# Memorandum

To: People interested in Rathdrum Prairie water and aquifer management

From: The Rathdrum Prairie Comprehensive Aquifer Management Plan (CAMP) Advisory Committee

Date: November 4, 2010

Subject: Review of the Draft

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The Rathdrum Prairie CAMP Avisory Committe is pleased to offer a draft plan for public review.

At the request of the Idaho Water Resource Board, our eighteen-member Advisory Commitee continues to deliberate on water supply and demand issues looking out 50 years into the future. This Committee represents a variety of water interests, including local business leaders, elected officials, environmental representatives, government representatives, and local water providers. The Idaho Water Resource Board has specifically tasked the Advisory Committee with the following goals:

1. Provide reliable sources of water, projecting 50 years in to the future
2. Develop strategies to avoid conflicts over water resources
3. Prioritize future state investments in water
4. Bridge the gaps between future water needs and supply

Before we submit our final recommendations to the Idaho Water Resource Board, we would like to collect input and advice. As such, we hope to receive feedback on the draft via the open house scheduled for November 18, 5 p.m.- 9 p.m., at the Coeur d'Alene public library or via the online survey located at www.idwr.gov. We will be collecting public input until December 1.

We look forward to discussing your feedback at the next Advisory Committee meeting, also at the Coeur d'Alene public library on December 10. Thank you, in advance, for your input on this plan.

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# Rathdrum Prairie Aquifer

## Comprehensive Aquifer Management Plan

*Vision: Provide a sustainable source of high-quality groundwater for current and future economic, social, and environmental benefits, and preserve the exceptional quality and reliability of the Rathdrum Prairie Aquifer.*

Draft of October 30, 2010

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# Glossary

## Abbreviations and Terms

| | |
|---|---|
| acre foot | A volume of water equivalent to one acre covered in water one foot deep. One acre foot (af) equals 325,851 gallons |
| afa | Acre foot per annum. Rate of water flow equivalent to 1 acre foot of water flowing in a 1 year period. |
| aquifer | A water-bearing layer of rock that will yield water in a usable quantity to a well or spring |
| CAMP | Comprehensive Aquifer Management Plan |
| cfs | Cubic feet per second. A rate of flow equal to one cubic foot of water passing a point each second. One cfs equals approximately 7.48 gallons per second, or 449 gallons per minute. |
| consumptive use | Consumptive use is water that is actually consumed and not returned to the immediate water environment. It is the portion of water that evaporates, is used in products or crops, or consumed by humans or livestock. |
| GWMA | Ground Water Management Area |
| M&E | Monitoring and Evaluation |
| mgd | Million gallons per day |
| the Plan | Rathdrum Prairie Comprehensive Aquifer Management Plan |
| RPA | Rathdrum Prairie Aquifer, Idaho |
| RP CAMP | Rathdrum Prairie Comprehensive Aquifer Management Plan |
| Sensitive Resource Aquifer | A sensitive resource aquifer is considered to have good water quality, is highly vulnerable to contamination and an irreplaceable source. Activities that could degrade the aquifer shall be managed in a manner which maintains or improves existing water quality through the use of best management practices and best available methods. The Rathdrum Prairie Aquifer is Idaho's only sensitive resource aquifer.Sensitive Resource aquifers require the strongest level of protection. |
| SVRPA | Spokane Valley Rathdrum Prairie Aquifer, Idaho and Washington |

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## Key Agencies

| | |
|---|---|
| APD | Rathdrum Prairie Aquifer Protection District (jurisdiction over Kootenai County) |
| IDEQ | Idaho Department of Environmental Quality |
| WDOE | Washington Department of Ecology |
| EPA | Environmental Protection Agency |
| IDWR | Idaho Department of Water Resources (also abbreviated as "Department") |
| IPH | Idaho Panhandle Health |
| IWRB | Idaho Water Resource Board (also abbreviated as "Board") |
| USGS | United States Geological Survey |

## Conversion table for units of water

| | | |
|---|---|---|
| 1 acre-foot | 43,560 cubic feet per day | 325,851 gallons |
| 1 cubic foot | 7.48 gallons | 448.800 gallons per minute (gpm) |
| 1 cfs for 1 year | 235,889,280 gallons | 723.97 acre-feet |
| 1 million gallons | 133,689 cubic feet | 3.07 acre feet |
| 1 million gallons per day (mgd) | 3.07 acre-feet per day | 1,1acre feet per year |
| 1,000 gallongs per minute | 2.2 cfs | 4.4 acre-feet per day |

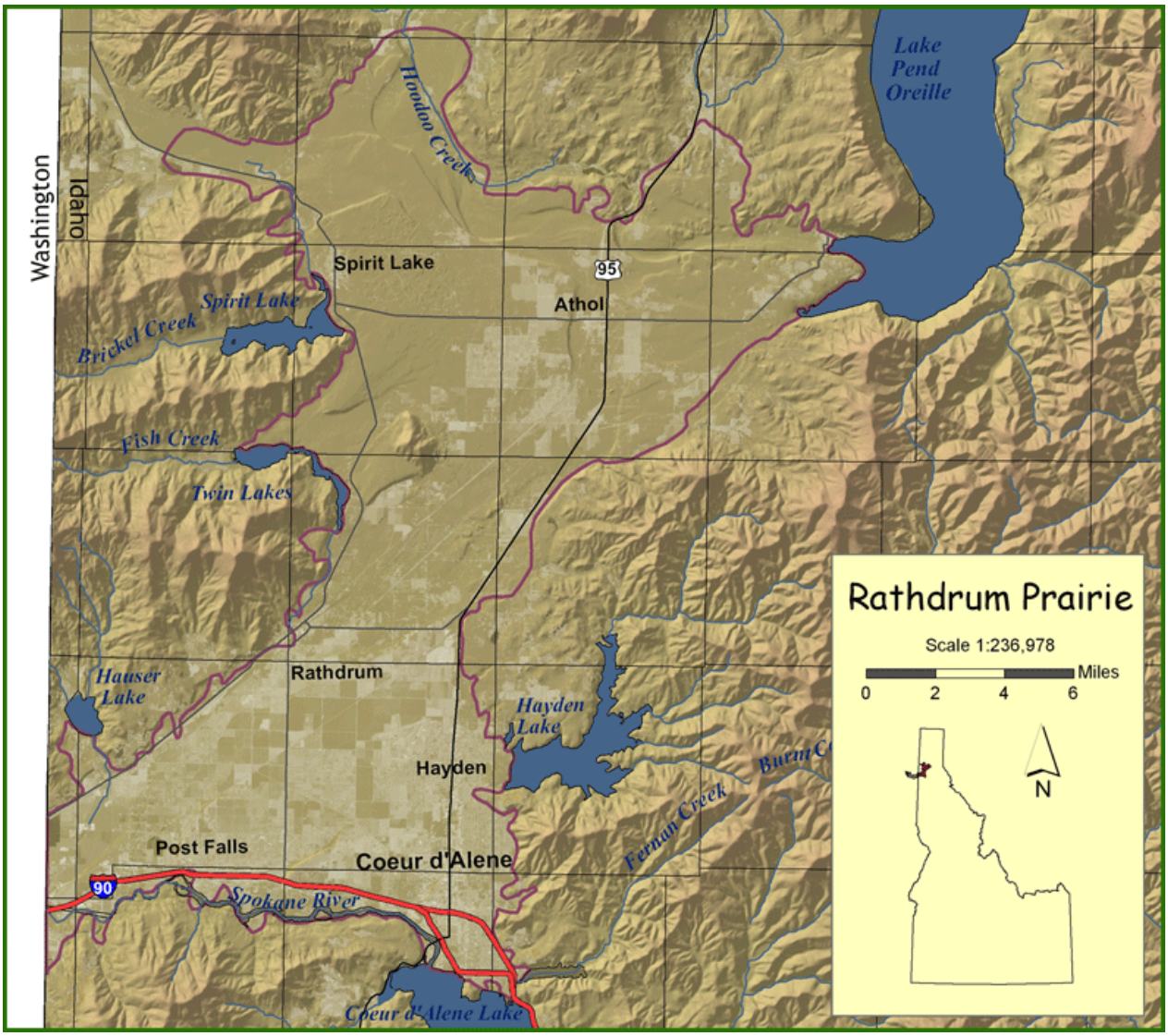


Figure 1. Rathdrum Prairie Aquifer Map

# 1.0 Executive Summary

The Rathdrum Prairie Aquifer in Northern Idaho is a valuable and significant resource to the region and the state of Idaho. Lying under parts of Kootenai and Bonner counties, the aquifer is a key part of the regional water resources which make the area a magnet for economic growth and an attractive place to live and work. The region produces approximately 8 percent of goods and services in the state of Idaho resulting in an estimated value of $4 billion. Beyond the economic value to the state, the region provides cultural and social benefits throughout the bi-state Spokane Valley-Rathdrum Prairie in Washington and Idaho.

The Rathdrum Prairie Comprehensive Aquifer Management Plan (Plan) provides a framework for long-range management of the aquifer. The Plan describes the overarching goals and recommended actions which can be implemented to successfully accomplish the stated goals for local residents, the state of Idaho, and to promote productive regional cooperation to benefit the area over the next 50 years.

This document presents a Comprehensive Aquifer Management Plan (CAMP) for the Rathdrum Prairie Aquifer. At the direction of the Idaho Water Resource Board and Idaho Legislature, the Plan was developed collaboratively by the Rathdrum Prairie CAMP Advisory Committee. The committee submitted a recommended Plan to the Board for their consideration and adoption. Once adopted by the Board, the Plan will be submitted to the Idaho Legislature for final action.

The Idaho Water Resource Board (IWRB) developed the following goals for the statewide Comprehensive Aquifer Planning and Management Program are:

- Provide reliable sources of water, projecting 50 years into the future
- Develop strategies to avoid conflicts over water resources
- Prioritize future state investments in water
- Bridge the gaps between future water needs and supply

Based on the four goals, the Rathdrum Prairie Comprehensive Aquifer Management Plan Advisory Committee (AC) developed the following vision for the Plan:

*"Provide a sustainable source of high-quality groundwater for current and future economic, social, and environmental benefits, and preserve the exceptional quality and reliability of the Rathdrum Prairie Aquifer."*

The Committee developed the action items in Figure 2 to accomplish their vision.

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**Meet Future Demand for Water**

Projecting future water demand is an integral part of the Rathdrum Prairie CAMP process. The sufficiency of existing water resources cannot be determined without understanding the potential magnitude of future water demand.

The Rathdrum Prairie Aquifer Water Demand Projections report provides projections of Rathdrum Prairie water demand over the next 50 years. The water-demand study was conducted for (and funded by) the IWRB as part of the Rathdrum Prairie CAMP process. The study was conducted by SPF Water Engineering, LLC (SPF), AMEC Earth and Environmental (AMEC), Idaho Economics (John Church), and Taunton Consulting (Taunton), with guidance from the IWRB, IDWR, and the Rathdrum Prairie CAMP Advisory Committee. The following conclusions were drawn from that report.

Water demand by the year 2060 could rise from estimated current withdrawals of approximately 74,000 acre-feet to between 77,000 acre-feet (based on a low population-

## SUMMARY OF KEY ACTION ITEMS

(not ranked or placed in order of priority):

**Objective #1: Meet Future Demand for Water**

Enact water conservation measures that promote water efficiency and reduced use.

Establish municipal water rights to protect water resource available for future needs.

Identify local water use improvement strategies and develop partnerships to implement them.

Hydrologic and social impacts of exportation of water from the basin must be considered carefully.

Update the Rathdrum Prairie Future Water Demand Study.

**Objective #2: Prevent and Resolve Water Conflicts**

Develop a framework for regional discussion and cooperation for SVRPA water issues.

IDWR should develop criteria for future water augmentation projects in Idaho whose objective is to enhance the hydrologic system.

Identify local water use improvement strategies and develop partnerships to implement them.

Redefine the IDWR GWMA boundaries so they are consistent with the boundaries defined by the bi-state USGS study.

**Objective #3: Protect the Aquifer**

Assess all CAMP activities to ensure projects implemented through CAMP protect aquifer water quality.

Support and encourage the Aquifer Protection District to work with Panhandle Health District, Idaho Department of Environmental Quality, and others to address overlapping jurisdictions with the goal of improving efficiency.

Figure 2. Summary of Key Action Items

growth rate of 1.6% per year and aggressive water conservation) and 223,000 acre-feet (based on a higher population growth rate of approximately 3% per year and no water conservation). The area over the Rathdrum Prairie Aquifer has experienced both of these population-growth rates over multi-year periods in past decades.

The most likely 2060 water-demand projection ranges from approximately 101,000 to 163,000 acre-feet, depending on the level of water conservation. This projection is based on a moderate level of population growth (averaging approximately 2.3% per year) over the next 50 years.

The Rathdrum Prairie Aquifer is a highly prolific aquifer which fully satisfies the existing water needs and it is anticipated to meet future needs. However, to ensure that the water resources are put to optimum use to benefit the state of Idaho, this plan identifies actions which will protect the resource for future generations.

**Prevent and Resolve Water Conflicts**

The Plan addresses the long-term planning and management objectives and actions for the Rathdrum Prairie Aquifer located in Idaho. It is a part of the larger regional aquifer which is shared with the state of Washington. Additionally, the regional hydrological system is a dynamic interrelationship between the aquifer and the Spokane and Little Spokane Rivers in Washington. Although state authorities and planning programs do not cross the state and tribal boundaries, the larger regional interests and needs should be considered. The benefits of cooperation and coordination among the sovereigns in the region far outweigh the potential costs of conflict.

**Protect the Aquifer**

The Rathdrum Prairie Aquifer is a part of the larger Spokane Valley-Rathdrum Prairie Aquifer (SVRPA). The SVRPA is the sole source of drinking water for the residents living over the aquifer. The aquifer is vulnerable to water quality degradation which could influence the availability for beneficial use by local communities and residents. The protection of the aquifer from contamination is undertaken through a number of programs and authorities of local, regional and state entities.

The implementation of the Plan and all actions associated with the Plan will be assessed to ensure that water quality is maintained and coordinated with other responsible agencies and programs.

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**Plan Implementation**

To ensure that the valuable input of stakeholders continues during the implementation of these actions, this Plan establishes an Implementation Committee. The committee will assist IWRB staff by providing recommendations.

**Summary**

Although the Plan is built upon a substantial base of technical information and stakeholder guidance, it is recognized that present-day solutions may be refined and improved as new information, regional activities, and technologies are developed. Accordingly, the Plan includes an adaptive management component which requires ongoing coordination between the IWRB staff and Implementation Committee. The Plan provides for continued effort to identify and address all water use needs affected by this Plan, including environmental considerations.

The Plan also recognizes that successful implementation requires sufficient funding. The Committee expects that the preliminary funding recommendations and structure may need to be refined or modified as further research is conducted about the funding needs and legal opportunities.

## 2.0 Introduction

In 2008, the Idaho Legislature passed House Bills 428 and 644, establishing the statewide comprehensive aquifer planning and management effort and creating a fund to support the effort. The Idaho Water Resource Board and the Idaho Department of Water Resources initiated work in the Rathdrum Prairie to establish a framework and path forward which will lead to sustainable water supplies, optimum use of the aquifer and develop strategies to avoid future conflicts.

This effort was conducted under the leadership of the Idaho Water Resource Board (IWRB). The IWRB is the constitutionally established agency responsible for formulating and implementing the state water plan for optimum development of the water resources in the public interest. This plan is a component of the state water plan, which guides the development, use, conservation and management of water resources in Idaho.

The specific goals of the statewide CAMP program, and this specific CAMP, are to:

- Provide reliable sources of water, projecting 50 years into the future
- Develop strategies to avoid conflicts over water resources
- Prioritize future state investments in water
- Bridge the gaps between future water needs and supply

The IWRB recognizes that the long-term management of the water resources of the Rathdrum Prairie must be acceptable to the local community and take into account the social and economic interests of the residents and public interest. The long-range plan must also be consistent with the legal constraints and laws of Idaho. The Idaho Water Resource Board appointed an Advisory Committee to consider these interests and develop recommendations for this plan. For a list of Advisory Committee members, see Appendix 1.

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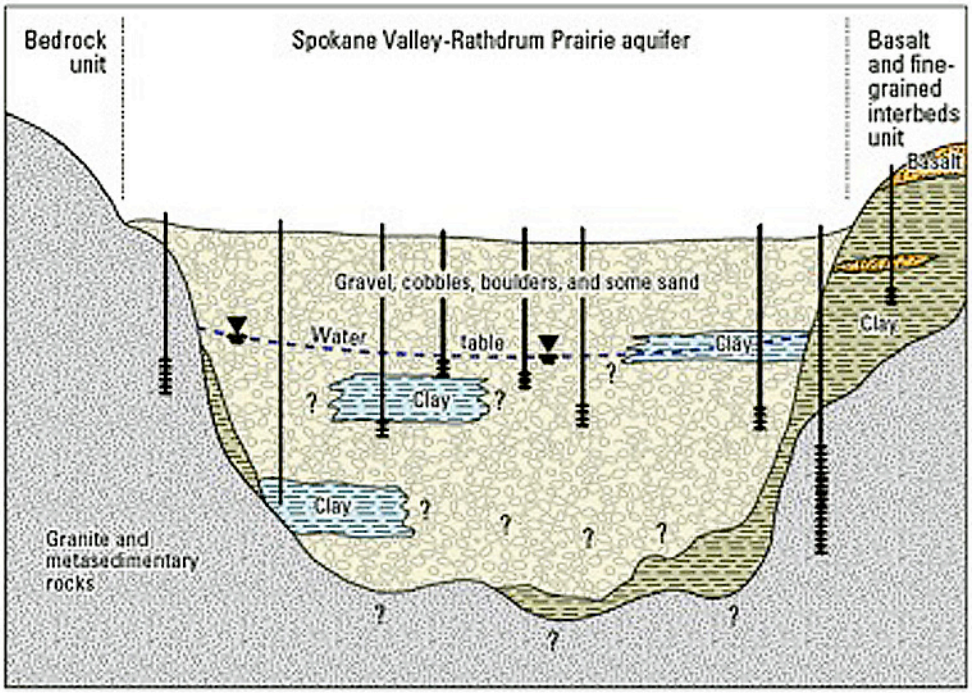


Simplified conceptual model of hydrologic conditions in the Spokane Valley-Rathdrum Prairie aquifer and surrounding hydrogeologic units, Spokane County, Washington, and Bonner and Kootanai Counties, Idaho.

Source: Hydrogeologic Framework and Ground-Water Budget of the SVRP Aquifer, Washington and Idaho. USGS Scientific Investigations Report 2007-5041

Figure 3. Hydrologic conditions in the SVRPA.

# 3.0 Background

## Regional setting and hydrological system

The Rathdrum Prairie Aquifer is the Idaho portion of the regional Spokane Valley-Rathdrum Prairie Aquifer in Northern Idaho and Eastern Washington. The RPA underlies approximately 250 square miles in Kootenai and Bonner Counties. Approximately two-thirds of the entire aquifer lies under Idaho. A population of over 500,000 live above the SVRPA, with the Idaho population accounting for approximately 128,000 or about 25%. Approximately 8% of Idaho's economy is generated within the Rathdrum Prairie area.

The RPA consists primarily of thick layers of coarse-grained sediments deposited during a series of massive floods from ancient Glacial Lake Missoula. These floods deposited sands, gravels, cobbles, and boulders across the landscape. The nature of the Rathdrum Prairie Aquifer has created one of the most productive and transmissive aquifers in the world. See Figure 3 for an illustration of hydrologic conditions found throughout in the SVRPA.

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**Rathdrum Prairie Aquifer – By the numbers**

The Spokane Valley-Rathdrum Prairie Hydrologic Project developed a region-wide water budget for the hydrologic system. The average annual inflow to the aquifer is approximately 1,470 cubic feet per second (cfs). Flow at the state line is approximately 900 cfs, based on the 10-year average (1995-2005).

In recent years, approximately 99 cfs of water was annually withdrawn from the Rathdrum Prairie Aquifer. Community water systems used 47 cfs (47.7)%; agricultural irrigation accounted for 34 cfs (34.3%); individual domestic wells used 12 cfs (12.2%); and commercial/industrial (self-supplied) totaled 6 cfs (5.8%). The estimated aggregate consumptive use (water lost from the local hydrologic system) was approximately 53 cfs.

**Ground-water surface water interaction**

There is a strong relationship between the Spokane River and the SVRPA. From the outlet of Coeur d'Alene Lake to its confluence with the Little Spokane River, the Spokane River alternatively transitions between reaches that lose to the SVRPA and reaches that gain from the SVRPA. The Spokane River is perched above the aquifer through its entire reach in Idaho from the outlet of Coeur d'Alene Lake to beyond the border between Idaho and Washington. In Idaho, there is no direct connection between groundwater pumping in Idaho and the Spokane River flows due to the perched condition of the river over the aquifer. In Washington, however, there is a direct connection with several gaining and losing reaches of the river which result in water seeping from the river into the aquifer (losing reaches) or water discharging from the SVRPA into the river.

**Water quality**

The overall quality of the RPA is very good. The highly permeable soils and gravels over the RPA make it susceptible to contamination. In 1978, the RPA was designated by the Environmental Protection Agency as a Sole Source Aquifer under the Safe Drinking Water Act. This designation requires all federally funded projects that have the potential to contaminate the aquifer are subject to EPA review. In 1997, the RPA received additional protection from the state of Idaho and is now designated a Sensitive Resource Aquifer.

Due to the vulnerability of the aquifer to contamination, ongoing protection programs have been implemented by local and state agencies. These programs have resulted in protecting or improving the groundwater quality despite a significant increase in population over the RPA.

Due to the vulnerability of the aquifer to contamination, ongoing protection programs have been implemented by local and state agencies. These programs have resulted in protecting or improving the groundwater quality despite a significant increase in population over the RPA.

**Studies**

This plan references several studies and reports on the RPA, and various planning processes precede the work conducted for this CAMP. Please see Appendix 2 for a Chronology of Studies and Events relevant to the Rathdrum Prairie Aquifer.

## Future demand for water

Critical to the development of the RP CAMP is estimation of future water demands. Water demand overlying the Rathdrum Prairie Aquifer Future water demand was projected for a 50-year time horizon (2060). This study included consideration of the potential impacts of climate variability during this time frame on water supply and demand in the area. A qualitative estimate of conservation and water demand was also included in the study. A basic assumption in the calculation is that the service area remains centered over the aquifer without additional exportation of water to outlying areas. See Appendix 3 for the executive summary of this study.

The primary conclusions from this analysis include the following:

The Rathdrum Prairie Aquifer area population growth is projected to grow from approximately 128,000 people to approximately 400,000 people by the year 2060, reflecting an average growth rate of approximately 2.3% per year. If population growth for the next 50 years is at the same 1.6% annual rate experienced between 1980 and 1990, the 2060 population overlying the aquifer will be approximately 286,000 people.

If the population grows at a rate of 3% per year (which is less than the 3.7% annual growth between 1970 and 2007), the 2060 population overlying the Rathdrum Prairie Aquifer will be approximately 581,000 people.

Water demand by the year 2060 could rise from estimated current withdrawals of approximately 74,000 acre-feet to between 77,000 acre-feet (based on a low population-growth rate of 1.6% per year and aggressive water conservation) and 223,000 acre-feet (based on a higher population growth rate of approximately 3% per year and no water conservation). The Rathdrum Prairie Aquifer area has experienced both of these population-growth rates over multi-year periods in past decades.

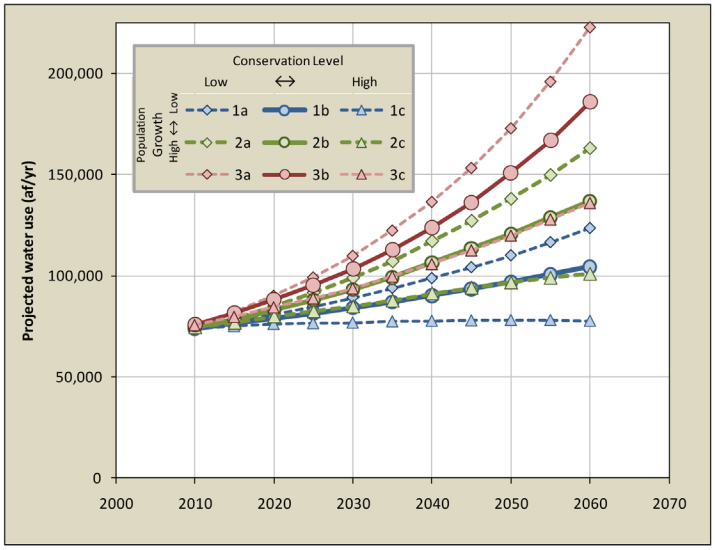


Figure 4. Future demand projections

The most likely 2060 water-demand projection ranges from approximately 101,000 and 163,000 acre-feet, depending on the level of water conservation. This projection is based on a moderate level of population growth (averaging approximately 2.3% per year) over the next 50 years. See Figure 4. Future demand projections.

The consumptive use is water that is actually consumed and not returned to the immediate water environment (i.e., aquifer and Spokane River), mostly through evapotranspiration. The consumptive use is projected to increase from approximately 40,000 acre-feet in 2010 to between 59,000 and 76,000 acre-feet in the year 2060 under moderate population- and employment-growth rates. This range reflects the effects of different water conservation levels. See Figure 5. Consumptive use projections.

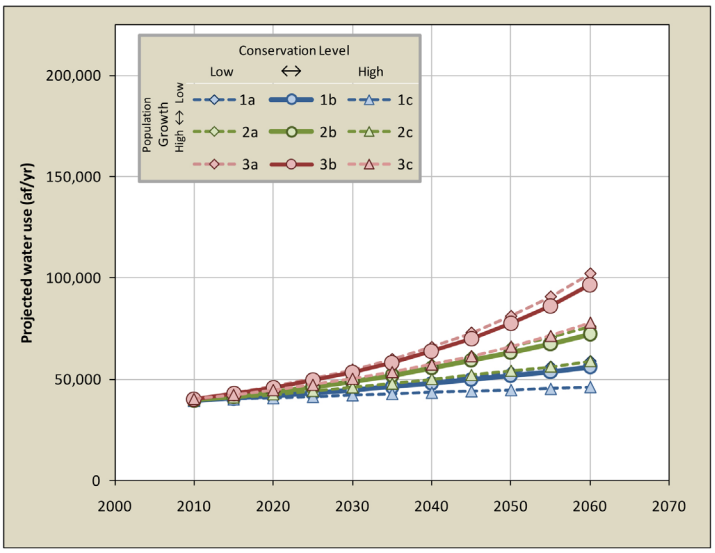


Figure 5. Consumptive use projections

The water use for agricultural irrigation will likely decrease in time as irrigated agricultural land is replaced by more urban and suburban land uses. However, development of new residential and municipal irrigation on land (i.e. lawns) that is currently non-irrigated will likely lead to an overall increase in total irrigation demand.

The Idaho Department of Water Resources conducted a modeling exercise to assess the potential impact on the Spokane River of additional water use in Idaho. Using the medium growth prediction from the Future Demands study, the model estimated a maximum flow reduction of 31 cfs in late summer and early fall. Additionally, the model showed an impact on Lake Coeur d'Alene, which would result in an indirect impact on the Spokane River. A summary memo is attached in Appendix 4.

**Climate Variability**

The Board contracted with Boise State University to evaluate potential changes to water supply and demand which might result from climate variability on a watershed scale. Additionally, SPF includes a discussion of regional impacts from climate variability in their Future Water Demand Study.

Climate variability adds another element of uncertainty to planning for future water needs. Studies based on climate models and emission scenarios indicate that the overall temperature in the Rathdrum Prairie Aquifer region may increase over the next 50 years. The precipitation forecast is less certain. The Northwest United States is expected to see some increase in annual precipitation; the expected change over the Rathdrum Prairie is inconclusive. Increased temperatures may mean that more winter precipitation may fall as rain instead of snow.

Temperature increases may also alter the timing of snowmelt, potentially shifting peak runoff from May to April. Any additional precipitation is expected to occur during the fall, winter and spring, rather than the summer months. Increases in temperature may lead to increased evapotranspiration. This could translate into increased irrigation demands during the summer months when there may also be less precipitation. Earlier runoff, combined with decreased precipitation during the summer, may also result in decreased flows in the Spokane River. Another likely impact of climate change is an increase in extreme events such as droughts and floods.

**Water Conservation Potential**

The Future Water Demand Study evaluated

the potential of water conservation to reduce future demand. Based on a review of literature and other information, the study reflected three future conservation scenarios:

- No conservation – no new measures or programs are implemented during the 50-year period, though ongoing adoption of newer appliances is assumed
- Intermediate conservation – voluntary water conservation measures are implemented throughout the period
- Aggressive conservation – government-mandated measures require conservation measure above and beyond current codes

These scenarios covered indoor and outdoor residential use, commercial use, and agricultural use. They were applied to the three primary water-demand projection scenarios to estimate the potential impact of conservation over the study period. Figures 3 and 4 demonstrate the impacts conservation scenarios are projected to have on water demand and consumptive use, respectively.

The Future Water Demand Study found that water conservation can help mitigate projected future water use. The study described a range of conservation measures and projected assumed conservation outcomes that could be achieved by a combination of various potential water conservation measures and programs.

Water conservation will be an important part of managing future demand and ensuring the viability of the aquifer. While all conservation measures are important, reduced outdoor irrigation, both residential and agricultural, presents the largest conservation opportunity. Water reuse has the potential to reduce groundwater pumping and meet other goals, but does not bear directly on future aquifer demands.

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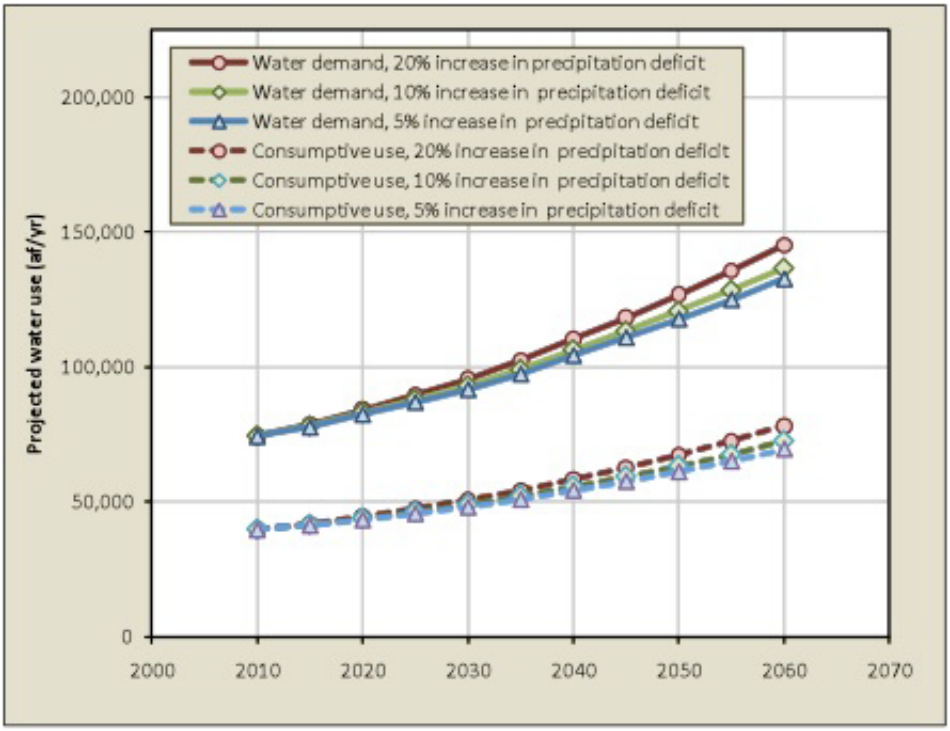


Figure 6. Future demand and consumptive use comparison chart

## 4.0 Recommendations

The specific goals of the statewide CAMP program, and this specific CAMP, are to:

- Provide reliable sources of water, projecting 50 years into the future
- Develop strategies to avoid conflicts over water resources
- Prioritize future state investments in water
- Bridge the gaps between future water needs and supply

Based on the four CAMP goals adopted by the IWRB, the Advisory Committee developed the following vision for the RP CAMP:

> *"Provide a sustainable source of high-quality groundwater for current and future economic, social, and environmental benefit, and preserve the exceptional quality and reliability of the Rathdrum Prairie Aquifer."*

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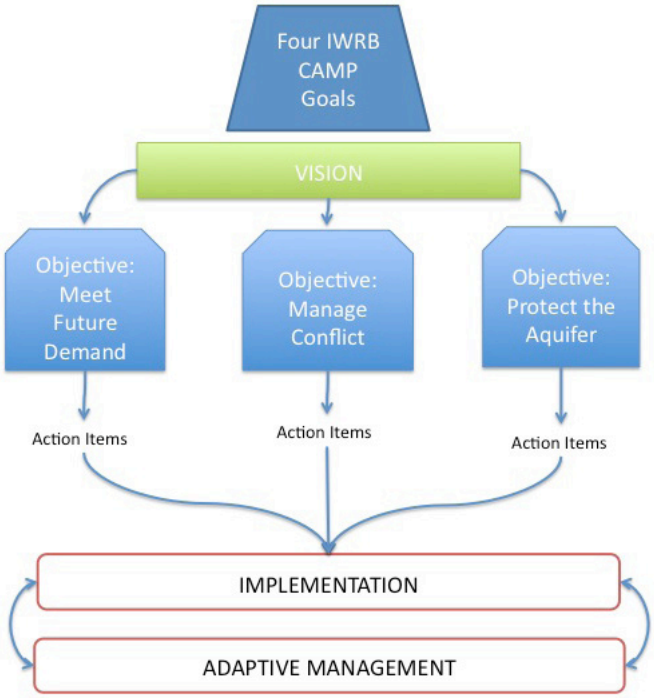


Figure 7. Moving from CAMP goals to adaptive management

Using the four CAMP goals and this vision, the Advisory Committee developed three main objectives and several recommendations for achieving the goals and vision. Figure 2 illustrates how the Committee moved from CAMP goals to RP Vision to Objectives to Recommendations. Figure 7 represents the framework for the CAMP recommendations that follow.

The following recommendations are not ranked or placed in order of priority.

### Objective # 1: Meet Future Demand for Water

The Future Water Demand Study completed in 2010 shows that projected growth over the RPA is not expected to exceed the aquifer's annual recharge rate. However, as the aquifer supplies communities in Idaho and Washington, meeting this objective should reflect regional implications.

In the face of all of the uncertainties relative to future water demand – for example, growth and climate change, the Board recognizes that water conservation is one approach that the region can control. Conservation is an important strategy to make more efficient use of groundwater and reduce the need for future water supplies. The CAMP includes a broad-based, voluntary, incentive-based approach to enacting a water conservation program designed to meet a part of the projected future water needs.

The CAMP also includes a strategy of moving ahead with Reasonably Anticipated Future Needs (RAFN) water right applications for municipal water providers.

The Board adopts the water-demand projections of moderate population growth and moderate level of conservation (scenario 2b) as the target on which to evaluate CAMP performance and to meet the goal established

by the Board of having a sustainable aquifer. At least once every five years, annual consumptive use will be calculated, water demand projections updated, and progress evaluated against this target. The level of effort in each of the action items should be reviewed and modified as necessary to meet the overall objective of a sustainable aquifer. The Board believes that if Idaho demand meets the established target, the jurisdictional conflicts with Washington will be minimized.

The Board recognizes the variability in growth and future water needs predictions and recommends periodic reviews and updates to the Rathdrum Prairie Aquifer Future Water Demand Study.

**Action Item #1: Enact water conservation measures that promote water efficiency and reduced use.**

Conservation should be an ongoing goal to improve wise use of water. IWRB should encourage water conservation through incentive programs to achieve conservation today and in the future. Voluntary programs and actions can be implemented which focus on reducing current water consumption by use of best practices. Programs should also be developed which target new and changing uses. For example, the following steps could be taken, cooperatively with funding partners:

- Develop partnerships to establish demonstration conservation projects.
- Establish incentive programs directed at targeted water use categories (residential, commercial, agricultural, etc.).
- Enhance water conservation education programs through partnerships with governmental and private interests.

In compliance with Idaho water law, water conservation should be a consideration in the IDWR review processes for new and transferred water appropriations. In the event additional measures are found necessary to maintain a sustainable aquifer; the Board recommends consideration of regulatory measures through support of legislation that addresses conservation.

**Action Item #2: Establish municipal water rights to protect water resource available for future needs.**

In partnership with the municipal water providers in the Rathdrum prairie area, studies necessary to support Reasonably Anticipated Future Needs (RAFN) water right applications should be undertaken.

This action item applies to the first goal of providing a reliable source of water in the future as well as preventing conflict over water resources.

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**Action Item #3: Identify local water use improvement strategies and develop partnerships to implement them.**

To accomplish Action Item #3:

Assess local ordinances and land–use plans that may have an effect on water resources. Examples of strategies are:

- Use the city and county comprehensive land use plans, GWMA, conservation plans, agency education and aquifer studies as tools to encourage growth in areas to minimize impacts.
- Encourage all land use policies to retain topsoil where possible over the RPA. This will enhance the conservation of water use, as well as provide additional buffer for contaminant travel.

**Action Item #4: Hydrologic and social impacts of exportation of water from the basin must be considered carefully.**

Exporting water from the Rathdrum Prairie Aquifer to areas outside the basin can

potentially impact the hydrologic system, local economies and local public interest. Idaho Code (42-203A(5)) describes the conditions and considerations when proposals for appropriations for water when the place of use is outside of the watershed or local area where the source water originates. Extending water service to new areas outside the watershed should be carefully evaluated.

The Director will consider if proposed uses are in conflict with local public interest, contrary to conservation of water resources within the state of Idaho, or will adversely affect the local economy of the watershed or local area.

**Action Item #5: Assess the Rathdrum Prairie Future Water Demand Study on a regular basis.**

The Board recognizes the variability in predicting future growth and water needs and recommends periodic reviews and updates to the Rathdrum Prairie Aquifer Future Water Demand Study.

**Action Item #6: Fully fund implementation of the Groundwater Management Plan.**

In 2005, the IDWR Director adopted the Rathdrum Prairie Ground Water Management Plan. This plan was developed by a collaborative advisory group and reflects locally supported actions. The plan sets forth goals and actions which guide the water resource management "to balance the protection of existing ground water uses and water quality with the opportunity for future development while encouraging water conservation." The plan has not been fully implemented. The following actions must be implemented to complement the implementation of the RP CAMP:

- Implement monitoring protocols for all water users
- Collect and analyze data to refine knowledge of water supply and water use
- Establish a water district upon completion of the Northern Idaho Adjudication
- Finalize Water Conservation Measures and Guidelines document

A summary of the status of the Groundwater Management Plan is attached in Appendix 5.

## Objective # 2: Prevent and Resolve Water Conflicts

The Rathdrum Prairie Aquifer is part of the Spokane Valley Rathdrum Prairie Aquifer, a regional water resource shared with the state of Washington. While studies show there is adequate water for Idaho needs for the duration of the current planning horizon, Idaho recognizes cooperation by stakeholders and governments from both states and the tribes on water issues is necessary to avoid future conflict that may compromise or complicate water management for both states.

A hydrologic analysis by IDWR determined that the most likely future water need projection could potentially reduce flow in the Spokane River at the Spokane gage by approximately 31 cfs by 2060 due to reduction of aquifer discharge to the river. This could result in additional attention and scrutiny from downstream interests. See Allan Wylie's hydrologic analysis in Appendix 4.

One of the prominent features of the SVRPA is the connectivity to surface water. The interaction between the ground and surface water dictate that long-term management and planning must integrate both sources of water. Any surface water conflict issues that arise in the future will also relate to groundwater. As communities over the SVRPA grow, so will the potential for these conflicts. Figure 8 shows a map of the SVRPA.

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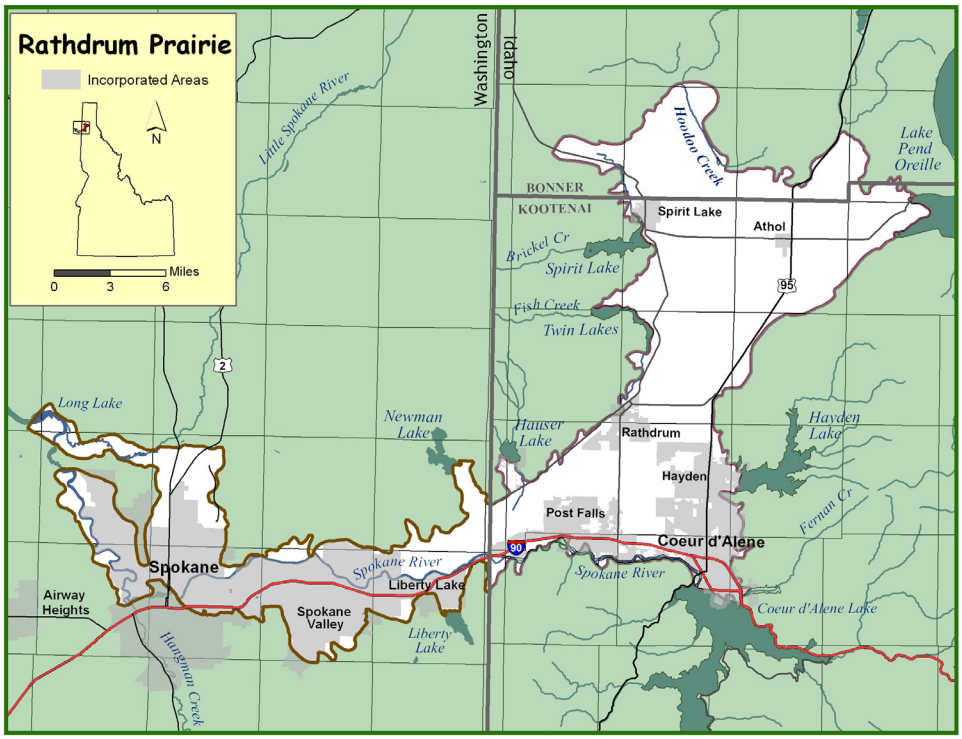


Figure 8. SVRP Aquifer Map

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**Action Item #1: Develop a framework for regional discussion and cooperation for SVRPA water issues.**

Building on the history of bi-state relationships, studies, and efforts to work together, the IWRB, in cooperation with the State of Washington and tribal governments, should convene an official bi-state Advisory Committee to develop a bi-state regional cooperative forum for the SVRPA.

The framework should respect the sovereignty of Idaho, Washington, and the Coeur d'Alene and Spokane Tribes.

The Idaho contingent of the Bi-State Advisory Committee should include local interests along with tribal, local, state government and others. It should report periodically to the appropriate state agencies and implement the framework within two years of the adoption of this CAMP.

The particular type of legal or institutional instrument to initiate the Advisory Committee, and to implement the framework itself, should be determined through a collaboration among the states and the tribal governments.

For more details on how this framework might be developed, please see Appendix 6.

**Action Item #2: IDWR should develop criteria for future water augmentation projects in Idaho water whose objective is to enhance the hydrologic system.**

Idaho should anticipate future requests or applications for water augmentation projects and determine what values need to be considered in the application review process. Criteria or guidelines for future projects will protect Idaho's interests and may provide a more predictable process for those wishing to implement water augmentation projects.

**Action Item #3: Encourage mechanisms that resolve local issues before they become conflicts. For example, by assembling local water purveyors, tribes, municipalities, and state agencies on a regular basis.**

Support a venue for local jurisdictions to discuss and coordinate local water needs, as well as articulate local needs to IDWR and other relevant agencies.

This group should:

1. Provide a forum to consider whether local jurisdictions should coordinate and apply for a Reasonably Anticipated Future Needs water right.
2. Assess the effectiveness of recharge options to increase aquifer beneficial use to support aquifer sustainability while meeting non-degradation standards
3. Share data to the extent that IDWR understands local needs when engaging with neighboring states over water issues.

**Action Item #4: Redefine the IDWR GWMA boundaries so they are consistent with the boundaries defined by the bi-state USGS study.**

The director of IDWR should redefine the RPA boundaries in the GWMA so that they are consistent with the Idaho boundaries in the bi-state USGS study to promote cohesive management, which should reduce future conflict over water resources.

## Objective # 3: Protect the Aquifer Quality

The Rathdrum Prairie Aquifer can be characterized as having sufficient quantity for Idaho's needs and good quality. However, the aquifer is vulnerable to contamination and the region must be vigilant in protecting this valuable resource. There are many threats to the water quality of the aquifer, and a number of agencies and authorities exist to protect and improve the water quality.

The aquifer provides high quality water to all of its users. The health of the aquifer is of paramount importance to the region.

Working within existing authorities and programs to protect and enhance the water quality of the RPA is the appropriate and cost-effective way to protect the water resources to meet future water needs.

**Action Item #1: Assess all CAMP activities to ensure projects implemented through CAMP protect aquifer water quality.**

**Action Item #2: The Board should support and encourage the Aquifer Protection District to work with Panhandle Health District, Idaho Department of Environmental Quality, tribal governments and others to address overlapping jurisdictions with the goal of improving efficiency.**

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The Aquifer Protection District should consider funding the following strategies to address current water quality protection:

1. Mitigate the impacts of stormwater runoff.
2. Promote practices that prevent accidental or incidental releases of contaminants over the RPA.
3. Encourage accounting of wellheads over RPA and proper abandonment of unused wellheads.
4. Support continued monitoring and management of potential water quality issues contained in RPA source lakes and rivers.
5. Encourage wastewater disposal methods that benefit the RPA.
6. Prepare for emerging or unknown threats.

For a full description of the suggested funding agenda for the Aquifer Protection District, please see Appendix 7.

Figure 9. Summary of Key Action Items

## SUMMARY OF KEY ACTION ITEMS

(not ranked or placed in order of priority):

**Objective #1: Meet Future Demand for Water**

Enact water conservation measures that promote water efficiency and reduced use.

Establish municipal water rights to protect water resource available for future needs.

Identify local water use improvement strategies and develop partnerships to implement them.

Hydrologic and social impacts of exportation of water from the basin must be considered carefully.

Update the Rathdrum Prairie Future Water Demand Study.

**Objective #2: Prevent and Resolve Conflicts**

Develop a framework for regional discussion and cooperation for SVRPA water issues.

IDWR should develop criteria for future water augmentation projects in Idaho whose objective is to enhance the hydrologic system.

Identify local water use improvement strategies and develop partnerships to implement them.

Redefine the IDWR GWMA boundaries so they are consistent with the boundaries defined by the bi-state USGS study.

**Objective #3: Protect the Aquifer**

Assess all CAMP activities to ensure projects implemented through CAMP protect aquifer water quality.

Support and encourage the Aquifer Protection District to work with Panhandle Health District, Idaho Department of Environmental Quality, and others to address overlapping jurisdictions with the goal of improving efficiency.

# 5. Additional Plan Components

In addition to the objectives and action items listed in the Plan, additional actions are included to enhance coordination, decision-making, and aquifer management.

## Plan Implementation Committee

Management of the Rathdrum Prairie Aquifer affects numerous stakeholders and the States of Idaho and Washington. Effective implementation of the Plan will require the participation and cooperation of stakeholders and governmental entities with jurisdictional authorities and responsibilities. An Implementation Committee will be charged with providing guidance and recommendations concerning the implementation of management strategies and review of goals and objectives. The Implementation Committee will provide a forum for discussing implementation, establishing benchmarks for evaluating the effectiveness of actions, coordinating with water users and managers, evaluating and addressing environmental issues and identifying and pursuing funding opportunities.

The Implementation Committee will include interest groups currently represented on the Rathdrum Prairie Advisory Committee. In addition, the Board will appoint at least one of its members to serve as a liaison between the Committee and the Board. The Implementation Committee will serve at the pleasure of the Board and provide a forum for public participation. Board's staff will facilitate the work of the Implementation Committee and provide the technical information needed for its deliberations. The Board will make all final decisions concerning Plan project priorities, implementation, and funding.

As various programs are implemented, additional monitoring or modifications will likely be needed. Specific projects may require site specific measurement and analysis which are not currently available. Additional analysis will likely be required to assist the Board and The Implementation Committee.

## Outreach and Education

During implementation of RP CAMP, the Implementation Committee will help develop and recommend funding mechanisms for a broad water education and outreach effort, building on existing outreach efforts and programs. Emphasis will be placed on education efforts that promote conservation and a reduction in consumptive use.

## Implementation Plan and Funding

Implementation of new CAMP actions will be a partnership among the state, local and federal governments, tribes, stakeholders, water users and non-governmental organizations. The costs of implementation are anticipated to be shared among partners. As the implementation plan is developed, the funding needs for the plan components will be evaluated and potential funding sources, including federal grants, will be identified. The state cost share is anticipated to be up to 40% of implementation costs and the remaining 60% to be matched through other mechanisms.

The many existing activities for protecting the Rathdrum Prairie Aquifer reflect the value and importance the aquifer and water resources have to the region. These existing activities are undertaken by a myriad of governments, agencies, and others. These activities are funded through various sources and through various programs. The Board supports existing programs which protect and enhance the water resources of the area. Opportunities to combine resources and leverage existing programs with CAMP implementation will be encouraged and supported.

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# 6. Adaptive Management

This section sets forth an adaptive management strategy for implementation of the Plan. The goal of adaptive management is to support improved decision-making and performance of water management actions over time.

Key principles fundamental to this approach include:

1. Anticipating possible future uncertainties and contingencies during planning.

2. Employing science-based approaches to build knowledge over time.

3. Designing projects that can be adapted to uncertain or changing future conditions.

Adaptive management involves taking actions, testing assumptions, and then monitoring and adapting/adjusting the management approach as necessary. It is a way of taking action in a complex system with many variables and constant change. Developing perfect knowledge concerning any system, including the Rathdrum Prairie Aquifer, is impossible. Therefore an adaptive management approach is critical to the successful attainment of the qualitative and quantitative goals set forth in the Plan. Successful adaptive management requires patience and long term commitment, just as acquiring enough data to make decisions about program changes takes time.

The adaptive management strategy will allow the Board to:

- Develop protocols for revising management actions and/or quantitative targets as necessary.
- Compare costs and impacts of different actions in the Rathdrum Prairie Aquifer.
- Adjust funding allocation between projects to get the most "bang for the buck."
- Concentrate funding on management actions that show results.
- Make adjustments and revisions to the Plan as new information becomes available or in response to changing water supply and demand needs.
- Proceed with flexibility depending on results and analysis of monitoring and measurement data.

## Coordination & Implementation

Management of the RPA affects numerous stakeholders within Idaho and requires coordination with other interests including the state of Washington and tribes. The Implementation Committee will be charged with providing guidance and recommendations concerning the implementation of management strategies and review of objectives. The Implementation Committee will provide a forum for discussing implementation, establishing benchmarks for evaluating the effectiveness of actions, coordinating with water users and mangers, evaluating and addressing environmental issues and identifying and pursuing funding opportunities.

## Monitoring and Data Gathering

With data gathered through the monitoring process, the Implementation Committee and the Board's staff will be able to assess the impacts of each management activity. In some cases, it may take a number of years to obtain sufficient data to achieve a comprehensive understanding of the effects of particular actions. Regardless, the success of the Plan depends upon the development and maintenance of state-of-the-art monitoring and evaluation tools that provide the information necessary to make sound planning decisions for the future.

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## Legislative Reporting and Plan Revision

The Board will provide periodic reports to the legislature documenting the progress made on the implementation of the Plan. The Board will evaluate the Plan after 5 years of implementation, and make planning recommendations to the legislature and Governor's office. The 50-year horizon will be considered at each revision so that the Plan will remain a relevant planning document without expiration.

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# Appendices

## Appendix 1: Advisory Committee members

Chris Beck, AllWest Testing and Engineering

Phil Cernera, Coeur D'Alene Tribe

Mike Clary, Hecla Mining

Bruce Cyr, Jacklin Land Company

Andy Dunau, Spokane River Forum

Mike Galante, North Kootenai Water District

Bruce Howard, Avista Utilities

Allen Isaacson, Sierra Club

Hal Keever, Stimson Lumber Co.

Kermit Kiebert, North Idaho Chamber of Commerce

Paul Klatt, JUB Engineers

Kevin Lewis, Idaho Rivers United (resigned)

Jim Markley, City of Coeur d'Alene

Alan Miller, Hayden Lake Irrigation District

Jonathan Mueller, Landmark/Architects West

Michael Neher, City of Post Falls

Todd Tondee, Kootenai County

Ron Wilson, East Green Acres Irrigation District

Ken Windram, Hayden Area Regional Sewer Board

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## Appendix 2: Chronology of Studies & Events relevant to the Rathdrum Prairie Aquifer

**1908** City of Spokane switches water source from the Spokane River to the Aquifer due to typhoid concern from sewage in river and private wells near cesspools

**1900's** There were few water wells on the Rathdrum Prairie until drilling and pumping technology improved in the 1930's. A history of Prairie water use can be found at: http://www.deq.idaho.gov/water/prog_issues/ground_water/rathdrum_prairie_aquifer/index.cfm#history

**1976** Washington Department of Ecology adopts instream flows standards for the Little Spokane River

**1976** The Federal Clean Water Act §208 spawned completion of local studies to identify sources of pollution for the Rathdrum Prairie region

**1977** Panhandle Health District adopts enhanced septic system regulations for the Rathdrum Prairie Aquifer, creating the "5-acre rule" limiting development to one residential septic system per five acres without connection to a public sewer system. This rule led directly to Sewage Management Agreements with surrounding communities and the complete sewering of Coeur d'Alene, Fernan, Hayden, Hayden Lake, Post Falls, and Rathdrum.

**1978** EPA sole source aquifer designation

SVRP Aquifer was the first aquifer in Idaho and the second in the nation to receive this designation. http://yosemite.epa.gov/r10/water.NSF/Sole+Source+Aquifers/SSA

**1978** USGS publishes Spokane Valley-Rathdrum Prairie Aquifer, Washington and Idaho by Drost and Seitz

**1978** IDEQ adoptsWater Quality Management Plan for Rathdrum Prairie. This plan was developed under CWA §208.

**1979** Spokane County and the City of Spokane adopt Water Quality Management Plan consistent with Section 208, Clean Water Act and begin septic tank elimination program

**1980** IDEQ "special resource water" designation

**1980** Spokane County and Panhandle initiate a groundwater monitoring program

**1986-1988** PHD's Sewer Management Agreements result in complete sewering of the Cities of Hayden, Hayden Lake, Post Falls and Rathdrum with the construction of the regional treatment plants in Post Falls and HARSB.

**1988** IDEQ publishes Rathdrum Prairie Aquifer Technical Report

http://www.deq.state.id.us/water/data_reports/ground_water/rathdrum_prairie_aquifer_beg_thru_chap2.pdf

**1997** Sensitive Resource Aquifer designation for the Spokane Valley – Rathdrum Prairie Aquifer in Idaho creates non-degradation standard

**2000** Original Spokane Valley-Rathdrum Prairie (SVRP) Atlas published as an educational and outreach tool

**2001** Newport Generation, Cogentrix Energy, and Avista Utilities apply for water rights to drill wells to extract about 18 million gallons per day of cooling water for natural gas turbine power plants

**2001** CDA Basin Environmental Improvement Project Commissionwas created by Idaho legislature under the Basin Environmental Improvement Act of 2001 (Idaho Code Title 39, Chapter 81 to provide a system for environmental remediation, natural resource restoration and related measures to address heavy metal contamination in the

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Coeur d'Alene Basin.

**2002** Idaho Department of Water Resources denies moratorium on permits from the aquifer and designates the Rathdrum Prairie Groundwater Management Area

**2003** Spokane Valley-Rathdrum Prairie Aquifer Study. The major product of the study is a numerical groundwater model that Washington and Idaho can use to cooperatively manage the SVRP aquifer and adjacent rivers and lakes. Information gathered by partner agency scientists and contractors has expanded and refined our understanding of the aquifer and its interaction with local lakes and the Spokane and Little Spokane rivers, and water use region wide.

The three main agencies involved in this project/study has references listed here along with the way that each agency refers to the project:

IDWR – Spokane-Valley Hydrological Project

http://www.idwr.idaho.gov/WaterInformation/projects/svrp/

DOE – Spokane Valley-Rathdrum Prairie Aquifer Study http://www.ecy.wa.gov/programs/wr/ero/svrp_summit.html

USGS – Spokane Valley-Rathdrum Prairie Aquifer Study http://wa.water.usgs.gov/projects/svrp/

**2004** SVRP Aquifer Atlas updated

http://www.spokaneaquifer.org/aq.htm#atlas

**2005** IDWR adopts Groundwater Management Plan – 2005

http://www.idwr.idaho.gov/WaterInformation/GroundWaterManagement/RathdrumPrairie/rp_gwma.htm

**2005** Avista files application to FERC to relicense their Spokane River hydroelectric projects, including Post Falls Dam.

**2006** Aquifer Protection District legislation approved in Idaho and Kootenai County voters overwhelmingly approve its formation to fund aquifer protection efforts overseen by the Kootenai County Commission http://www.phd1.idaho.gov/environmental/rathdrum/protectionprogram.cfm

**2007** USGS publishes "Hydrogeologic Framework and Water Budget of the SVRP Aquifer" and "Groundwater flow model for SPVRP Aquifer" – 2007

**2007** Spokane River Forum non-profit created with WDOE seed funding to facilitate informed and non-partisan dialogue on important water issues in the region.

**2007** Idaho Department of Water Resources and Washington Department of Ecology sign a Memorandum of Agreement to preserve and maintain the SVRP Aquifer and Groundwater Flow Model created by the US Geological Survey.

**2008** Legislature approves House Bill 428 and 644

This legislation establishes CAMP program and funding for 10 basins including TV and RP. The legislation authorizes characterization and planning efforts for ten different basins in the next 10 years. http://www.idwr.idaho.gov/waterboard/WaterPlanning/CAMP/CAMP.htm

**2008** Rathdrum Prairie Wastewater Master Plan (JUB Engineers)

http://www.postfallsidaho.org/pzdept/RathPrairieMasterPln/RPWWMP08/TM3_Final_Draft.pdf

**2008** North Idaho Adjudication begins

The purpose of the general adjudication of water rights is to make a complete and accurate record of all existing water rights. The term "adjudicate" means to settle judicially. A water

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right adjudication can be described as a "fair, comprehensive, technically correct and legally sufficient determination of existing water rights."

http://www.idwr.idaho.gov/WaterManagement/NorthIdAdju/

**2009** Idaho Water Resources Board starts the process to development the RP CAMP

**2009** Based on settlement agreements with Coeur d'Alene Tribe and State of Idaho, among others, FERC issues new 50-year license for Avista's Spokane River hydro project, including the Post Falls dam.

**2009** Kootenai County Comprehensive Land Use Plan - Prior update was in 1994. The current draft was published in March of 2009. http://www.kcgov.us/departments/planning/newcompplan.asp

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**2009** Coeur d'Alene Lake Management Plan. The Coeur d'Alene Tribe and the Idaho Department of Environmental Quality collaboratively developed the 2009 Lake Management Plan to protect and improve lake water quality by limiting basin-wide nutrient inputs that impair lake water quality conditions, which in turn influence the solubility of mining-related metals contamination contained in lake sediments. http://www.deq.state.id.us/WATER/data_reports/surface_water/water_bodies/cda_lake_mgmt_plan.cfm

**2010** Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load Water Quality Improvement Report approved by WDOE and EPA but disputed by Idaho communities.

http://www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/dissolved_oxygen/status.html.

## Appendix 3: Executive Summary of Future Water Demand Study

Water demand overlying the Rathdrum Prairie Aquifer (the Idaho portion of the Spokane Valley-Rathdrum Prairie Aquifer) was projected for 5-year increments between 2010 and 2060. The projections were made for the Idaho Water Resource Board (IWRB) and the Idaho Department of Water Resources (IDWR) as part of the Idaho Statewide Comprehensive Aquifer Planning and Management Program (CAMP).

### Approach

The approach for projecting future water demand consisted of

1. Reviewing historic population growth trends and growth rates;
2. Estimating existing water demand based on community water system data, water right information, USDA crop data, and other information;
3. Reviewing climate projections from the University of Washington Climate Impacts Group relative to the northern Idaho area;
4. Quantifying water conservation potential;
5. Evaluating selected potential water-demand constraints;
6. Projecting future population and employment growth;
7. Projecting future water demand for indoor domestic, municipal, commercial, industrial, and irrigation uses; and
8. Developing "water-demand scenarios" to evaluate possible future water-demand outcomes that take into account various population growth rates, levels of water conservation, and the potential impact of climate variability.

There are two general categories of factors that will shape future water demand: (1) exogenous factors over which local policies have limited influence and (2) local factors over which public policy and private incentives can have substantial influence. Exogenous factors include the strength of the national or global economy and national demographic trends that strongly influence regional population and job growth. Although local governmental policy can have some influence over these factors, the local economy is largely driven by national or global factors. One needs to look only at the recent economic recession to see that some of these national or global factors are difficult to control at the local level. Exogenous factors also include potential effects of climate variability, over which local policy-making will have very little direct influence.

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In contrast, regional land-use policies, building codes, governmental policies, water delivery pricing, and other local measures can have substantial influence on future water demand. Local and state government, local water purveyors, and area residents have substantial influence over these factors.

Thus, future water-demand scenarios were constructed to reflect the effect of both exogenous (external realm) and local influences (policy realm) on future water use. First, three primary scenarios were developed to reflect three different population growth scenarios: low population growth, medium-level ("baseline") population growth, and high population growth. Then, three sub-scenarios were constructed within each of the population-growth scenarios to reflect various water conservation levels. The three primary population-growth scenarios, each with three water conservation sub-scenarios, result in nine different projections of potential future water demand. Finally, the effects of potential climate variability were illustrated with a scenario representing baseline population growth and moderate water-conservation.

**Conclusions**

The primary conclusions from this analysis include the following:

1. Water demand by the year 2060 could rise from estimated current withdrawals of approximately 74,000 acre-feet to between 77,000 acre-feet (based on a low population-growth rate of 1.6% per year and aggressive water conservation) and 223,000 acre-feet (based on a higher population growth rate of approximately 3% per year and no water conservation). The Rathdrum Prairie Aquifer area has experienced both of these population-growth rates over multi-year periods in past decades.

2. The most likely 2060 water-demand projection ranges from approximately 101,000 to 163,000 acre-feet, depending on the level of water conservation. This projection is based on a moderate level of population growth (averaging approximately 2.3% per year) over the next 50 years.

3. The consumptive use is water lost from the local hydrologic system (i.e., aquifer and Spokane River), mostly through evapotranspiration. The consumptive use is projected to increase from approximately 40,000 acre-feet in 2010 to between 59,000 and 76,000 acre-feet in the year 2060 under moderate population- and employment-growth rates. This range reflects the effects of different water conservation levels.

4. The water use for agricultural irrigation will likely decrease in time as irrigated agricultural land is replaced by more urban and suburban land uses. However, development of new residential and municipal irrigation on land that is currently non-irrigated will likely lead to an overall increase in total irrigation demand.

**Population and Employment Projections**

5. The Kootenai County population grew from approximately 22,300 people in 1940 to 134,400 people in 2007. Bonner County grew from 15,700 people in 1940 to approximately 41,000 people in 2007.

6. Annual population growth rates in Kootenai County (most of which overlies the Rathdrum Prairie Aquifer) have ranged from 1.6% (between 1980 and 1990) to 5.4% (between 1970 and 1980). The average annual growth rate between 1970 and 2007 was 3.7%.

7. The Rathdrum Prairie Aquifer area population growth is projected to grow from approximately 128,000 people to approximately 400,000 people by the year 2060, reflecting an average growth rate of approximately 2.3% per year. If population growth for the next 50 years is at the same 1.6% annual rate experienced between 1980 and 1990, the 2060 population overlying the aquifer will be approximately 286,000 people. If the population grows at a rate of 3% per year (which is less than the 3.7% annual growth between 1970 and 2007), the 2060 population overlying the Rathdrum Prairie Aquifer will be approximately 581,000 people.

8. Employment over the aquifer area is projected to increase from approximately 53,000 employees in the year 2010 to 183,000 employees in the year 2060. The largest employment sector will likely continue to be wholesale and retail trade.

**Existing Water Use**

9. Existing water use was estimated with data from 20 community water systems ranging in size from approximately 39 to 46,000 people; these 20 community water systems serve approximately 72% of the total Rathdrum Prairie population. Data from the 20 community water systems were used to extrapolate water use to 70 additional community water systems that serve approximately 19% of the study area population. Estimates of self-supplied domestic water use for the remaining 9% of

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the population were made based on household domestic use rates estimated from community water system data. Self-supplied industrial water use estimates were based on IDWR water right information. Agricultural water use rates were estimated based on irrigated acreage, USDA crop information, and precipitation-deficit data.

10. Approximately 72,000 acre feet of water were withdrawn annually from the Rathdrum Prairie Aquifer in recent years. Of this, an estimated 34,400 acre-feet were withdrawn by community water systems, 8,800 acre-feet were withdrawn by individual domestic wells, 4,200 acre-feet were withdrawn for self-supplied commercial and industrial uses, and 24,700 acre-feet were used for agricultural irrigation. The estimated aggregate consumptive use (water that is lost from the local hydrologic system) was approximately 38,400 AFA.

11. Approximately 67% of the projected 2010 groundwater withdrawals are used for the irrigation of residential, commercial, institutional, and agricultural lands. Other residential uses (14%), commercial, industrial, and institutional uses (14%), and unaccounted water (5%) constitute the balance.

**Water Supply Characteristics**

12. The Rathdrum Prairie Aquifer, part of the larger Spokane Valley-Rathdrum Prairie Aquifer, consists of unconsolidated sediments that are primarily course-grained sand, gravel, cobbles, and boulders deposited by immense floods.

13. The highly transmissive nature of the Rathdrum Prairie Aquifer means that the impact of water use in one portion of the aquifer will rapidly propagate throughout the entire aquifer.

14. Recharge to the entire Spokane Valley-Rathdrum Prairie Aquifer is approximately 1,000,000 acre feet per year.

15. The existing Rathdrum Prairie Aquifer consumptive water use (consumptive use is a measure of aquifer impact) is approximately 38,000 AFA, or approximately 3.8% of the 1,000,000 acre feet of aggregate Spokane Valley-Rathdrum Prairie Aquifer recharge.

16. It is unlikely that groundwater availability in most portions of the Rathdrum Prairie Aquifer will limit future water demand over the next 50 years. A projected consumptive use of approximately 71,000 AFA in the year 2060 (based on medium population and employment growth and medium levels of water conservation) represents only about 7% of the Spokane Valley-Rathdrum Prairie Aquifer recharge (although, recharge rates are not equivalent to water available for use). Given the transmissive nature of the Rathdrum Prairie Aquifer sediments, it is likely that this amount of water could be withdrawn from the aquifer (except for, perhaps, along the basin margins where the aquifer is less thick than in central portions of the Rathdrum Prairie).

**Potential Environmental Constraints**

17. Aquifer water quality is good in most areas and does not presently pose a constraint on future groundwater demand.

18. Future water demand may, however, be limited by the ability to discharge treated municipal effluent.

19. A portion of the Rathdrum Prairie agricultural land will almost certainly be maintained for the land application of treated municipal effluent. Residential or municipal irrigation, to the extent that it occurs on currently non-irrigated land, will contribute to a likely increase in overall irrigation demand.

**Climate Variability**

20. Annual average temperatures are projected to increase by approximately 3.2°F by 2040

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and about 5.3°F by 2080.

21. Evapotranspiration may increase by approximately 6% per degree centigrade over 2010 values. This could lead to potential evapotranspiration increases of between 12% and 19% by the years 2040 and 2080, respectively. Another study suggests possible potential evapotranspiration increases of 5% to 9% by the year's 2040 and 2080, respectively. Based on these predictions, irrigation demand could increase by 5% to 20% in the next 50 years.

22. For most of the projections in this study, we assumed a 10% increase in future irrigation demand as a result of increased evapotranspiration. However, the effects of a 5% increase and a 20% increase in future irrigation demand were also evaluated for a moderate population-growth and conservation-level, scenario. A 5% increase in irrigation demand would result in an overall water demand that is approximately 3% less than the demand projected based on a 10% increase in irrigation demand. A 20% increase in future irrigation demand would result in an overall aquifer demand that is approximately 6% greater than the demand projected based on a 10% increase in irrigation demand.

23. Annual precipitation may increase by approximately 2.3% by the year 2040, and by approximately 3.8% by the year 2080. The Rathdrum Prairie Aquifer area is expected to become wetter in the fall and winter and dryer in the spring and summer. Additional precipitation, to the extent it occurs in the fall, winter, and spring, will not reduce irrigation demand during summer months.

24. Extreme temperature and precipitation events will likely increase in frequency. Extreme and/or extended drought periods will increase annual irrigation demands.

**Water Conservation Potential**

25. Aggressive water conservation can help mitigate some of the projected future water use. Aggressive conservation can result in aggregate water demand that is approximately 60% of the non-conservation demand for a given population growth outcome in 2060.

26. Aggressive water conservation could lead to a 52% reduction in per-household domestic water demand by the year 2060 (from 2010 levels).

27. Per-household outdoor residential irrigation use could be reduced by up to approximately 33% from 2010 levels.

28. Commercial and industrial use could likely be reduced by up to approximately 40% over the next 50 years compared to 2010 per-employee use rates.

29. Specific water conservation measures are outlined in the report.

30. Water reuse is a potential method to extend water supply, but does not bear directly on future Rathdrum Prairie water demands or aquifer withdrawals.

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## Appendix 4: Impact of Projected 2060 Demand on Spokane River

# MEMO

**State of Idaho**
**Department of Water Resources**
**322 E Front Street, P.O. Box 83720, Boise, Idaho 83720-0098**
**Phone: (208) 287-4800 Fax: (208) 287-6700**

**Date:** 27 May 2010
**To:** Helen Harrington and Sandra Thiel
**From:** Allan Wylie
**cc:** Rick Raymondi and Sean Vincent
**Subject:** Impact of projected 2060 demand on Spokane River

Helen and Sandra:

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The Rathdrum Prairie CAMP Committee asked me to conduct a transient analysis of the impact of the SPF 2b population growth and consumptive use prediction (medium growth with moderate conservation efforts) on the Spokane River and present my findings at the June 4 meeting. I am preparing this memo because I will probably be either involved in a hearing regarding an Eastern Snake Plain Aquifer water call, or ensnared in the aftermath of the hearing and unable to attend the June 4 meeting.

**Method**

The SPF scenarios provide average projected consumptive use for 2060, not monthly projections, so I needed to shape the steady state scenario I presented at the April 16 meeting into a monthly transient file for use in the Spokane Valley Rathdrum Prairie (SVRP) Model. To accomplish this, I apportioned the 2060 steady state file to match the Idaho portion of the 2005 consumptive use for the SVRP Model. Table 1 shows the Idaho portion of the 2005 consumptive use from the SVRP aquifer model along with the shaped SPF 2060 consumptive use estimate and the difference between the two files.

**Table 1. 2005 water budget for SVRP model and the 2060 monthly water budget.**

| Month | 2005 (ac-f) | Projected 2060 (ac-f) | Difference (ac-f) |
|---|---|---|---|
| January | 1,161 | 1,638 | 476 |
| February | 975 | 1,337 | 363 |
| March | 1,180 | 1,641 | 461 |
| April | 4,318 | 6,762 | 2,445 |
| May | 4,189 | 6,518 | 2,328 |
| June | 7,119 | 11,365 | 4,246 |
| July | 11,829 | 18,985 | 7,156 |
| August | 7,658 | 12,222 | 4,564 |
| September | 3,316 | 5,216 | 1,900 |
| October | 1,512 | 2,228 | 716 |

| | | | |
|---|---|---|---|
| November | 981 | 1,370 | 389 |
| December | 943 | 1,284 | 341 |
| SUM | 45,181 | 70,566 | 25,385 |

The impacts of the projected growth on the Spokane River can be simulated either by running the model with the 2005 consumptive use and again with the 2060 consumptive use and then differencing the outputs, or by running the model with the difference between the 2005 and 2060 consumptive use. I chose to work with the difference.

**Results**

Figure 1 shows the direct impact on the river. The direct impact is a result of the change between the 2005 aquifer model consumptive use and the SPF estimate for year 2060. The additional water use lowers the water table causing either increased seepage from or decreased gains to the Spokane River. The maximum change in impact is about 31 cfs in late summer and early fall. Late summer or early fall is when the seven day low flow typically occurs in the Spokane River.

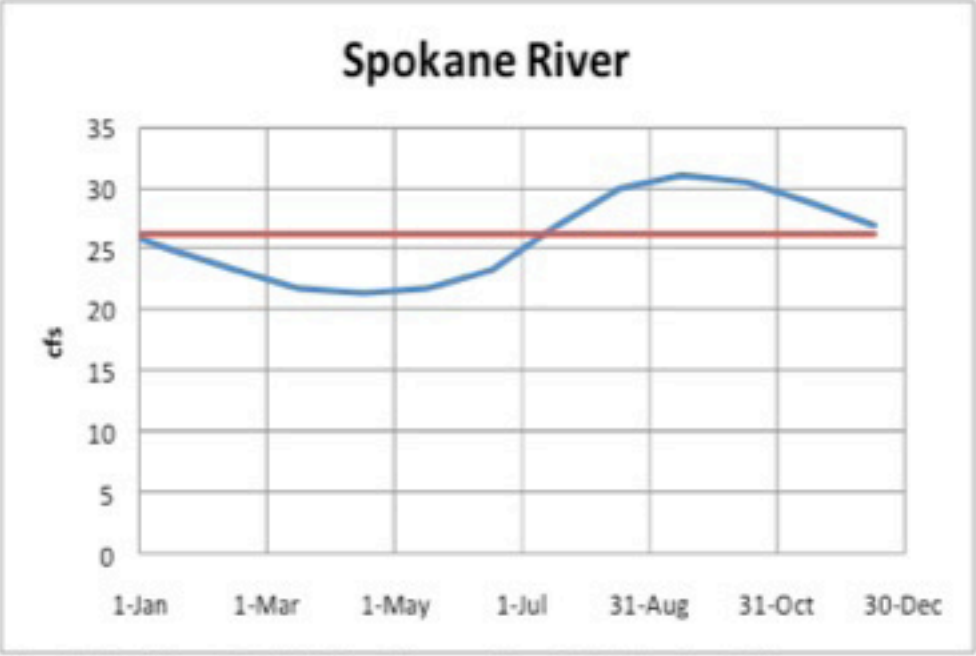


**Figure 1. Direct impact on the Spokane River; red=steady state, blue=transient.**

Figure 2 presents an impact on Lake Coeur D' Alene that results in an indirect impact on the Spokane River. This is where increased water use in Idaho lowers the water table resulting in increased seepage from Lake Coeur D' Alene. This water leaks from the lake into the aquifer to replace water than has been consumptively used, the water that leaked out of the lake can't be discharged through Post Falls Dam into the Spokane River. Because discharge from the lake is controlled at Post Falls Dam, the timing of this impact

does not appear to be critical. Although the magnitude of the impact is small and would be difficult to quantify, it does represent a decrease in the supply of water that can be released to mitigate downstream impacts.

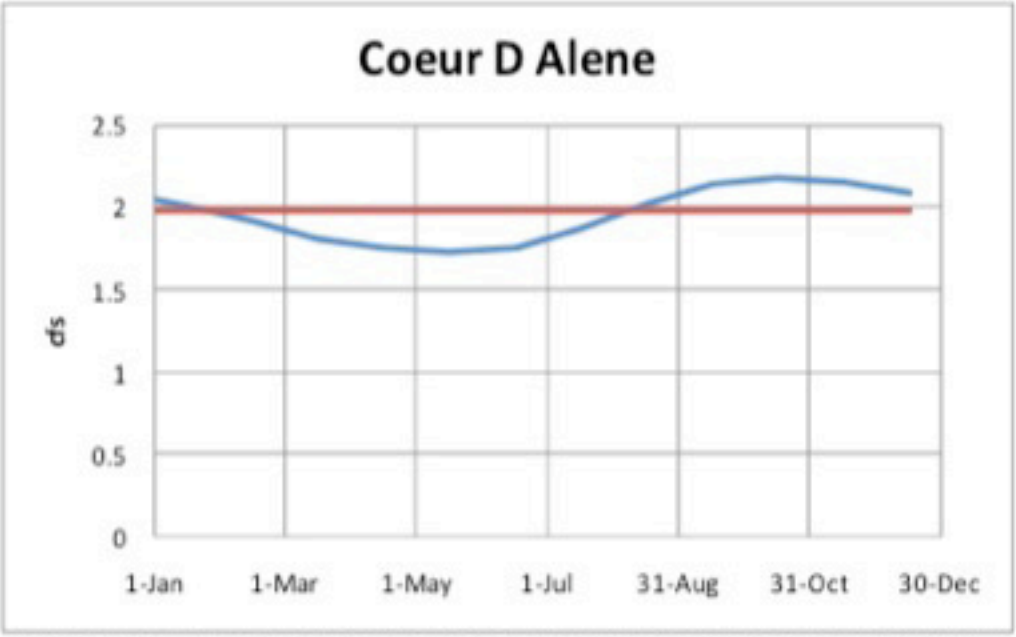


**Figure 2. Impact on Lake Coeur D' Alene that results in an indirect impact on the Spokane River; red=steady state, blue=transient.**

**Conclusion**

The transient impacts of SPF scenario 2b were estimated by shaping the 2060 annual consumptive use similar to the consumptive use for 2005 used in the SVRP aquifer model. The difference between the 2005 consumptive use in the SVRP aquifer model and shaped scenario 2b was input into the ground water model. The resulting simulation indicates that the maximum direct impact on the Spokane River would be about 31 cfs and should occur during late August and early September.

The model indicates that Lake Coeur D' Alene will also be impacted by growth in Idaho. Although the impact is small and on a large lake, it does represent a decrease in water than can be released to mitigate downstream impacts.

Allan Wylie

## Appendix 5: Summary of Groundwater Management Plan Status

On September 15, 2005, the Director of the Idaho Department of Water Resources adopted the Rathdrum Prairie Groundwater Management Plan. The plan was based on a recommended plan developed by the Rathdrum Prairie Groundwater Management Advisory Group. The plan set forth goals and actions which were intended to guide water resource management "to balance the protection of existing groundwater uses and water quality with the opportunity for future development, while encouraging water conservation." (A copy of the full plan is available at: http://www.idwr.idaho.gov/WaterInformation/GroundWaterManagement/RathdrumPrairie/PDFs/Final%20Order%20Rathdrum%20GWMA.pdf.)

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Since the plan was adopted, some actions have been accomplished, others await implementation. As a part of the RP CAMP, the management plan provides a framework for management actions which would benefit the RP CAMP implementation. The following review of the goals and actions set out in the plan is intended to guide the recommendations for implementing CAMP.

**Goal 1: Technical Data and quantification of water availability.**

Actions to meet this goal included participation in the SVRP Hydrologic Project; continuing data acquisition; and adaptation of permitting conditions as new data was analyzed. Additionally, IDWR was directed to obtain hydrogeologic data as new wells are completed. All actions have either been accomplished or are in place.

**Goal 2: Technical Data and quantification of water use.**

Two actions defined under this goal were the establishment of a water measurement district and investigation of starting an adjudication. Since the Northern Idaho Adjudication was initiated successfully, IDWR determined that the establishment of a water measurement district, as an interim measure prior to the adjudication, was not practical. Upon completion of the adjudication, establishment of a permanent area-wide water district will be established.

**Goal 3: Manage groundwater resources efficiently and fairly for all users.**

Two actions identified included the establishment of a water district and evaluation of transfer applications to ensure consistency with local public interest and conservation of the resource. Both these actions are or will be implemented. As stated above, a permanent area-wide water district will be established once the adjudication is completed.

**Goal 4: Encourage water purveyors, regulatory agencies and local and regional governments to plan and incorporate plan principles.**

This goal did not lay out actions which IDWR could implement but to show support and encouragement. Elements within this goal included encouragement for municipal water providers to undertake long term plan under the Growing Communities Doctrine statute. Local jurisdictions were encouraged to require community water systems over individual wells.

**Goal 5: Encourage water conservation efforts by all users of the resource.**

Two action items were identified: conservation plans required for municipal purveyors and support for establishment of an aquifer-wide water conservation advisory committee. An additional list of measures was compiled for IDWR encouragement and assistance. This list included economic support for developing

conservation plans; water conservation demonstration projects and educational activities; support for price structures to encourage water conservation; and, investigating strategies for using reclaimed wastewater. IDWR has implemented the requirement for conservation plan submission, but a final guidance document has not been completed. Draft Water Conservation Measures and Guidelines for Preparing Water Conservation Plans has been prepared and is available on the IDWR web pages, but has never been finalized. No actions have been taken to implement the other actions or suggestions.

**Additional Actions**

Seven additional actions were identified:

1. New domestic wells required to be authorized through permit (no Start Card). Implemented.

2. Protection against loss or forfeiture if non-use is due to conservation plan. Implemented, but unused.

3. Proper abandonment of wells, with consideration of use as monitoring well. Implemented.

4. Monitoring required for new wells, if deemed appropriate. Implemented.

5. Investigation of managed recharge. Not implemented.

6. Continued advisory committee activity. Regular meetings not held.

7. Annual review of plan and 5-year report to IDWR Director. Not implemented.

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## Appendix 6: Full description of ideas for the Framework for Regional Discussion

Develop a plan for regional engagement to promote collaborative bi-state SVRP aquifer management. While the specific elements of such a framework would be determined by Idaho and Washington, the study effort has helped highlight some principles that may be useful. Several are noted below, along with specific considerations for the Board.

- The initial effort should be to assemble a manageable-sized regional framework planning group from both states to develop the fuller framework itself (this could include ground rules, process definition, goals, etc.).
- The USGS aquifer study effort provides a possible template, along with strong working relationships, for future collaboration, as well as funding sources.
- A regional framework should be equitable for each state, and be inclusive of tribal governments as well as stakeholders across the region.
- A regional framework should acknowledge the range of economic, environmental and other interests related to the SVRPA and seek to find ways to support that range of interests.
- The focus of a regional framework should begin with issues and efforts that are currently possible with existing governance: working toward common definitions, measurement standards, water use data, mutual conservation and efficiency goals, and further refinement, where needed, of the aquifer as well as groundwater and surface water interactions.
- A regional framework may or may not need to result in formal governance mechanisms; it should be flexible in considering different approaches for collaborative water management. The Moscow-Pullman aquifer effort may provide useful examples in this regard.
- A regional framework should look for ways to constructively integrate with other local and regional efforts, such as water system planning, watershed planning, ongoing adjudication, and similar efforts.

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## Appendix 7: Full description of strategies that should be addressed by the Aquifer Protection District.

**Strategy # 1: Encourage the support and development of existing and future applicable programs to monitor, enhance, and model water quality concerns.**

- Emphasize continuance and expansion of existing programs and plans, which have been successful in protecting and enhancing the quality of the aquifer. In some cases, we need either to bolster or enforce plans that have not been implemented to their full potential; or develop new plans to fill voids or areas that need to be addressed.
- Continue funding for long term monitoring to provide for trend analysis of RPA health.
- Encourage development of fate and transport models to enhance response to contamination events and long term planning to avoid contamination.
- Explore whether there are opportunities to adapt existing models, or develop new models, to determine when and where quality problems will occur. This may require modifying the models so they can be applied at a micro level.
- Develop and expand existing aquifer programs to include basin-wide consideration, such as threats to water quality on a watershed basis.
- Ensure programs relating to water quality and aquifer protection should not be subject to short-term changes in departmental or administrative leadership. Create programs that support long-term vision.

**Strategy # 2: Mitigate the impacts of stormwater run off. Stormwater runoff from developed lands can contain a variety of pollutants that can adversely affect water quality. As land development increases, the Advisory Committee recognizes that mitigating the impacts of stormwater run off is essential to protecting the quality of water in the aquifer.**

- Promote pretreatment methods for stormwater.
- Encourage permitting agencies to review and improve stormwater permits at regular intervals. Review operations and maintenance overview of systems, and ensure they are maintained as intended.
- Promote the use of best management practices in development design. Although this is not a comprehensive treatment mechanism, the Advisory Committee believes this alternative is more desirable than mere collection in urban areas, which is difficult to deal with.
- Monitor for an increase of chloride or other contaminants in runoff. Develop strategies to address the timing issue of chloride increases following a freeze and use of road salts.
- Consider how to assess and approach the effects of nutrient pollution from both developed and agricultural lands.
- Develop incentives to retrofit non-conforming systems.
- Identify pollutions that create serious problems and identify programs that help reduce and eliminate those pollutants.
- The Advisory Committee encourages utilization of future technologies that enhance the stormwater treatment strategies for the RPA.

**Strategy # 3: Promote practices that prevent accidental or incidental releases of contaminants over the RPA.**

- Support and expand regular monitoring programs with vigilance to the risk of

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incidental releases of industrial pollution. Encourage coordination and communication between those regulatory groups to enhance the protection of the aquifer.

• Where applicable, require increased monitoring and reporting of petroleum pipelines by owner and operation entities.

**Strategy # 4: Develop a program to account for wellheads over RPA and proper abandonment of unused wellheads. Wellhead contamination is possible if well head construction lacks a seal and allows for contamination.**

• Include consideration of wellhead contamination in continued or enhanced regulations and in periodic water quality threat assessments.

• Support proper decommissioning of private wells that should no longer be in use. Support creation of incentives for decommissioning.

• Evaluate unused wells to see if they can and/or should be used for other purposes febore sealing against potential contamination (instead of decommissioning).

• Create an educational program to support public awareness of the issue through a coordinated effort with local jurisdictions as a health and safety issue.

**Strategy # 5: Support continued monitoring and management of potential water quality issues contained in RPA watershed.**

• Determine whether monitoring of lake metals is being completed at the appropriate scale and time intervals (both length and frequency of testing).

• Encourage support or increased resources for monitoring of lake metals.

• Ensure that the prospect of catastrophic events involving the Lake are considered, such as a sudden shift from aerobic to anaerobic conditions.

• Ensure that potential contamination due to dredging is considered in light of potential problems with heavy metal migration.

• Apply for grants to study the potential for mobilization of contaminants in CDA lake.

• Encourage support or increased resources for monitoring of lake contamination.

**Strategy # 6: Encourage wastewater disposal methods that benefit the RPA.**

• Develop strategies to maintain standards of nondegradation that can include wastewater reuse such as purple pipe.

• Conduct study to determine cumulative effects of wasterwater disposal methods, including septic systems.

• Determine the permissible land use and density that would not degrade the RPA greater than existing regulations. Account for the aggregate impact of contamination.

• Avoid damaging the water quality with wastewater disposal systems.

• Develop better monitoring or consider study on impacts from septic systems.

**Strategy # 7: Prepare for emerging or unknown threats. Traces of personal care products and pharmaceuticals in our water systems are a growing concern, and issues may emerge in the edges of the aquifer where there is less dilution due to the slow moving areas. The Advisory Committee is also concerned about activities beyond the regulatory boundary of the aquifer that may threaten water quality in the future. To address this issue, the Advisory Committee proposes the following:**

• Expand regulations beyond aquifer boundaries to maintain water quality at a

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watershed scale.

• Develop strategy to address overarching federal regulations that may conflict with regional or local needs. (i.e. Pipeline Safety Act)

• Encourage testing for and regulating new compounds that may be proven or suspected of causing potential harm.

• Continue or enhance existing water quality monitoring programs.

• Encourage modification of existing, or development of new models to assist in determining or predicting water quality impacts on the RPA. Continue funding for long-term monitoring to provide trend analysis of RPA health and for the development of fate and transport models to enhance the response to contamination events.

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