DROUGHT

DEFINITIONS:

Drought – an extended period of abnormally low precipitation; a condition of climate dryness that is severe enough to reduce soil moisture as well as water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems.

BACKGROUND INFORMATION:

While drought originates from a deficiency of precipitation over an extended period of time, usually a season or more; drought is also related to the timing and the intensity or number of rainfall events. Other climactic factors such as high temperature, high wind, and low relative humidity are associated with drought in many regions of the world and can significantly aggravate the severity of a drought. Drought differs from aridity, a permanent climactic feature common to regions with low rainfall.

ALDER LAKE (Western Washington) 2001
(Washington State Department of Ecology Photo)

In 1989, the Washington State Legislature gave permanent drought relief authority to the Department of Ecology and enabled them to issue orders declaring drought emergencies. (RCW 43.83B.400-430 and Chapter 173-166 WAC)

In Washington State, the statutory criteria for drought is a water supply below 75% of normal and a shortage expected to create undue hardship for some water users.

HISTORY:

Riffe Lake (Western Washington) 2001
(Washington State Department of Ecology Photo)

Even in the Evergreen State, droughts are a natural part of the climate cycle. In the last century, there have been a number of drought episodes, including several that have lasted for more that a single season, such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 1977 event set records for low precipitation, snow-pack, and stream flow totals that still stand today. The 2001 event was the second-worst drought year in state-recorded history.

Washington State usually experiences drought during a regional climate event characterized by a period of below-normal precipitation. While Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural industry usually experiences the greatest impact from a drought event in Skagit County.

Rainfall for Western Washington during the 2001 water year was approximately 30% below normal. On March 14, 2001, after several months of record low precipitation, Governor Gary Locke authorized the Department of Ecology (Ecology) to declare a statewide drought emergency. Washington was the first Northwest state to make a drought declaration. Due to above-average precipitation in the final two months of the year, the drought emergency formally expired on December 31, 2001. The National Weather Service reported that the winter of 2000-01 was the driest since 1976-1977. It was also one of the five driest in the past 100 years.

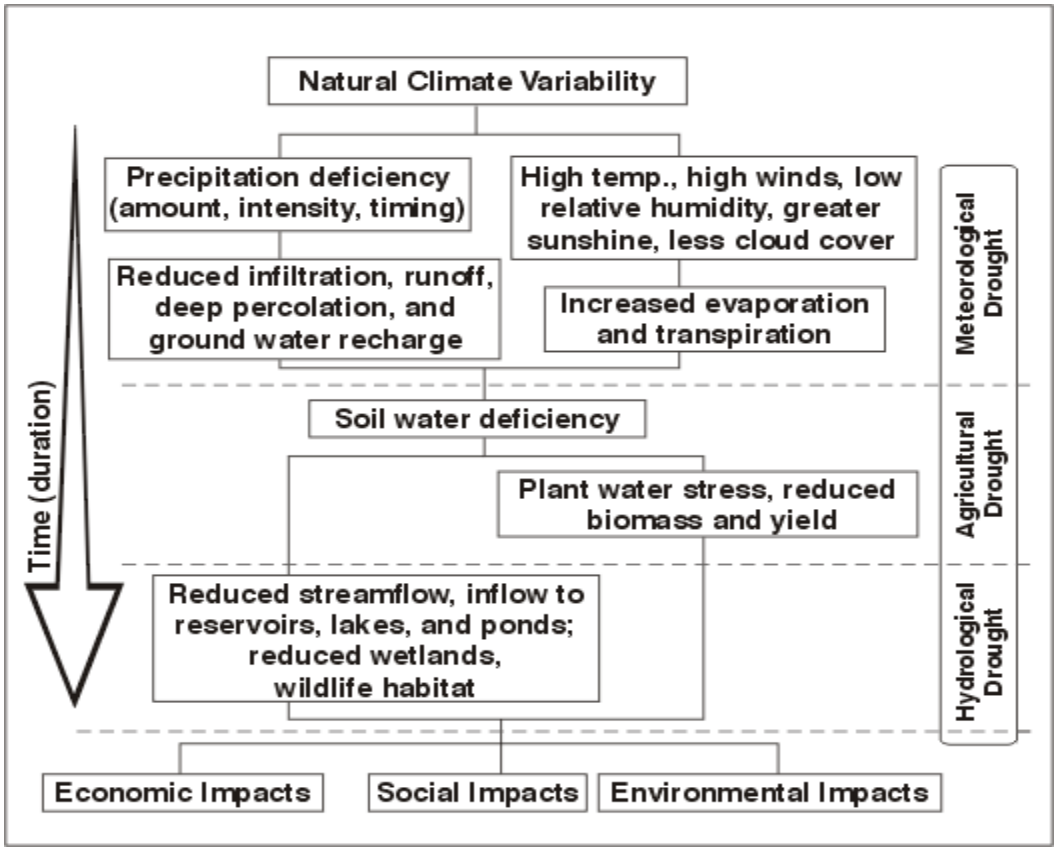
Washington State Drought Occurrences
(Information obtained from Washington State Military Department, Emergency Management Division)

Date	Occurrence
July-August 1902	No measurable rainfall in Western Washington.
August 1919	Drought and hot weather occurred in Western Washington.
July-August 1921	Drought in all agricultural sections.
June-August 1922	The statewide precipitation averaged .10 inches.
March-August 1924	Lack of soil moisture retarded germination of spring wheat.
July 1925	Drought occurred in Washington.
July 21-Aug 25, 1926	Little or no rainfall was reported.
June 1928-March 1929	Most stations averaged less than 20 percent of normal rainfall for August and September and less than 60 percent for nine months.
July-August 1930	Drought affected the entire state. Most weather stations averaged 10 percent or less of normal precipitation.
April 1934-March 1937	The longest drought in the region's history – the driest periods were April-August 1934, September-December 1935, and July-January 1936-1937.
May-September 1938	Driest growing season in Western Washington.
1944	Water shortages in Spokane.
1952	Every month was below normal precipitation except June. The hardest hit areas were Puget Sound and the central Cascades.
January-May 1964	Drought covered the southwestern part of the state. Precipitation was less than 40 percent of normal.
Spring, 1966	The entire state was dry.
June-August 1967	Drought occurred in Washington.
January-August 1973	Dry in the Cascades.
October 1976 – September 1977	Below normal precipitation in Olympia, Seattle, and Yakima. Crop yields were below normal and ski resorts closed for much of the 1976-77 ski season.
October 1991 – September 1994	Water supply in Yakima River Basin was 65 percent of normal.
2000 - 2001	Governor Gary Locke authorized the Department of Ecology (Ecology) to declare a statewide drought emergency. National Weather Service reported that the winter of 2000-01 was the driest since 1976-1977. It was also one of the five driest in the past 100 years.

HAZARD IDENTIFICATION:

When a drought begins, the agricultural sector is usually the first to be affected because of its heavy dependence on stored water in the soil. Soil water can be rapidly depleted during extended dry periods. If precipitation deficiencies continue, then people dependent on other sources of water will begin to feel the effects of the shortage. Those who rely on surface water (reservoirs and lakes) and subsurface water (ground water), for example, are usually the last to be affected. A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.

When precipitation returns to normal and meteorological drought conditions have abated, the sequence is repeated for the recovery of surface and subsurface water supplies. Soil water reserves are replenished first, followed by stream-flow, reservoirs and lakes, and ground water. Drought impacts may diminish rapidly in the agricultural sector because of its reliance on soil water, but linger for months or even years in other sectors dependent on stored surface or subsurface supplies. Ground water users, often the last to be affected by drought during its onset, may be last to experience a return to normal water levels. The length of the recovery period is a function of the intensity of the drought, its duration, and the quantity of precipitation received as the episode terminates.



The following list is a compilation of comments and suggestions made by various stakeholders and the public regarding possible problems that could result from a drought.

In addition to a possible shortage of potable water in some areas of the county as well as possible damage to forest lands and agricultural crops, a drought in Skagit County could potentially result in the following:

- Inadequate stream flow volumes to support fish.
- Long-term burn bans throughout the county.
- The closing of all forest lands to commercial logging operations.
- An increase in the potential risk of wildland fires, wildland-urban interface fires, and cropland fires from a variety of natural and human-caused sources including the discharge of fireworks.

VULNERABILITY ASSESSMENT:

The agricultural and forestry industries are the most vulnerable to the impacts of a drought event in Skagit County.

The agricultural industry relies on a consistent and ample water supply. Annual crops may be damaged or lost in a single growing season but usually rebound with normal precipitation amounts the following year. Many farmers have drilled wells or have the ability to pump water directly from the Skagit River or drainage ditches to irrigate fields during short-term dry periods. In the case of a long-term drought that lasts for several growing seasons, there is a possibility that salt water may intrude into fresh water aquifers.

The forestry industry utilizes loaders, trucks, moving cables, chain saws, and a variety of other motorized equipment to harvest and transport timber in the industrial forest areas of Skagit County. By its nature, logging operations in the industrial forest create sparks and other ignition sources that can cause forest fires. While logging operations are typically curtailed during the warm, summer months when forest fire danger is highest, a long-term drought event would most likely cause all industrial logging operations to cease due to severely reduced moisture levels in the soil and timber thereby leading to extreme fire risk.

If industrial logging operations were to be suspended for a long period of time due to drought conditions, the overall economy of Skagit County could be severely affected.

Should an extreme, long-term drought occur, a large portion of the population of Skagit County could feel the impact. Many residents in rural areas of the county rely on private wells or private water systems for their domestic water supply. Those areas that could be most vulnerable to drought situations are Fidalgo Island and Guemes Island in western Skagit County. Guemes Island relies totally on an island aquifer for domestic water. It is unknown what effect a long-term drought would have on this aquifer. While the number of full-time residents living on Guemes Island is relatively few, a large number of residents living on rural Fidalgo Island

rely on private, stand-alone water systems for their domestic water supply. A severe or long-term drought situation could severely impact a large number of citizens living and working on Fidalgo Island.

A severe drought may result in large numbers of wells going dry. The water supply for most of Skagit County is obtained from the Skagit River or large creeks with reliable, glacial sources. The effects of an extreme, long-term drought could result in inadequate streams flows thereby resulting in the implementation of strict water conservation measures – something that the majority of the population of Skagit County is not familiar with.

A drought lasting for more than one season would most likely reduce the annual snow-pack normally accumulated at high elevations in the Cascade Mountains thereby reducing normal stream flows in local rivers and creeks. A substantial reduction in stream flows could severely impact the generation of electricity from the hydro-electric dams located on the Skagit River and the Baker River in Eastern Skagit County. A reduction in hydro-electric generation will result in increased electricity rates for all residents and businesses in the area. In addition, a substantial reduction in stream flows would severely impact local fish runs as well as recreational use of many lakes and streams within Skagit County.

According to the Washington State Hazard Identification and Vulnerability Assessment (HIVA), three energy curtailments during drought periods prior to 1977 caused temporary unemployment. Due to a drastic increase in electricity rates in 2001, many large manufacturing plants closed their businesses and laid off many employees. A severe, long-term drought would no doubt have the same effect on large business and industry that rely on large amounts of electrical power to operate.

A severe drought could cause reduced stream flows thereby creating a major impact on local salmon runs due to potentially warmer waters and low water levels. In addition, several residential areas within the county could be at risk from forest fires ignited by lightening as well as accidental or intentional human actions.

PROBABILITY and RISK:

Based on historical evidence, there is a **moderate probability** of a drought occurring in Skagit County but a **very low risk** associated with such an event due to the typically short duration and minor severity of drought events in Skagit County.

CONCLUSION:

Rainfall amounts vary greatly within Skagit County. As per the Western Regional Climate Center, Anacortes receives an average of 26 inches annually, Mount Vernon receives an average of 32 inches annually and Concrete receives an average of 65 inches annually. The majority of annual precipitation occurs during the fall and winter months with the months of July and August being the driest.

Skagit County water supplies, for the greatest part, are relatively resistant to short-term drought episodes.

Should a severe, long-term drought occur, it will be vital that local elected officials and governmental agencies work cooperatively with the Washington State Department of Health and the Washington State Department of Ecology to help insure efforts are make to protect public water supplies, aid agriculture and local industry, and safeguard fish and stream flows.