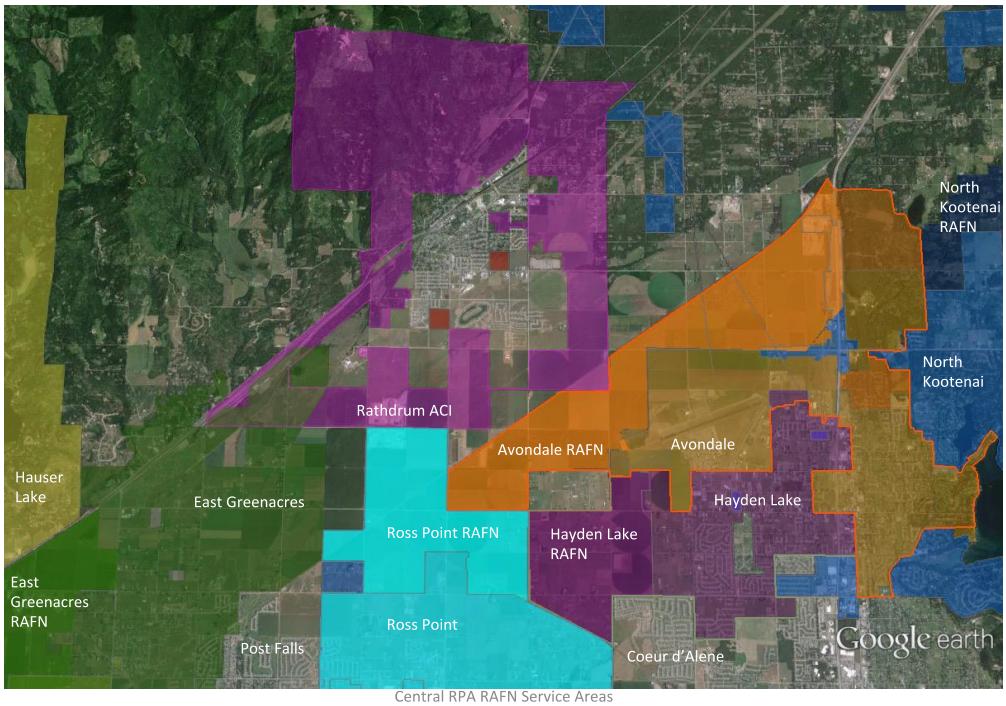
RATHDRUM PRAIRIE AQUIFER FUTURE WATER DEMAND



Central RPA RAFN Service Areas

12/15/14

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Approximately 85,000 acre foot (AF) annually is withdrawn from the RPA for municipal, domestic, commercial, industrial, and agricultural use. Of that, 36,400 AF is withdrawn by RPA municipal providers with eleven providers supplying water to 95% of the RP population.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 61.53 cfs, and the Peak Hourly Demand will increase by 171.81 cfs.

RAFN rights totaling 58.86 cfs are required to meet the 2045 MDD of five RPA municipal providers. The rights are offset by a decrease of 103.74 in MDD required rights among six other RPA municipal providers. RAFN rights totaling 264.69 cfs are required to meet the 2045 PHD of ten RPA municipal providers. The 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.

IWRRI December 2014

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.

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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

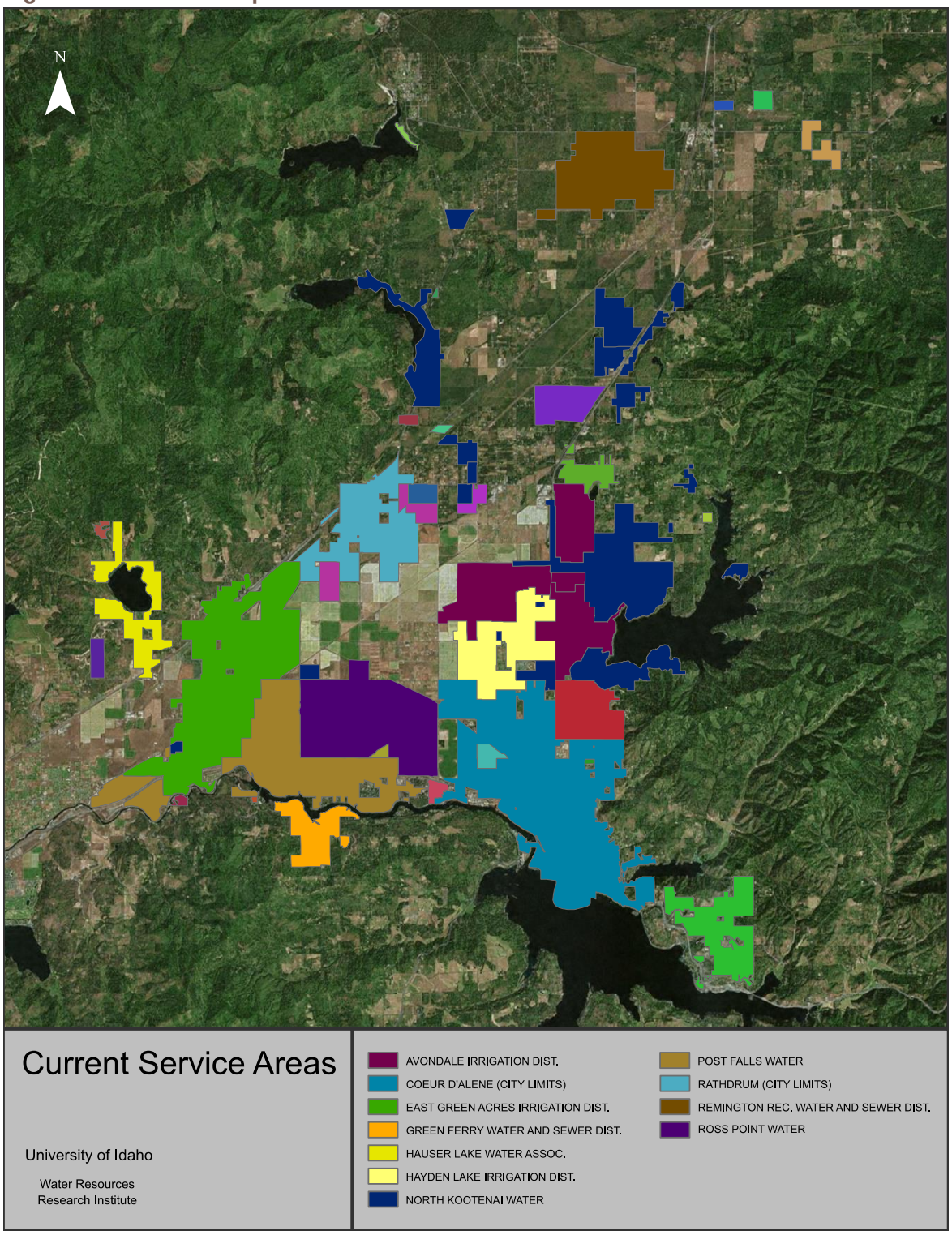

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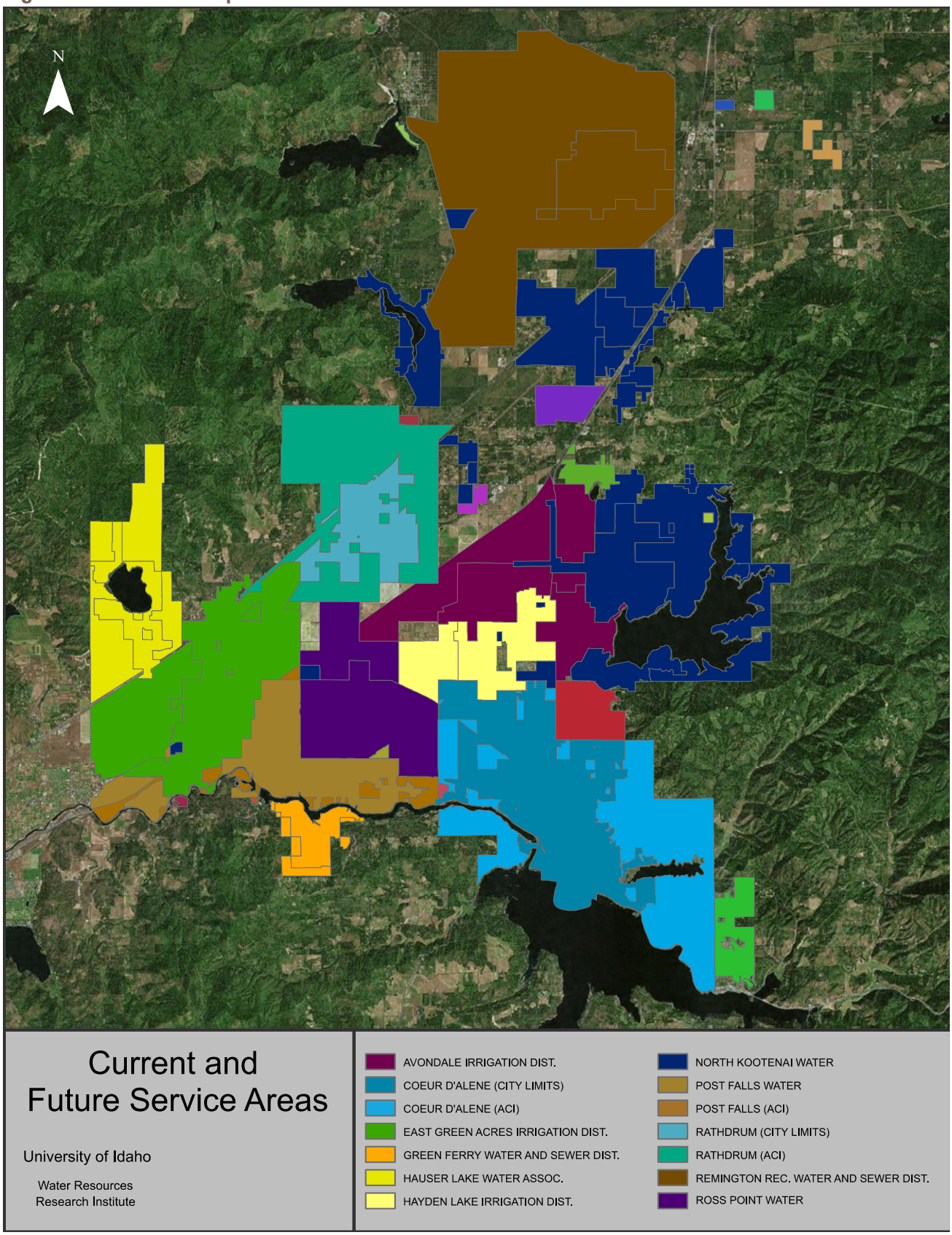
Figure 2. 2045 Municipal Provider Service Areas



IWRRI December 2014

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:

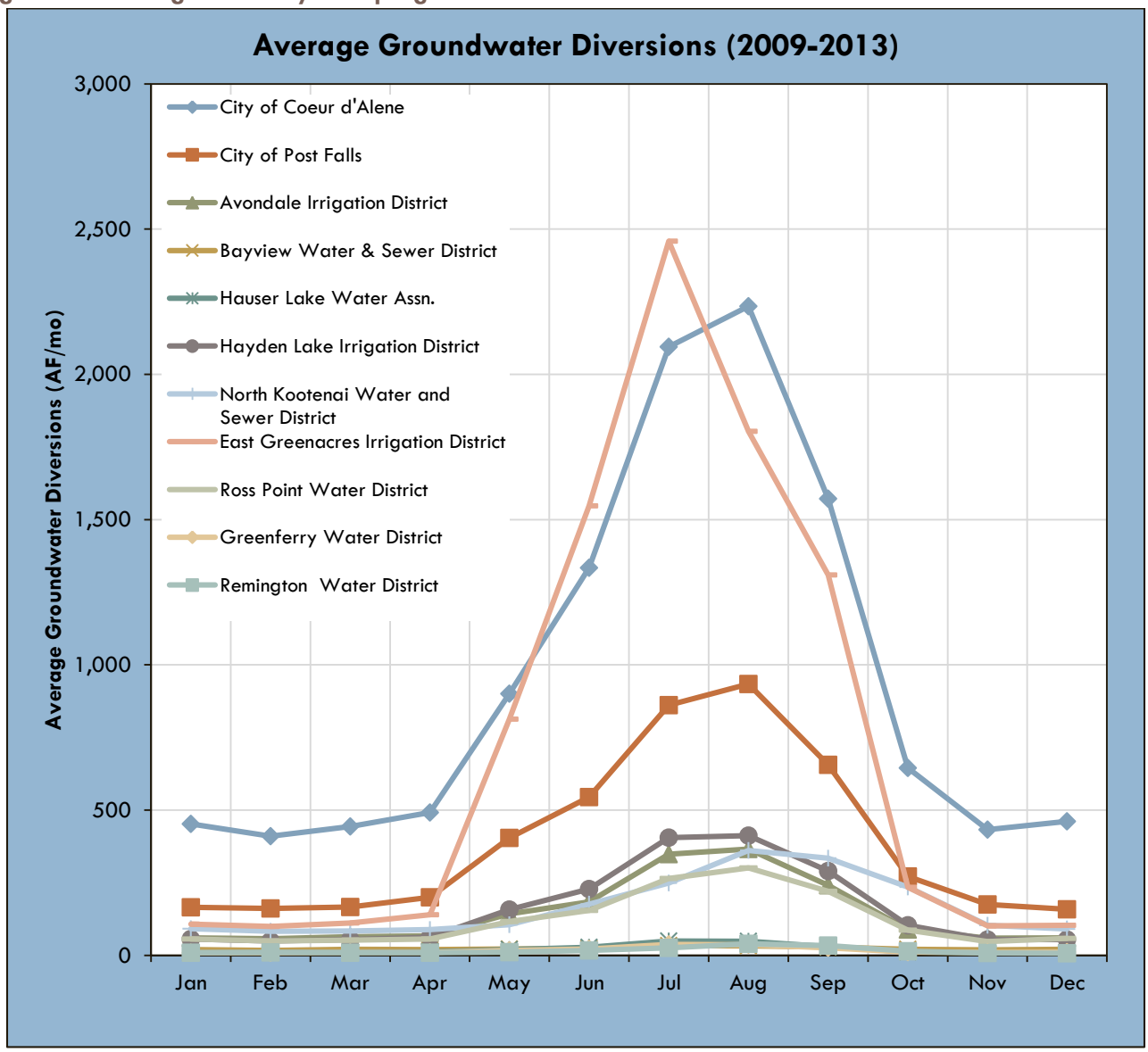
1. Request water-diversion data from Rathdrum Prairie water purveyors (list provided by IWRRI);
2. Compile water purveyor production data from 2009 to 2013;
3. Estimate current indoor (e.g., potable) and outdoor (i.e., irrigation) water use within purveyor service areas;
4. Develop estimates of total 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

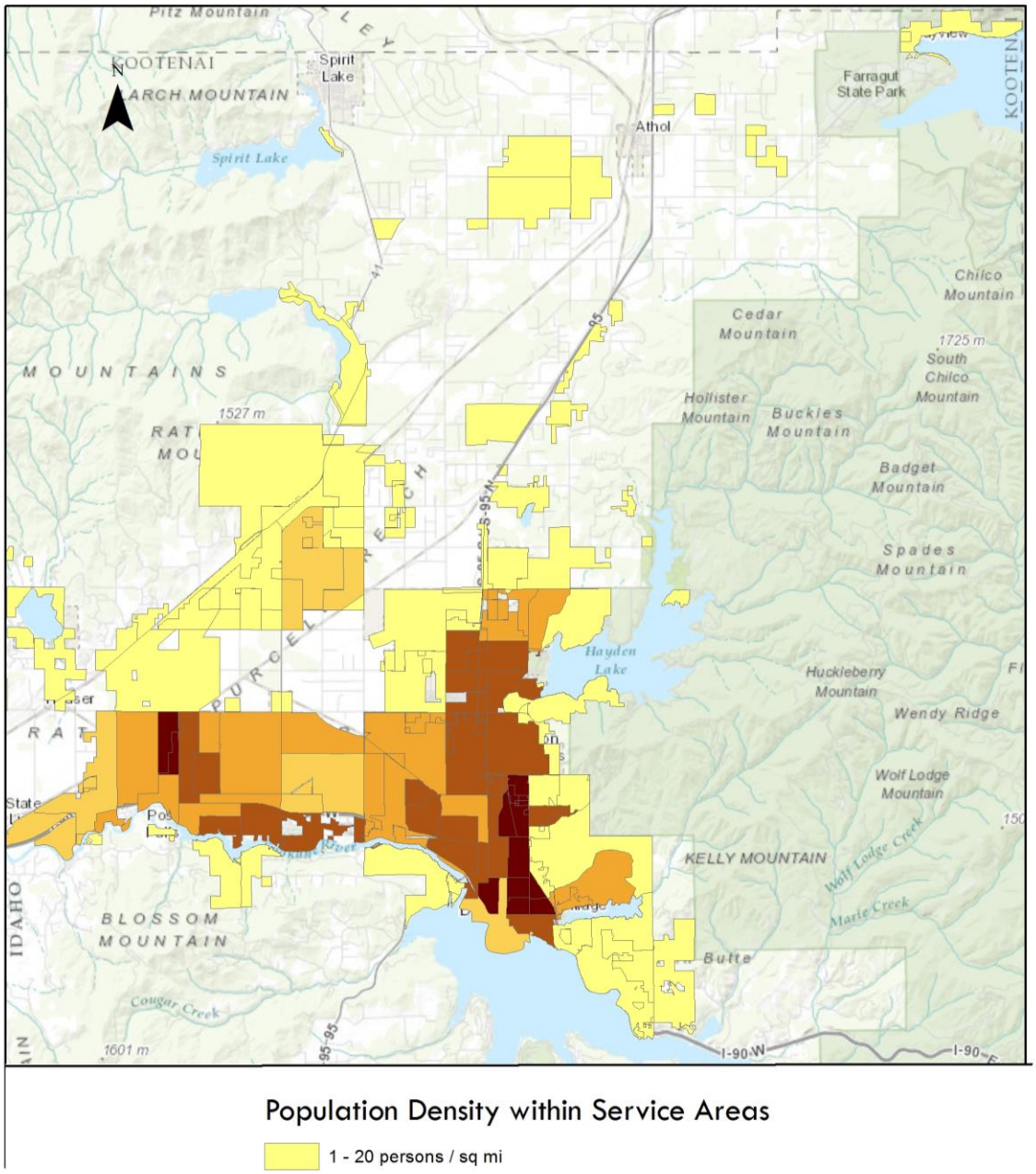


Figure 5. RPA Census Tracts with Population Outside Current Service Areas

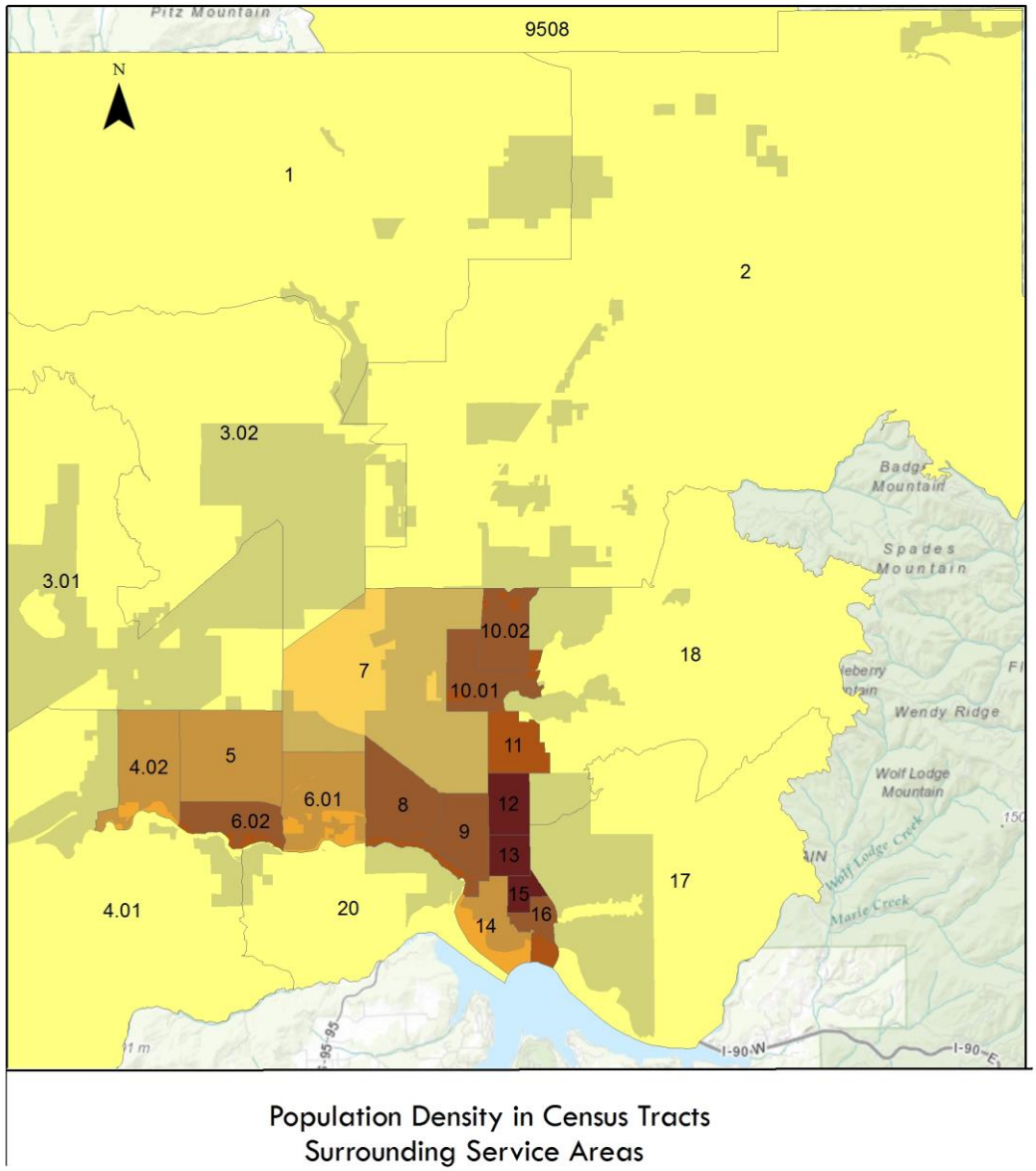


Table 6. Estimated Population Outside of Current Service Area

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

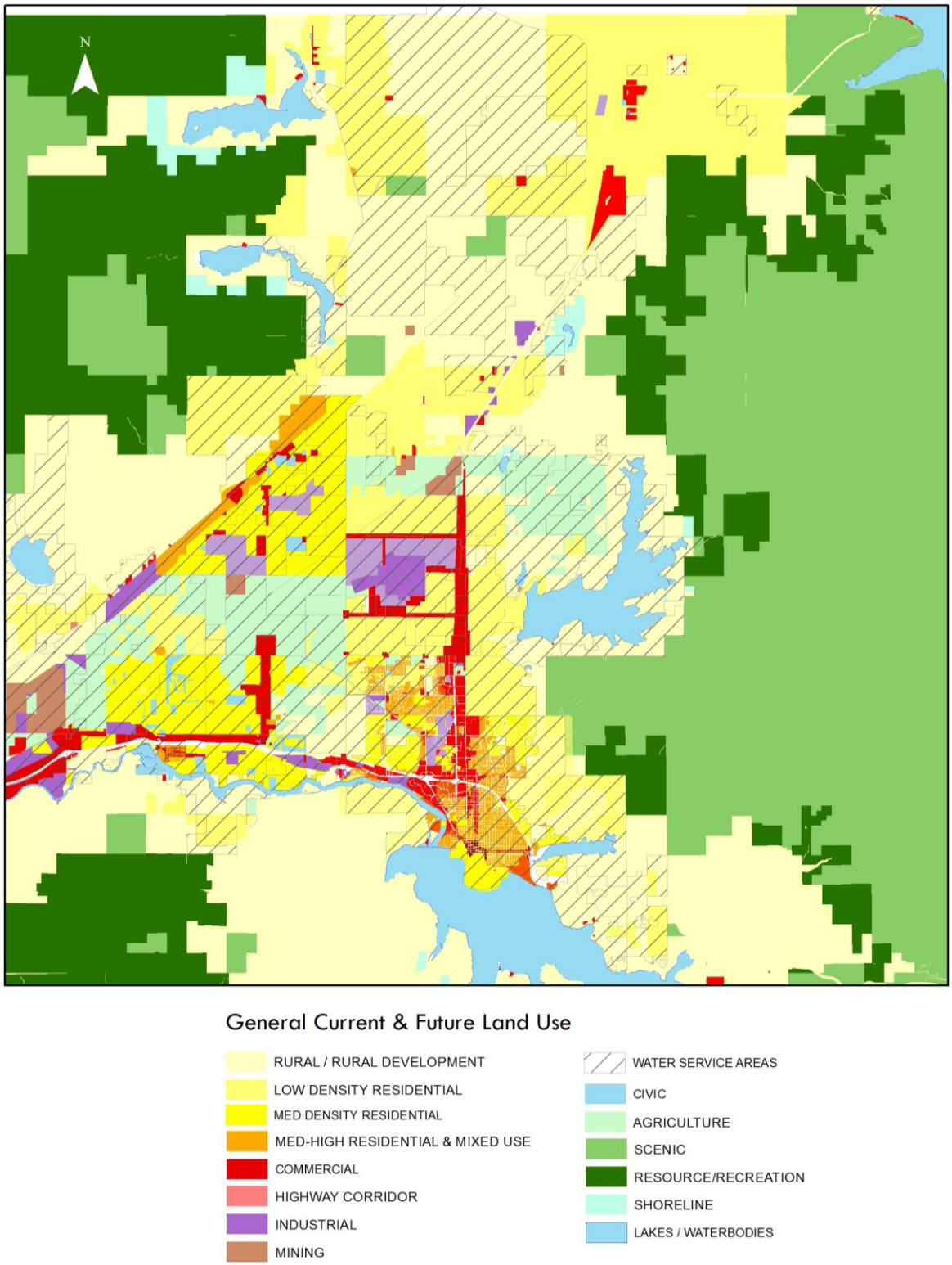
Population projections for future service needs are dependent on the definition of new service area boundaries. Population growth for these regions is first calculated at the census block group level, using a cohort component method. This method takes into account natural birth and death rates, and net 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?

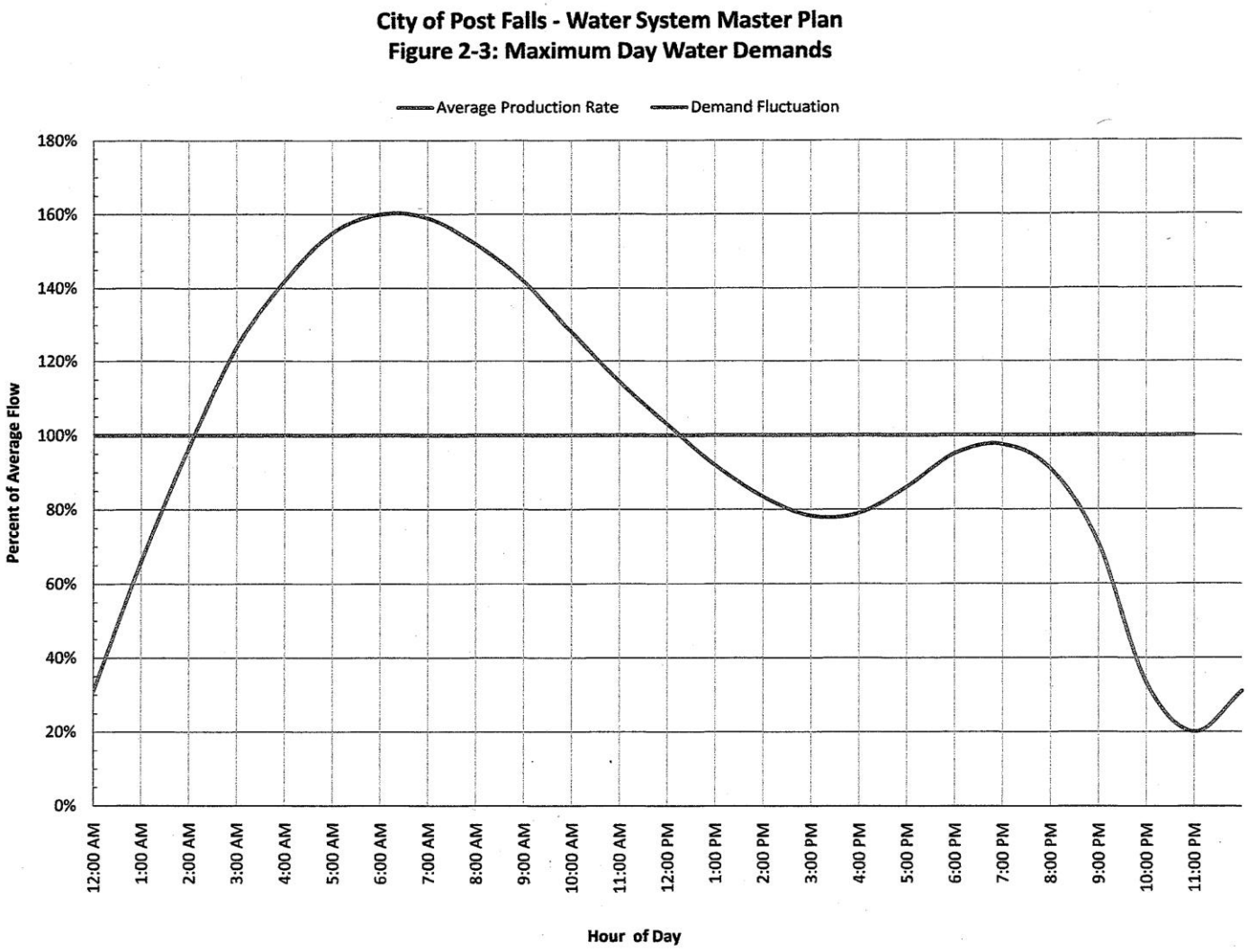
RECOMMENDATION: IDWR SHOULD CONSIDER APPROVING RPA RAFN RIGHTS AT MDD FLOW RATES WITH PERIOD-OF-USE RESTRICTED HIGHER PHD FLOW RATES.

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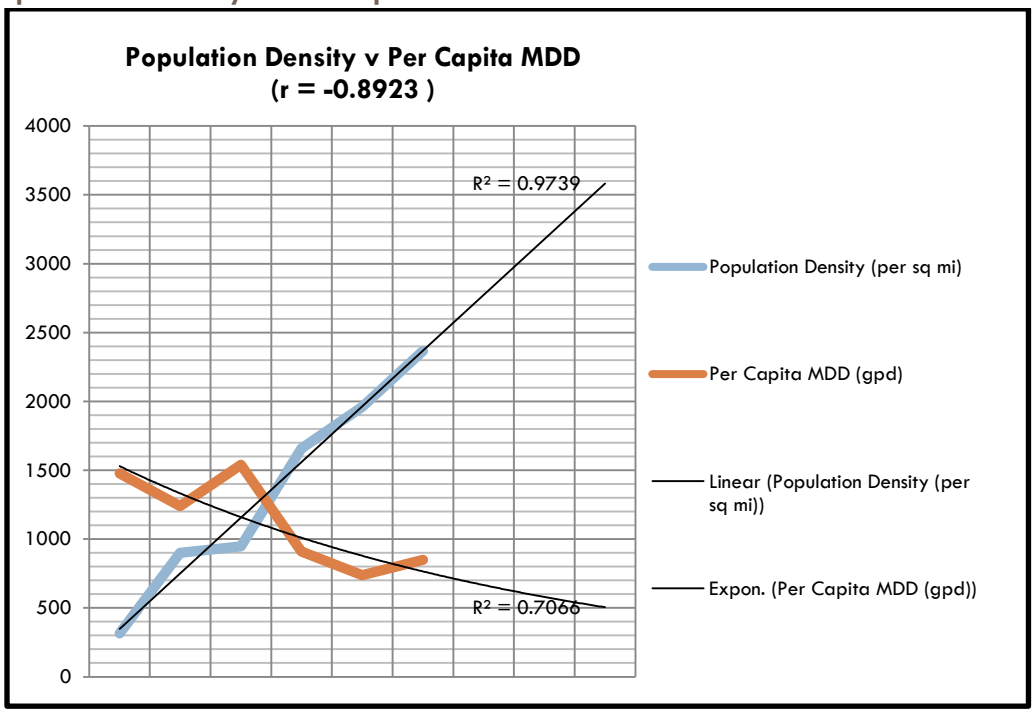
Provider specific per capita MDD and population density was then graphed and correlated (r= -0.8923).

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.

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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**	**61.55**

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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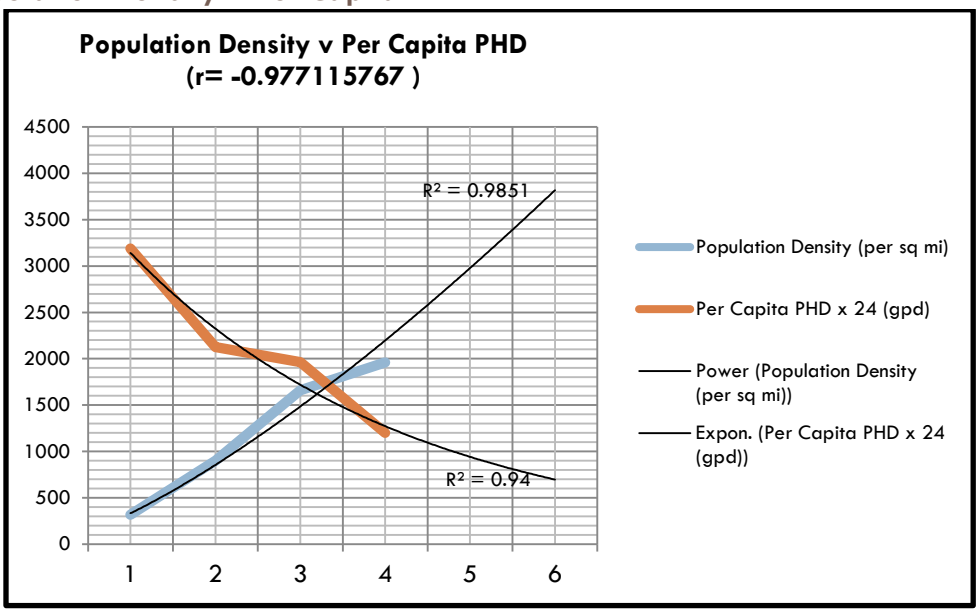
Figure 9. Population Density v Per Capita PHD



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	0.85	0.13	0.72	32.13
Hauser Lake	2647	304	128	0.34	0.09	0.25	11.10
Greenferry	4800	1920	74	0.36	0.13	0.23	10.04
Avondale	7838	612	112	0.88	0.5	0.38	16.85
Rathdrum	9545	530	117	1.12	0.52	0.60	26.61
East Greenacres	14299	831	102	1.46	2.39	-0.93	-41.54
North Kootenai	29435	994	97	2.86	1.07	1.78	79.55
Ross Point	16190	1572	66	1.07	0.45	0.62	27.58
Hayden Lake	11216	1869	56	0.63	0.54	0.18	3.93
Post Falls	24523	2919	44	1.08	0.80	0.13	12.47
Coeur d'Alene	64027	3722	53	1.73	1.74	-0.01	-0.50
Total				**12.21**	**8.36**	**3.85**	**171.53**

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	0.85	37.91	352	11.98	32.11
Hauser Lake	81	317	1.0	4.00	6.18	0.09	0.34	15.11	236	4.64	11.10
Greenferry	68	330	1.44	4.32	6.68	0.13	0.36	16.05	262	4.46	10.26
Avondale	567	788	7.0	10.97	16.98	0.5	0.88	39.15	221	6.15	16.85
Rathdrum	566	770	7.58	13.65	21.12	0.52	1.12	49.80	204	9.40	26.61
East Greenacres	2877	4766	41.96	19.16	29.64	2.39	1.46	65.04	1889	-35.28	-41.54
North Kootenai	652	1717	17.2	37.09	57.39	1.07	2.86	127.33	1065	30.77	79.55
Ross Point	477	1959	5.68	16.19	25.05	0.45	1.07	47.65	1482	16.27	27.58
Hayden Lake	628	1067	6.0	10.54	16.31	0.54	0.63	28.01	439	7.03	3.93
Post Falls	1531	2346	11.8	15.94	24.66	0.80	0.93	41.56	815	6.41	5.87
Coeur d'Alene	3738	5803	32.19	32.01	49.53	1.74	1.73	77.09	2065	-0.27	-0.50
Totals	**11248**	**20278**	**133.45**	**173.21**	**267.99**	**8.36**	**12.23**	**544.7**	**9030**	**61.56**	**171.82**

*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	37.91	32.01	~
Hauser Lake	2.65	6.18	3.53	15.11	12.46	~
Greenferry	2.05	6.68	4.63	16.05	14.00	~
Avondale	19.09	16.98	-2.11	39.15	20.06	~
Rathdrum	16.90	21.12	4.22	49.80	32.90	1.0
East Greenacres	97.90	29.64	-68.26	65.04	-32.86	0.325
North Kootenai	28.20	57.39	29.19	127.33	99.13	~
Ross Point	16.31	25.05	8.74	47.65	31.34	1.0
Hayden Lake	24.00	16.31	-7.69	28.01	4.01	~
Post Falls	33.84	24.66	-14.23	41.56	2.67	6.25
Coeur d'Alene	60.98	49.53	-11.45	77.09	16.11	6.0
Total	**307.82**	**267.99**	**-44.88**	**544.7**	**231.83**	**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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