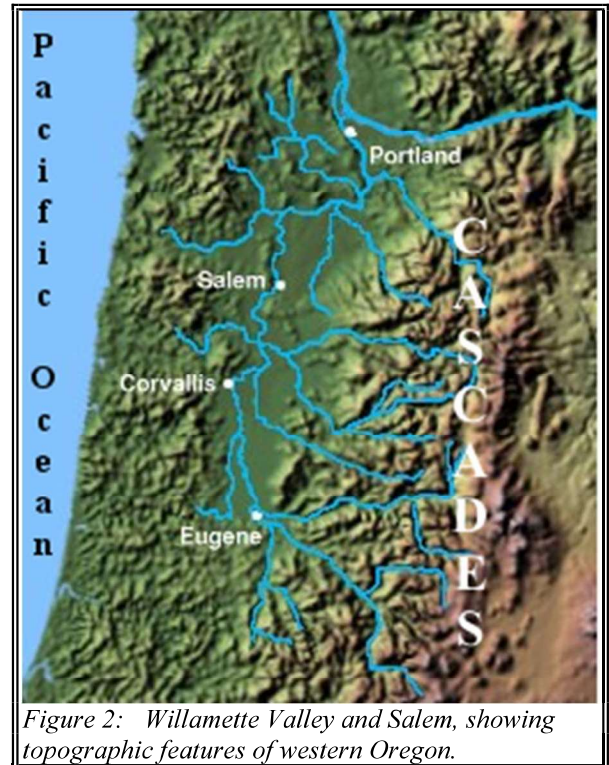
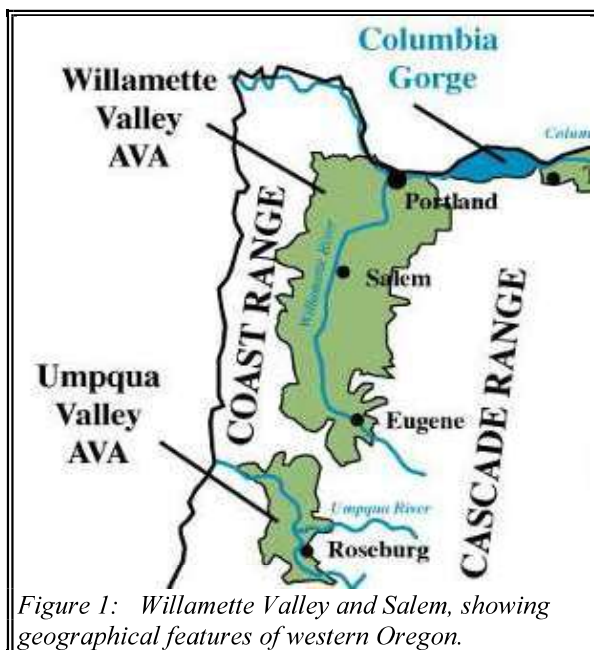


Climate of Salem

I. Geographical Overview

Salem is about 60 miles inland from the Pacific Ocean, and is located in the middle of the fertile Willamette River Valley. McNary Field, Salem's airport, is the current location of the weather observation equipment. The airport is located in the south central part of Salem, about 3 miles from downtown Salem.

At Salem, the Willamette Valley is about 50 miles wide, with Salem at midpoint. To the east rise the Cascades Range, which top out near 5000 to 6000 feet, with a few peaks being much taller. Mount Jefferson, which is about 60 miles east of Salem, is a stratovolcano that rises to 10,496 feet above sea level. To west of Salem lies the Coast Range, generally 2500 to 3500 feet above sea level. There is a ridge of hills (Turner Hills) that extend from southeast of Salem across southern part of Salem, and continue to west and northwest of Salem (Eola Hills).

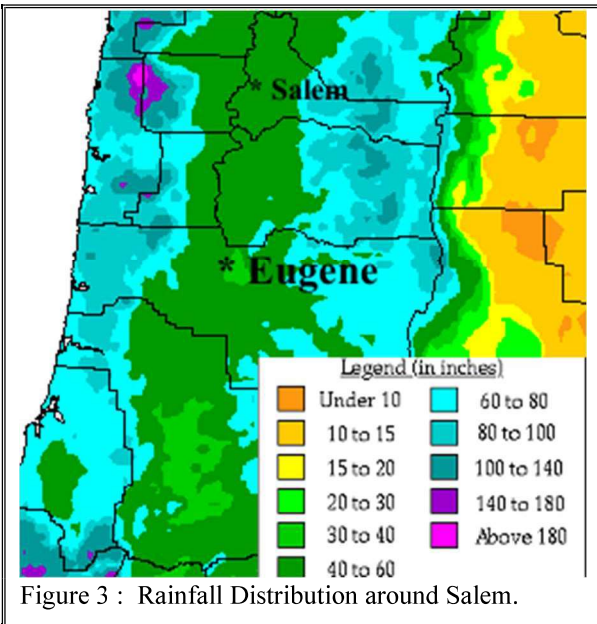


II. Climatological Summary

The Coast Range provides the Salem area, with limited shielding from incoming storms from the Pacific Ocean. Rainfall over the Coast Range totals over 150 inches annually. From the ridge of the Coast Range (about 3000 feet above sea level), there is a gradual decrease in rainfall downslope to the valley floor, where annual rainfall is 35 to 45 inches.

The Cascades offer a steep slope for orographic lift of moisture-laden westerly winds, resulting in increasing rainfall for the Cascades and foothills. The Cascades also act as a barrier, preventing the colder continental air masses that originate in the arctic areas of Canada, from invading western Oregon. Occasionally, cold air does work its way into western Oregon via the Columbia River Gorge, filling the Willamette Valley.

Rain is a part of life during autumn and winter. Nearly 90 percent of the annual rainfall occurs between early October and mid-May. In fact, only about 2 percent of our rain occurs in July and August. It is not uncommon to see relatively dry summers, with no rain in both July and August. The first autumn rain often arrives about mid to late September, but it generally is not until early October when rain frequency increases.



Precipitation falls mostly as rain, with an average of only four days per year recording measurable snow. Snow accumulations are rarely more than two inches, and often melt within a day. Most likely areas of snow will be the higher terrain above 800 feet (which includes the South Hills and Turner Hills). Too many times, warm air pushing in from the Pacific quickly ends the threat of low elevation snow. However, occasionally, significant snow can occur, such as in January of 1950 when 3 feet of snow fell.

The winter season is characterized by mild temperatures, frequent cloudy skies, and rain. Winds are predominately either southerly during the mild rainy spells, or northerly

during the colder dry spells. Outbreaks of cold arctic air from east of the Cascades will occasionally spill into Western Oregon via the Columbia River Gorge, bringing chilly north winds. During these cold air events, if a moist Pacific front pushes into the region, rain will occur. Initially, the warm south winds will not be strong enough to scour out the cold air from the lowlands. As a result, the rain falls into the shallow layer of sub-freezing air, with freezing rain, sleet, and sometimes snow resulting. Often this phase is of short duration, with temperatures warming and ending the freezing/frozen precipitation.

Temperatures are generally mild during the cool season, with highs in the middle 40s to lower 50s and lows in the 30s. It is common to see overnight winter low temperatures into 20s. During cold nights in winter, with an arctic air mass in place over the region, winds are often light under clear skies. This allows for rapid temperatures falls once the sun sets. At that time, temperatures can plummet below 20°F. Such cold temperatures are rare, averaging about twice per winter. The most notable cold snaps occurred in 1950, 1972 and 1989. During the 1972 cold snap, Salem recorded its lowest temperature, with 12°F below zero.

Spring is a transitional time as the weather pattern shift from winter to summer. However, spring is not all that warm, and often, not all that dry. March and April are often damp and cool, with only a few warm dry days. May and June turn more dry, and see the most of the warming weather. Generally, afternoon temperatures warm from the 60s/70s in May to the 70s/lower 80s in June. However, it is not uncommon to see temperatures into the 80s in April and May, with temperatures of 90°F or warmer in May. The warmest day in May was 100°F, occurring in 1983. Even though the number of rainy days decreases in May and June,

there are still plenty of cloudy days, keeping daytime temperatures in the 70s.

Summer finally arrives in early July, when afternoon highs in the 80s occur with regularity. High pressure over the Pacific builds in the summer, with northerly winds prevailing in the afternoons and evenings. This high also shuts off the moisture source, allowing summers to often be dry and warm. Temperatures will often reach the lower to middle 90s, but these warm days do not last long before the cooler ocean air moves inland and cools the region back into the 70s. Temperatures above 100 degrees are rare, but usually occur in July and/or August. Hottest day ever in the Salem was 117°F on 28 June 2021. This is likely the hottest temperature ever recorded west of the Cascades.

Autumn is the reverse of spring. September is still warm and dry, but by early to mid-October, fall arrives with high temperatures back into the 60s. As the night time hours increase, the valley cools more, allowing fog to form on clear nights. Fog can be quite dense during the late night/early morning hours, and can persist for several days.

Destructive windstorms are rare in Salem, due to proximity of the hills to south and southwest. These hills act as a block for the strong southerly winds. The strong south winds blow aloft over the Salem area, but do surface to the Willamette Valley floor further north. But strong winds often occur on the higher hills. Surface winds seldom exceed 50 mph, and have rarely exceeded 70 mph. The strongest winds occurred during the infamous Columbus Day storm of 1962, when south winds peaked at 90 mph.

Thunderstorms can occur during any month, but are not common. Thunderstorms in the winter and spring are weak, producing small hail and brief gusty winds. However, those in summer can produce prolific lightning,

strong winds and larger hail. Occasionally, thunderstorms will produce funnel clouds, but tornadoes are rare. No tornado has ever been recorded in the city of Salem.

On average, the last occurrence of 32 degrees in the spring is 18 April, while the first of autumn is 28 October. However, temperatures of 32°F have occurred as late in spring as 6 June (in 1899) and as early in autumn as 12 September (in 1921).

IV. Station Observing History

Salem's weather records date back to February 1892, when a cooperative station was established. Recorded weather data included temperatures and precipitation. The station was maintained at various locations in downtown Salem until 1937.

On 3 November 1937, a first order weather reporting station was established by the U.S. Weather Bureau at the Salem Municipal Airport. Staff now observed and recorded weather observations 24 hours per day. Primary reason for the new weather station was due to the increased air traffic between San Francisco and Seattle. Many of the aircraft needed to land and refuel between the two cities. Salem, like Medford and Eugene, became stopping points for aircraft. The new weather stations supplied weather information to pilots, making these pilot weather briefings a significant operation and the new offices. Old weather equipment was replaced, and other equipment such as wind anemometers and barometers were added. In addition to the pilot weather briefings and weather data collection, the new Salem weather office issued regular public weather forecasts and if necessary, storm warnings, for Marion, Polk, Benton, Yamhill, Lincoln, and Linn counties in Oregon. The newly created office was located in the Eyerley Aircraft Corporation office, located next to

the airport. On 3 March 1938, the office was moved to a small room in the north corner of the second floor of the hangar building, about 200 feet southwest of the former location. This office was enlarged in 1948, to provide room for teletype machines. On 18 July 1950, the offices and observational equipment were moved to the Salem Airport Administration Building, a half mile west of the hangar.

National Weather Service (NWS) operations continued at Salem through summer of 1995. On 1 July 1995, the Automated Surface Observing Station (ASOS) replaced the manned observations. Weather forecasts, services and warning operations were transferred to the NWS office in Portland. Since 1 July 1995, Salem's weather observations have been generated by machine, with limited augmentation.

Climate data continue to be collected, but snowfall was no longer measured due to ASOS inability to measure snowfall.

V. Updating this Study.

For future updates to the data in this study, refer to the latest climatic data published by the National Climatic Data Center, or contact the National Weather Service in Portland.

Salem data is also available on our website:

<http://weather.gov/Portland>

Table below shows the basic movement and elevations of Salem's weather equipment.

Salem Observation Equipment History and Locations	Occupied		D I S T A N C E M O V E (mile)	L A T I T U D E	L O N G I T U D E	Elevation (in feet) Above								
	F R O M	T O				Sea	Ground							
						Level	W	E	P	S	T	W	8	H
							I	X	S	U	I	E	I	Y
			N	T	U	N	P	P	G	I	N	C	H	
			D	R	C	H	I	N	G	I	N	G	R	A
			E	Q	E	R	O	M	E	B	U	C	K	U
			T	I	T	E	T	E	R	U	C	K	U	C
			M	P	M	P	P	P	P	B	U	C	K	U
			P	P	P	P	P	P	P	B	U	C	K	U
			S							B	U	C	K	U
Various sites in downtown Salem	Feb 1892	6 Aug 1928	n/a	na	na	195		5					4	
Eyerley office	6 Aug 1928	3 Nov 1937	3 miles SSE	45°55'	123°00'	182	60	5	5				3	
Eyerley office (WB Station)	3 Nov 1937	3 Mar 1938	none	45°55'	123°00'	195	80	5	5				3	
Salem Airport Hangar Building	3 Mar 1938	18 Jul 1950	200 ft SW	45°55'	123°00'	195	24	5	5			4	3	
Salem Airport Admin Building	18 Jul 1950	1 Sep 1959	0.5 mile W	45°55'	123°01'	196	30	5	5			4	3	
Salem Airport Admin Building	1 Sep 1959	26 Apr 1978	none	45°55'	123°01'	196	20	5	5			4	3	4
3030 25 th St. SE McNary Field	26 Apr 1978	1 Jul 1995	370 feet SSW	45°55'	123°00'	196	20	5	5			5	5	4
ASOS	1 Jul 1995	Present	none	45°54'	123°00'	195								