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AN ASSESSMENT OF MUNICIPAL WATER RIGHTS AND WATER SYSTEMS IN THE CLARK FORK RIVER BASIN

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FORK RIVER BASIN

By

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ABSTRACT

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An Assessment of Municipal Water Rights and Water Systems in the Clark Fork River Basin

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In the semi-arid Inland Northwest, water is undoubtedly the most important natural resource. Western Montana's Clark Fork River basin is no exception. As the population of western Montana continues to grow, the Clark Fork River basin below the Flathead Indian Reservation is largely in de facto closure to the establishment of new water rights. Communities face a great amount of uncertainty with respect to their ability to establish new water rights to accommodate future growth due to the de facto closure, along with the ongoing adjudication process and the inability for communities to grow into their claimed water rights established before July 1, 1973. It is therefore essential for communities, and water resources planners and managers, to know their legal and physical entitlements to water. This assessment of municipal water rights and systems in the Clark Fork River basin was conducted by ascertaining the volumes and maximum flows of each community's water right, analyzing the volume of water used annually, and projecting future water consumption amounts for the next 20 years based on projected county population growth rates. Other information gathered includes water conservation measures, water-related infrastructure, and metering. Interviews of water system managers and operators were conducted to gauge their level of understanding of water resource issues and policies that might play a significant role in each community's ability to provide water to its residents. It appears that while the vast majority of communities in the Clark Fork River basin will have sufficient water right amounts for the next 20 years, other communities, e.g., Seeley Lake, Hamilton, and Missoula are more likely to experience difficulties in meeting future population growth with their current rights. Some communities, e.g., Butte, Columbia Falls, Superior, and Thompson Falls, may be limited in using their water rights due to water quality issues, while others, e.g., Hamilton, Missoula, and Stevensville, will be limited due to the Montana Department of Natural Resources and Conservation's rules regarding where water rights are able to be used.

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CHAPTER 1. INTRODUCTION

The Problem

Historically, water in the western United States has been one of the most sought-after resources. As Americans settled on the frontier, water was the main driver of growth and settlement. Water continues to be a key factor that may constrain (or prevent) growth in the West, and as water use in western states shifts from being primarily agricultural to municipal, some communities are going to great lengths to ensure that there will be enough water for their growing populations.

In an effort to encourage settlement of the West, the federal government built dams during what is now known as the Reclamation Era to store excess water for use during drought to encourage the establishment of irrigated farms. The dams allowed farmers to extend the irrigation season. A consequence of dam construction is that it made state control of water management less secure, especially on larger rivers such as the Columbia and Missouri, as the federal government became the "water master" instead of state and territory governments (Tarlock 2001).

As of 2006, the Interior West's population was still growing faster than any other region of the United States (Travis 2007). This has increased residents' concerns about issues such as urban sprawl and stretched water supplies. Drawn to the region first by its wealth of precious minerals and uncut timber, people now move to the West for its job opportunities in service industries, telecommunications, and information technology, not to mention the region's natural amenities (Travis 2007).

Certain incorporated and unincorporated communities in Montana's Clark Fork River basin may be approaching their limits of water resources availability for future population and economic growth. As more basins "close" to new surface water appropriations when surface water becomes fully appropriated (e.g., the Upper Clark Fork and Bitterroot), communities will have to look for alternatives to solve their water supply needs. It is therefore necessary to determine the actual developed capacity of municipal water systems, including existing claimed and permitted water rights and water delivery infrastructure for municipal use, and the ability of municipal water systems to meet current and future demands. According to an estimate of the population performed by the Montana Census and Economic Information Center (CEIC), the Clark Fork River basin had a July 1, 2008 population of 333,000 (Montana CEIC 2009). The population has increased from 268,000 in 1990 and 301,888 in 2000, and is predicted to continue to increase to nearly 455,000 by 2030 (Petersen-Perlman and Shively 2008). While western Montana's population continues to grow, the amount of available water does not.

In a 2004 application for a new water right, Thompson River Lumber Company, Inc. (TRLC) sought to appropriate 250 gallons per minute (gpm; approximately 56 cubic feet per second) and up to 400 acre-feet (acft) of water annually from the Clark Fork River for power generation (Yates 2008). Multiple objections were made to the application. The most notable of these was that from Avista Utilities which operates the Noxon Rapids Dam for hydroelectric power generation some 40 miles downstream of TRLC's proposed project (Yates 2008). This case was of particular concern to the Montana Department of Natural Resources and Conservation (DNRC), along with the Clark Fork River Basin Task Force (CFTF), as Avista holds three of the more senior water rights (relative to newer applications) on the lower Clark Fork River. This objection marked the first time that Avista objected to a new water right (Tubbs 2008). If communities want to expand water rights to serve growing populations, Avista's senior hydropower water rights present difficulties.

General Purpose

The purpose of this thesis is to determine the current state of municipal water use in the Clark Fork River basin and to determine whether there are certain communities that are likely to fully grow into their water rights in the future. Managers and/or operators of the basin's municipal water systems were interviewed to determine current rates of water use and to gauge their knowledge and perceptions of policy issues and other constraints that will face the systems in the future (e.g., basin closures, drought, climate change, acquiring new water rights, etc.). This assessment will help communities in the Clark Fork River basin to determine if there are possibilities of water shortages now and in the future given current consumption rates and water right limitations. Existing municipal water rights as well as the characteristics of corresponding municipal water systems were assessed, and the data include (but are not limited to): water right diversion rates and annual volumes, current and historic levels of water use, number of metered accounts of various types (i.e., residential, commercial, industrial), demographic data and trends of communities served, amount of system leakage, water system-organized conservation measures, and use of effluent water.

Research Questions

The following questions are addressed in this thesis:

1. Are the municipal water rights sufficient to meet current needs of municipalities in the Clark Fork River basin?
2. Will municipal water rights be sufficient to meet future needs of municipalities in the Clark Fork River basin?
3. If the water rights are not sufficient, what are some alternatives that municipalities could use to ensure that their water supplies will be?
4. What is the level of understanding of water system managers of water resource issues and policies that could affect the ability of municipalities to expand their water rights in the future?

The following chapter discusses the background and literature review relevant to this thesis (Chapter 2). This is followed by a discussion of the methods used to perform this research (Chapter 3), a presentation of the results (Chapter 4), a discussion of the results by community (Chapter 5) and basin-wide (Chapter 6), and a conclusion (Chapter 7).

CHAPTER 2. BACKGROUND AND LITERATURE REVIEW

Introduction

This chapter is organized around the following sections: water supply and demand, water demand forecasting, opportunities for water conservation, climate change, demographics, and Montana water law. The ways in which water supply and demand can change are important to understand. As communities approach their water right volume and flow rate limits, water demand forecasting is a necessary tool to predict how much water the community needs. Communities also need to know how to conserve water that is available to them in the event of water shortages; hence, the discussion of the opportunities that communities have to conserve water is relevant. Climate change may also affect basin-wide water amounts available seasonally and/or annually. As the Clark Fork River basin continues to be the fastest-growing basin in Montana, urban water demand will likely increase. As such, it is necessary to know where the population is increasing and by how much. Finally, this chapter concludes with a discussion of Montana water law relevant to community water system issues.

Water Supply and Demand

Although the global renewable water supply is about 7,000 m^3 per person per year, only about 1% of global water (renewable and non-renewable) is liquid fresh water, with 98% of that being groundwater (Bouwer 2000). Unfortunately for Montana (and the world), fresh water is not evenly distributed across the world. For “adequate” living standards in western and industrialized countries, a renewable water supply of at least 2,000 m^3 per person per year is necessary

(Bouwer 2000). But, it's difficult to determine a specific volume per person necessary for every community, as the range of consumption rates for households or per capita varies significantly (Wong 1972). Comparing water consumption data between water systems is far from an exact science, as many systems have no metering. Also, billing varies in frequency from monthly, quarterly, and semi-annually to annually (Wong 1972). Water quantities are often lumped together as an aggregate for residential, commercial, industrial and public uses. To get a fair estimate for domestic water demand, individual uses must be separated (Wong 1972).

Along with differences between communities concerning how much water is required to sustain them, actual patterns of demand can vary greatly. Relative demand variation is diurnal, by day of week, by month, and seasonal. Weather conditions, weekend/holiday use patterns, and regular domestic and industrial activities of consumers can also modify demand (Zhou et al. 2002). Due in part to the complicated nature of water consumption, the economics of municipal water supply has been an underdeveloped area. The reasons for the long neglect stems from at least two factors:

1. With the exception of treatment of raw waters before distribution, the technology of municipal water supply has not changed that dramatically since the Romans built aqueducts 2,000 years ago (Milliman 1963). Although today's water distribution networks are more elaborate and use modern technology, the basic principles of water delivery remain the same. Gravity is still used whenever possible to transport water, water reserves are stored

either in surface reservoirs or storage vessels, water is delivered through pipes lying beneath city streets, and treated wastewater is generally returned to rivers downstream of water supply areas (Cech 2005).

2. The economic costs of urban water supply have been very low in relation to water's worth in domestic, commercial, and industrial uses. The economic value of water is quite low in spite of its very great aggregate value in use (Milliman 1963; Cech 2005) i.e., water is underpriced compared to what it's truly worth.

Another large problem in comparing municipal water systems is the disparity in pricing between systems. In his 1972 appraisal of municipal water pricing, Lawrence Hines noted that municipal water rates were "the most unscientifically determined price in the public utility field" (Wong 1972, 36). There is little in the more recent literature to suggest that this situation has changed. One pricing difference is related to the sources of supply. Surface water and groundwater treatment costs vary considerably compared to one another (Wong 1972); groundwater is generally less expensive to treat. Another pricing difference depends on the size of the community served. Households in some communities pay a flat rate for water use, while industrial and commercial users pay a minimum block or declining rate. On top of that, some systems include a sewerage charge, others include an assessed charge annually, and some have no surcharge at all (Wong 1972). The billing frequency may also influence water consumption through price perception. Two opposite forces could be at play: on one hand, frequent bills are a reminder that water is not free and may create a better understanding of the price structure and a relation between consumption and cost for consumers, thus increasing price elasticity. On the other hand, more frequent billing causes smaller overall bills, which would drop price elasticity (Gaudin 2006). In a study of price information on residential water demand, Gaudin (2006) suggested that residents' sluggish response to price is partly due to an absence of price information on water bills. In a survey conducted by the American Water Works Association in 1996, 495 utilities with metered rates were examined to identify the types of information provided on residential water bills that might affect water use. The results provide evidence in support of the hypothesis that price information increases the price elasticity of demand (Gaudin 2006). Nevertheless, it is suggested that while water demand is sensitive to price, the magnitude of that sensitivity is small at current prices (Olmstead et al. 2003).

Water Demand Forecasting

Forecasting the demand for water is a critical activity for communities, especially in situations when the community's supply is strained. A computer-based mathematical model that relies on past demand data and other information, such as weather forecasts, can perform water demand forecasting for periods of time ranging from 24 hours to a year (Zhou et al. 2002). Several academic studies have relied on time-series analysis methods to forecast, though sample reliability can be a big problem as the sample chosen may sometimes be too short (Wong 1972).

Another problem with accurately forecasting water demand for municipal systems arises from income parameters, which are very hard to obtain. Most studies tend to rely on the use of median family income data coming from the decennial census of population (Wong 1972). A few studies use average household income, which may be obtainable from sales management or marketing surveys. When that index is not available, proxy variables e.g., assessed property value, the number of water-using appliances (e.g., dishwashers and automatic washers) in a household, size of lot, and the number and type of automobiles owned by a family, are used (Wong 1972).

Price elasticity of demand can be strongly influenced by demand shifters, such as household income, number of persons in a household, ages of consumers and other demographic characteristics, size of home and lot, and even prices of non-water goods (Espen et al. 1997). In their study of price elasticity of residential demand for water, Espen et al. (1997) identified evapotranspiration rates, rainfall, pricing structure, and season as the most important influences on price elasticity of demand.

There are other variables that can affect the demand for water, some of which are climatic in nature. Temperature and precipitation are two of the most commonly used, and possibly the most effective, meteorological variables (Zhou 2002). In a cross-sectional study of 33 cities in southern California, Morgan and Smolen (1976) found that temperature and precipitation were more significant than potential evapotranspiration minus precipitation, or monthly binary seasonal variables. Maidment and Parzen (1984) also utilized precipitation, temperature, and pan evaporation as climatic variables in a water use study of six cities in Texas. They found that climate is strongly correlated with water use in the three cities examined in the semiarid Texas High Plains where if one inch more than the mean monthly rainfall or pan evaporation occurs, it results on average in a 10 gallons per capita per day change in mean monthly water use (with a decrease for rainfall and an increase for evaporation). The response of water use to weather variations is weaker in the three cities located in the more humid climes of East Texas.

To manage water supplies during a long-term, multi-annual drought, it is important to understand and predict how demands are likely to respond both to management interventions (e.g., price increases and outdoor water use restrictions) and exogenous factors (e.g., weather and demographic changes). This information is particularly valuable in the context of drought planning and mitigation (Kenney et al. 2008). An example of this usefulness occurred in Aurora, Colorado. Aurora Water implemented a variety of short and long-term demand management programs in response to the 2002 drought, which was one of the worst on record. Programs included drought restrictions (i.e., lawn watering restrictions); incentive programs; introductions of new technologies; and multiple changes in billing structures and ratios, culminating in an adoption of an increasing block rate (IBR) pricing structure with individualized (house-specific) block widths (i.e., volume of water priced at a given rate level) based on water budgets adjusted annually in response to consumption levels, water storage conditions, and revenue considerations (Kenney et al. 2008). These water demand efforts were largely successful, reducing total annual deliveries in 2002 and 2003 by 8% and 26%, respectively, relative to average deliveries in the 2000-2001 period (Kenney et al. 2008). However, Aurora Water was unable to tell which reductions could be relied upon in the future. The findings of the study suggest that residential water demand is largely a function of price, the impact of non-price demand management programs, weather, and climate (Kenney et al. 2008).

A 1986 study developed a transfer function model to forecast daily water use. The study used data from nine cities (three each in Florida, Pennsylvania, and Texas). The model showed a dynamic response of water use to rainfall and air temperatures. The response of water use to rainfall depended first on the occurrence of rainfall and second on its magnitude (Maidment and Maiou 1986). The study concluded that for smaller cities (e.g., College Station, Texas), there is a relatively higher inherent randomness in the daily water use data than in larger cities, so smaller cities are harder to model than larger cities (Maidment and Maiou 1986).

In a listing of water demand forecast methodologies for California, William Y. Davis (2003) showed that each of those methodologies followed a common approach:

$Q_{cgm,y} = q_{c,m,y} \times N_y$, where

Q = monthly water use;

q = per unit use;

N = number of units;

c = customer class;

m = month; and

y = year.

Methods used include the Average Rate of Use, Disaggregate Factor Forecast, Functional per Unit, and Functional Population. The selection of which water demand forecast method is a function of three primary criteria: the planning objective, available data, and available resources (Davis 2003).

One software program developed by the Institute of Water Resources, known as the Institute of Water Resources Municipal and Industrial Needs (IWR-MAIN) is used to forecast water needs for communities. The purpose of the IWR-MAIN application program is fourfold: (1) to use demographic, housing, and business statistics of service areas to estimate existing and future per unit water demands; (2) to use projections of population, housing, employment, or other demographic units to derive baseline forecasts of water use; (3) to provide an analysis of existing water demands at the end use level, including an estimation of conservation savings from passive, active and emergency demand reduction measures; and (4) to allow the user to select the lowest-cost combinations of demand-side alternatives through benefit-cost analysis, and to formulate and optimize a cost-effective long-term water management policy (Dziegielewski et al. 2009). The program has two main modules: the Forecast Manager estimates future water use by customer sectors with user-assigned models developed for each sector; and the Conservation Manager that estimates water use efficiency savings by specific end uses. The input data in this program can be organized spatially, seasonally, and by use. The program also allows the user to analyze variables that affect the rate of water use (e.g., per household for the residential sector, and per employee for the industrial sector). It also allows the user to analyze long-term water demand impacts, evaluate long-term water savings of different demand management practices, and to aggregate and compare forecast results. IWR-MAIN models have been used in large metropolitan areas in the southwestern U.S., including the Metropolitan Water District of Southern California, the Phoenix Department of Water and Wastewater, and the Las Vegas Valley Water District (a member agency of the Southern Nevada Water Authority) (Dziegielewski et al. 2009).

Opportunities for Water Conservation

As the overall demand for water increases over time with a growing population, water planners face new challenges. Untapped sources of water are becoming rare, and the depletion and contamination of groundwater sources has further limited supplies. The increasing frequency of regional droughts has increased competition for water between urban and agricultural interests (Baumann and Boland 1998). Environmental concerns about increased water use have intensified during the last few decades to the point where the development of new supplies is politically infeasible, and the prospects for financing major construction programs are discouraging for many water agencies. Also, the Safe Drinking Water Act of 1974, and its recent amendments, have forced many communities to comply with increasingly stringent limits on a large number of contaminants in drinking water that have significantly increased the cost of water treatment; some water sources that had served communities for decades are no longer considered adequate because of excessive contamination (Baumann and Boland 1998).

To conserve as much water as possible, community water managers need to adopt water management practices that reduce water use (or water loss). Some 50 years ago, Milliman (1963) predicted that, under certain conditions, the reuse of waste water will be far less expensive than tapping new sources of supply, which is true for some places in the southwestern U.S. Water-short areas could also minimize their use of water by importing commodities that take a lot of water to produce, like food and electric power, from other areas or countries that have more water. This concept is called “virtual water” (Bouwer 2000). The IWR-MAIN Conservation Manager program function mentioned above would also be useful to identify which areas of water delivery and consumption are efficient (Dziegielewski et al. 2009). Another possibility is using reclaimed water for industrial purposes, lawn-sprinkling at parks and golf courses, and for ponds and recreational lakes (Milliman 1963).

Research into the effectiveness of outdoor watering restrictions generally focuses on comparing voluntary versus mandatory programs. The literature is consistent in showing significant (sometimes 30% or more) savings from mandatory restrictions. Voluntary restrictions are much more variable, but they consistently achieve less in savings than mandatory restrictions do (Kenney et al. 2008).

In a survey of Canadian municipalities conducted by Canada's Intergovernmental Committee on Urban and Regional Research, municipalities listed measures they have implemented to conserve water, these include retrofitting residential water infrastructure by installing toilet dams, low-flow showerheads, and faucet aerators or washers. Nearly 85 percent had carried out infrastructure initiatives that included leak detection, installation of new or updated water meters, new or updated computerized water-use monitoring equipment or pressure reducing valves (Waller et al. 1998).

Hydrology and Water Resources of the Clark Fork River Basin

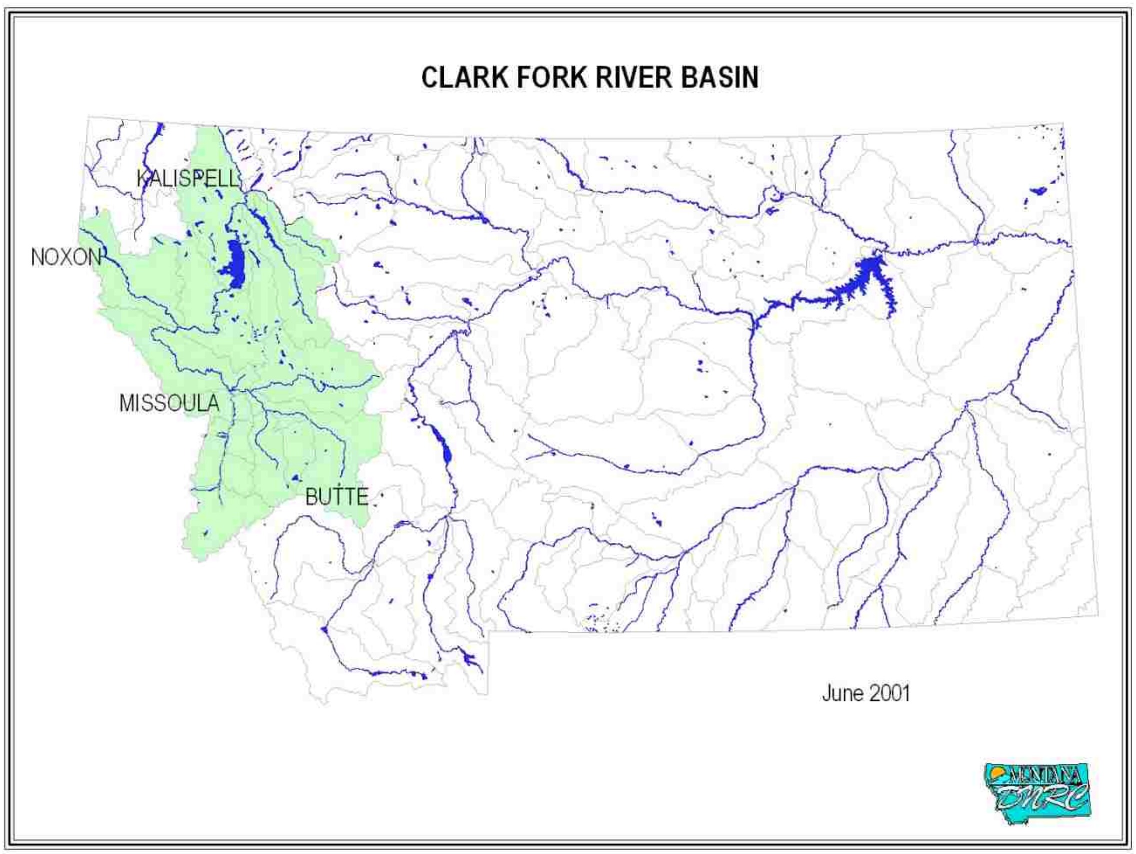

Figure 1. Map of Study Area (Montana Department of Natural Resources and Conservation 2004).

The Clark Fork River basin (Figure 1) is a headwater tributary basin of the Columbia River (CFTF 2004). The basin spans the majority of western Montana, with the Clark Fork River heading on the west of the Continental Divide near Butte and emptying into Lake Pend D'Oreille in Idaho. The total drainage area of the basin is 21,833 mi^2 (USGS 2009).

Unique from the rest of the state, the climate in western Montana and the Clark Fork River basin is strongly influenced by moist air masses from the Pacific Ocean, which produce relatively abundant precipitation and mild winters. Occasionally, the climate exhibits more continental patterns of weather with extended cold periods in the winter and hot, dry periods in the summer (CFTF 2004).

A good method of analyzing the range of annual discharge, or water yield, of the entire Clark Fork River basin (a snowmelt-dominated water regime) is through the examination of its mean annual discharges. At the United States Geological Survey (USGS) gage on the Clark Fork River near Noxon, the mean annual discharge has ranged from a high of 31,870 cubic feet per second (cfs) in 1996 to a low of 11,540 cfs in 2001, and has a 40-year (1967-2006) average of 19,850 cfs/yr that translates to 14,345,594 acft/yr (USGS 2009). Because of the latitude of the basin and its complex mountainous terrain, precipitation falls mostly as snow and most of the runoff is snowmelt (CFTF 2004). The majority of precipitation falls as snow in the winter and the early spring, with streamflows peaking in the early summer after snowmelt has commenced (CFTF 2004). Low flows occur in the early fall after low levels of precipitation in the summer and in the late winter before snowmelt has begun (CFTF 2004). This inconsistency of annual river flows and the large size of Avista Utilities' water rights, which were purposefully sized to take advantage of the river's largest seasonal flows, means that Avista's hydropower rights are not fully satisfied during the majority of the year.

The basin contains 21 reservoirs with capacities greater than 5,000 acft (CFTF 2004). The reservoirs were constructed to store water for irrigation, hydropower, municipal water supply, and for flood control (CFTF 2004). The three largest reservoirs are: (1) Hungry Horse Reservoir on the South Fork of the Flathead River, which has a 3.5 million acft capacity; (2) Flathead Lake on the Flathead River, which has a 1.8 million acft capacity (though not technically a reservoir, the installation of Kerr Dam on the Lower Flathead River raises the level of Flathead Lake by 10 feet (PPL Montana 2006); and (3) Noxon Rapids Reservoir on the Clark Fork River, which has approximately a 500,000 acft capacity (CFTF 2004). As John Tubbs (former Director of the DNRC's Water Resources Division) mentioned in his June 9, 2008 memorandum, the State of Montana is pursuing the possibility of using 100,000 acft of stored water in Hungry Horse Reservoir to help satisfy more senior water rights in the Clark Fork River basin, especially Avista's (Tubbs 2008).

Climate Change

Climate change could also play a part in determining how much water will be available in the Clark Fork River basin. In Montana, the five-year average temperature from 2003 to 2007 was 2.1° F warmer than the 20th century's average (Kinsella et al. 2008). Western Montana has experienced an increase of 1.33° C in annual average temperatures from 1900-2006, which is 1.8 times greater than the rise in global temperatures (Pederson et al. 2010). This was determined by data from climate stations across western Montana. Also, future warming is anticipated (Moore et al. 2007). Average snowpack levels in the West have been less than the historical average for the past half-century (Kinsella et al. 2008). This is important to note as river systems in the western United States receive about 60% of their annual discharge directly from snowmelt (Moore et al. 2007). This is especially worrisome for water users in the Clark Fork River basin, since the basin is a snowmelt-dominated water regime. Further, the snowpack that does exist in the West is now melting faster, sometimes 20 to 30 days earlier than normal, which affects annual runoff patterns (Kinsella et al. 2008). If these trends continue, as is expected by Kinsella et al. (2008), Pederson et al. (2010), and Moore et al. (2007), they could have serious consequences for the way water is distributed and used in the basin.

Demographics

The economic slowdown of 2001-2002 did little to stop growth in Montana and the West. In fact, the West has consistently increased its share of the total U.S. population since the 1850s (Travis 2007). The Clark Fork River basin has been no exception.

The populations of ten Montana counties are located entirely or almost entirely in the Clark Fork River basin (i.e., Deer Lodge, Flathead, Granite, Lake, Mineral, Missoula, Powell, Ravalli, Sanders and Silver Bow Counties). Two other counties have less than five percent of their population within the Clark Fork River basin (Lincoln and Lewis & Clark Counties). The basin had a total population of 301,888 in 2000, with an estimated population of 322,709 in 2006 (Petersen-Perlman and Shively 2008). Montana Department of Commerce demographer Susan Ockert has noted that the basin's population is predicted to reach 342,780 in 2010 and 454,820 in 2030 (Petersen-Perlman and Shively 2008). However, the growth is uneven. According to Dick King of the Missoula Area Economic Development Corporation, 68% of the Clark Fork River basin's population resides in Flathead, Missoula and Ravalli counties, and these three counties have accounted for 92% of the Basin's population growth since 2000 (Petersen-Perlman and Shively 2008). The population growth has also been more concentrated in small cities due to high job growth rates. From 1996 to 2005, small cities in Montana (having populations between 10,000 and 50,000) outperformed both large cities (over 50,000 residents) and rural counties in job growth, adding 27.6% more jobs since 1996, compared to 18.4% more jobs in large cities and 10.2% more jobs in rural areas (Eldredge 2007).

Another factor of Montana's population growth that warrants attention is age. From 1990 to 2000, people aged 40 to 60 have been responsible for the majority of population growth (15-25 year olds to a lesser degree) (Swanson 2006). The median age of Montanans is expected to continue to increase, with senior citizens (ages 65 and over) being the fastest-growing age group (Swanson

2006). The ages of the population that moves to the state will play a significant role as to future water uses.

Water and Poverty

While many assume that all people living in the United States have access to safe water and sanitation, this is not the case. US citizens have limited awareness of low-income water issues affecting their fellow citizens. The US reports 100% access to safe water and sanitation in international water surveys (Wescoat et al. 2007). Access to safe water is defined as having a public fountain or water spigot located within 200 meters of a household in urban areas, and residents not having to spend excessive time each day fetching water. Access to safe sanitation refers to a share of the population with at least adequate excretion disposal facilities that can effectively prevent human, animal, and insect contact with excreta (Wescoat et al. 2007).

Low-income water issues have limited political salience in the US. Environmental justice programs created in response to robust social movements and civil rights litigation that link consumption by more privileged groups to degradation of resources of marginalized groups and places are the two principal exceptions (Wescoat et al. 2007).

Montana Water Law

Early in Montana's history, residents were quick to learn that Montana's harsh climate made dry-land farming a tough business and that a reliable water supply was priceless. Pleas from irrigators to Helena and Washington, D.C. on the subject of alleviating water scarcity were answered when governments set up around 180 irrigation projects that were constructed across the state during and after the Great Depression (Montana Legislature 1987).

Along with the irrigation projects, lawmakers have made several efforts to help alleviate the shortage of water in Montana. In 1967, the Water Resources Act was passed which set several water management goals for the state and concluded that those goals would be met through a state water plan (Montana Legislature 1987). In 1973, the Montana legislature passed the Montana Water Use Act, which established a centralized record system for water rights and required that all water rights existing before July 1, 1973 must be finalized, documented, and quantified through a statewide water rights adjudication court (UCFSC 2004). As of November 30, 2009, the DNRC has examined 39,250 rights, with 17,750 claims yet to be examined. The DNRC is examining claims by sub-basin and has written a summary report to the Water Court on sub-basin 76 F (Blackfoot River). The claims have yet to be finalized by the Court (Gilman 2010).

Prior Appropriation

The ability to use surface and groundwater in Montana is determined by the prior appropriation doctrine, which is usually summarized by "first-in-time, first-in-right (CFTF 2008)." The phrase "first-in-time, first-in-right" refers to the fact that water use is based on water rights whose priority or seniority is based on when water was first put to a beneficial use. Prior appropriation has been the primary doctrine for the development and use of surface water across the western United States (Tarlock 2001). Generally, it has supplanted the riparian doctrine (the right to use water if one owns land abutting a body of water) wherever it had been utilized in the past. Prior appropriation was initially developed as a fair and efficient risk distribution scheme for many small-scale irrigators in arid and semi-arid areas (Tarlock 2001); however, despite the initial purpose, prior appropriation has been increasingly criticized in recent years. A principal criticism is that the perpetual “use it or lose it” nature of the rights locks up too much water in marginal agriculture and generally encourages inefficient off-stream consumptive uses that are detrimental to aquatic ecosystem values and the needs of growing urban areas (Tarlock 2001). Critics also charge that it discourages water conservation by not clearly awarding water rights holders for conservation efforts (Wescoat 1985). Other criticisms include that it is difficult to administer in highly appropriated river basins, allocations are inflexible, climate change and ecological factors are not considered, and the system does not recognize that water is not just an economic good (Whittlesey and Huffaker 1995). They also have mentioned that prior appropriation gave neither any consideration to the needs of fish and wildlife, nor the hydrologic needs of streams and canyons (Wilkinson 1992). Some critics have also argued that the system of prior appropriation should be ended and replaced with another allocation scheme (perhaps even a version of the riparian doctrine used commonly in eastern states), which provides for shared reductions by water users in times of drought (Reisner and Bates 1990).

Though prior appropriation remains the primary water law of the western United States, and is likely to remain so for the foreseeable future (Tarlock 2001), western states have augmented it in various ways. Some western states (i.e., Oregon and Washington) have incorporated what is called the "growing communities doctrine" into their statutes, which allows cities and towns to apply for or claim water rights with diversion rates and volumes in excess of their current needs so that they can meet the water demands of growing populations (CFTF 2008). This is done for permitted rights, but not for unadjudicated claims. In the Clark Fork River basin, Mountain Water Company (the private company that supplies water to the City of Missoula) raised the growing communities doctrine before Montana's Water Policy Interim Committee in 2007 (UCFSC 2008). Greg Petesch, Director of Legal Services in the Montana Legislative Services Division, wrote a memorandum that describes the growing communities doctrine as containing two primary elements. First, it gives municipal water suppliers more time to perfect their water rights by allowing the rights to be held for future needs and therefore allowing more time to put the water to beneficial use. In addition, the doctrine usually exempts municipal water rights from being lost through nonuse (UCFSC 2008). But, Montana has not explicitly adopted the growing communities doctrine, as the DNRC has ruled that neither the Montana Water Use Act nor Montana case law provides for this doctrine (CFTF 2008).

Some states use the public trust doctrine to subordinate prior rights to subsequent public uses (Tarlock 2001). For example, California has invoked the public trust doctrine to reduce vested rights when there has been serious ecosystem damage (e.g., Mono Lake), and Hawaii has used the doctrine to instruct the state water resource agency to protect in-stream flows with a greater effort when abandoned water uses are reallocated (Tarlock 2001). The problem with the public trust doctrine, though, is the debate over the source of the doctrine and the failure of agencies and courts to articulate a coherent justification to implement it (Tarlock 2001).

Basin Closures

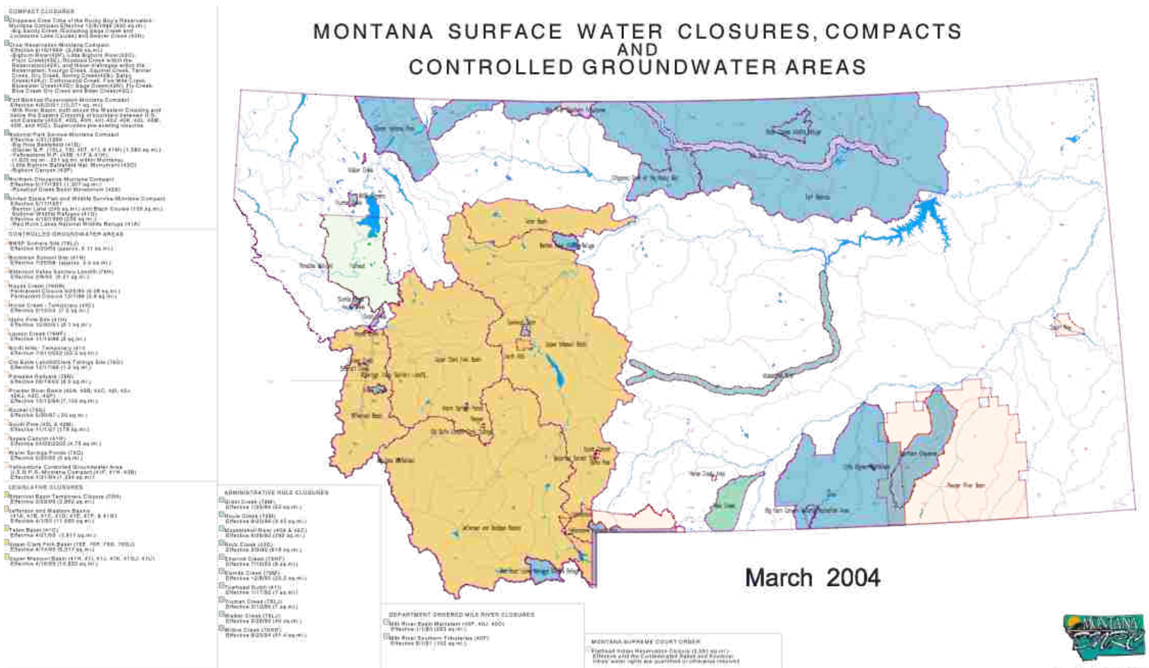

Figure 2. Map of Closed Basins in Montana (Montana Department of Natural Resources and Conservation 2004).

Another hurdle to developing new municipal water rights in the Clark Fork River basin is presented by basin closures (Figure 2). Currently, the Upper Clark Fork River basin is closed to most new surface water appropriations, the Bitterroot River basin is under temporary closure, and the Flathead Indian Reservation area of the Lower Flathead basin is closed due to a Montana Supreme Court Order (DNRC 2004). Adding to the already complicated situation is that Montana is currently negotiating a compact with the Confederated Salish & Kootenai Tribes (CSKT) of the Flathead Reservation for the "equitable division and apportionment of waters between the State and its people and the several Indian Tribes claiming reserved water rights with the State" (Kracher 2008, 3). The State and the Tribes are scheduled to complete the negotiations in 2013. While the Bitterroot River basin temporary closure has an exception for new municipal water rights, the Upper Clark Fork River basin closure does not (Government of Montana 2007). The State of Montana has the authority to control or close river basins and groundwater aquifers to certain types of water appropriations due to water availability problems, water contamination problems, and a concern for protecting existing water rights (Water Resources Division 2003). There are five different types of closures: controlled groundwater areas, petitioned surface water basin closures by rule, department-ordered Milk River closures, legislative closures, and compact closures. Both the Bitterroot and Upper Clark Fork River basins were closed legislatively, where by law the legislature precluded permit applications for new surface water rights in those drainage basins with the exception of municipal rights for the Bitterroot (Water Resources Division 2003 and Government of Montana 2007). Also, the entirety of the Clark Fork River basin was temporarily closed above the Noxon Rapids hydropower facility from 1999 to 2001 (Water Resources Division 2003). Though the Clark Fork River basin below the confluence of the Blackfoot and Clark Fork Rivers is not legally closed, one can say that a *de facto* closure exists given the TRLC case. As a response to the *Trout Unlimited v. DNRC* case in which the

Montana Supreme court recognized the linkage between surface waters and groundwater, the Legislature passed HB 831 in 2007, which tightened the rules for issuing groundwater appropriations in closed basins by requiring adverse affects [sic] to surface waters to be mitigated for (Montana Legislature 2007); the bill required an applicant for a new well in a closed basin to provide a hydrogeologic assessment which would demonstrate whether the new appropriation would result in a net depletion of surface water (CFTF 2008). All of these issues have helped to draw attention to the growing problem that Montanans face in the coming years regarding water availability.

Municipal Water Rights in Montana

Before passage of the Montana Water Use Act, the right to use water in Montana was obtained by putting it to a "beneficial use." In 1972, Montana adopted a revised State Constitution. Article IX, Section 3 of the new constitution included several provisions regarding water and water rights, including the statement that water is the "property of the state for the use of its people" (CFTF 2008). Municipal water supply users who would buy their water from a municipal water supply system do not need to have a water right, although the municipality or water supply system owner must have a water right to divert water for the system's users (Doney and Loble 2003).

However, Article II, Section 3 of the Montana Constitution establishes the people's right to pursue "life's basic necessities" as an inalienable right of Montanans. Some argue that since water is a basic necessity, that statement should give domestic use priority. It is important to note that domestic water use inside a house is for the most part non-consumptive, while use outside the house is more consumptive (CFTF 2008).

Clark Fork Task Force

In 2001, the Montana Legislature passed HB 397 to establish the CFTF, which was authorized to prepare a management plan for the waters of the Clark Fork River basin (CFTF 2004). The CFTF plan, completed in 2004, was predicated on the assumption that continuing growth and development in the basin would lead to increased conflict and uncertainty concerning water rights, especially in the context of the Avista water rights. The plan included several recommendations that the DNRC adopted. One of the key recommendations was that the State of Montana should open discussions with the US Bureau of Reclamation (USBR) to determine the cost and availability of long-term contracting options and to determine a quantity of water stored in Hungry Horse Reservoir for Montana uses other than hydropower (CFTF 2004). Another key recommendation was Recommendation 9-1, which recommended that cities and counties should use their zoning and subdivision powers to protect surface water-groundwater interaction areas, to require water meters in new subdivisions and government-owned water systems, and to promote conservation (CFTF 2004).

Obtaining New Municipal Water Rights in Montana

As per the prior appropriation rules, Avista Utilities can challenge any application for a new water right that it feels might infringe on their own rights. Similarly, it can make call (call for the curtailment of use) on any junior rights that can be shown to be affecting their own rights. It is important to reiterate that Avista's water rights total 50,000 cubic feet per second (cfs), and are sufficient to utilize almost all flows leaving the basin (CFTF 2004). The Clark Fork River's flows greater than 50,000 cfs generally occur only 22 days in May and June of wetter years, which suggests that surface water and groundwater connected to surface water is legally available for future appropriation in the basin only during the period when Avista's water rights are fulfilled (CFTF 2004). It is also important to note that the Clark Fork River's flows greater than 50,000 cfs occurred only 6 to 8% of the time over a 90-year period of record (CFTF 2004). Nevertheless, Avista has not challenged new water rights, with the exception of the previously mentioned TRLC application.

According to a June 2008 memorandum written by Avista's Hydro Project Manager Steven A. Fry (2008) to Montana's DNRC Water Resources Division Administrator John Tubbs, Avista had four main reasons for objecting. The reasons included:

1. TRLC proposed to divert water directly upstream of Avista's Noxon Dam Reservoir, which would have directly impaired the water right.
2. TRLC had alternative sources of water available.
3. TRLC made the assumption that water was available, since downstream hydroelectric projects had never made a call on junior right users.
4. TRLC's expert witness fundamentally misunderstood the operations of the Noxon Rapids Dam.

Fry (2008) further stated that it would be unlikely that Avista would object to an issuance of other future provisional water right permit applications (provisional meaning to grant the use of water for a specific purpose [Montana Department of Natural Resources and Conservation 2004]) if:

1. The points of diversion are in the Flathead River Basin, upstream of the point where the Flathead River leaves the Flathead Reservation.
2. The application meets at least one of the following criteria:
    a. The amount of water proposed is *de minimus* (of minimum importance)*;*
    b. The proposed use of water is largely non-consumptive (e.g., domestic use inside of a home); and
    c. Aquifer recharge or mitigation is developed to offset adverse impacts.

Avista Utilities was successful in its objection (the DNRC denied the application) proving that a 250 gpm, 400 acft/yr use of surface water in the Lower Clark Fork would adversely affect its senior hydropower rights (Tubbs 2008). In a memorandum to the DNRC Regional Managers whose offices might review such applications, Mr. Tubbs advised them to limit their use of the TRLC case as a precedent to new applications for surface water in the open Clark Fork River and its tributaries, excluding the Flathead River upstream of the Flathead Indian Reservation (Tubbs 2008). In this memorandum, Tubbs also mentioned that the TRLC case should be seen in context with the efforts the State is undertaking to seek 100,000 acft of stored water in the Hungry Horse Reservoir (Tubbs 2008).

Hungry Horse Reservoir

Due to the CFTF's recommendation, the State of Montana has started to negotiate with the U.S Bureau of Reclamation to lease water to help to satisfy Avista's water rights downstream. As of March 31, 2010, the State of Montana has completed the cost reallocation estimates. The next steps include completing a cost reallocation report and approval of entities including the Bonneville Power Administration, the U.S. Army Corps of Engineers, the Montana DNRC, and the U.S. Congress. A process for the release of water downstream to Noxon will also have to be established before this takes full effect (Bryggman 2010).

The following chapter describes the methods used to conduct the research for this thesis.

CHAPTER 3. METHODS

Introduction

This chapter begins with a description of the study area followed by a description of the data accessed for this research along with analysis of said data.

Study Area

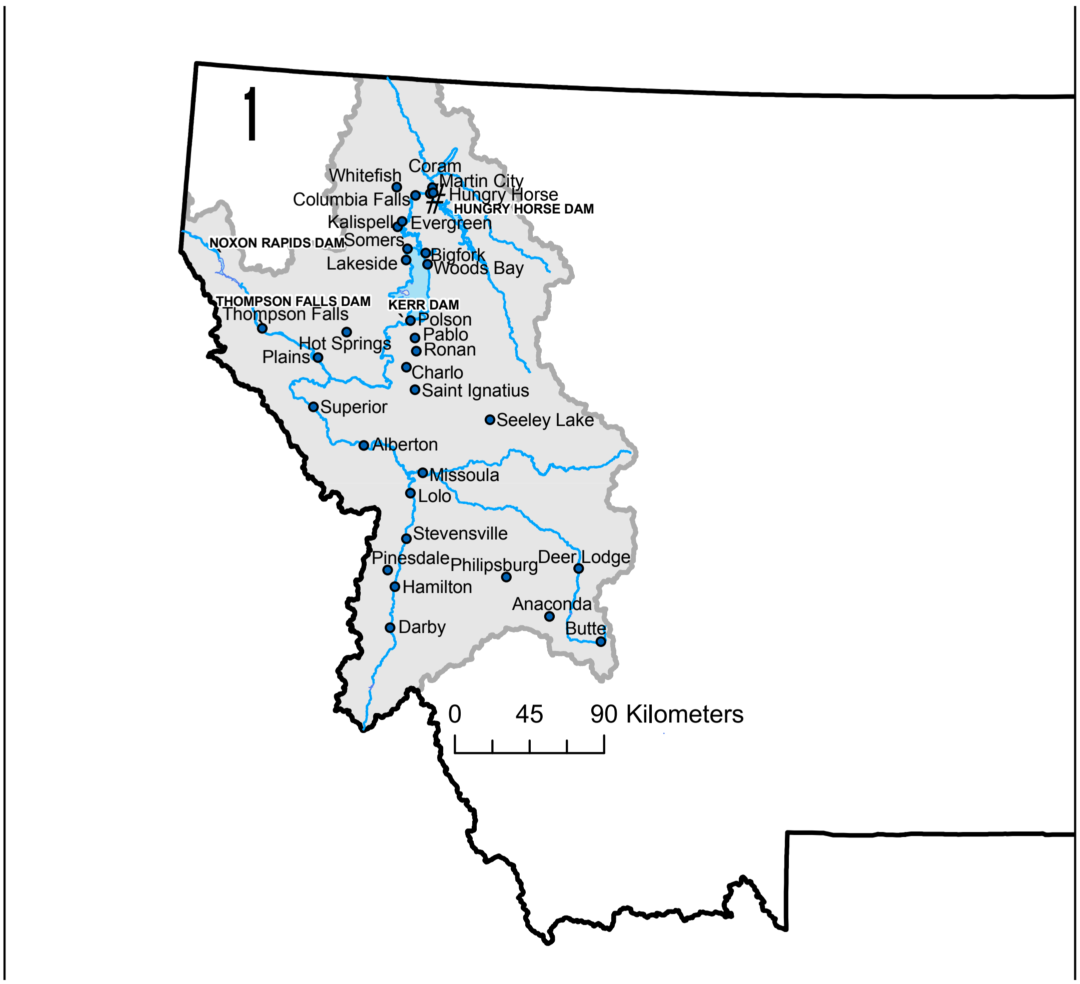

Figure 3. Map of Communities in the Clark Fork River Basin (Shively 2010).

The study area for this thesis is the Clark Fork River basin and the communities located within it. The basin covers the majority of that portion of

Montana's share of the larger Columbia River basin, and it drains most of Montana west of the Continental Divide. For the purpose of this study, the Clark Fork River basin is subdivided into five sub-basins: the Upper Clark Fork (which includes the Blackfoot River basin), the Middle Clark Fork, the Lower Clark Fork, the Flathead, and the Bitterroot. The Upper Clark Fork and Blackfoot basins are combined due of the fact that the Blackfoot River basin has only one community with a community water system (Seeley Lake). The Upper Clark Fork River basin is defined as the drainage area of the Clark Fork River and the Blackfoot River and their tributaries above the confluence of the Clark Fork River and Blackfoot River, as defined in Section 85-2-335 (2) of the Montana statutes (Montana, 2007). The Middle Clark Fork River basin is defined as the drainage area of the Clark Fork River and its tributaries below the confluence of the Clark Fork River and the Blackfoot River, and above the confluence of the Clark Fork River and Flathead River. The Lower Clark Fork River basin is defined as the drainage area of the Clark Fork River and its tributaries below the confluence of the Clark Fork River and Flathead River. The Flathead River basin is defined as the drainage area of the Flathead River and its tributaries above the confluence of the Flathead River and Clark Fork River. The Bitterroot River basin is defined as the drainage area of the Bitterroot River and its tributaries above the confluence of the Bitterroot River and the Clark Fork River (MCA 2007). The basins are defined as such to match the administrative basin divisions employed by the DNRC.

Data and Data Analysis

A database that lists all water rights that pertain to municipal uses for community systems in the Clark Fork River basin was compiled using information provided by the Natural Resource Information System (NRIS) Water Rights Query System (WRQS - available at http://nris.mt.gov/dnrc/waterrights/). In total, water rights for 30 communities were examined.

Municipal water rights in the Clark Fork River basin are classified in the DNRC WRQS (2010) by three types: Statement of Claim, Ground Water Certificate, and Provisional Permit. Rights classified as Statement of Claim are rights claimed by municipalities before July 1, 1973. These rights have not been adjudicated. Provisional Permits grants the use of water for a specific purpose, and have been established after July 1, 1973. Ground Water Certificates have also been issued after July 1, 1973 (DNRC 2004).

Demographic data for the basin's communities were acquired from the Montana Census and Economic Information Center (CEIC). Data from the 2000 Census, along with 2007 and 2010 community population estimates (where available) were examined, as were population projections for the years 2020 and 2030. The population projections were developed for Montana counties by NPA Data Services, which used plausible assumptions about birth rates, death rates, international migration, and domestic migration. Some of the communities (such as Butte and Anaconda) have consolidated city-county governments; hence the population projections are more valid for those communities. However, there are other communities (such as Seeley Lake) that may be experiencing different growth rates than their own county. These communities' population projections will be interpreted using past demographic data. In the Upper Clark Fork basin assessment (Table 1), population projections were obtained by multiplying the predicted growth rate of the community's county by the estimated or actual population of the community. This method was employed when community population data aren't available from the 2000 Census. When community population data were available, population growth was interpolated using 2000 Census data and projected county population growth rates from the CEIC's NPA Data Services population projection data.

Municipal water system administrators and/or operators (at least one in each community) were interviewed to acquire qualitative data concerning the problems facing municipal water systems (the interview guide is provided as Appendix 1). Each operator or manager interviewed was asked for verbal consent to be recorded. The University of Montana Institutional Review Board approved the questions asked beforehand. The interviewees were asked basic information about their systems, the systems' distribution, future issues facing the system, economic issues, and their perceptions on major state water issues. These interviews provided information concerning the capacities and/or constraints of their systems, along with their perceptions of pressing water issues facing their communities. The interviews were conducted either in person or on the telephone. The in-person interviews were recorded using a tape recorder and were later transcribed. The telephone interviews were recorded using

Skype's Call Recorder; these were also transcribed. Following the transcription of the interviews, the text from each was coded using important themes contained in the interview guide itself, as well as recurring themes that emerged from the transcriptions.

Interviewees were asked whether communities had lifeline rates for low-income residential consumers. In this study, lifeline rates are defined as rates reduced based upon income level for those who are lower or lower-middle class as defined by the individual community.

Each community's water needs, by volume, are shown in a series of one to three tables provided in the following chapter. After obtaining information about how much water each community pumps in an average year, that amount was multiplied by the county's projected growth rates for 2020 and 2030. The first table lists a community's total water rights, by their amounts. The second table lists total active water rights, which are those that are actually being used as opposed to the DNRC WRQS definition of whether the right was active. The third table shows only the permitted water rights corresponding to a given community, meaning the rights were established after July 1, 1973. These rights are either provisional permits, meaning that communities are allowed to grow into these rights during a certain time period, or ground Water certificates, which are certificates for groundwater use. The third table excludes those rights that are classified as statements of claim, as those rights are unadjudicated and therefore not guaranteed for the communities. A table for each community showing current and projected populations is also included in the results.

Finally, alternatives for municipal water systems that could be employed in the event of a current or predicted shortage of available water were examined. Conservation methods, the availability of extra water (such as Bureau of Reclamation water at Hungry Horse Reservoir), and other solutions (e.g., water reuse, etc.) were considered.

This study builds upon a previous work, "An Assessment of Municipal Water Rights in the Upper Clark Fork River Basin."

This chapter has described the methods used for this thesis. What follows is a presentation of the results by community.

CHAPTER 4. RESULTS BY COMMUNITY

Organization of the Results

In this chapter, the results of the research are summarized for each community. Each community profile presents background information on the community and its water system, and discusses current and future problems the systems (water supply and wastewater) may face.

As discussed in the preceding chapter, each community profile has four tables. The first table shows the current and projected water use based on total water rights volumes. The second table has projections based on the community's total active water rights volumes. The third table shows current and projected use compared to permitted, or post-July 1, 1973, rights. Finally, the fourth table shows current population and projected population figures. In the case where the community's water rights were all active or all permitted, the number of tables was curtailed.

The results coming from the content analysis of the transcribed interviews are presented following the community profiles. The important themes are reinforced with quoted passages from the interviewees to show evidence of their perspectives on the problems they face.

Upper Clark Fork River Basin

Aside from Seeley Lake, every community surveyed has sufficient water right amounts to provide for future growth based on total volume in water rights and active water rights and is not predicted to experience significant population growth. The majority of municipal water rights in this basin are claimed rights, which could lead to the adjudication process curtailing some of the current rights for these communities.

Anaconda-Deer Lodge City/County – Community Profile

Anaconda is the county seat and the only incorporated city in Deer Lodge County. It is located in sub-basin 76 G (Clark Fork River above Blackfoot River). As of the 2000 Census, the City has 9,417 residents, though estimates show that the population has decreased since then. As the city government is consolidated with Deer Lodge County's, the community will be referred to as "Anaconda-Deer Lodge."

System Characteristics

Anaconda-Deer Lodge has eight municipal water rights. The rights for Anaconda-Deer Lodge have a total flow rate of 19.88 cfs and 12, 467.1 acre feet per year (acft/yr) for consumptive use. Four of the rights are groundwater rights, while the other four rights are for surface water and are currently inactive. This is due to the lack of infrastructure to treat surface water (ADLCCWDS 2009). The wells pump water to a chlorination building. After treatment, the water is distributed. The water system serves the City of Anaconda and a state-run hospital in Warm Springs. According to the former Water Superintendent of Anaconda-Deer Lodge's water system, approximately 3,000 connections and 2,900 accounts are in use. Around 230 of those connections are metered (8%), with a chance of that number being expanded in the future (Petersen-Perlman and Shively 2009). The current Water Superintendent is submitting a grant application to the EPA's Natural Resources Damages division to install meters citywide in the near future (ADLCCWDS 2009). Roughly 2,700 (90%) of the connections are residential. Nearly 270 (9%) are commercial and 30 (1%) are industrial. On average, the water system is running at 45% capacity (Petersen-Perlman and Shively 2009).

Anaconda-Deer Lodge is planning to expand its infrastructure to the Mill Creek power substation, which is four miles outside of town. The community is also planning a $1,500,000 upgrade to its system's infrastructure, which has not been upgraded since 1992. The City/County has no plans to expand the community's water rights (Petersen-Perlman and Shively 2009).

Economic Issues

Customers are billed monthly. Unmetered customers are charged a flat rate, along with a sprinkling rate based on lawn size. Metered customers are charged a $14.08 for a base rate, which includes 5,000 gallons of consumption. The system charges three commercial properties a commercial fee of $18.60 for every office or business. The City/County has nearly 200 delinquent customers each month. The City/County is willing to work with customers who need extra time paying the bills, but, after two months of delinquency the Water Department Supervisor disconnects "between 8 to 12 [users] every two months" due to unpaid bills (ADLCCWDS 2009).

Future Issues

The Water Department Supervisor was unconcerned with how House Bill 831 might affect his system. He was also unconcerned about environmental flows, water quality issues, the economy, and Endangered Species Act listings affecting the water system (ADLCCWDS 2009). The only item of note that he mentioned was the possibility of an energy plant being installed. "That's kind of a concern. We can keep up [with the growth] once we go metered. We also have surface water rights that we could use, but it would be very expensive to use it," he said.

Population and Water Use Projections

As of 2009, Anaconda-Deer Lodge is using 31% of the available water right volume (Table 1) and 56% of the volume of its active water rights (Table 2). One important note is that Anaconda-Deer Lodge only has one water right (76 G 74255 00) that has been established post-1973, meaning that the adjudication process could curtail its water rights. Currently, the City/County is using 200% of its water right volume established post-1973 (Table 3). Since the City/County is projected to decline in population in the next 20 years (Table 4), its water rights are clearly sufficient to provide for any future expansion in use, barring any loss of water rights in adjudication. It is impossible to predict when the City/County will need more water (Petersen-Perlman and Shively 2009).

Table 1. Current and estimated average annual water use for Anaconda-Deer Lodge based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Anaconda-Deer Lodge County (76 G)	12467 acft/yr	3867 acft/yr (31%)	3523 acft/yr (28%)	3519 acft/yr (28%)

Table 2. Current and estimated average annual water use for Anaconda-Deer Lodge based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Anaconda-Deer Lodge County (76 G)	6934 acft/yr	3867 acft/yr (56%)	3523 acft/yr (51%)	3519 acft/yr (51%)

Table 3. Current and estimated average annual water use for Anaconda-Deer Lodge based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Anaconda-Deer Lodge County (76 G)	1935 acft/yr	3867 acft/yr (200%)	3523 acft/yr (182%)	3519 acft/yr (182%)

Table 4. Current population and population projections for Anaconda-Deer Lodge. [1]

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
8530	7870	7860

Butte-Silver Bow County – Community Profile

Butte is the county seat and largest city of Silver Bow County. It is located in sub-basin 76 G (the Clark Fork River basin above Blackfoot River). The City/County's population stood at 33,892 in the 2000 Census (the analysis that follows uses an estimate of the Butte population served provided by the Manager of Water Treatment), and is predicted to decrease until 2020, only to rebound to near the current population level by 2030 (Petersen-Perlman and Shively 2009).

[1] . Estimates for this and following population tables were derived using county growth rates for 2020 and 2030 based on data taken from the Demographic Database, Economic Projections Series, NPA Data Services, Inc., Arlington, VA. Accessed 22 January 2009. Available online at http://ceic.mt.gov/popprojections.asp.

System Characteristics

Butte-Silver Bow County has a total of fourteen municipal water rights. Nine of the rights are surface water rights, while five are groundwater (DNRC WRQS 2010). The water rights are from both the Clark Fork River above the Blackfoot River sub-basin of the Upper Clark Fork River basin, and the Big Hole River sub-basin of the Upper Missouri River basin. Though part of its system is supplied by water that does not originate in the Upper Clark Fork, that water will be included in the following analysis.

Butte-Silver Bow relies entirely on surface water for its water supply. The system is broken down into three sections, each of which draws from a different source: the Moulton water system north of town; the Basin Creek Reservoir south of town; and the South Fork Reservoir, whose source is the South Fork of Divide Creek. The South Fork water is treated through a process called CAC+ (contact absorption clarifier), which filters material from the water. The Moulton water is treated through a conventional water treatment plant. The Basin Creek water has a filtration waiver, and therefore does not need to be treated. The South Fork Reservoir provides the majority (50-60%) of the system's water, followed by Basin Creek (30-40%) and Moulton (less than 10%) (BSBCMWT 2009).

The system supplies water for the communities of Butte, Walkerville and Rocker, and currently serves a population of between 27,000 and 28,000, according to the Manager of Water Treatment. Part of Butte is not served by the system; instead, those residents rely on wells for their water supply. The water system is fully developed. Recently, the County has made water system upgrades (renewals and replacements of mains and lines) that have made the system more efficient. There are 12,450 active connections in use as of the end of 2008, of which 5,544 (44.5%) are metered (Petersen-Perlman and Shively 2009). However, the County is in the process of installing more meters (BSBCMWT 2009). The split between the number of different types of users is around 89% residential, 8% commercial, 2% industrial, and 1% public (governmental) (Petersen-Perlman and Shively 2009).

The water system produces around 7.5 million gallons per day (gal/day) on average, and is capable of producing 23 million gal/day, which is 32.6% of its capacity. Peak consumption tends to occur in the months of July and August, where 350 million gallons per month (gal/mo) has been consumed. The City/County uses less water in the winter months. According to the Manager of Water Treatment, maximum consumption days are less frequent due to main renewal and the fixing of leaks. Before infrastructure upgrades in 1994, some of the transmission lines were wooden pipelines (Petersen-Perlman and Shively 2009).

Economic Issues

Customers are billed monthly. Included on the bill for non-metered customers is the flat rate charge. The County adds a sprinkling fee based on square footage of lawns during the spring and summer months. The County budgeted $5,240,000 for operation and maintenance costs for FY 2009 (BSBCMWT 2009).

When asked how the economy might have an impact on Butte-Silver Bow County's water system, the Manager of Water Treatment said that he was not terribly worried. "People still seem to be paying their water bills, so I guess right now those impacts don't seem to be very significant right now," he said.

Future Issues

The Manager of Water Treatment said that House Bill 831 has affected the community of Butte-Silver Bow.

> [I]t's been more of a plus for us. The natural resource damage with the Superfund and the mining in Butte, it has been determined that the aquifer, at least under uptown Butte, is not suitable for groundwater supply, so that has been a source of funding for us for replacing some water mains. The mitigation part of it...if Butte were to go into any groundwater sources, we are in a closed basin. Therefore, if we were to take a million gallons out, we have to, in effect...allocate a million gallons that we have somewhere else. So right now, it's not having an effect because we really don't at this point anticipate acquiring or looking for other sources of water.

Currently, the County is replacing the diversion structure at the Big Hole pump station. The County is also planning to replace more of its 36-inch transmission line. Next, the County is also anticipating some disinfection byproduct issues in the Basin Creek system. Finally, the County is planning to meter more of the system's connections (BSBCMWT 2009).

The system has been somewhat affected by Endangered Species Act listings, with the Arctic grayling in the Big Hole River basin.

> We're going to be a user on the Big Hole [River], one of hundreds of users, and the main effects are going to be on the ranching communities and especially in the Upper Big Hole. One little footnote to that is the diversion structure existing, that has been there for close to 100 years, it may have been a barrier to any fish migrating and/or spawning. People who want the Arctic grayling...listed are not going to give up on their quest no matter what every rancher and everybody does. As far as I'm concerned, those folks have bent over backwards to give up their water to accommodate the Arctic grayling, and we've had some pretty dry years around here, and I can't give enough accolades to the ranchers up there, because to the detriment of their crops they've given up their water, because

> they realized the effects of listing that grayling. So, as far as Butte-Silver Bow and its water rights and what it takes out of the river, really shouldn't have any effect.

Though the system has ample capacity for high summer water use, the system implements water conservation measures in summer months. The water system staff begins to implement water conservation measures in place before restrictions for consumers take effect (mandatory restrictions include alternating days for watering lawns). The water system also makes sure to use the local media to its advantage in advertising restrictions on water (Petersen-Perlman and Shively 2009).

Population and Water Use Projections

Examining the numbers by water consumption, the Butte-Silver Bow water system has nothing to worry about for the foreseeable future. The area is experiencing little to no population growth, and the population of Butte-Silver Bow used to be larger than it is today (Table 7). It is hard to say when Butte-Silver Bow will use the balance of its water rights, if ever. This is, of course, assuming Butte-Silver Bow will keep the majority of its water rights volumes following adjudication. Currently, all of Butte-Silver Bow's active water rights are unadjudicated (Table 6).

Table 5. Current and estimated average annual water use for Butte-Silver Bow based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Butte-Silver Bow County (41 D, 41 G, 76 G)	49712 acft/yr	8439 acft/yr (17%)	8273 acft/yr (17%)	8486 acft/yr (17%)

Table 6. Current and estimated average annual water use for Butte-Silver Bow based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Butte-Silver Bow County (41 D, 41 G, 76 G)	49707 acft/yr*	8439 acft/yr (17%)	8273 acft/yr (17%)	8486 acft/yr (17%)

*Unadjudicated.

Table 7. Current population and population projections for Butte-Silver Bow.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
27500	26959	27650

Deer Lodge – Community Profile

Deer Lodge is the largest city and seat of Powell County. It is located in sub-basin 76 G (Clark Fork River basin above Blackfoot River sub-basin). As of the 2000 Census, Deer Lodge had 3,421 residents. If Powell County's projected growth rates are applied for 2010 - 2030, Deer Lodge's population is expected to nearly rebound to the 1970 population (Petersen-Perlman and Shively 2009).

System Characteristics

Deer Lodge has a total of six water rights, three of which are active (all groundwater rights) (CDLO 2010). The City has five groundwater water rights and one surface water right. The total volume of the water rights is 8481 acft/year. The water system supplies water within the Deer Lodge city limits. Currently, there are 1,700 connections, of which 1,474 are active. About 150 of the 1,474 connections are metered (10%). The system has about 1,350 residential connections (93.1% of total) and 100 commercial users (6.9%) in Deer

Lodge's system. The only industrial user in Deer Lodge is a sawmill (Petersen-Perlman and Shively 2009).

Deer Lodge uses three wells for its water supply, and prefers using the 2nd St. well as its primary well. In the summer months, the system also uses the Milwaukee St. and the Park St. well to meet demand. The Operator avoids using the surface water right due to the expenses associated with the required treatment and the fact that Deer Lodge has a filtration waiver for its groundwater (CDLO 2010).

Deer Lodge has two storage tanks, one holding 2,000,000 gallons and another holding 600,000 gallons. All the water from the city's water rights enters the storage tanks untreated, due to the City's filtration waiver (Petersen-Perlman and Shively 2009).

Generally, the system is not affected by drought problems. The aquifer reaches its lowest point in August, but still has plenty of water for consumption. Up to 1,000,000 gallons of water are used per day in the summertime in Deer Lodge, with a decrease to around 350,000 gallons per day in the winter. The City of Deer Lodge is looking into building an industrial park west of the city, though that park would not be connected to the city water system. Instead, the City would drill wells to provide the industrial park with water that would be separate from the City system. Deer Lodge currently has no plans to expand its water rights (Petersen-Perlman and Shively 2009).

Economic Issues

Customers are billed monthly. Non-metered customers pay a flat rate of $15.97, while all metered customers pay a consumptive rate. The City budgeted $145,000 for operation and maintenance costs for FY 2009 (CDLO 2010).

Since Deer Lodge's water rates are relatively inexpensive, the City has few problems with people being able to pay their water bills. However, Deer Lodge is planning to raise water rates in the future. The Operator noted that

> Rural Water has come in and helped us set up the flat rates as where we should be as far as the national average, and we're below that. So for the people of Deer Lodge, we've raised our water [rates] the last few years, not a whole bunch, but trying to get to the target rate.

He also mentioned that it is important to raise the rates to help strengthen the City's grant applications. "When you put in a grant and you're looking for money for infrastructure rehab, one of the first questions on the application is 'Are you at that target rate?' And if you're not, it's hard to find money."

Infrastructure Projects

Deer Lodge has a project that irrigates effluent water. The plant has been operational since 2000. The City installed a mechanical wastewater plant to treat the water to make it of suitable quality (Petersen-Perlman and Shively 2009).

The next infrastructure project for Deer Lodge is a new wastewater treatment plant. "With our wastewater plant right now, we got a four cell aerated lagoon system, and because of the TMDLs (Total Maximum Daily Loads) in the summer months we can't discharge into the river," said the Operator. Until that project is complete, the City of Deer Lodge is not considering installing meters for every water customer (CDLO 2010).

Conservation

Deer Lodge has instituted sprinkling hours and has alternating days for residents to water their lawns. Water system employees check for lawn watering violations. As the summer months approach, the City distributes brochures and water conservation measures are mentioned in the local newspaper. Like every other water system, leaks occasionally develop. Homeowners are usually able to identify leaks, but sometimes the city uses a service that employs ultrasound to identify leaks (Petersen-Perlman and Shively 2009).

Policy Issues

The Operator said that he was not worried about the bill affecting Deer Lodge due to the lack of a connection to the surface water with the groundwater that the city uses. Regarding future issues that might affect Deer Lodge, the Operator mentioned that he suspects that the DEQ and EPA will enact stricter regulations on maximum contaminant levels. He also mentioned having to do “some major main replacements [and] service replacements” in the future (CDLO 2010).

The Operator has noticed the recent economic downturn affecting the water system, in that some customers are not being able to pay their bills. “With this failing economy and unemployment rates, the closure of plants and businesses, the people just aren’t going to be able to pay their bills,” he said. With that being said, he has not noticed a significant impact on the water system (CDLO 2010).

Population and Water Use Projections

Examining the amount of available water for use in Deer Lodge (Table 8) leads to a conclusion that Deer Lodge has enough in water rights and active water rights (Table 9) to serve the city's consumptive needs in the future. Though Deer Lodge is expected to grow in the next 20 years, the population should not exceed previous levels by 2030 (4,306 in 1970) (Table 11). Assuming the City had enough water to serve its residents in the 1970s, there will be plenty of water in the future for Deer Lodge unless Deer Lodge experiences unprecedented growth or Deer Lodge's water rights are severely curtailed by adjudication (Table 10) (Petersen-Perlman and Shively 2009).

Table 8. Current and estimated average annual water use for Deer Lodge based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Deer Lodge (76 G)	8471 acft/yr	780 acft/yr (9%)	814 acft/yr (10%)	870 acft/yr (10%)

Table 9. Current and estimated average annual water use for Deer Lodge based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Deer Lodge (76 G)	5087 acft/yr	780 acft/yr (15%)	814 acft/yr (16%)	870 acft/yr (17%)

Table 10. Current and estimated average annual water use for Deer Lodge based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Deer Lodge (76 G)	152.46 acft/yr	780 acft/yr (512%)	814 acft/yr (534%)	870 acft/yr (571%)

Table 11. Current population and population projections for Deer Lodge.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
3529	3685	3940

Philipsburg – Community Profile

Philipsburg is a town located in Granite County, Montana, of which it is the county seat. It is located in the Flint Creek sub-basin of the Upper Clark Fork River basin (sub-basin 76 GJ). Philipsburg's population was 914 at the 2000 Census and is expected to slightly increase in the next 20 years if the Town follows Granite County's predicted demographic trend (Petersen-Perlman and Shively 2009).

System Characteristics

Philipsburg has six municipal water rights that supply water for its system. Five of those water rights are surface water, while the other is a developed spring. The total volume for the rights is 8,463.95 acft/yr. The water system serves Philipsburg and parts of unincorporated Granite County. According to the Public Works Director of the town there are diversions on two of the systems and a pump on two other systems. The water system is fully developed and there are over 550 connections, 530 of which are active. Meters were recently installed in the summer months of 2009, and the Public Works Director will begin reading them in early 2010 (TPPWD 2009). The split in consumption between different types of customers is roughly 80% residential to 20% commercial. The sole industrial connection in Philipsburg supplies water to an ore mill (Petersen-Perlman and Shively 2009).

As with other cities in the Upper Clark Fork basin, Philipsburg's water use peaks in the summertime and is lowest in the winter. During the summer, monthly rates can go as high as 650,000 gallons of water per day, while in the winter it drops down to around 330,000 gal/day. According to the Public Works Director, most of Philipsburg's water comes from a high mountain lake. As the water descends from the lake, the same water used for consumption is also used to generate hydropower.

Economic Issues

Customers are billed monthly. While Philipsburg has billed on a flat rate in the past, it are planning to switch to consumptive rates after the meters have been fully installed and read. The town has a flat rate for residential and commercial customers (TPPWD 2009).

The Town sends notices to "10 to 12 people" a month to delinquent customers, though has never done a physical disconnect due to unpaid bills. "We do sometimes have to go shut them off to get paid, but that very rarely happens, either because they usually come in and pay or they come in and work out something with the clerk," said the Public Works Director. He said that he usually does less than ten shutoffs a year (TPPWD 2009).

Policy Issues

Currently, Philipsburg has a filtration waiver, which frees it from having to treat its water. The Public Works Director saw keeping the filtration waiver as a primary concern for future years. He was unconcerned about House Bill 831 affecting Philipsburg, or the economy (barring a large system upgrade) (TPPWD 2009).

Conservation

Philipsburg currently has no water conservation program in place. The meters were principally installed for the sewer to operate more cheaply and for less water to be treated. Once the metering takes effect, people will most likely be more careful about consuming water. At this point, with a potential per account water use rate of 15.39 acft/yr (and over 9 acft/yr per person), the town of Philipsburg has plenty of water for its consumptive, industrial, commercial and irrigation needs (Petersen-Perlman and Shively 2009).

Population and Water Use Projections

When analyzing the prediction in consumptive numbers for the years 2020 and 2030, it becomes apparent that Philipsburg will most likely have plenty of water for years to come (Table 12), barring massive cuts in its water rights due to adjudication (Table 13). Philipsburg's population is projected to grow steadily (Table 14), but not to the point where the growth would require more than the current water right amounts. The main question comes down to the efficiency of Philipsburg's infrastructure. Philipsburg has a very high rate of consumption per account and per connection. If Philipsburg follows the trend of other communities, the consumption will decrease once the rates are no longer flat (Petersen-Perlman and Shively 2009).

Table 12. Current and estimated average annual water use for Philipsburg based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Philipsburg (76 GJ)	8464 acft/yr*	848 acft/yr (10%)	895 acft/yr (11%)	942 acft/yr (11%)

*All active.

Table 13. Current and estimated average annual water use for Deer Lodge based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Philipsburg (76 GJ)	241.95 acft/yr	848 acft/yr (350%)	895 acft/yr (370%)	942 acft/yr (389%)

Table 14. Current population and population projections for Philipsburg.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
930	982	1034

Seeley Lake – Community Profile

Seeley Lake is a census-designated place (CDP) located in sub-basin 76F (Blackfoot River). The community has experienced significant amounts of growth in recent years and if its growth matches the projected growth rate of Missoula County, the population served by its water system is projected to rise to 2,635 in 2030, a 31.8% increase (Petersen-Perlman and Shively 2009).

System Characteristics

Seeley Lake has one surface water right that supplies water for its system. Established on May 1, 1968, the right has a flow rate of 2.23 cfs and a total volume of 350 acft/yr (DNRC WRQS 2010). The water is pumped from a pipe 60 feet below the lake surface to a filtration plant. After that, the water is treated in the treatment facility and sent to the distribution system. The water system serves Seeley Lake and the surrounding areas. According to the District Manager of the Seeley Lake Water District, the system is currently using approximately 260 acre-feet per year (SLWDM 2009).

Currently, there are 716 accounts and 545 active connections. The entire system is equipped with radio-read meters along with a centralized meter located at the facility. The split in consumption between different types of customers is roughly 60% residential to 15% commercial. The community has a lumber mill as its sole industrial source that consumes roughly 25% of the water that is produced. The system also has a 100,000 gallon/day US Forest Service line that is used intermittently for fire equipment (Petersen-Perlman and Shively 2009).

In the summertime, 450,000-500,000 gallons of water are used per day, compared with 250,000 gal/day in the winter. The water system is able to produce up to 860,000 gal/day, but the maximum ever reached by the system was 640,000 gal/day. To be prepared for potential growth, Seeley Lake's system is undergoing a $4,000,000 upgrade to its water delivery lines and storage capacity. The district is also looking to acquire new water rights, possibly by purchasing existing rights (Petersen-Perlman and Shively 2009).

Economic Issues

Customers are billed monthly. Included on the bill are bonded indebtedness, a maintenance fee, and the customers' consumption per 1,000 gallons. The average bill for customers is nearly $65.00/month. The rate structure is based on meter size. Though the rates are comparatively higher than most communities, the system does not have lifeline rates for low-income residential consumers. "We wish we could do that, but because of our bond indebtedness that we have, the state revolving fund and other agencies that we have financed through want to see everything kept equal across the board," said the District Manager. Operation and maintenance costs for 2010 are budgeted at $254,000 for the year (SLWDM 2009).

The District has many lower income residents, which has affected the community in that some customers have left due to foreclosures and economic downturns. The District Manager noted that,

> We know the mill...here in town has affected some people and their ability to pay their bills to take care of things. There have been layoffs and things like that. It's pretty standard, but maybe it was a little more of an effect this last year. Hopefully, we'll have another turn around next year and things will get better.

The system does not have many problems with customers being able to pay their water bills. Though it averages nearly 50 delinquent accounts a month, very few of those delinquent customers do not go beyond two months of delinquency. The District Manager claimed that 99% of the delinquent customers stay current, and the system takes "maybe five customers a year" to small claims court (SLWDM 2009).

Conservation

Regarding conservation measures, the water system has an information campaign designed to inform people about ways to conserve water. The system also supplies donated plumbing parts geared toward higher water efficiencies. The community does not have a lawn watering conservation program in effect due to most people not having lawns, as much of the land is forested. The water district would consider the reuse of effluent water to mitigate low water situations; however, there is no sewer system in place. The community has a sewer district in the works, but needs significant federal help (estimated at a cost of $20,000,000). One might wonder if, with the projected growth, the system would be able to meet future demand with the existing water right.

The District Manager said that Seeley Lake's water right amounts are limiting its capacity to grow.

> We actually had to turn down subdivisions in the last year within our system because I can't rightfully give away the water right that someone else is entitled to, to a subdivision that's not actually part of our district right now. So, it is limiting our growth. If I had a little more capacity on the water right, we could allow a couple subdivisions within reason, and those folks would actually help pay down some of the bond indebtedness that we have and things like that. It's kind of a two-edged sword right now.

Future Issues

Currently, Seeley Lake looks to have enough water to supply for consumptive needs. This does not take into account extreme situations, such as the Jocko Lakes fires of 2007, which saw daily consumptive rates rise to 780,000 gal/day. This rate greatly exceeded the normal summer consumptive rate of 450,000 gal/day in Seeley Lake. As long as people are more cautious regarding consumption, Seeley Lake will likely not experience the problems it faced in

2007. The $4,000,000 upgrade to the system will also help to ensure a more efficient delivery of water (Petersen-Perlman and Shively 2009).

The community has been trying to mitigate that situation with negotiating water right purchases with neighboring properties. However, the community has been unsuccessful in negotiations as the individual was requesting "a couple million dollars," which the community deemed unaffordable. The community has not had any success applying for new water rights. "You can't apply for any water rights," said the District Manager. "DNRC is not giving out any water rights to anyone, especially on the surface water within our closed basin. It makes it real hard."

The District Manager said that House Bill 831 was having an effect on the community.

> I do know there [were] a lot of wells in town that had to prove their consumption, prove their water rights, prove whether they're affecting other sources and whatnot, and it was a really contentious matter. As far as affecting us, it hasn't. The part where it does affect us has been through this project process. We actually looked at putting in wells, and the amount of consumption drawdown that we would have on the aquifers, we had to prove what kind of damage we would do to someone else's water consumption. So, we just stayed away from it.

Water quality issues have been an issue for the District in the recent past. The EPA identified a violation about how the chlorination affects the organics in the water. That was part of why the system underwent at $4,000,000 upgrade (SLWDM 2009).

Population and Water Use Projections

Seeley Lake is and most likely will continue to deal with high population growth. It appears, however, that Seeley Lake will have enough water to last it to 2020 (Petersen-Perlman and Shively 2009).

The District Manager identified two possibilities for whether or not the system's water rights and water delivery system would be sufficient until 2030. If the system does not develop any further and the sewer system does not get installed, it will "just barely make it." However, if the sewer system is installed,

> There is no way we'll make it to 2030, because if we see a sewer system, it'll probably be within the next five years, and it will change the face of this small community. It will allow things to develop that weren't here before and will press our capabilities, our water rights, and everything.

There is a likelihood of the EPA forcing the District to install the sewer system within 5-10 years (SLWSD 2009).

But, measures probably will have to be taken in order for the Seeley Lake Water District to provide enough water for the needs of its citizens in later years, including perhaps purchasing water rights. If current rates of consumption continue, Seeley Lake will reach its full use of the water right once the population reaches 2,798. Considering the amount of growth projected for Missoula County, this will most likely occur shortly after 2030 (Table15). Because of this, the community should consider ways to secure additional water. If the funds are ever made available to build a sewer system, the community could consider using effluent water to supplement and meet future needs (Petersen-Perlman and Shively 2009).

Table 15. Current and estimated average annual water use for Seeley Lake based on total volume on active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Seeley Lake (76 F)	350 acft/yr*	260 acft/yr (74%)	296 acft/yr (85%)	335 acft/yr (96%)

*Right established before 1973 (not adjudicated).

Table 16. Current population and population projections for Seeley Lake.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
2000	2330	2635

Bitterroot River Basin

Growth and water quality will continue to present challenges to communities in the Bitterroot River basin. Water quality issues are prevalent in three of the communities (copper in Darby, nitrates in Hamilton, and turbidity in Pinesdale). The communities of Hamilton and Stevensville are both wrestling with change in place of use issues for their municipal water rights.

Darby – Community Profile

Darby is a town of 800 people in Ravalli County. It is located in sub-basin 76 H (Bitterroot River). The Town has three municipal water rights, all of which are groundwater. Currently, three wells supply Darby with water, but the Town has recently drilled a new well and is in the process of obtaining water rights for that well via purchase. Each of the wells is used equally. The water enters the system untreated (TDDPW 2009).

System Characteristics

The infrastructure dates back to the early 1960s, when Darby began to use groundwater, and has been expanded since then. The system has 427 active connections, all of which are metered. The Town has 108 commercial connections, with the rest of the connections are residential. The system distributes 6.5 million gallons of water on an average month, peaking at 13 million during the summer months. Comparing metered water with what the system pumps, the town is averaging 55% in leakage losses. However, that number should cautiously considered. The Director of Public Works noted,

> What we have found is that our meters installed in the [19]80s are beyond their useful life and they are failing, so we are currently in the process of putting new meters in all of the homes. We're probably 80% completed on getting all of those meters done, and those homes that we're putting new meters on, there's a large handful of those...I haven't looked at the data closely, but there's a lot of them using almost double the amount they used to, because the meters weren't metering correctly.

The Director estimated that the system is running anywhere from 60% to 70% capacity at a given time (TDDPW 2009).

Darby is drilling a new well in part for water quality issues. The EPA has notified the Town that corrosion control must be done on the water. The system will start using orthophosphate to mitigate the corrosion. "It's not copper in the ground, but there's copper in the homes, and this is causing higher levels of acceptable copper levels in the homes," said the Director of Public Works. Because of the orthophosphate, the water will also have to be chlorinated. The town engineer proposed that all wells should be put at one end of town so the water could be pumped through one treatment building. To obtain water rights for the new well, the Town is purchasing some of the water rights from adjacent landowners and transferring other rights the Town has from a soon-to-be-abandoned well.

Conservation

Darby's Director of Public Works said that while the Town encourages water conservation, there are no conservation measures in place.

> The town used to have watering hours that ...you're only allowed to water your lawns at certain periods of the day, but that was more for supply. Once supply

> was no longer an issue, then they removed those, and a lot of people water at whatever time, especially with underground sprinklers.

He did, however, mention raising rates as a mechanism to conserve water.

Applying for New Rights

Though Darby has no plans to apply for new water rights aside from the purchase of water rights from adjacent landowners, the Director of Public Works has doubts that Darby would even be able to obtain them if desired.

> [A] lot of talk up and down the valley is that Montana itself is restricting the amount of water rights being given out, which will hamper any major growth that any of the communities want to do. We haven't applied for any new water rights, but it's almost like you're not gonna get it even if you ask for it.

Economic Issues

Customers are billed monthly. The bills list the gallons of metered water used, along with the base rate ($27.07). Customers are allowed 3,000 gallons included with their base rate, and are charged $1.50 for every 1,000 gallons used after that amount. Rates are based on service line size. The Town budgeted $92,246.37 for operation and maintenance costs for FY 2009 (TDDPW 2009).

Aside from water quality issues and the new well, the Director of Public Works is worried about the reliability of the aquifer in the future. "My worry is making sure we always have enough, and since you can't see it, you just hope it's still there as you're pumping it," he said.

The Director of Public Works has noticed an impact on Darby's water system due to the economy in the form of unpaid bills.

> I'm sure it's not just [Ravalli] County that's suffering the economic decline, but just within the last 30 days, Smurfitt Stone, which is a pulp mill factory up north of Missoula, gave notice that they're shutting down completely, and with that, there's people that are affected in Darby by that. Their livelihood is over now because of that.

Population and Water Use Projections

When asked if the current system and water right amounts will be able to supply water users until 2030, the Director of Public Works was fairly confident as long as growth does not accelerate. "[B]ecause of the way of the growth the last couple of census, they had Ravalli County blocked at a really high rate of increase, and every census they come back and readjust those numbers to the actual [population]," he said. Though the estimated annual water use for 2020 and 2030 exceed current water right values (Table 17), those results should be tempered by the facts that Darby is in the process of obtaining a new (existing) water right. Also, total water use volumes will likely decrease once the new meters have been fully installed.

Table 17. Current and estimated average annual water use for Darby based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Darby (76 H)	300 acft/yr*	239 acft/yr (80%)	323 acft/yr (108%)	351 acft/yr (117%)

*All active and established post-1973

Table 18. Current population and population projections for Darby.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
800	988	1175

Hamilton – Community Profile

Hamilton is a city in the Bitterroot Valley. It is the county seat of Ravalli County and is located in sub-basin 76 H (the Bitterroot Basin). The City of Hamilton has twelve municipal water rights. Ten of the rights are groundwater (wells), while the other two are surface water rights from Canyon Creek. According to the Operator, the surface water rights are used for irrigation in parks and cemeteries. The water rights date from 1912 to 2002 (DNRC WRQS 2010). All groundwater rights are used for drinking water, and the newer wells are preferred by the Operator for use "because of the contact tank...that eliminates the problem with disinfectant byproducts (CHO 2009)."

System Characteristics

Hamilton's water system infrastructure dates back to the 1890s.

> The wells were [installed] in the 1930s, and that's when the first storage tank was built...Over the years, we've upgraded the pipes from wooden pipes to metal pipes to now plastic. We're in the process of upgrading probably half of the city to plastic now.

The water from the wells enters into the distribution system after chlorination. Before the City of Hamilton took over operations of the water system in the mid-1980s, Valley Water owned the system (CHO 2009).

The water system serves nearly the entire city of Hamilton (with the exception of "maybe a dozen homes"), along with a small section of Ravalli County near the city limits. The system has 1,993 active connections to serve a population estimated by the Operator of about 5,000 people. All connections are metered. Out of those connections, the system has 1,622 residential, 369 commercial/multi-family, and two industrial. The system is normally used at about 50% capacity, with an increase to around 70% in the summertime. The capacity of the system is not affected by drought or low water situations (CHO 2009).

On an average month, the system distributes about 43,000,000 gallons of water. In the winter months, the system averages around 30-35,000,000 gallons, while the system distributes 85-90,000,000 gallons in the summer months. The peak month was July of 2006, where the system distributed 101,000,000 gallons. While the system has a 35-40% differential between produced water versus metered water, the Operator said that, "It can't be all to leaks." He attributed the difference due to faulty meter readings and the use of hydrants (which are not metered); the leakage loss is more likely around 5% of total water distributed.

Water Right Protection Efforts

While Hamilton does not have any plans to expand its water rights, the City is keen on protecting the rights it has. Currently, Missoula attorney Ross Miller is investigating how to keep the rights because Hamilton has more rights than are currently being used. He is trying to consolidate all of Hamilton's water rights into one city water right, which would eliminate the issue of using every well. The Operator said,

> We want to bank them as a municipality, which we feel we have the right to do for future growth. In the past that's how it was done, so I'm not sure why the DNRC is so hard on that now. I know they did that with Mountain Water in Missoula. They wanted to move some water rights to Rattlesnake [Creek] that they weren't using elsewhere and the DNRC threatened to take them away from them and take them to court.

Miller is also interested in banking water rights and procuring water rights for future use. Along with preserving rights and banking, to accommodate future growth the mains will have to be expanded according to the Operator.

Water Quality

Hamilton is closely monitoring its water quality. With the increased amount of development in Ravalli County (especially near Hamilton), the Operator has noticed nitrate levels slowly rising. "We've seen our nitrates go up in the last 15-20 years. [The homes have] septics, most of them are cesspools, and they don't have the 100 foot separation," said the Operator. The Operator is trying to expand the sewer system out to residents around the Southeast quadrant of the city.

> It's going to take either the county or the state directing [the residents] to get on a sewer system because of environmental considerations, or we're going to have to wholly surround them and force annexations, which is going to be very, very difficult to do because it's such a large area in the Southeast quadrant of the city. The septic systems have an impact on our wells. They've been around so long that they've been grandfathered under the 1975 Clean Water Act. The only way cesspool systems fail if they collapse. When that happens, the county's always begging us to run another sewer line out there so they don't have to give another permit for a septic. It might get to the point where the county starts requiring Level 2 septic systems to deal with the phosphorus and nitrates.

Hamilton performs system-wide leak detection twice a year to help conserve water. The City also has an ordinance for households to water on alternate days during drought situations.

> With the economy, the people kind of self-regulate on the irrigation. Most of the people in town can't afford their water bill already, so they self-regulate. We got 55% of our city [that] is low to medium income. They can't afford the water, so they don't irrigate, basically.

A few car washes in town also recycle water (CHO 2009).

Economic Issues

The City bills customers monthly. Each bill lists the previous month's usage and the current month's usage. Customers also have the option of obtaining a report from the billing clerk listing the meter readings and usage of the past 10 months. The system has a $700,000 annual budget for operations and maintenance, some of which is saved each year for capital improvements (CHO 2009).

On average, Hamilton sends out 60-100 late notices a month. If the customers do not pay after that, the city sends out shutoff notices when customers are two months past due. Finally, the city shuts the customers off after 90 days of delinquency. The City shuts off "maybe one or two" customers every month (CHO 2009).

House Bill 831

While the City is still assessing the impacts of House Bill 831, the Operator has not noticed any currently. "I would say the immediate impact we haven't felt. But, we know there's going to be some," said the Operator.

Population and Water Use Projections

HDR Engineering is completing a water facility plan for the City of Hamilton. The City is hoping that the plan will forecast what the next 20 years will hold for Hamilton regarding growth and water demand. "We know that 20 years from now if growth continues at the rate they've been projecting, 2-3% per year, in 20 years, we will not have enough water. We do know that," said the Operator. He predicts that lack of water in Hamilton's water rights will become an issue in eight to ten years (CHO 2009).

This statement conflicts with the water use projections developed here (Tables 19 and 20). With that being said, perhaps Hamilton is of this opinion because of where growth is going to occur. The community is projected to have significant population growth in the next twenty years (Table 22). Or, perhaps the City is worried about having its water rights curtailed due to the adjudication process (Table 21).

The Operator mentioned expanding the water lines as one of the future infrastructure improvements.

> We got some areas where we'd like to have a looped system when we expand. Right now with the Glaxo Smith Kline [plant] on the north end of town, it's a dead end. We'd like to loop that around the east side highway and back in and maybe put a storage tank in there somewhere.

Table 19. Current and estimated average annual water use for Hamilton based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Hamilton (76 H)	5732 acft/yr	1584 acft/yr (28%)	1957 acft/yr (34%)	2328 acft/yr (41%)

Table 20. Current and estimated average annual water use for Hamilton based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Hamilton (76 H)	3791 acft/yr	1584 acft/yr (42%)	1957 acft/yr (52%)	2328 acft/yr (61%)

Table 21. Current and estimated average annual water use for Hamilton based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Hamilton (76H)	851.5 acft/yr	1584 acft/yr (186%)	1957 acft/yr (230%)	2328 acft/yr (273%)

Table 22. Current population and population projections for Hamilton.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
5000	5520	6567

Lolo – Community Profile

Lolo is a town of 3,300 people in Missoula County. The Town is in sub-basin 76 H (Bitterroot River). All of Lolo's water rights are listed through Missoula County Rural Special Improvement District (RSID) #901 on the WRQS and all are groundwater rights. The water enters the system untreated as the system has a filtration waiver. The Water Superintendent prefers using the newer well to supply Lolo with water because it is more energy efficient, but he uses all three wells during the summertime (MCRSIDWS 2010).

System Characteristics

The system serves approximately two-thirds to three fourths of Lolo's population. There are other subdivisions and water districts that serve the remainder of the population. The main part of the infrastructure was built in the late 1960s-early 1970s and has slowly expanded over time. According to the Water Superintendent, half of the infrastructure is less than 20 years old. Two of the wells were drilled in late 1960s-early 1970s and a third well was drilled in 1995. The system has a total storage of 740,000 gallons. The original piping is cement asbestos, while the new piping is all PVC. The water system is fully developed with 1,359 connections. None of the connections are metered. "It wasn't until about five years ago that new homes had to put meter pits in their yards, but no meters are installed yet because we can't bill them out that way," said the Water Superintendent. Ninety of those connections are apartment condominiums, and 40 are commercial connections. The rest are residential (MCRSIDWS 2010).

Missoula County RSID #901 distributes 9 million gallons a month during the wintertime. This increases tenfold to 90 million gallons during the summer. The system distributes 23 million gallons a month on average. Since no connections are metered, it is impossible to say how much the system loses due to leakage. However, the Water Superintendent estimated that there is nearly a 25% loss, mostly due to faulty plumbing (MCRSIDWS 2010).

The system operates at 17% capacity. Lolo has no problems with low water situations, drought, or seasonality. This is due to Lolo's position in the Bitterroot Valley. "Whatever excess groundwater is passing through the valley, it has to pass through here," said the Water Superintendent. Because of the District's relatively plentiful water right amounts, there is no plan to apply for new water rights (MCRSIDWS 2010). Instead of the water right amounts limiting the system's growth, "It's probably more the service area [boundaries]," said the Water Superintendent.

Economic Issues

Unlike many other systems in the Clark Fork River basin, Missoula County RSID #901 bills its customers semi-annually through their property taxes. The bills are based upon the base value of customers' properties. The rate is 0.375% of customers' household income. Since the billing is done through the county, the District itself does not deal with delinquent bills. Operation and maintenance costs for the system are $200,000 per year (MCRSIDWS 2010).

Conservation

The District has watering hours, days, and times for the summer irrigation season. The District alternates between even and odd addresses for watering, and does not allow water between the hours of 12:00 and 6:00 P.M. Though the watering restrictions are loosely enforced, the Water Superintendent or the Water Operator will talk to the neighbors and educate them of the regulations. The watering hours are in effect year-round (MCRSIDWS 2010).

Future Policy Issues

When asked about how House Bill 831 might impact the District, the Water Superintendent said,

> I don't know. I would assume that just for this community itself, I don't think we're going to have any issues because we have been able to prove to use these things for growth. So, we're going to hold on to them for a long time.

The District will be completing a facilities plan by 2011. It will mostly examine wastewater issues the District is facing, though the study will also examine water issues. One of the infrastructure additions that the Water Superintendent would like is to build another main across Highway 93. "We only have one crossing that goes across the highway from our wells to the tank. I'd like to get a second backup to that," he said. Recently, the system has installed a UV disinfection system for its wastewater. Previously, the system was using chlorine, but had to upgrade to UV by 2011 (MCRSIDWS 2010).

Population and Water Use Projections

The Water Superintendent was confident in being able to supply water users until 2030 with its current system (MCRSIDWS 2010). If the projected water use based on projected population growth (Table 23) comes to fruition, the

Water Superintendent will be correct. Unlike other communities in the Bitterroot Basin, most of Lolo's water rights were established after 1973, meaning that adjudication is much less likely to curtail much of the rights (Table 24).

Table 23. Current and estimated average annual water use for Lolo based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Lolo (76 H)	3053 acft/yr*	847 acft/yr (28%)	965 acft/yr (32%)	1091 acft/yr (41%)

*All rights are active.

Table 24. Current and estimated average annual water use for Lolo based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Lolo (76H)	2866 acft/yr	847 acft/yr (30%)	965 acft/yr (34%)	1091 acft/yr (38%)

Table 25. Current population and population projections for Lolo.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
2310	2853	3394

Pinesdale – Community Profile

Pinesdale is a town of 1,000 people in Ravalli County. It is located in sub-basin 76 H (Bitterroot River). The Town has nine municipal water rights, four of which are groundwater rights. The five surface water rights list Sheafman Creek as its water source. All of Pinesdale's Sheafman Creek water rights are the primary sources for Pinesdale's water, while the groundwater wells are used for backup during the high demand season of the summer. The water from

Sheafman Creek is pumped to an infiltration gallery and spring box for treatment, while the water from the wells is chlorinated at each well site. Though the Operator said that using well water would be an ideal source, the aquifer does not produce enough water to serve the town alone (TPO 2010a).

System Characteristics

The Town's water system has 131 connections, 128 of which are active. Four of the connections are commercial and the rest are residential. All connections are soon to be metered. The Town's water system recently engaged in a system-wide project to meter all connections. However, three of the meters still needed to be installed as of this writing. The system pumps an average of about 2.5 million gallons of water a month, peaking near 3 million during the summer months. Since the system just installed meters for connections, it is impossible to determine how much the system loses in leakage. The Operator estimated the system running anywhere from 75-90% capacity. The Town does not have a sewer system, so the entire population relies on septic systems for wastewater treatment (TPO 2010b).

Economic Issues

Customers are billed monthly. Since the meters were very recently installed, customers are billed on a flat rate of $60.00. The Operator has noticed an increase of customers not being able to pay their water bills due to the economic downturn, but estimated the percentage of customers not being able to pay at 2-3%. The Operator is willing to work with customers who get behind by allowing late payments. The Operator estimated the yearly operation and maintenance costs for the system at $60-70,000.

Conservation

Pinesdale has a relatively unique system for water conservation. The system has “water turns,” where residents are able to irrigate for two to four hours during non-peak hours in zones. The town is divided into four zones and two zones are able to water in alternating days. This takes effect during the irrigation season from May to September. The Operator informs the community by mail when this takes effect. If residents ignore the dates, the Operator shuts off the irrigation water (TPO 2010b).

Future Issues

The Operator was “not really worried” about the impact House Bill 831 may have on Pinesdale. The town’s water rights are either senior or second senior to other downstream users (TPO 2010b).

The water system has water quality issues during the spring due to the fact that the town is “sitting right at the base of the mountain.” The spring runoff makes the water turbid (TPO 2010b). According to a December 26, 2009 article in *The Missoulian*, the Town is beginning to discuss adding a settling tank to reduce turbidity. Pinesdale has been subject to EPA violations due to the turbidity, and the Town is looking at solutions to mitigate that problem (Schmerker 2009).

Population and Water Use Projections

Pinesdale's Operator felt fairly confident that the system has enough water rights to handle future growth, given spatial constraints.

> I don't know how much bigger the community can get than it is, but there's just not the land to make a community bigger. The only way to make it bigger would be to buy more land...I don't know how much more that we can grow, other than buying more land.

The Operator also does not anticipate any subdivisions wanting to join the water situation in the near future. The only caveat to whether the system would be able to be sufficient to supply water users for the next twenty years would be constant maintenance and improvements (TPO 2010b). The results from Table 26 support the Operator's assertion.

Table 26. Current and estimated average annual water use for Pinesdale based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Pinesdale (76 H)	313 acft/yr*	92 acft/yr (29%)	114 acft/yr (36%)	135 acft/yr (43%)

*All rights are active and established after 1973.

Table 27. Current population and population projections for Pinesdale.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1000	1235	1469

Stevensville – Community Profile

Stevensville is a town of 1,900 people in Ravalli County. It is in sub-basin 76 H (Bitterroot River). The Town has ten municipal water rights, five of which are groundwater. The other five rights have sources in Mill Fork Creek or North Swamp Creek (DNRC WRQS 2010). All of the Town's rights are active. The surface water from the creeks enters through an infiltration gallery and then through a plant, which has a sand filter and a reservoir. The wells enter directly into the system. The Water/Wastewater Superintendent prefers the groundwater rights to the surface water rights due to fewer rules and regulations associated with using groundwater (TSWWS 2009).

System Characteristics

The Town has infrastructure of varying ages. Some of the mains are cast iron and date back to the late 1930s, while the Town has added on to the system in a piecemeal fashion from the 1970s into the present day. The Town installed one well and the storage tank in the 1950s, whereas other wells that were installed in the 1960s or 70s. The system is fully developed with 739 residential connections, 50 commercial connections, and one industrial connection. Just over half of the system is metered, and the Town is "working on grant money to meter the whole town." The system is losing an estimated 300,000 gallons a month in leakage (TSWWS 2009).

During the summertime, Stevensville is "using everything" it can for water production. Water production decreases in the non-summer months. The Town has been affected by drought or low water situations in a few instances.

> We've had a couple times...you know, the surface plant also has to share with ranchers, so sometimes we'll get a little short of us getting water, and at that time, we got to get a hold of the ditch walker, and he'll get the ranchers to shut down so we can get that water better.

That has happened twice since his start in 1993 (TSWWS 2009).

Economic Issues

Stevensville bills its customers on a quarterly basis, but will switch to monthly once the entirety of the system is metered. The bill lists water usage along with sewer charges. The rate system is based on meter size for those who have metered connections, while the unmetered customers are charged a flat rate along with a sprinkler rate during the summertime. The Town budgeted $227,747 for operation and maintenance costs for FY 2009-2010 (TSWWS 2009).

The Town, like every other, has some difficulties with customers being able to pay their bills. But, the problem is relatively small. According to the Water/Wastewater Superintendent, only one or two customers a month cannot pay. The delinquent customers are able to work out a payment schedule to repay their debt.

Future Issues

Currently, Stevensville is in the process of trying to transfer their surface water rights into groundwater rights. The Town "has a well fight already lined up" with the prospect of the switch. However, Stevensville has no plans to expand its water rights as the town feels that it has enough to sustain itself (TSWWS 2009). "What's keeping us from growing right now is we need to get rid of that surface plant and install the wells. We're not letting any new growth occur because we haven't got the system in place yet," said the Water/Wastewater Superintendent.

Conservation

Stevensville enforces watering restrictions from April 1 to October 1. Customers are allowed to run their sprinkler systems at night, while those who water their lawns with a hose are allowed to water until noon. Customers are also only allowed to water during alternating days that correspond to their address numbers (TSWWS 2009).

Policy Issues

The recent economic downturn has played a role for the Town's water system. Currently, the system is trying to acquire funding and customers are having trouble paying their bills (TSWWS 2009).

Population and Water Use Projections

According to the Water/Wastewater Superintendent, Stevensville's water system will not be sufficient to supply water users until 2030 without meter and sewer upgrades. The Town Engineer is working on a formal water demand forecast to determine how much Stevensville will need for future years (TSWWS 2009).

Nevertheless, Stevensville should have sufficient amounts in water right volumes to accommodate future growth until 2030 (Tables 28 and 29), even with significant population growth (Table 30).

Table 28. Current and estimated average annual water use for Stevensville based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Stevensville (76 H)	6515 acft/yr*	849 acft/yr (13%)	1049 acft/yr (16%)	1248 acft/yr (19%)

*All rights are active.

Table 29. Current and estimated average annual water use for Stevensville based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Stevensville (76 H)	2129 acft/yr	849 acft/yr (28%)	1049 acft/yr (49%)	1248 acft/yr (59%)

Table 30. Current population and population projections for Stevensville.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1900	2347	2792

Middle and Lower Clark Fork River Basins

Aside from Missoula, all of the communities in these sub-basins have sufficient water right amounts to provide for future growth. Missoula, like communities in the Bitterroot sub-basin, will most likely try to change its place of use on certain water rights to ensure that the community will be able to provide water for future growth.

Alberton

Unfortunately, though numerous attempts were made to contact the Operator, no information concerning Alberton's water system and water use were provided. Water usage was calculated from a USGS estimate of per capita water use (PEPPS 1995). According to those calculations, Alberton should have sufficient amounts in water rights available for future years.

Table 31. Estimated average annual water use for Alberton based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Estimated Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Alberton (76 M)	242 acft/yr*	77 acft/yr (32%)	85 acft/yr (35%)	93 acft/yr (38%)

*All rights assumed to be active.

Table 32. Current and estimated average annual water use for Alberton based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Alberton (76 M)	161 acft/yr	77 acft/yr (48%)	85 acft/yr (53%)	93 acft/yr (58%)

Table 33. Current population and population projections for Alberton.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
422	462	503

Missoula – Community Profile

Missoula is the largest city in Missoula County and in the Clark Fork River basin. Mountain Water Company (MWC, or the Company) is the city's provider of water. It also provides water to East Missoula. The Company has 68 water rights drawing water from two sub-basins: sub-basin 76 M (Middle Clark Fork River) and sub-basin 76 H (Bitterroot River). Sixteen of those water rights are surface water rights (and currently inactive), where Rattlesnake Creek is the source. The rest of the rights are for groundwater. The system currently has 37 wells spaced across the Missoula Valley. All water from the wells pumps either to one of the MWC's reservoirs or directly to the customers. The water is disinfected and chlorinated at each well site (MWC 2009).

System Characteristics

The Company has no preference between the wells for use. But, the Company does prefer using the groundwater rights to the surface water rights. "Probably...the only reason we favor it is feasibility. Right now, pumping out of the ground is more feasible than the surface water because the surface water does have to have additional treatment than the groundwater at this point," said the Assistant General Manager/Vice President.

As one would expect of a larger system, the Company's various parts of infrastructure were installed at various points in time. The Rattlesnake Dam was built in 1903. The first well was drilled in 1929. The pipes are of various ages, and vary from "anything from cast iron to PVC." Apparently, the system also has a main that dates back to the 1920s (MWC 2009).

The MWC's water system has 22,096 active connections. Of those, 4,500 are flat rate connections while the rest of the connections are metered. Residential customers are the vast majority of those connections at 18,467, with commercial connections numbering 3,367. None of the connections are industrial. The system distributes 15,000,000-16,000,000 gallons a day on average. During the winter months, the system distributes around 11 million gallons a day (MGD), while during the peak months of July or August the average is 52 MGD. Since the system is not fully metered, it is hard to say how much the system loses due to leakage, but the Assistant General Manager/Vice President estimated around 20% of its water. The system is capable of producing 55 MGD. Generally the system produces at 29% capacity, though technically the system operates at 100% for fire protection (MWC 2009).

The system has not been affected by drought or low water situations due to the quality aquifer MWC draws from.

> We have not seen...we just have very little drawdown. Even on our biggest 6,500 gpm well just barely draws down. Our static levels...we keep a good eye on [them]. We do see some seasonality to our static levels, but not the net.

The Company brings in about $17,000,000 for its annual revenue. Annual operation and maintenance costs are $9,400,000. The rest of the revenue is profit (MWC 2009).

Future Water Rights

Regarding MWC expanding water rights or obtaining new rights, the General Manager/Vice President said that it's driven by new development. He added,

> We're in a very grey transition area, period. What's happening is that there's operational requirements of our system that make it so that we can't push water into some areas with our existing water rights, so those developers are having to bring in new water rights. We're not able to go out and put a new point of diversion well and utilize our water rights. So, what the developer's looking at is the cost associated with running a giant transmission main to connect to our current wells, or putting in a well into this aquifer. Still, the least cost [option] seems to be the new well in the aquifer. If they want to do that, they're going to have to bring us mitigation water rights. If they can connect to our existing system, we still have some capacity where we continue to grow in that way. It's kind of a mix.

With that being said, the Company does not have any plans to expand its rights (MWC 2009). "We think that the process of [obtaining new] water rights is...limiting [our capacity to grow],” said the General Manager/Vice President. The Assistant GM/VP added,

> [The exempt well issue] is one aspect that is definitely limiting the ability for municipal and public systems to grow, because now there is this run-around game that developers are saying, ‘Hey, this aquifer’s good enough. I can put in a well this easy and don’t have to deal with water rights.’ I would say that a big part of the [water rights] process is limiting public systems in their ability to grow.

Conservation

Regarding conservation measures, Missoula has specific watering times and alternate watering days based on address, mostly to avoid “overtaxing the water system.” The hours and dates are enforced “to some degree,” usually in the event of the system not being able to meet the demand (MWC 2009).

Economic Issues

Customers are billed monthly. On each bill is a graph of the 13-month history of the customer’s consumption. Also included are the monthly charges of the meter charge, the fire protection fee, and the consumption charge for the billing period. The charges for flat rate customers are based on a flat rate terrace, which is calculated based upon the number of rooms, baths, and toilets that customers have in their homes. The Company does have a low-income discount for qualified customers (determined by their qualifications for energy assistance), which is administered through the Human Resource Council. Also, MWC is willing to create payment plans with customers unable to pay when the bill is due. The Company disconnected 225 customers due to unpaid bills in 2008 (MWC 2009).

The General Manager/Vice President said, “Generally speaking, the economic factors that would stimulate construction and development, mostly residential development, have the potential of playing into impacts on our water system in future years." The Assistant GM/VP added,

> The economy plays a huge role as far as how it relates to our revenue, and then passed onto the customer, is the cost of replacing the infrastructure. As inflation goes up, we mentioned earlier, our old pipe in the ground is coming to the end of its life. The customer isn't paying any dollars associated with it. It's no longer base rate; it's depreciated out. It was probably put in the ground for $2.00/foot. Now we're talking $200, $250 a foot to go back and replace that in the streets. So that's going to be a major impact to the customers' rates as we move forward and continue to replace the infrastructure.

House Bill 831

The Assistant GM/VP expressed how House Bill 831 was affecting the system.

> Because of the municipal exemption, we're not finding that for Mountain Water it's much different than what we're experiencing in the Lower Clark Fork basin because of the lawsuit from Avista and DNRC. So it's basically mitigating new permits.

On a related note, the General Manager/Vice President listed securing mitigation water rights for new wells a major issue for development and growth. Regarding the *de facto* closure of the Clark Fork basin affecting MWC, the Assistant GM/VP averred that the closure affects the Company mostly with new developers having to procure water rights before joining MWC's system (MWC 2009).

Water Quality

Like many other large systems, the Company has some water quality issues. It is concerned about impacts that Class 5 injection wells have on the aquifer. Currently, it has researchers at the University of Montana examining what the potential long-term impacts are (MWC 2009).

Population and Water Use Projections

Both the General Manager/Vice President and the Assistant GM/VP are not sure whether MWC's current system and water rights will be sufficient to supply water users until 2030. "I think we're comfortable that we can handle [future growth] until 2030, but what has to be done to accommodate the growth will depend on where the growth occurs. [The] big challenge, like I said, is the exempt wells aspect." Ideally, both would like to see some changes to the current exempt well policy. The Assistant GM/VP said,

> You know, there's definitely a need for exempt wells throughout Montana. If you have a public water supply [nearby], there needs to be some sort of incentive for that developer to connect to the public water supply.

Water demand forecasting for MWC has shown developments trending towards smaller plots, which implies less irrigation. The forecasts are also predicting new construction with less domestic water use. However, with so many "variables" that can affect growth, both the Assistant GM/VP and the General Manager/Vice President had difficulties predicting future demand with much certainty (MWC 2009). The projected annual water use for Mountain Water's service area, though, showed that Missoula should have sufficient amounts in water right volumes (Tables 34, 35, and 36).

Table 34. Current and estimated average annual water use for Missoula based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Missoula (76 H, 76 M)	140609 acft/yr	17362 acft/yr (12%)	19783 acft/yr (14%)	22374 acft/yr (16%)

Table 35. Current and estimated average annual water use for Missoula based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Missoula (76 H, 76 M)	137985 acft/yr	17362 acft/yr (13%)	19783 acft/yr (14%)	22374 acft/yr (16%)

Table 36. Current and estimated average annual water use for Missoula based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Missoula (76 H, 76 M)	43500 acft/yr	17362 acft/yr (40%)	19783 acft/yr (45%)	22374 acft/yr (51%)

Table 37. Current population and population projections for Missoula.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
68000	77483	87631

Plains – Community Profile

Plains is a town in Sanders County. It currently has 1,244 residents (TPPWA 2009). It is located in sub-basin 76 N (Lower Clark Fork River). The Town of Plains has five municipal water rights, four of which are groundwater. However, the surface water right from Boyer Creek is no longer active according to the Public Works Assistant. The DEQ inactivated that right due to water quality issues. "There's cattle and horses up there [near the spring] and whatnot, and there was just no way to satisfy the DEQ that the water source was being kept clean," he said. The Town currently has two wells in operation (the Balch well and the City well), both of which are chlorinated with gas (TPPWA 2009).

System Characteristics

The system has 584 connections (all of which, aside from the fire hydrants, are metered) pumps “in the neighborhood of 500,000 gallons a day” in the summertime, and decreases to about 100,000 gallons a day in the wintertime. There are 537 residential and 47 commercial connections. On average, the system pumps 2,935,200 gallons a month. The Public Works Assistant prefers to use the City well due to its variable drive, and tends to use the City well for three weeks out of the month, while using the Balch well for one week out of the month. Most of the infrastructure is 25-30 years old, as that is when Plains annexed large tracts of land. The system is fully developed and operates at an average capacity of 17.5% (TPPWA 2009).

Economic Issues

Customers are billed monthly. The Public Works Assistant lists each customer’s usage to the nearest 100 gallons on every bill. There are no rate structures for different types of users, and no lifeline rates for low-income residential consumers. Plains also has a shutoff rate of 2-3 a month. Like most communities, if users are having trouble paying their bills they can speak with the mayor to work out a payment plan. Plains has budgeted $144,006 for operation and maintenance costs per year (TPPWA 2009).

Future Water Rights

Currently, Plains has no plans to expand or obtain new water rights, though there have been discussions about possibly building a new well and more elevated storage for better water pressure. Also, Plains has no water conservation measures (TPPWA 2009).

Policy Issues

The Public Works Assistant was not worried about the *de facto* closure of the Clark Fork River basin due to Plains not actively pursuing new water rights in the near future (TPPWA 2009). Regarding the economy affecting Plains' water system in future years, the Public Works Assistant was not concerned. "We're a small community. There's no industry here or anything, so we are going to be limited to what we can and can't do."

Water Quality

Though the Town has not had any recent water quality issues with water intake, the DEQ has been monitoring Plains' wastewater discharge. "We are discharging into the river, and we have put in a UV system, and we're being monitored pretty tightly on that by DEQ. Thus far, we haven't had any problems meeting our limits," said the Public Works Assistant.

Population and Water Use Projections

Plains is projected to have sufficient water right volumes for the upcoming years (Tables 38, 39, and 40). Even if Plains' unadjudicated water rights are severely curtailed, Plains' current and projected water use volume is well under the maximum.

Table 38. Current and estimated average annual water use for Plains based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Plains (76 N)	1034 acft/yr	108 acft/yr (10%)	120 acft/yr (12%)	134 acft/yr (13%)

Table 39. Current and estimated average annual water use for Plains based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Plains (76 N)	779 acft/yr	108 acft/yr (14%)	120 acft/yr (15%)	134 acft/yr (17%)

Table 40. Current and estimated average annual water use for Plains based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Plains (76 N)	263 acft/yr	108 acft/yr (41%)	120 acft/yr (46%)	134 acft/yr (51%)

Table 41. Current population and population projections for Plains.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1244	1382	1542

Superior – Community Profile

Superior is a town in Mineral County with a current population of 900 people. It is located in sub-basin 76 M (Lower Clark Fork). The Town has seven municipal water rights, six of which are groundwater. Currently, the Town uses three of those rights (all groundwater) for water supply. The water is chlorinated at each well site, after which the water is pumped directly into a 400,000-gallon reservoir tank from the wells. The Public Works Supervisor prefers using the newest well (drilled in 1974), and rotates use between the other two active wells to supply the system (TSPWS 2010).

System Characteristics

The water system was previously owned and operated by Mountain Water Company, but the Town purchased the system in 1999. The system's infrastructure has pipes of various ages, with parts dating back to the early 1900s. The mains and services have been gradually replaced and upgraded since then. The water system is fully developed with 415 connections, all of which are metered. The Public Works Supervisor estimated that 95% of those connections are residential and that 6-10 of those connections make up the largest users in the system. In an average month, the system distributes 3-4 million gallons of water, with an increase to 7-8 million during the peak months. The system generally runs at 40% capacity. The Public Works Supervisor estimated average leakage losses at 30-40%. To rectify that problem, the Town has been completing nearly $2 million worth of upgrades since 2009 (TSPWS 2010).

The Town's water supply has not been affected by drought, low water situations, or seasonality. However, the supply has been curtailed due to water quality issues with the surface water right. The surface water is contaminated with antimony and has been inactive since 1997 (TSPWS 2010).

Future Water Rights

Currently, the Town has no plans to expand its water rights. It would, however, like to examine the possibility of installing a water treatment facility to remove the antimony contamination from its surface water source. The Town has no definitive plans for that to happen in the near future, as the Public Works Supervisor feels that the town "could grow quite a bit more" with its current rights (TSPWS 2010).

Conservation

The Public Works Supervisor cited metering all connections as a chief mechanism to conserve water.

> Once we took over the system [from] Mountain Water, they had a few [connections] metered, but most of them were flat rate. Once we bought it, we metered everything, and that actually caused the citizens to conserve quite a bit more.

The Town also has lawn watering restrictions, including alternating days based on address number and watering hours (6:00-11:00 A.M and 4:00-10:00 P.M.). The watering restrictions are in effect from May to September, and are enforced by the Public Works Supervisor (TSPWS 2010).

Economic Issues

Customers are billed monthly. The Town lists the previous month's consumption and the current month's consumption on each bill. The Town charges a base rate based on service size (starting at $26.13 for ¾" meters) along with a consumption rate of $2.27 per 1,000 gallons (TSPWS 2009). The Public Works Supervisor said that he generally does not have many problems with delinquencies and disconnects rarely.

> If we get one or two a year, that's a lot. Normally, if we knock on the door and say you're late, and we'll hang a notice saying, 'You're late, contact the office.' They usually do, and if they make arrangements and work with us, we go that route first.

Policy Issues

The Public Works Supervisor said that he was unconcerned about House Bill 831 affecting his system. He was also unconcerned about the *de facto* closure of the Clark Fork River basin, downstream flow obligations, and Endangered Species Act listings affecting his system (TSPWS 2010).

Future Improvements

Regarding future issues for the Town's system, the Public Works Supervisor will continue to work on replacing some of the older water lines. The Town received funding from the 2009 stimulus bill to apply to that work. The Public Works Supervisor was not worried about how the economy might affect the system (TSPWS 2010). "If the economy were to take off, I don't think it would affect us much. We're kind of in an area, where even good or bad [economies] we kind of stay the same," he said.

Population and Water Use Projections

Superior is currently using very little of the total volume available in water rights (Table 42), and is projected to continue to use very little of the total volume onto 2030. Even when considering active water rights (Table 43) and rights established post-1973 (Table 44), Superior is still well within the margin of comfort.

Table 42. Current and estimated average annual water use for Superior based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Superior (76 M)	6169 acft/yr	129 acft/yr (2%)	138 acft/yr (2%)	150 acft/yr (2%)

Table 43. Current and estimated average annual water use for Superior based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Superior (76 M)	3867 acft/yr	129 acft/yr (3%)	138 acft/yr (4%)	150 acft/yr (4%)

Table 44. Current and estimated average annual water use for Superior based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Superior (76 M)	645 acft/yr	129 acft/yr (20%)	138 acft/yr (21%)	150 acft/yr (23%)

Table 45. Current population and population projections for Superior.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
900	923	1005

Thompson Falls – Community Profile

Thompson Falls is a city in Sanders County. It is also the county seat. Thompson Falls is located in sub-basin 76 N (Lower Clark Fork basin) and has four municipal water rights. Two of the rights are groundwater, while the other two rights are surface water rights from Ashley Creek. Though the City of

Thompson Falls used to have strictly surface water rights, the City changed the point of diversion on its rights in the early 2000s. This had to be done because during the winter of 1996-97, Thompson Falls had a large avalanche in its watershed, which increased the turbidity level to a point of making the water undrinkable (CTFO 2009).

System Characteristics

The City redeveloped springs in Ashley Creek and has a ductile iron pipe that travels down to the community and connects to a water storage tank. The City's wells are directly connected to the water system. The surface water rights have been reassigned to groundwater rights (CTFO 2009).

Thompson Falls has upgraded the majority of is infrastructure within the last 15 years.

> We lost our surface water exemption...and we didn't worry too much about leaks and stuff because you just shoved water in the pipe. There was no expansion of treatment, so leaks weren't a big issue. Then we had to change our source of water and then we had to really look at our distribution.

Thompson Falls has a fully developed water system, with "roughly 500" connections. All connections are metered. Though the Operator did not know how many connections were commercial, he estimated the number around 30 to 40. The City's water system is affected slightly by seasonality during the summer months, but not enough to where the system cannot handle it (CTFO 2009).

Currently, Thompson Falls has no plans to expand its water rights. Before the upgrades to the system, Thompson Falls was distributing nearly 900,000 gallons of water per month. Now, Thompson Falls distributes around 200,000 gallons of water per month.

Economic Issues

Customers are billed monthly. The City has a different rate structures for commercial users as opposed to residential users. The residential base rate is $35.85/month, which includes 8,000 gallons of use. For every 1,000 gallons used after that, the City charges $1.25. Though there are occasions where customers are delinquent on paying their bills, the City generally does not have many problems with delinquency (CTFO 2009).

Policy Issues

The Operator was not concerned about the *de facto* closure of the Clark Fork River basin due to the Thompson River Lumber case. “We have water rights that predate Avista [Utilities],” said the Operator. The Operator was also unconcerned about water quality issues. He also did not predict any effect the economy could have on the City’s system in future years.

Population and Water Use Projections

Since Thompson Falls has a projected sufficient amount in water rights to supply users for the next twenty years, the Operator said that there are no plans for Thompson Falls to apply for new water rights. However, the Operator did mention that he was glad that he has senior water rights relative to Avista Utilities, as he thinks changing water rights have become “more and more of an issue (CTFO 2009).”

“The only major problem I see affecting us [in future years] is that we have limited storage capacity. Over the next couple years, we’re going to have to expand our storage capacity to meet fire flow requirements,” said the Operator.

Currently, the system has two water tanks with a total storage capacity of 400,000 gallons (CTFO 2009).

Though Thompson Falls has not engaged in any formal water demand forecasting, the town has a Preliminary Engineering Report that does “some forecasting” of water demands. The City updates the forecast every four years.

Currently, Thompson Falls is using an insignificant amount of its water right (Table 46). Even when inactive water rights (Table 47) and unadjudicated water rights (Table 48) are factored out, Thompson Falls still has significant room to grow.

Table 46. Current and estimated average annual water use for Thompson Falls based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Thompson Falls (76 N)	3626 acft/yr	7 acft/yr (0.2%)	8 acft/yr (0.2%)	9 acft/yr (0.2%)

Table 47. Current and estimated average annual water use for Thompson Falls based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Thompson Falls (76 N)	1938 acft/yr	7 acft/yr (0.4%)	8 acft/yr (0.4%)	9 acft/yr (0.5%)

Table 48. Current and estimated average annual water use for Thompson Falls based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Thompson Falls (76 N)	1871 acft/yr	7 acft/yr (0.4%)	8 acft/yr (0.4%)	9 acft/yr (0.5%)

Table 49. Current population and population projections for Thompson Falls.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1470	1633	1822

Upper Flathead River Basin

Unlike the other sub-basins in the Clark Fork River basin, the Upper Flathead River basin is open for communities to file for new municipal rights. As a consequence of this fact, communities do not (and some would argue that they do not have to) employ many conservation measures to ensure sufficient amounts in water rights. This lack of conservation might change in the future if communities in the basin continue to grow at a rapid clip, causing water shortages.

Bigfork – Community Profile

Bigfork is an unincorporated community in Flathead County, Montana. It is located near the northeastern shore of Flathead Lake. Bigfork Water & Sewer District (hereafter referred to in this section as "District") has six different water rights listed in the Water Rights Query System, although only three are currently are in use according to the Bigfork Water & Sewer District Manager. The others have been abandoned. All of the community's water rights are groundwater rights, and are in sub-basins 76 LJ and 76 K. The rights that are currently in use are 76 LJ 30011517, 76 LJ 80206 00, and 76 LJ 41432 00 (BWSDM 2009). The community of Bigfork is not incorporated, and is classified as a CDP. Bigfork is a seasonal community, where according to the District Manager the population "triples or quadruples in the summer."

System Characteristics

The water from two wells manifold at one point at Ramsfield Road and function as the main supply for the district. The other well is named Eagle Bend South well, and the District runs it during the summer, when irrigation use peaks (BWSDM 2009). Each of the wells has pumps that pump directly into the distribution system. The two wells located at Ramsfield Road are favored for drinking water (BWSDM 2009).

Bigfork's water distribution infrastructure was built almost 100 years ago, but most of what was built then is no longer in use. The oldest infrastructure currently in use was "probably from 1963, [including] some transmission mains and a steel tank (BWSDM 2009)." The system has been constantly undergoing upgrades, which includes adding new subdivisions. While the water system is not fully developed, the District has recently obtained a grant to perform a water survey. The District Manager is hoping that the survey will identify deficiencies and where the District needs to upgrade infrastructure. The water system also has a wastewater treatment plant (BWSDM 2009).

As of August 2009, the District had 1,179 active connections, all of which are metered. None of the connections are industrial. The District has varied from 42 gpm in July 2009 to upwards of 400 gpm for leakage losses. The District Manager estimated that leakage losses have averaged near 100 gpm for the past few years (BWSDM 2009).

The District water system has the capacity to pump almost 1.5 million gallons per day. However, the system has been producing close to one million gallons a day in the summer, and near one quarter million gallons a day in the winter. The District Manager has not been concerned about drought or any sorts of seasonal shortage affecting the water supply (BWSDM 2009).

Conservation

The District Manager cited that the District's rates as one of the main ways to conserve water. The District charges more "to the bigger user per gallon." There are no lawn watering restrictions, though previously in "2006 or so" before larger pumps in the wells were installed, the District asked people to alternate days for lawn watering, though this was not policed. The District is considering using effluent water for irrigation, as it is installing a membrane bioreactor, which would bring treated wastewater up to an acceptable quality for irrigation (BWSDM 2009).

Economic Issues

District customers are billed monthly. The bill lists each customer's meter reads for the beginning and the end of the month, the customer's consumption, and the total amount owed. The District has a base rate of $19.30, which includes 5,000 gallons of water. Bigfork has an IBR rate structure for water consumption. Customers are charged $1.20 for every thousand gallons used after 5,000 up to 10,000 gallons. From 10,000 to 30,000 gallons, customers are charged $1.70 per 1,000 gallons of use. Any customers who use more than 30,000 gallons are charged $2.25 per 1,000 gallons of use. The District uses a multiplier for larger meter sizes to calculate base rates. For 1" meters, the base rate is multiplied 2.5 times, while for 2" meters, the base rate is multiplied eight times the original rate. This is meant to help pay for operation and maintenance costs, which run about $600,000 per year (BWSDM 2009).

There are no lifeline water rates for lower income residents of Bigfork, as the District Manager said that there are not "many low-income people that can afford to live in Bigfork." The District also has a "very low delinquency rate," though "this year, with the economy, we had three that we sent to the county and added the [rates] onto their taxes, but that was the first time in three to four years."

When asked on how the economy plays a role for the District's water system in future years, the District Manager responded,

> Passing bond issues may be a challenge for future upgrades, and if the economy goes down we have several subdivisions that have gone back to the banks, so those are a concern if we don't get the tax base to pay off the assessments. We got some RFIDs (radio frequency identification systems) that have brought in some older parts of town that are paying for development.

Policy Issues

The District Manager was not worried ongoing negotiations the State of Montana is having with the CSKT. Regarding the *de facto* closure of the Clark Fork River basin, the District has been working for over a year to change its point of diversion and the Manager mentioned how the rules are "more stringent than they've used to be." She added, "We imagine it's going to get worse, so you have to plan for years in advance if you want to expand your water rights."

The District has not been affected by ESA listings in the area, as all sources are groundwater. Though there have not been any issues with the District's main wells, the District did have "some gross alpha [radiation] in our Eagle Bend well, but there's enough mixing that we haven't had any notification." The District performs water quality tests quarterly (BWSDM 2009).

Population and Water Use Projections

The District Manager considers the District's water rights and its water delivery system insufficient to supply water users until 2030, saying that there are "areas that are maxed out right now." The District Manager is anticipating continued growth for Bigfork. To rectify this issue, the District has already purchased property on which to install a new water tank. Also, the District is considering the option of installing a third well at the Ramsfield Road well site, depending on what the aforementioned survey recommends. Finally, the District is adding capacity to its wastewater treatment plant to accommodate future growth (BWSDM 2009).

Examining the projected water use numbers for Bigfork compared to total volume available in all water rights (Table 50), in active water rights (Table 51), and in permitted water rights (Table 52) leads to the conclusion that Bigfork will have sufficient amounts of legally entitled water for future growth until 2030.

Table 50. Current and estimated average annual water use for Bigfork based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Bigfork (76 K)	1657 acft/yr	18 acft/yr (1%)	21 acft/yr (1%)	25 acft/yr (1%)

Table 51. Current and estimated average annual water use for Bigfork based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Bigfork (76 K)	1148 acft/yr	18 acft/yr (2%)	21 acft/yr (2%)	25 acft/yr (2%)

Table 52. Current and estimated average annual water use for Bigfork based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Bigfork (76 K)	760 acft/yr	74 acft/yr (10%)	87 acft/yr (11%)	101 acft/yr (13%)

Table 53. Current population and population projections for Bigfork.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1757	2077	2403

Columbia Falls – Community Profile

Columbia Falls is a city in Flathead County. It is located in sub-basin 76 LJ (Upper Flathead). The City has nine water rights; six are groundwater wells. The other three water rights are surface water from Cedar Creek. Three of the groundwater rights (76 LJ 22105 00, 76 LJ 79327 00, 76 LJ 83816 00) are active, while all surface water rights are active but not used. The system used to be entirely reliant on surface water, but changed to relying upon wells due to the difficulty of treatment. The City plans to transfer the surface water rights to a new well in the future (CCFDPW 2010).

System Characteristics

The system's infrastructure ranges in age from one to 80 years old, with the majority of the system installed 50-55 years ago. The water system is fully developed with 1,757 active connections, all of which are metered. Residential connections number 1,593, while the system has 144 commercial accounts, 5 industrial accounts, and 15 government accounts. The system distributes 11,250,000 gallons in an average month, peaking around 35,000,000 gallons/month in the summer months. The system loses an average of 30% of its water due to leakage losses. The Director of Public Works (DPW) mentioned that the system's capacity was not affected by seasonal drawdown, low water situations, or drought (CCFDPW 2010).

Economic Issues

Customers are billed on a monthly basis. The bill includes the customer's consumption per 1,000 gallons. The system has five rate classifications, including single-family residences, multi-family residences, commercial, government, and industrial. The rates are also affected by meter size and pipe size. The system has an annual budget of $1,063,000 for 2010. Operation and maintenance costs average from $35-38,000 a month (CCFDPW 2010).

Though the City does not have lifeline rates for low-income residential customers, the customers are allowed to request relief before the City Council. The City also has a payment plan for economically stressed customers. The system averages 40-50 delinquencies per month, with four to five delinquencies (CCFDPW 2010).

Concerning how the recent economic downturn has affected the system, the DPW said,

> Boy, you're dependent on what's going on in your community for sure, and we've been feeling it this year with the two main sources of our economy, one being the Seapac aluminum plant over here, which basically went to complete closure this year, and then our Plum Creek Lumber Company...and a wood manufacturing company laid off a third of their operation.

The downturn has affected water usage, therefore lowering revenue (CCFDPW 2010).

Conservation

Regarding water conservation in Columbia Falls, the City canvasses the system annually for leaks and system education. The DPW mentioned that metering connections is a "definite plus" in conservation. In the event that stricter water conservation needs to be implemented, the town has a three-tier notification system. The first tier is voluntary water restriction on lawn irrigation. The next tier is an ordered restrictive use of water for irrigation, followed by limited water use in one's home. The last two tiers would have to be approved by the City Council before they would be in effect (CCFDPW 2010).

Policy Issues

The DPW mentioned water quality concerns for the system. "We just went through one in November where we were in violation of our coliform rule, and wound up having to go through a major flushing and disinfection of the system," he said. As mentioned earlier, the City is also not using its surface water rights due to the high organic content (CCFDPW 2010).

The system has also been slightly affected by endangered species. Since the bull trout are native to the Flathead River, the system is fairly restricted by contaminant limits from its wastewater treatment plants (CCFDPW 2010).

Future Growth

The DPW said that recently the system has not had the need to expand its water rights, though the system has had "several fairly large development proposals" to expand. In the event that one is approved, the system will most likely need to develop a new well. "What's more limiting our growth is terrain," said the DPW. This is mostly due to some of the proposed development would be in areas where the current system could not deliver well with enough pressure (CCFDPW 2010).

Population and Water Use Projections

The DPW said that the City's water system was sufficient to supply water users until 2030. "We conducted a water facility study about four years, and basically it was telling us...we had sufficient water supply based on the 3% population growth factor per year. If it were 5%, then we'd probably be borderline," he said. However, when examining water right volume amounts (Table 54), active water right volume amounts (Table 55), or permitted water right volume amounts (Table 56), it is projected that Columbia Falls will have sufficient amounts for future growth.

Table 54. Current and estimated average annual water use for Columbia Falls based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Columbia Falls (76 LJ)	4989 acft/yr	414 acft/yr (8%)	489 acft/yr (10%)	566 acft/yr (11%)

Table 55. Current and estimated average annual water use for Columbia Falls based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Columbia Falls (76 LJ)	3789 acft/yr	414 acft/yr (11%)	489 acft/yr (13%)	566 acft/yr (15%)

Table 56. Current and estimated average annual water use for Columbia Falls based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Columbia Falls (76 LJ)	3189 acft/yr	414 acft/yr (13%)	489 acft/yr (15%)	566 acft/yr (18%)

Table 57. Current population and population projections for Columbia Falls.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
4508	5330	6167

Coram – Community Profile

Coram is a CDP and an unincorporated community in Flathead County, Montana. It is located four miles away from Hungry Horse. Coram Water & Sewer District has three water rights, all of which are groundwater. All three of the water rights are from sub-basin 76 LJ, which is the Upper Flathead River to and including Flathead Lake. However, only one groundwater right is active, with a flow rate of 425 gpm.

System Characteristics

According to the District's General Manager, the District has two active wells in Coram. Both of the wells feed to one building and therefore one well is not preferred over the other. In 2000, the District installed an all-new water system. The District has approximately 125 connections, all of which are metered (CWSDGM 2009).

The General Manager of the District estimates that Coram distributes 350,000-400,000 gallons for an average month from its two wells. Each of the pumps is able to pump 175 gpm. The system has one pump pass in both of the wells that feed to a well house. The District has an 89,000-gallon storage tank. Approximately 5% of the water is unaccounted for due to leakage (CWSDGM 2009).

Future Growth

According to the District General Manager, growth in Coram is limited due to the lack of vacant lots available to develop. There are also no plans to expand water rights. "We can't get 40 psi (pounds per square inch) going up the road, so the DEQ said they would not approve any further extensions up that road," the District General Manager said.

Economic Issues

Customers are billed monthly, and are charged with a base rate along with a rate based on gallons consumed. The District also has a sprinkling rate. The sprinkling rate is charged based on every customer's average monthly usage between November and February. The customer is charged $1.05 for every gallon above the customer's average use. The sprinkling rate is applied from May 10 to September 10 (CWSDGM 2009).

Policy Issues

Being located in the Upper Flathead sub-basin, Coram has not been affected by some of the issues that other communities have had to deal with further south. According to the District General Manager, Coram has not been affected e.g., House Bill 831, the CSKT compact negotiations, and fulfilling downstream environmental flows (CWSDGM 2009).

When asked what some major issues might be for the District's water system in future years, the District Manager mentioned that chlorination might become a reality. "We're not currently, though I do chlorinate when I need to, but we don't do it very often, and I think that the DEQ and federal people are wanting us to chlorinate, though a lot of the customers aren't in favor of that," he said.

Population and Water Use Projections

Coram will most likely have sufficient water right amounts as the system has little room to expand. Even if growth occurs with the current boundary constraints, Coram is projected to use little of its total water rights available (Tables 58 and 59).

Table 58. Current and estimated average annual water use for Coram based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Coram (76 LJ)	492 acft/yr	14 acft/yr (3%)	17 acft/yr (3%)	19 acft/yr (4%)

Table 59. Current and estimated average annual water use for Coram based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Coram (76 LJ)	275 acft/yr*	14 acft/yr (5%)	17 acft/yr (6%)	19 acft/y (7%)

*All active rights are permitted.

Table 60. Current population and population projections for Coram.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
417	493	570

Evergreen – Community Profile

Evergreen is a CDP in Flathead County. It is located within sub-basin 76 LJ (Upper Flathead River basin). Flathead County Water District #1 Evergreen (FCWDE, or District) supplies water to the community. The District has four water rights, all of which are groundwater. According to the General Manager, FCWDE has three well sites across the community. The District recently drilled two wells within the last year that are not operational as of October 2009 (FCWDEGM 2009).

System Characteristics

The District installed the majority of the system infrastructure (including the storage tank) in 1967. Throughout the years, the system has been gradually expanding by adding service to nearby subdivisions. All water from the well sites except for the water from the bluff wells enters the District's 1,000,000-gallon storage tank. This pressurizes FCWDE's lower system. The bluff wells rely on gravity to be pressurized (FCWDEGM 2009).

The District has 3,006 water customers, all of which are metered. Though the District does not categorize by type of connection (i.e., residential/ commercial/industrial), it does have a breakdown by meter size: 2,322 connections with a 3/4" meter; 456 with 1"; 31 with 2"; three with 3"; one with 4"; and two with 8" meters. The 8" meters are for Plum Creek, a paper mill (FCWDEGM 2009).

In FY 2008-2009, the District pumped a total of 689 million gallons. That averages out to 57.4 million gallons a month. The District distributes the most water during the summer months, pumping close to 100 million gallons. Conversely, the District averages around 30 million gallons of water distributed during the winter. The District had 26% last fiscal year in unaccounted water.

> I don't think that's accurate, because we've done leak detection." I don't think we're losing that much. I think we're having some telemetering or metering issues. When we get our new wells online, we're upgrading our telemetry. I'm hoping that'll show us an improvement, because we can't be losing that much. (District Manager)

The system's capacity varies throughout the year, but is "probably at three quarters capacity" during the summer months. The capacity is not affected by drought or low water situations, yet the General Manager mentioned how heavy irrigation could take a toll on the situation. “Our big issues are like up on the bluff, everyone is irrigating and there’s a fire or something like that,” said the General Manager. To mitigate this problem, Evergreen is planning to add more storage capacity. The community has recently advertised for bid a second tank, which would be adjacent to its current storage tank (FCWDEGM 2009).

Economic Issues

Customers in FCWDE are billed monthly. The District prints the customers’ previous readings, their current readings, and their gallons used on the bills. Currently, the base rate is $4.00, with an additional $1.10 charged per 1,000 gallons of water consumed. Unlike many other communities in the basin, Evergreen has a declining block rate. After 500,000 gallons of consumption, the rate per gallon decreases. The District’s operating expense for the 2008-09 fiscal year was $489,967 (FCWDEGM 2009).

Despite the favorable rate structure, FCWDE still has problems with customers being able to pay their bills. The community, according to the General Manager, is not “economically well-off.” Like many other water systems, the District will work with customers if they cannot pay immediately. The District disconnects “maybe half a dozen people once a month, if that (FCWDEGM 2009).”

The General Manager has noticed some economic impacts of the recent recession, noticing a drop in construction. “It affected mostly our connection fees; there weren’t so many new connections or extensions to development.”

House Bill 831

The General Manager said that House Bill 831 has not impacted Evergreen. While aware of the ongoing compact negotiations between the CSKT and the State of Montana, the General Manager was not terribly concerned. "We don't think it'll affect us very much. It's not a big concern, but we have talked about it a little bit," she said.

Conservation

According to the General Manager, not very much is done in Evergreen to conserve water.

> "I'm not happy with that, because we drop our rates in the summer. But, our board is of the attitude of wanting to keep things green, and that we have enough water. I think it would be nice to encourage conservation a little, but that's not how our board feels."

Population and Water Use Projections

Regarding water right expansion, the General Manager said that would be doubtful in the near future. "Right now, our rights cover everything we need, and then some. As far as expanding our rights, I don't know if we're particularly interested in that." Tables 60 and 61 support that statement. Though Evergreen appears to have enough in water rights for the future, the General Manager was not confident in saying whether the system would be able to handle growth for the next 20 years. The District has not engaged in any form of formal water demand forecasting. The General Manager identified the issue of installing an elevated tank to pressurize the bluff part of the water system as the District's largest water issue (FCWDEGM 2009).

Table 61. Current and estimated average annual water use for Evergreen based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Evergreen (76 LJ)	6781 acft/yr*	2114 acft/yr (31%)	2499 acft/yr (37%)	2892 acft/yr (43%)

*All rights are active.

Table 62. Current and estimated average annual water use for Evergreen based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Evergreen (76 LJ)	6434 acft/yr	2114 acft/yr (33%)	2499 acft/yr (39%)	2892 acft/yr (45%)

Table 63. Current population and population projections for Evergreen.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
7686	9087	10513

Hungry Horse – Community Profile

Hungry Horse is a CDP and unincorporated community located in Flathead County. It is located near Hungry Horse Dam and Reservoir, which features prominently in Clark Fork water reallocation plans (see Chapter 2). Hungry Horse Water/Sewer District has six municipal water rights listed in the DNRC WRQS: four are groundwater rights and one is a surface water right with Sand Creek as the source. Two of Hungry Horse's water rights are from sub-basin 76 J (Flathead River, South Fork) and three rights are from sub-basin 76 LJ (Upper Flathead).

System Characteristics

Hungry Horse alternates between three wells weekly. None are preferred as drinking water sources. Hungry Horse performed some plant renovations in 1988 with additional renovations in 2005. According to the General Manager, very little infrastructure dates back to the 1970s (HHWSDGM 2009).

Hungry Horse Water/Sewer District (hereafter referred to in this section as "District") has approximately 350 connections, all of which are metered. Like the vast majority of other systems in the Clark Fork River basin, Hungry Horse pumps much more water in the summer than in the winter. In 2008-09, the District pumped 1,628,530 gallons of water from December 20th to January 20th, while from July 20th to August 20th the District pumped 3,688,850 gallons. The District averages close to 2,000,000 gallons per month. Approximately 5% of the water is unaccounted each month due to leakage or malfunctioning meters (HHWSDGM 2009).

The District has two 100,000-gallon storage tanks, which are both used simultaneously. The General Manager was not concerned about low water situations or drought. "We have more water than anybody in the world!" he said, half-jokingly. Consequently, Hungry Horse does not have conservation measures. "When you start metering...that's your number one conservation method in my opinion," the General Manager said. However, the General Manager does do an audit for nine months out of the year on the customers' meters, which allows him to spot aberrations in meter readings that could possibly be caused due to leaks (HHWSDGM 2009).

Economic Issues

Customers in the District are billed monthly. They pay a base rate and are also charged for consumption per 1,000 gallons consumed. This is the only information listed on the bill. Occasionally, there are problems with customers not paying the bills.

> We have a rental base in Hungry Horse, which is the hardest to get money out of. A lot of the owners don't want to be messed with the renters, so they try to always get it in the renter's name, and the renters don't want to pay anything they don't have to, so it's a battle every month.

The Manager usually has about 60 delinquent customers each month. First, the Manager delivers a late notice. If the customer still has not paid the Manager delivers a final notice, and if the customers have not paid at that point, the Manager shuts off the service. He shuts off "maybe 2-3 people per month." However, if the customer comes in and explains that they cannot pay the bill that month, the General Manager is willing to make separate payment arrangements (HHWSDGM 2009).

The economic downturn has also played a role in affecting the District.

> The Forest Service sold 92 acres [to private developers] in 2004, and they had a big subdivision and they were going to take Hungry Horse water, [which] was going to eat up every bit of spare capacity we had, and the thing got stalled. That was five years ago.

He also mentioned the lack of new service installations. "I haven't put in a new service at all this summer in Hungry Horse, when I used to do 5-10 every summer."

Policy Issues

Since the District has a large amount of entitled water in water rights and has plenty of water in the aquifer, other issues facing other communities in western Montana do not affect it. The General Manager mentioned not being affected by such issues as House Bill 831, the CSKT compact negotiations, and fulfilling environmental flow requirements. Regarding water quality, the General Manager did mention the possibility of chlorinating to treat the water in the future, due to the preferences of the DEQ and federal agencies (HHWSDGM 2009).

Population and Water Use Projections

The General Manager was confident that the District's water rights and water delivery system was sufficient to supply water users until the year 2030 (HHWSDGM 2009). According to the water use projections compared to total volume available in water rights (Table 64), in active water rights (Table 65), and in permitted water rights (Table 66), the General Manager's assertion will prove to be correct.

Table 64. Current and estimated average annual water use for Hungry Horse based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Hungry Horse (76 J, 76 LJ)	2401 acft/yr	74 acft/yr (3%)	87 acft/yr (4%)	101 acft/yr (4%)

Table 65. Current and estimated average annual water use for Hungry Horse based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Hungry Horse (76 J, 76 LJ)	1402 acft/yr	74 acft/yr (5%)	87 acft/yr (6%)	101 acft/yr (7%)

Table 66. Current and estimated average annual water use for Hungry Horse based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Hungry Horse (76 J, 76 LJ)	465 acft/yr	74 acft/yr (16%)	87 acft/yr (19%)	101 acft/yr (22%)

Table 67. Current population and population projections for Hungry Horse.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
1155	1364	1578

Kalispell – Community Profile

Kalispell is the largest city in Flathead County with 21,182 people. The City has 13 municipal water rights, 11 of which are groundwater. Kalispell is located in sub-basin 76 LJ (Upper Flathead River). One of the surface water rights is from Stillwater River and is used to irrigate the municipal golf course. The other surface water right is from Ashley Creek and is an instream flow right. The only rights used for potable water supply are groundwater rights. The groundwater is chlorinated at each well site. The Public Works Director and City Engineer (PWDCE) said that the City has no preference among the rights for drinking water, though some rights are used at certain times of the year and others are preferred due to pressure (CKPWDCE 2010).

System Characteristics

The water system supplies 99% of Kalispell's population, along with some houses along the City's perimeter. The system's infrastructure varies in age from over 100 years old to one year old. Most of the older infrastructure is cast iron pipe, with the newer piping being made out of PVC. The water system is fully developed with 8,016 active connections. The vast majority of connections (95%) are metered. Of those active connections, 6,488 are residential while 1,528 are either commercial or industrial.[2] The system distributes 120,000,000 gallons of water during an average month. The system averages closer to 220,000,000 gallons of water during the summer months, and 75,000,000 gallons/month during the wintertime. The leakage loss rate is 30%. "We've tightened it up, because we can't account for a lot of the water simply because we know it's being used but not metered," said the PWDCE. The system operates at an average of 28% capacity, though operates at 75% capacity during peak days. While the system does not have issues with its capacity, the system sometimes has issues meeting demand during periods of high water use (CKPWDCE 2010).

Economic Issues

Customers are billed on a bimonthly basis. The billing period, number or billing days, and the quantity used per 1,000 gallons are included on the bill. Customers are billed strictly on consumption at $2.43 per 1,000 gallons, with a sprinkling rate of $1.55 per 1,000 gallons. The sprinkling rate is calculated by averaging customers' use between November and February and subtracting that from the customers' summer usage. Low-income customers are billed at a lower rate. Not including debt service, capital outlays, bond indebtedness, personal services, and labor costs, operation and maintenance costs are $780,000/year. The system has an annual budget of $4.1 million (CKPWDCE 2010).

[2] The system has no separate category for large industrial users.

The system occasionally deals with delinquent customers, though the PWDCE classified the problem as “minimal.” The City also has a very low disconnection rate given its population, disconnecting customers due to unpaid bills 6-8 times a month (CKPWDCE 2010).

Regarding the economy affecting the system, the PWDCE said,

> The demand on our system will be reflected in the growth of the system. Right now, we’re on the receiving end of effects from the current recession in the housing market, and there has been over the past several years an abundance of subdivision and lot creation so the [housing, construction, and real estate industries have been] suffering from the general lack of interest in purchasing what’s currently been done. Obviously, if someone wants to move here, they’ve got to sell what they own there. If they can’t sell what they own there, they’re not going to move here. So locally, we have an effect and a lot of the effect is related to what’s happened elsewhere.

Future Water Rights

The City has recently drilled one well in 2006 and another pair of wells in 2008. Currently, Kalispell is in the process of filing for rights to the newest wells. Instead of planning to purchase neighboring water rights, the City is planning to continue to file for new water rights (CKPWDCE 2010).

> There’s very little incentive for us as an organization to spend too much money on buying existing water rights based upon the normal amount. You might have one that might generate 3,000 acre-feet a year if you’re using it only a certain time of the year, and it’s for irrigation purposes and agricultural purposes. Once you have gone through the process of changing that over, you might be lucky to get 500 acre-feet per year to be used again during that same period, because you can’t get a period of diversion changed.

Though there are no plans for Kalispell to reuse effluent water, the PWDCE said that it might happen within the next 15 years.

> At a certain point, the additional treatment costs...the additional costs of capital and the difficulty in consistently complying with regulations will make it more advantageous to stop discharging and then to find a way to reuse that water. But, we have not reached that point.

The system has budgeted $1,000,000 for FY 2010 for additional capital outlays and just completed a 2,000,000-gallon storage tank. Though the improvements might help to improve water efficiencies, that is all that the City has done to conserve water.

> The city actually has a water rate structure that provides an incentive for outside irrigation through a reduced rate. The problem with conservation measures is that they typically they involve added costs to the ratepayer. In one form or another, the way in which you get conservation is to make it more expensive to use the water. That's the bottom line. And to us, things that...tend to conserve water tend to raise the bottom line to people who use it...We advise people to be careful, and that's about it.

Kalispell, like other communities in the Upper Flathead River basin, has a fortunate location. Partly since the Upper Flathead basin is not closed, the City has been able to obtain new water rights with relative ease compared to other communities in the Clark Fork River basin. This has been very beneficial to the fastest growing city in Montana (CKPWDCE 2010).

House Bill 831

When asked about how House Bill 831 has affected his system, the PWDCE said that it would make the process of obtaining water rights

> Far more complicated [if the Upper Flathead closed]. The procedures are far more lengthy, reporting requirements are far more lengthy, and depending on who you get as your case officer, if you want to call them that...it can be a significant challenge to get a new water right. Defining that area [of impact] and being able to demonstrate availability can be a challenge. But, so far we've not been denied anything. It's just been more work.

Future Issues

The PWDCE cited the challenge of complying with new federal and state regulations as the biggest issue for Kalispell's water system.

> We have a system of water rates and we have a system of water impact fees that is pretty well-thought out, so as long as both of those systems remain in place and are kept current to fund operations and the projections, and don't forget

> about planning for the future, we should be in decent shape. It kind of depends a large part on how your ability to grow will depend on your ability to respond to the changing environment of regulations.

CSKT

The PWDCE was aware and concerned about the ongoing negotiations between the CSKT and the State of Montana.

> You'd have to be a mind-numb robot to not be concerned that someone at the state level or someone in the political position of power could make a bad decision that places essentially the control of water rights in the Flathead in the hands of an organization that is not necessarily interested in economic growth and development and sustaining what it is you have already made commitments to. I think the people who are managing water rights now are the right people to be doing it, because there's always a potential that someone can do something stupid… That does cause a level of concern, but I just cross my fingers and think that, 'Okay, the right people will make the right decisions and it'll all come out fine.' You'd have to be foolish not to have some level of concern. There's always that possibility of a bad decision being made.

Regarding issues such as environmental flows, water quality, and endangered species, the PWDCE expressed no concerns.

Population and Water Use Projections

The City completes regular facility plans that forecast water demand. The most recent facility plan was completed in 2002 and was updated in 2008 (CKPWDCE 2010).

The PWDCE does not consider Kalispell's water rights and water delivery system sufficient to supply water users until the year 2030. He mentioned that significant efforts would have to be made to expand the water rights and infrastructure to meet future growth (CKPWDCE 2010). "[O]ur existing capacity is around 12 million gallons a day, and we have been peaking about 9. [That is] not a lot of headroom for additional growth there when you start thinking in terms of peaking."

Though the PWDCE does not consider the system's capacity sufficient to accommodate future growth, the water right amounts, whether considering the total (Table 68), active (Table 69), or permitted (Table 70), should be sufficient to meet growth until 2030.

Table 68. Current and estimated average annual water use for Kalispell based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Kalispell (76 LJ)	19857 acft/yr	4419 acft/yr (22%)	5225 acft/yr (26%)	6045 acft/yr (30%)

Table 69. Current and estimated average annual water use for Kalispell based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Kalispell (76 LJ)	18757 acft/yr	4419 acft/yr (24%)	5225 acft/yr (28%)	6045 acft/yr (32%)

Table 70. Current and estimated average annual water use for Kalispell based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Kalispell (76 LJ)	14969 acft/yr	4419 acft/yr (30%)	5225 acft/yr (35%)	6045 acft/yr (40%)

Table 71. Current population and population projections for Kalispell.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
21311	25196	29150

Lakeside – Community Profile

Lakeside is a CDP and an unincorporated community on the western shore of Flathead Lake. The community is in the 76 LJ sub-basin, which is codified as the Upper Flathead River basin (DNRCWRQS 2010). Lakeside County Water and Sewer District (District) has a total of nine water rights. Five of the rights are groundwater, while the other four are surface water rights. According to the District's General Manager, the wells are used for water supply and the surface water rights are used for wastewater treatment. It is important to realize, however, that only the groundwater rights are classified as municipal (LCWSDGM 2009).

System Characteristics

The District operates two separate systems: one specifically for Lakeside, and the other for subdivisions west of Lakeside proper, called the Troutbeck Rise/Lakeside Estates water system.

> Lakeside isn't incorporated, so it doesn't have city limits. It's a homeowner's association water system west of the main road, and a Lakeside system on the other side. As the community grows, those will be merged together.

The Lakeside system has around 285 connections, while the Troutbeck system has about 90. While the Troutbeck system only has residential connections, the Lakeside system has approximately 20 commercial connections with the rest being residential. All connections in both systems are metered. The water from the wells enters into the District's system through distribution pipes or from a reservoir. The District does not treat the water. The Lakeside system was formed when three smaller systems merged in the 1970s and consequently has infrastructure of various ages. However, the District completed a $1,000,000 infrastructure upgrade in 1998 on the Lakeside system. The Troutbeck system was installed “probably the late 1970s,” and Lakeside Estates subdivision merged with the Troutbeck system with all-new infrastructure in the early 1990s. The District also operates a sewer system that has about 1,000 customers, many of which are not customers of either water system (LCWSDGM 2009).

Like all communities in the basin, the District distributes considerably more water in the summer than in the winter. It averages 7,000,000 gallons during its peak month (August), and about 2,500,000 gallons per month in the wintertime. According to the General Manager, the system loses anywhere between 7 to 15% in leakage per month (LCWSDGM 2009).

Currently, the District is not experiencing any trouble with water shortages.

> We have plenty of storage and pumping capacity, so there are no restrictions in that regard. If I went back 10 years, there was water rationing in Lakeside. When we upgraded the system in [19]98, we solved that problem. We’ll have to have another well as our community grows, and we’ll have to have another reservoir. But, we’re nowhere near that today.

Future Growth

The District is expecting future growth. “The Lakeside Estates subdivision has been approved for Phases 3-5, and as part of their requirements they have to drill another well...there’s another division called Spurwig that has to build another reservoir,” said the General Manager. The District hopes to complete this is by the end of 2010. While the District will have to obtain a new water right for the new well, the General Manager is thinking about other options for future water use (LCWSDGM 2009). “In the issue of appropriating new water, we could mitigate a new well with some of our surface water rights. We haven’t done that yet, but that’s out there,” the General Manager said.

Economic Issues

The District's operations budget for the water system is approximately $170,000 per year. Customers are billed monthly, with a base rate of $20.75. They are also charged a rate of $1.79 per 1,000 gallons of consumption. The base and consumptive rates increase by a multiplier for meter sizes larger than 3/4". Though there are no lifeline rates for low-income residential consumers, problems with customers being able to pay their water bills are "minimal." Around 9% of the District's customers have not paid their bills in 60 days. "If [the customers] don't pay...we don't just shut people off every month, since most people come in and pay or make arrangements. If they're unfortunate, we usually make arrangements with them as long as they come in and talk to us," said the General Manager. As in other systems in Montana, any delinquent bills are turned over to the county, who adds it to their property taxes (LCWSDGM 2009).

House Bill 831

As Lakeside is in an open basin, House Bill 831 has not affected the District's water system at this point. The General Manager is not concerned since the groundwater around Flathead Lake is not connected to the lake itself.

> I don't know what the bill says, but the hydrologists' opinion is that it has no effect at all; i.e., if you drill a well in Lakeside, it won't affect Flathead Lake at all. Our wells are around 700 feet deep, and that's way below the bottom of the lake.

Nevertheless, if the District does have to mitigate for groundwater withdrawals, the district has irrigation rights that could be used (LCWSDGM 2009).

The General Manager cited the ability to obtain new water rights as an issue of primary concern for the District in future years.

> If water rights become a problem [in meeting] the growth of the community, that's more of a developer's issue. Our water system, the town is fairly well built out. If developers want to build more houses, they have to get a new water right. The way that it's worked here is that the developers can build their water system and all that type of stuff if they're not in our territory. They don't want to run a water system when they're done; they want to build their houses and get out. If they build a system and turn it over to us, they have to get a water right. So that's a big issue for the developers more than us.

Closure of the Clark Fork Basin

When asked about issues that might affect the District by curtailing its current rights, the General Manager was not concerned. Regarding the *de facto* closure of the Clark Fork River basin, the General Manager said,

> We've got our rights for our existing systems and I don't think they're going to take those away from us. I don't know, I don't think they would. What are they going to do, kick people out of town and say they can't live there anymore? I don't think so.

CSKT

Regarding the current compact negotiations between the CSKT and the tribe, the General Manager "know[s] it's out there," but is not concerned about the Compact taking away the District's existing water supply (LCWSDGM 2009). The community is north of the reservation boundary, but the compact may still have an impact due to the reservation's proximity.

Future Growth

The General Manager said that he expects future development once the economy recovers.

> When the growth picks up again, we're going to be right back there, the water rights will be the issue again. For example, the Sable Creek subdivision outside of town is supposed to be 1,000 houses over the next 30 years or so and would take up a whole new water system. They've been having public hearings on their two wells for water rights, and they want us to own the system. But, they have to secure the water rights before we agree to own it. So, they're in the process doing that, but then the economy has just stalled that project stone cold, so there's nothing happening right now. They've gotten far enough along that they

have drilled their two wells and they've applied for water rights...If the growth picked up, we'd be right back in there again.

Population and Water Use Projections

The General Manager is of the opinion that the District would have to acquire more water rights to accommodate future growth. "I think we'd need to augment the system before 2030 if growth takes up again. If it became static, we're fine." The projections in Tables 72 and 73 support that assertion. The District has had formal water demand forecasts completed, but there is more of a concern for wastewater treatment than water supply (LCWSDGM 2009).

Table 72. Current and estimated average annual water use for Lakeside based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Lakeside (76 LJ)	424 acft/yr*	129 acft/yr (30%)	153 acft/yr (36%)	177 acft/yr (42%)

*All rights are active.

Table 73. Current and estimated average annual water use for Lakeside based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Lakeside (76 LJ)	396 acft/yr	129 acft/yr (33%)	153 acft/yr (39%)	177 acft/yr (45%)

Table 74. Current population and population projections for Lakeside.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
2076	2454	2839

Martin City – Community Profile

Martin City is an unincorporated CDP in Flathead County. Martin City/County Water District has three water rights, all of which are groundwater wells. According to the Chairperson, only two of those are active.

System Characteristics

Currently, the drinking water is not treated. There are 107 water users that are connected to the system, serving a population of 305. Five of the connections are considered commercial, and there are two connections to an RV park. All the connections are metered. Currently, the water system loses 23% of its distributed water due to leakage. The Chairperson was not sure whether the leakage is caused all from one leak. Martin City does not have any wastewater treatment. All homes are on septic systems (MCCWDC 2009).

Conservation

According to the Chairperson, the District has no water conservation measures in place, though there are policies in place if necessary to restrict water (MCCWDC 2009).

Economic Issues

Customers are billed monthly. There are no lifeline rates for low-income residential consumers. According to the Chairperson, “We try to keep from raising the bills, since Martin City is not a wealthy area. There are a lot of people who can’t afford much on the water.”

House Bill 831

Though the community did discuss House Bill 831 when it passed, it appears to be a small concern for Martin City. "I remember talking about it a little bit, but we haven't been bothered by it," the Chairperson said. "I don't think we're worried about it. It may be something in the future we'll have to worry about. It's not really that big of a deal, though."

Future Issues

Regarding major issues in future years, the Chairperson was most concerned about maintaining water quality. "It might become a problem with more and more septic systems coming in," the Chairperson said. The Chairperson also mentioned the lack of concern Martin City has regarding such issues as the CSKT compact negotiations and indigenous rights (MCCWDC 2009).

Population and Water Use Projections

Asked whether Martin City's delivery system was equipped to supply water users until the year 2030, the Chairperson said, "Well, that's kind of hard to say. Who knows what's going to happen in the future, but as we stand right now, we're good, yes."

Table 75. Current and estimated average annual water use for Martin City based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Martin City (76 LJ)	689 acft/yr*	34 acft/yr (5%)	40 acft/yr (6%)	46 acft/yr (7%)

*All rights are active and permitted.

Table 76. Current population and population projections for Martin City.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
305	361	418

Somers – Community Profile

Somers is a CDP in Flathead County. The community draws its water rights from sub-basin 76 LJ (Flathead River, to & including Flathead Lake). Somers County Water & Sewer District (SCWSD or District) has two water rights: one is a surface water right from Flathead Lake and the other is a groundwater right. The District is not using the surface water right at this time, due to the high treatment costs associated with municipal surface water use (SCWSDGM 2009).

System Characteristics

The District has two active wells that have a combined flow rate of 440 gpm. The vast majority of the system (aside from the storage tank and one main) was installed in 1990. The storage tank was also refurbished that year. The wells run alternately, and the water from those wells enters a storage tank and then into the distribution system. The system is fully developed and has "about 300" connections, all of which are metered. Fifteen of the connections are commercial, while the rest of them are residential. The system pumps nearly 1.5 million gallons of water in an average month, with a monthly maximum of 4.6 million gallons. On average, it averages 6% in leakage losses (SCWSDGM 2009).

Wastewater Treatment

Currently, the District has an inter-local agreement with Lakeside County Water & Sewer District where Lakeside treats Somers' sewage as long as

Somers does not exceed 45,000 gallons per day. As of this writing, Somers was averaging close to “35,000.” Though the General Manager does not feel that The District’s water rights are amounts are limiting growth capacity, she is concerned about wastewater as a limiting growth factor.

> Basically, Lakeside has this drive to become a very large system. They’re saying they won’t increase our capacity for wastewater until we agree to consolidation with them. That’s been over a nine-year period. I don’t know what’s going to happen when the renewal of our inter-local agreement comes due, which will be in three years. I’m hoping we’ll have our own wastewater treatment plant then and don’t have to deal with it. But, I don’t know what’s going to happen.

Economic Issues

Customers in the District are billed monthly. The rates are based on meter sizes, and increases accordingly as capacity units increase. The base rate for ⅝” and ¾” meters are $12.00/month plus $1.50 per thousand gallons of consumption. The District’s annual operational and maintenance costs are $58,000 (SCWSDGM 2009).

Somers has a 10% delinquency rate. Before customers are shut off, the District sends out letters with a red “Past Due” mark. After that, customers receive a letter notifying that they are past due. If the customers still ignore the delinquent bills, their water is shut off. The General Manager advocated shutting off connections in order for bills to be paid (SCWSDGM 2009).

> You pretty much have to shut [the customers] off to make them wake up and start paying their bills. A lot of people don’t think they’re going to be shut off. A lot of people wrongly conclude that we are like the electric company, where we can’t turn off during the winter, and that’s incorrect.

That being said, the District is willing to work with customers if they make an agreement to a payment schedule. The General Manager disconnects 2 or 3 customers a month due to delinquency (SCWSDGM 2009).

Future Plans

The District is in the process of purchasing land with the hopes of expanding storage capacity. "We have a 100,000 gallon tank, and we want to at least double that size of storage," said the General Manager. This would help with the storage capacity needed for fire flows. The District also hopes to drill a new well.

Conservation

Somers has no official conservation measures. However, the General Manager contended, "Basically, the best way to conserve is to hit their pocketbooks. So, people conserve based on their ability to pay. That is about the only thing we do other than if we find a leak," said the General Manager.

> I've been in the business since 1981, and I've found that the best way to conserve water is to charge for it. People really pay attention when it hits their wallet. We discovered that in numerous systems in my life where they were on a flat rate system, and then we switched them to metered, which I'm going to be doing for one of my subdivisions this month. They sit there, they're on flat rates, [and] they let their sprinklers run all night. They don't care about their leaks. You throw them on a meter and your pumping goes WAY down.

House Bill 831

Regarding House Bill 831 affecting the District, the General Manager said that the bill, along with other new regulations, has been confusing. It has also caused delays in the District's process of changing the place of water rights usage (SCWSDGM 2009).

> With the passing of that house bill, DNRC is kind of all confused. And, they've got all of these new employees, and they don't seem to know which way they're going. [This] has caused our project delays, because they're putting in new rules and new thoughts every time you turn around.

Population and Water Use Projections

When asked whether the District's current water delivery system and water rights are sufficient to supply water users for the next twenty years, the General Manager said yes, with a caveat. Although she is unconcerned about supply (Tables 77 and 78), she is worried about having enough storage capacity for fire flows (SCWSDGM 2009).

Table 77. Current and estimated average annual water use for Somers based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Somers (76 LJ)	224 acft/yr	55 acft/yr (25%)	65 acft/yr (29%)	75 acft/yr (34%)

Table 78. Current and estimated average annual water use for Somers based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Somers (76 LJ)	152 acft/yr*	55 acft/yr (36%)	65 acft/yr (43%)	75 acft/yr (49%)

*All active rights are permitted.

Table 79. Current population and population projections for Somers.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
688	813	941

Whitefish – Community Profile

Whitefish is the second-largest city in Flathead County. It is located in sub-basin 76 LJ (Flathead River, to & including Flathead Lake). The City of Whitefish has six municipal surface water rights, all of which are surface water. The City draws its water from Whitefish Lake and Haskill Creek. All water is treated at the water treatment plant. The water rights are used for municipal water supply; however, one water right, 76 LJ 17981-00, is also used for golf course irrigation (CWUOS 2009).

System Characteristics

The water from Haskill Creek is gravity fed into the system, while the Whitefish Lake supplies are pumped. The City relies on the Haskill Creek water for 90% of the domestic water supply. This is due to the superior water quality and the fact that the water does not have to be pumped (CWUOS 2009).

The system's infrastructure has parts of varying ages. Portions of the system were installed in the early 1900s. The original town site has mains that date back to the late 1920s-early 1930s. Newer portions of the system were installed within the last 10 years. This includes the pumps and the transmission line from the lake to the water treatment plant, which was installed in 2000. The water system is fully developed, with 3,350 connections. All connections are metered. The system distributes an average of 1.3 million gallons per day, which extrapolates out to 39.5 million gallons for an average month. The monthly maximum averages to 96.9 million gallons, and occurs during the summer months. Since Whitefish is a ski resort community, the City's monthly consumption valleys in March or November, depending on the year. Usage increases during the ski season from December to February. The system averages between 10% and 15% for leakage losses, with losses being higher in the summer months (CWUOS 2009).

The system has 3,017 residential customers, 328 commercial customers (five of which are combination of residential/commercial), one industrial commercials, and 427 strictly irrigation customers. The system operates at an average 33% capacity, approaching 75% during peak days. Though the capacity is not affected by drought or low water situations, it is affected by seasonality due to high amounts of irrigation in July and August (CWUOS 2009).

Economic Issues

Customers are billed monthly. The City lists the users' consumption on the bill, along with a base rate. Base rates are based on meter size, and consumption rates may increase in certain pressure zones that require booster pumping facilities and/or additional storage. Low-income residential consumers have a lower base rate, but not a lower consumption rate. Operation and maintenance costs for the system for FY 2009 were $2.7 million. That figure includes capital outlay and debt service (CWUOS 2009).

Whitefish has not had many problems in delinquencies, though the town does occasionally deal with delinquencies from the high rental population once they've left town.

> [W]e may have 30 a month that we threaten to turn off because they're delinquent, but they either pay up by the time turnoff day comes, or they make arrangements to pay it the next day or so...It's certainly in the neighborhood of 1%.

He said that he averages 4 or 5 shutoffs a month due to unpaid bills. Though there are no city-based programs offering assistance paying water bills (aside from discounted base rates), private and church-based programs are available to aid lower-income customers (CWUOS 2009).

The Utility Operations Supervisor mentioned significant impacts regarding the economy affecting the City's system.

> [A]s a resort community, most of our growth and everything was pretty much dependent on people having disposable income. An awful lot of the construction that was going on the last ten years in Whitefish was second and third and fourth homes for the people who had nothing else to do with their money except to invest it. So that hasn't come to a total halt, but it's slowed considerably.

Future Expansion

The City has no plans to expand its water rights.

> We're in the middle of a draft preliminary report for our water rights, but based on the water rights that we have, it just depends on adjudication, whether or not we'd have to get anymore. Right now, we're not looking at any new appropriations.

Aside from being concerned about adjudication, the City is paying attention to the CSKT negotiations to see whether the outcome of the talks will have an impact. One option that the City is considering is using its return flows to mitigate (CWUOS 2009).

Conservation

The Utility Operations Supervisor cited rates as the chief mechanism to conserve water.

> When the rates go up, people tend to conserve. If you look at water usage from the 1980s, given the population of much less than half of what we have now, we haven't increased our water usage very much. In 1980, our average water consumption was about a million gallons a day. Now it's 1.3 [million] and we've well over than doubled our population.

With that being said, Whitefish does have a graduated rate system that encourages high volumes of water use for its largest users.

> The irrigation water, we basically sell at production cost. [T]he current council, the current administration, they prefer a green city, I guess, to restricting irrigation through the rates, but that's definitely in what we look at as opposed to spending $4 million to add to the water plant.

Population and Water Use Projections

The Utility Operations Supervisor considers its water rights and its water delivery system to be sufficient to supply users for the next twenty years (CWUOS 2009). This assertion is supported by Table 80; however, if Whitefish loses significant amounts of water right volumes due to the adjudication process, the City may want to consider filing for new rights as consumption is currently exceeding permitted volumes fivefold (Table 81).

Table 80. Current and estimated average annual water use for Whitefish based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Whitefish (76 LJ)	13557 acft/yr*	1455 acft/yr (11%)	1720 acft/yr (13%)	1990 acft/yr (15%)

*All rights are active.

Table 81. Current and estimated average annual water use for Whitefish based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Whitefish (76 LJ)	359 acft/yr	1455 acft/yr (405%)	1720 acft/yr (479%)	1990 acft/yr (554%)

Table 82. Current population and population projections for Whitefish.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
8572	10135	11726

Woods Bay – Community Profile

Woods Bay is a CDP in Lake County. The community is located on the northeastern shore of Flathead Lake. Woods Bay Water & Sewer District (WBWSD, or District) has two water rights, both of them groundwater. The water from the wells enters a manifold station and then out into the system. The Manager/Secretary expressed no preference between the two wells for drinking water.

System Characteristics

The system serves 121 properties, of which 110 are active connections. All connections are metered and all but one are residential (the other being commercial) (WBWSDMS 2009).

The current infrastructure is, according to the Manager/Secretary, “very, very old,” but the District is undergoing a reconstruction of the entire system. The District is revamping both wells, installing new pumps and installing a pump house. This was due to be completed by the end of 2009. The District does not have waste treatment capacities (WBWSDMS 2009).

As of this writing, the system distributes approximately 600,000 gallons per month. However, the Manager/Secretary expects that number to decrease once the new system is fully installed. Currently, the system is losing “at least half” of the water distributed due to leakage (WBWSDMS 2009).

Economic Issues

Customers are billed on a monthly basis. The customers’ meter readings are on each bill, along with the customers’ monthly consumption. The District does not employ lifeline rates due to the lack of low-income residential consumers. Generally, 95% of the customers pay on time (WBWSDMS 2009).

The Manager/Secretary shuts off customers because of unpaid bills “maybe six times out of the whole year.” Customers are charged $40.00 as a base rate, which includes an allotment of 5,000 gallons. For consumption that exceeds 5,000 gallons, the customers are charged $2.50 for every 1,000 gallons used. The District's annual operation and maintenance costs are $30,000 (WBWSDMS 2009).

CSKT/Water Quality Issues

The Manager Secretary is unconcerned about the CSKT compact negotiations due to the community's location. When asked about water quality issues, the Manager/Secretary said, "The only thing that we're concerned about, of course, which everyone is since we're on the lake, is the nitrates from the septic systems. But, so far so good."

Population and Water Use Projections

Currently, the District is not planning to expand or obtain new water rights. However, when asked what some major issues for the District's system in future years, the manager mentioned finding well water to accommodate future growth. "We're in a pocket here in the Woods Bay area with 1,200 homes and there's only 240 of them on an actual water system. The rest of them are on their own wells. And, well water is getting more difficult to find, of course," she said. The District has not engaged in any formal water demand forecasting (WBWSDMS 2009).

According to the projections in water use comparing total volume available (Table 83) and total volume of permitted water rights (Table 84), Woods Bay should have sufficient volumes of water legally entitled to the community to be sufficient for future growth.

Table 83. Current and estimated average annual water use for Woods Bay based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Woods Bay (76 LJ)	403 acft/yr*	22 acft/yr (5%)	25 acft/yr (6%)	29 acft/yr (7%)

*All rights are active.

Table 84. Current and estimated average annual water use for Woods Bay based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Woods Bay (76 LJ)	193 acft/yr	22 acft/yr (11%)	25 acft/yr (13%)	29 acft/yr (15%)

Table 85. Current population and population projections for Woods Bay.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
845	979	1120

Lower Flathead River Basin

All of the communities mentioned are located on the Flathead Indian Reservation, and therefore, each has a significant part of its population that is made up of tribal members. The results of the CSKT compact negotiations could have a significant impact on each of these communities. Operators and managers from many of these communities also mentioned the possibility of future shortages in water right volumes due to growth.

Charlo – Community Profile

Charlo is a CDP and an unincorporated community in Lake County in the Lower Flathead River basin. It is located entirely within the Flathead Indian Reservation. According to the Secretary/Treasurer of Charlo/Lake County Water

& Sewer District (District), Charlo has an estimated population of 450 people. The District has four water rights. While the Secretary/Treasurer is not certain, she believes that one of the rights had to be re-filed. This is because the original well was not producing when drilled in 1947. The District filed for a new water right with the same flow rate and volume the following year (76L 119831 00 and 76L 119832 00). The District has three active wells, though one of the wells does not have a water right. None of the wells are preferred for drinking water.

System Characteristics

The District installed a water tower in 1965, and replaced the main lines in 1986. The system has a total of 173 connections, of which 164 are active. There are 12 commercial connections, while the rest are residential. The District Board decided to meter four of the highest users by volume: the school, the bar, an apartment building, and a car wash. The system distributes approximately 1.2 million gallons of water on an average month and 3-4 million gallons during the summer months. Since only four of the 164 active connections are metered, it is not possible to determine how much the system loses in leakage (CLCWSDST 2009).

While the District does not have capacity issues due to drought, low water situations, or seasonality, the District is meeting with an attorney to possibly arrange the appropriation of new water rights. The District has sprinkling regulations to conserve water. Open hoses are not allowed, and houses are allowed to use sprinklers every other day during specified times. This regulation is loosely enforced, and is in effect from April 1st to September 30th (CLCWSDST 2009).

Economic Issues

Customers are billed monthly. The metered customers are informed of their usage on the bill and are charged $20.00 up to 8,000 gallons and $0.80 for every 1,000 gallons exceeding that amount, while the non-metered users are charged a flat rate of $20.00 per month. According to the Secretary/Treasurer, 2-3% of the users are delinquent in paying their bills. The District has no official program assisting water users with paying their bills, but the District is willing to negotiate a payment plan for delinquent payers. Operation and maintenance costs for the District for FY 2009 were $26,632 (CLCWSDST 2009).

Policy Issues

Since the District is located within the Flathead Indian Reservation, the Board is “aware that’s [the CSKT compact negotiations] going on,” and is concerned with how that might affect the most recent well’s legality. The Secretary/Treasurer is unconcerned with water quality issues due to the high quality of water the aquifer produces. When asked about the economy playing a role in the District’s water system in future years, the Secretary/Treasurer mentioned that, “It might affect expansion if we don’t have the money (CLCWSDST 2009).”

Population and Water Use Projections

The Secretary/Treasurer is fairly confident in Charlo being able to provide water users for the next twenty years (CLCWSDST 2009). Assuming that Charlo will not have its water right volumes curtailed by adjudication, Charlo has a sufficient volume of water rights (Table 86). However, if only permitted rights are considered, Charlo is already exceeding its water right volume (Table 87).

Table 86. Current and estimated average annual water use for Charlo based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Charlo (76 L)	324 acft/yr*	44 acft/yr (14%)	51 acft/yr (16%)	58 acft/yr (18%)

*All rights are active.

Table 87. Current and estimated average annual water use for Charlo based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Charlo (76L)	39 acft/yr	44 acft/yr (113%)	51 acft/yr (131%)	58 acft/yr (149%)

Table 88. Current population and population projections for Charlo.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
496	575	658

Hot Springs – Community Profile

Hot Springs is a town of 640 people in Sanders County. It is located in the Flathead Indian Reservation and in sub-basin 76 L. The community has four water rights, three of which are groundwater. The spring water right is currently inactive. The water from the wells enters directly into the system without treatment, as the community has a filtration waiver. The Mayor said that the community prefers using the oldest water right. The 1963 well produces the most water; however, the Mayor does not prefer to use it as the customers complain of the water's odor (THSM 2010).

System Characteristics

The system is fully developed with nearly 340 connections, all of which are metered. The Mayor estimated that 20 of those connections are commercial, with the rest being residential. The system serves the entire community of Hot Springs, along with some tribal housing and three residences outside of city limits. The system's infrastructure was rebuilt in 2000-01. In an average month, the system distributes 50,000 gallons of water, peaking at 80,000 gallons in the summer months. The system runs at an average of 4% capacity. The Mayor did not know how much of the water was lost due to leakage losses (THSM 2010).

Economic Issues

Customers are billed monthly based on consumption. Each bill lists the customer's previous reading and current reading, along with a base rate based on meter size. Though the Town does not have a lifeline rate for low-income residential consumers, the Mayor is willing to work with customers by establishing payment plans. The Mayor said that he has "four or five" delinquent customers per month, with very few of those ending up in disconnections. "I've only done two in two years," said the Mayor. Operation and maintenance costs for the Town's system run nearly $125,000 annually. That cost includes debt service (THSM 2010).

Future Issues

The Town has no plans to expand its water rights, but is discussing the possibility of expanding its storage capacity.

> The state has some guidelines…[that] just kind of tell you how much you should have for a population base and this and that...our town should have 300,000 gallons of storage, and to account for growth and all that, we should put in a 200,000 gallon tank so we have 400,000 [gallons] in storage.

Water Conservation

During the summer of 2009, the Town tried to enforce water conservation by having alternating days and set watering hours for irrigation. The customers were very proactive about conserving water...perhaps too proactive (THSM 2010).

> [P]eople just quit watering when we did that. I asked a couple different people and they thought that [the town] was getting short of water, so [they] just quit watering so there'd be plenty of water for everybody. I said, 'No, we're just trying to plan ahead. We're just trying to protect the system.' So it kind of backfired a little, I guess. We'll do it again this year and see what happens.

Policy Issues

Though initially unfamiliar with House Bill 831, the Mayor said that he was not concerned about it affecting Hot Springs. The Mayor was slightly concerned, though, about the ongoing negotiations between the CSKT and the State of Montana. "I'm a little bit concerned, kind of not. I don't know; it just depends. Actually, I'd have to agree with some of the tribes with what happens with some of that groundwater," said the Mayor. He said that he does not think the State will take away rights and that the Town has a good working relationship with the Tribes. The Mayor said that Hot Springs has no water quality issues nor any downstream flow obligations, and considers the system and the Town's rights able to supply its water users until 2030 (THSM 2010).

Pablo – Community Profile

Pablo is a CDP and an unincorporated community in Lake County, Montana. It is located entirely within the Flathead Indian Reservation. Pablo/Lake County Water & Sewer District ("District") has four municipal water rights. According to the Operator, Pablo lost one water right because the Town "didn't put in to renew our water rights, and that's being reverted back to 200 gpm. I think that was the 300 gpm one." The District has been making efforts to try to recover that water right, even though, according to the Operator, "It would probably be reverted back to what we're using now and not as to what it could be potentially used." All four of the water rights are groundwater (PLCWSDO 2009).

System Characteristics

All water from the District's water rights is used entirely for drinking water and the Operator has no preference for a specific well. The District has a metered manifold that is pumped from each well, which pumps the water into a 200,000-gallon raised-elevation tank (PLCWSDO 2009). The District rotates use on the four wells.

Most of the water infrastructure for Pablo was installed in 1976, including the storage tank, though the infrastructure is constantly being updated and extended. The water system is fully developed and fully metered. There are approximately 650 connections in Pablo, and the Operator does not differentiate between commercial and residential connections. The Operator loses approximately 7-8% of the water the system distributes through “bad meters” (PLCWSDO 2009).

The Operator expressed concern that the District does not have enough in storage capacity. “DEQ requires a system our size to have 1,000,000 gallons of storage for fire flow and emergency situations. Right now, we are about 800,000 gallons lacking; we have about 200,000 gallons of storage.” Regarding production capacity, the Operator said the Town could maybe handle 25% more in system growth. There is no relationship between water supply and wastewater treatment in Pablo (PLCWSDO 2009).

Currently, the District is working with the CSKT to install new wells and put a new tank on the East side of Highway 93 with “one or two new wells.” However, that plan is still in the grant writing process, which could delay the installation for a few years. The CSKT is “by far [Pablo’s] biggest customer,” hence being willing to work with the District to establish new wells and new storage capacity (PLCWSDO 2009).

Conservation

Though there is no formal conservation program in Pablo, the District does recycle effluent water by irrigation. The District owns 100 acres and leases the field out to a rancher who uses the land for hay production. The District has no residential lawn watering restrictions or anything of that nature. Recently, the District received funding from the State of Montana and the 2009 federal stimulus package to replace 2,400 lineal feet of pipe that was prone to breaking (PLCWSDO 2009).

The Operator expressed concerns about future growth for the system, stating,

> Short-term, like 5-10 years, we're in good shape. But, in 20-30 years, we're definitely lacking. I know that we still have room to grow, but the amount of growth we have potential for is limited by our water supply. I know we have to get more wells, more water rights, and another tank if we want to continue to grow.

Economic Issues

Customers are billed on a monthly basis. The bill includes gallons of usage, along with "different scenarios if some reason we need to chlorinate their system or area or whether or not we have a water shutoff coming up." The base rate is $17.46 up to the first 5,000 gallons of usage, with a charge of $1.25 per 1,000 gallons of additional usage. With salary included, the District spends "around $8-9,000 a month for salary and maintenance."

Though there are not any lifeline rates for low-income residential consumers, the CSKT sometimes pays the bills for tribal members residing in Pablo. The District shuts off customers around three to four times a month on average, but "they get turned [back] on right away (PLCWSDO 2009)."

Regarding the economy playing a role for the District in future years, the Operator mentioned that there are three subdivisions pending that already have approval through the District.

> Since the economy slowed down, the subdivisions have shut down completely. They haven't broke ground, nothing has moved further on with that. They have shut down completely. So, hopefully when the economy comes back, we can get some more growth, and get a few more users on the system, and better the situation for everybody.

Policy Issues

According to the operator, one of the major issues for the District is the ongoing negotiations between the CSKT and the State of Montana. The Operator expressed concern about how Pablo will be able to obtain new water rights, and if Pablo will have to pay for groundwater. The Operator was semi-familiar with House Bill 831, though he was not terribly concerned with the bill affecting the District. "I don't think it affects us. At least it hasn't yet. It could in the future, but I'm not sure about that." The Operator was also not concerned about any water quality issues as the water quality in the aquifer used for withdrawal is "top-notch" (PLCWSDO 2009).

Population and Water Use Projections

When asked his opinion regarding future growth, the Operator believes that the system will be sufficient to supply water users until 2030, provided Pablo does not see a "major growth expansion (PLCWSDO 2009)." The water right amounts should be sufficient as well provided that significant growth does not occur (Tables 89 and 90).

Table 89. Current and estimated average annual water use for Pablo based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Pablo (76 L)	879 acft/yr*	166 acft/yr (19%)	192 acft/yr (22%)	220 acft/yr (25%)

*All rights are active.

Table 90. Current and estimated average annual water use for Pablo based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Pablo (76 L)	589 acft/yr	166 acft/yr (28%)	192 acft/yr (33%)	220 acft/yr (37%)

Table 91. Current population and population projections for Pablo.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
2049	2374	2716

Polson

After numerous attempts to contact the Operator were made, information was unable to be obtained for Polson. As with Alberton, an estimate of annual water use was made based on per capita water use in the United States. Based on the U.S. average of per capita water use, Polson should have sufficient quantities available to accommodate for growth until 2030 (Tables 92, 93, 94).

Table 92. Estimated average annual water use for Polson based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Estimated Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Polson (76 L, 76 LJ)	6315 acft/yr*	1013 acft/yr (16%)	1173 acft/yr (19%)	1342 acft/yr (21%)

*Unknown if all rights are active.

Table 93. Estimated average annual water use for Polson based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Polson (76L, 76LJ)	2227 acft/yr	1013 acft/yr (45%)	1173 acft/yr (53%)	1342 acft/yr (60%)

Table 94. Current population and population projections for Polson.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
5504	6377	7296

Ronan – Community Profile

Ronan is a city of 2,250 people in Lake County. It is located inside the Flathead Indian Reservation. Ronan has three water rights in sub-basin 76 L (Lower Flathead River). Two of the water rights are groundwater, while the other is a surface water right diverted by a headgate out of Middle Crow Creek (DNRC WRQS 2010). According to the Water Superintendent, Ronan uses the surface water right 90% of the time for its water supply. The larger groundwater right is used as a secondary water source. The city rarely uses the other well, which is located in a city park. The Water Superintendent said that he prefers using the surface water right due to higher water quality. Before the water enters Ronan's system it is treated with chlorine and ozone (CRWS 2009).

System Characteristics

The system serves the city of Ronan, along with properties along the distribution line into town. Most of the pipe was installed in the early 1990s, with some older pipe installed in the 1960s. The smaller and larger wells were installed in 1962 and 1973, respectively. The City also has a 750,000-gallon storage tank. Currently, there are 925 active connections, with 99% of those being metered. About 50 of those connections are commercial, with the rest being residential. The Water Superintendent said that the average flow rate was 230 gpm, which extrapolates to 10,074,000 gallons for an average month. During the higher usage months of July and August, the water system distributes "around 25 million gallons" of water (CRWS 2009).

The system is normally used at 25% capacity, and averages "less than 1%" in leakage losses. Ronan's system capacity is affected by seasonality due to spring runoff. The Water Superintendent shuts off the surface water during that time and relies on groundwater, usually for a three-week period out of the year (CRWS 2009).

The City is examining the possibility of adding another well to the system. It would not file for a new water right, as it would draw on its existing water right volumes for water, which are not fully used. The City is also planning to install another storage tank "at some point."

Conservation

The Water Superintendent mentioned that while Ronan does have sprinkling restrictions in times of low water situations or repairs, there are no other official conservation measures in Ronan.

> We haven't really gone into anything conservation-wise. Everybody is pretty much allowed to sprinkle as they wish in the summertime, because we can provide enough water with what we have.

Though Ronan does not have conservation programs as other communities, the Water Superintendent is skeptical that Ronan will have enough in water rights in the future. He suspects that Ronan is on the verge of "doing some major growing."

Economic Issues

Ronan bills its customers on a monthly basis. The City bills based on meter size and gallons used. The Water Superintendent estimates that the system has a delinquency rate of 5% or less per month. Though the City has no formal lifeline rate program, the CSKT does pay for water bills for homes that are tribal owned. On average, the Water Superintendent disconnects users due to unpaid bills once a month. The budgeted costs for operation and maintenance run about $154,000 annually (CRWS 2009).

Regarding economic issues, the City is discussing increases in water and sewer rates, as the system is not "really keeping [their] reserves at the proper levels." According to the Water Superintendent, the current rates are not highly priced (CRWS 2009).

Policy Issues

The Water Superintendent was unconcerned about the *de facto* closure of the Clark Fork River basin. As Ronan is located within the Flathead Indian Reservation, the Water Superintendent was somewhat concerned about the ongoing negotiations between the CSKT and the State of Montana.

> I'm not sure how it's all going to play out. We try to work very closely with the tribes here, and we have a good relationship with them, so if something comes to play out, we're involved with the tribe.

Along with the new well and storage tank, Ronan will also deal with water quality issues in the future. The EPA is working with Ronan to reduce its treatment.

> I think we're the only municipality in the state of Montana that treats with ozone. The DEQ doesn't really understand it from what I've worked with them. We found it to be the better of all of them as far as treatment goes; I mean, the ozone gets everything.

Though the DEQ is pushing for Ronan to adopt UV treatment, the City is resisting (CRWS 2009).

Population and Water Use Projections

When asked about whether the current water delivery system and water rights were sufficient to meet demand until 2030, the Water Superintendent was pessimistic. He said that the town needs to add another well to meet fire flow requirements and demands brought by the largest users (e.g., the schools and the hospital). Regarding water rights, the Water Superintendent is not concerned about the system's current usage amounts. "We can flow max at about 1,200 gpm. We use about 250 or so on average. If I turn them on at max capacity, we're fine. Our big well, it's got a good aquifer. We never have any problems with that," he said.

That being said, Pablo has enough in water right amounts to provide for future growth until 2030 (Tables 95 and 96).

Table 95. Current and estimated average annual water use for Ronan based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Ronan (76 L)	1924 acft/yr*	371 acft/yr (19%)	430 acft/yr (22%)	492 acft/yr (26%)

*All rights are active.

Table 96. Current and estimated average annual water use for Ronan based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Ronan (76L)	887 acft/yr	371 acft/yr (42%)	430 acft/yr (48%)	492 acft/yr (55%)

Table 97. Current population and population projections for Ronan.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
2250	2607	2983

St. Ignatius – Community Profile

St. Ignatius is a town in Lake County. It is located within the Flathead Indian Reservation. The Town of St. Ignatius has three municipal water rights in sub-basin 76 L; two of the rights are for groundwater, while the other is a surface water right from Mission Creek. According to the Operator, the surface water right is gravity-fed, and while the infiltration gallery is currently out of use, the Town is planning to reinstall it. The Town relies on the two wells for its water supply, due to the higher water quality. “We don’t have to disinfect the groundwater,” the Operator said. The water from Mission Creek needs purification and chlorination to be considered potable. “There’s no reason for us to put in the chlorine system when we can do without,” the Operator said (TSIO 2009).

System Characteristics

The town built the majority of the infrastructure “probably in the [19]50s, maybe even the [19]40s,” according to the Operator. However, the wells are relatively newer, with one being built in 1961 and the other in 1981. “Our service lines are leaking, but our system basically, with the exception of about 1,000 feet of it, it’s all new PVC [pipes]. So if we’re losing any, it’s all in the service line connections going into the house,” the Operator said. The system is fully developed (including waste treatment capacities), and has 297 connections, all of which are metered. The Operator estimated that nearly 20 of those connections were commercial, with the rest being residential. Approximately 2.4 million gallons of water are distributed in an average month, with about 5% of the water being lost to leakage (TSIO 2009).

Along with reinstalling its infiltration gallery, the Town is planning to drill another well.

> What our problem is, is that both wells are on the South side of town and the tower’s on the North side of town. In between that, there’s a creek called Mission Creek, and the main service line goes under the creek and back up to the tower. Everything is pumped quite a way to the tower. Well, if something happens to our creek crossing, the whole North side of the town has no water at all. We were wanting to put a well on the North side, so even if it was small capacity, we’d have something.

The Town is hoping to drill the well in the next few years (TSIO 2009).

Conservation

For water conservation, St. Ignatius does not allow open hoses, and restricts lawn irrigation from 6:00 A.M. to 10:00 A.M., and again from 6:00 P.M. to 10:00 P.M. This is enforced year-round (TSIO 2009).

Economic Issues

While the Operator reads the customers’ meters every six months (in April and October), customers are built monthly. Customers are given 42,000 gallons in six months (or 7,000 gallons a month) before charged for consumption over that limit. There is a different rate structure for high water users depending on the size of the service. There are no lifeline rates for low-income residential consumers, but the tribe "usually ends up paying their bills" for those customers who belong to the CSKT (TSIO 2009).

The Operator holds concerns about the economy.

> If [the economy] stays like it's going now, the people around here...in the last year, I've noticed more people having a hard time paying their monthly water and sewer bills. So I don't know. If it keeps up for long enough, I don't know what's going to happen.

Future Issues

While the procuring of water rights for a new well is St. Ignatius' primary priority, storage is also of concern. The town currently has a storage tank with a 300,000-gallon capacity, but need to expand the storage capacity to twice that amount for fire protection. According to the Operator, St. Ignatius feels limited somewhat for future growth due to fire protection obligations. "Our district is quite large. The fire department is actually a rural-city combination," said the Operator (TSIO 2009).

House Bill 831 and CSKT

Regarding House Bill 831, the Operator said, "We won't know that until we get farther into drilling this well," he said. The most relevant policy issue affecting St. Ignatius is the ongoing compact negotiations between the CSKT and the State of Montana as St. Ignatius is on reservation land (TSIO 2009).

Population and Water Use Projections

St. Ignatius is not confident in being able to supply enough water in the next twenty years. "We won't have enough water or storage, either one," said the Operator. This is based on a forecast done by engineers from Great West (TSIO 2009). Perhaps this is an issue of place of use, as St. Ignatius is projected to have sufficient water right volumes (Table 98), even when considering active water rights (Table 99) and permitted water rights (Table 100).

Table 98. Current and estimated average annual water use for St. Ignatius based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
St. Ignatius (76 L)	1828 acft/yr	88 acft/yr (5%)	102 acft/yr (6%)	117 acft/yr (6%)

Table 99. Current and estimated average annual water use for St. Ignatius based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
St. Ignatius (76 L)	1104 acft/yr	88 acft/yr (8%)	102 acft/yr (9%)	117 acft/yr (11%)

Table 100. Current and estimated average annual water use for St. Ignatius based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
St. Ignatius (76 L)	564 acft/yr	88 acft/yr (16%)	102 acft/yr (18%)	117 acft/yr (21%)

Table 101. Current population and population projections for St. Ignatius.

Current Population Served (Est.)	2020 Projected Population	2030 Projected Population
890	1031	1180

CHAPTER 5. BASIN-WIDE RESULTS

Introduction

This chapter details the results of this study in a basin-wide perspective. The results address each of the research questions mentioned in Chapter 1, along with other latent themes that operators and managers discussed in the interviews. Those themes include: wastewater discharge, surface water versus groundwater use, fire flows, lifeline rates, changes in use/place, capacity, and others.

Research Question #1

Are the municipal water rights sufficient to meet current needs for municipalities in the Clark Fork River basin?

According to Table 94, the vast majority of communities' water rights are sufficient to meet current needs. Only Seeley Lake and Darby are currently using over 70% of their water right volumes.

Research Question #2

Will the municipal water rights be sufficient to meet future needs for municipalities in the Clark Fork River basin?

For many communities, this will be the case. Based on projected population growth rates, Seeley Lake and Darby will be the only ones approaching the total volume of their water rights. However, Darby's numbers are a little misleading as the town is in the process of purchasing a new water right and recently installed meters system-wide.

While many communities will have enough in volume for water rights, many communities will be in trouble if growth occurs in areas that are not under their current rights (see below). Operators and managers are also predicting issues with storage capacity, wastewater treatment, and water quality.

Research Question #3

If the water rights are not sufficient, what are some alternatives that municipalities could use to ensure that their water supplies will be?

Water conservation is one way in which communities could increase the efficiency of their water rights. Water conservation measures for communities in the Clark Fork River basin varied. The operators and managers listed metering connections, raising rates, restricting lawn watering, and improving infrastructure as the most popular ways to conserve water. However, quite a few communities did not have any conservation measures, and Kalispell and Evergreen have rate structures that encourage the use of more water.

The most common method of conserving water for communities in the Clark Fork River basin is lawn watering restrictions during the summer months, with eleven communities having this measure. Most of the communities that have lawn-watering restrictions (Butte, Lolo, Missoula, Pinesdale, Stevensville, Superior, Woods Bay, and Charlo) restrict watering to alternating days based on address number (even numbers water on even days, odd numbers on odd days). Many of those communities restrict watering lawns to certain hours of the day in order to limit irrigation during peak usage and/or evaporation hours.

Water operators and managers in several communities, including Columbia Falls, Superior, Coram, Hungry Horse, Darby, Somers, Lolo, Lakeside, Bigfork, and Whitefish mentioned that metering and/or rate structures were the most effective means of conservation. A strong example of this is the City of Whitefish. The Utility Operations Supervisor said,

> [W]hen the rates go up, people tend to conserve. If you look at our water usage from the 1980s, given the population of much less than half of what we have now, we haven't increased our water usage very much. In 1980, our average water consumption was about 1,000,000 gallons a day. Now it's 1.3 (million) and we've well over than doubled our population.

The General Manager of Somers' water system said,

> I've been in the business since 1981, and I've found that the best way to conserve water is to charge for it. People really pay attention when it hits their wallets. We discovered that in numerous systems in my life where they were on a flat rate system, and then we switched them to metered...They sit there, they're on flat rates, they let their sprinklers run all night; they don't care about their leaks. You throw them on a meter and your water pumping goes *way* down.

Operators from three communities (Kalispell, Pablo, and Thompson Falls) mentioned improvements to water system infrastructure as a chief mechanism to conserve water. The operators said that replacing old pipes and frequent leak detections helped to curb the waste of water. Only three communities are actively recycling their wastewater as effluent (Deer Lodge, Lakeside and Pablo).

One surprising result of the research is that there were five communities (Darby, Evergreen, Martin City, Ronan, and Plains) that do not and plan not to have any water conservation measures. Though it should be said that operators of those communities encouraged water conservation, none of them employ any official conservation measures.

Perhaps the most intriguing response to water conservation measures came in Hot Springs. In 2009, the Town implemented lawn-watering restrictions for the first time. The Mayor said,

> We put out the [policy] in May only to water during early morning, late afternoon, the evening. People with odd house numbers water on odd days, even on even days so there wasn't a big tax on the system and they pretty much all just quit watering. Well, they thought...I asked a couple different people and they thought that, 'we were getting short of water, so we just quit watering so there'd be plenty of water for everybody.' I said, 'No, we're just trying to plan ahead. We're just trying to protect the system.' So it kind of backfired a little, I guess.

Research Question #4

What is the level of understanding of water system managers of water resource issues and policies that could affect the ability of municipalities to expand their water rights in the future?

The Economy

When asked how the economy affects their water systems, community water system managers and operators had diverse responses. The operators/managers from Anaconda, Butte, Charlo, Coram, Deer Lodge, Lakeside, Lolo, Martin City, Philipsburg, Plains, Somers, Superior, Thompson Falls, and Woods Bay said that the economy has not or probably will not greatly affect their water systems. But, managers and operators from Columbia Falls, Hot Springs, Hungry Horse, Kalispell, Stevensville, and Whitefish said that the economy plays a major role on their water system. The Columbia Falls Director of Public Works said,

> Boy, you're dependent on what's going on in your community for sure, and we've been feeling it this year with the two main sources of economy, one being the Seapac aluminum plant over here, which basically went to complete closure this year, and then our Plum Creek lumber company…and a wood manufacturing company laid off about a third of their operation shut down, a plywood plant. When that occurred, we noticed almost immediately. We were talking about

> shutoffs, a number of the shutoffs we did this year were subject to home foreclosures and vacated homes. People leave. So when that occurs, of course your revenue source begins to deplete.

Most operators and managers mentioned a decline in the number of new connections and subdivisions due to the economic downturn, coupled with increases in bill delinquencies. Operators and managers in Butte, Evergreen, Hamilton, Kalispell, Missoula, and St. Ignatius said that they thought the economy has somewhat affected their systems.

House Bill 831

Operators and managers were asked about how the recent passage of House Bill 831 has affected their system. The majority were unfamiliar with the Bill, but said it didn't affect their community once the contents of the Bill were explained. Operators and managers in five communities (Hamilton, Kalispell, Missoula, Seeley Lake, and Somers) said that it has affected their water system in some way. "I would say the immediate impact we haven't felt. But, we know there's going to be some," said the City of Hamilton Operator. The Vice President/Assistant General Manager of Missoula's Mountain Water said that the biggest effect the bill has had is mitigating for new permits. The operators in Kalispell and Somers both said that it makes the process of obtaining new water rights more complicated.

The Seeley Lake Water District Manager said that it played a minor role in their search for new water rights in how the possible new rights might affect other users.

> We actually looked at putting in wells, and the amount of consumption drawdown that we would have on the aquifers, we had to prove what kind of damage we would do to someone else's water consumption. So we just stayed away from it.

> We just aborted that idea all together. The other thing is when we're going after looking for water rights, once again, when you're looking at well rights or water rights and how they affect other people, it has had a small effect on what we can actually look at, but on a normal daily basis up here, we don't see any effect as far as our water right, it hasn't affected us in any way, shape, or form.

Effects of Basin Closures

Though the *de facto* closure of much of the Clark Fork River basin makes the process of obtaining new water rights much more complicated, most of the operators and managers interviewed were unconcerned with how that might affect their systems. That being said, operators and managers from five communities described how it would affect their community. Those interviewed from Lakeside and Missoula's Mountain Water Company both said that it affects the developers wanting to add on to their water systems more than it affects their water system. The LCWSD General Manager said,

> We've got our water rights for our existing systems and I don't think they're going to take those away from us. I don't know, I don't think they would. What are they going to do, kick people out of town, and say they can't live there any more? I don't think so. I don't see those issues, I think those issues are all growth issues, and the growth is more of a developers' issue than a water operator's issue.

One community where both the *de facto* closure of the Clark Fork basin and the closure of the Upper Clark Fork River basin make a big difference is Seeley Lake. The Manager said that is impossible to apply for new water rights, and that the DNRC is not "giving out any water rights to anyone, especially on the surface water" in the Upper Clark Fork River basin.

On a related note, the Bigfork Manager said that the closure has affected the process of changing water rights' point of use. "[T]he rules are more stringent than they've used to be, and we imagine it's going to get worse...so you have to plan for years in advance if you want to expand your water rights," the Manager said.

CSKT Compact

The ongoing compact negotiations between the CSKT and the State of Montana could change the landscape of obtaining water rights in the Flathead River basin. There is also the potential for those negotiations to result in the curbing or negating of active water rights in the reservation. Naturally, the compact would affect only communities in the Flathead River basin.

The operators and managers in the Upper Flathead basin (including Bigfork, Evergreen, Kalispell, Lakeside, and Whitefish) were, in general, aware of the negotiations but were not terribly concerned about the results affecting their systems. In the Lower Flathead basin, where many of the towns are located within the Flathead Indian Reservation, operators and managers seemed to be paying more attention. When asked how the compact negotiations might affect Ronan, the Water Superintendent said,

> That concerns me a little bit. I'm not sure it's all going to play out, and we try to work very closely with the tribes here, and we have a good working relationship with them, so if something comes to play out, we're involved with the tribe. The City of Ronan would get along very well with them.

The Secretary/Treasurer for CLCWSD was concerned about how negotiations might affect the District's newest well. Most of the communities in the Flathead Indian Reservation have a significant portion of their population belonging to the Tribes, though it seems that those communities have a good working relationship with the Tribes and probably will be able to come to a solution that will work for both the communities and the Tribes.

Water Quality

As mentioned earlier in this chapter, a number of community water systems have switched from using surface water to using groundwater due to water quality issues. But, that is not the only way in which the issue of water quality affects community water systems in the Clark Fork River basin.

Though many systems in the Clark Fork River basin rely on filtration waivers to refrain from treating their water, some operators feel that will change. The Hungry Horse and Coram General Manager said,

> My systems are both hanging in there and not chlorinating, but you sure feel like that's going to be short-lived. They want groundwater disinfected. If you get so many bad tests, they're going to pinpoint you and say you need to. When that happens, I guess that's what we'll do. I'm all for that.

Darby has a unique problem with its water quality; the pH is slightly too acidic. This causes the water to corrode the copper pipes in homes, creating higher than acceptable levels of copper for consumption. The EPA directed the Town to compensate by adding orthophosphate to the water. "[B]ecause we have to add orthophosphate, we also have to chlorinate [our water]," said the TDDPW.

In addition to its water quantity shortages, Seeley Lake has also been directed by the EPA to improve its water quality.

> We did have a violation with the EPA about our chlorine and how it reacts with the organics in the water, so that's our second-biggest issue right now. For a small system, trying to stay on top of the new EPA regulations is very hard. So we're kind of facing that challenge right now.

Columbia Falls, Saint Ignatius, and Superior are not using their surface water rights due to water quality issues. Columbia Falls' surface water has too much organic content, St. Ignatius' surface water "needs purification" to be potable, while Superior's spring water is contaminated by antimony. In Pinesdale, the Operator has to compensate for high turbidity during the spring runoff months.

The City of Hamilton has water quality issues due to septic systems in the area. The Operator said,

> [T]here's a very high septic area of people not wanting to annex into the city because they don't want the extra taxes and whatever. They do have an influence because we've seen our nitrates go up in the last 15-20 years. Our nitrates are slowly rising. They're not to the point where it's not potable yet, but they are rising. That's not something you can just turn off during the road.

The city is working with Ravalli County to test groundwater with the hopes of perhaps forcing county residents to join Hamilton's sewer system to protect groundwater.

The water system in Ronan is unique in the basin in that it treats its water with ozone. The city is currently working with the EPA to reduce some of its treatment at its surface water plant. The Ronan Water Superintendent said,

> The DEQ doesn't really understand it from what I've worked with them. They're familiar with UV and chlorine and stuff, but they don't know a whole lot about ozone. We found it to be the better of all of them as far as treatment goes; I mean the ozone gets everything. We haven't had any issues with it. They've been trying to push us to UV and we've been fighting it. We're going to redo some stuff at our plant to keep our ozone.

Endangered Species Act

Butte, Columbia Falls, and Missoula were the only communities in which their operators mentioned that the Endangered Species Act affected their community. The Columbia Falls Public Works Director said that the community's wastewater treatment plant has had its discharges restricted to protect bull trout.

Mountain Water in Missoula has worked with state agencies to install a fish ladder for bull trout to get past its dam on Rattlesnake Creek.

While not in the Clark Fork River Basin, the BSBCMWT said that Butte-Silver Bow's withdrawals in the Big Hole River should not have any effect on the Arctic grayling.

> We're going to be a user on the Big Hole, one of hundreds of users, and the main effects are going to be on the ranching communities and especially in the Upper Big Hole. One little footnote to that is, the diversion structure existing, that has been there for close to 100 years, it may have been a barrier to my fish migrating and/or their spawning. It remains to be seen to this day when we put in the new diversion structure, that barrier won't be there any more; there will be fish passages that will allow all species of fish to go up and down the river at Divide, there. So, that may be a positive impact to the Arctic grayling, and whether they still get listed, I don't know. People want the Arctic grayling...listed are not going to give up on their quest no matter what every rancher and everybody does. As far as I'm concerned, those folks have bent over backwards to give up their water to accommodate the arctic grayling, and we've had some pretty dry years around here, and I can't give enough accolades to the ranchers up there, because to the detriment of their crops, they've given up their water, because they realize the effects of listing that grayling.

Other Themes

Wastewater Discharge

As mentioned before, three communities (Deer Lodge, Lakeside, and Pablo) discharge wastewater through irrigation. Deer Lodge is unable to discharge its wastewater into the Clark Fork due to strict TMDL limits, and therefore is planning to upgrade its aerated wastewater lagoon system or installing a mechanical plant with its irrigation system. Lakeside stores its wastewater during the winter and disperses it via irrigation in the summertime. Pablo owns approximately 100 acres of land, which is irrigated with effluent water. The Town leases the field to a rancher for haying.

Like Deer Lodge, Columbia Falls is under strict contaminant limits for its wastewater. Since the bull trout are native to the Flathead River and are listed as endangered, Columbia Falls has to be careful not to disrupt the fish's ecosystem.

Wastewater discharge limits some communities' capacity to grow. Somers has an inter-local agreement with Lakeside where Somers sends Lakeside its wastewater. But, according to the Somers General Manager, Lakeside will not increase Somers' wastewater discharge until Somers agrees to consolidation. Somers is considering the construction of its own wastewater plant to mitigate that problem. Lolo and Bigfork are both planning to install membrane filtration, which would allow the effluent to be of high enough quality for irrigating.

Surface Water versus Groundwater Use

One trend that emerged was that when given the choice, many communities preferred using their groundwater rights to surface rights. Twelve of the communities (Anaconda-Deer Lodge, Columbia Falls, Deer Lodge, Hot Springs, Kalispell, Missoula, Pinesdale, Plains, St. Ignatius, Somers, Superior, and Thompson Falls) have surface water rights that they choose not to use. Some of the reasons given were the expenses associated with treating surface water and the compromising of surface water quality due to turbidity, organic material, or metals. However, there were two communities (Philipsburg, Ronan) that preferred using their surface water rights to groundwater due to higher surface water quality. It is also important to note that ten communities (Part of

Butte-Silver Bow, Columbia Falls, Darby, Deer Lodge, Evergreen, Hot Springs, Lakeside, Lolo, Martin City, and Philipsburg) have filtration waivers, meaning that those communities do not have to treat their groundwater before public use. One can assume that would greatly reduce costs.

Fire Flows

One unexpected result of interviewing water system operators and managers across the Clark Fork River basin was the amount of concern they had upon reaching fire flow requirements. Many operators and managers said that meeting fire flow requirements was limiting their systems' capacity to grow.

A number of operators and managers, especially in the Lower Flathead River basin, said that they were being limited in growth due to storage requirements due to fire flows, including Hot Springs, Pablo, Ronan, St. Ignatius, and Somers. The Operator in Thompson Falls also said that the Town would have to expand its storage capacity to meet fire flow requirements.

Lifeline Rates

Many communities in the Clark Fork River basin (especially smaller communities) do not have lifeline rates for low-income residential consumers. However, the vast majority of communities are willing to work with customers who need to pay in smaller installments or at a later date.

Operators and managers whose communities are located within the Flathead Indian Reservation, including Hot Springs, Pablo, Ronan, and St. Ignatius, said that the CSKT has a program that assists tribal members for paying their water bills.

For communities outside the Reservation, only Missoula, Kalispell, Stevensville, and Whitefish have discounted rates for low-income residential consumers. Whitefish also has some private and church-based organizations that help people pay their utility bills on a short-term basis. Mountain Water in Missoula bases its low-income discount for qualified customers on whether they qualify for low-income energy, administrated through the Human Resource Council.

Changes in Use/Place

Interviewees in several communities mentioned the difficulties in observing the protocols of the DNRC in changing the place of use of their water rights. This is an important issue because while many communities have enough in water right volumes and flow rates, some are limited due to specific boundaries in which the water right may be used.

The CKPWDCE has been using the approach of filing for new water rights to meet growth instead of purchasing new rights, as Kalispell is located in the open Upper Flathead basin. He said that he obtains new rights this way due to the lack of water rights available for purchase.

> The bulk of significant, producing types of wells around here are agricultural in nature, and there's a restricted period of use, typically from April to October. That doesn't help you if you're a city. If you have a fantastic amount of water that's been produced and demonstrated out of the wells, then what you have to do is you have to go through a process of converting that agricultural use into an equivalent annual domestic use, and there are a series of reduction factors that apply to that, and you don't end up with much. There's very little incentive for us as an organization to spend too much money on buying existing water rights based upon the nominal amount. You might have one that might generate 3,000 acre-feet a year if you're using it only a certain time of the year, and it's for irrigation purposes and agricultural purposes. Once you have gone through the process of changing that over, you might be lucky to get 500 acre-feet per year to be used again during that same period, because you can't get a period of diversion changed.

Seven communities (Bigfork, Hamilton, Lolo, Missoula, Pinesdale, Somers, and Stevensville) are interested in changing the boundaries of use in their water rights. The SCWSDGM expressed the difficulties associated with that task.

> We're not actually asking for more water; we're trying to change the boundaries of our water rights. I guess the biggest thing that I see that has...it's kind of how it affected us, is that with the passing of that House Bill [831], DNRC is kind of all confused. They've got all of these new employees, and they don't seem to know which way they're going, which has caused our project delayed, because they're putting in new rules and new thoughts every time you turn around.

The City of Hamilton has employed attorney Ross Miller to explore ways in which the City would be able to keep all of its water rights, as the City has more rights than what they are currently using. "We want to bank them as a municipality, which we feel we have the right to do for future growth. In the past, that's how it was done, so I'm not sure why the DNRC is so hard on that now," the Operator said. Miller is also working with Mountain Water in Missoula to preserve Mountain Water's claimed water rights.

Capacity

Every water system operator and manager interviewed was asked whether his or her system's water rights, production capacity, or wastewater capacity was limiting growth. Some operators and managers said they were more limited by their storage capacity.

Four operators and managers said they were limited due to their communities' water supplies (Hamilton, Pablo, Ronan, and Seeley Lake). The Operator in Hamilton said that the City's water rights would limit its growth in 8 to 10 years. Pablo's Operator was also concerned about water rights. "I know that we still have room to grow, but the amount of growth we have potential for is limited by our water supply. I know we have to get more wells, more water rights, and another tank if we want to continue to grow," he said. The SLDWM also said that Seeley Lake was being limited by its water rights.

> We have a water right for 350 acre-feet of water, which we received that right in the '60s. Right now, we're pumping about 260 acre-feet per year, but we still have a third of our system to develop and about a third of our water right left. So if our system is completely developed out, we would be pushing our water right to the limit. We actually had to turn down subdivisions in the last year within our system because I can't rightfully give away the water right that someone else is entitled to a subdivision that's not actually part of our district right now. So it is limiting our growth. If I had a little more capacity on the water right, we could allow a couple subdivisions within reason, and those folks would actually help pay down some of the bond indebtedness that we have and things like that. It's kind of a two edged sword right now.

Operators and managers from Somers (as covered previously), Stevensville, and Whitefish said they were limited by their wastewater treatment capacity. In Stevensville, the Town is discussing the possibility of adding another cellar to its sewer lagoon to expand capacity.

As stated before, the operators in Thompson Falls and St. Ignatius will have to expand their storage capacity to meet fire flow requirements to be sufficient for years to come. The Operator in Lolo would like to expand its service boundaries. Out of all the communities, only the Operator in Pinesdale specifically mentioned that the community's capacity is being affected by drought. "There definitely are times where we gotta cut back on things to get the demand and stuff like that, so...pretty much every system kind of struggles with that," he said.

Opinions on Sufficiency

Operators and managers across the Clark Fork River basin had varied (and sometimes surprising) responses to the question of whether their current system and water rights would be sufficient until 2030. Thirteen operators and managers from Anaconda-Deer Lodge, Butte-Silver Bow, Charlo, Coram, Deer Lodge, Hot Springs, Hungry Horse, Lolo, Martin City, Somers, Superior, Thompson Falls and Whitefish all thought their systems would be sufficient. On the contrary, eight operators and managers Bigfork, Hamilton, Kalispell, Lakeside, Philipsburg, Ronan, Seeley Lake, and Stevensville were fairly positive that their system would not be sufficient to accommodate what the future holds. Operators and managers from Darby, Pablo, and Plains were somewhat confident that their system would be sufficient, but would not commit to a firm 'yes' on the question.

Those interviewed from Mountain Water in Missoula said yes and no. The Assistant GM/VP said,

> So much of the variables that you put into the model can impact it: where the growth occurs, can they connect to your existing system, like I said with transmission main, do they have to put in future wells, because right now we already have developers having to put in new wells, new infrastructure, so... I think we're comfortable that we can handle it until 2030, but what has to be done to accommodate the growth will depend on where the growth occurs. Big challenge, like I said, is the exempt wells aspect.

While each system has its own set of current and future problems, managers and operators are being proactive about solving them. State policy appears to be the one area where a number of managers and operators could benefit from information detailing how policy changes will affect their systems.

CHAPTER 6. DISCUSSION

Though municipalities face several problems in providing water to their residents, currently and in the future, there are a few problems that seem to be more significant than others. This chapter considers these in turn.

Sufficiency of Existing Water Rights

As mentioned before, Seeley Lake is the community with the most difficult water supply situation. The community is currently using 74% of its water rights, which is the second highest by percentage in the basin. Though Seeley Lake Water District has a water conservation program with an information campaign and the encouragement of using water-efficient plumbing parts, the system is undergoing a $4,000,000 infrastructure upgrade. Also, the EPA could force the District to install a $30,000,000 sewer system due to water quality violations. Considering that there are many lower income residents (according to the District Manager) and the water rates, with an average bill of $65.00/month, are comparably high to the rest of the communities in the Clark Fork River basin, it will be hard for the District to raise the rates to generate the revenue needed to perhaps buy a neighboring water right. The District’s situation is also hurt by the fact that the Upper Clark Fork basin is closed to new water rights, with no municipal exemption in the basin closure.

As demonstrated in Tables 102, 103, and 104, the vast majority of communities have enough regarding water right volumes. But, a few of the faster-growing communities (e.g., Hamilton, Missoula, and Stevensville) are running into the issue of changing the place of use. Instead of procuring new rights, these faster-growing communities will most likely do one of two things in the future:

(1) Continue to lobby the DNRC to allow them to change the place of use on their rights; and

(2) Continue to lobby the Montana Legislature to adopt a growing communities doctrine, freeing up the ability of municipalities to fully utilize their claimed rights.

Place of Use

As stated previously, some communities (such as Hamilton and Missoula) are trying to change the place of use on some of their water rights. Bill Schultz, the Missoula Regional Water Resources Manager of the DNRC, explained the DNRC's perspective.

> [W]hen somebody...a water company, a community water system or a municipality comes in and wants to change a water right, we at the DNRC do not take the adjudication work carte blanche; we do our own historic use analysis and prescribe some limitations. That's the source of contention between the Department and many water users, not just municipal users. But, it tends to hit municipal users because many...their water operators look at the gross numbers and think they're in good shape, and they look at change. When a few municipalities, including Missoula and Hamilton, say that changing the place of use of their water right was a big obstacle for future growth, that leads me to the question: Are they changing the place of use or *expanding* the place of use to include (outside properties)...because there's a huge difference. If you're expanding the place of use, that's a new permit. You can't change your way into growth. That's a new water use. For Hamilton, they've got these new areas they want to annex and add to the city. You just can't roll those into a permit or into a change, because when you change something, you gotta give something else up. You can't expand the water right and go into the change process.

Schultz continued, saying that the DNRC is currently in litigation with Mountain Water Company over the issue of historic use. "[T]he (DNRC) is required by statute and case law to consider the historic use of the water right, and municipalities don't get any special exemption," he said.

Mitigation/House Bill 831

When asked what some major issues for municipalities regarding water rights in future years, Schultz said that keeping their water rights in sync with their actual use and place of use, along with the need to acquire rights for mitigation. He believes that mitigating for year-round depletions with seasonal water rights such as irrigation will be a way for communities to ensure that they will have sufficient water right volumes (Schultz 2010). Operators and managers in closed sub-basins will need to understand when they must mitigate for adverse effect to be in compliance with House Bill 831 as their community acquires new water rights. This could also be a problem for other communities if the entire basin is closed. As stated previously in Chapter 4, many operators and managers do not currently have a clear understanding as to how House Bill 831 affects or could potentially affect their community.

Confederated Salish and Kootenai Tribes (CSKT)

Communities located on the Flathead Indian Reservation (Charlo, Hot Springs, Pablo, Polson and Ronan) are not allowed to obtain new water rights until the pending CSKT compact has been implemented. “Hopefully out of the compact will come a process for acquiring a water right, so I think it’d be a potential benefit to get the compacts settled so that they could...expand their water rights, get new additional water rights to accommodate proposed or pending growth,” said Schultz. He added, “[The negotiations] have a chance to potentially affect the legal availability” of municipal rights on the reservation (Schultz 2010). The Tribes are hoping to appropriate 128,000 acft of water stored in the Hungry Horse Reservoir for tribal use. Another goal of the compact for the CSKT is to have a priority date of time immemorial for its aboriginal and treaty based rights that cannot be lost through non-use (Azure 2010).

While operators in all communities in the Lower Flathead River basin were aware of the compact negotiations, there were several operators in the Upper Flathead who were unfamiliar. The negotiations also have a chance to curtail municipal rights upstream of the reservation as CSKT rights could be established as the most senior in the Flathead River basin. Therefore, all operators and managers in the Flathead River basin should be paying close attention to the ongoing negotiations.

Perceptions of the Approval of New Rights

A few system operators and managers were under the impression that the DNRC had stopped approving new rights because of the *de facto* closure of the Clark Fork River basin below the northern boundary of the Flathead Reservation. "The statement that what these managers said is not true at all," said Schultz. He listed a few examples where applications had been accepted recently by the DNRC, including a right for a community system in the Bitterroot (K&J Development) was issued (with a mitigation plan).

Potential Limitations to Claimed Rights

Though it's unlikely that the Montana Water Courts will significantly curtail municipal water rights by high volumes to the point of shortages (as the courts will curtail based upon determining how much water was used by communities in 1973), the possibility still exists that some communities will face a reduction in their rights. All communities studied in the Upper Clark Fork River basin

(Anaconda-Deer Lodge, Butte-Silver Bow, Deer Lodge, Philipsburg, and Seeley Lake) have unadjudicated water rights. While every community aside from Seeley Lake will most likely not face water shortages in the future, this should be cause for concern (Table 104).

Other communities such as Charlo, Hamilton, and Whitefish will also have to be wary of how the adjudication process affects their communities.

Climate Change

Climate change could also affect river flows, which could put a greater emphasis on water right holders observing their flow rate limits. With the trends of rising temperatures and an earlier melting of mountain snowpacks, the amount and timing of runoff could limit junior users, especially in the high-use low-flow period of late summer. Communities with lower priority date rights will have to be prepared for future lack of availability.

Water Demand Forecasting

Forecasting for future water demand might be a prudent solution for some of the communities in the basin. Larger communities (such as Missoula, Kalispell, and Butte) would probably have the greatest result from their forecasting, as forecasting for larger populations produces more accurate forecasts (see Chapter 2). With that being said, a few smaller communities (such as Hamilton) have hired consulting firms to produce forecasts. If communities plan to forecast, it would be in their best interest to build localized models that would take into account the community's unique demographic, income, and climate parameters. Another alternative would be using already developed models (such as the IWR-MAIN) and customizing the variables used. But, the IWR-MAIN model has been primarily used for cities much larger than those in the Clark Fork River basin (also in a different geographic region) and may not be accurate.

Water Conservation

Community systems have the potential of facing shortages in two ways: exceeding the total volume of their water rights, or exceeding the flow rates of individual rights. While no operator or manager mentioned exceeding flow rates as a concern, some mentioned exceeding available water right volumes in future years.

For those communities facing water shortages, perhaps the easiest solution to conserve water is to enact outdoor watering restrictions during the summer months. Aside from the costs assorted from enforcement, this is probably the cheapest option. Of course, many communities in the basin already have outdoor watering restrictions.

Another option is metering. Several operators and managers mentioned that metering customers' water use was the most effective means of conservation, coupled with a graduated rate structure based on use. This solution is more expensive (cost of meter installations), but could be cost-effective in the long run.

One solution not considered in the literature that might prove effective is creating an incentive program. If, for example, customers installed water-efficient plumbing fixtures (e.g., low-flow showerheads, low-flow toilets), they could get a price break on their bills.

Infrastructure upgrades are another option for communities. This might be one of the more expensive options, but if communities are losing significant amounts due to leakage, it may be a long-term option to consider.

Finally, communities could consider more aggressive ways to reuse water. This would be a great option for Seeley Lake if they received funds to build a sewer system. Effluent water could be used for park irrigation and industrial use, and considering that a lumber mill uses 25% of Seeley Lake's water, this could prove very beneficial. Again, this is not a cheap option for communities.

Communities will have to be proactive to ensure that the aforementioned problems will not become great burdens on their systems. This requires fully understanding future policy changes and communication with state regulatory agencies, such as the DNRC. What follows is the conclusion to this thesis.

CHAPTER 7. CONCLUSION

Though the problem of water shortages for growing communities in the Clark Fork River basin will not abate anytime soon, certain communities can employ measures to ensure that residents will have water for years to come. This thesis has addressed whether communities will have sufficient water right amounts for current and future uses, alternatives that communities could use to ensure sufficient water supplies, and the level of understanding of water system operators and managers regarding policies that could affect their systems. It has aimed to paint a basin-wide picture of the current and future statuses of community water systems.

Communities that are experiencing (or will experience) water shortages have many opportunities to conserve more water. Perhaps the most cost-effective method would be implementing specified hours for lawn watering on alternating days during the summer season. This will reduce stress on the system and help to curb the greatest source of water use. Communities can also improve infrastructure to curb leakage losses; many average nearly 40% in leakage losses due to old mains and pipes.

Though perhaps an unpopular solution in many communities, many operators suggested raising rates, installing meters, and basing rates on consumption as a way to conserve water. This would be done in an IBR fashion. As stated in Chapter One, many communities are undervaluing water. This is also true in communities in the Clark Fork River basin.

While many communities might benefit from the release of water from the Hungry Horse Reservoir, communities in the two closed sub-basins (Bitterroot and Upper Clark Fork) will most likely not. This is because those sub-basins are upstream of the confluence of the Flathead and Clark Fork Rivers and those sub-basins were closed due to the surface water being fully or over-appropriated. Other solutions need to be found for growing communities in those areas, most likely in the form of mitigation.

Water from Hungry Horse Reservoir will serve mostly to fulfill the downstream rights of Avista Utilities. Though it is unclear at this time if the water is needed, the release of water could act as a safeguard for future water development. The goal of the water leasing is to allow new municipal and industrial users, especially in the lower Flathead River basin, to appropriate new water rights, or to be used as a mechanism to secure junior water rights and to mitigate for calls being made by Avista on such water uses. It is yet to be determined when, or how much of, this water will be available for appropriation. The compact negotiations between the CSKT and the State of Montana will most likely have to be completed before the State can determine how much water it will need to lease from Hungry Horse Reservoir.

Implications of this Thesis for Water Resources Geography

According to Wescoat's (2003) analysis of water resources geography, the topic of applied problem-solving and policy recommendations is one of three main topics researched. This thesis addresses that topic in relation to the Clark Fork River basin, an area not specifically examined in this format. This thesis also addresses community-based water resource management, a topic not usually considered until recently by water resources geographers (Wescoat 2003).

Limitations of this Thesis

Perhaps the most significant limitation of this study is not being able to synthesize the water volumes needed with the places of use in certain growing communities. As said before, many communities will have sufficient water rights based on their growth rates, but that will only be if the growth occurs in areas where the water rights can be used. This study also did not include any climatic factors when considering how much water each community (or the basin) will need.

The sources of the data also limit this study. In some instances the demographic data were obtained from the water system operators themselves. As some community systems (e.g., Missoula and Butte) do not supply water to all residents within the city limits, only estimates can be made for the population served. Also, the estimates of population growth are based on either 2007 Census estimates or 2000 Census figures, which will be out of date once the 2010 Census figures are tallied. The population projections might be overly high, as the effect of the recent recession on future population growth is unknown.

Another demographic attribute not considered in this study is the projected increase in median age. An older population is projected, which could lead to an increase in townhomes and condominiums being built. The aging population would bring a different pattern of water use (e.g., increased lawn watering) than the current one.

As information from Alberton and Polson was unable to be obtained regarding current use, the projections on current and future water use are estimated. This damages the credibility of the projections.

The accuracy of the study would be improved if more specific population projections (i.e., by community instead of county) could be obtained. Some counties have communities with growth rates that probably vary wildly, and projections could be more accurately with this information. Economic factors, such as potential job growth and industrial use, were also not factored into the analysis.

Recommendations for Future Research

As western Montana continues to grow, there will be many more opportunities to study what the region needs in order for its communities to grow. One area that could be studied is the water rights market for communities in the closed sub-basins, particularly near Hamilton, Missoula, Stevensville, and Seeley Lake. Communities would be greatly helped if they would be able to find water rights that were reasonably priced.

Afterword

Water is and will continue to be humanity's most precious resource. How we will manage it in areas of limited availability, such as the Clark Fork River basin, is and will continue to be an issue for years to come. New demands will be made on water, and it is up to the West's residents to act prudently and intelligently to ensure enough water for the populace and nature.

No single solution offered here or elsewhere will alleviate every water quantity problem in the Clark Fork River basin. A multi-faceted, moderated approach will be needed to resolve current and future conflicts. Our legal system of prior appropriation will have to be amended as people in Montana use water in new and previously unanticipated ways and quantities.

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Appendix A. Current and estimated annual water use tables.

Table 102. Current and estimated average annual water use based on total volume available in water rights.

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
Seeley Lake (76 F)	350 acft/yr	260 acft/yr (74%)	296 acft/yr (85%)	335 acft/yr (96%)
Anaconda-Deer Lodge County (76 G)	12467 acft/yr	3867 acft/yr (31%)	3523 acft/yr (28%)	3519 acft/yr (28%)
Butte-Silver Bow County (41 D, 41 G, 76 G)	49712 acft/yr	8439 acft/yr (17%)	8273 acft/yr (17%)	8486 acft/yr (17%)
Deer Lodge (76 G)	8471 acft/yr	780 acft/yr (9%)	814 acft/yr (10%)	870 acft/yr (10%)
Philipsburg (76 GJ)	8464 acft/yr	848 acft/yr (10%)	895 acft/yr (11%)	942 acft/yr (11%)
Darby (76 H)	300 acft/yr	239 acft/yr (80%)	323 acft/yr (108%)	351 acft/yr (117%)
Hamilton (76 H)	5732 acft/yr	1584 acft/yr (28%)	1957 acft/yr (34%)	2328 acft/yr (41%)
Lolo (76 H)	3053 acft/yr	847 acft/yr (28%)	965 acft/yr (32%)	1091 acft/yr (41%)
Pinesdale (76 H)	313 acft/yr	92 acft/yr (29%)	114 acft/yr (36%)	135 acft/yr (43%)
Stevensville (76 H)	6515 acft/yr	849 acft/yr (13%)	1049 acft/yr (16%)	1248 acft/yr (19%)
Hungry Horse (76 J, 76 LJ)	2401 acft/yr	74 acft/yr (3%)	87 acft/yr (4%)	101 acft/yr (4%)
Bigfork (76 K)	1657 acft/yr	18 acft/yr (1%)	21 acft/yr (1%)	25 acft/yr (1%)
Charlo (76 L)	324 acft/yr	44 acft/yr (14%)	51 acft/yr (16%)	58 acft/yr (18%)
Pablo (76 L)	879 acft/yr	166 acft/yr (19%)	192 acft/yr (22%)	220 acft/yr (25%)
Ronan (76 L)	1924 acft/yr	371 acft/yr (19%)	430 acft/yr (22%)	492 acft/yr (26%)

Community (Sub-basin)	Total Volume of Water Rights	Average Annual Water Use, 2009 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume Available in Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume Available in Water Rights)
St. Ignatius (76L)	1828 acft/yr	88 acft/yr (5%)	102 acft/yr (6%)	117 acft/yr (6%)
Coram (76 LJ)	492 acft/yr	14 acft/yr (3%)	17 acft/yr (3%)	19 acft/yr (4%)
Evergreen (76 LJ)	6781 acft/yr	2114 acft/yr (31%)	2499 acft/yr (37%)	2892 acft/yr (43%)
Kalispell (76 LJ)	19857 acft/yr	4419 acft/yr (22%)	5225 acft/yr (26%)	6045 acft/yr (30%)
Lakeside (76 LJ)	424 acft/yr	129 acft/yr (30%)	153 acft/yr (36%)	177 acft/yr (42%)
Martin City (76 LJ)	689 acft/yr	34 acft/yr (5%)	40 acft/yr (6%)	46 acft/yr (7%)
Somers (76 LJ)	224 acft/yr	55 acft/yr (25%)	65 acft/yr (29%)	75 acft/yr (34%)
Whitefish (76 LJ)	13557 acft/yr	1455 acft/yr (11%)	1720 acft/yr (13%)	1990 acft/yr (15%)
Woods Bay (76 LJ)	403 acft/yr	22 acft/yr (5%)	25 acft/yr (6%)	29 acft/yr (7%)
Missoula (76 H, 76 M)	140609 acft/yr	17362 acft/yr (12%)	19783 acft/yr (14%)	22374 acft/yr (16%)
Superior (76 M)	6169 acft/yr	129 acft/yr (2%)	138 acft/yr (2%)	150 acft/yr (2%)
Plains (76 N)	1034 acft/yr	108 acft/yr (10%)	120 acft/yr (12%)	134 acft/yr (13%)
Thompson Falls (76 N)	3626 acft/yr	7 acft/yr (0.2%)	8 acft/yr (0.2%)	9 acft/yr (0.2%)

Table 103. Current and estimated average annual water use based on total volume in active water rights.

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Seeley Lake (76 F)	350 acft/yr	260 acft/yr (74%)	296 acft/yr (85%)	335 acft/yr (96%)
Anaconda-Deer Lodge County (76 G)	6934 acft/yr	3867 acft/yr (56%)	3523 acft/yr (51%)	3519 acft/yr (51%)
Butte-Silver Bow County (41 D, 41 G, 76 G)	49707 acft/yr	8439 acft/yr (17%)	8273 acft/yr (17%)	8486 acft/yr (17%)
Deer Lodge (76 G)	5087 acft/yr	780 acft/yr (15%)	814 acft/yr (16%)	870 acft/yr (17%)
Philipsburg (76 GJ)	8464 acft/yr	848 acft/yr (10%)	895 acft/yr (11%)	942 acft/yr (11%)
Darby (76 H)	300 acft/yr	239 acft/yr (80%)	323 acft/yr (108%)	351 acft/yr (117%)
Hamilton (76 H)	3791 acft/yr	1584 acft/yr (42%)	1957 acft/yr (52%)	2328 acft/yr (61%)
Lolo (76 H)	3053 acft/yr	847 acft/yr (28%)	965 acft/yr (32%)	1091 acft/yr (41%)
Pinesdale (76 H)	313 acft/yr	92 acft/yr (29%)	114 acft/yr (36%)	135 acft/yr (43%)
Stevensville (76 H)	6515 acft/yr	849 acft/yr (13%)	1049 acft/yr (16%)	1248 acft/yr (19%)
Hungry Horse (76 J, 76 LJ)	1402 acft/yr	74 acft/yr (5%)	87 acft/yr (6%)	101 acft/yr (7%)
Bigfork (76 K)	1148 acft/yr	18 acft/yr (2%)	21 acft/yr (2%)	25 acft/yr (2%)
Charlo (76 L)	324 acft/yr	44 acft/yr (14%)	51 acft/yr (16%)	58 acft/yr (18%)
Pablo (76 L)	879 acft/yr	166 acft/yr (19%)	192 acft/yr (22%)	220 acft/yr (25%)
Ronan (76 L)	1924 acft/yr	371 acft/yr (19%)	430 acft/yr (22%)	492 acft/yr (26%)
St. Ignatius (76L)	1104 acft/yr	88 acft/yr (8%)	102 acft/yr (9%)	117 acft/yr (11%)

Community (Sub-basin)	Total Volume of Active Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Active Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Active Water Rights)
Coram (76 LJ)	275 acft/yr	14 acft/yr (5%)	17 acft/yr (6%)	19 acft/y (7%)
Evergreen (76 LJ)	6781 acft/yr	2114 acft/yr (31%)	2499 acft/yr (37%)	2892 acft/yr (43%)
Kalispell (76 LJ)	18757 acft/yr	4419 acft/yr (24%)	5225 acft/yr (28%)	6045 acft/yr (32%)
Lakeside (76 LJ)	424 acft/yr	129 acft/yr (30%)	153 acft/yr (36%)	177 acft/yr (42%)
Martin City (76 LJ)	689 acft/yr	34 acft/yr (5%)	40 acft/yr (6%)	46 acft/yr (7%)
Somers (76 LJ)	152 acft/yr	55 acft/yr (36%)	65 acft/yr (43%)	75 acft/yr (49%)
Whitefish (76 LJ)	13557 acft/yr	1455 acft/yr (11%)	1720 acft/yr (13%)	1990 acft/yr (15%)
Woods Bay (76 LJ)	403 acft/yr	22 acft/yr (5%)	25 acft/yr (6%)	29 acft/yr (7%)
Missoula (76 H, 76 M)	137985 acft/yr	17362 acft/yr (13%)	19783 acft/yr (14%)	22374 acft/yr (16%)
Superior (76 M)	3867 acft/yr	129 acft/yr (3%)	138 acft/yr (4%)	150 acft/yr (4%)
Plains (76 N)	779 acft/yr	108 acft/yr (14%)	120 acft/yr (15%)	134 acft/yr (17%)
Thompson Falls (76 N)	1938 acft/yr	7 acft/yr (0.4%)	8 acft/yr (0.4%)	9 acft/yr (0.5%)

Table 104. Current and estimated average annual water use based on total volume in permitted water rights.

Community (Sub-basin)	Total Volume of Permitted Water Rights	Average Annual Water Use, 2009 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2020 (% of Total Volume of Permitted Water Rights)	Estimated Annual Water Use, 2030 (% of Total Volume of Permitted Water Rights)
Anaconda-Deer Lodge County (76 G)	1935 acft/yr	3867 acft/yr (200%)	3523 acft/yr (182%)	3519 acft/yr (182%)
Butte-Silver Bow County (41 D, 41 G, 76 G)	0 acft/yr	8439 acft/yr (NA%)	8273 acft/yr (NA%)	8486 acft/yr (NA%)
Deer Lodge (76 G)	152.46 acft/yr	780 acft/yr (512%)	814 acft/yr (534%)	870 acft/yr (571%)
Philipsburg (76 GJ)	241.95 acft/yr	848 acft/yr (350%)	895 acft/yr (370%)	942 acft/yr (389%)
Seeley Lake (76 F)	0 acft/yr	260 acft/yr (NA%)	296 acft/yr (NA%)	335 acft/yr (NA%)
Darby (76 H)	300 acft/yr	239 acft/yr (80%)	323 acft/yr (108%)	351 acft/yr (117%)
Hamilton (76H)	851.5 acft/yr	1584 acft/yr (186%)	1957 acft/yr (230%)	2328 acft/yr (273%)
Lolo (76H)	2866 acft/yr	847 acft/yr (30%)	965 acft/yr (34%)	1091 acft/yr (38%)
Pinesdale (76 H)	0 acft/yr	92 acft/yr (NA%)	114 acft/yr (NA%)	135 acft/yr (NA%)
Stevensville (76 H)	2129 acft/yr	849 acft/yr (28%)	1049 acft/yr (49%)	1248 acft/yr (59%)
Missoula (76 H, 76 M)	43500 acft/yr	17362 acft/yr (40%)	19783 acft/yr (45%)	22374 acft/yr (51%)
Plains (76 N)	263 acft/yr	108 acft/yr (41%)	120 acft/yr (46%)	134 acft/yr (51%)
Superior (76 M)	645 acft/yr	129 acft/yr (20%)	138 acft/yr (21%)	150 acft/yr (23%)
Thompson Falls (76 N)	1871 acft/yr	7 acft/yr (0.4%)	8 acft/yr (0.4%)	9 acft/yr (0.5%)
Bigfork (76 K)	1148 acft/yr	18 acft/yr (2%)	21 acft/yr (2%)	25 acft/yr (2%)
Columbia Falls (76 LJ)	3189 acft/yr	414 acft/yr (13%)	489 acft/yr (15%)	566 acft/yr (18%)
Coram (76 LJ)	275 acft/yr	14 acft/yr (5%)	17 acft/yr (6%)	19 acft/yr (7%)
Ronan (76L)	887 acft/yr	371 acft/yr (42%)	430 acft/yr (48%)	492 acft/yr (55%)
St. Ignatius (76 L)	564 acft/yr	88 acft/yr (16%)	102 acft/yr (18%)	117 acft/yr (21%)

Appendix B. Assessment of Municipal Water Rights in Montana's Clark Fork River Basin – Interview Guide

Informed Verbal Consent Statement

Subject: (Position title) ________________________________ Community Water System *Administrator* or *Operator* (Circle one or both as necessary)

Basic Information

Water Rights (Claim No., Priority Date, Flow Rate, Volume):

____

____

____

____

____

____

____

____

How are each of these water rights used?

How does the water from your water rights enter your system?

Are you using an infiltration gallery?

Are any of these water rights favored for drinking water? Why?

Do you favor using your surface water over using your groundwater rights and vice versa? Explain.

Communities served? Which?

Population(s) & Source of info:

Age of system/various parts of infrastructure:

Connections/Distribution

Is your water system fully developed (i.e., pumping/diversion/waste treatment capacities)?

Connections: How many are currently in use?

What percentage of your system is metered?

Average Monthly Water distributed (volume, avg. rate, monthly max, etc.)

Leakage losses (avg/mo.)

What is the number of different types of users/connections:

Residential:

Commercial:

Industrial:

Capacity:

At what capacity (i.e., percentage) is your system normally used?

Is capacity affected by drought or low water situations or seasonality?

Can you describe the relationship between water supply and wastewater treatment in your community?

What are the operation and maintenance costs for your system (per month or per year)?

Future issues

What (if any) plans do you currently have to expand your rights?

New appropriations?

Purchasing rights?

Condemnation?

Reuse of effluent water or other?

Conservation measures?

What is done in your community to conserve water?

Do you employ and enforce any water conservation measures (i.e., residential lawn watering, other outdoor water uses)?

If so, how and under what conditions (what time of year)?

Do you feel that your water right amounts are limiting your capacity to grow?

Economic Issues

How often do you bill your customers?

What information is included on the bill in terms of consumption?

What rate structures exist for different types of users?

Do you employ lifeline rates for low-income residential consumers?

Are there any problems with people being able to pay their water bills?

If so, what percentage cannot pay?

Are there any programs in place offering assistance with paying water bills?

If so, how does the program work?

How often are disconnects employed because of unpaid bills?

Major State Water Issues

How (if at all) is your community affected by HB 831?

What do you see as some major issues for your water system in future years?

1. How does the *de facto* closure (i.e., TRLC case) of the Clark Fork River basin affect you in case you want to expand your water rights?
2. CSKT compact (and Cooperative Mgmt. Entity, Indigenous rights, Environmental flows, etc.).
3. Water Quality.
4. ESA Listings.
5. Economy.
6. Wastewater capacity - any linkage with water supply?

Do you consider your system currently sufficient to supply water users until the year 2030?

Have you engaged in any form of formal water demand forecasting, and if so, what are the results?

Can you provide me with information that details your pricing structure?