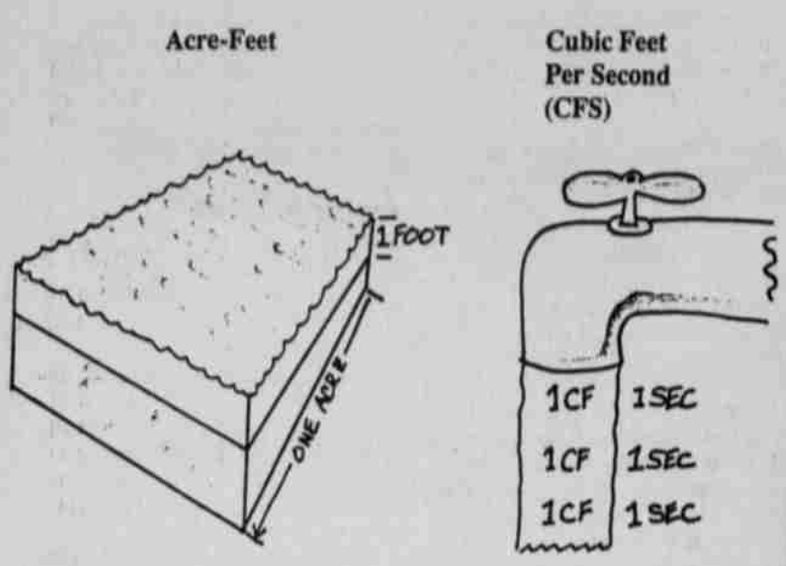
Two Ways To Measure Water



An acre-foot of water is equal to 1 acre of land covered by 1 foot of water. There are 43,560 cubic feet in one acre-foot.

The number of cubic feet of water passing a given point each second is referred to as cubic feet per second.

An Acre Foot Equals • • •

- Almost 6,000 fifty-five gallon barrels.
- One tenth of the water used by the Reservation's domestic water plant each day.

The entire average output of water from the Deschutes River at the North end of the Reservation is equal to 3.7 million acre-feet.

Cubic Feet Per Second

- 3,000 cubic feet per second equal almost 6,000 acre-feet each 24 hours.
- 3,000 cubic feet per second equal more than 35 million fifty-five gallon barrels per day.
- One cubic foot per second of flow for one entire day would be nearly 650,000 gallons.
- One cubic foot per second of flow for one entire day would cover a football field with nearly two feet of water.

Comparing Cubic Feet Per Second And Acre Feet

1 cubic foot per second equals:

60	cubic feet per minute
3,600	cubic feet per hour
86,400	cubic feet per day
31,536,000	cubic feet per year

1 acre-foot equals:

43,560	cubic feet

1 cubic foot per second equals:

724	acre-feet per year

Human activities can impact watersheds

Water moves down slopes into streams which carry it to rivers. Activities on all parts of the watershed can influence this part of the

All land on earth is a watershed. Humans and their activities play an important and essential role in watersheds, yet few people understand them. Still fewer know the dynamics and boundaries of the ones in which they live.

A watershed is a system. It is the land area from which water, sediment, and dissolved materials drain to a common watercourse or body of water. For each watershed there is a drainage system that conveys rainfall to its outlet. A watershed may be the drainage area surrounding a lake that has no surface outlet, or a river basin as large as that of the Columbia River. Within a large watershed are many smaller watersheds which contribute to the overall streamflow. The point where two watersheds connect is called the divide. A watershed is drained by a network of channels whose size increases as the amount of water and sediment they must carry increases. Streams cut the valleys in which they lie. The shape and pattern of the stream is a result of the land it is cutting and the sediment it must carry.

The watershed system is made almost entirely of hillsides. Only about one percent of the watershed area is made up of stream channels. As a means of comparing stream channels of different sizes, a system of stream ordering is often used.

Channels change by erosion and deposition. The natural channels increase in size downstream as tributaries enter and add to the flow. The channel is neither straight nor uniform, yet its average size characteristics change in a regular and progressive fashion. In upstream reaches, the channel tends to be steeper. The gradient decreases downstream as width and depth increase. The size of the sediment debris on the bed tends to decrease, often from boulders in the hilly or mountainous upstream portions, to cobbles or pebbles in the middle reaches, and sand or silt farther downstream. In some cases, severe bank erosion has led to formation of a new stream channel, leaving once productive channels dry and barren.

Streams are dynamic, open-water systems with channels that collect and convey the surface runoff generated by rainfall, snowmelt, or groundwater discharge to the estuaries and oceans. In addition to the ordering system described above, streams may be classified by the period of time during which flow occurs.

Perrenial flow indicates almost year-round flow (90% or more) in well defined channels. Most higher order streams are perennial. Intermittent flow occurs generally only during the wet season (50% of the time or less). Ephemeral flow generally occurs during and shortly after extreme precipitation or snowmelt conditions. Channels are not well defined and these are usually headwater or low order streams.

The physical, chemical, and biological makeup of a stream is directly related to the surrounding physical features of the watershed topography, geology, and geomorphic origin. Analysis of these features aids in the understanding of stream-watershed relationships and assists in the prediction of the effects of human influences on different stream types.

Factors affecting watersheds

Land and water are linked directly by water moving in the water cycle. Flows of solar energy drive this and the other material cycles in the watershed. Climate is the source of the water resource which comes to the watershed in seasonal cycles. It comes principally as rain or snow, and, in some areas, as small amounts of condensation and fog drip. The seasonal pattern of precipitation controls streamflow and water production.

Some of the precipitation infiltrates the soil and percolates through permeable rock into groundwater recharge areas called aquifers. Natural ground water discharge becomes the main contributor to streamflow during the dry summer and fall months. Without the ground water discharge, many streams would dry up. The total volume of water contained in the ground is storage. When recharge from infiltration is not equal to discharge, the amount of storage changes. Pumping water from storage, for irrigation or domestic water use, reduces the amount of discharge, reduces storage, or both. If the amount removed by pumping plus natural discharge exceeds recharge on a continual basis, water levels and natural discharge will decrease. Unless withdrawals are modified or recharge increased, the aquifer will eventually be depleted.

Away from streams and lakes, water is taken by pumping from underground supplies, occasionally at great depths, or from springs. In many regions, the water tables have been severely lowered. As the pores in the aquifer are drained, they collapse and become compacted by settling of the overlying land. The compacted underground aquifers no longer has as much capacity to accept and hold water. Recharge is difficult, volume is less, and yields are considerably reduced. Another effect is the drying up of springs once fed from the water table. As well as providing the water, climate also affects the loss of water from the watershed. In hot, dry, or windy weather the evaporation loss from bare soil and from water surfaces is very high.

The same climatic influences that increase evaporation also increase transpiration when plants are present. Transpiration draws on soil moisture from a much greater depth than evaporation due to the depth the plant roots may reach into the available moisture supply. Transpiration is greatest during the growing season and least during cold weather when most plants are relatively dormant.

Wind may cause erosion, control the accumulation of snow in sheltered places, and may be a significant factor in the rate of melting of a snowpack. Wind erosion can occur wherever wind is strong and constant, and soil unprotected by sufficient plant cover.

Physical features

The area of the watershed affects the amount of water produced. A large watershed receives more precipitation than a small one. The shape and slope of the waterhed and its drainage pattern affect the concentration time of surface runoff and quick seepage in streams draining the watershed. For example, areas with high drainage density (length of all channels in the drainage basin divided by the basin area) are associated with high flood peaks, high sediment production, and steep hillsides. Steep slopes increase soil creep and the incidence of landslides and avalanches. The steeper the slope, the greater the possibility for rapid runoff and erosion, and the greater the difficulty of establishing plant cover, or of gaining much infiltration of surface water. Evaporation and transpiration loss will deplete soil moisture rapidly on steep slopes facing toward the sun.

Orientation of the watershed relative to the principal direction of storm movement also affects runoff concentration and peak flows. A rainstorm moving up a watershed from the mouth releases water in such a way that runoff from the lower section has passed its peak before runoff from the higher sections has arrived. A storm starting at the top and moving down a watershed can reverse the process. Orientation of the watershed relative to the sun affects temperature, evaporation, and transpiration. Watersheds sloping away from the sun will be cooler, and evaporation and transpiration less than in watersheds exposed directly toward the sun. Slopes exposed to the sun usually support quite different vegetation than those facing away from the sun. Orientation with regard to the prevailing winds has similar effects.

More information on watersheds will be published in the next issue of Spilyay Tymoo.

Man must live in balance with nature

All wild creatures on the earth live as part of a delicate balance. They take from the land, from the air, from the common pool of water, and from the plants upon which they ultimately depend for food. In the course of living and dying, they return to each all of what they have taken. Plants and animals have established, through the millennia, a fascinating partnership fed by the sun's energy and the richness of the earth itself.

Man was born a wild creature and has spent most of his years in keeping with the rhythms of nature. But we the people of our time are living in violation of the scheme upon which life itself depends. Since the development of the earliest technology we have taken from the earth, in increasing amounts for increasing numbers of people, more than we have returned. We have poisoned the environment with substances to which living things are not adapted. Within a few short years, life on some corners of our planet will be largely untenable.

The quality of our air and water, our landscapes and our communities, the quality of life itself is being destroyed by people, you and me—by the cars we drive, the resources we use, and the wastes we leave behind. And what will replace us, as the forest replaced the meadow, if we create an environment unsuitable for our own kind?

In the normal course of event plants and animals move across the land, responding to changes in the environment and altering the environment still further by their own life processes. Over the ages, species come and go, only to be replaced by new kinds of organisms better adjusted to the conditions of the time.

But in the process of succession it is imperative that there are other places to colonize, and that in the areas left behind as species either die out or move one, conditions are suitable for the organisms which follow.

We have now seen the earth from space, and we know that our world is a small, lonely place drifting in a dark, frigid void. We are beginning to realize that when we have colonized the last corners of our planet, there will be no further place to go.

We are also beginning to understand that, unlike all other species this earth has ever known, man now has the ability to alter a place so drastically that when it is fouled beyond our own ability to live there, it is also spoiled for most other living things.

White Swan Powwow set

The Fourth Annual Northwest Indian Summer Celebration is scheduled for October 4, 5, & 6, 1991 at the White Swan Pavillion in White Swan, Washington.

There will be dancing nightly. Drummers will be paid nightly and a host drum will be chosen nightly. Dance finals over $6,000 in prize money. Prizes for 1st, 2nd and 3rd places in each category. Categories include men, women, Jr. girls, boys & teens, traditional, fancy, grass and jingle contests. All dancers must register, registration is required for each separate category. Registration opens Friday evening. Tiny tots, 6 years and under, full regalia will be during the Friday and Saturday sessions. Specials at the discretion of the NWISC Committee.

Memorials start at 9:00 a.m. Friday. The 1991-92 Royalty Coronation will be Saturday afternoon. There will be food concessions and arts & crafts.

For more information contact: Kipp & Ladine Albert, 509-848-2017; Russ Billy, 874-2186; Yvonne Eneas; Richard & Karen Marek, Jr.; Rosalie Slimjohn; Elizabeth Ohms; Rhonda Billy; & Julia Jack.

NWIS Committee not responsible for theft, accidents or injury. No alcohol or drugs allowed. Visitors travel at own expense.