

CEDAR-SAMMAMISH 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, appears to have 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 rights, it is vital that we accurately assess the quality and quantity of our 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.

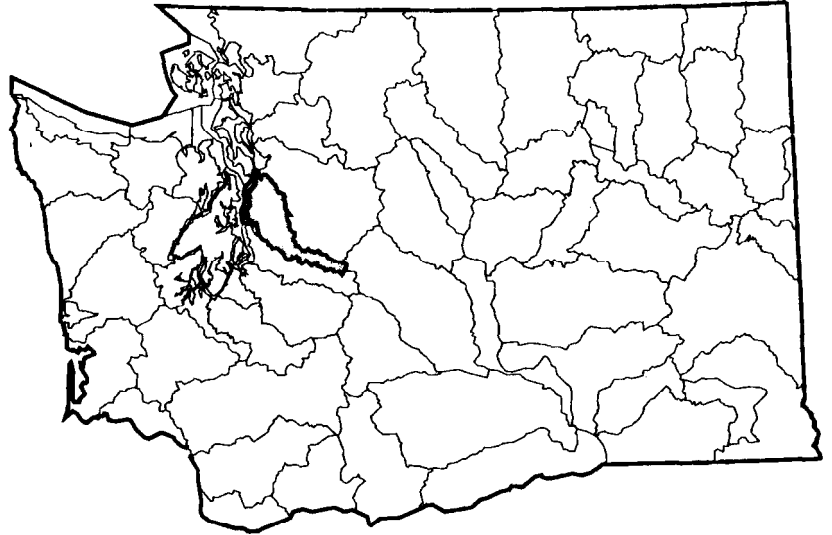
The assessments describe existing water rights, streamflows, precipitation, geology, hydrology, water quality, fisheries resources and land use patterns. Some assessments provide straightforward results, allowing immediate water management decisions. In watersheds with little existing information, further 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. 95-07. It also presents some actions that could be taken in response to the results of this assessment.

Science Applications International Corporation
Shapiro and Associates
Taylor Associates
Environmental Systems Research Institute

In partnership with the:
Washington Department of Ecology

Cedar-Sammamish Watershed Location Map



What are the water allocation issues?

- Ecology needs to make decisions on the 62 pending water right applications.
- Excluding the Cedar River drainage, the majority of the lakes and streams within the watershed are closed to issuing new water rights by Ecology. Nonetheless, flows in Issaquah Creek and the Sammamish River are declining.
- At the Cedar River flow measurement gage at Renton, streamflows necessary to protect instream resources were not met an average of about 81 days per year between 1980 and 1993. The number of days these minimum flows are not met appears to be increasing.
- Low streamflows in the Cedar and Sammamish rivers increase the adverse impact of pollutants, diminish support for fish populations and can increase the intrusion of seawater into Lake Washington through the Hiram M. Chittenden Locks.

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 streams, lakes, springs and other surface waters 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.

Average annual precipitation in the Cedar-Sammamish watershed ranges from about 38 inches at SeaTac to more than 102 inches at Cedar Lake. Data from the SeaTac and other western Washington weather stations show that precipitation was higher than average from the mid-1950s through 1980 and has been lower than average since then.

What are the major surface water sources?

The largest surface water source in the watershed is the Cedar River, which drains into Lake Washington. Issaquah Creek empties into Lake Sammamish, which in turn flows into the north end of Lake Washington via the Sammamish River.

What are the major ground water sources?

In the upper part of the watershed, much of the geology is made up of the volcanic rocks of Mount Rainier and the Cascade Mountains. This geology does not form productive aquifers, so ground water is not the main source of water in this area. Lower down, the glacial deposits in the Puget Sound area form aquifers that store usable amounts of ground water. Some of the major ground water sources are found around Issaquah, the Sammamish Plateau, Redmond and Renton.

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

Along Issaquah Creek and along the Cedar River at Renton, pumping from the aquifers has significantly reduced surface water flow and led to lower water levels in the streams.

How is water used?

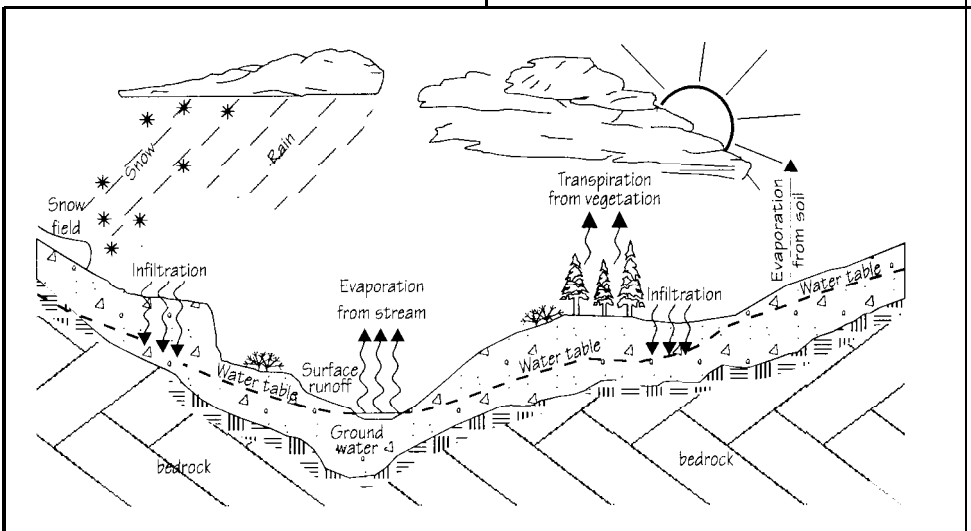
The major surface water uses in the Cedar-Sammamish watershed are municipal and domestic supplies. The City of Seattle diverts water through a pipeline that starts at Landsburg. Other important uses of surface water are for protection of water quality and fish populations.

The U.S. Army Corps of Engineers controls the amount of water that flows through the Chittenden Locks to facilitate ship traffic and to maintain fresh water conditions in Lake Washington.

Outside the metropolitan area, ground water within the watershed is used primarily for municipal and domestic supplies and irrigation.

How does land use affect water?

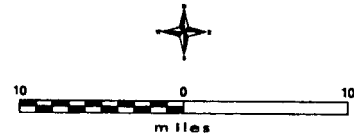
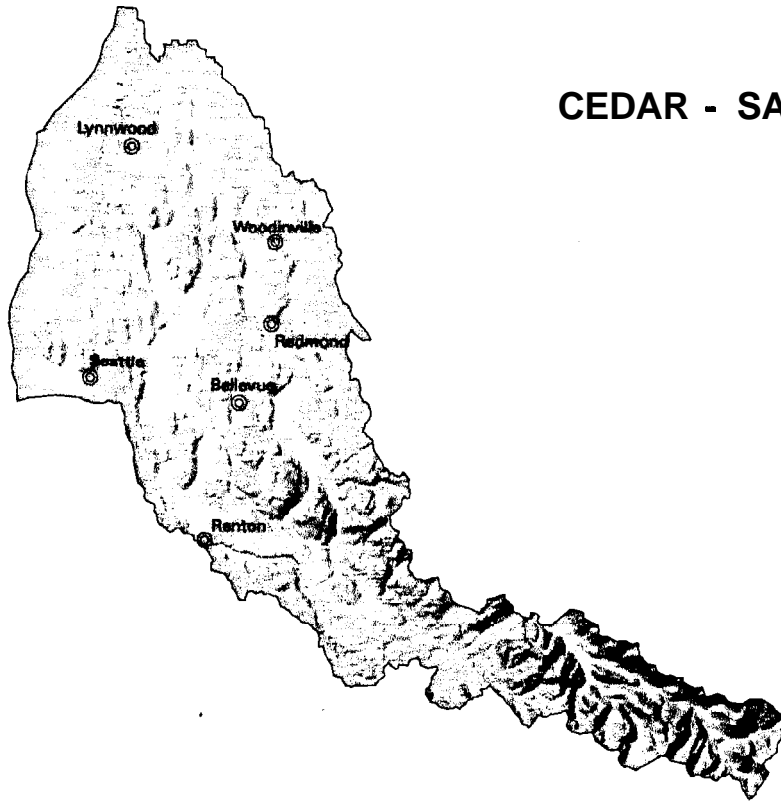
Land use practices have profound effects on the amount and quality of water moving through the watershed. Logging operations can strip soils of vegetation, increasing the amount of runoff. Increased soil



The hydrologic cycle in the Cedar-Sammamish Watershed (modified from Walters and Nassar).

CEDAR - SAMMAMISH WATERSHED

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erosion from this runoff can cloud the water with sediment. In agricultural areas, chemicals and livestock wastes can drain into streams and rivers and irrigation can withdraw significant volumes of water.

The expansion of impervious surfaces (roads, parking lots, buildings) increases the amount and rate at which surface runoff flows into streams. This increased runoff means less water enters the ground to recharge the aquifer. It may lead to increased flooding. Stormwater runoff can also carry pollutants from these surfaces into local surface water bodies.

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, as well as recreation and other uses we all enjoy. At the same time, water quality may depend on

maintaining large quantities of clean water to reduce the adverse impacts of existing pollutants and maintain proper water temperatures for fish.

The major water quality problems can be attributed to piped discharges and runoff from the land. Contaminants of concern include fecal coliform bacteria, phosphorus and low dissolved oxygen levels. Other problems reported include sediments containing mercury, pesticides, PCBs and dioxins.

Some ground water pollution has occurred in the aquifers. Data from public supply wells indicate concentrations of nitrate are elevated above natural levels. However, none of the nitrate concentrations in drinking water exceeded the standards set under the federal Safe Drinking Water Act.

Are fish resources stable?

Fish species in the Cedar-Sammamish watershed include chinook, sockeye, coho salmon and steelhead and cutthroat trout. Fish habitats in the watershed have been degraded by human activities as evidenced by poor water quality, high water temperatures, destruction of spawning habitat and low streamflows. Seattle Water Departments Landsburg dam prohibits upstream fish migration. Therefore, no salmon spawning occurs above the dam at Landsburg.

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 Cedar-Sammamish watershed. The studies are the American Fisheries Society ("AFS") and the Salmon and Steelhead Stock Inventory ("SASSI").

Sockeye stocks from the Cedar River and tributaries of Lake Washington and Lake Sammamish, are described in the SASSI report as “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. Lake Washington winter run steelhead and coho salmon of mixed stock in Lake Washington and Lake Sammamish are also classified as “depressed.”

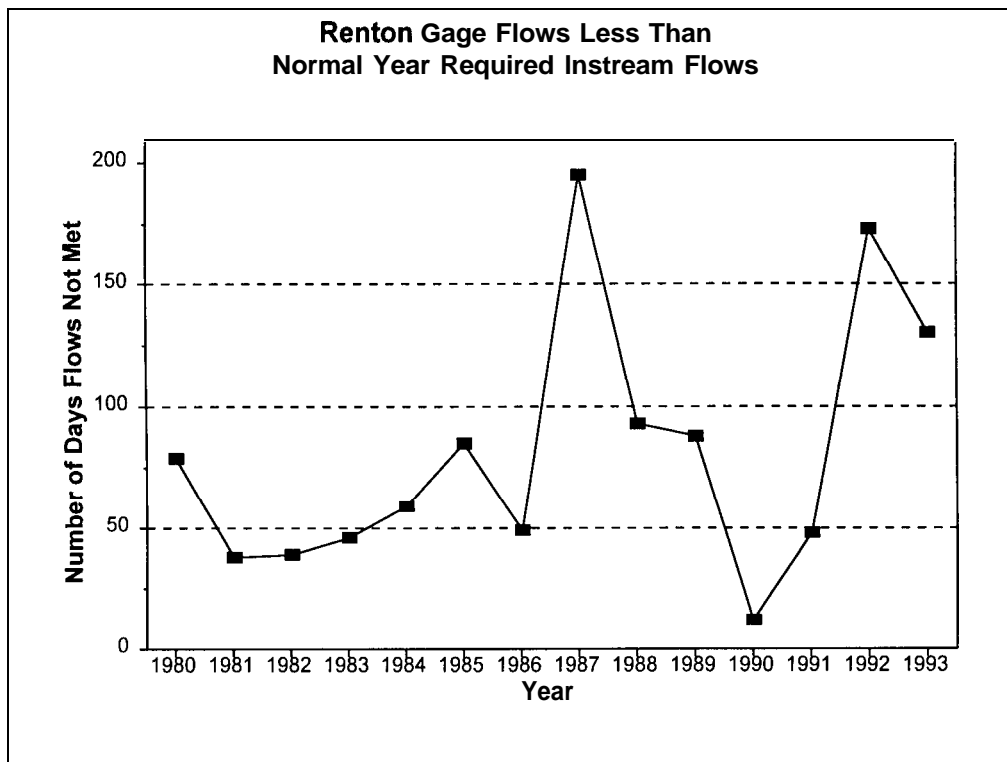
How have streamflows changed?

The U.S. Geological Survey has operated a stream gaging station to measure the amount of water that flows through the Cedar River at Renton continually since 1945. The average annual flow at this gage is 666 cubic feet per second or cfs.

In 1980, Ecology established streamflows for the Cedar River at the Renton gage. The instream flows apply only to water rights issued after they were established. Water rights issued before flows were set are not affected.

Cedar River minimum flows have not been met an average of about 81 days per year at the Renton gage since 1980. The number of days appears to be increasing (see graph at right).

The graph on the top of page 5 shows the instream flow established by rule along with the flows that are likely to occur based on actual flow data from 1980 to 1993 at the Cedar River gage at Renton. The upper line represents the flows which can be expected about 50 percent of the time. This indicates that about one half of the time instream flows will not be met during much of the summer, and in most years, seldom during late summer. The lower line indicates that instream flows normally will not be met throughout much of



Number of days instream flows were not met

the year about one out of every ten years.

In addition to setting instream flows on the Cedar River, Ecology also closed all tributaries of Lake Washington to further surface water appropriations. Data from gages on the Sammamish River at Woodinville and near the mouth of Issaquah Creek show significant summer flow declines within these two subbasins. These declines can be attributed to a combination of less precipitation, increased ground water withdrawal and the paving of land surfaces. Paving land surfaces reduces the recharge to the aquifers which, in turn, reduces the ground water contribution to streams in summer.

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 obtain a water

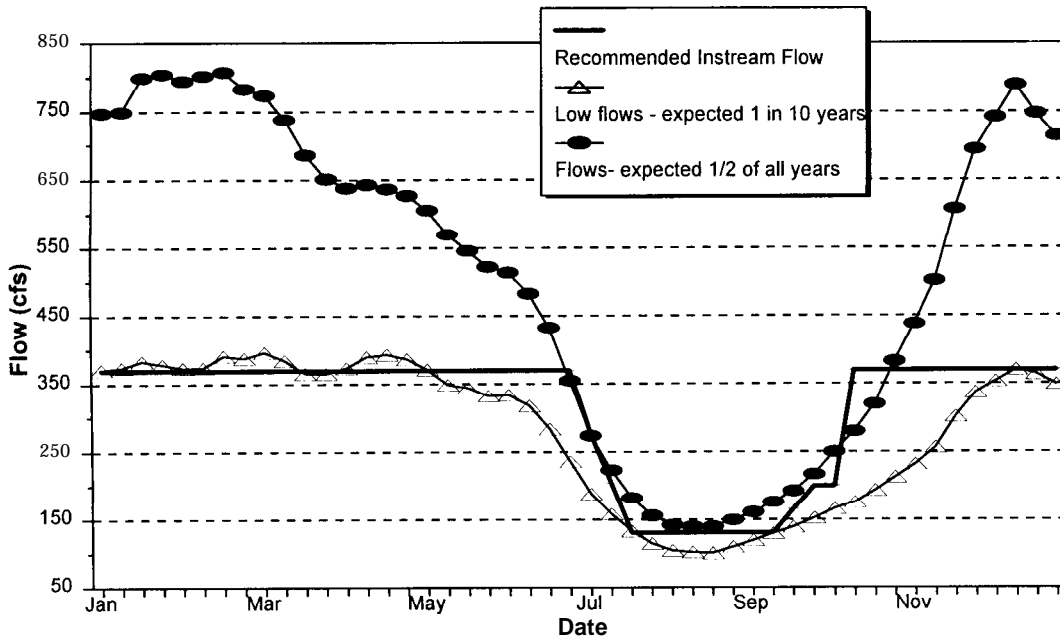
right permit before using these waters. People who use ground water also need a water right permit unless they use 5,000 gallons or less each day for one or more of the following purposes: watering stock, watering a lawn or garden less than one-half acre in size, or a single or group domestic or industrial 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 cannot be determined until the court rules on it through an adjudication process. Within the watershed, a total of 6,225 water right claims have been filed, for a total flow equivalent to about 674 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,



Renton Gage - Comparison of Instream Flows and Expected Flows (1980-1993)

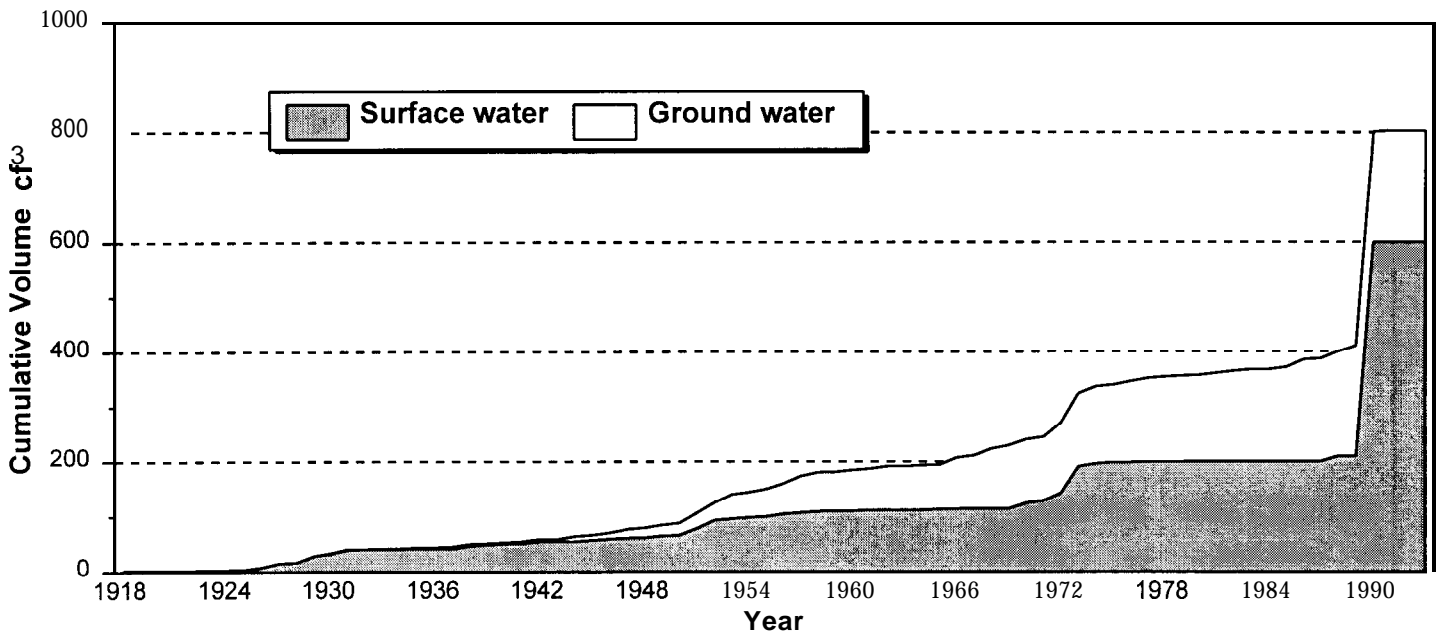
rights get to use the water first when there is not enough for everyone. The water rights program ensures that Washington's water resources are appropriately allocated and managed. By effectively managing allocation of new water rights, we can protect senior water rights and benefit the overall public good.

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

The amount of water allocated through water right permits in the watershed has risen dramatically. Between 1950 and 1993, ground water rights increased more than ninefold, from 22 to 204 cfs.

During the same time, surface water rights increased by the same factor from 65 to 600 cfs. This includes a 15-year temporary permit issued to Seattle in 1990 (see graph at the bottom of this page).

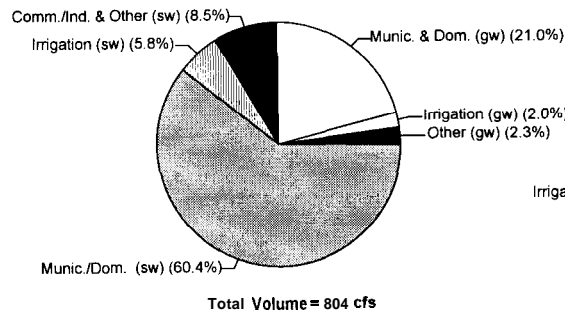
Water Rights Permits & Certificates



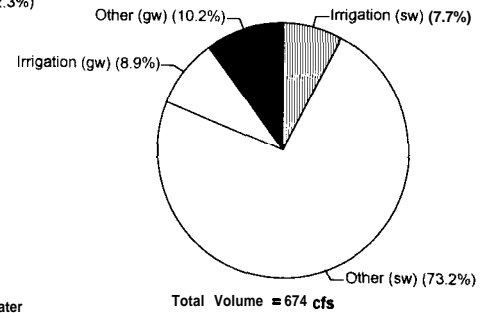
There are currently 55 ground water applications on file with Ecology for water rights in the Cedar-Sammamish watershed. The applications request a total of 136 cfs. There are also seven applications for surface water rights totalling less than 1 cfs. The additional requests, if granted, would increase the quantity of ground and surface water allocated in the watershed by 17 percent, primarily to serve municipal demands.

Allocated Uses of Water

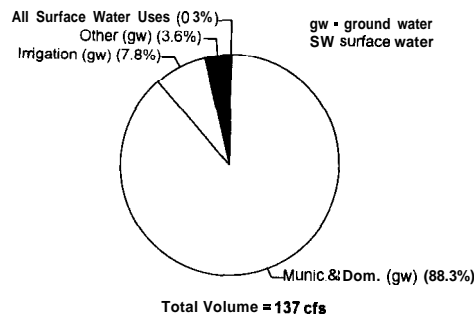
SURFACE AND GROUND WATER RIGHTS



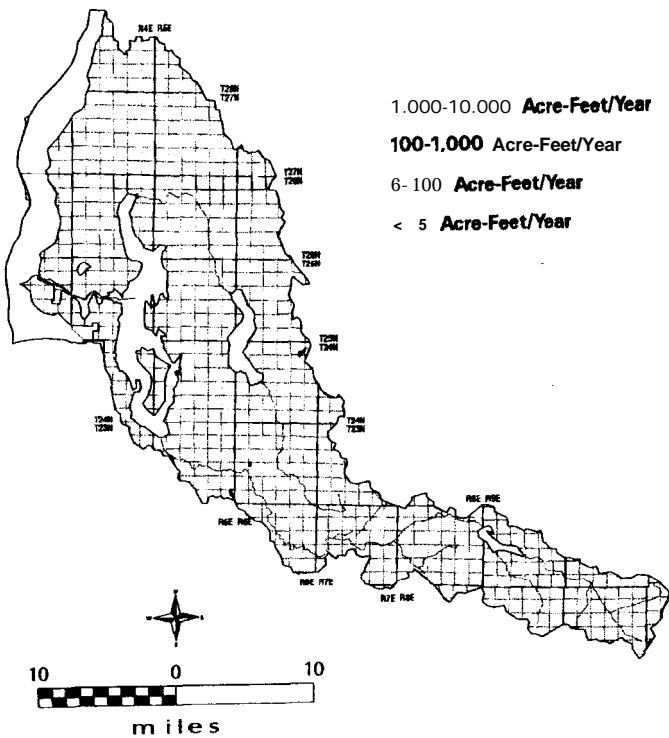
WATER RIGHT CLAIMS



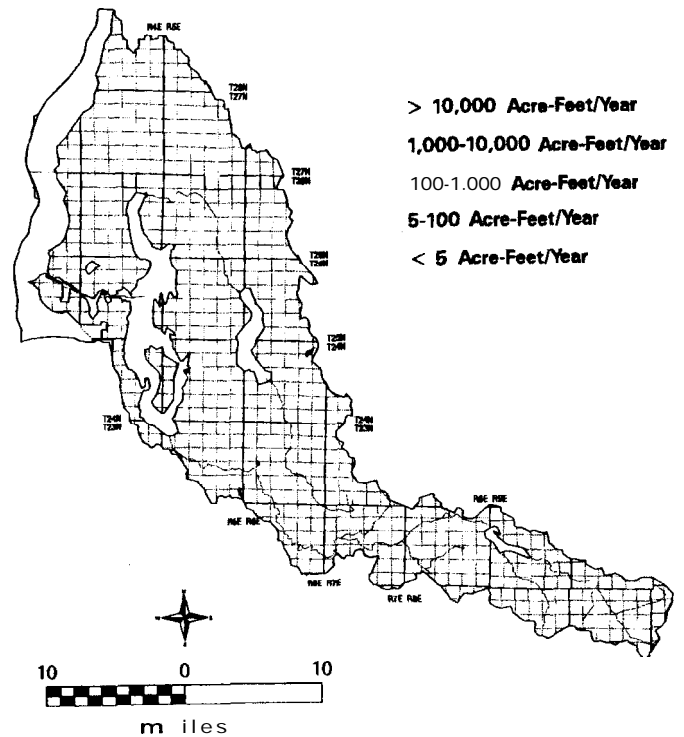
WATER RIGHT APPLICATIONS



GROUND WATER RIGHTS BY SECTION



SURFACE WATER RIGHTS BY SECTION



What are the conflicts in the watershed?

Both surface water flows and ground water levels have declined in the closed portions of the watershed during recent years and the two are interconnected. Additional ground or surface water withdrawals that would likely be associated with predicted population growth in the watershed will cause surface water flows to decline even more. Before issuing future water rights, Ecology must consider potential effects on existing water users.

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 to learn more about water rights issues in the Cedar-Sammamish 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." Fisheries. American Fisheries Society.

Ecology. 1979. Cedar-Sammamish Basin Instream Resources Protection Program Including Proposed Administrative Rules to Supplement EIS (WRIA 8). Washington State Department of Ecology, Olympia, Washington.

Ecology. 1995. Draft Initial Watershed Assessment Water Resources Inventory Area 8 Cedar-Sammamish Watershed. OFTR 95-07.

King County. 1990. East Lake Sammamish Basin Conditions Report - Preliminary Analysis. King County Surface Water Management Division. September, 1990.

King County. 1989. King County Watershed Ranking Final Report. King County Natural Resources and Parks Division, King County Public Works Department, METRO, Muckleshoot and Suquamish Indian Tribes, Seattle/King County Environmental Health Department, WSU King County Cooperative Extension.

KCSWM. 1993. Cedar River Current and Future Conditions Report. King County Surface Water Management.

KCSWM. 1993. Sammamish River Corridor Conditions and Enhancement Opportunities. King County Surface Water Management.

KCSWM. 1991. Issaquah Creek Basin Current/Future Conditions and Source Identification Report, King County Surface Water Management.

METRO. 1989-1990. Quality of local lakes and streams. Annual Status Reports. Municipality of Metro Seattle, Seattle, Washington.

WDF & WDW. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI).

For more information...

Contact Steve Hirschey at (206) 649-7066 (voice), (206) 6494249 (TDD), or write to the Department of Ecology, 31 90-160th Ave. SE, Bellevue, Washington 98008-5452.

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 Cedar-Sammamish watershed?

This assessment found that ground water pumping and land use changes may be reducing stream flow and adversely affecting senior water rights. Ground water also maintains the water level in streams when there is little precipitation. Water quality and aquatic habitat also depend on adequate stream flow. Because of these findings, the Cedar-Sammamish watershed is classified as a “high risk” watershed by Ecology.

What actions can be taken?

Based on the risk, 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.

Encourage conservation, changes and transfers of water rights. water reuse and pipeline interconnections to make efficient use of existing 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.

Increase storage of water during periods of high stream flow for use during periods of low stream flow.

Pro: -Allow for additional water rights to be issued without adverse impact on water resources during critical flow periods.

Con: -Potentially expensive, may be difficult to find suitable site, may require cooperation of others.

Deny applications for new water rights 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.

Approve applications for new water rights where acceptable mitigation is proposed or where source is not tributary to closed surface water and impairment of existing rights 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.

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 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.