KETTLE 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 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 flow, 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.

Dames i? Moore, Inc.
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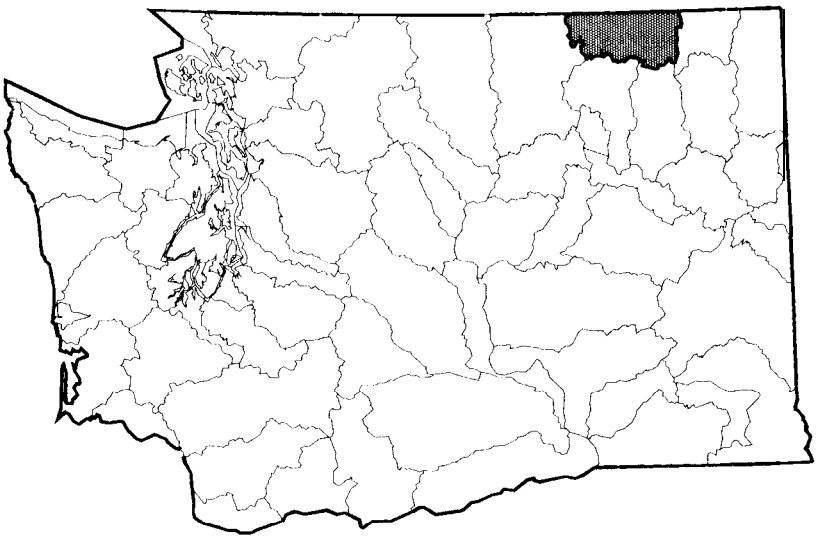
In Partnership with the:
Washington Department of Ecology

Kettle River Watershed



This report summarizes information presented in the detailed Ecology Open-File Technical Report No. 95-16. It also presents some actions that could be taken in response to the results of this assessment.

What are the water allocation issues?

- Ecology needs to make decisions on 50 pending applications for new water rights.
- Many of the instream conditions in the Kettle River are affected by occurrences upstream in British Columbia.
- Along parts of the Kettle River and some of its tributaries, limited streamflow data indicates that flows are extremely low, or nonexistent, during summer months, the time when the demand for water is highest and the needs of fish are greatest. In those cases, neither surface nor ground water may be available for new allocations.
- The close interconnection between surface and ground water must be considered when evaluating new water right applications, particularly in the Kettle River valley and the Curlew Lake and Curlew Creek areas.

WR-95-164

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.

Roughly one-quarter of the Kettle River watershed lies within Washington State. The Kettle River originates in the Okanogan Highlands and Monashee Mountains of southern British Columbia and drains approximately 4,200 square miles. The Washington portion of the watershed constitutes the southernmost 1,000 square miles and includes the northeastern portion of Okanogan County, the northern part of Ferry County, and a small part of northwestern Stevens County.

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.

Surface water and ground water in the Kettle River and its tributaries are replenished by precipitation, including rainfall and snowmelt. Most of precipitation comes in late fall and winter with the highest totals occurring between November and January. May and June also tend to be very rainy months. Average annual precipitation is about 21 inches a year. The seasonal variations in precipitation, evaporation and use by plants, and water storage in the snowpack affect water availability in the watershed. The Kettle River receives an estimated 15 percent of its flow from sources within Washington, with the remainder originating in British Columbia.

What are the major surface water sources?

Surface water sources include rivers, streams, and lakes. The major drainage in the watershed is the Kettle River, which flows into Washington near the town of Ferry, winds its way back into Canada near Danville, and re-enters Washington at Laurier. The Kettle flows into the Columbia River at Kettle Falls. The primary tributaries to the Kettle River in Washington are Torada, Myers, Boulder, Deadman and Curlew creeks. Curlew Creek flows out of Curlew Lake, the only major lake located within the Washington portion of the watershed.

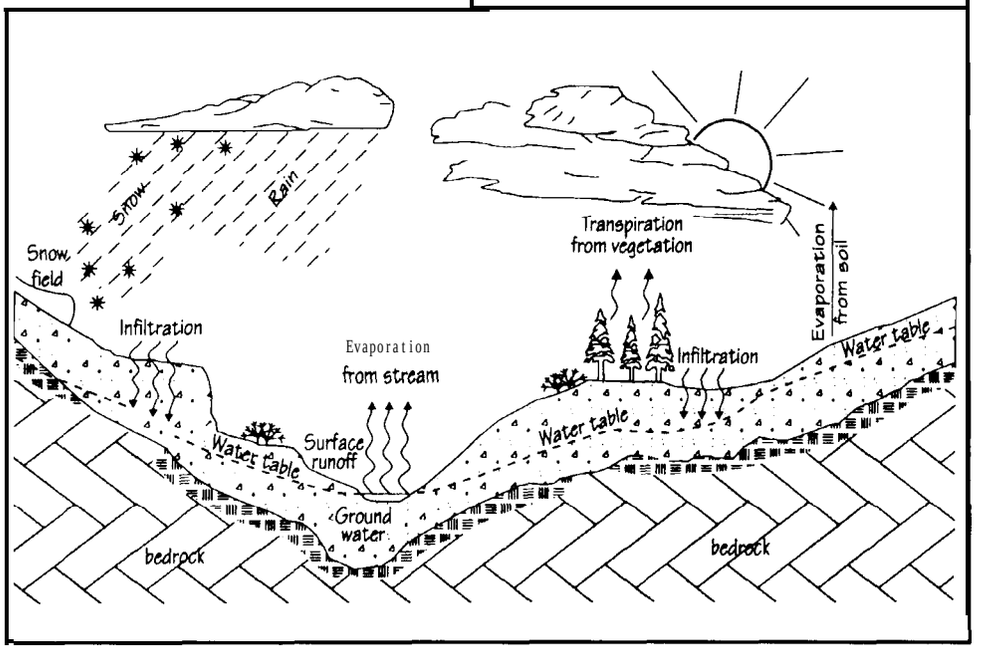
What are the major ground water sources?

Ground water sources originate as rain or snowmelt that infiltrate the soil surface and percolate down to geologic layers called aquifers. The most productive ground water aquifers occur in alluvial and glacial sediments found in the major river and stream valleys within the watershed. Ground water is also available in bedrock formations located beneath the glacial and alluvial sediments and in the upper elevations of the watershed. Seasonal variability in precipitation, snowmelt and recharge affects the availability of shallow ground water along smaller tributaries.

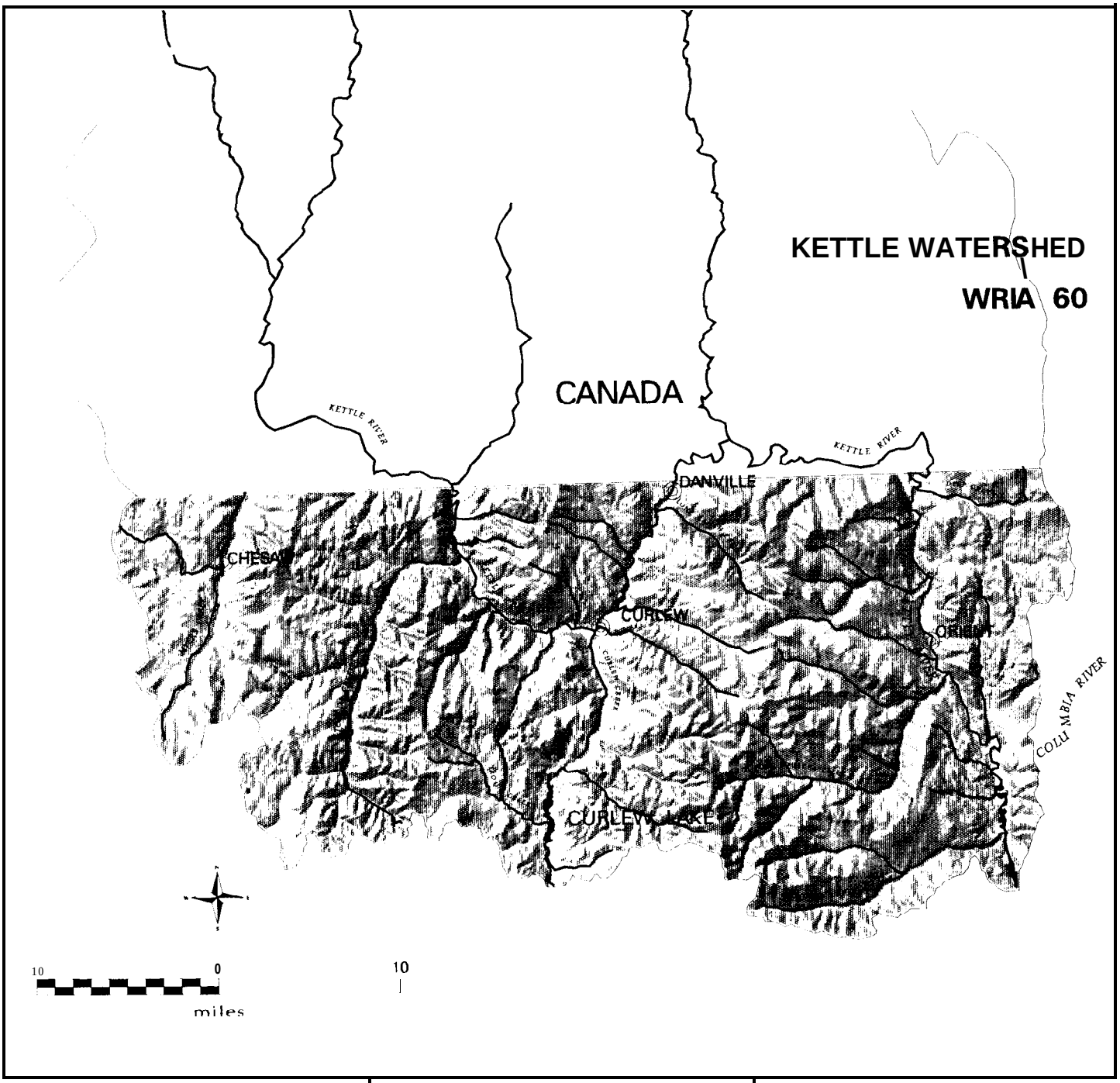
How are surface and ground water connected?

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.

Ground water supplies within the watershed are recharged directly from precipitation or seepage from streams. Infiltration is affected by the amount and type of vegetative cover, soil type and rainfall intensity.



A general *representation* of the hydrologic (water) *cycle* (modified *from* Walker and *Nassar).*

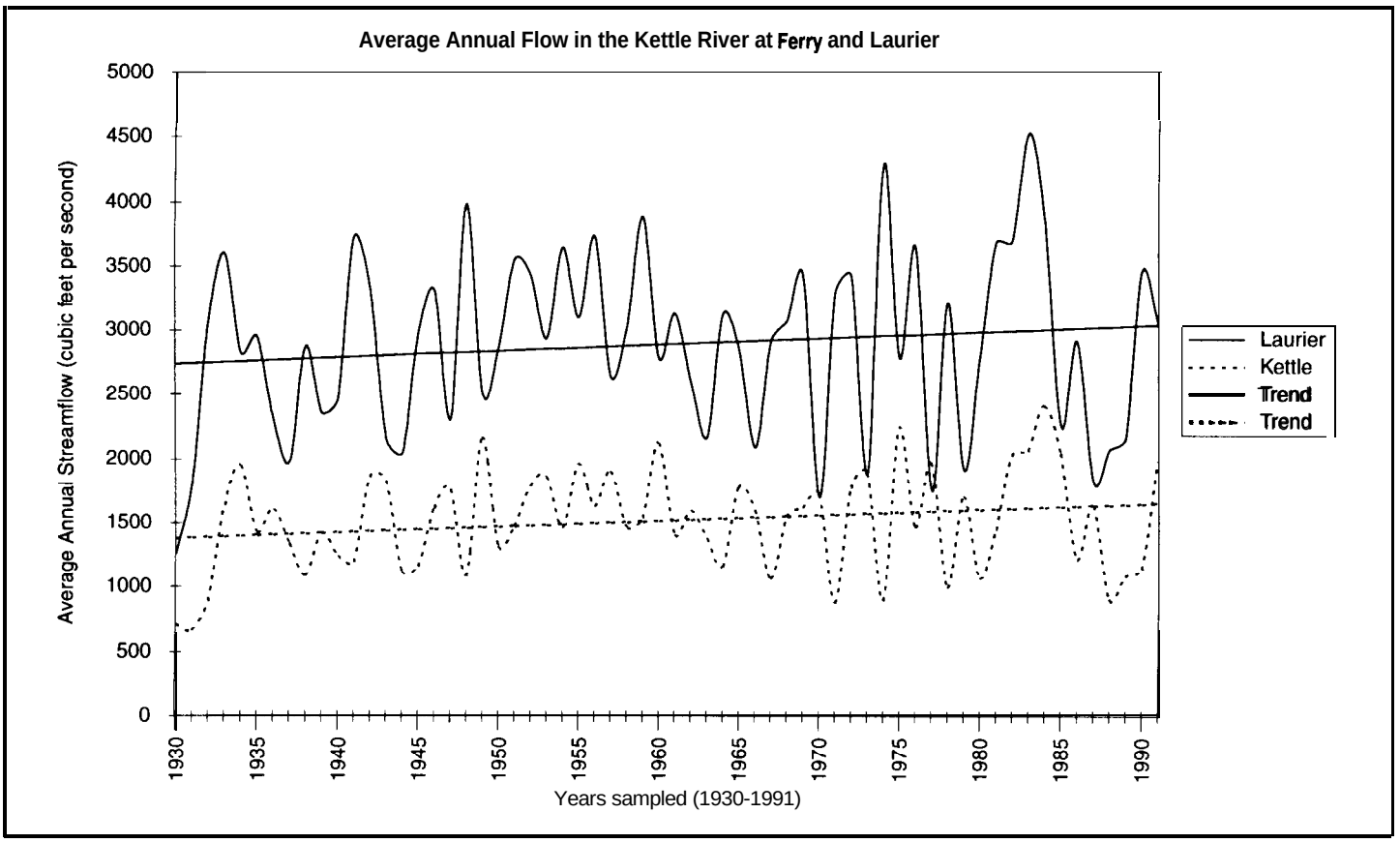


Eventually, all ground water drains toward the surface water bodies such as streams, lakes and rivers. Ground water in shallow aquifers is highly connected to surface water bodies, often flowing short distances before being discharged to a stream or lake. Deeper ground water follows longer flow paths and is discharged further down the watershed. Where the ground water level lies above a stream or lake bed, ground water will flow into the stream channel. Conversely, when the ground water level lies below the stream bed, surface water will flow from the stream into the aquifer.

How **is water used?**

Irrigated agriculture and domestic use account for most of the out-of-stream use of water. The heaviest period of irrigation occurs during summer months when water is least available and most necessary to maintain instream flows. Water is also used for stockwater, commercial, industrial, and mining purposes.

Approximately ten percent of the documented water allocation in the watershed is from ground water. Most of the ground water is used for irrigation and domestic purposes.



Annual streamflow in the Kettle River, recorded at the USGS gaging stations.

How does land use affect water?

Land use practices can affect the amount and quality of water moving through the watershed. Land use here has not changed significantly for several decades. Main agricultural and rangeland areas are located within the river corridor. Land uses include cultivation of crops and livestock grazing. Irrigation of crops can require significant amounts of water during the dry summer months.

The largest towns located in the Kettle River watershed are just across the border in Canada (Grand Forks, Greenwood and Midway). Within Washington, small towns with populations of less than 1,000 are located along the Kettle River valley. About 75 percent of the watershed is federally managed forest including Okanogan and Colville National Forests.

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

In the Kettle River, water quality generally meets State water quality standards, with the exception of high instream temperatures during the summer months in the lower reach of the river between Laurier and the confluence with the Columbia River. Additionally, nonpoint source water quality degradation in the Curlew Lake area has been documented for bacteria, turbidity and excess nutrients.

Are fish resources stable?

The two most common sport fish in the basin at present are resident rainbow trout and Eastern brook trout. There also appears to be significant populations of brown trout, sculpins, bridgelip suckers, and mountain whitefish. Bull trout have been documented in one major tributary to the Kettle River. The status of the resident fish population is unknown.

Prior to construction of Grand Coulee Dam and other dams along the Columbia River, several species of salmon migrated and spawned in the Kettle River. There are no longer anadromous fish within the Kettle River system.

How have streamflows changed?

Average annual streamflow for the Kettle River at Ferry, where it enters the United States, is 1,500 cubic feet per

second (a measure of the volume of water flowing through a stream, or cfs) and 2,900 cfs at Laurier. Streamflow varies considerably on a seasonal basis with summer and winter low flows often less than 300 cfs during most years.

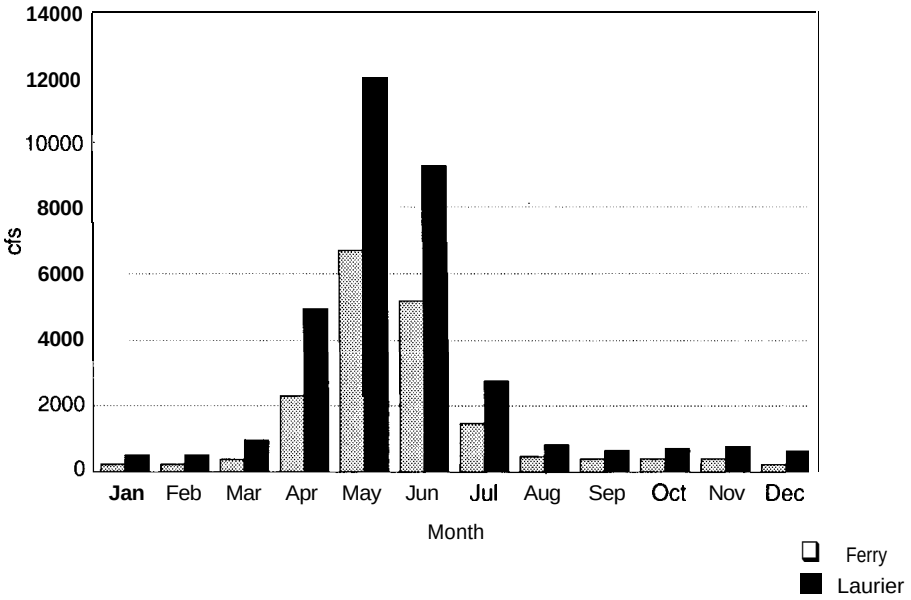
The total flow of the river, while varying on an annual basis, has declined just slightly since the 1950s similar to trends in precipitation. However, declines have been somewhat greater at Laurier, compared to Ferry, indicating greater declines in flow in the lower portions of the river, which includes Washington. Trends in tributary streams have not been identified due to lack of long-term streamflow data.

Some tributary streams get extremely low or cease to flow in late summer. These include streams located in the central portion of the watershed, including the Curlew Creek area, coinciding with an area of lower precipitation and higher summer evaporation. Although streamflow data are incomplete for these tributary streams, the low flows indicate seasonally limited water availability. This may be the case for other portions of the watershed as well.

No instream flows have been established by rule for the Kettle River watershed. However, water rights issued since 1990 for the main stem of the river have been made subject to recommended low flows of 600 cfs (April through July) and 300 cfs (August through September) at Ferry, and a year-round low flow of 570 cfs at Laurier where the river re-enters the state. These flows are met 99 percent of the time during spring and early summer. However, flows are typically not met 50 percent of the time during late summer and fall.

Numerous small tributaries to the Kettle River have been administratively closed or subject to low flows for a number of years. As far back as the 1950s, the Department of Game recommended closures on some streams to protect habitat. Water right decisions on these tributaries have taken such recommendations into account.

Average Monthly Flows Kettle River at Ferry and Laurier (1928-1992)

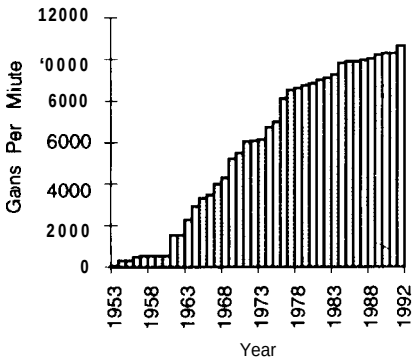


What are water rights?

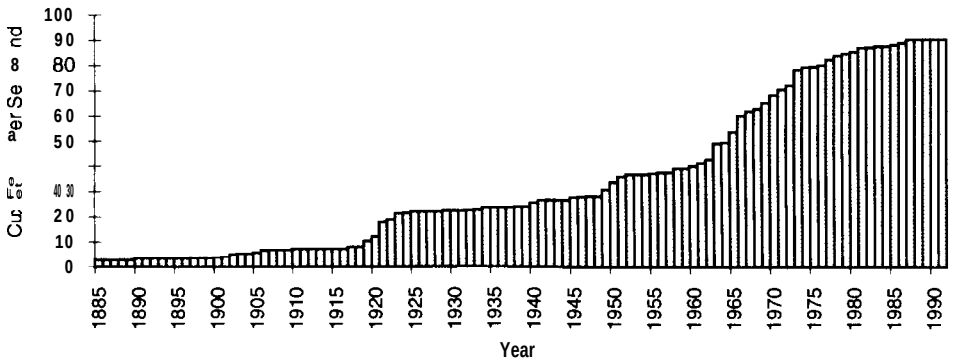
A water right is a legal authorization to use a certain amount of public water for specific beneficial purposes.

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

Cumulative Growth in Ground Water Rights

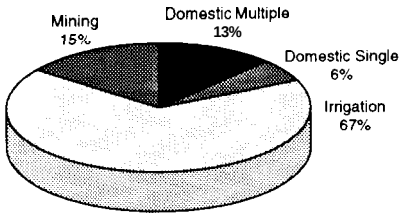


Cumulative Growth in Surface Water Rights



Kettle River Watershed

Ground Water Applications
Primary Purpose of Use As Percentage of Total Applied For



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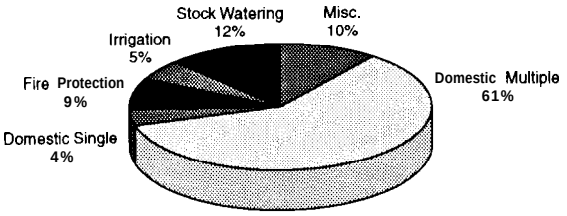

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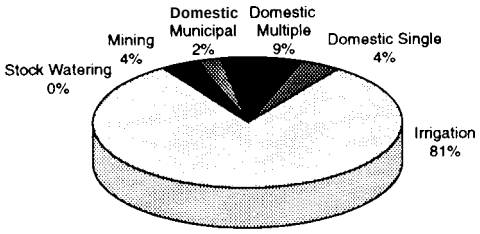

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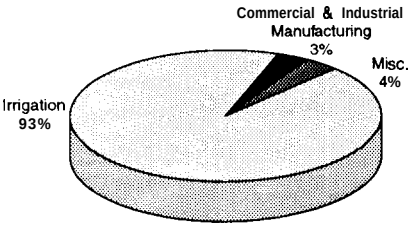
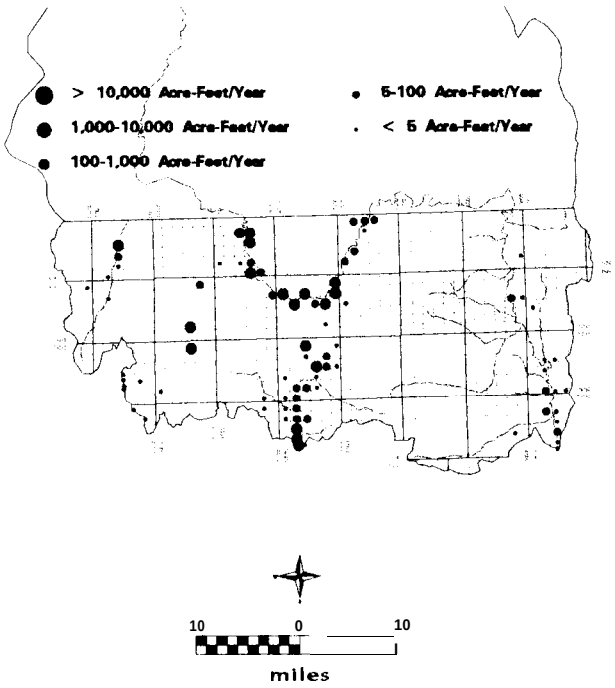
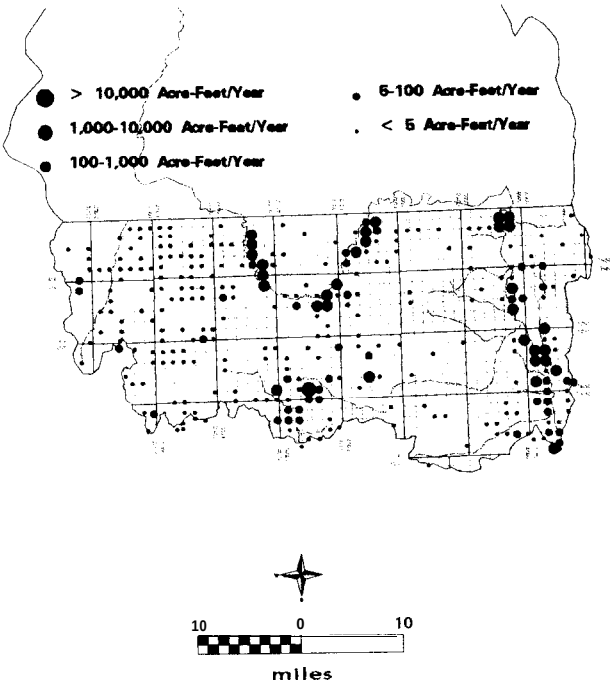


GROUND-WATER RIGHTS BY SECTION



SURFACE WATER RIGHTS BY SECTION



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 1,011 water right claims have been filed, for a total flow equivalent of about 156 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?

In the Kettle River watershed a total of 634 water right permits and certificates have been issued, 514 for surface water and 120 for ground water. Permitted withdrawals for both surface and ground water total 114 cfs.

Thirty-one applications for surface water right permits have been filed, requesting approximately 75 cfs. Additionally, 19 applications for ground water permits are on file with Ecology, requesting a total of 10 cfs. Before issuing new water rights, Ecology must consider potential effects on other water users.

Total withdrawals currently constitute less than 10 percent of average annual flows in the Kettle River. That percentage increases, however, when flows are seasonally low. Withdrawals may then account for as much as half of the flows likely to occur once every ten years. Low or nonexistent flows in tributaries could pose serious problems for both water quality and fish habitat in downstream reaches and in the Kettle River.

What are the conflicts?

Water use conflicts occur when available water supply is insufficient to fulfill existing water rights and claims and, at the same time, maintain sufficient water quality and aquatic habitat.

Balancing these needs is complex. Water does appear to be available for additional allocation from the main stem of the Kettle River and from ground water sources connected to the river, on a seasonal basis. However, since recommended instream flows are not met in the Kettle River more than 50 percent of the time during the lowest flow periods in late summer and early fall, additional water allocations from the Kettle River may not be available during these months.

In small tributary streams, comprehensive long-term data are lacking, but available information indicates seasonally low flow and even zero flow conditions are widespread, especially in the central portion of the watershed. It is therefore difficult to adequately assess water availability for these areas, but it appears that, at least seasonally, water may not be available for additional allocation in some tributaries.

The interconnection between surface and ground water and the effect of ground water withdrawals on streamflows in much of the watershed is not well known.

Yet, in areas draining to streams that have been administratively closed to protect habitat or have recommended flow limitations, new allocations for use of ground water will need to evaluate the interconnection.

What additional information is available?

If you would like more about water issues in the Kettle River watershed, the following technical report is available:

Ecology. 1995. Initial Watershed Assessment, Kettle River Watershed. OFTR 95-I 6. Washington Department of Ecology.

For more information ...

Contact Bruce Howard, (509) 456-5057 (voice), (509) 458-2055 (TDD), or write the Department of Ecology, Water Resources Section, N. 4601 Monroe, Suite 202, Spokane, WA 99205-I 295.

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).

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 do we know about the Kettle River watershed?

This assessment found that the amount and quality of water in the Kettle River are greatly effected by conditions and activities upstream in British Columbia. Streamflow in the Kettle River and some of its tributaries is limited during summer and fall and may not be available for new year-round uses. In addition, aquatic habitat and water quality depend on maintaining adequate streamflow. Because of these findings, the Kettle River watershed is classified as "medium risk" by Ecology. Water rights decisions must consider additional adverse impacts to existing water rights and instream resources.

What actions can be taken?

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. Usually, a combination of actions is needed to effectively manage water resources and to meet the challenges faced with managing those resources.

Encourage water conservation, changes and transfers of water rights, and water reuse 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 applications for new water rights subject to instream flow requirements or where acceptable mitigation is proposed and impairment of senior water rights would not occur.

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

Con: Water may not be available year round, no criteria exist for "acceptable mitigation".

Hold applications while instream flows are developed.

Pro: Provide public involvement to protect instream resources.

Con: Delay decisions for applicants

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 an adverse impact on water resources during low stream flow periods.

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

Encourage watershed planning to protect existing uses and meet future water needs.

Pro: Cooperation between water interests would allow more flexible solutions and cost-effective approaches to water issues. Activities could include improvement of aquatic habitat and water quality, interconnection of water suppliers, and additional collection of hydrogeologic and water use data.

Con: Would require time, money, and political consensus to create and carry out the plan. Availability of funding is uncertain.