WENATCHEE 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.

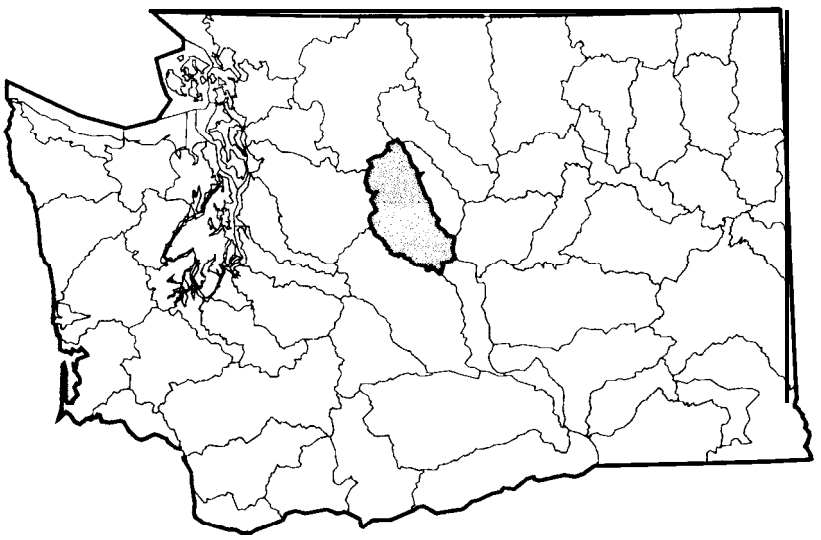
The assessments describe existing data on water rights, streamflows, precipitation, geology, hydrology, water quality, fisheries resources, and land use patterns. Some assessments provide straightforward results, allowing immediate water management decisions. In watersheds with little existing information, 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. 95-12. It also presents some actions that could be taken in response to the results of this assessment.

Montgomery Wafer Group
***Adolfson* Associates, Inc.**
and associated firms

Prepared in cooperation with the
Washington Department of Ecology

Wenatchee River Watershed Location Map



What are the water allocation issues?

- Ecology needs to make decisions on 119 pending water rights applications.
- Flows in the Wenatchee River, Mission Creek, and Icicle Creek frequently fall below established instream flow levels.
- The Wenatchee River watershed is one of the best salmon producing systems in eastern Washington, offering fair to excellent habitat for spawning and rearing. It is important to keep this high quality habitat.
- Ground water resources are present primarily within sands and gravels in the Wenatchee River valley. Aquifers present within the watershed generally flow toward surface water bodies, such as streams, lakes, and rivers.
- In some areas, additional pumping of ground water may affect stream flows or affect existing ground or surface water users.

WR-95160

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 Wenatchee River watershed encompasses about 1,371 square miles. The watershed originates in the Cascade Mountains and extends to the Columbia River. The watershed also includes area on the west side of the Columbia River from the south part of the city of Wenatchee northward to Rocky Reach Dam.

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.

Rain and snow supply all of the water in the Wenatchee River watershed. Most of the annual precipitation falls in winter as snow, with 150 inches received annually and accumulations of 25 feet or more in the mountainous areas of the watershed. As the snowpack melts in spring and early summer, it supplies most of the streamflow. In addition, some of the melting snow infiltrates into the soil, replenishes the ground water, and is then slowly discharged to rivers and tributary streams to provide a relatively low but constant flow the rest of the year.

The lower Wenatchee Valley is semi-arid and receives, on average, 8.5 inches or less of precipitation annually.

What are the major surface water sources?

The main surface water feature of the watershed is the Wenatchee River, which has its source at Lake Wenatchee. Four large tributaries join to form the Wenatchee River in the vicinity of Lake Wenatchee: the Chiwawa, White, and Little Wenatchee rivers, and Nason Creek. These streams combine with a fifth tributary, Icicle Creek, to provide over 94 percent of the surface water in the Wenatchee River. The Columbia River is also an important source of water for users at the southeast end of the watershed. See map, right.

What are the major ground water sources?

Ground water can be found in usable quantities in two types of materials: bedrock and the overlying surface sediments. The sediments that fill the river valleys and depressions in the bedrock are a main source for domestic and public water supply. The nature and extent of the fill materials is highly variable, so well yields vary considerably.

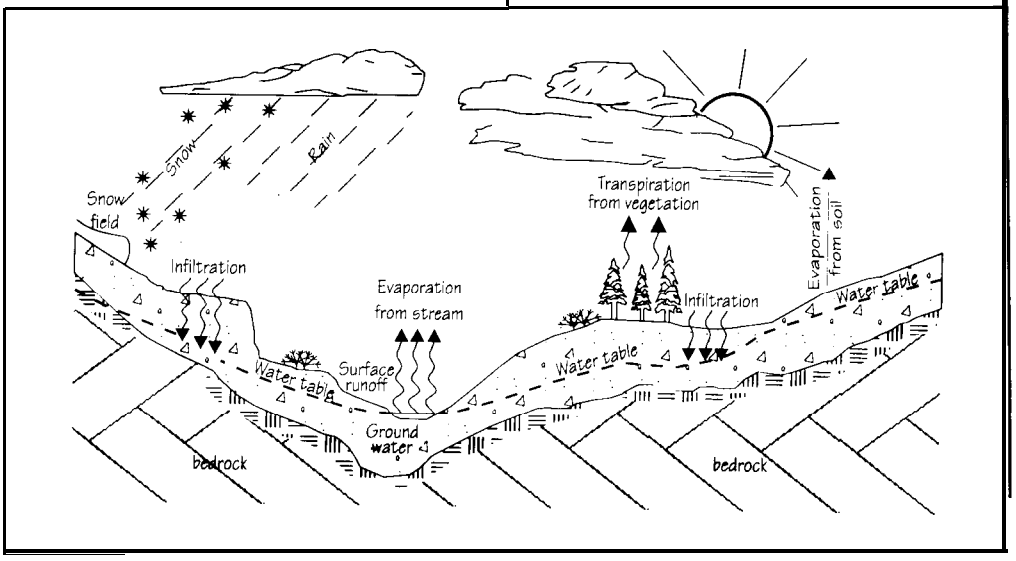
Ground water in the surface sediments is primarily replenished through infiltrating rain and snowmelt, infiltration from surface water, and discharge from deeper bedrock aquifers.

Geological studies of the area indicate that most of the bedrock is made up of sandstones and shales. Many domestic wells which penetrate the bedrock have low yields of 15 gallons per minute or less, indicating the bedrock is not a viable source for significant ground water development.

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 inflow to lakes, when there is no rain or snowmelt to contribute to the flow.

Reports indicate that ground water and surface water interact to varying degrees throughout the Wenatchee River watershed. Aquifers in many of the smaller drainages are in direct connection with surface water. In these cases, the water levels of both surface water and ground water generally respond together. Increased withdrawal from ground water will often result in decreased discharge to surface water later downstream.



Representative hydrologic cycle (modified from Walters and Nassar).

Wenatchee River Watershed

How is water used?

Water supply for irrigated agriculture is the major water use in the watershed. Most irrigation water, about 93 percent, is taken from surface water sources. Water supply for commercial and industrial use is the second largest, while water supply for municipal and domestic use for the cities of Cashmere and Leavenworth, as well as unincorporated communities in the county and private water systems, is the third largest. Most water used for commercial and industrial reasons is surface water, while most municipal and domestic water sources are ground water. Fish propagation accounts for approximately 33 percent of the ground water use and eight percent of the total water use in the 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.

The primary land uses in the Wenatchee River watershed are forestry, wilderness areas, agriculture, range, residential, and recreation. The largest landowner is the U.S. Forest Service, with approximately 395,000 acres of forest land encompassing approximately 45 percent of the total watershed area. Irrigated farmland acreage within the Wenatchee River valley and its tributaries is estimated to be about 12,500 acres. Water is diverted from the Wenatchee River to serve an additional 9,000 acres in the vicinity of the cities of Wenatchee and East Wenatchee.

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 effect of existing pollutants and maintain proper water temperatures for fish.

The Wenatchee River has occasional problems

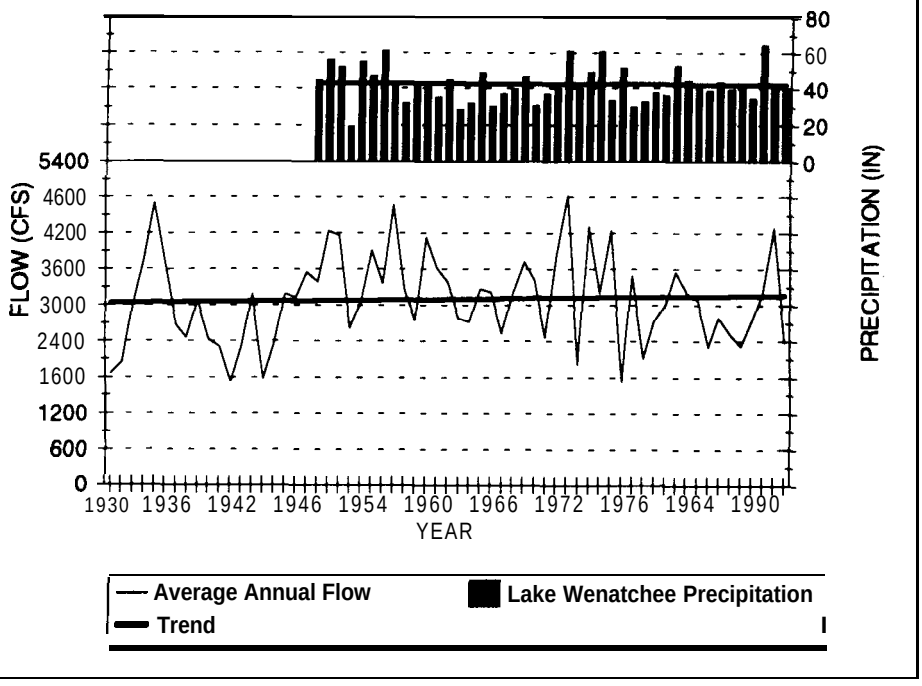
with pH (acidity), dissolved oxygen, and high water temperatures. Water quality problems are more evident in smaller drainages such as the Mission and Chumstick creek drainages, where high fecal coliform levels and high water temperatures have been recorded. The smaller drainages have more intensive land use and increasing populations.

Are fish resources stable?

There have been a number of recent studies on the health of fish stocks in Washington State. Technical data from a wide variety of sources, including information from two prominent fishery resource studies, were used to evaluate fishery issues in the Wenatchee River watershed. The two studies are referred to as the "AFS study," (published as "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington"), and the "SASSI" study (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.

Three anadromous fish species are found in the Wenatchee River watershed: spring and summer chinook salmon, sockeye salmon, and summer steelhead trout. In addition, Lake Wenatchee and the Wenatchee River contain populations of westslope cutthroat, rainbow trout, mountain whitefish, brook trout, and golden trout. Tributaries to the Wenatchee are also used by bull trout, which has been nominated for the Federal Threatened and Endangered Species List.

The Washington State Departments of Fisheries and Wildlife determined that the Wenatchee River watershed is one of the best salmon producing systems in eastern Washington, offering fair to excellent habitat for spawning and rearing. The dominant factor limiting the production of anadromous fish is the seven mainstem Columbia River dams between the Wenatchee River and the Pacific Ocean, and their fish passage impacts.



Average annual flows in the Wenatchee River at Peshastin are shown in the graph above. No trend of zither increasing or decreasing streamflows was found for the stream gages analyzed.

Other factors that limit production of anadromous fish in the Wenatchee River watershed include the highly variable flows encountered (both natural occurring and manmade), the reduction of rearing habitat in the lower Wenatchee River from channel modifications, inadequate screening of some irrigation diversions, and natural barriers that prevent upstream passage of fish in steep tributaries.

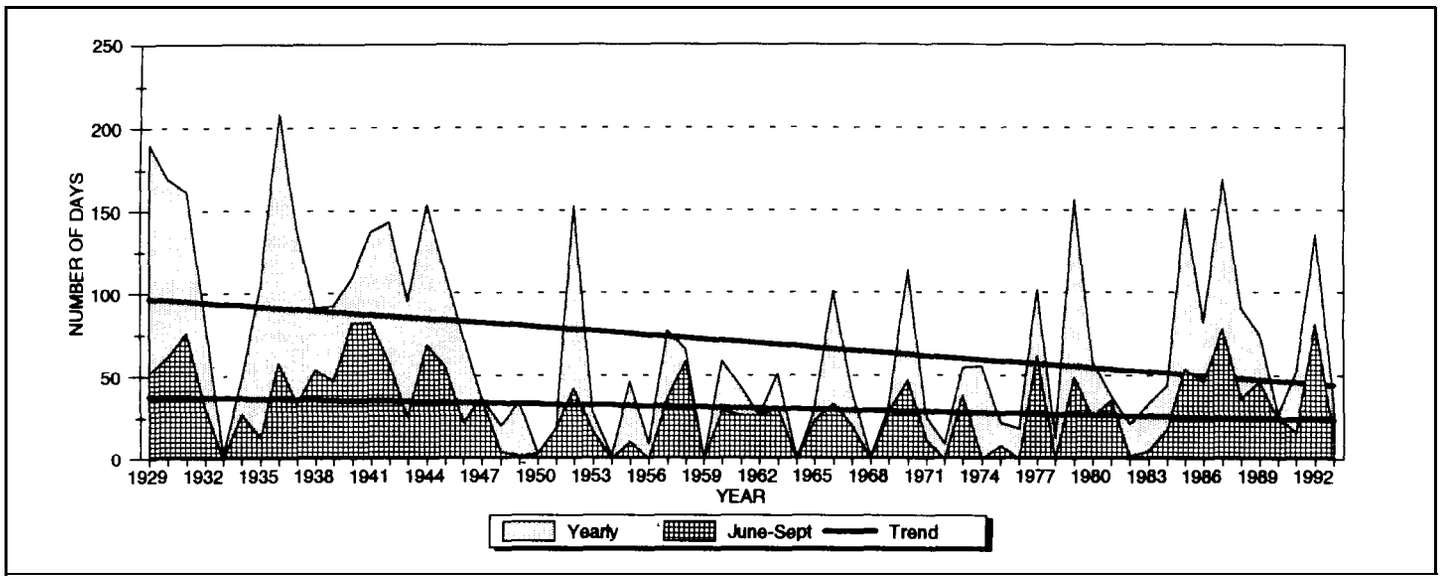
According to the SASSI report, the spring chinook and steelhead trout are "depressed," meaning fish production is below expected levels based on available habitat and natural survival rates, but above the level where permanent damage to the stock is likely. Summer chinook and sockeye are classified as "healthy." The AFS study rates the steelhead stock as being "high risk," which is defined as "fewer than one adult fish returning to spawn from each parent spawner." Sockeye and summer chinook are classified as being of "special concern."

How have streamflows changed?

The U.S. Geological Survey currently operates stream gage stations near Plain, Monitor and Peshastin to measure the amount of water that flows through the Wenatchee and Chiwawa rivers. These volumes are expressed in cubic feet per second (cfs), which is a measurement of the volume of water flowing through a stream. Flow records on the Wenatchee River date back to 1910 for the stream gage station at Plain, to 1929 for the stream gage at Peshastin, and to 1962 for the stream gage at Monitor.

Records indicate the average annual flow for the Wenatchee River at Monitor is 3,321 cfs, at Peshastin is 3,062 cfs, and at Plain is 2,262 cfs. See graph, above. The highest flows occur during the spring snowmelt period and continue until early summer.

Ecology has set instream flows for the



Streamflows in the Wenatchee River fall below instream flow levels on average 69 days per year at Plain, 69 days per year at Peshastin and 51 days per year at Monitor, This graph depicts the number of days in a year instream flows are not reached in the Wenatchee River at Peshastin.

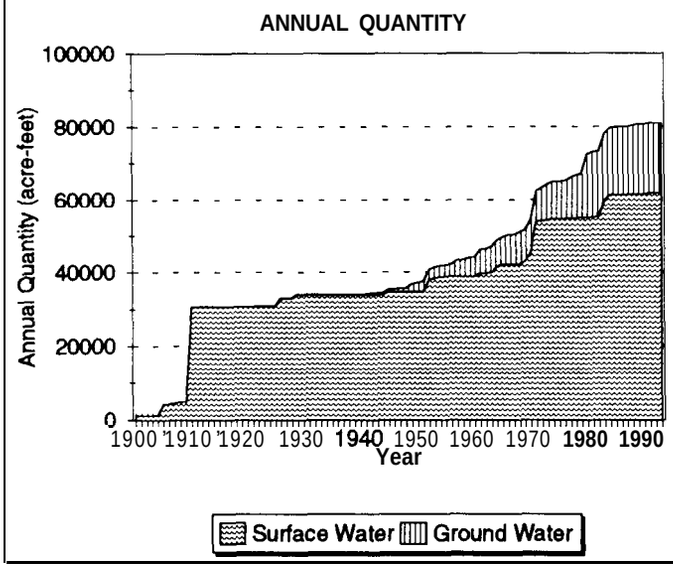
Wenatchee River, Icicle Creek, and Mission Creek. The instream flows apply only to water rights issued after flows were established. Water rights issued before flows were set are not affected.

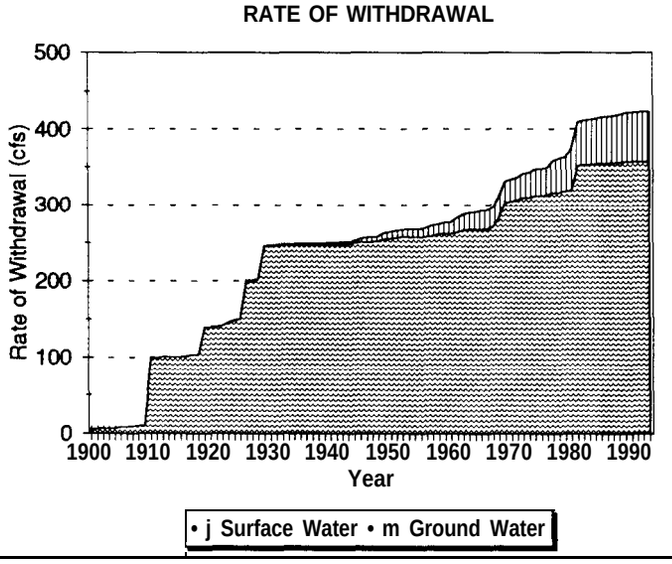
In general, streamflows have not been affected significantly by human use in the watershed above Leavenworth because the area is largely mountainous and undeveloped. Streamflows near the lower ends of the watershed, particularly in the Wenatchee River and in tributaries below Leavenworth, are more affected by withdrawals for irrigation, commercial, industrial, municipal and domestic uses, and other activities. Because many water uses predate streamflow data collection, it is difficult to determine the extent of the changes to natural streamflow. No trend of either increasing or decreasing streamflows was found for the stream gages analyzed.

Streamflows in the Wenatchee River fall below instream flow levels on average 69 days per year at Plain, 69 days per year at Peshastin and 51 days per year at Monitor. See graph, above. Streamflows on Icicle Creek fall below instream levels an average of 66 days per year. The majority of the excursions from instream flow levels occur in the August through October period. However, there does not appear to be an increasing trend in the number of instream flow excursions in the critical summer months.

In addition to establishing instream flows in 1983 for the Wenatchee River, Icicle Creek, and Mission Creek, Ecology closed Peshastin Creek to further appropriation between June 15 and October 15.

HISTORICAL GROWTH OF WATER RIGHTS APPROPRIATIONS IN WENATCHEE RIVER WATERSHED





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 1,885 water right claims have been filed for a total flow equivalent to about 669 cfs. Of those water right claims, there are 646 surface water claims for 608 cfs, and 1,239 ground water claims for 61 cfs.

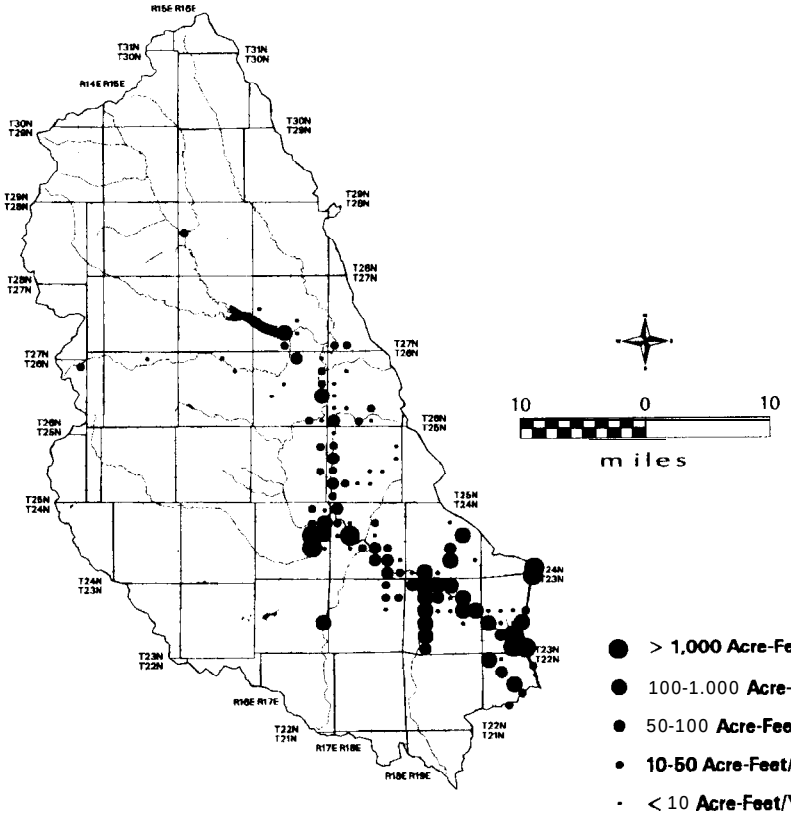
Why are water rights important?

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.

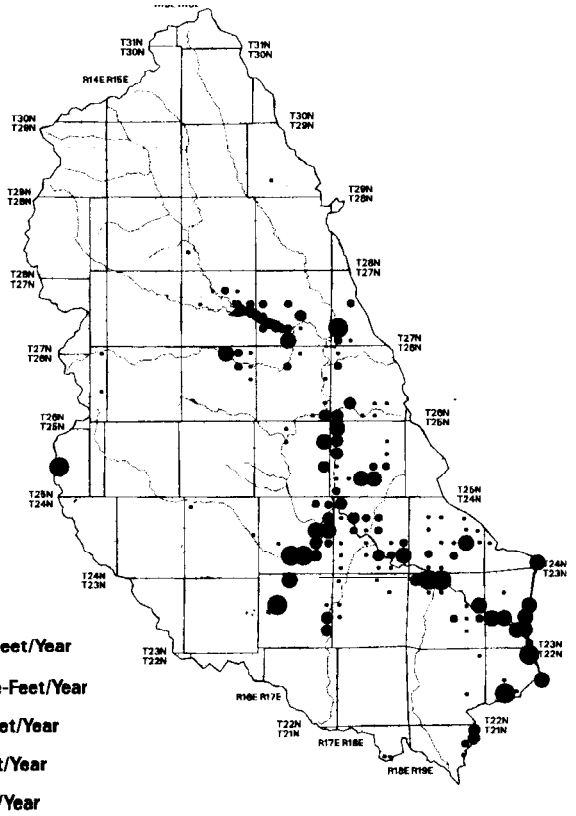
How is water currently allocated and what new uses are proposed?

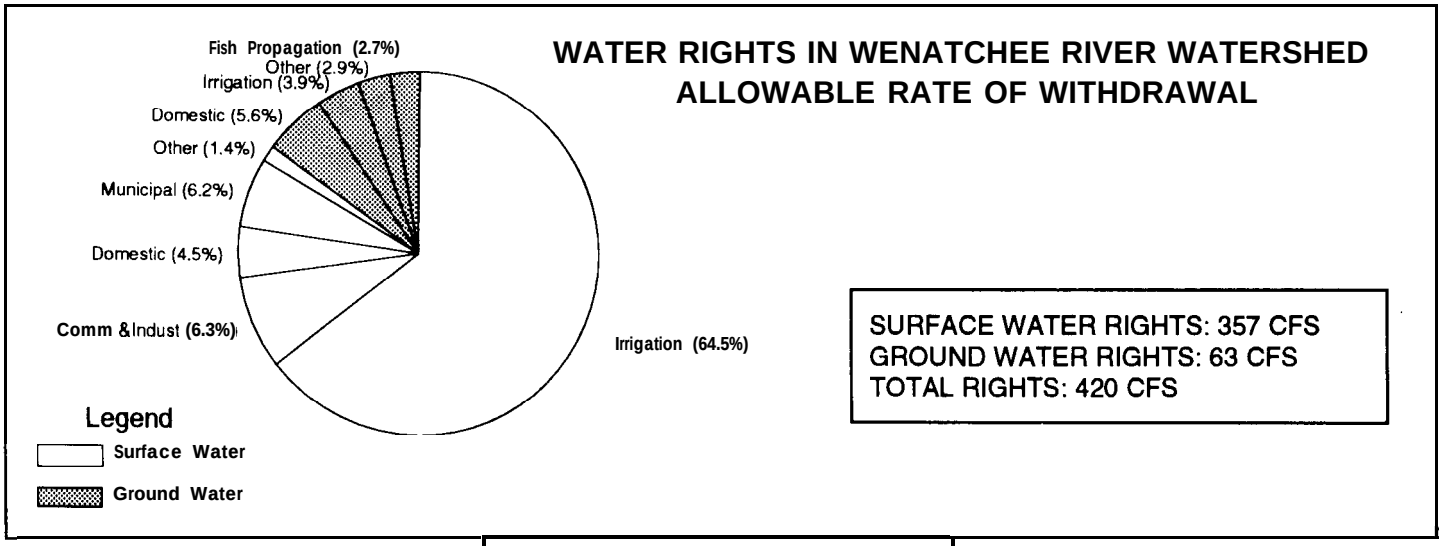
Ecology has issued water rights for withdrawals of 63 cfs of ground water and 357 cfs of surface water. The annual volume of issued ground water rights equals 19,155 acre-feet, and issued surface water rights equal 61,857 acre-feet. One acre-foot equals the amount of water contained in a one-acre area with a water depth of one foot. The historical growth of water right appropriations is shown in the figure on page 5, bottom. Seventy-six percent of the surface water and 26 percent of the

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



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





ground water is allocated for irrigated agriculture. The second largest use is municipal and domestic, with about 45 percent of the allocated ground water and 12 percent of the surface water allocation. Commercial and industrial uses have 11 percent of the allocated ground water and 10 percent of the allocated surface water. Fish propagation accounts for 33 percent of the allocated ground water. Water use allocations are shown on the figure above. Location of rights by section are shown in the figures on page 6.

There are 55 applications for surface water permits pending, requesting approximately 20 cfs. Additionally, 64 applications for ground water permits are on file with Ecology, requesting a total of 21 cfs. Municipal, single and multiple domestic uses comprise 81 percent of the total water requested. Applications for irrigation use comprise nine percent of the volume requested. Most of the surface water applications are for use near Lake Wenatchee, Icicle Creek, and along the Wenatchee River downstream from Leavenworth. Most of the ground water applications are associated with domestic water systems and are located in the Nason Creek basin, near Lake Wenatchee, and also along the Wenatchee River valley downstream from Leavenworth. Sixteen applications, requesting five cfs, are for withdrawals from the Columbia River.

What are the conflicts?

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.

In the Wenatchee River watershed, the flows often do not meet instream flow levels set by Ecology, yet there is continued interest in obtaining water rights. For example, flows at Peshastin are below instream flows 57 percent of the time, on average, during September.

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.

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 Wenatchee 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.

Chapter 173-545 WAC. "Instream Resources Protection Program - Wenatchee River Basin, Water Resource Inventory Area (WRIA) 45."

Chelan County Conservation District, 1994. "Watershed Characterization and Ranking Report, Wenatchee River Watershed Ranking Project."

Ecology. 1995. "Initial Watershed Assessment, Wenatchee River Watershed. OFTR 95-I 2." 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 Wenatchee River watershed?

This assessment found that streamflow falls below instream flow levels for 51 to 69 days per year on the Wenatchee 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. Water use is highest in the late summer months when streamflows are lowest. Maintaining water quality and aquatic habitat depend on adequate streamflow. Because of these findings, the portions of the watershed along the Wenatchee River are classified as "medium risk" by Ecology. Other portions of the watershed that are tributary to the Wenatchee River, such as Peshastin, Chumstick, and Mission creeks, are classified as "high risk" because of seasonal stream closures and the potential effects of additional withdrawals on streamflow and on existing users.

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 Wenatchee 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 established streamflow levels more frequently and for longer periods of time. Not all new uses of water, including public water supply, could be approved unless acceptable mitigation was proposed.

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

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

- Increase storage of water during periods of high stream flow for use during periods of low stream flow if this can be done without impacting 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; may only be suitable for small-scale projects.

- 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) 5752800 (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).