B Appendix B - Backgrounder Reports

SIMILKAMEEN RIVER WATERSHED
Backgrounder #1 Overview of the Watershed

Background – Similkameen Watershed

The Similkameen River is a tributary of the Okanogan River, joining it just south of the Canada-United States border at Oroville, Washington. The watershed is part of the traditional territory of the Sylix (Okanagan) Nation. Most of the Similkameen River watershed is located within Canada, although both a portion of the headwaters and the lower watershed are in the U.S.

The People

Communities and Population

Local communities include Princeton, Keremeos, Upper Similkameen Indian Band, Lower Similkameen Indian Band, Hedley, Coalmont, Tulameen, Cawston, Apex, Bankeir and Olalla. The watershed also includes six irrigation and improvement districts: Cawston Irrigation District, Fairview Heights Irrigation District, Keremeos Irrigation District, Similkameen Improvement District, Hedley Improvement District, and Allison Lake Improvement District.

The 2006 census (Province of British Columbia 2011) indicated that about 9,200 people lived in the Similkameen River watershed, with about 5,600 living in the population centres of Princeton, Hedley, Keremeos, Cawston, and Olalla. Between 2001 and 2006, the population of the Similkameen Valley increased 5.9%, and from 2006 to 2011 the population decreased by 2.3%. The current population is 10,600 persons.

Land Use and Economic Development

Agriculture is a mainstay of the Similkameen Valley economy. Cattle-ranching is the largest agricultural activity based on the area of crop land, and about 83% of the land in RDOS Areas B, G and H is in alfalfa, alfalfa mixtures or hay. Fruit growing, including apples, cherries, grapes, and peaches, is the next most significant activity. Average farm sizes increase moving from east to west from 82 ha in Area B, to 143 ha in Area G, and 276 ha in Area H.

Other land use activities in the watershed include forestry, range, and mining. The area surrounding Princeton is included in the Cascades Forest District, while Keremeos and area is in the Okanagan Shuswap Forest District. Additionally, in the vicinity of Princeton, Hedley, and other local areas, most Crown land is under mining claim or licence tenure.

Highway 3 passes through the watershed from northwest to southeast, and Highway 5A goes north-south through the western part.

The Land

Geology, Physiography and Soils

The Similkameen River watershed is underlain by bedrock from several geologic ages. The bedrock types are generally resistant to water erosion, form uplands and mountain ranges, and where strongly fractured, may contain bedrock aquifers. The Hedley gold mining district and coal deposits in the Princeton and Tulameen areas were previously mined but have not been active since about 1992 or before. The former Similco open pit copper mine and concentrator facility south of Princeton was re-opened as the Copper Mountain mine in 2011.

The Similkameen River watershed is included in the Thompson Plateau physiographic area, a gently undulating upland of low relief, with some hills of more resistant bedrock. This upland is a very old erosion surface cut into by the major rivers. The Similkameen headwaters are in the Hozameen Range of the Cascade Mountains, in Manning Provincial Park, southwest of Princeton. The Okanagan Range of the Cascade Mountains is located along the U.S. border. The landscape consists of wide, flat-floored valleys, and rugged mountain ranges and plateau areas with dry land vegetation and forest.

The watershed was glaciated with later ice stagnation and melting about 10,000 years before present, leaving glacially-shaped bedrock features, glacial till and meltwater channels. There are three types of deposits that make up the modern agricultural and forest soils in the Similkameen River watershed:

1. Glacial till that was deposited from glaciers on the overlying bedrock;
2. Loose sediment deposits at the bottom of hill slopes from rainwash and the continuous downslope creep of sediments; and
3. Sands and gravels that were deposited by meltwater streams.

Most soils developed under a grassland-forest vegetation type, and dry climatic conditions.

Hydrology and Water Quality

The Similkameen River is about 196 km long and its watershed includes about 7,600 km^2 in B.C. The hydrologic regime of the Similkameen River is dominated by snowmelt processes, and there is a large variation between annual peak flows and low flows. The maximum flows typically occur in June after spring snowmelt and the low flows typically occur in September. There is significant demand for water from mid-July through to mid-October when the flows are naturally low. See **Backgrounder #3** for more information on hydrology and water supply.

The water quality within the Similkameen Valley is rated as “good” – meaning that water quality measurements rarely exceeded water quality guidelines. **Backgrounder #4** provides more information on water quality information in the Similkameen River watershed.

Groundwater

Groundwater is the primary or secondary source of water for numerous homes, farms, ranches, and businesses in the Similkameen Valley. Two aquifers within the Similkameen River watershed have been mapped by the B.C. Ministry of Environment. Aquifer #259 is located between the U.S.

border and Princeton. It is a deposit of sands and gravels, which makes it highly vulnerable to contamination from surface pollution. A much smaller aquifer (#258) is located near Richter Pass and has a much lower vulnerability from surface contamination. Many other aquifers exist in the Similkameen Valley, but have not been mapped. More information about groundwater and its interaction with surface water can be found in **Backgrounder #8.**

The Climate

A summary of climate normals collected at climate stations in the Similkameen watershed is provided below. Climate becomes cooler and moister moving upstream.

Summary of climate normals (1971-2000) at selected Similkameen watershed sites.

Station name	Keremeos	Princeton Airport	Similkameen Mine
Elevation above sea level	435 m	701 m	940 m
January daily Average temperature (°C)	-2.2	-6.2	-6.1
July daily Average temperature (°C)	20.9	17.7	16.9
Annual average precipitation (mm)	323.1	356.3	453.7
Days with max. temperature >20°C	134.1	106.5	86
Annual average rainfall (mm)	256.3	239.2	284.6
Annual average snowfall (mm water equivalent)	66.8	146.8	169.1
Extreme daily rainfall (mm)	45.8	121.9	31
Extreme daily snowfall (mm water equivalent)	36.8	57.2	43

The Similkameen River watershed is located in the rain shadow of the Coast and Cascade mountains. The western section of the watershed is cooler and moister while the southeastern section is warmer and drier. The climate across the entire watershed varies, but it is generally characterized by warm summers and cooler winters with a relatively even distribution of precipitation throughout the year. Approximately 20-40% of the total annual precipitation of 340 mm falls as snow. More information on climate and climate change in the Similkameen Valley can be found in **Backgrounder #6**.

Plants, Animals and Fish

Ecosystems

The Similkameen River watershed is included in the Southern Interior Ecoprovince, within these biogeoclimatic zones: Bunchgrass, Ponderosa Pine, Interior Douglas Fir on the valley floors, and Montane Spruce and Englemann Spruce-Subalpine Fir at the higher elevations, and Alpine Tundra at the mountain peaks.

While about one-third of the cottonwood-dogwood floodplain vegetation area along various streams has been lost, as a whole, there are many riparian deciduous forests, areas of dense deciduous brush, and riparian meadows and wetlands. The higher elevation mountains and deep tributary valleys have sensitive sagebrush grasslands, steep and rugged slopes, and old growth Ponderosa Pine and Interior Douglas Fir forests.

An inventory of sensitive ecosystems has been completed for the lower Similkameen and rural Princeton areas. The fragile ecosystems that are generally unmodified and ecologically fragile, possess high wildlife values, and may be rated as “at risk” according to provincial criteria. The sensitive ecosystems most affected by human development include: grasslands, low elevation forests, wetlands and riparian areas. Many wildlife species of endangered, threatened or special concern status are present in the Similkameen River watershed. Intact areas of wilderness support grizzly and black bear, California bighorn sheep and mountain goat. The valley bottom riparian ecosystems stretch along extensive areas of low elevation valley and form corridors.

Since settlement, there has been a long history of ranching, commercial orchard and field crop production, and recently vineyard/winery and rural home developments with the attendant vegetation, species and stream changes.

The Similkameen River has not had much modification by dikes, dams, bank protection and channelization (compared to the Okanagan River, for example), and the river morphology is still primarily affected by natural flow and meander erosion action.

Fisheries Resources

The Similkameen River and its tributaries provide about 500 km of fish-supporting habitat. There are 17 different types of fish found in the Similkameen Basin, some occur naturally, while others have been introduced. There are no anadromous fish in the Canadian portion of the Similkameen River due to Enloe Dam and Coyote Falls acting as a fish barrier. The Similkameen River was historically stocked with surplus hatchery fish (i.e. rainbow and brown trout); however, this process had adverse effects on wild fish populations and is now limited to areas with high fishing pressure. In general, the Similkameen River watershed has a small fish population density.

The Similkameen River watershed generally has low levels of phosphorous and nitrogen, and cool temperatures, which limits the growth rate of fish in the area. Low water levels in the fall and the formation of anchor ice also inhibits fish growth and survival rates. The Similkameen River has good side-channel habitat that is suitable for fish spawning, rearing, and reproduction. In addition, tributaries along the Similkameen River from Hedley to the international border play a key role in spawning and juvenile life stages. More information regarding fish and fish habitats can be found in **Backgrounder #5**.

Lakes and Wetlands

There are an estimated 153 lakes in the Similkameen River watershed, most of which are small, with maximum depths ranging from 4 to 74 metres. Lakes located at lower elevations within open aspen-ponderosa pine parkland are productive lakes that support fisheries. A majority of lakes

and wetlands in the Similkameen Valley are located in the high mountain plateau areas. These high elevation lakes are low in productivity and are associated with slow fish growth. Lakes are mainly used for recreation and angling; 68 lakes in the Similkameen Valley are stocked with rainbow and brown trout for sport-fishing. Only 29 lakes (of the 68 managed lakes) in the Similkameen naturally support high fish production.

There are four main wetland ecosystems in the Similkameen area: marshes, swamps, wet meadows, and shallow open water. Wetland and riparian habitat in the South Okanagan has been reduced to <4% due to development pressures and flood control measures.

Where to Get More Information

There is a great deal of information about the Similkameen River because it is an international river and a tributary of the Columbia River; the most managed river in North America. Two key reports have summarized all of the information available on the Similkameen River. In addition, the RDOS is developing a database that will have a significant amount of information pertaining to the Similkameen Valley water resources that will be available to the public.

Glorioso, Moss & Associates. 2010. Strategy for a Sustainable Similkameen Valley (2011-2020). Prepared for Similkameen Valley Planning Society. http://www.rdosmaps.bc.ca/min_bylaws/contract_reports/CorpBd/2010/13July8/SSS_Final_Report_041510.pdf

Summit Environmental Consultants Inc. 2011. Similkameen water management plan: Part 1 – scoping study. Prepared for the Similkameen Valley Planning Society. Draft.

Summit Environmental Consultants Inc. 2013. Similkameen River watershed plan: Phase 1 report. Prepared for the Regional District of Okanagan Similkameen.

SIMILKAMEEN RIVER WATERSHED
Backgrounder #2 Summary of Available Technical Information

Background – Available Technical Information

The Similkameen River is an international river and a tributary of the Columbia River – one of the most managed rivers in North America. Because of this, the Similkameen River has been studied extensively by various Canadian and U.S. agencies. Much information is readily available regarding the water resources of the Similkameen River watershed, including a number of on-going studies and above-average amounts of hydrometric and water quality data. Most of the information is readily available and searchable in government and other on-line databases. The information now resides in the new Similkameen Water Information Database (SWID).

There is a significant amount of water-related information available for the Similkameen because it is an international river and a tributary of the Columbia River.

Summary of Available Technical Information

Streamflow (Water Quantity)

The ongoing monitoring conducted by the Water Survey of Canada (WSC) in the Similkameen River watershed has produced a good amount of streamflow data and interpretive reports. The WSC maintains 12 active hydrometric monitoring stations in the Similkameen River watershed: four stations on the mainstem of the Similkameen River, two on the Tulameen River, and one on each major tributary (Ashnola and Pasayten rivers as well as Ewart, Hedley, Keremeos, and Siwash creeks), providing excellent spatial coverage of the watershed. With the exception of Ewart Creek, all of the active stations have more than 35 years of data and four have more than 60 years of data. Historically, 62 hydrometric monitoring stations operated in the Similkameen River watershed; the discontinued stations have more than 20 years of data that can support hydrological analyses.

Water Demand and Use

In addition to water use information provided by water suppliers, the Agricultural Water Demand Model developed by the B.C. Ministry of Agriculture and Agriculture and Agri-Foods Canada provides estimates of agriculture (including crop irrigation and livestock watering) water demands (by surface and groundwater) on a property-by-property or watershed basis for the Canadian portion of Similkameen River watershed.

Water Quality

Water quality data coverage for the Similkameen River watershed is better than average and includes two Canada-B.C. long-term monitoring sites, located at Princeton and near the U.S. border. There is a very good set of water quality data for the mainstem of the Similkameen River and for Hedley Creek, and a reasonable amount of information for the Tulameen River and Ashnola

Creek, which have been monitored in relation to mining and municipal wastewater discharges. However, relatively little data exists for other tributary streams and lakes.

Groundwater

There are six groundwater observations wells in the watershed and groundwater protection plans have been initiated or completed for Keremeos, Princeton, and Olalla. Two active groundwater level observation wells are monitored by the B.C. government with "real time" data – in Cawston (#203) and in Keremeos (#74). Four other observation wells (Princeton, two in Keremeos, and Mt Kobau near Cawston) are no longer actively monitored.

Climate and Climate Change

The current climate and snowpack monitoring network as well as discontinued stations have provided a relatively good understanding of the climate throughout (and adjacent to) the Similkameen River watershed. However, climate monitoring in the upper elevations is lacking; there is considerable bias in the lower elevations where most development is concentrated. Currently, 10 active climate stations and six snow survey stations are in operation in the Similkameen River watershed. In addition, recent climate change modeling by the University of Victoria's Pacific Climate Impacts Consortium, the University of Washington's Climate Impacts Group, and Agriculture and Agri-Foods Canada is directly applicable to the Similkameen River watershed.

Lakes, Wetlands and Riparian Areas

A good set of information on fish stocking, fish populations, and fish habitat for key angling lakes in the Similkameen Valley is available; however, limnological data (e.g. water quality, plankton) on these lakes are limited. A small amount of information about wetlands and riparian areas is found in the habitat atlas and sensitive ecosystem inventory, but this information focusses on the warmer and drier parts of the watershed. Information on higher elevations areas in the Similkameen watershed is lacking.

Fish, Fish Habitat and Instream Flows

There are many records pertaining to fish and fish habitat in the Similkameen, including general correspondence, fish permits, fish and fish habitat investigations, and technical and overview reports. Collectively, these documents provide an important source of information on fish and fish habitat. Detailed analyses of in-stream flow needs for fish have not been completed for the Similkameen River.

Species at Risk

There is a reasonable amount of information regarding the evaluation of important habitats to species at risk, habitat inventory and ecosystem mapping, and species at risk profiles for the South Okanagan and Lower Similkameen valleys. Detailed sensitive ecosystem and species at risk information is available for Area H (Rural Princeton). Inventories and mapping for the lower part of the watershed have typically been completed as part of assessments focussed on the South Okanagan; a single document that addresses the Similkameen watershed in its entirety is not available.

Traditional Use

Traditional ecological information related to water resources and fish is in the public domain, but little is specifically about the Similkameen River watershed. The Lower and Upper Similkameen Indian Bands hold a great deal of information on traditional knowledge and values gained through thousands of years in the watershed.

Land Use and Economic Development

Watershed planning documents include general B.C., local government and First Nations guides as well as primers and toolkits relating to water conservation and management. A few Similkameen-specific planning documents related to groundwater and agriculture water demand provide background information for specific water issues. Many of the governance documents are focussed on water reform because B.C. is currently undergoing a process to modernise the *Water Act*.

Planning for Flood and Drought

Ministry of Environment has published floodplain maps for the Keremeos-Cawston and Princeton areas. These maps were last updated in 1995. Floodplain mapping has not been completed outside of these areas. There has been high-level drought management planning for the B.C. Southern Interior, but a watershed-specific drought management plan is not in place for the Similkameen Valley.

International Waters and Treaty Obligations

A variety of documents have been identified that address international waters and treaties. However, few have direct application to the Similkameen River. The International Osoyoos Lake Board of Control Order of Approval under the International Boundary Waters Treaty, primarily

guides management Osoyoos Lake but considers how the Similkameen River influences Osoyoos Lake management. Although the Similkameen River is generally included the Columbia River Treaty, there are no specific conditions with respect to how it is managed. Documents related to trans-boundary management of water in the Columbia and Similkameen include the Columbia River Treaty, the Pacific Salmon Treaty, *and International Rivers Improvement Act*.

The Columbia River Treaty has no specified expiration date. However, either Canada or the United States can unilaterally terminate the Columbia River Treaty any time after 16 September 2024, provided written notice is filed at least 10 years in advance. The governments of B.C., Canada, and the U.S. will therefore complete a review of the Treaty in 2014 in order to decide whether it should be renewed in 2014.

Data Gaps

Despite the relative wealth of information available on the Similkameen River watershed, a number of technical and socio-economic data gaps have been identified that could constrain water resource decision-making and land use planning. The highest priority gaps include assessment of how actual water use compares to natural flows and the licenced total allocation, groundwater-surface water interaction, status of wetlands and riparian areas, assessment of water quality status and trends, and an up-to-date summary of the state of fisheries resources and habitat in the Similkameen Watershed.

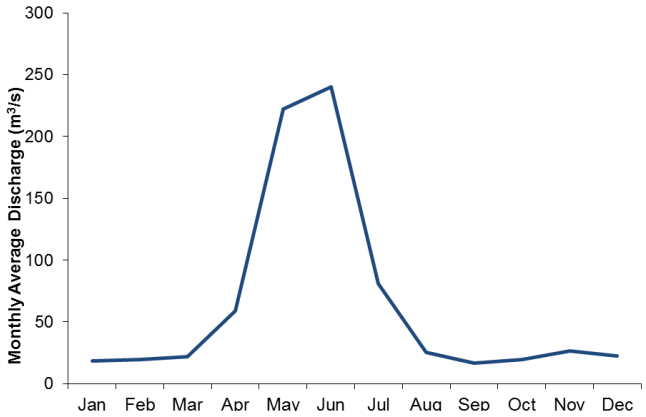
SIMILKAMEEN RIVER WATERSHED
Backgrounder #3 Water Supply

Background – Water Supply

Everyone needs water. Residents and businesses in the Similkameen River watershed use water for irrigation, domestic, livestock watering, industry, storage, and recreation purposes. Economic and population growth creates increased demand for water, and sometimes these demands can impinge on the available water supply. How much water is available in the Similkameen River and how does this supply compare with demand? These are important questions to consider for water resource planning. To answer these questions, a sound knowledge of the hydrologic characteristics (occurrence, distribution, timing, movement, and properties of water) in the region is needed.

Hydrologic Regime of the Similkameen River Watershed

The Similkameen River is about 196 km long, with its headwaters in Manning Park. The watershed includes 7,566 km^2 in B.C. and 1,704 km^2 in Washington State. The river flows north to Princeton, southeast through Keremeos, and across the international border just south of Cawston. The Tulameen River is the largest tributary. Other notable tributaries are Ashnola and Pasayten rivers and Allison, Wolfe, Hedley, Keremeos, Hayes, and Otter creeks.



Typical flow pattern of the Similkameen River.

The volume of water that flows in a river is not constant over time. A **hydrograph**, like the one shown on the left, is a graphical representation of the volume of water flowing in a drainage basin at any given point of time. During the fall and winter months, discharge in the Similkameen River is relatively low (less than 15 m^3/s) because precipitation is in the form of snow. The tributary and mainstem streams in the Similkameen River watershed are primarily supplied by snowmelt. Annual peak flows commonly occur from May to July during snowmelt, with river flow typically exceeding 275 m^3/s during spring snowmelt.

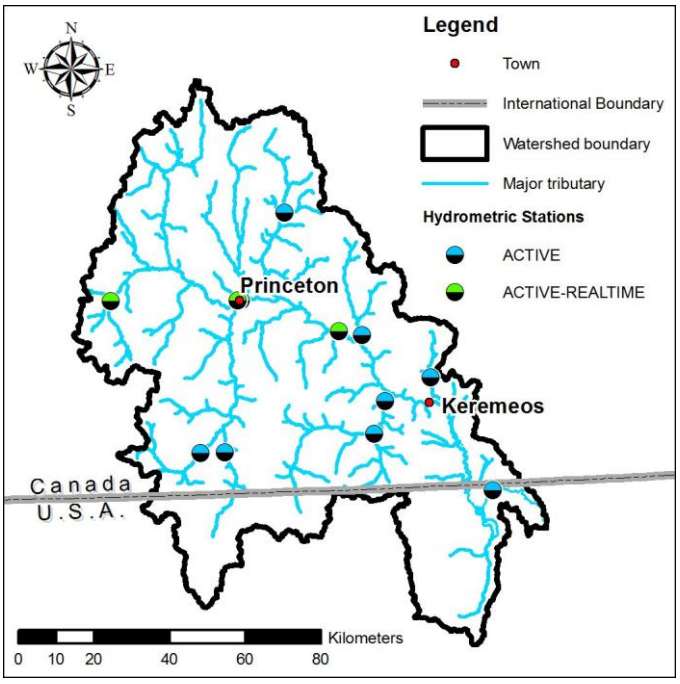
From July through April, after the high snowmelt-generated flows have subsided, water flow is generally low on average – this period includes the peak irrigation months, and the peak fish spawning periods. Flow during this time is primarily derived from groundwater discharge – known as **baseflow**. Baseflow throughout the Similkameen varies, ranging from about 2 m^3/s near the east boundary of Manning Park to about 11 m^3/s near the U.S. border near Cawston. Heavy rain events during the late summer and fall can quickly increase the flow in the river, followed by an equally steep decrease in flow after the rains subside.

Water Supply Monitoring

Streamflow (hydrometric) monitoring is generally conducted by the Water Survey of Canada (WSC) and the United States Geological Service (USGS). These agencies install hydrometric stations that collect water level and streamflow data to provide information on surface water availability (water quantity). This type of information can be used to support management of water and related resources and to provide the spatial distribution of natural streamflow for past, present, and future (i.e. climate change) conditions.

Hydrometric means "related to the measurement of velocity, discharge, volume and other physical parameters of surface water."

In the Similkameen River watershed, numerous stations have been operated over the years; however, a large number of these have been discontinued. There are currently 12 active WSC and USGS long-term hydrometric monitoring stations, with four of these recording streamflows on the mainstem of the Similkameen River. The Tulameen River has two active stations, and the Ashnola and Pasayten rivers and Ewart, Hedley, Keremeos, and Siwash creeks have one each. With the exception of Ewart Creek, the active stations have more than 35 years of data and four have more than 60 years of data. The locations of the active hydrometric stations are shown in the figure below.



The WSC also operates a number of "real-time" hydrometric stations in B.C. where the water levels and flows can be viewed online[1]. Four are located in the Similkameen River watershed – the two Tulameen River stations and the Similkameen River stations at Princeton and Hedley. These stations allow users to see flow conditions in near real-time by transmitting data to users via the internet, using either satellite or telephone communications. The real time stations are very useful for situations where water management decisions need to be made based on the river discharge.

Due to the Similkameen River's status as an international river, the number of current (and discontinued) hydrometric networks in the watershed is above average for B.C. and the

[1] http://www.wateroffice.ec.gc.ca/index_e.html

stations are spatially well distributed. This provides watershed managers with an excellent database to understand water supply, plan for droughts and floods, and look for changes over time.

Water Supply Management

Water Licensing

As of 2013, a total of 831 current licences (at 690 points of diversion) have been issued on streams, springs, and lakes within the Canadian portion of the Similkameen River watershed. Licences have been issued for off-stream uses, including: domestic, irrigation, waterworks, livestock watering, enterprise, mining, and processing purposes, as well as for storage, power, and conservation purposes.

The largest licensed offstream water use sector in the watershed is agricultural irrigation and the licensed period of use is generally from April to the end of September. Domestic and waterworks purposes are the second largest licensed water use sector and the licensed period of use is generally the whole year. Storage licences are commonly used to support irrigation and waterworks requirements and approximately 7% of the total licensed offstream volume in the Similkameen River watershed is supported by storage. Table 1 provides a summary of the major water uses and water licences in the region.

Table 1. Water Licences in the Similkameen Watershed

Water Use	Number of Water Licences	Total Volume of Licences
Agriculture (irrigation)	404	62,816 mega-litres/year
Domestic	401	33,822 mega-litres/year
Industrial and Commercial	18	15,316 mega-litres/year
Storage	47	7,730 mega-litres/year
Other*	23	38,444 mega-litres/year

*Includes licences for conservation, land improvement, ponds, and power

Note that one mega-litre (ML) is one million litres or 1,000 m^3 (or 220,000 Imperial gallons). Most of the water licenses in the Similkameen watershed are along the Similkameen River from Hedley to the International Border. If expressed as a volume per square kilometre, the Canadian surface water licences in the watershed would average 15.3 ML/km^2 per year. Individuals and most of the main water suppliers within the Similkameen River watershed hold surface water licenses. Not all surface water licences are utilized to their full capacity, and some users have started to use groundwater instead of surface water. Thus, the total volume of water allocated within water licenses does not accurately portray water use in the region.

Water Suppliers

The major water suppliers in the Similkameen River watershed include:

- Apex Mountain Resort
- Allison Lake Improvement District
- Hedley Improvement District
- Missezula Lake Waterworks District
- Osprey Lake Waterworks District
- Town of Princeton
- Fairview Heights Irrigation District
- Keremeos Irrigation District
- Olalla Community Water System
- Similkameen Improvement District
- Lower Similkameen Indian Band
- Upper Similkameen Indian Band

Water Supply Challenges

The Similkameen River watershed is highly dependent on the water contained in snowpacks to provide ample water supply. The potential for climate change to reduce the depth of snowpacks is a major threat to the water supply of the Similkameen watershed (see Backgrounder #6). In addition to reduced snowpack depth, longer growing seasons and warmer and drier summers will adversely affect water supply by increasing rates of evaporation from surface water and soils as well as transpiration from plants.

Water Supply Challenges

- Climate variability and change
- Increasing groundwater extraction
- Balancing supply with demand
- Maintaining high water quality

Many surface water licences are not being utilized in the Similkameen and many water users are (or already have) transitioning to groundwater use. As discussed in Backgrounder #8, groundwater pumping of aquifers that are hydraulically connected to streams can reduce the amount of available surface water through groundwater – surface water interactions (especially in late summer), which could also impact water quality and fish. At present, there is relatively little information on groundwater – surface water interaction in the Similkameen Valley.

Where to Get More Information

The following reports provide a summary of water supply and use in the Similkameen watershed, and are all available on-line. The key reports for readers interested in streamflow (water quantity) is a review of the hydrology of the Similkameen River by Obedkoff (1973) and a water quality assessment completed by

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MAP 1
SIMILKAMEEN RIVER WATERSHED: HYDROMETRIC AND METEOROLOGICAL MONITORING STATIONS, POINTS-OF-DIVERSION, AND DAM LOCATIONS

PROJECT:		
Similkameen River Watershed Management Plan		
DATE: June 2013	DRAWN: BdJ	FILE: map1.mxd

Kelowna
Peachland
Summerland
Penticton
Coalmont
Princeton
Hedley
Keremeos
Cawston
Oliver
Osoyoos
Similkameen River
Canada
USA
Chopaka
Nighthawk
Oroville
Cordell
Loomis
Ellisforde
Enterprise
Tonasket
Janis
Anacortes Crossing
Barron
Cedar Crossing
Vanderpool Crossing

Legend

- Sub-basin boundary

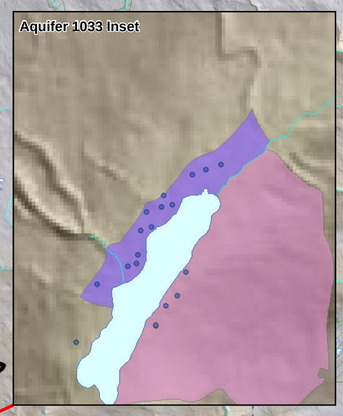
Water Licenses
- Irrigation
- Mining
- Hydro-Power
- Waterworks
- Storage - non-power
- Other

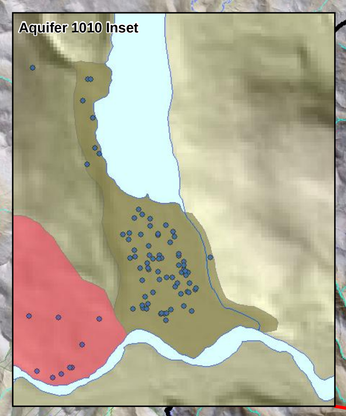
Environment Canada Hydrometric Stations
- ACTIVE
- ACTIVE-REALTIME
- DISCONTINUED

Climate Related Monitoring Program stations
- Agricultural and Rural Development Act Network
- BC Ministry of Agriculture
- BC Ministry of Environment - Air Quality Network
- BC Ministry of Environment - Automated Snow Pillow Network
- BC Ministry of Forests, Lands, and Natural Resource Operations - Wild Fire Managment Branch
- Environment Canada (Canadian Daily Climate Data 2007)
- Environment Canada (raw observations from "Climate Data Online")
- Ministry of Transportation and Infrastructure (electronic)
- Ministry of Transportation and Infrastructure (manual)
- Dams
- First Nations Reserve
- Parks / Protected Areas
- International Boundary
- Ambient freshwater monitoring station (Dept. of Ecology, Washington)
- Environmental monitoring station (Dept. of Ecology, Washington)

Water rights points (Dept. of Ecology, Washington)
- Ground water collector
- Headworks
- Surface water pump

0 2.5 5 10 15 20 Kilometers





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MAP 2
SIMILKAMEEN RIVER WATERSHED: GROUNDWATER WELLS AND AQUIFERS

PROJECT: Similkameen River Watershed Management Plan

DATE:	DRAWN:	FILE:
Jan. 2014	BdJ	map2.mxd

Coalmont
Princeton
Hedley
Keremeos
Cawston
Chopaka
Nighthawk
Oroville
Loomis
Cordell
Ellisforde
Enterprise
Tonasket
Janis
Barron
Anacortes Crossing
Cedar Crossing
Ruby (historical)
Vanderpool Crossing
Peachland
Summerland
Penticton
Oliver
Osoyoos
Canada
U.S.A.

Legend

- Sub-basin boundary
- First Nations Reserve
- Parks / Protected Areas
- International Boundary
- Ground Water Wells

Observation wells

- Active
- Inactive

Aquifers

- Aquifer #258
- Aquifer #259
- Aquifer #935
- Aquifer #937
- Aquifer #1010
- Aquifer #1011
- Aquifer #1012
- Aquifer #1013
- Aquifer #1024
- Aquifer #1025
- Aquifer #1026
- Aquifer #1027
- Aquifer #1028
- Aquifer #1029
- Aquifer #1030
- Aquifer #1031
- Aquifer #1032
- Aquifer #1033

0 2.5 5 10 15 20 Kilometers