DESCHUTES RIVER WATERSHED INITIAL ASSESSMENT

D R A F T

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 rights.

To expedite decisions about pending water right applications, it is vital that we accurately assess the quality and quantity of surface water (streams, lakes and springs) 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.

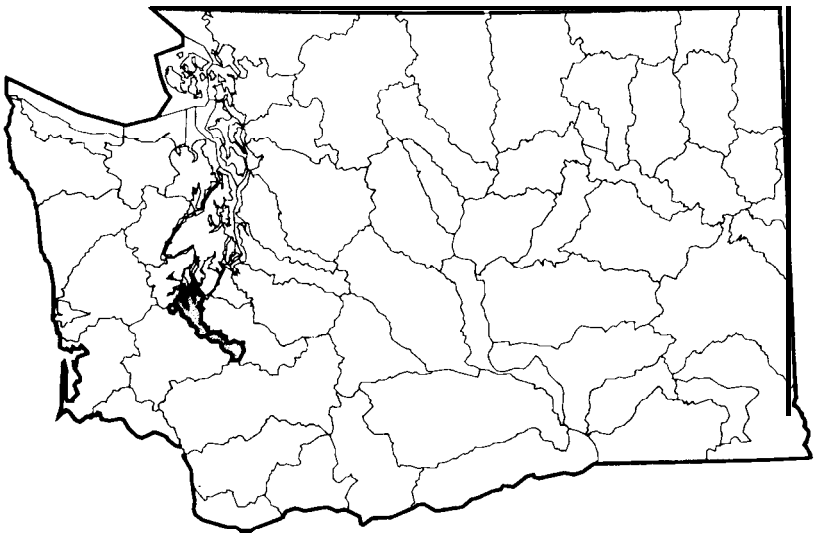
The assessments describe existing data on water rights, streamflow, precipitation, geology, hydrology, water quality, fisheries resources, and land use patterns. Some assessments provide straightforward results, allowing immediate water management decisions. In watersheds with little existing information, 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. 95-10. It also presents some actions that could be taken in response to the results of this assessment.

Pacific Groundwater Group, Inc. and associated firms

Prepared in cooperation with the
Washington Department of Ecology

Deschutes River Watershed



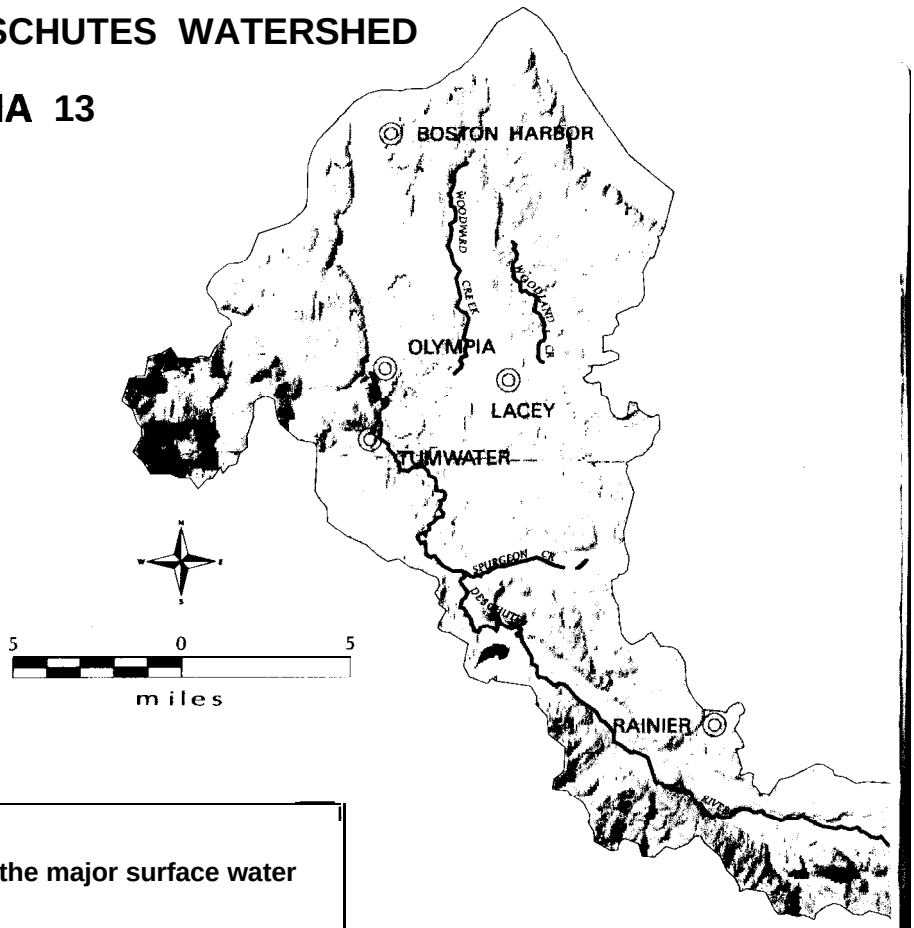
What are the water allocation issues?

- Ecology needs to make decisions on 45 pending applications for water rights.
- Since 1980, parts of the Deschutes River, its tributaries and other tributaries to Puget Sound have been closed by rule to further appropriation. The closures vary from seasonal to year-round. Other tributaries have low flow limitations.
- Population growth is steadily increasing the demand for water. Water may not be available to meet this demand because of concerns regarding low flow conditions and the potential for seawater intrusion.
- Ground water discharge provides the low flows of all streams in the watershed and additional pumping may cause a reduction in those flows,

WR-95-158

DESCHUTES WATERSHED

WRIA 13



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.

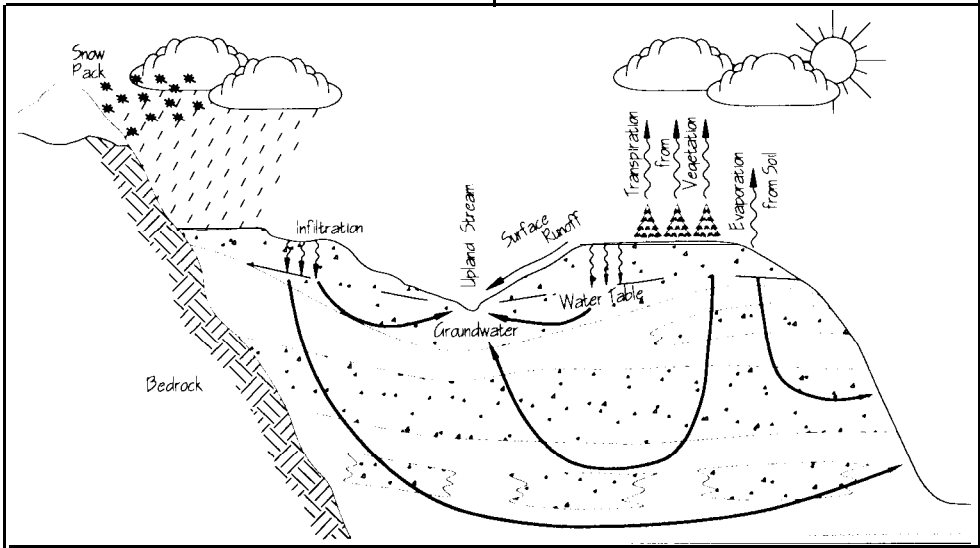
Where does the water come from?

Ultimately, all of the surface 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 streambeds into the ground.

Average annual precipitation in the Deschutes watershed is 51 inches per year. About 40 to 60 inches per year fall in the lower elevations and 60 to 90 inches in the higher elevations. Winter snowfall is common in higher elevations. According to Olympia rainfall records, almost 80 percent of precipitation falls between October and March, while less than seven percent falls between June and August.

What are the major surface water sources?

The Deschutes River is the major surface water source in the watershed. In addition to the Deschutes River and its tributaries, several creeks in the watershed drain directly into Puget Sound (see map, above).



The hydrologic cycle in the Deschutes watershed

Flow in the watershed's rivers and streams has two sources: ground water discharge to the stream and overland runoff during wetter periods. Streamflows during the dry summer months are sustained by ground water discharge, and are generally stable from day to day. Streamflows during other periods are closely linked to rainfall and therefore vary widely.

What are the major ground water sources?

Over 1,000 feet of sediments underlie the northern portions of the watershed. Layers of these sediments which yield usable amounts of water are known as aquifers. Sand and gravel

deposits along the major rivers and streams also make good aquifers. Shallow bedrock in the southern portions of the watershed yields small amounts of water to wells from cracks and joints.

Ground water is primarily recharged by infiltrating rain and snowmelt. Most of the wells in the Deschutes watershed are developed in the shallow stream deposits or the layered glacial sediments. Water yields from the sediments are substantially higher than from the bedrock.

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

In the Deschutes watershed, there is a direct connection between shallow aquifers and local rivers and streams. Deeper aquifers tend to be connected on a more regional scale to the major drainages, such as the Deschutes and Nisqually rivers, and to Puget Sound.

The connections between streams and aquifers are most obvious during dry periods, when most of the flow comes from ground water. Studies by the U.S. Geological Survey have shown that the Deschutes River loses and gains streamflow along its course due to seepage through the streambed. Where ground water and surface water are highly connected, pumping of additional ground water will reduce river flows or discharge to Puget Sound.

How is water used?

According to state records, most of the water allocated in the Deschutes watershed (87 percent) is from ground water (see graphs and charts on page 5). Of this amount, 72 percent is used for municipal and domestic purposes, 16 percent for commercial and industrial uses, 8 percent for irrigation, and 4 percent for other uses. Surface water, which consists of only 13 percent of total amount of water allocated, is primarily used for irrigation.

How does land use affect water?

Land use affects water availability by changing the demand for and use of water. Some land uses, such as municipal, industrial and irrigated agriculture, may require large amounts of water. Other land uses, such as timber production, require less water.

Most of the Deschutes watershed (82 percent) is covered by non-agricultural vegetation. Surface water bodies cover 9 percent, agriculture covers about 0.5 percent, and developed areas cover less than 8.5 percent.

Urban development is centered in and around the cities of Olympia, Lacey and Tumwater.

Municipal, industrial, and agricultural land uses have the greatest effect on ground water availability because of high volume pumping. Municipal and industrial land uses also tend to decrease ground water recharge while increasing stormwater runoff. Impervious surfaces, such as roads, buildings, parking lots, usually cause stormwater to run directly to drainpipes and streams, reducing the chance for infiltration to the ground.

Agricultural diversions have the greatest effect on stream flow, particularly during the summer months when water needs are highest and streamflows are naturally low.

Population growth in Thurston County, which contains much of the Deschutes watershed, is predicted to continue at about two percent per year. To serve this additional population, municipal and other domestic ground water withdrawals are likely to increase. Any additional pumping will capture more of the ground water that naturally discharges to rivers and Puget Sound.

Increasing development also tends to increase pollution from “non-point” sources, such as lawns, septic tanks and roads.

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 a sufficient amount of clean water to reduce the adverse effects of pollutants and increased surface water temperatures. Removing streamside

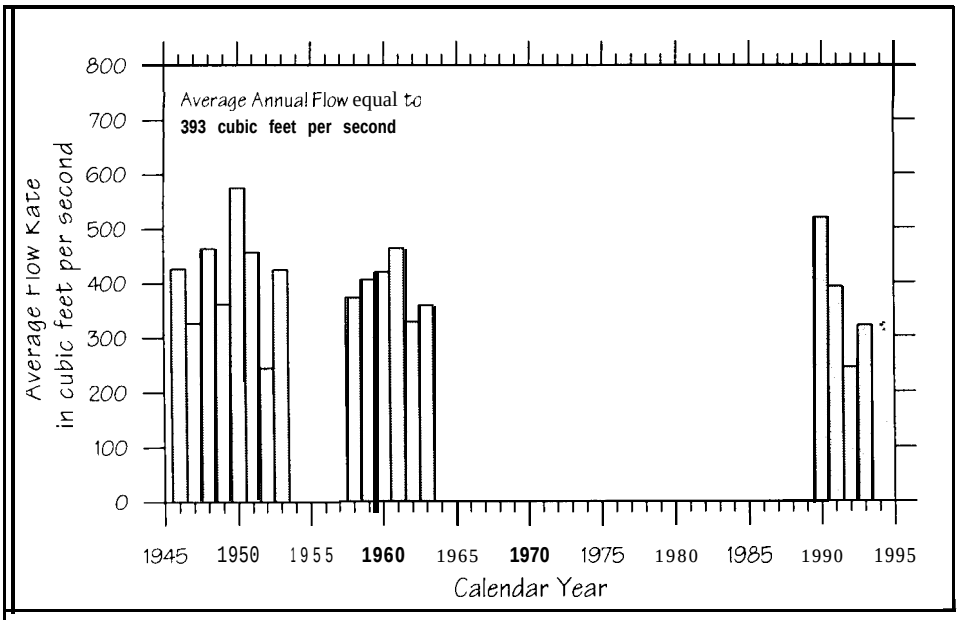
vegetation tends to raise water temperature to a level that may be harmful to fish and other aquatic animals, insects and plants.

The Deschutes River and some other streams in the watershed occasionally experience problems with water quality. Problems include high temperature and fecal coliform in the Deschutes River; pH (acidity) in Huckleberry Creek; and high temperature, fecal coliform, turbidity and low dissolved oxygen in Woodland Creek.

Ground water in the Deschutes watershed is generally of good quality, although problems with seawater intrusion have been noted along parts of Puget Sound. Localized contamination and naturally occurring iron and manganese (especially in the deeper aquifers) may limit some ground water development.

Are fish resources stable?

Much of the information on fishery issues in the Deschutes watershed is found in the "SASSI" report (the State Salmon and Steelhead Stock Inventory), prepared by the Washington State Departments of Fisheries and Wildlife, with assistance from 23 Indian Tribes and tribal organizations. According to the SASSI report, the Deschutes watershed supports chinook, coho, and chum salmon as well as winter steelhead. All but two stocks are reported to be "healthy," meaning escapement, run size, and survival levels are within normal ranges. The condition of Woodward and Woodland creek chum and McLane Creek steelhead, are "unknown," according to the report. The watershed also supports a number of other fish species whose survival is of concern, including Dolly Varden/bull trout, Olympic mudminnow, pygmy whitefish and sea-run cutthroat trout.



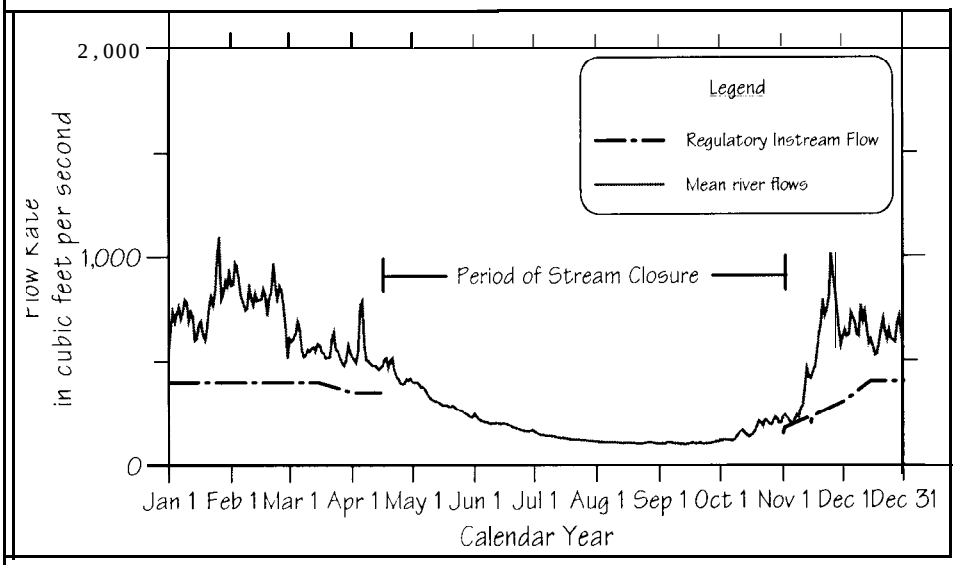
Annual average streamflow for the Deschutes River, recorded at the USGS gaging station near Tumwater. Average runoff is 393 cubic feet per second

How have streamflows changed?

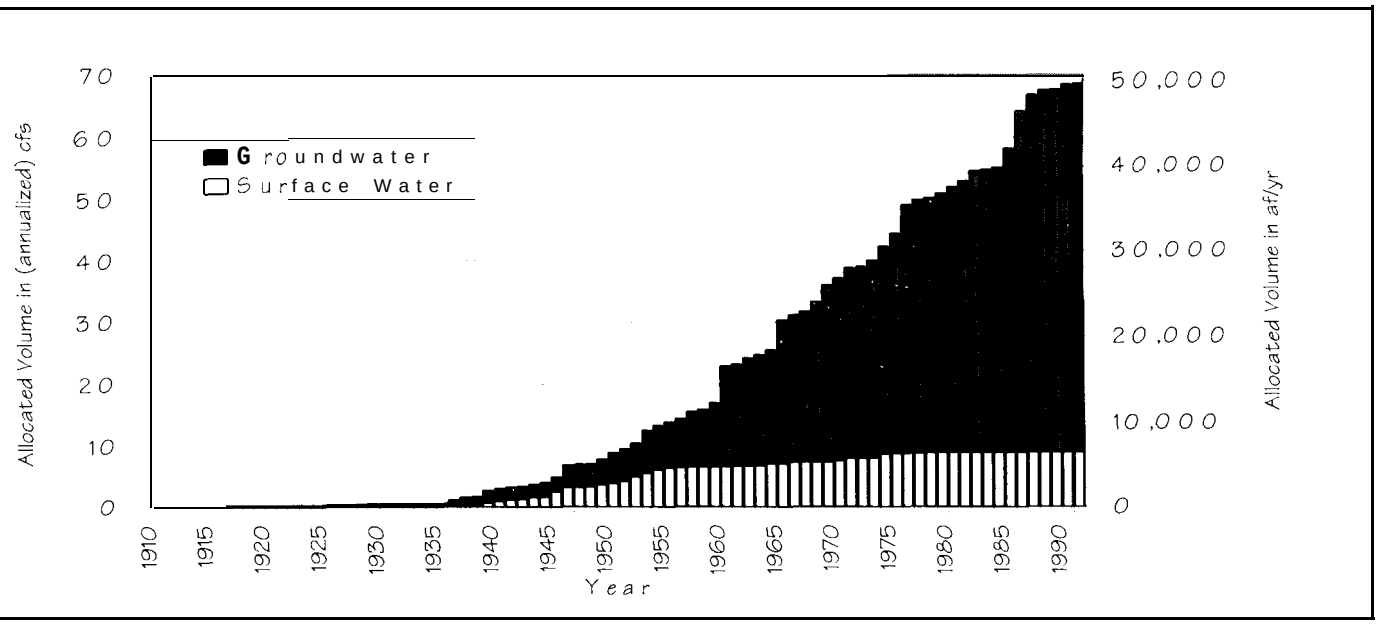
Annual streamflow in the Deschutes River varies widely from year to year in a pattern similar to annual precipitation. This high variability is demonstrated by data from the stream gage at Tumwater (see above), where 1991 annual average streamflow was 393 cfs compared to a 1992 annual average streamflow of 245 cfs.

Summer streamflows, which are largely dependent on ground water discharge, do not vary as much as annual streamflows, which are largely influenced by precipitation.

To protect senior water rights and instream uses, such as critical fish habitat, Ecology set by rule in 1980, instream flows and seasonal or year-round closures for the Deschutes River and smaller streams in the watershed. Water rights issued



Mean daily flow versus minimum instream flow requirements and closure periods for the Deschutes River. Most of the river's flow occurs in winter and spring, when demand is lowest and fisheries habitat is least critical.



Water rights (permits and certificates) versus time in the Deschutes watershed. The last water right was issued in 1991, however applications for new permits are on file with Ecology.

before flows were set are not affected.

The graph presented on the previous page shows average flows for the Deschutes River near Tumwater as compared to the minimum instream flows. The period of stream closure was set in 1980 because summer instream flows were commonly not met.

Recent streamflow data (1990-1993) show little change in summer low flows compared to the earlier (1946-l 963) period of record. However, the recent streamflow record is quite limited. Continued collection of long-term uninterrupted data would be necessary to determine how seasonal low flows have been affected by water use.

What are water rights?

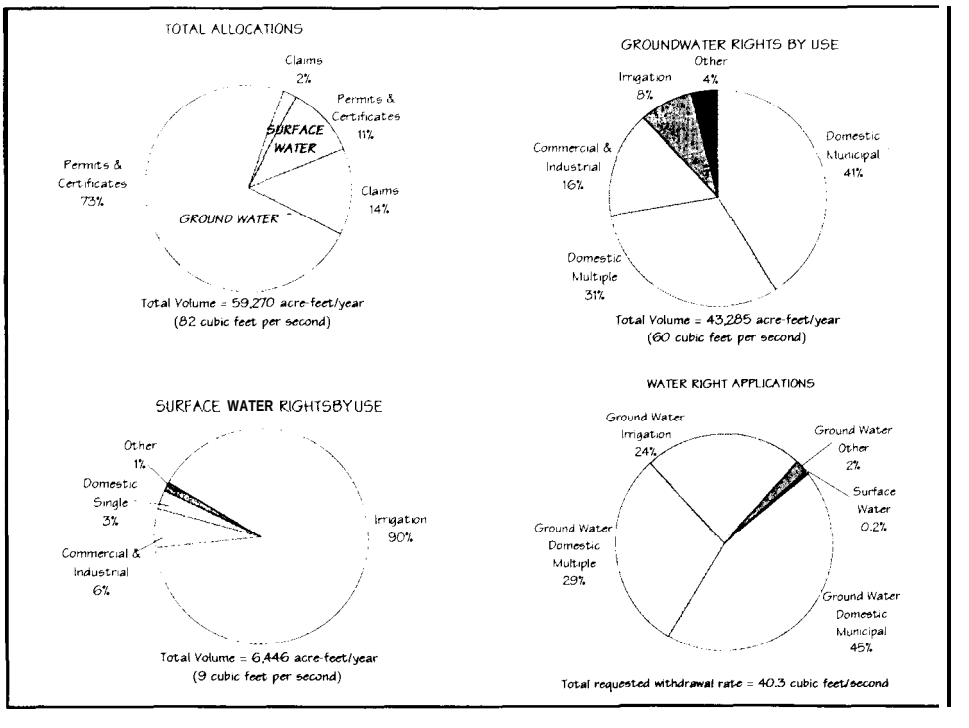
A water right is a legal authorization to use a certain amount of public water for specific beneficial purposes.

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



Distributions of water rights in the Deschutes watershed by use and by category (permits/certificates, claims, and applications).

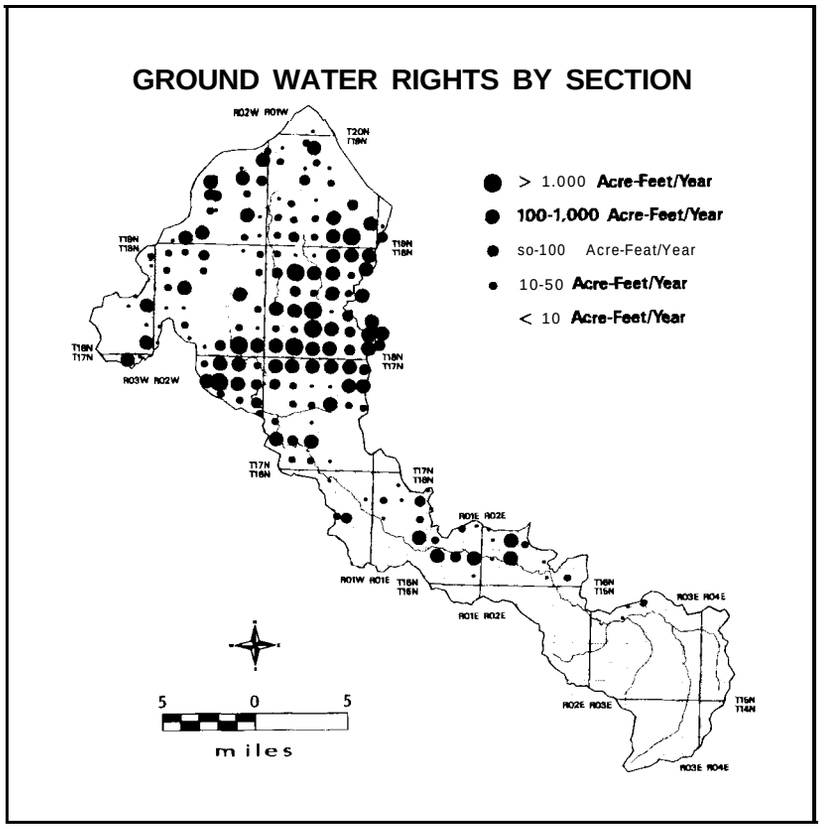
superior court determination of water rights. Within the watershed, there are 3,566 ground water and 234 surface water claims on file, for a total flow equivalent to about 13 cfs.

Why are water rights important?

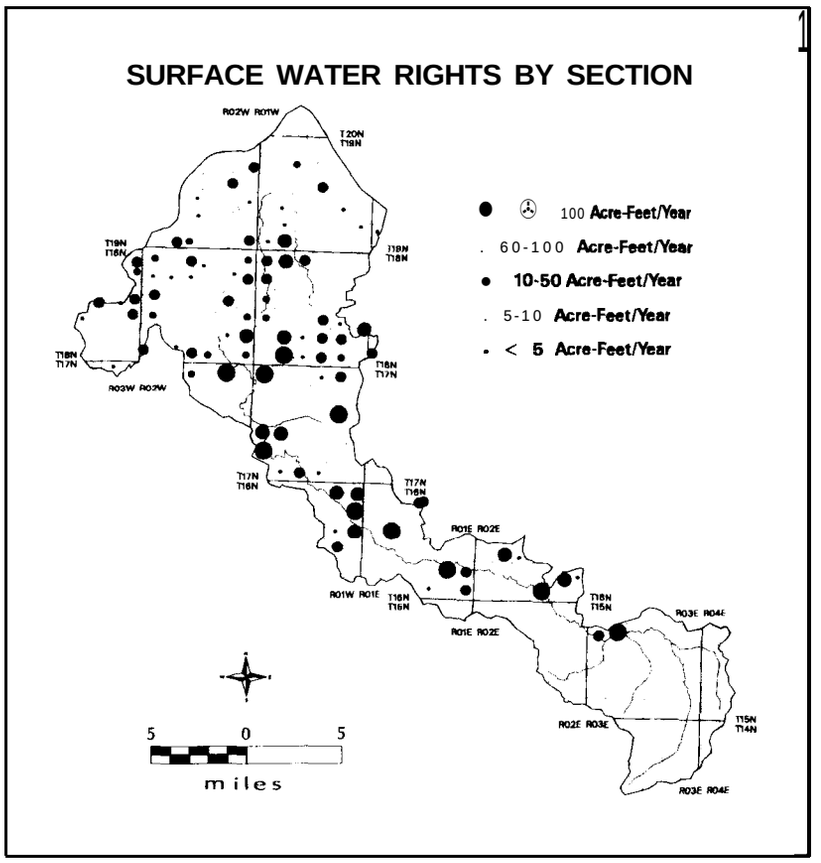
The basis for water rights is “first in time, first in right.” This means people with older, or senior, rights get to use the water first when there is not enough for everyone. The water rights program ensures that Washington’s water resources are appropriately allocated and managed. By effectively managing 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?

Eighty-seven percent of the water allocated in the Deschutes River watershed is ground water. The 582 ground water rights issued by Ecology are equivalent to a flow of about 60 cfs, and the 453 surface water rights are equivalent to a flow of about 9 cfs.



Ground water rights in the Deschutes watershed.



Surface water rights in the Deschutes watershed.

Ecology currently has applications for 41 ground water and four surface water permits. Applications are filed for specific pumping rates or diversion flows, however allowable annual withdrawal volumes may be less. The applications are requesting about 40 cfs of ground water and 0.07 cfs of surface water. The applications are almost entirely for municipal, domestic, and irrigation use.

Distributions of water rights applications by use and category are shown on the previous page. The geographic distribution of water rights is shown on the figures above and to the left.

The amount of water allocated probably exceeds the amount used. This assessment and earlier research by the U.S. Geologic Survey indicate that ground water use is about 50 percent of allocations, the volumes legally available for use if all water rights are exercised. If the amount of water used approaches the amount allocated, streamflow reductions may occur.

What are the conflicts?

The Deschutes River and many of its tributaries are closed seasonally or year round to new uses that will impair streamflows.

Water use conflicts occur when the available water supply is insufficient to fulfill existing water rights and claims, including maintaining instream flows. Future conflicts could occur between existing rights and proposed future uses. Before issuing future ground water rights, Ecology must consider potential effects on other water users.

Annual flow in the Deschutes River averages 393 cfs at Tumwater. Flow at the mouth of the Deschutes River is somewhat higher. Water claims and rights for the entire watershed total 82 cfs and current applications are requesting an additional 40 cfs. Although current rights, claims and applications comprise less than one third of total annual streamflow, most of this streamflow occurs in the winter months and is not available for meeting the high summer demands.

Many water right permits, claims, and applications are for ground water sources in the northern part of the watershed. Ground water in this area discharges to Puget Sound, consequently any withdrawal from this area would not likely affect the streamflow of the Deschutes River. However, ground water withdrawal in this area could affect the streamflow of other smaller streams or could result in seawater intrusion.

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 about water issues in the Deschutes watershed, the following studies and technical reports are available:

Noble and Wallace. 1966. Geology and Ground-Water Resources of Thurston County, Washington. Water Supply Bulletin No. 10.

Ecology. 1980. Deschutes River Basin Instream Resource Protection Program, Including Proposed Administrative Rules (WRIA 13), State Water Program, State of Washington,

Ecology. 1980. Instream Resources Protection Program- Deschutes River Basin, Water Resources Inventory Area (WRIA) 13, Chapter 173-513 WAC.

Ecology. 1988. Reservation of Future Public Water Supply for Thurston County, Chapter 173-591 WAC.

Ecology. 1995. Initial Watershed Assessment, Deschutes River Watershed. Open File Technical Report 95-10. Washington Department of Ecology.

Puget Sound Cooperative River Basin Team. 1990. Deschutes/Budd Inlet Watershed, Thurston County, Washington.

Thurston County Health Department. 1992. Northern Thurston County Ground Water Management Plan.

USGS. 1994. Hydrology and Quality of Ground Water in Northern Thurston County, Washington. Water Resources Investigations Report 92-4109.

WDF & WDG. 1975. A Catalog of Washington Streams and Salmon Utilization, Volume 1, Puget Sound Region. Washington Departments of Fisheries and Game.

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

For more information ...

Contact Gale Blomstrom at (360) 407-0271 (voice), (360) 407-6306 (TDD), or write to the Department of Ecology, P.O. Box 47775, Olympia, Washington 98504-7775.

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).

What do we know about the Deschutes watershed?

This assessment found that the Deschutes River and its tributaries are closed to new water uses seasonally or year round in order to protect senior water rights. In coastal areas, excessive ground water pumping could cause seawater intrusion. Land use activities have degraded the water quality in some parts of the watershed. In addition, adequate streamflows must be maintained for water quality and aquatic habitat. Because of these findings, the Deschutes Watershed is classified as "high risk" by Ecology. Ecology must consider potential impairments to existing water rights and instream resources when making decisions on pending water right applications.

What actions can be taken?

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

Encouraae water conservation, changes and transfers of water riahts. water reuse. and pioeline interconnections to allow 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 or other large water users, and may not meet all demands through these mechanisms.

Approve aoolications for new water riahts where acceptable mitiaation is proposed or where source is not tributary to closed surface water and impairment of existina riahts would not occur.

Pro: Some applicants would get approvals; surface waters and existing rights would be protected.

Con: No criteria exist for "acceptable mitigation"; applicants would have to determine that the source is "non tributary"; could be expensive and time consuming.

Deny aoolications for new water riahts where source is tributary to closed surface water.

Pro: Applicants would get decisions now; surface waters and existing rights would be protected.

Con: Applicants would not get the decisions they want.

Encouraae reaional 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 and/or storm water retention areas, 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.