byron
95-11179	Commercial, Domestic, Irrigation	0.22	85.0	Finman, Lorna
95-11754	Commercial	0.01	4.8	Hms Holdings LLC
95-11811	Cooling, Heating	0.78	424.3	Rude, Howard
95-11871	Industrial, Irrigation	2.76	567.5	Acme Materials & Construction Co
95-12277	Industrial, Irrigation	0.20	16.2	Idaho Asphalt Supply Inc.
95-12786	Cooling, Fire Protection, Irrigation	0.25	135.0	Hern Iii, John A
95-13899	Commercial	0.10		Marina Yacht Club LLC
95-14052	Commercial, Domestic	1.04	1.2	35a 614 LLC
95-14211	Domestic, Fire Protection, Industrial	0.11		Stimson Lumber Co
95-16473	Cooling, Heating	0.63	342.7	Kootenai Technical Education Campus
TOTAL		**41.82**		

Rathdrum Prairie Aquifer
Future Water Demand

Appendix C:

RPA RAFN WATER RIGHT GAP ANALYSIS

RPA RAFN WATER RIGHT GAP ANALYSIS

Bob Haynes, Idaho Water Engineering, 12/14/2014

The information for assembling the water rights portfolio for each provider was taken from searching the Idaho Department of Water Resources (IDWR) website for water right records in the name of the respective provider. Because of the ongoing adjudication of water rights in the basin, some possible uncertainty may exist with regard to some of the rights. With the single exception of 95-4027 in the name of North Kootenai Water District, all rights claimed by the various providers were taken at face value. 95-4027 is a Statutory Claim to a Water Right which states a priority date that would have required it to have been established by first obtaining a Permit to Appropriate Water from IDWR. This was not done and this claim will likely be rejected in the adjudication process. In the process of evaluating the water rights for the Avondale Irrigation District what appears to be an error the combined limits for licenses 95-8687, 95-8774, 95-8867 and 95-8909 was discovered. Avondale has petitioned IDWR to modify the combined limits from 13.94cfs to 19.09cfs. Since IDWR has indicated a willingness to consider amending those licenses, 19.09cfs was assigned as the combined limit for purposes of the Gap Analysis.

Water Right Gap Analysis

Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Remington	5.90	14.45	8.55	27.35	21.45	~
Hauser Lake	4.90	6.18	1.28	12.58	7.68	~
Greenferry	2.05	6.68	4.63	13.19	11.14	~
Avondale	19.09	16.98	-2.11	32.60	13.51	~
Rathdrum	16.90	21.12	4.22	41.47	24.57	1.0
East Greenacres	97.90	29.64	-68.26	54.16	-43.74	0.325
North Kootenai	28.20	57.39	29.19	106.02	77.82	~
Ross Point	16.31	25.05	8.74	39.68	23.37	1.0
Hayden Lake	24.00	16.31	-7.69	25.82	1.82	~
Post Falls	38.89	24.66	-14.23	40.07	1.18	6.25
Coeur d'Alene	60.98	49.53	-11.45	73.70	12.72	6.0
Total	**315.12**	**267.99**	**-47.13**	**466.64**	**151.52**	**12.25**

The purpose of some of the water rights in this analysis is other than municipal and, as such, the conditions on those rights may carry a volume limitation. If a provider has irrigation rights in their portfolio, the assumption in this analysis is made that the provider will have at least as many acres to which water is applied as the sum total for the acres of irrigation in the original water rights.

Avondale Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Avondale Irrigation District	95-7588	9/29/1975	License	10.20[1]	3687.5	Domestic, Irrigation
Avondale Irrigation District	95-8144	12/2/1981	License	2.00[1]	-	Municipal
Avondale Irrigation District	95-8321	5/31/1983	License	0.20[1]	32.8	Irrigation, Stockwater, Domestic
Avondale Irrigation District	95-8687	3/21/1991	License	1.14[1]		Municipal
Avondale Irrigation District	95-8447	10/20/1992	License	3.00[1]		Municipal
Avondale Irrigation District	95-8867	5/13/1994	License	2.00[1]		Municipal
Avondale Irrigation District	95-8909	3/8/1995	License	3.00[1]		Municipal
Total				**19.09[1]**	**-**	

[1] Totals affected by Combined Limit Conditions in licenses

Coeur d'Alene Water Rights Portfolio						
Original Owner	Water Right #	Priority Date	Basis of Right	CFS	A-F	Purpose
Idaho Water Company	95-2111	4/20/1955	License	3.00	-	Municipal
Idaho Water Company	95-2133	7/21/1960	License	2.27	-	Municipal
Ronald Russell	95-2164	10/5/1964	License	3.61	948.0	Municipal
Idaho Water Company	95-2198	12/13/1966	License	5.12	-	Municipal
City of Coeur d'Alene	95-7142	5/3/1971	License	2.45[1]	-	Municipal
Idaho Water Company	95-7181	3/14/1972	License	5.73	-	Municipal
City of Coeur d'Alene	95-8565	12/7/1987	License	7.55[1]	-	Municipal
City of Coeur d'Alene	95-8647	3/19/1990	License	7.30	-	Municipal
City of Coeur d'Alene	95-8672	8/27/1990	License	3.00	-	Municipal
City of Coeur d'Alene	95-8938	2/8/1996	License	4.57	-	Municipal
City of Coeur d'Alene	95-9007	1/25/1999	License	7.80	-	Municipal
City of Coeur d'Alene	95-16580	5/14/2013	Permit	9.00	-	Municipal
Total				**60.98[1]**		

[1] Totals affected by Combined Limit Conditions in licenses

East Greenacres Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Dept. of Interior	95-7055	4/18/1969	License	90.00	14,100	Irrigation, Domestic, Stockwater
Dept. of Interior	95-8057	10/9/1980	License	3.0	2,171.9	Municipal
Dept. of Interior	95-8851	8/30/1994	Permit	4.9		Domestic, Commercial, Industrial
Total				**97.90**	**-**	

Greenferry Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Greenferry Water and Sewer District	95-8613	2/2/1989	License	1.00	651.0	Municipal
Greenferry Water and Sewer District	95-9082	5/5/2004	License	1.00[1]	-	Municipal
Greenferry Water and Sewer District	95-9531	8/25/2008	Permit	0.80		Municipal
Total				**2.05[1]**	**-**	

[1] Totals affected by Combined Limit Conditions in licenses

Hauser Lake Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Hauser Lake Water Association	95-2189	8/8/1966	License	0.56	108.0	Domestic
Hauser Lake Water Association	95-7463	7/3/1974	License	2.00[1]	150.0	Domestic
Hauser Lake Water Association	95-8535	11/17/1986	License	2.45[1]	352.2	Domestic, Irrigation
Hauser Lake Water Association	95-9111	2/7/2002	License	2.25		Municipal
Total				**4.90[1]**		

[1] Totals affected by Combined Limit Conditions in licenses

Hayden Lake Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Richard & Elmer Heath	95-9242	3/3/1966	License	1.26	-	Municipal
Hayden Lake Irrigation District	95-7800	11/16/1977	License	3.80	2751.1	Municipal
Roy Armstrong	95-8269	3/11/1983	License	1.56	273.0	Irrigation
Roy Armstrong	95-8273	3/16/1983	License	2.00[1]	374.5	Municipal
Mary Ellen Weber	95-8279	4/1/1983	License	3.00[1]	553.0	Municipal
Hayden Lake Irrigation District	95-8581	4/25/1988	License	12.92	4537.0	Municipal, Irrigation
Total				**18.06[1]**		

[1] Totals affected by Combined Limit Conditions in licenses

North Kootenai Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Howard Water Works	95-2144	10/22/1962	License	0.65	30.0	Municipal
Wash. Water Power	95-2205	2/21/1967	License	0.29	30.0	Municipal
Idaho Contractors	95-7138	3/25/1971	License	0.14	60.6	Municipal
Wash. Water Power	95-7185	4/3/1972	License	1.39	624.0	Municipal
Wash Water Power	95-7271	4/3/1973	License	0.83	-	Municipal
Hayden Pines	95-7713	3/30/1977	License	0.04	29.0	Municipal
Honeysuckle Hills HOA	95-7763	8/29/1977	License	3.00	2810.4	Municipal
Ranch Valley Water	95-7231	2/23/1978	License	0.08	15.6	Municipal
Hayden Pines	95-7827	3/29/1978	License	0.20	55.2	Municipal
Hayden Pines	95-8522	8/20/1986	License	0.61	441.6	Municipal
North Kootenai Water District	95-8369	1/5/1990	License	1.00	376.0	Municipal
North Kootenai Water District	95-9199	3/3/2003	License	8.83	-	Municipal
North Kootenai Water District	95-9217	1/22/2004	License	2.51	-	Municipal
East Season Acres HOA	95-10019	5/6/2003	Permit	0.20	-	Municipal
North Kootenai Water District	95-9244	8/27/2004	Permit	2.00	-	Municipal
Sylte Development	95-9129	6/13/2008	Permit	0.95	-	Municipal
North Kootenai Water District	95-12599	5/17/2010	Permit	5.48	-	Municipal
Total				**28.20**		

Post Falls Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Earl Sanders	95-4199	6/1/1910	Statutory Claim	0.04	-	Domestic
Marvin Mellick	95-4187	6/10/1910	Statutory Claim	0.04	-	Domestic
City of Post Falls	95-4458	7/1/1947	Statutory Claim	1.69	-	Municipal
City of Post Falls	95-4460	7/1/1947	Statutory Claim	2.50	-	Municipal
Jacklin seed Company	95-2093	12/5/1951	License	1.26	-	Municipal
Manuel Schniedmiller	95-2094	12/19/1951	License	1.25	-	Municipal
Owen Jacklin	95-2124	1/31/1957	License	0.22	-	Municipal
Owen Jacklin	95-2127	1/23/1958	License	0.13	-	Municipal
City of Post Falls	95-4457	8/16/1961	Statutory Claim	1.20	-	Municipal
Elmer Satchwell	95-9524	13/13/1961	License	2.07	-	Irrigation
George Carlson	95-2166	10/14/1964	License	1.40	248.5	Irrigation
Jacklin Partnership	95-15535	2/19/1969	License	0.71	-	Municipal
City of Post Falls	95-7436	4/30/1974	License	4.00	-	Municipal
City of Post Falls	95-7538	6/9/1975	License	0.21	7.6	Domestic, Irrigation
City of Post Falls	95-8048	8/11/1980	License	3.79	-	Municipal
City of Post Falls	95-8572	4/7/1988	License	1.16	-	Municipal
City of Post Falls	95-8768	3/31/2003	License	3.75	92.4	Municipal
City of Post Falls	95-8862	3/23/1994	License	4.68	-	Municipal
City of Post Falls	95-9137	7/2/2002	License	3.00	-	Municipal
City of Post Falls	95-9147	7/2/2002	License	5.79	-	Municipal
Total				**38.89**	**348.5**	

Rathdrum Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
City of Rathdrum	95-4403	1/1/1930	Statutory Claim	0.67	-	Municipal
Thomas Brickert	95-2130	10/13/1959	License	3.86	1120.0	Irrigation
George Thayer	95-16466	11/18/1963	License	1.95	486.9	Municipal
George Thayer	95-11426	11/2/1964	License	1.81	426.85	Municipal
George Thayer	95-16378	4/11/1964	License	3.71	931.36	Municipal
City of Rathdrum	95-7047	3/18/1969	License	1.30	-	Municipal
George Thayer	95-10175	5/23/1878	License	0.80	175.0	Municipal
City of Rathdrum	95-7881	12/1/1978	License	2.00	-	Municipal
George Thayer	95-16371	6/28/1979	License	0.60	91.0	Municipal
Carl Nagel	95-16386	5/29/1986	License	0.20	30.0	Municipal
Total				**16.90**		

Remington Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Remington Water District	95-9457	11/14/1996	License	0.33	-	Municipal
Remington Water District	95-9458	12/12/1996	License	1.92	-	Municipal
Remington Water District	95-9427	10/18/2007	Permit	5.90	-	Municipal
Total				**8.15**	**-**	

Ross Point Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Ross Point Water District	95-4088	6/1/1912	Statutory Claim	1.00	-	Municipal
Lyle Jacklin	95-15531	11/5/1952	License	0.94	220.5	Irrigation
Roy Pettinger	95-15533	2/8/1955	License	2.87	774.0	Irrigation
Lyle Jacklin	95-15527	11/14/1967	License	0.94	220.5	Irrigation
Ross Point Water District	95-7258	2/20/1973	License	1.03	692.6	Municipal
Jacklin Seed Company	95-7698	2/18/1977	License	1.25	365.0	Irrigation
Ross Point Water District	95-8477	5/1/1985	License	2.51	925.0	Municipal
Ross Point Water District	95-9009	2/12/1999	License	5.25	-	Municipal
Total				**16.31**		

Rathdrum Prairie Aquifer
Future Water Demand

Appendix D:

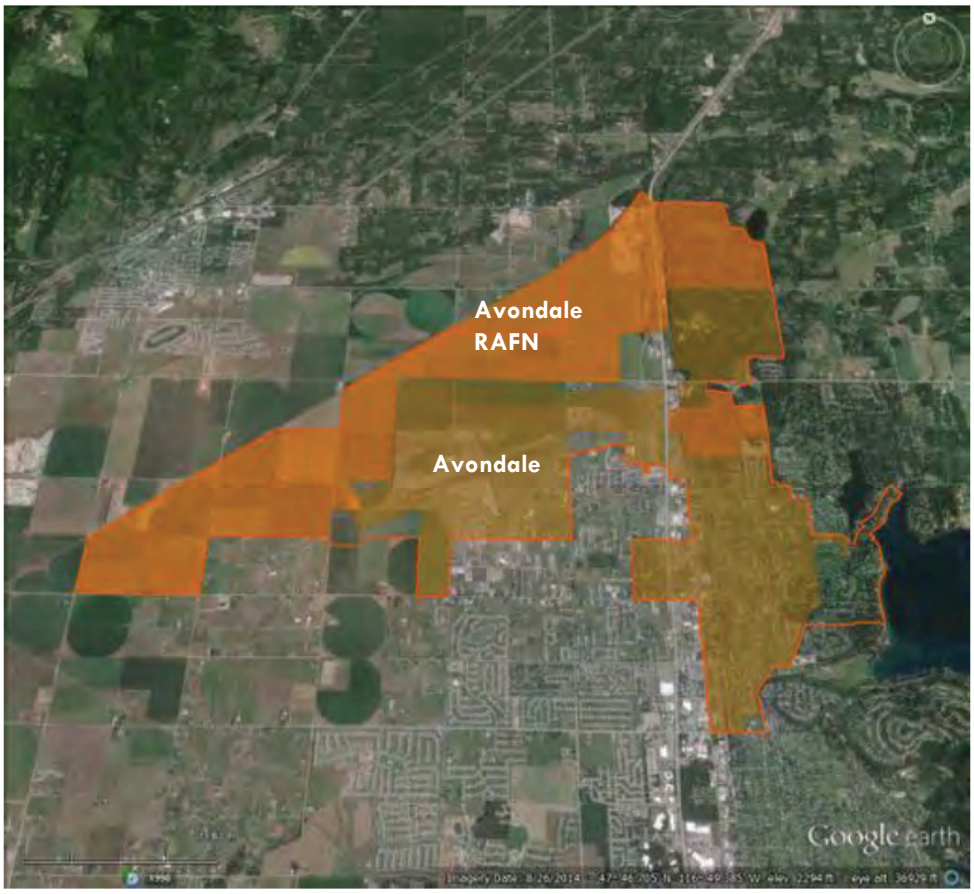
RATHDRUM PRAIRIE WATER PROVIDER REPORTS

RATHDRUM PRAIRIE WATER PROVIDER REPORTS

Contents

AVONDALE IRRIGATION DISTRICT

Avondale Irrigation District serves residents within the City of Hayden, unincorporated portions of Kootenai County, and the Coeur d'Alene airport and associated industrial park. Avondale anticipates an increase from the current service area of 6.3 square miles to 12.8 square miles by 2045.



Population

The 2014 population within the boundaries of the Avondale Irrigation District is 5,643 and the projected 2045 population is 7,838. Population density per square mile is projected to decrease from 900 in 2014 to 612 in 2045.

Avondale Population Projections					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
5643	7838	6.3	12.8	900	612

Water Demand

The current annual water demand of Avondale is 567 MGY, which is projected to increase to 788 MGY in 2024. The maximum daily demand in 2014 of 10.83cfs is expected to increase to 16.98cfs in 2045. Peak hourly demand is projected to increase from 22.30cfs in 2014 to 39.15cfs in 2045.

Avondale Water Demand Summary

2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
567	788	7.0	10.97	10.83	16.98	0.5	0.88	18.57	32.60	221	6.15	14.03

Water Rights Gap Analysis

Avondale Water Rights Portfolio

Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Avondale Irrigation District	95-7588	9/29/1975	License	10.20[1]	3687.5	Domestic, Irrigation
Avondale Irrigation District	95-8144	12/2/1981	License	2.00[1]	-	Municipal
Avondale Irrigation District	95-8321	5/31/1983	License	0.20[1]	32.8	Irrigation, Stockwater, Domestic
Avondale Irrigation District	95-8687	3/21/1991	License	1.14[1]		Municipal
Avondale Irrigation District	95-8447	10/20/1992	License	3.00[1]		Municipal
Avondale Irrigation District	95-8867	5/13/1994	License	2.00[1]		Municipal
Avondale Irrigation District	95-8909	3/8/1995	License	3.00[1]		Municipal
Total				**19.09[1]**	**-**	

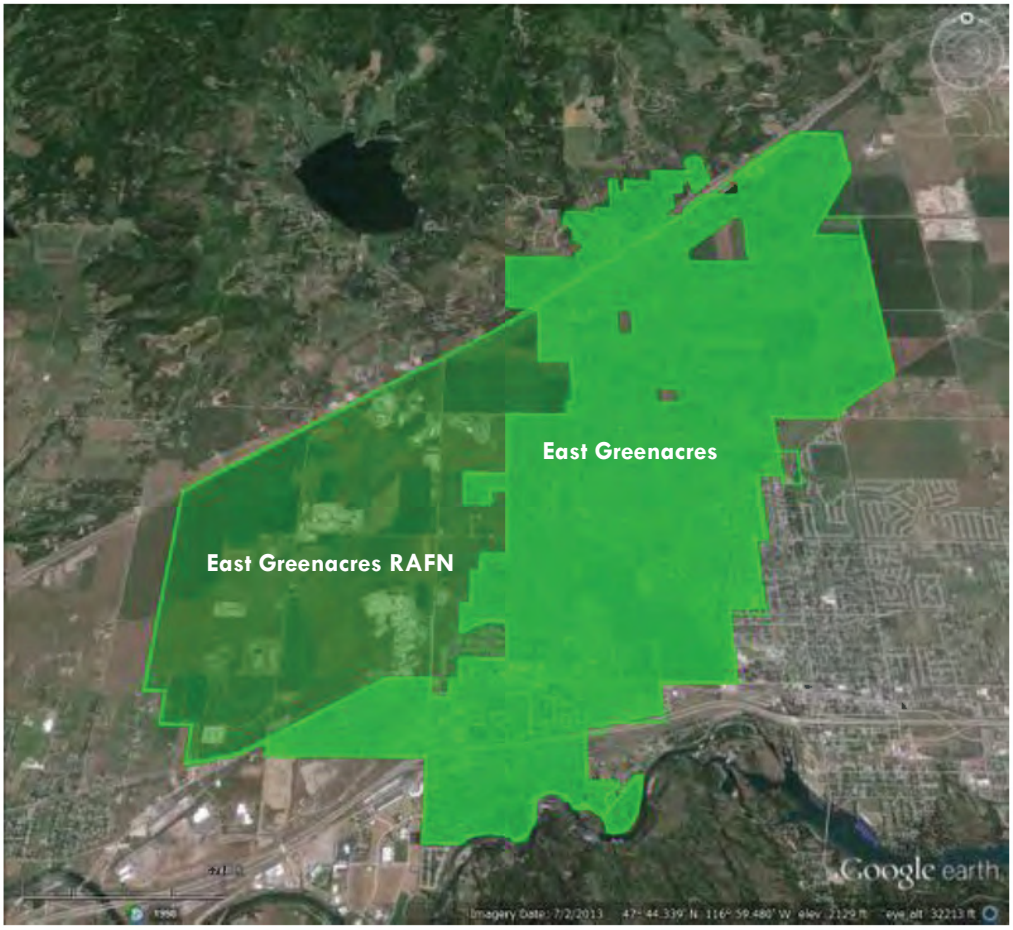
[1] Totals affected by Combined Limit Conditions in licenses

Avondale Water Right Gap Analysis

Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Avondale	19.09	16.98	-2.11	32.60	13.51	~

EAST GREENACRES IRRIGATION DISTRICT

East Greenacres anticipates an increase from a current service area of 11.5 square miles to 17.2 square miles by 2045.



Population

East Greenacres currently serves a population of 8,632, which is predicted to grow to 14,299 by 2045. Population density within East Greenacres' service boundary is projected to increase from 754 to 831 residents per square mile.

East Greenacres Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
8632	14299	11.5	17.2	754	831

Water Demand

Although annual volume is projected to increase from 2,877 MGY in 2014 to 4,766 MGY in 2045, both maximum daily demand and peak hourly demand are estimated to decrease by 35.28cfs and 41.54cfs, respectively.

East Greenacres Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
2877	4766	41.96	19.16	64.92	29.64	2.39	1.46	88.75	54.16	1889	-35.28	-41.54

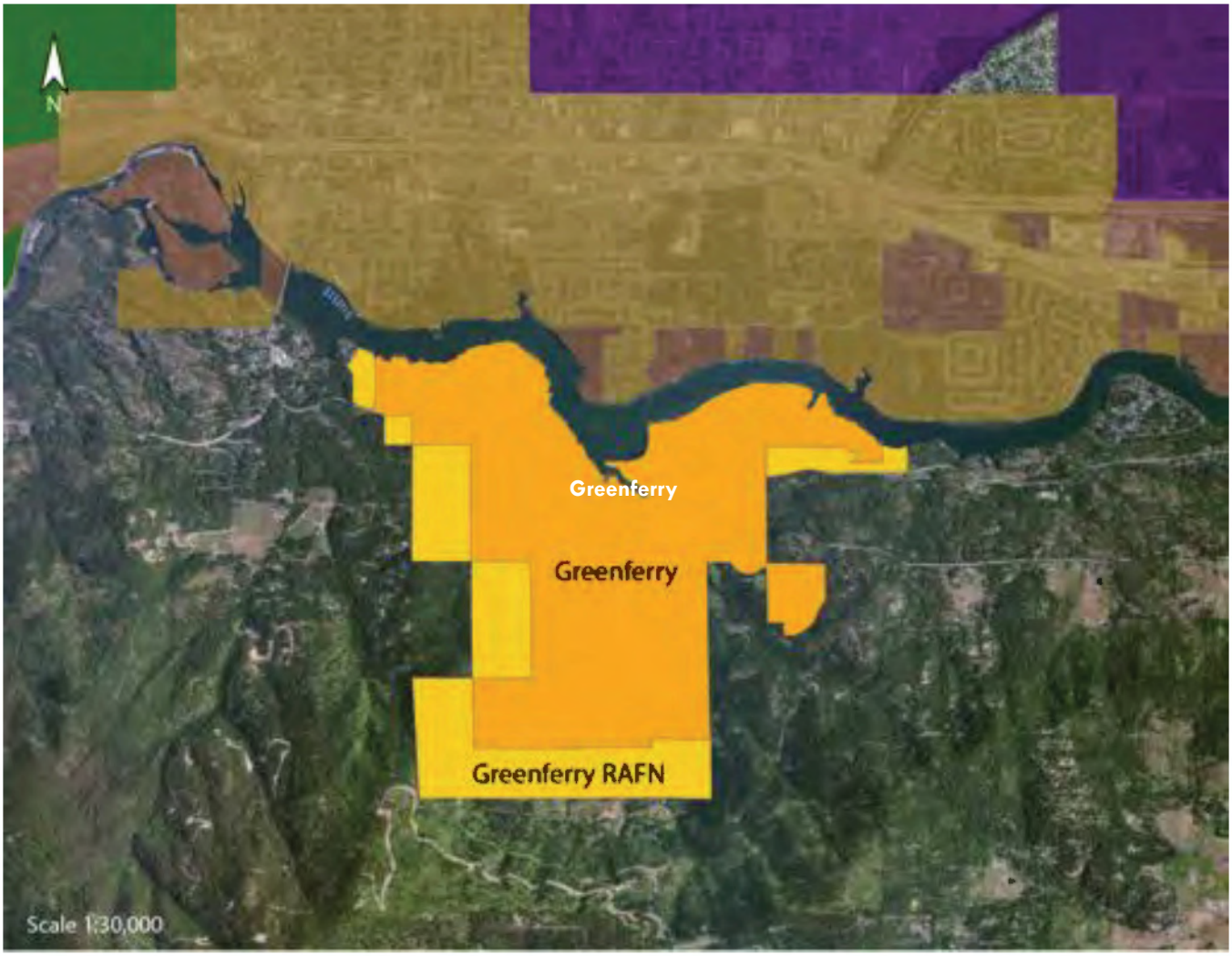
Water Rights Gap Analysis

East Greenacres Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Dept. of Interior	95-7055	4/18/1969	License	90.00	14,100	Irrigation, Domestic, Stockwater
Dept. of Interior	95-8057	10/9/1980	License	3.0	2,171.9	Municipal
Dept. of Interior	95-8851	8/30/1994	Permit	4.9		Domestic, Commercial, Industrial
Total				**97.90**	**-**	

East Greenacres Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
East Greenacres	97.90	29.64	-68.26	54.16	-43.74	0.325

GREENFERRY WATER AND SEWER DISTRICT

Greenferry Water and Sewer District anticipates an increase from a current service area of 1.8 square miles to 2.5 square miles by 2045.



Population

Greenferry currently serves a population of 405, which is predicted to grow to 741 by 2045. Population density within Greenferry's service boundary is projected to increase from 229 to 296 residents per square mile.

Greenferry Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
990	5989	1.8	2.5	552	1920

Water Demand

Annual water demand is predicted to increase to 124 MGY, maximum daily demand will grow to 1.13 MGD, and peak hourly demand will increase to 0.10 MGD.

Greenferry Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
68	330	1.44	4.32	2.23	6.68	0.13	0.36	4.83	13.19	262	4.46	8.36

Water Rights Gap Analysis

Greenferry Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Greenferry Water and Sewer District	95-8613	2/2/1989	License	1.00	651.0	Municipal
Greenferry Water and Sewer District	95-9082	5/5/2004	License	1.00[1]	-	Municipal
Greenferry Water and Sewer District	95-9531	8/25/2008	Permit	0.80		Municipal
Total				**2.05[1]**	**-**	

[1] Totals affected by Combined Limit Conditions in licenses

Greenferry Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Greenferry	2.05	6.68	4.63	13.19	11.14	~

HAUSER LAKE WATER ASSOCIATION

The Hauser Lake Water Association provides water for residents of the City of Hauser Lake with a service area of 2.1 square miles. This service area is projected to increase to 8.7 square miles by 2045.

Population

Hauser Lake Water Association currently serves a population of 677, which is predicted to grow to 2,647 by 2045. Population density within Hauser Lake's service boundary is projected to decrease from 316 to 304 residents per square mile.

Hauser Lake Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
677	2647	2.1	8.7	316	304

Water Demand

Annual water demand is predicted to increase to 317 MGY, maximum daily demand will grow to 4 MGD, and peak hourly demand will increase to 6.18 MGD.

Hauser Lake Water Demand Summary

2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
81	317	1.0	4.00	1.55	6.18	0.09	0.34	3.34	12.58	236	4.64	9.24

Water Rights Gap Analysis

Hauser Lake Water Rights Portfolio

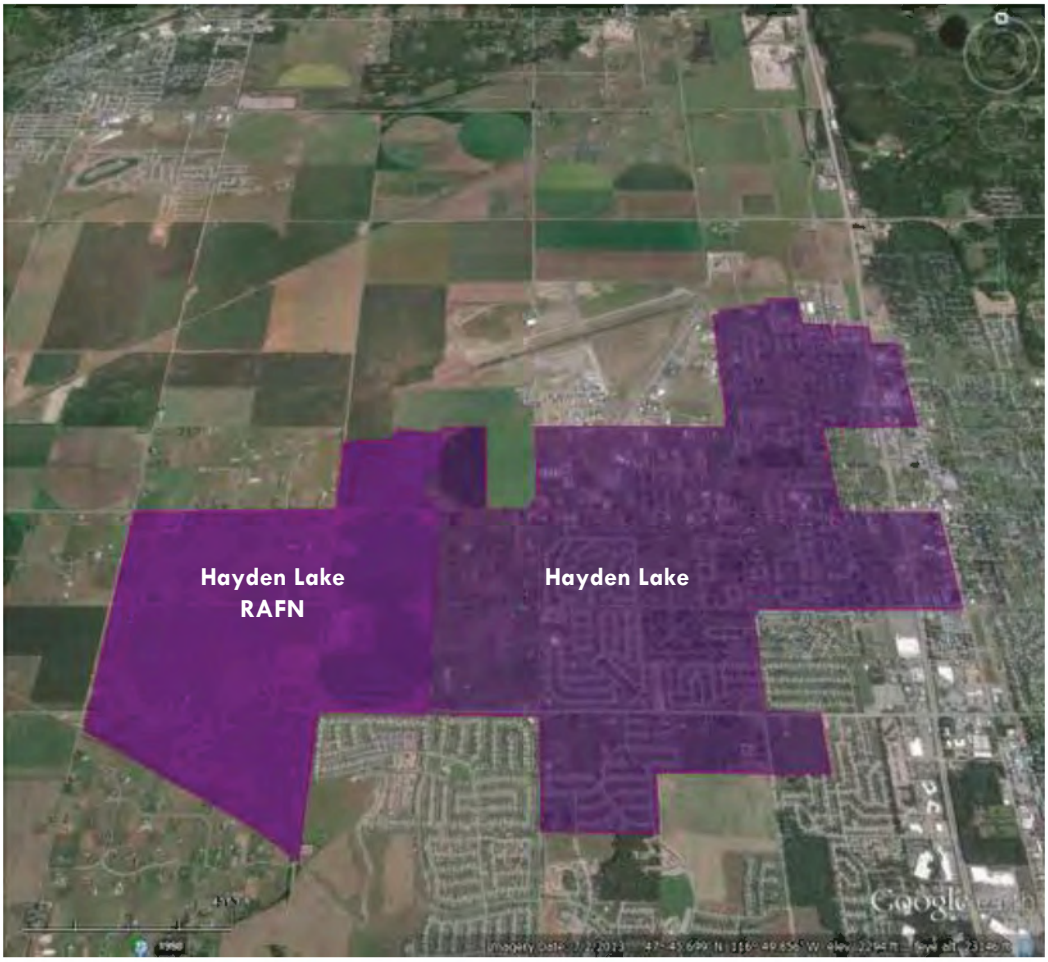
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Hauser Lake Water Association	95-2189	8/8/1966	License	0.56	108.0	Domestic
Hauser Lake Water Association	95-7463	7/3/1974	License	2.00[1]	150.0	Domestic
Hauser Lake Water Association	95-8535	11/17/1986	License	2.45[1]	352.2	Domestic, Irrigation
Hauser Lake Water Association	95-9111	2/7/2002	License	2.25		Municipal
Total				**4.90[1]**		

Hauser Lake Water Right Gap Analysis

Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Hauser Lake	4.90	6.18	1.28	12.58	7.68	~

HAYDEN LAKE IRRIGATION DISTRICT

Hayden Lake Irrigation District serves the population of the City of Hayden and anticipates an increase from a current service area of 4 square miles to 6 square miles by 2045.



Population

Hayden Lake Irrigation District currently serves a population of 6,604, which is predicted to grow to 11,216 by 2045. Population density within Hayden Lake's service boundary is projected to increase from 1,658 to 1,869 residents per square mile.

Hayden Lake Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
6604	11216	4.0	6	1658	1869

Water Demand

Annual water demand is predicted to increase to 1,067 MGY, maximum daily demand will grow to 10.54 MGD, and peak hourly demand will increase to 0.63 MGD.

Hayden Lake Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
628	1067	6.0	10.54	9.28	16.31	0.45	0.63	16.71	25.82	439	7.03	9.11

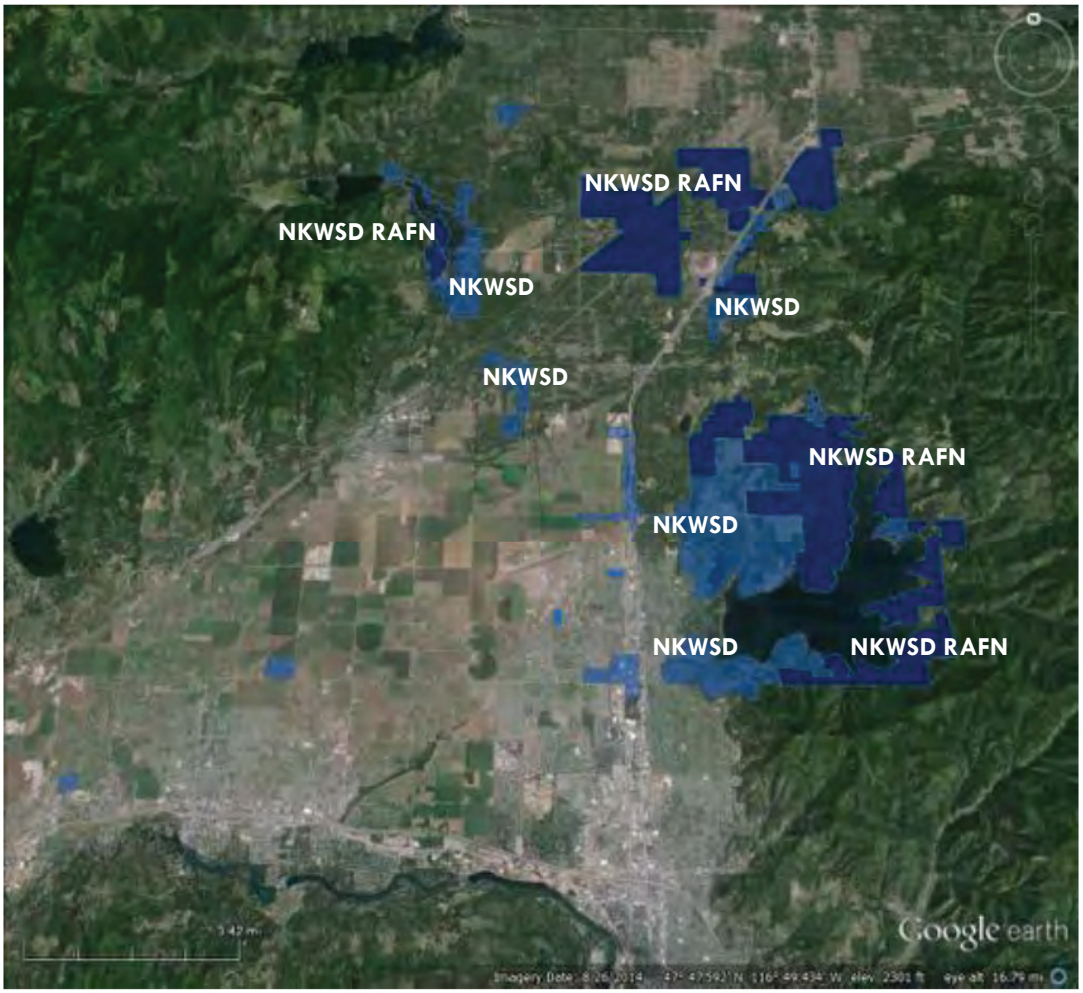
Water Rights Gap Analysis

Hayden Lake Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Richard & Elmer Heath	95-9242	3/3/1966	License	1.26	-	Municipal
Hayden Lake Irrigation District	95-7800	11/16/1977	License	3.80	2751.1	Municipal
Roy Armstrong	95-8269	3/11/1983	License	1.56	273.0	Irrigation
Roy Armstrong	95-8273	3/16/1983	License	2.00[1]	374.5	Municipal
Mary Ellen Weber	95-8279	4/1/1983	License	3.00[1]	553.0	Municipal
Hayden Lake Irrigation District	95-8581	4/25/1988	License	12.92	4537.0	Municipal, Irrigation
Total				**18.06[1]**		

Hayden Lake Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Hayden Lake	24.00	16.31	-7.69	25.82	1.82	~

NORTH KOOTENAI WATER AND SEWER DISTRICT

North Kootenai Water and Sewer District is projected to increase from a current service area of 11.8 square miles to 29.6 square miles by 2045.



Population

North Kootenai Water and Sewer District currently serves a population of 11,179, which is predicted to grow to 29,435 by 2045. Population density within North Kootenai's service boundary is projected to increase from 946 to 994 residents per square mile.

North Kootenai Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
11179	29435	11.8	29.6	946	994

Water Demand

Annual water demand is predicted to increase to 1,717 MGY, maximum daily demand will grow to 37.09 MGD, and peak hourly demand will increase to 2.86 MGD.

North Kootenai Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
652	1717	17.2	37.09	26.61	57.39	1.07	2.86	39.78	106.02	1065	30.77	66.24

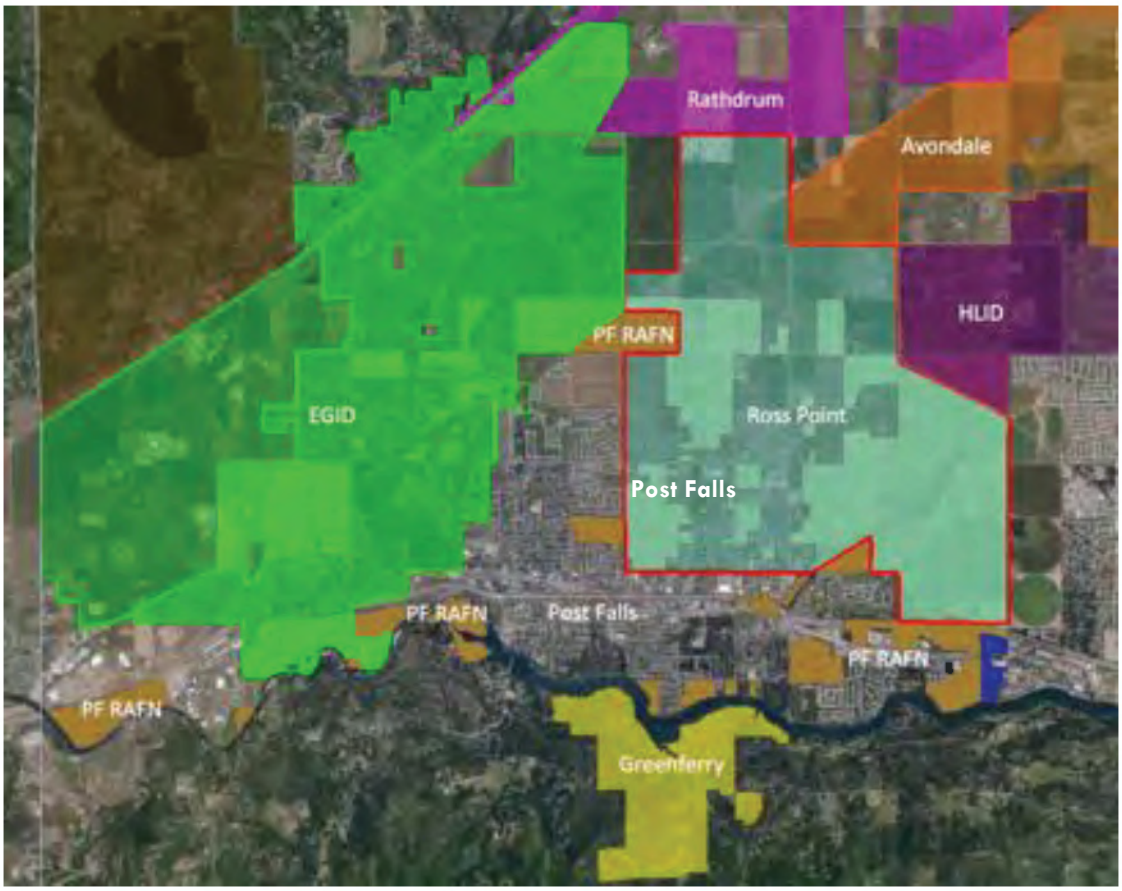
Water Rights Gap Analysis

North Kootenai Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Howard Water Works	95-2144	10/22/1962	License	0.65	30.0	Municipal
Wash. Water Power	95-2205	2/21/1967	License	0.29	30.0	Municipal
Idaho Contractors	95-7138	3/25/1971	License	0.14	60.6	Municipal
Wash. Water Power	95-7185	4/3/1972	License	1.39	624.0	Municipal
Wash Water Power	95-7271	4/3/1973	License	0.83	-	Municipal
Hayden Pines	95-7713	3/30/1977	License	0.04	29.0	Municipal
Honeysuckle Hills HOA	95-7763	8/29/1977	License	3.00	2810.4	Municipal
Ranch Valley Water	95-7231	2/23/1978	License	0.08	15.6	Municipal
Hayden Pines	95-7827	3/29/1978	License	0.20	55.2	Municipal
Hayden Pines	95-8522	8/20/1986	License	0.61	441.6	Municipal
North Kootenai Water District	95-8369	1/5/1990	License	1.00	376.0	Municipal
North Kootenai Water District	95-9199	3/3/2003	License	8.83	-	Municipal
North Kootenai Water District	95-9217	1/22/2004	License	2.51	-	Municipal
East Season Acres HOA	95-10019	5/6/2003	Permit	0.20	-	Municipal
North Kootenai Water District	95-9244	8/27/2004	Permit	2.00	-	Municipal
Sylte Development	95-9129	6/13/2008	Permit	0.95	-	Municipal
North Kootenai Water District	95-12599	5/17/2010	Permit	5.48	-	Municipal
Total				**28.20**		

North Kootenai Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
North Kootenai	28.20	57.39	29.19	106.02	77.82	~

CITY OF POST FALLS

The City of Post Falls anticipates an increase from a current service area of 8.2 square miles to 8.4 square miles by 2045.



Population

The City of Post Falls currently serves a population of 16,006, which is predicted to grow to 24,523 by 2045. Population density within Post Falls' service boundary is projected to increase from 1,960 to 2,919 residents per square mile.

Post Falls Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
16006	24523	8.2	8.4	1960	2919

Water Demand

Annual water demand is predicted to increase to 2,346 MGY, maximum daily demand will grow to 15.94 MGD, and peak hourly demand will increase to 0.93 MGD.

Post Falls Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
1531	2346	11.8	15.94	18.26	24.66	0.80	1.08	29.72	40.07	815	6.41	10.35

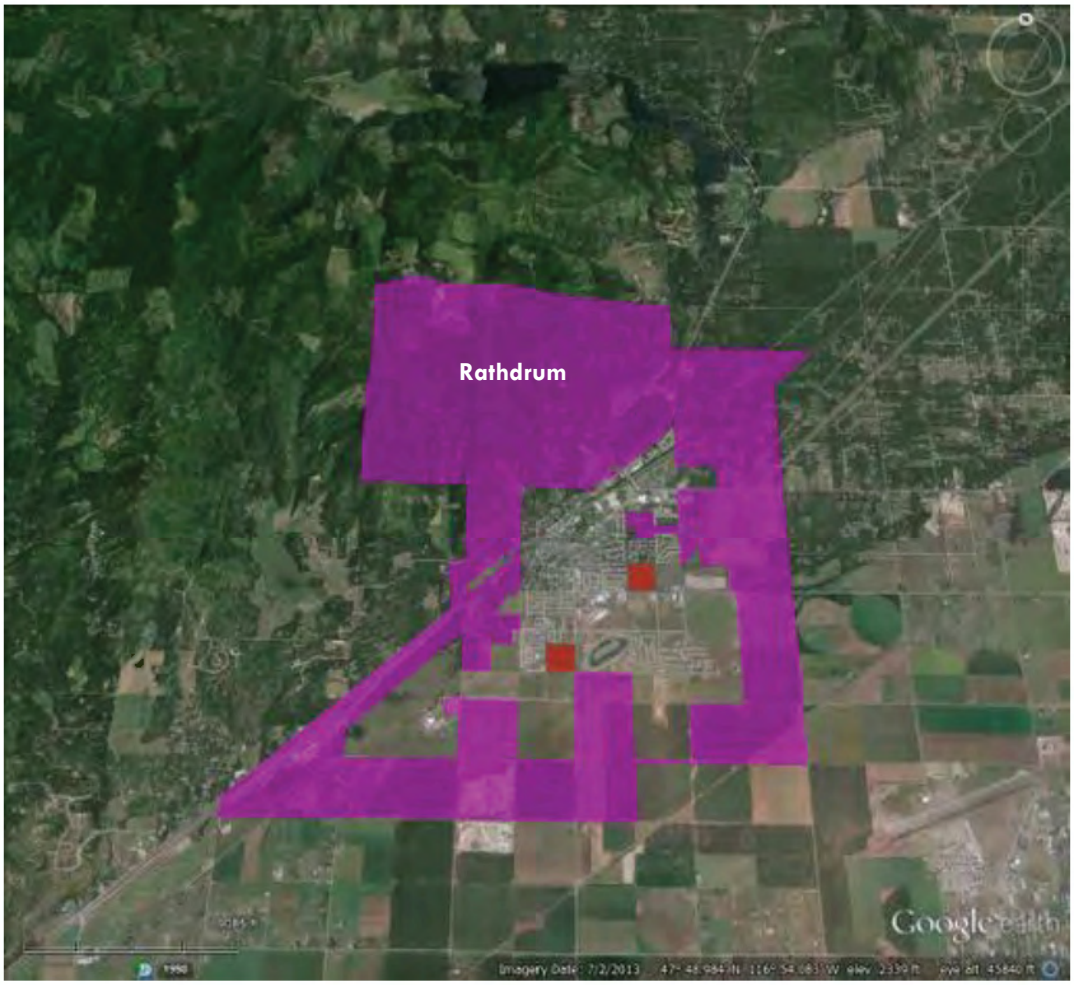
Water Rights Gap Analysis

Post Falls Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Earl Sanders	95-4199	6/1/1910	Statutory Claim	0.04	-	Domestic
Marvin Mellick	95-4187	6/10/1910	Statutory Claim	0.04	-	Domestic
City of Post Falls	95-4458	7/1/1947	Statutory Claim	1.69	-	Municipal
City of Post Falls	95-4460	7/1/1947	Statutory Claim	2.50	-	Municipal
Jacklin seed Company	95-2093	12/5/1951	License	1.26	-	Municipal
Manuel Schniedmiller	95-2094	12/19/1951	License	1.25	-	Municipal
Owen Jacklin	95-2124	1/31/1957	License	0.22	-	Municipal
Owen Jacklin	95-2127	1/23/1958	License	0.13	-	Municipal
City of Post Falls	95-4457	8/16/1961	Statutory Claim	1.20	-	Municipal
Elmer Satchwell	95-9524	13/13/1961	License	2.07	-	Irrigation
George Carlson	95-2166	10/14/1964	License	1.40	248.5	Irrigation
Jacklin Partnership	95-15535	2/19/1969	License	0.71	-	Municipal
City of Post Falls	95-7436	4/30/1974	License	4.00	-	Municipal
City of Post Falls	95-7538	6/9/1975	License	0.21	7.6	Domestic, Irrigation
City of Post Falls	95-8048	8/11/1980	License	3.79	-	Municipal
City of Post Falls	95-8572	4/7/1988	License	1.16	-	Municipal
City of Post Falls	95-8768	3/31/2003	License	3.75	92.4	Municipal
City of Post Falls	95-8862	3/23/1994	License	4.68	-	Municipal
City of Post Falls	95-9137	7/2/2002	License	3.00	-	Municipal
City of Post Falls	95-9147	7/2/2002	License	5.79	-	Municipal
Total				**38.89**	**348.5**	

Post Falls Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Post Falls	33.89	24.66	-14.23	40.07	1.18	6.25

CITY OF RATHDRUM

The City of Rathdrum anticipates an increase from a current service area of 5.2 square miles to 18 square miles by 2045.



Population

The City of Rathdrum currently serves a population of 7,016, which is predicted to grow to 9,545 by 2045. Population density within Rathdrum's service boundary is projected to decrease from 1,357 to 530 residents per square mile.

Rathdrum Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
7016	9545	5.2	18	1357	530

Water Demand

Annual water demand is predicted to increase to 770 MGY, maximum daily demand will grow to 13.65 MGD, and peak hourly demand will increase to 1.12 MGD.

Rathdrum Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
566	770	7.58	13.65	11.72	21.12	0.52	1.12	19.31	41.47	204	9.40	22.16

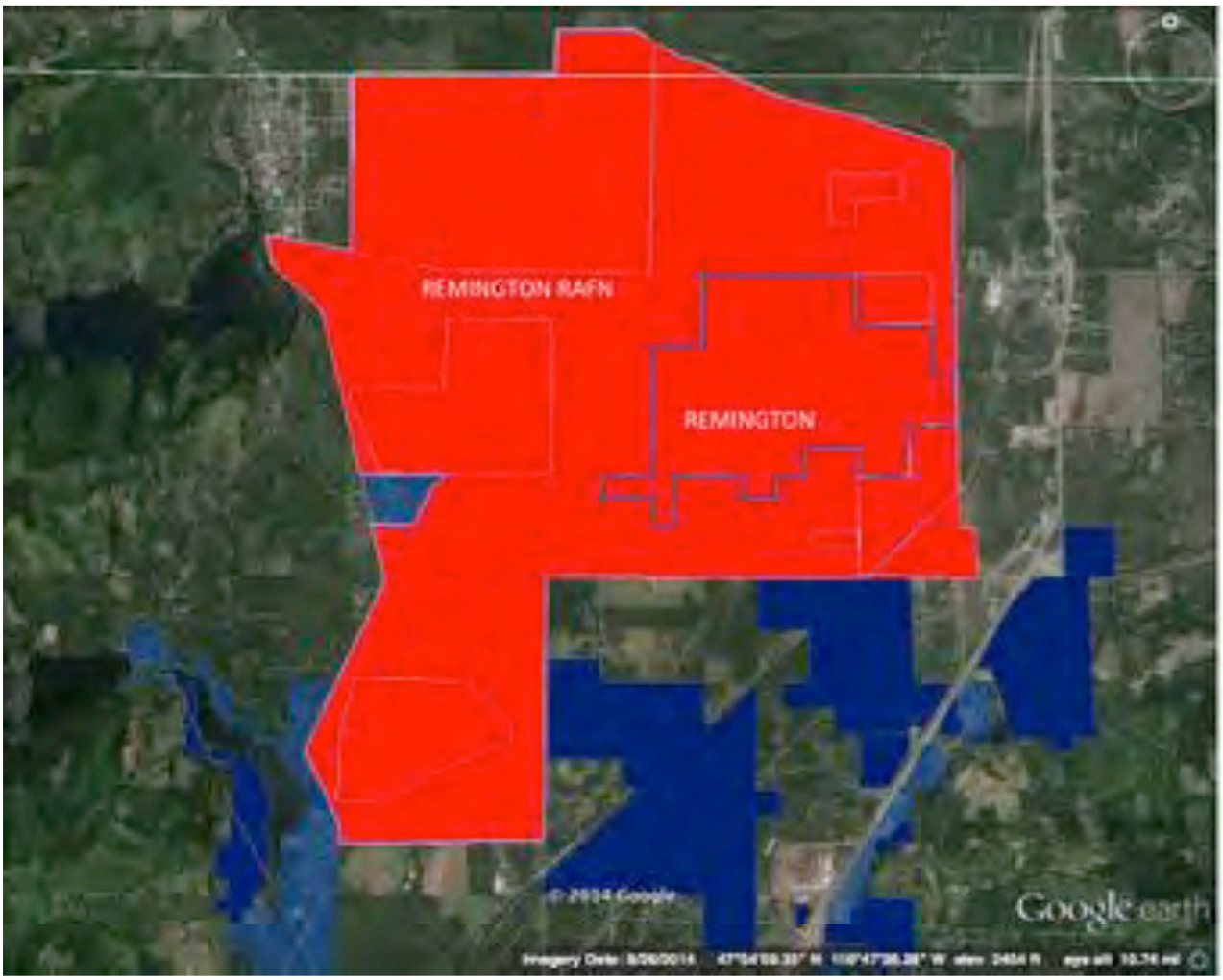
Water Rights Gap Analysis

Rathdrum Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
City of Rathdrum	95-4403	1/1/1930	Statutory Claim	0.67	-	Municipal
Thomas Brickert	95-2130	10/13/1959	License	3.86	1120.0	Irrigation
George Thayer	95-16466	11/18/1963	License	1.95	486.9	Municipal
George Thayer	95-11426	11/2/1964	License	1.81	426.85	Municipal
George Thayer	95-16378	4/11/1964	License	3.71	931.36	Municipal
City of Rathdrum	95-7047	3/18/1969	License	1.30	-	Municipal
George Thayer	95-10175	5/23/1878	License	0.80	175.0	Municipal
City of Rathdrum	95-7881	12/1/1978	License	2.00	-	Municipal
George Thayer	95-16371	6/28/1979	License	0.60	91.0	Municipal
Carl Nagel	95-16386	5/29/1986	License	0.20	30.0	Municipal
Total				**16.90**		

Rathdrum Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Rathdrum	16.90	21.12	4.22	41.47	24.57	1.0

REMINGTON RECREATIONAL WATER AND SEWER DISTRICT

The Remington Recreational Water and Sewer District anticipates an increase from a current service area of 5 square miles to 34.9 square miles by 2045.



Population

Remington currently serves a population of 584, which is predicted to grow to 5,186 by 2045. Population density within Remington's service boundary is projected to increase from 118 to 149 residents per square mile.

Remington Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
909	5989	5.0	34.9	186	159

Water Demand

Annual water demand is predicted to increase to 559 MGY, maximum daily demand will grow to 8.09 MGD, and peak hourly demand will increase to 0.74 MGD.

Remington Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
63	415	1.60	9.34	2.48	14.45	0.13	0.85	4.83	27.35	352	11.98	22.52

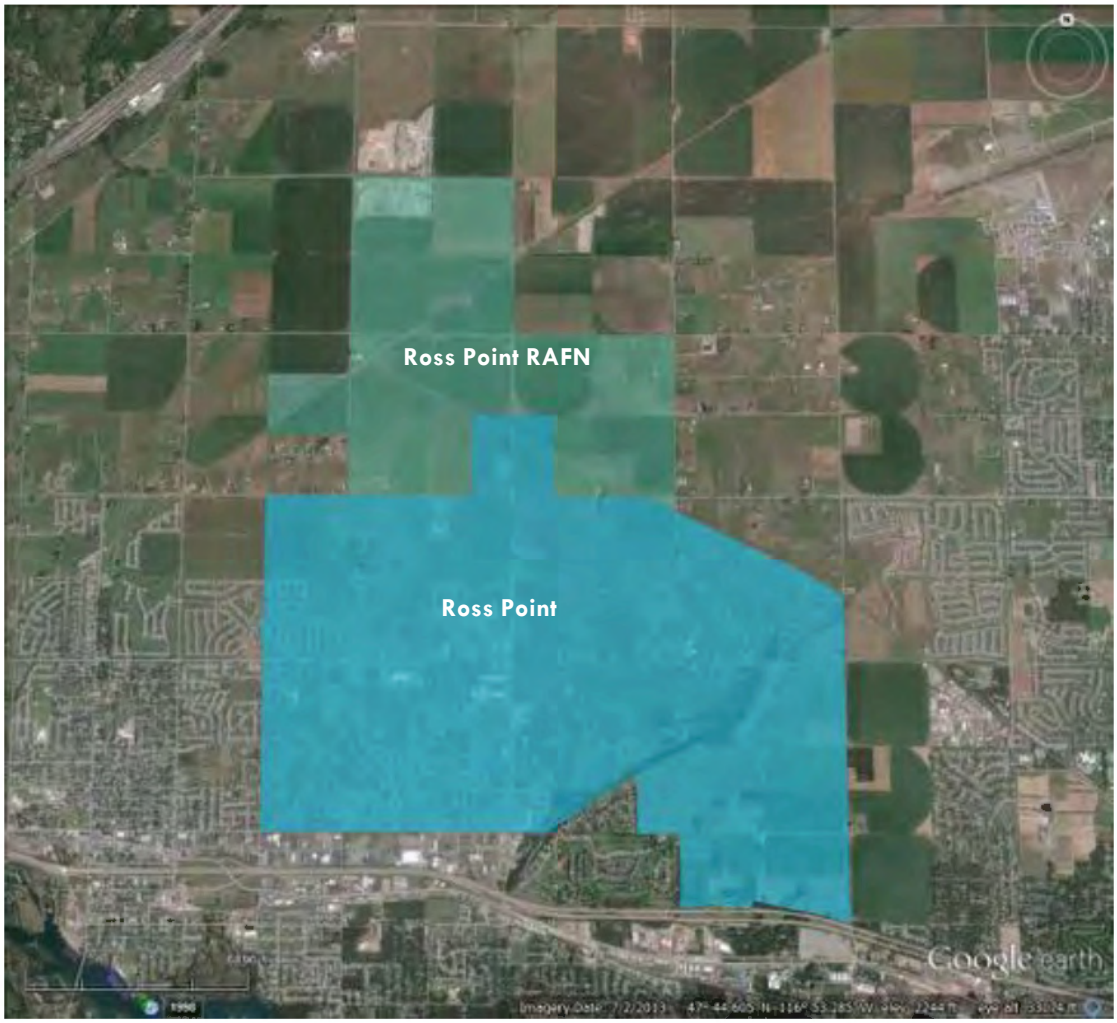
Water Rights Gap Analysis

Remington Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Remington Water District	95-9457	11/14/1996	License	0.33	-	Municipal
Remington Water District	95-9458	12/12/1996	License	1.92	-	Municipal
Remington Water District	95-9427	10/18/2007	Permit	5.90	-	Municipal
Total				**8.15**	**-**	

Remington Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Remington	5.90	14.45	8.55	27.35	21.45	~

ROSS POINT WATER DISTRICT

Ross Point Water District anticipates an increase from a current service area of 7.2 square miles to 10.3 square miles by 2045.



Population

Ross Point currently serves a population of 3,942, which is predicted to grow to 16,190 by 2045. Population density within Ross Point's service boundary is projected to increase from 550 to 1,572 residents per square mile.

Ross Point Population Summary					
2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
3942	16190	7.2	10.3	550	1572

Water Demand

Annual water demand is predicted to increase to 1,959 MGY, maximum daily demand will grow to 16.19 MGD, and peak hourly demand will increase to 1.07 MGD.

Ross Point Water Demand Summary												
2014 Annual Volume (MGY)	2045 Annual Volume (MGY)	2014 MDD (MGD)	2045 MDD (MGD)	2014 MDD (cfs)	2045 MDD (cfs)	2014 PHD (MGH)	2045 PHD (MGH)	2014 PHD (cfs)	2045 PHD (cfs)	Δ Annual Volume (MGY)	Δ MDD (cfs)	Δ PHD (cfs)
477	1959	5.68	16.19	8.78	25.05	0.45	1.07	16.71	39.68	1482	16.27	22.97

Water Rights Gap Analysis

Ross Point Water Rights Portfolio						
Original Owner	Water Right Number	Priority Date	Basis of Right	Division Limits		
				CFS	A-F	Purpose
Ross Point Water District	95-4088	6/1/1912	Statutory Claim	1.00	-	Municipal
Lyle Jacklin	95-15531	11/5/1952	License	0.94	220.5	Irrigation
Roy Pettinger	95-15533	2/8/1955	License	2.87	774.0	Irrigation
Lyle Jacklin	95-15527	11/14/1967	License	0.94	220.5	Irrigation
Ross Point Water District	95-7258	2/20/1973	License	1.03	692.6	Municipal
Jacklin Seed Company	95-7698	2/18/1977	License	1.25	365.0	Irrigation
Ross Point Water District	95-8477	5/1/1985	License	2.51	925.0	Municipal
Ross Point Water District	95-9009	2/12/1999	License	5.25	-	Municipal
Total				**16.31**		

Ross Point Water Right Gap Analysis						
Provider	Maximum Water Right (cfs)	2045 MDD (cfs)	Additional Water Right Requirement Based on MDD (cfs)	2045 PHD (cfs)	Additional Water Right Requirement Based on PHD (cfs)	Storage (MG)
Ross Point	16.31	25.05	8.74	39.68	23.37	1.0