CHAMBERS-CLOVER 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, stream flows, 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. 95-09. It also presents some actions that could be taken in response to the results of this assessment.

Science Applications International Corporation
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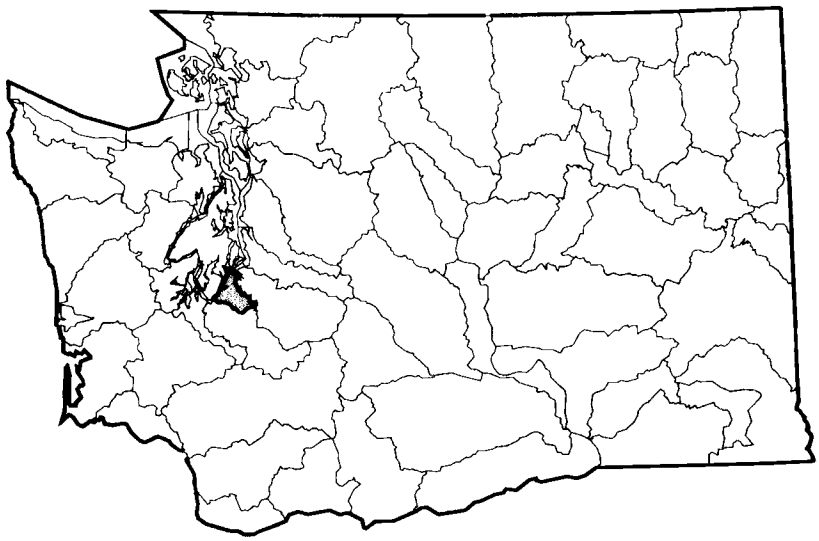
In partnership with the:
Washington Department of Ecology

Chambers-Clover Watershed Location Map



What are the water allocation issues?

- Ecology needs to make decisions on the 18 pending water right applications.
- Instream flows are lowest in the summer and fall months when Pacific salmon species migrate upstream to spawn and when the demand for water is highest.
- In 1980, Ecology closed major surface water bodies to new withdrawals. Continued withdrawal of ground water may result in further declines of instream flow. Senior water rights may not be adequately protected.
- All water users desire high quality water and surface water quality has declined in parts of the watershed.
- Population growth is steadily increasing the demand for water. Increased water use may further adversely affect water quality, fish habitat and existing water rights.

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?

All of the surface and ground water in the watershed comes from precipitation, as rain or snow. Some of this precipitation 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 while others lose water that leaks through the streambed into the ground.

Annual precipitation in the Chambers-Clover watershed averages about 39.4 inches (Tacoma rain gage). Data from eight western Washington weather stations show that precipitation was higher than average between the mid-1950s and early 1980s, and has been lower than average since then.

What are the major surface water sources?

Chambers-Clover Creek originates from springs and ground water discharge to streams in the northeast corner of the watershed. Clover Creek enters Steilacoom Lake which in turn is the source of Chambers Creek. Leach Creek and Flett Creek are two important tributaries to Chambers Creek. Chambers Creek flows north and west down a ravine into Chambers Bay, then into Puget Sound.

Chambers Bay is very narrow and its flow is limited by a railroad dike across the mouth. Chambers Creek is restricted further upstream by a dam built for industrial water supply.

What are the major ground water sources?

Ground water within the watershed is replenished solely from precipitation that falls within its boundaries. On the uplands, rain and melted snow infiltrate the soil and percolate to the water table. In the valleys, surface water from streams or lakes infiltrates into the adjacent aquifer wherever the ground water is below the level of the surface water. The most productive aquifers occur in the sandy or gravelly materials deposited by glaciers and streams.

How is water used?

The major surface water use in the Chambers-Clover watershed is for single and multiple domestic supply.

The major ground water uses are for public water supply and single domestic users.

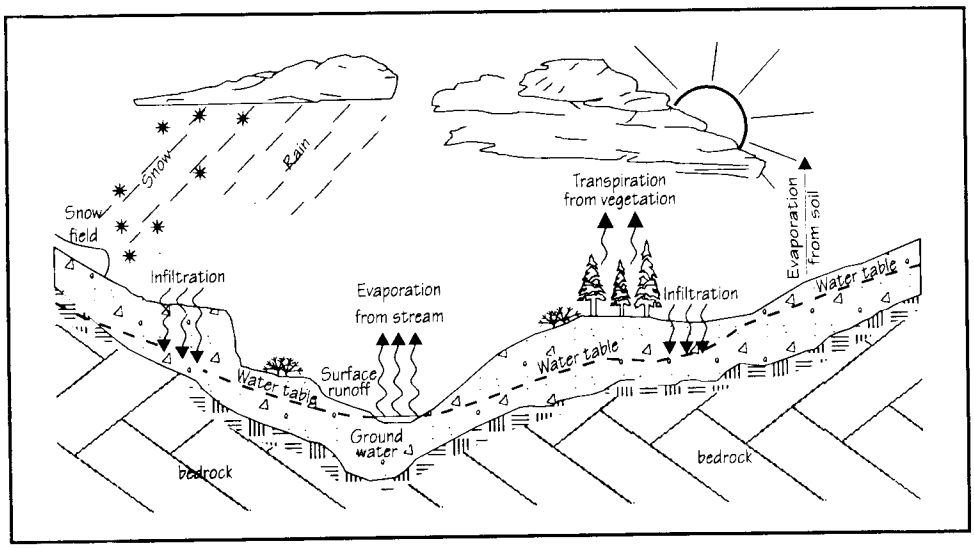
How are surface and ground water connected?

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

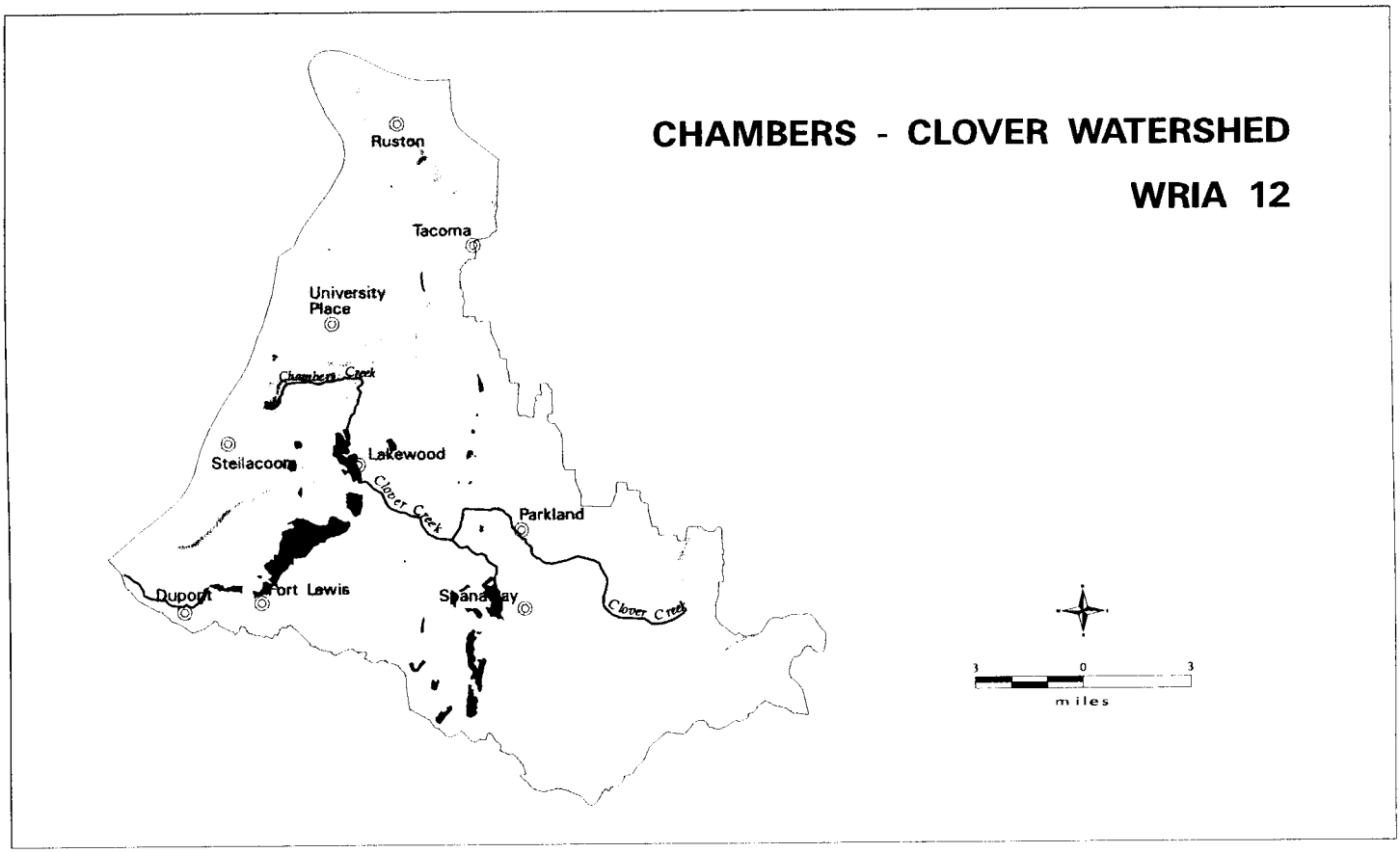
Ground water also maintains the water levels in most of the lakes in the watershed, particularly those with no inlet or outlet, such as Gravelly Lake.

How does land use affect water?

Land use practices can profoundly affect the amount and quality of water moving through the watershed. Municipal and industrial consumers use large quantities of water and discharge pollutants to surface and ground water. The expansion of impervious surfaces (roads, parking lots or buildings) increases the amount and rate of runoff into streams. Increased runoff means less water enters the ground to recharge the aquifer. It may also cause increased flooding. Stormwater runoff can also carry pollutants from these surfaces into nearby surface water bodies.



The hydrologic cycle in the Chambers-Clover Watershed (modified from Walters and Nassar)



In the remaining agricultural areas, chemicals and livestock wastes can wash into streams and infiltrate into ground water. Additionally, irrigation can require significant amounts of water during the dry summer months.

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

Major surface water quality problems in the Chambers-Clover watershed include fecal coliform bacteria and phosphorus. Other water quality problems reported include dissolved copper and lead. Sediments in American Lake are also contaminated.

Ground water quality in the federally designated "sole source aquifer" that lies within the watershed is generally good. Some nitrate contamination has been detected as well as small areas of organic contamination.

Are our fish resources stable?

Fish species in the Chambers-Clover watershed include chinook, coho, and chum salmon, and steelhead and cutthroat trout. Fish populations have been severely affected by human activities, particularly physical barriers (dams), low streamflows, poor water quality, high water temperature and destruction of spawning habitat.

Despite a fish trap near the mouth of Chambers Creek, fish migrate as far as the impassible dam at Steilacoom Lake. This blockage restricts salmon migration to the lower nine miles of the watershed.

Although fish production has been relatively low for many years, the Salmon and Steelhead Stock Inventory (SASSI) reports healthy populations of several salmon species. Coho and chum salmon are present and healthy within the watershed. According to the SASSI report, coho spawn in Chambers Creek and its tributaries. Chambers Creek sustains a healthy population of winter-run chum salmon. A healthy summer chinook population of mixed stock (native and hatchery-bred) is also reported in the creek.

How have streamflows changed?

The U.S. Geological Survey operates stream gaging stations on Flett and Leach creeks to measure the amount of water that flows

through these two stream channels. Flows are measured in cubic feet per second or cfs.

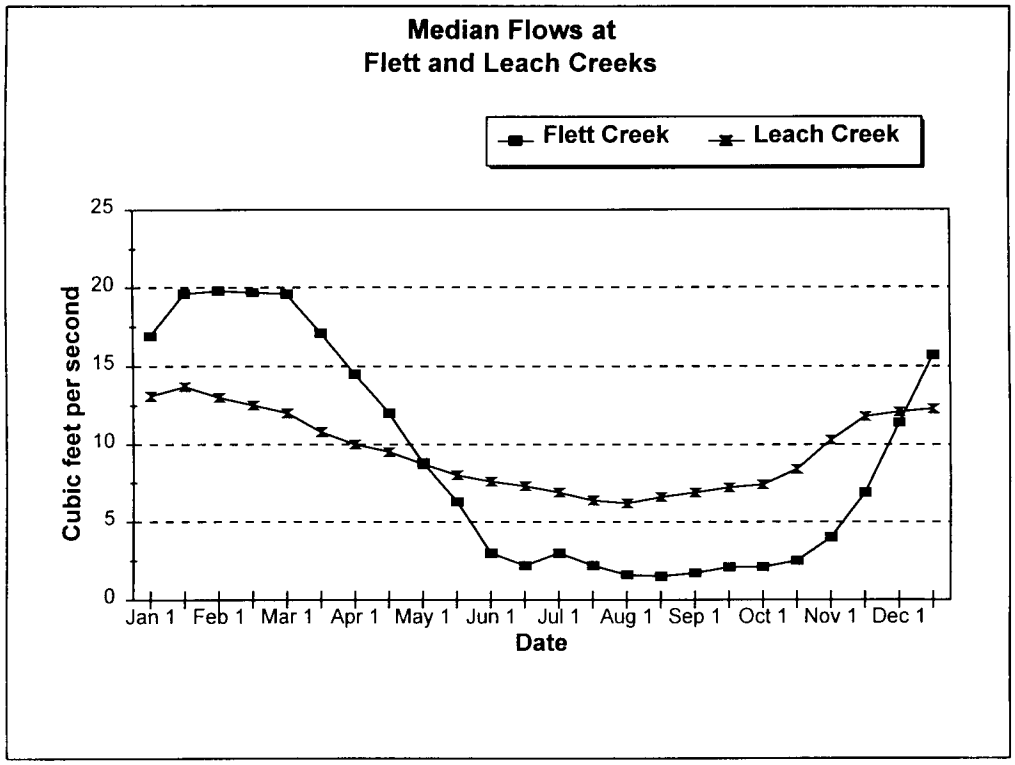
Instream flow rates have not been established for any streams in the watershed. All tributaries to American Lake, Chambers, Clover and Sequalitchew creeks, including Steilacoom, Spanaway and Sequalitchew lakes, have been closed to further surface water appropriations since 1980.

The median monthly flows at Flett Creek in Tacoma from 1958 to 1986 and Leach Creek near Steilacoom from 1956-1986 (see graph at right) show the seasonal flow patterns. As tributaries to Chambers Creek, these creeks have relatively small flows year-round. Flows are lowest between July and October.

The average low flows for a given year are calculated as the seven-day period of lowest flows. Since 1986, most of the gages in this watershed were not operated during May through September, the period of lowest flow. The gage on Leach Creek near Fircrest lacks only 1986 and 1987 low flow data. The figure at the top of page five shows these data graphically. Since 1988, the Leach Creek gage indicates below average low flows. Unfortunately, data are incomplete and do not allow an analysis of recent trends.

In 1994, substantial seasonal declines in lake levels were observed in Gravelly and American lakes, while Carp Lake dried up.

Declines in the streams and lake levels can be attributed to below average precipitation, increased demand for ground water and paving of land surfaces. Paving land surfaces reduces the recharge to the aquifers which, in turn, reduces the ground water contribution to streams and lakes 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.

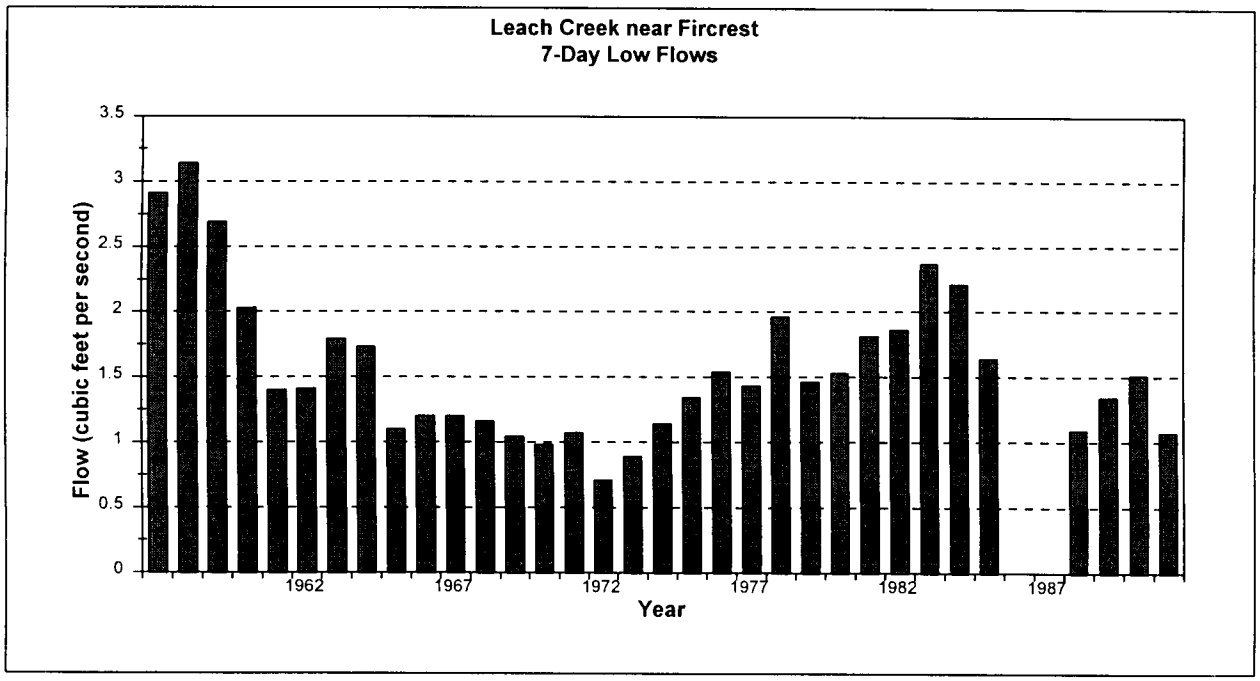
State law requires every user of streams, lakes, springs and other surface waters to obtain a water right permit before using these waters. Ground water users also need a water right permit unless they use 5,000 gallons or less each day for one or more of the following purposes: watering stock, watering a lawn or garden less than one-half acre in size, or for a single or group domestic or industrial 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 2,133 water right claims have been filed, for a total flow equivalent to about 54 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.

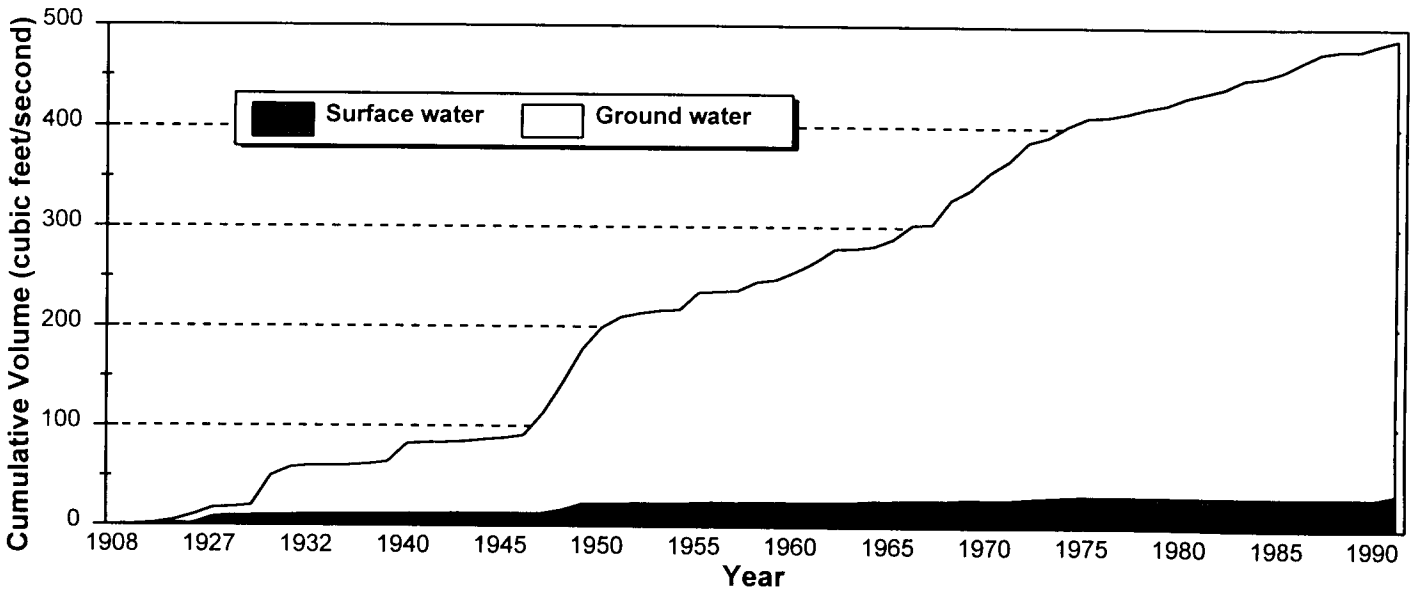


How is water currently allocated and what new uses are proposed?

The amount of water already allocated in the entire watershed has increased more than fivefold since 1946. The allocations of ground and surface water increased from 91 to 488 cfs between 1946 and 1991, the period of most rapid population growth. These water rights do not include water withdrawals by the military bases.

Currently, 17 ground water applications and one surface water application are pending with Ecology for water rights in the watershed. The applications request a total of 62 cfs (50 cfs for ground water and 12 cfs for surface water) for municipal and domestic supplies, commercial use and fish rearing. Before issuing future water rights, Ecology must consider potential effects on other water users.

Water Right Permits & Certificates

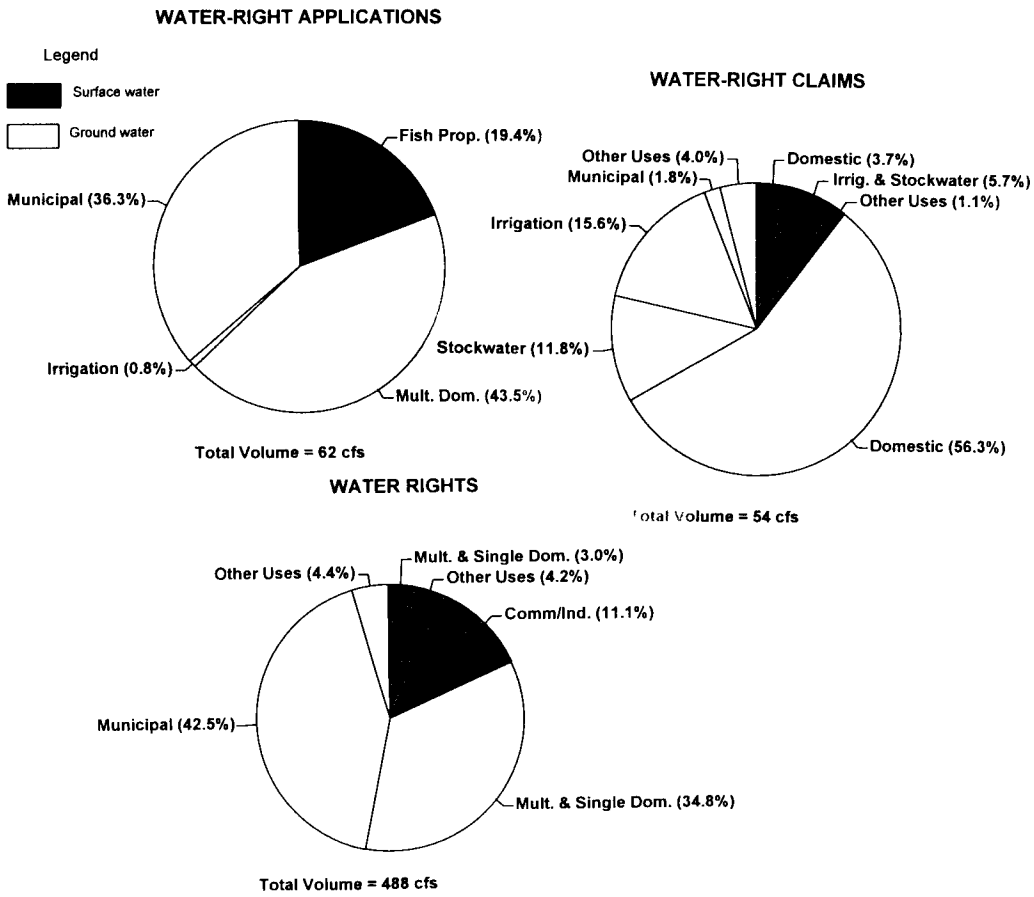


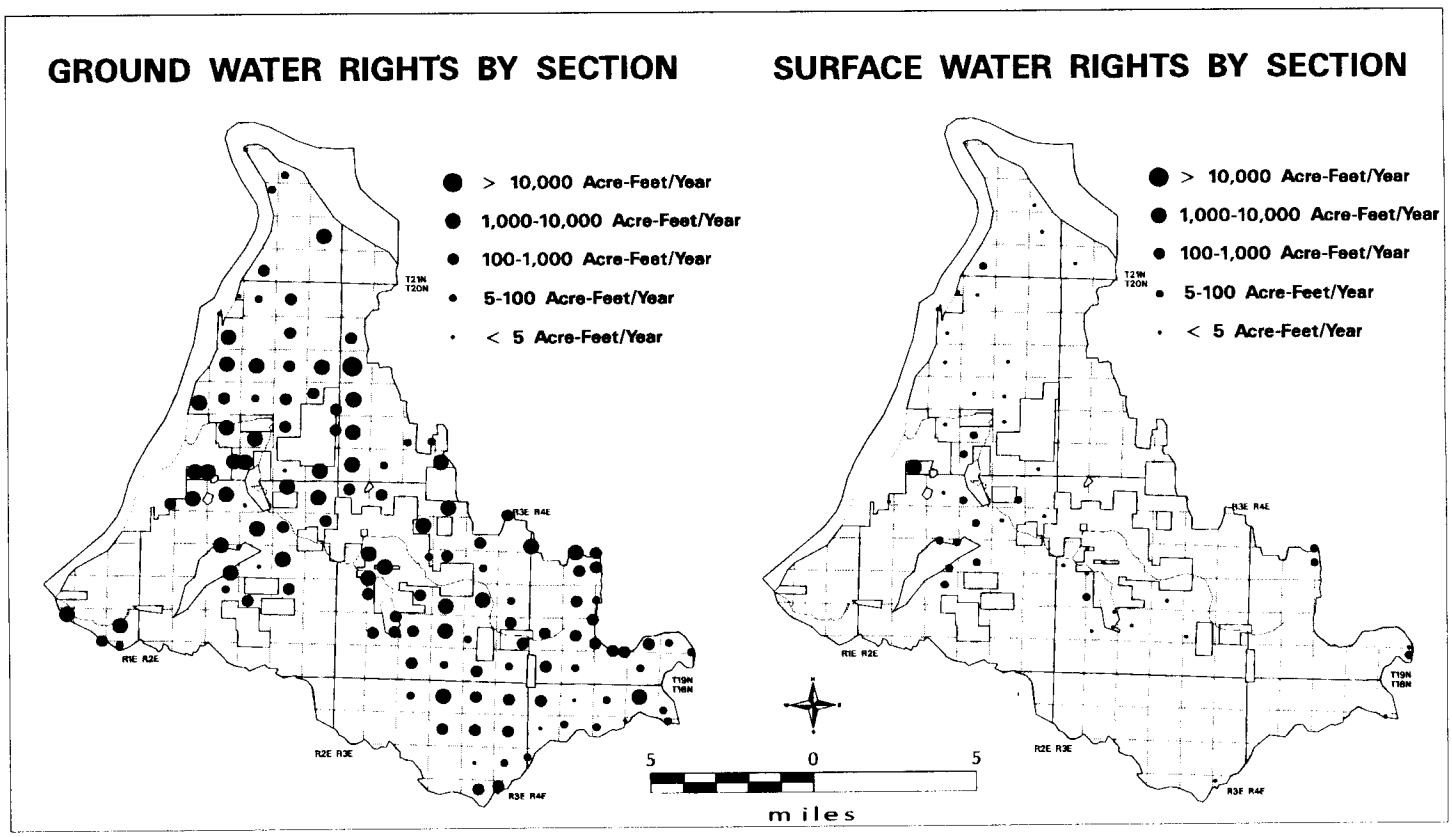
What are the conflicts?

Streamflows and ground water levels within the Chambers-Clover watershed must be maintained year-round to satisfy existing water rights, support fish populations, provide recreation and reduce the effects of pollutants. Currently, summer flows are extremely low and cannot adequately support all of these uses. Summer base flows are maintained by ground water. Ground water withdrawals and construction of impervious surfaces (roads, parking lots or buildings) have increased during recent years and, if continued, may cause stream flows to decline.

Federal facilities, such as Fort Lewis and McChord Air Force Base, occupy at least 25 percent of the land within the watershed. Proposed staffing growth at the bases along with other growth in the area will increase water demand.

Allocated Uses of Water





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 have to more information about water rights issues in the Chambers-Clover 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.

Brown and Caldwell. 1985. Clover/Chambers Creek Geohydrologic Study. Prepared for the Tacoma-Pierce County Health Department. July 1985.

Brown and Caldwell. 1991. Clover/Chambers Creek Basin Ground Water Management Program. Prepared for the Clover/Chambers Creek Basin Ground Water Advisory Committee. December 1995.

PCPWU. 1994. Chambers-Clover Creek Watershed Management Committee, Preliminary Draft Watershed Characterization. Pierce County Public Works and Utilities Water Resources Division.

Ecology. 1995. Draft Initial Watershed Assessment Water Resources Inventroy Area 12 Chambers-Clover Watershed. OFTR 95-09.

Ecology. 1979. Chambers-Clover Basin Instream Resources Protection Program, including Proposed Administrative Rules. Washington State Department of Ecology. Olympia, WA.

EPA. 1993. Support document for Sole Source Aquifer Designation of the Central Pierce County Aquifer System. U.S. Environmental Protection Agency, Region 10, Water Division. Seattle, WA. February 1993.

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

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 Chambers-Clover 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 Chambers-Clover 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 existing water rights, water reuse and pipe interconnections 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 or other large water users, and may not meet all demands through these mechanisms.

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

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 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.

Expand local water management efforts to a regional watershed planning committee which could resolve conflicts about water with the greatest participation by residents.

Pro: -Consolidation and cooperation between water interest would allow more flexible solutions and cost-effective approaches to water issues. Activities could include increases to 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.