OKANOGAN RIVER WATERSHED INITIAL ASSESSMENT

Draft
May 1995

With our multitudes of lakes, streams, and rivers, Washington State seems to have an abundance of water. However, the demand for water resources has steadily increased each year, while the water supply has stayed the same, or in some cases, declined. This increased demand for limited water resources has made approving new water uses complex and controversial.

The purpose of this assessment is to evaluate existing data on water to make decisions about pending water right applications. It does not affect existing water rights.

To expedite decisions about pending water right applications, it is vital that we accurately assess the quality and quantity of surface and ground water. The Washington State Department of Ecology recognizes that water right decisions must be based on accurate scientific information. Ecology is working with consultants to conduct special studies called Initial Watershed Assessments throughout the state.

The assessments describe existing data on water rights, streamflows, precipitation, geology, hydrology, water quality, fisheries resources, and land use patterns. Some assessments provide straightforward results, allowing immediate water management decisions. In watersheds with little existing information, further studies will be necessary to acquire new data. In watersheds where major public policy conflicts exist, or where significant land use impacts are expected, water management decisions will be coordinated with local and regional planning processes.

This report summarizes information presented in the detailed Ecology Open File Technical Report No. 95-14. It also presents some actions that could be taken in response to the results of this assessment.

Montgomery Water Group
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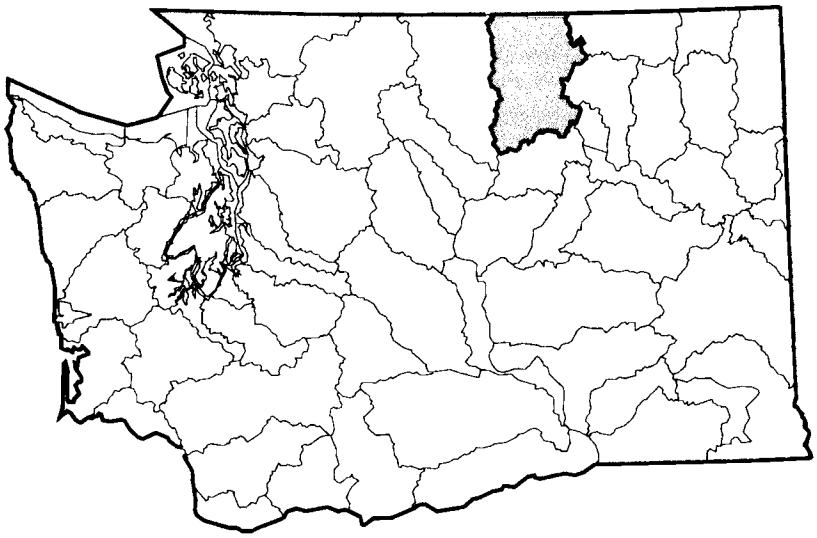
and associated firms

Prepared in cooperation with the
Washington Department of Ecology

Okanogan River Watershed Location Map



What are the water allocation issues?

- Ecology needs to make decisions on 118 pending water right applications.
- Flows on the Okanogan and Similkameen rivers frequently fall below instream flows established by rule.
- Fish stocks in the Okanogan River watershed are depressed, the reasons for which include low flows, habitat degradation, dams, and high water temperatures.
- Ground water is found primarily within the sand and gravel valley fill materials. The aquifers within the watershed flow toward surface water bodies, such as streams, lakes, and rivers.
- In some areas of the watershed, additional ground water pumping may affect stream flows.

What is a watershed?

A watershed is an area of land where topographic features such as hills and valleys cause water to flow toward a single major river or other body of water. The entire Okanogan River watershed encompasses approximately 8,400 square miles within the state of Washington and the Province of British Columbia in Canada. That portion of the watershed discussed in this assessment is the 2,100 square mile portion lying south of the U.S.-Canada border to the Columbia River.

Where does the water come from?

Ultimately, all of the streams, lakes, springs, and other surface water and ground water in the watershed comes from rain or snowmelt. Some of this water evaporates or is used by plants, some flows into the streams and rivers, and the rest infiltrates into the soil to become ground water. Some segments of streams and rivers gain water from ground water that seeps into the channel. Other segments lose water that leaks through the streambed into the ground. See figure, below.

Most all of the streamflow in the Okanogan River is contributed by the Okanogan and Similkameen rivers flowing out of British Columbia. Tributary streams located in Washington State also contribute flow, but the vast majority of water is derived from Canada.

The average annual precipitation in the Washington portion of the Okanogan River watershed ranges from about 12 inches at Omak to about 40 inches in the mountains of the Okanogan National Forest. Most of the precipitation falls as rain or snow during the winter months. Data from the Omak and other eastern Washington weather stations show that precipitation was higher than average since the 1940s except for a short period in the late 1960s and early 1970s.

The snowpack generally melts in May and June, supplying most of the stream-flow in spring and early summer. A portion of the melting snow also infiltrates into the soil to become ground water. The ground water slowly discharges to rivers and streams, providing a relatively constant discharge for the rest of the year.

What are the major surface water sources?

The Okanogan River watershed begins in Canada and drains southward to the Columbia River. The watershed also encompasses area along the Columbia River to west of Brewster. The Okanogan and Similkameen rivers are the major surface water sources. In addition to these rivers, there are dozens of creeks and streams, including Bonaparte, Omak, Whitestone, Salmon, Sinlahekin, and Toats Coulee creeks (see map, right). Lakes and reservoirs in the watershed include Omak, Palmer, Conconully, Osoyoos, Spectacle, and Whitestone lakes. The Columbia River is also an important water supply in the watershed.

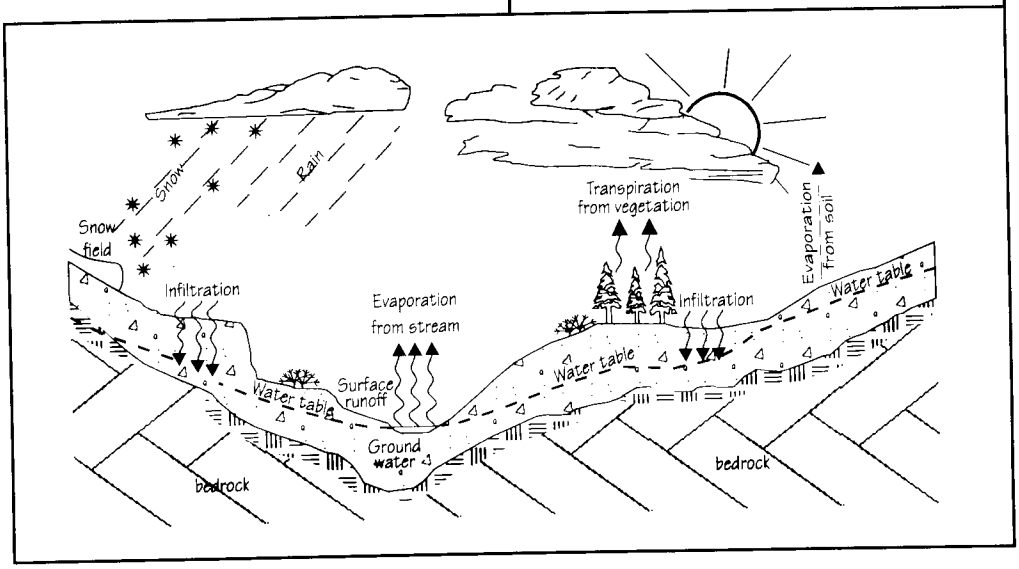
What are the major ground water sources?

It is estimated that 75 percent of the ground water supply is stored within deposits found in the river corridor and stream valleys. These deposits are comprised of silt, sand, gravel, and cobbles and in some places may be more than 500 feet thick.

Most of the area's bedrock is made up of highly fractured, folded, and faulted rocks. Water can be found in these rocks although well yields are generally low. Volcanic rocks in the south-central portion of the water-shed may yield larger quantities of water, although, in most instances, they do not appear to be thick enough to yield more than a few gallons per minute.

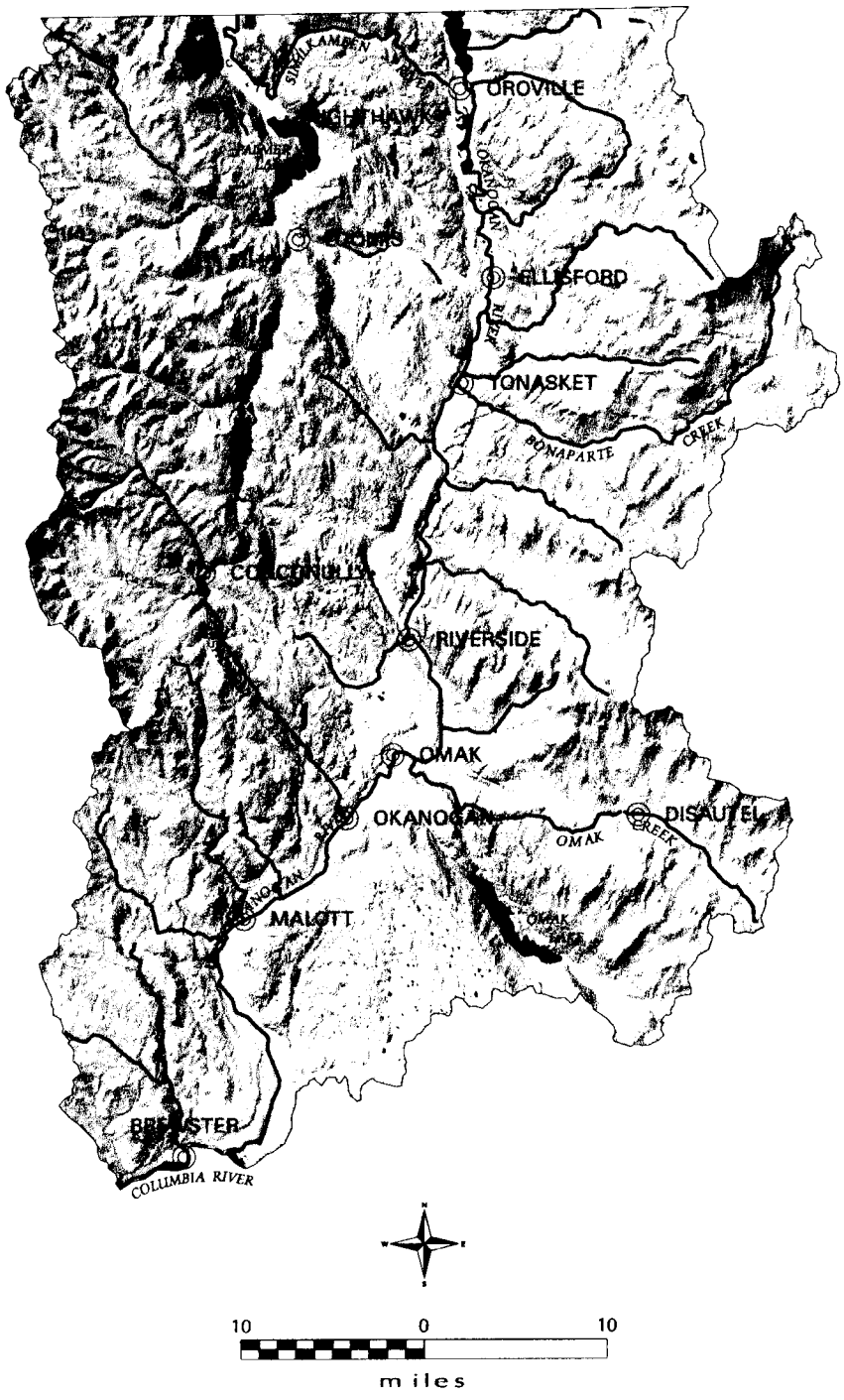
How are surface and ground water connected?

In areas where both surface water and ground water are used, the connections between the two sources become important. In some instances, the ground water flows from the aquifer to the surface water, while in others the reverse occurs. Ground water provides the total flow in the rivers and creeks, and also inflow to lakes, when there is no rain



Representative hydrologic cycle (modified from Walters and Nassar).

Okanogan River Watershed



or snowmelt to contribute to the flow.

Before issuing future ground water rights, Ecology must consider potential effects on other water users, including both surface and ground water users. At this time, however, there is insufficient data to fully understand the relationship between surface and ground water in the entire watershed.

How does land use affect water?

Land use can affect the demand for and use of water. Some land uses, such as irrigated agriculture, require large amounts of water on a seasonal basis. Other land uses, such as residential or livestock production, require less water but need it year-round.

Land use in the Okanogan River watershed includes agriculture, range, timber, residential, and recreation. Rangeland and forest land comprise about 90 percent of the watershed area. Estimates show that 90,000 acres of cropland exist in the watershed and that 36,000 to 40,000 acres of that total is irrigated agriculture. Some industrial and commercial uses exist, primarily around population centers. Approximately 28 percent of the watershed is within the Colville Indian Reservation, 28 percent is owned by the local, state or federal government, and 44 percent is privately owned.

Population growth in the Okanogan area was moderate until the early 1990s, when the population increased by 6.1 percent from 1990 to 1993. Approximately 40 percent of the population resides in small cities and towns, while the rest live in unincorporated areas.

What are the water quality issues?

Water quality is closely tied to water quantity. Water supplies must be of high quality for drinking water use and to support fish and wildlife. At the same time, water quality may depend on maintaining large quantities of clean water to reduce the adverse affect of existing pollutants and maintain proper water temperatures for fish.

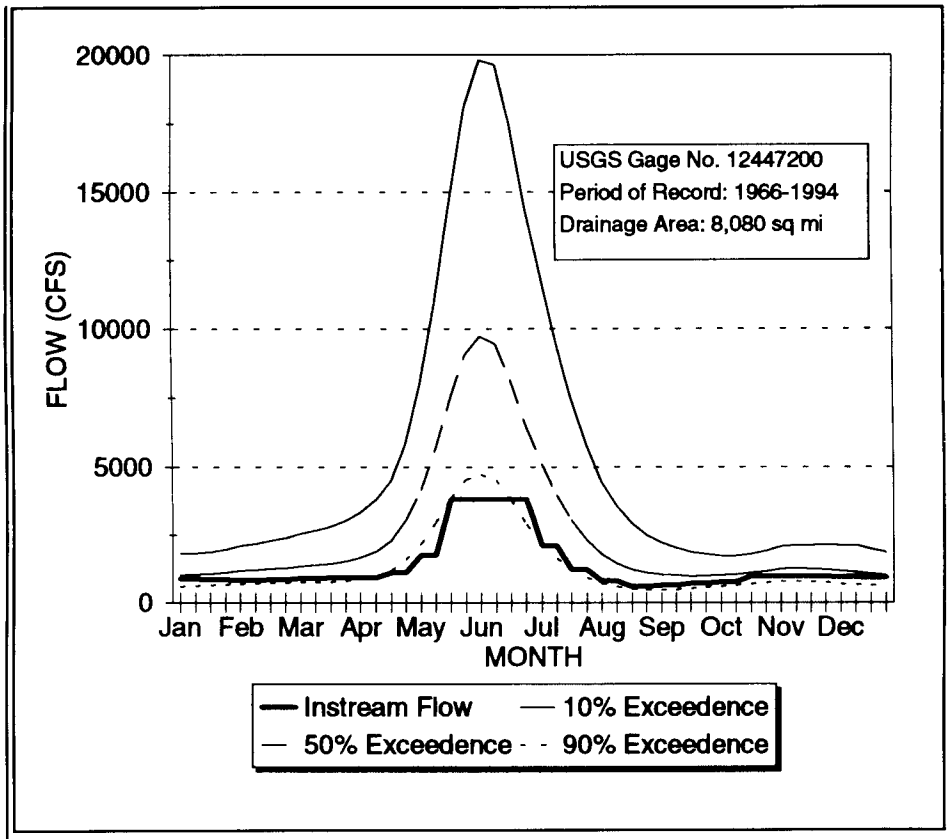
During the past ten years, the Okanogan River has had occasional problems with pH (acidity), temperature, dissolved oxygen, and fecal coliform. These problems are more likely to occur during the summer months, when water temperatures are high and dissolved oxygen concentrations fall below levels conducive to fish. Other problems reported include a consistent exceedence of lead and mercury criteria, and problems with sedimentation. Sediment problems can affect both the fisheries resource, by covering spawning and rearing habitat, and irrigators, due to sediment interference with pumps and sprinkler systems.

Are our fish resources stable?

There have been a number of recent studies on the health of fish stocks in Washington State. Data from two of the more prominent studies were used to evaluate fishery issues in the Okanogan River. These studies are referred to as the "AFS study," (published as "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington," American Fisheries Society), and the "SASSI" (the Salmon and Steelhead Stock Inventory), which was prepared by the Washington Departments of Fisheries and Wildlife, with assistance from 23 Indian Tribes and tribal organizations.

The Okanogan River supports summer chinook salmon, summer steelhead, and sockeye salmon. According to the SASSI report, both the chinook and steelhead stocks are "depressed," meaning fish production is below expected levels based on available habitat and natural survival rates, but above the level where permanent damage to the stock is likely. The SASSI report lists sockeye salmon as "healthy." The AFS study rates the steelhead stock as "high risk." Both chinook and sockeye are rated as "special concern" by AFS.

Nine Columbia River dams and their fish passage impacts have substantially reduced the production of anadromous fish in the watershed from historic levels. Fish habitat in the watershed has also been impacted by human activities including construction of dams, and poor water quality including high water temperatures, destruction of spawning habitat, and low streamflows. The most important of these may be high water temperatures. High water temperatures have been attributed to loss of streamside cover from livestock grazing on streambanks, low flow conditions during summer months, and the operation of Wells Dam, which appears to have caused a thermal barrier to form at the mouth of the Okanogan River.



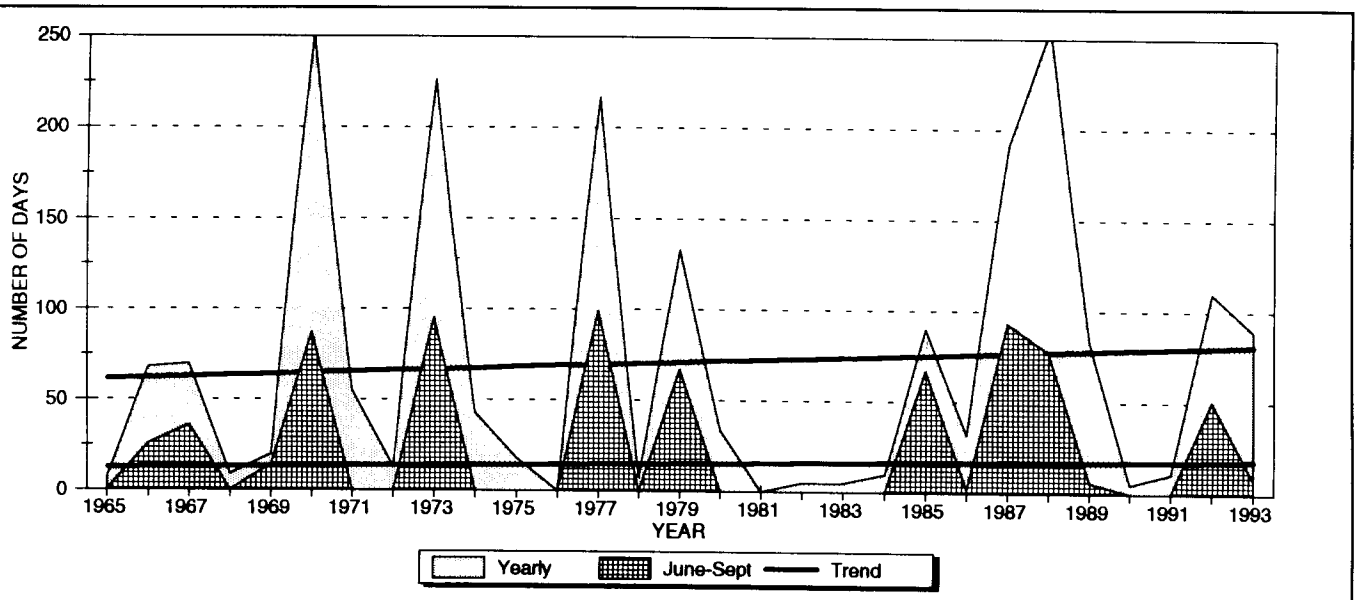
Streamflow data has been collected during the past 37 to 84 years on the Okanogan and Similkameen rivers. This graph depicts monthly flow exceedence for the Okanogan River at Malott.

How have streamflows changed?

The U.S. Geological Survey operates stream gage stations to measure the amount of water that flows through the Okanogan and Similkameen rivers and their tributaries. These volumes are expressed in cubic feet per second (cfs), which is a measurement of the volume of water flowing through a stream. Because many gages are located near the lower ends of the streams, measurements are affected by diversions for upstream water uses.

Streamflow data has been collected during the past 37 to 84 years on the Okanogan and Similkameen rivers. The data indicate that the average annual flow of the Similkameen River near Blackhawk is approximately 2,300 cfs and the average annual flow of the Okanogan River at Malott is approximately 3,000 cfs. More than 60 percent of the total annual volume of flow occurs in the spring and early summer.

Instream flows were set by rule in 1976 for the Okanogan and Similkameen



The Okanogan River does not meet instream flows for 60 days per year on average. This graph depicts the number of days in a year instream flows are not reached in the Okanogan River at Malott.

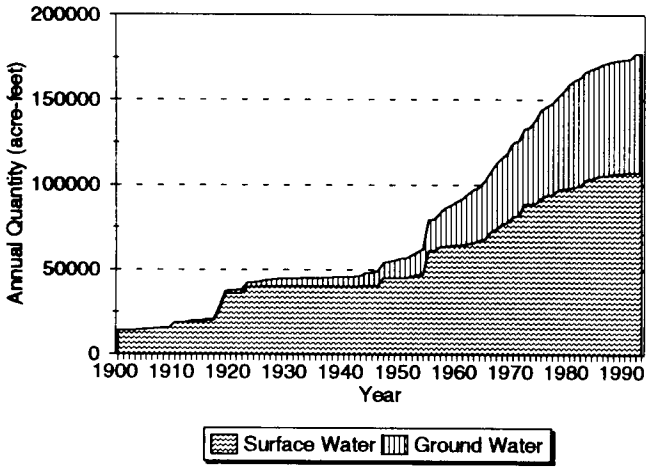
rivers. Flows set for the lower and middle Okanogan River range from 600 to 3,800 cfs. Flows set for the upper Okanogan River range from 300 to 500 cfs. Those set for the Similkameen River range from 400 to 3,400 cfs. The graph on page 4 compares instream flows to monthly flows for the Okanogan River at Malott gaging station.

Streamflows in the Okanogan River fall below instream flow levels 60 days per year on average in the reach below its confluence with the Similkameen River, and 100 days per year above the confluence to Lake Osoyoos. On the Similkameen River, instream flows are not met 75 days per year on average. There does not appear to be an increasing trend in the number of instream flow excursions in the critical summer months. See graph, above.

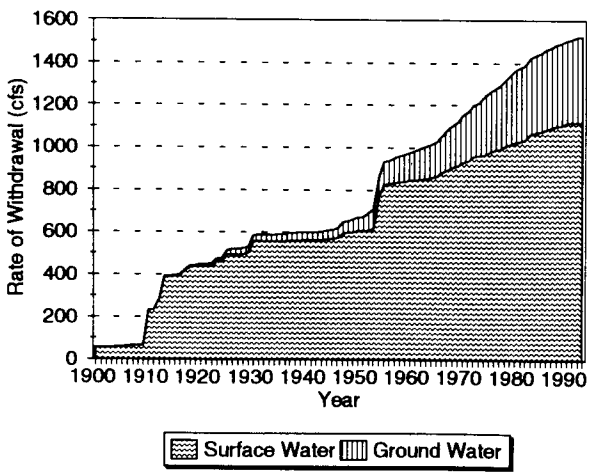
In addition to the instream flows set in 1976 for the Okanogan and Similkameen rivers, Ecology closed all perennial streams in the watershed to further permits between May 1 and October 1. The Okanogan River is closed to issuance of further permits from its confluence with the Similkameen River to Lake Osoyoos from June 15 to August 31, with exceptions given to single-domestic and stock watering uses.

HISTORICAL GROWTH OF WATER RIGHTS APPROPRIATIONS IN OKANOGAN RIVER WATERSHED

ANNUAL QUANTITY



RATE OF WITHDRAWAL



What are water rights?

A water right is a legal authorization to use a certain amount of public water for specific beneficial purposes.

State law requires every user of streams, lakes, springs, and other surface waters to obtain a water right permit before using these waters. People who use ground water also need a water right permit unless they use 5,000 gallons or less each day for one or more of the following purposes: watering stock, watering a lawn or garden less than one half acre in size, or for a single or group domestic or industrial water supply.

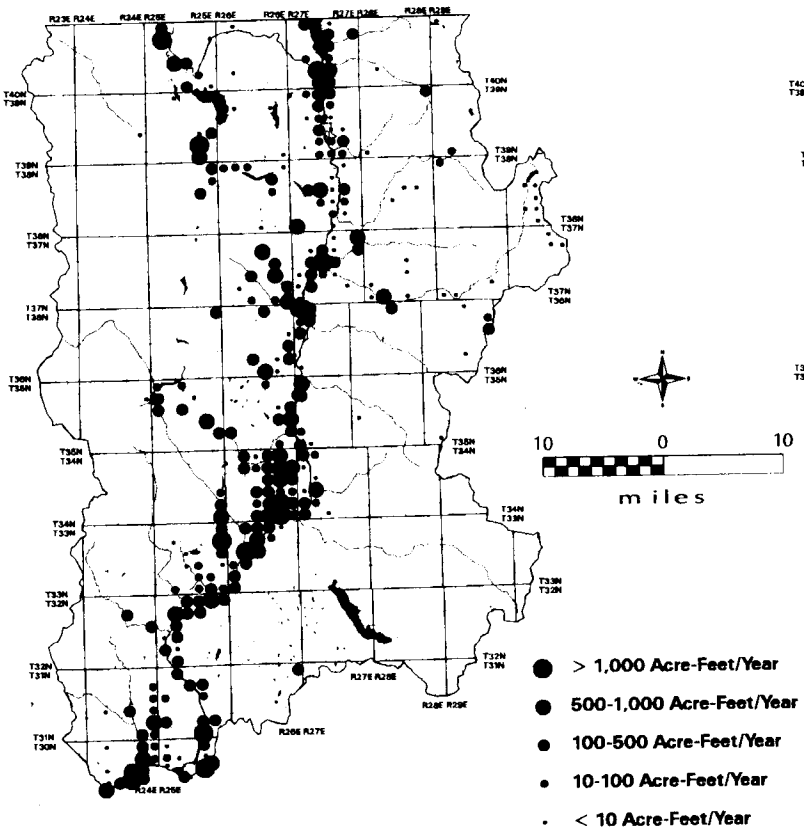
What are water right claims?

A water right claim is just that, a claim for a right to use water. A water right claim on file with Ecology may or may not represent a valid water right. The validity of a claim can only be established through a superior court determination of water rights. Within the watershed, a total of 4,336 water right claims have been filed, for a total flow equivalent to about 3,274 cfs. Of those water right claims, there are 1,919 surface water claims totaling 3,044 cfs, and 2,417 ground water claims totaling 230 cfs. Because many claims may not be capable of being fully used, due to their location on small tributary streams, a more realistic estimate of potential use is 500 cfs.

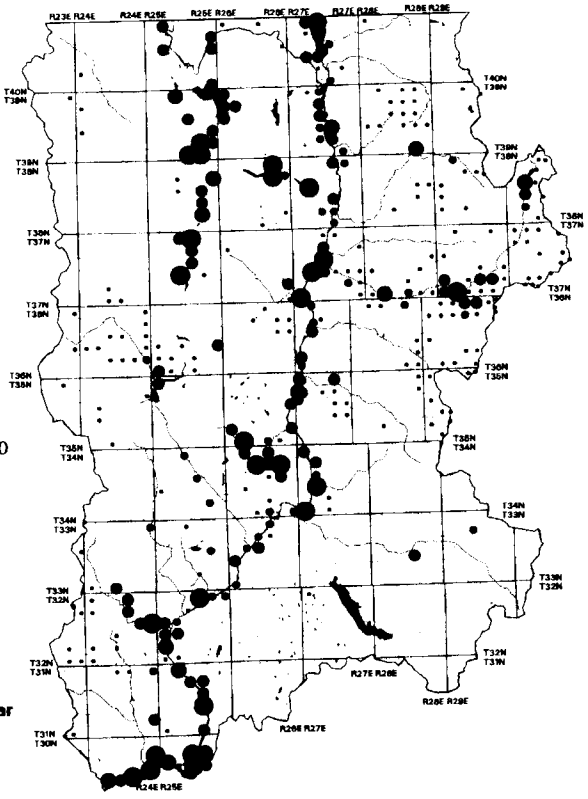
Why are water rights important?

The basis for water rights is "first in time, first in right." This means people with older, or senior, rights get to use the water first when there is not enough for everyone. The water rights program ensures that Washington's water resources are appropriately allocated and managed. By effectively managing allocation of new water rights, Ecology can protect senior water rights and benefit the overall public good.

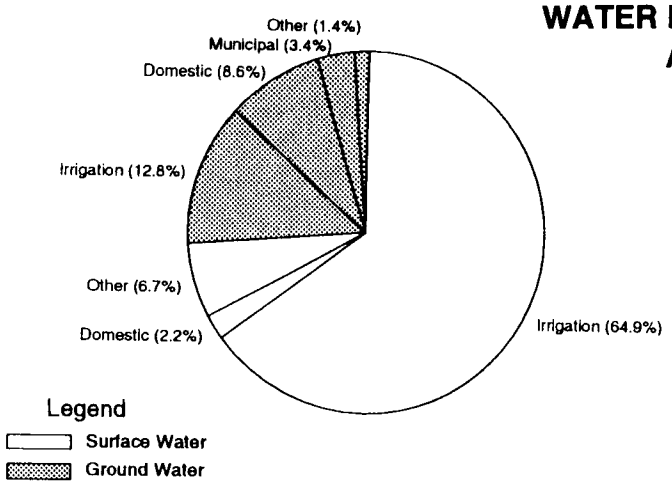
Existing ground water rights in the Okanogan River Watershed by section.



Existing surface water rights in the Okanogan River Watershed by section.



WATER RIGHTS IN OKANOGAN RIVER WATERSHED ALLOWABLE RATE OF WITHDRAWAL



SURFACE WATER RIGHTS: 1,133 CFS
GROUND WATER RIGHTS: 401 CFS
TOTAL RIGHTS: 1,534 CFS

How is water currently allocated and what new uses are proposed?

Ecology has issued water rights for withdrawals of 401 cfs of ground water and 1,133 cfs of surface water. The annual volume of issued ground water rights equals 70,700 acre-feet, and issued surface water rights equal 107,160 acre-feet. One acre-foot equals the amount of water contained in a one-acre area with a water depth of one foot. The rate of growth in appropriations is shown on page 5, bottom.

Eighty-eight percent of the surface water and 49 percent of the ground water is allocated for irrigated agriculture. The second largest use is municipal and domestic, accounting for about 46 percent of the allocated ground water, but only three percent of the surface water allocation. Water use allocations are shown in the figure above. Location of rights by section are shown in the figures on page 6.

Currently, Ecology has applications for 81 ground water permits and 37 surface water permits requesting a total flow of 120 cfs. Municipal, single, and multiple domestic uses comprise 33 percent of the total water requested, frost protection comprises 41 percent, irrigation comprises 14 percent and the remainder is requested for stock, mining and other uses. Most applications are for use along the Okanogan River valley.

What are the conflicts?

In the Okanogan River watershed, flows in the Okanogan and Similkameen do not meet instream levels for part of the year, yet there is continued interest in obtaining water rights. The rate of withdrawal for existing surface water rights and certificates already equals about one-third of the average annual flow of the Okanogan River. If the rate of withdrawal for surface water claims on file with Ecology is added, it appears that about one-half of the average annual flow has been allocated.

Water use conflicts can occur when the available water supply is not sufficient to maintain instream flows and at the same time fulfill existing water rights and claims. The greatest usage of water also occurs during the period of lowest streamflow, in the late summer.

A conflict may also arise between additional use of ground water and existing ground and surface water users that are in connection with new wells.

Another conflict is with applications for withdrawal from the Columbia River on the lower reach of the Okanogan River within the backwater influence of Wells Dam.

Where do we go from here?

While Ecology is mandated by law to protect instream water use and existing water rights, Ecology also is responsible for making decisions on applications for new water rights. The public's opinion is important to Ecology in making its program decisions related to water use. Ecology invites public input on what steps should be taken next. We will also work with people who have applied for new water rights in the area to discuss options for processing their applications.

What additional information is available?

If you would like more information about water issues in the Okanogan River watershed, the following studies and technical reports are available:

AFS. 1991. "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington," March-April 1991. American Fisheries Society.

Ecology, 1976. Chapter 173-549 WAC. "Water Resources Program in the Okanogan River Basin, WRIA 49."

Ecology. 1995. "Initial Watershed Assessment, Okanogan River Watershed. OFTR 95-14." Washington Department of Ecology.

Ecology. 1976. "Water Resources Management Program, Okanogan River Basin (WRIA 49)." Washington Department of Ecology.

WDF & WDW. 1993. "1992 Washington State Salmon and Steelhead Stock Inventory." Washington Departments of Fisheries and Wildlife.

What do we know about the Okanogan River watershed?

This assessment found that streamflow falls below instream flow levels for about 60 days per year on the Okanogan River. Ground water provides the total flow in the rivers and creeks when there is no rain or snowmelt to contribute to surface water flow. Maintaining water quality and aquatic habitat depend on adequate streamflow. Because of these findings, the portions of the watershed along the Okanogan River are classified as "medium risk" by Ecology. Other portions of the watershed that are tributary to the Okanogan River, such as Bonaparte and Salmon creeks, are classified as "high risk" because of seasonal stream closures.

What actions can be taken?

Based on these risks, Ecology could take a number of actions. Usually, a combination of actions needs to be taken to effectively manage water resources. The list below describes some actions that could address issues raised in this report. This list is not comprehensive. Ecology wants to hear your opinions on the actions listed here, and any other ideas you have about water management in the Okanogan River watershed.

- Continue managing the water resource according to the provisions and instream flows already set by rule.

  Pro: May meet some of the new water use demands or portions of those demands.
  Con: Stream flows would not exceed minimum flow levels more frequently and for longer periods of time. Not all new uses of water could be approved unless acceptable mitigation was proposed.

- Increase storage of water during periods of high stream flow for use during periods of low stream flow if this can be done without an adverse impact to water quality and aquatic habitat.

  Pro: Allow for additional water rights to be issued without an adverse impact on water resources during critical flow periods.
  Con: Potentially expensive, may be difficult to find suitable sites or difficult to engineer, may require cooperation of others.

- Encourage water conservation, changes and transfers of water rights, and water reuse to make efficient use of water.

  Pro: May meet new water use demand without an adverse impact on streamflow and senior water rights.
  Con: May only be applicable to municipalities, irrigation districts, or other large water users.

- Encourage regional watershed planning to resolve conflicts about water with the greatest participation by residents of the watershed.

  Pro: Cooperation between water interests would allow more flexible solutions and cost-effective approaches to water issues. Activities could include increases to storage, improvement of aquatic habitat and water quality, interconnection of water suppliers, and additional collection of hydrogeologic and water use data. A regional perspective could be used to meet new water uses.
  Con: Would require time, money, and political consensus to create and carry out the plan. Availability of funding is uncertain.

For more information . . .

Contact Darlene Frye at (509) 575-2800 (voice), (509) 454-7673 (TDD), or write Department of Ecology, Water Resources Section, 15 W. Yakima Avenue, Suite 200, Yakima, Washington 98902-3401. Ecology does not discriminate in its services. If you have special communications needs, contact Lisa Newman at (360) 407-6604 (voice) or (360) 407-6006 (TDD).