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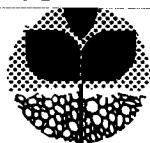
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May 1993

The Climate of Oregon Climate Zone 2 Willamette Valley

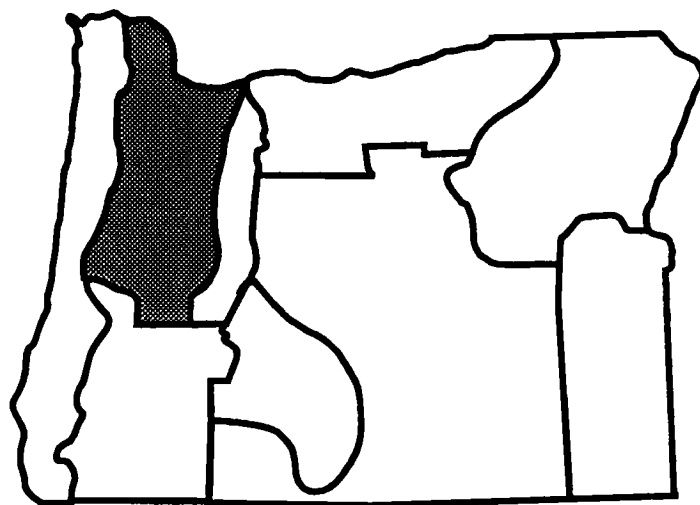
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The Climate of Oregon



Climate Zone 2
Willamette Valley

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March, 1993

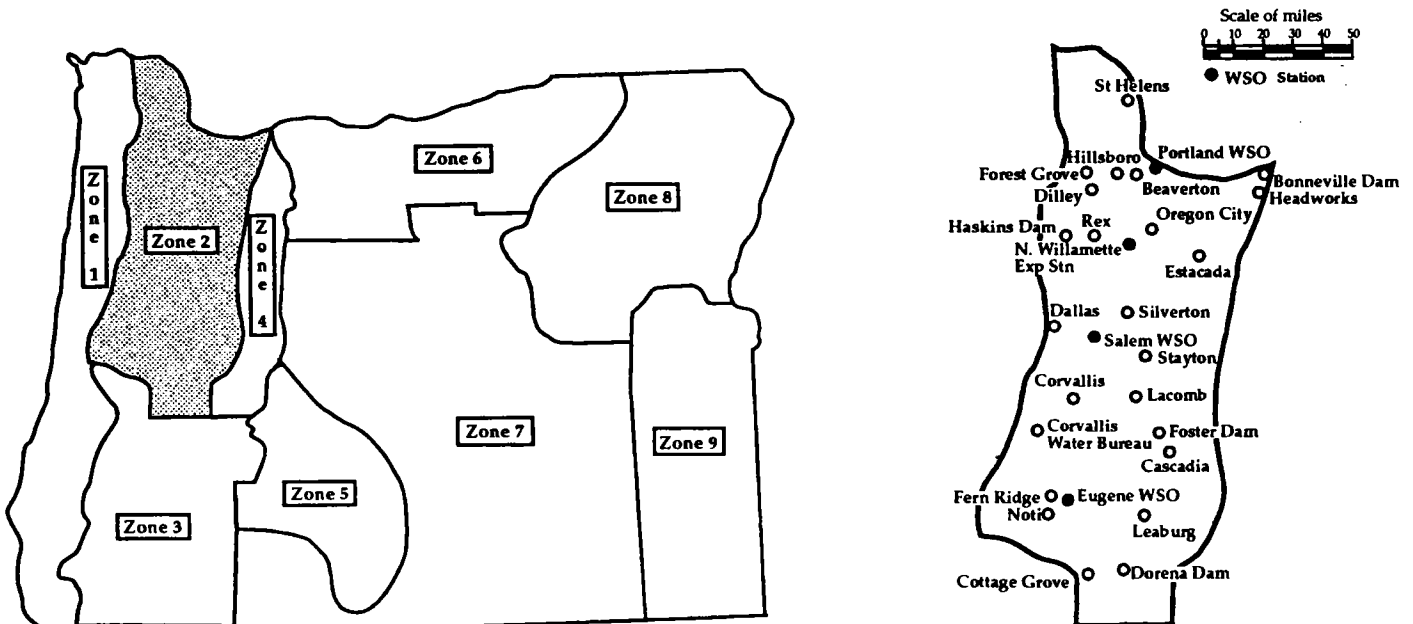
Oregon Climate Zone Summary

Zone 2 -- The Willamette Valley

The Willamette Valley is the most diverse agricultural area in the state of Oregon, and also the home of the majority of the population. Oregon's three largest cities, Portland, Salem, and Eugene, are located in the north, central, and south portions of the Valley, respectively, but the urban areas are surrounded by varied and productive ranches, orchards, and farms. Among the crops grown in significant quantities are tree fruits, nuts, berries, mint, grains, and hay. Livestock operations are also common, including the dairy and poultry industries.

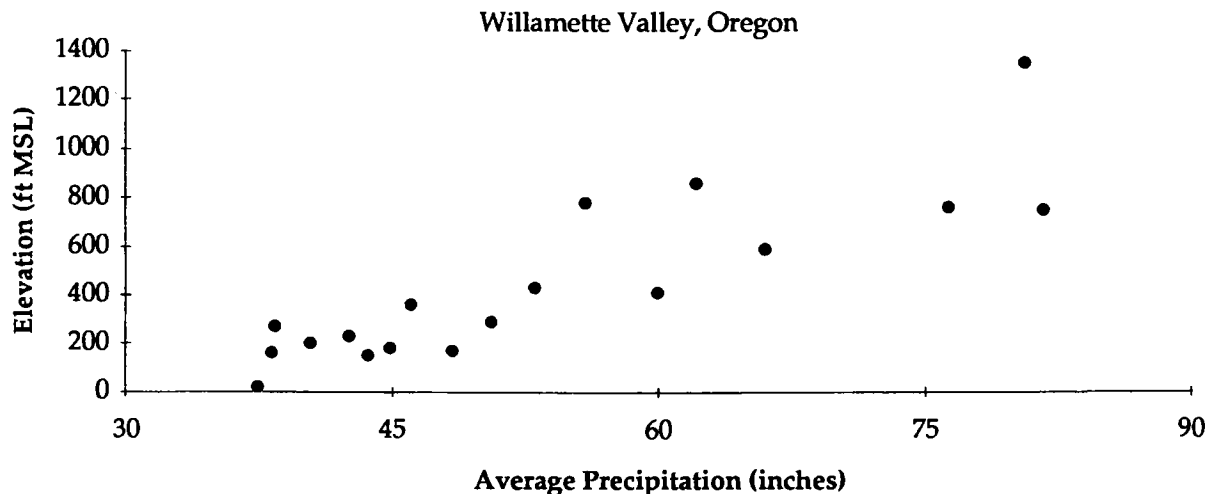
The climate of the Valley is relatively mild throughout the year, characterized by cool, wet winters and warm, dry summers. The climatic conditions closely resemble the Mediterranean climates which occur in California, although Oregon's winters are somewhat wetter and cooler. Growing seasons in the Willamette Valley are long, and moisture is abundant during most of the year (although summer irrigation is common).

Like the remainder of western Oregon, the Valley has a predominant winter rainfall climate. Typical distribution of precipitation includes about 50 percent of the annual total from December through February, lesser amounts in the spring and fall, and very little during summer. Rainfall tends to vary inversely with temperatures -- the cooler months are the wettest, the warm summer months the driest.



There is considerable variation in precipitation in the Valley, ranging from annual totals below 40 inches in the Portland area to upwards of 80 inches in the Cascade and Coast Range foothills. Elevation is the single most important determinant of precipitation totals. Figure 1 shows a plot of annual average precipitation versus elevation for stations in the Valley, and indicates a strong correlation between the two. Even in the lower sections of the Valley the effects of elevation are pronounced. Portland, for example, at 21 feet above sea level, receives an average of 37.4 inches (30-year normal), while Salem (196 feet) receives 40.4 inches and Eugene (359 feet) receives 46.0 inches. Thus, a change of only 338 feet of elevation produces an increase of 23 percent above Portland's total.

Figure 1. Annual Average Precipitation as a Function of Elevation



Extreme temperatures in the Valley are rare. Days with maximum temperature above 90°F occur only 5-15 times per year on average, and below zero temperatures occur only about once every 25 years. Mean high temperatures range from the low 80's in the summer to about 40°F in the coldest months, while average lows are generally in the low 50's in summer and low 30's in winter. The mean growing season (days between 32°F temperatures) is 150-180 days in the lower portions of the Valley, and 110-130 days in the foothills (above about 800 feet).

Although snow falls nearly every year, amounts are generally quite low. Valley floor locations average 5-10 inches per year, mostly during December through February, although higher totals are observed at greater elevations in the foothills.

Severe storms are rare in the Valley. Ice storms occasionally occur in the northern portions of the Valley, resulting from cold air flowing westward through the Columbia Gorge. High winds occur several times per year in association with major weather systems.

Relative humidity is highest during early morning hours, and is generally 80-100 percent throughout the year. During the afternoon, humidities are generally lowest, ranging from 70-80 percent during January to 30-50 percent during summer. Annual pan evaporation is about 35 inches, mostly occurring during the period April - October.

Winters are likely to be cloudy. Average cloud cover during the coldest months exceeds 80 percent, with an average of about 26 cloudy days in January (in addition to 3 partly cloudy and 2 clear days). During summer, however, sunshine is much more abundant, with average cloud cover less than 40 percent; more than half of the days in July are clear.

Table 1 is a summary of average precipitation conditions at selected stations in the Willamette Valley, while temperature conditions are summarized in Table 2. Median dates of low temperature thresholds in spring and fall are listed in Table 3, and Table 4 gives the length of the growing season at each station.

Oregon Climate Service
1993

Oregon Climate Zone 2 Willamette Valley

**Table 1. Monthly and Annual Precipitation (inches)
1961-1990 Means**

Name	Elevation (feet)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Beaverton	270	5.74	4.40	3.90	2.49	2.15	1.57	.68	1.04	1.85	2.66	6.56	6.72	39.77
Bonneville Dam	60	11.37	9.17	7.87	5.53	3.66	2.57	.99	1.58	3.24	5.60	11.07	12.35	74.99
Corvallis	230	6.82	5.04	4.55	2.56	1.95	1.20	.55	.87	1.51	3.11	6.77	7.73	42.67
Corvallis Water Bureau	590	11.73	8.64	7.87	3.95	2.50	1.38	.43	.78	1.76	4.26	10.44	12.39	66.13
Cottage Grove 1 S	650	6.53	5.09	5.24	3.59	2.43	1.39	.52	.97	1.65	3.47	7.46	7.20	45.54
Cottage Grove Dam	830	6.73	5.35	5.47	3.78	2.71	1.53	.57	1.09	1.81	3.77	7.56	7.51	47.89
Dallas 2 NE	290	8.08	6.00	5.64	2.71	1.98	1.22	.50	.70	1.55	3.28	7.65	9.11	48.42
Dilley	170	7.15	5.43	5.07	2.50	1.76	1.35	.53	.90	1.58	3.37	6.87	8.26	44.20
Dorena Dam	820	6.27	5.02	5.22	3.95	2.80	1.81	.72	1.14	1.94	3.52	7.31	6.96	46.65
Estacada 2 SE	410	8.53	6.40	6.23	4.77	3.73	2.58	1.03	1.49	2.63	4.55	8.44	8.90	59.28
Eugene WSO AP	360	7.91	5.65	5.52	3.11	2.16	1.43	.52	1.08	1.67	3.30	8.32	8.61	49.25
Fern Ridge	490	6.45	5.02	4.53	2.63	1.84	1.20	.39	.75	1.32	2.94	6.92	7.65	41.63
Forest Grove	180	7.10	5.26	4.86	2.46	1.70	1.29	.48	.93	1.60	3.31	6.91	7.98	43.86
Foster Dam	550	7.13	5.89	5.42	3.94	3.34	2.38	.74	1.33	2.00	3.79	7.95	7.86	51.77
Haskins Dam	760	12.19	9.53	9.08	4.15	2.72	1.51	.53	.91	2.27	5.21	11.85	13.58	73.52
Headworks	750	11.01	8.74	8.36	6.67	5.04	3.81	1.54	2.18	4.02	6.09	10.49	11.55	79.50
Hillsboro	160	5.87	4.25	4.02	2.15	1.62	1.39	.54	1.07	1.51	2.82	5.74	6.59	37.57
Lacomb	520	7.40	5.70	6.27	4.52	3.57	2.50	1.06	1.55	2.16	4.34	8.53	8.32	55.93
Leaburg 1 SW	680	8.86	7.17	7.16	5.11	3.72	2.50	.78	1.29	2.71	4.99	10.15	9.67	64.11
N. Willamette Exp. St.	150	5.84	4.34	4.06	2.64	2.28	1.70	.66	1.02	1.93	2.98	6.39	6.94	40.78
Noti 1 NW	450	10.18	7.68	7.26	3.93	2.38	1.32	.39	.80	1.66	4.06	9.86	11.14	60.65
Oregon City	170	7.13	5.21	4.78	3.41	2.54	1.91	.78	1.16	2.05	3.44	6.87	7.79	47.06
Portland KGW-TV	160	6.66	4.62	4.51	2.89	2.23	1.57	.69	1.13	2.01	3.20	6.40	7.23	43.15
Portland WSFO AP	20	5.36	3.85	3.56	2.39	2.06	1.48	.63	1.09	1.75	2.67	5.34	6.13	36.32
Rex	520	6.28	4.49	4.21	2.59	2.18	1.56	.63	1.00	1.82	3.18	6.41	7.02	41.37
ST Helens	100	5.91	4.61	4.66	2.53	2.41	1.64	.70	1.37	1.84	3.45	6.70	6.96	42.76
Salem WSO AP	200	5.91	4.50	4.17	2.42	1.88	1.34	.58	.76	1.56	2.98	6.28	6.87	39.24
Silver Creek Falls	1350	11.47	9.06	9.10	6.37	4.78	3.21	1.15	1.73	3.12	6.02	11.58	12.09	79.69
Silverton	410	6.50	4.82	4.85	3.37	2.76	1.90	.84	1.11	2.05	3.41	6.90	7.35	45.85
Stayton	430	7.12	5.72	5.31	3.65	2.91	2.16	.86	1.28	2.22	3.97	8.04	8.23	51.48

Oregon Climate Service
1993

Oregon Climate Zone 2

Willamette Valley

Table 2. Monthly Temperatures (°F)
1961-1990 Means

Station	Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Bonneville Dam	Mean Maximum	42.6	47.8	53.7	58.6	65.9	72.1	78.0	78.8	72.6	62.5	50.7	43.7	60.6
	Mean Minimum	32.6	36.0	38.0	41.3	46.6	52.4	56.3	56.2	52.4	46.2	40.0	34.4	44.4
	Monthly Mean	39.2	41.6	45.9	50.6	56.2	62.4	67.3	67.7	62.9	54.7	45.7	39.0	52.8
Cascadia	Mean Maximum	45.4	51.0	54.2	58.4	64.7	71.5	78.3	79.9	73.7	63.8	51.7	45.0	61.5
	Mean Minimum	30.9	32.8	34.4	36.8	41.3	46.7	48.4	47.9	43.6	38.5	35.8	32.2	39.1
	Monthly Mean	38.2	41.8	44.4	48.0	52.9	59.1	63.3	63.8	58.7	51.3	43.7	38.5	50.3
Corvallis	Mean Maximum	45.4	50.8	54.8	59.0	66.1	73.1	80.1	81.1	75.0	64.2	52.1	45.8	62.3
	Mean Minimum	32.9	35.4	37.0	38.8	43.0	48.5	50.9	51.2	47.7	41.6	37.8	34.1	41.6
	Monthly Mean	39.3	42.8	46.0	49.3	54.6	60.9	65.7	66.2	61.6	53.0	45.2	39.8	52.0
Corvallis Water Bureau	Mean Maximum	44.9	49.8	54.4	58.6	65.8	72.2	78.4	79.4	73.6	63.5	51.2	44.9	61.4
	Mean Minimum	31.7	33.9	35.6	37.3	41.8	47.4	50.1	50.4	47.4	41.1	36.4	32.6	40.5
	Monthly Mean	38.4	41.4	45.0	48.3	53.7	59.7	64.2	64.8	60.5	52.3	43.9	38.5	50.9
Cottage Grove	Mean Maximum	47.7	53.4	56.7	60.9	67.6	74.2	81.2	81.8	75.9	65.4	53.4	47.8	63.8
	Mean Minimum	32.4	34.7	35.4	36.5	40.8	45.7	47.4	47.8	43.9	40.2	37.3	33.6	39.6
	Monthly Mean	40.3	43.7	46.2	49.2	54.2	60.0	64.4	64.7	60.1	53.0	45.5	40.5	51.8
Dallas	Mean Maximum	46.2	51.5	55.9	60.8	68.6	75.6	82.6	82.8	76.6	65.3	52.3	45.9	63.7
	Mean Minimum	32.8	34.9	36.2	37.8	42.1	46.9	48.9	48.8	46.2	41.2	37.1	33.4	40.5
	Monthly Mean	39.5	43.0	46.0	49.6	55.4	61.3	65.6	65.8	61.6	53.4	44.8	39.4	52.1
Estacada	Mean Maximum	45.2	50.3	54.9	59.8	66.9	73.0	78.9	79.0	72.4	61.0	51.0	45.5	61.5
	Mean Minimum	33.3	36.1	37.2	39.3	43.9	48.8	51.7	51.7	48.3	42.9	38.3	34.3	42.2
	Monthly Mean	39.4	42.8	46.1	49.8	55.3	60.9	65.3	65.4	60.6	52.1	44.8	39.7	51.9
Eugene WSO	Mean Maximum	46.2	51.7	55.8	60.1	67.2	74.5	82.0	82.0	75.8	64.5	52.3	46.3	63.2
	Mean Minimum	33.2	35.7	37.1	38.5	42.7	48.0	51.2	51.7	47.8	41.9	38.0	34.5	41.7
	Monthly Mean	39.9	43.4	46.6	49.8	55.0	61.4	66.7	67.0	62.0	53.3	45.4	40.3	52.6
Forest Grove	Mean Maximum	45.7	51.5	56.1	61.0	68.5	75.2	81.6	82.7	76.4	65.1	52.7	45.8	63.5
	Mean Minimum	32.3	35.2	36.7	38.9	43.6	49.2	52.5	52.4	48.0	41.3	37.3	33.7	41.8
	Monthly Mean	39.2	43.0	46.5	50.3	56.2	62.3	67.2	67.5	62.3	53.4	45.1	39.5	52.7
Foster Dam	Mean Maximum	47.3	51.4	55.9	60.0	66.1	72.5	79.4	80.1	74.3	64.8	52.9	47.1	62.6
	Mean Minimum	33.1	35.1	37.2	39.4	43.4	48.3	50.5	50.2	46.4	41.5	38.2	34.2	41.5
	Monthly Mean	40.2	43.3	46.6	49.8	54.8	60.4	65.0	65.2	60.3	53.2	45.6	40.7	52.1
Headworks	Mean Maximum	44.9	49.7	53.5	58.5	66.0	72.0	77.8	78.1	72.1	63.2	51.3	45.1	61.0
	Mean Minimum	33.9	36.3	37.1	39.2	43.8	48.8	52.1	53.0	49.9	44.7	38.9	34.8	42.7
	Monthly Mean	39.5	42.7	45.3	49.3	55.0	60.5	65.1	65.7	61.5	54.1	45.2	39.8	52.0
Hillsboro	Mean Maximum	45.6	51.3	55.7	60.3	67.6	73.9	80.1	80.7	74.8	64.5	52.5	45.9	62.7
	Mean Minimum	33.0	35.5	36.8	38.7	43.3	49.0	51.8	51.6	47.0	40.8	37.2	33.9	41.6
	Monthly Mean	39.4	43.0	46.3	49.9	55.4	61.5	66.0	66.1	61.1	52.7	45.0	39.7	52.2

Table 2. Cont.
Willamette Valley

Station	Code	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Lacomb	Mean Maximum	46.2	51.1	55.5	59.7	65.9	72.2	77.8	79.2	74.2	64.5	51.9	46.8	62.1
	Mean Minimum	31.5	34.4	36.0	38.1	42.4	47.3	49.8	49.4	45.6	40.3	36.3	34.1	40.4
	Monthly Mean	39.1	42.1	45.9	49.5	54.3	59.9	64.1	64.4	60.3	52.5	44.3	39.8	51.4
Leaburg	Mean Maximum	46.9	52.2	56.0	60.4	67.4	74.2	81.5	82.3	75.5	65.0	52.6	46.5	63.4
	Mean Minimum	33.2	34.9	36.5	39.0	43.1	48.2	50.4	50.5	47.2	42.4	38.2	34.0	41.4
	Monthly Mean	40.2	43.5	46.3	49.9	55.2	61.2	66.0	66.4	61.5	53.8	45.4	40.2	52.5
N. Willamette Exp. St.	Mean Maximum	45.8	51.3	55.4	59.4	66.8	73.1	79.6	80.2	74.1	64.0	52.7	46.3	62.4
	Mean Minimum	32.2	34.6	36.5	39.0	44.0	49.5	52.4	52.2	48.4	41.2	37.3	33.3	41.7
	Monthly Mean	39.2	42.7	46.0	49.7	55.4	61.5	66.1	66.2	61.6	52.8	45.2	39.6	52.2
Oregon City	Mean Maximum	46.6	52.4	56.7	61.7	69.4	76.0	81.9	82.0	76.0	64.9	53.2	46.7	64.0
	Mean Minimum	34.6	37.3	38.9	41.0	46.2	51.6	54.8	55.0	51.2	44.7	39.5	35.5	44.2
	Monthly Mean	40.8	44.7	47.9	51.8	57.9	63.9	68.4	68.5	63.9	55.0	46.6	40.9	54.2
Portland KGW	Mean Maximum	45.7	50.3	56.2	60.9	67.0	73.6	79.4	79.1	73.8	63.6	51.3	46.1	62.3
	Mean Minimum	35.8	38.0	40.7	43.5	48.0	53.2	56.5	57.0	53.7	47.4	41.1	36.0	45.9
	Monthly Mean	40.9	45.4	48.4	51.9	58.0	63.8	68.3	68.7	64.0	56.0	47.0	41.6	54.5
Portland WSO	Mean Maximum	45.2	51.2	56.0	59.9	67.1	73.6	79.8	80.1	74.0	63.8	52.4	45.8	62.4
	Mean Minimum	33.6	36.5	38.5	41.0	46.8	52.8	56.4	56.8	51.7	44.7	39.2	34.9	44.4
	Monthly Mean	39.6	43.6	47.3	51.0	57.1	63.3	68.1	68.5	63.2	54.5	46.1	40.2	53.5
St Helens	Mean Maximum	45.8	51.4	57.9	62.6	68.2	74.9	79.7	81.2	74.5	65.3	51.8	45.5	63.2
	Mean Minimum	32.3	36.6	39.3	41.1	46.0	51.6	54.5	55.4	51.1	44.1	38.1	33.9	43.7
	Monthly Mean	39.6	43.3	48.4	52.4	57.1	63.4	67.5	68.4	63.6	54.9	45.5	39.5	53.6
Salem WSO	Mean Maximum	46.2	51.6	55.7	59.9	67.0	74.4	81.5	82.0	75.6	64.3	52.3	46.4	63.1
	Mean Minimum	32.6	34.5	35.6	37.3	42.2	47.9	50.6	51.1	46.8	40.8	37.0	33.8	40.9
	Monthly Mean	39.5	42.7	45.8	49.1	54.7	61.3	66.2	66.6	61.5	52.7	44.9	39.9	52.1
Silver Creek	Mean Maximum	45.1	48.6	52.6	58.0	64.8	71.2	77.1	77.4	72.8	61.9	49.7	44.0	60.6
	Mean Minimum	30.4	31.7	33.1	35.2	40.0	45.0	47.2	47.5	43.0	38.5	34.5	31.1	38.3
	Monthly Mean	37.8	40.2	42.9	46.5	52.1	57.8	62.1	62.1	58.0	50.4	42.2	37.7	49.5
Silverton	Mean Maximum	45.4	51.2	55.0	58.6	65.8	71.9	78.4	79.3	73.6	63.4	52.3	46.0	61.7
	Mean Minimum	32.4	35.5	37.4	39.5	44.7	50.2	53.2	53.6	49.8	43.3	38.0	33.6	42.6
	Monthly Mean	39.2	43.0	46.2	49.6	55.3	61.1	66.0	66.5	62.0	53.4	45.4	39.5	52.3

Oregon Climate Zone 2
Willamette Valley

Table 3. Median Frost Dates
1961-1990 Means

Station	Median Dates of Last Occurrence in Spring of				Median Dates of First Occurrence in Fall of			
	24° F	28° F	32° F	36° F	24° F	28° F	32° F	36° F
Beaverton	3-Feb	9-Mar	19-Apr	10-May	19-Dec	26-Nov	26-Oct	15-Oct
Bonneville Dam	22-Jan	16-Feb	18-Mar	20-Apr	***	19-Dec	24-Nov	13-Nov
Cascadia	13-Feb	4-Apr	13-May	25-May	28-Nov	3-Nov	3-Oct	17-Sep
Clatskanie	23-Jan	18-Feb	19-Apr	12-May	26-Dec	29-Nov	5-Nov	17-Oct
Corvallis Water Bureau	29-Jan	16-Feb	27-Apr	20-May	10-Dec	26-Nov	4-Nov	13-Oct
Cottage Grove	18-Feb	14-Apr	20-May	4-Jun	17-Dec	10-Nov	28-Sep	8-Sep
Cottage Grove Dam	1-Feb	10-Mar	20-Apr	14-May	19-Dec	27-Nov	31-Oct	7-Oct
Dallas 2 NE	4-Feb	23-Mar	2-May	27-May	9-Dec	12-Nov	16-Oct	24-Sep
Dorena Dam	12-Feb	29-Mar	29-Apr	22-May	19-Dec	18-Nov	16-Oct	2-Oct
Estacada	29-Jan	16-Feb	13-Apr	10-May	24-Dec	3-Dec	7-Nov	13-Oct
Fern Ridge Dam	28-Jan	19-Feb	21-Apr	8-May	21-Dec	1-Dec	7-Nov	20-Oct
Forest Grove	4-Feb	13-Mar	25-Apr	13-May	9-Dec	12-Nov	18-Oct	3-Oct
Headworks	24-Jan	10-Feb	12-Apr	4-May	***	14-Dec	18-Nov	22-Oct
Hillsboro	3-Feb	6-Mar	29-Apr	13-May	19-Dec	16-Nov	18-Oct	3-Oct
Leaburg	18-Jan	21-Feb	19-Apr	15-May	24-Dec	8-Dec	10-Nov	14-Oct
Lookout Point Dam	14-Jan	4-Feb	18-Mar	30-Apr	29-Dec	11-Dec	26-Nov	3-Nov
North Willamette Exp. Stn.	2-Feb	13-Mar	22-Apr	16-May	18-Dec	14-Nov	21-Oct	10-Oct
Noti 1 NW	18-Feb	28-Mar	12-May	31-May	15-Dec	18-Oct	3-Oct	13-Sep
Oregon City	30-Jan	21-Feb	5-Apr	28-Apr	30-Dec	6-Dec	6-Nov	16-Oct
Portland	28-Jan	25-Feb	30-Mar	26-Apr	22-Dec	2-Dec	8-Nov	21-Oct
Salem	4-Mar	12-Apr	4-May	25-May	29-Nov	2-Nov	16-Oct	2-Oct
Scotts Mills	23-Feb	13-Apr	12-May	3-Jun	4-Dec	15-Nov	18-Oct	25-Sep
Silver Creek	1-Mar	17-Apr	14-May	8-Jun	24-Nov	23-Oct	4-Oct	12-Sep
Silverton	29-Jan	5-Mar	11-Apr	29-Apr	20-Dec	26-Nov	4-Nov	16-Oct
Stayton	1-Feb	15-Mar	20-Apr	11-May	14-Dec	26-Nov	22-Oct	3-Oct
Troutdale Sub	12-Jan	21-Feb	2-Apr	26-Apr	***	10-Dec	12-Nov	16-Oct
Vernonia	4-Mar	10-Apr	7-May	9-Jun	10-Nov	24-Oct	30-Sep	8-Sep

*** Did Not Occur

Oregon Climate Service
1993

Oregon Climate Zone 2
Willamette Valley

Table 4. Growing Season
1961-1990 Means

Station	Average Days Between Occurrences of			
	24° F	28° F	32° F	36° F
Beaverton	320	262	190	158
Bonneville Dam	***	308	252	207
Cascadia	289	213	143	116
Clatskanie	339	285	200	159
Corvallis Water Bureau	316	284	191	146
Cottage Grove	303	210	131	96
Cottage Grove Dam	323	262	195	146
Dallas 2 NE	310	235	168	120
Dorena Dam	311	235	170	133
Estacada	330	292	209	157
Fern Ridge Dam	328	286	200	165
Forest Grove	309	245	177	143
Headworks	***	308	220	171
Hillsboro	320	255	173	144
Leaburg	342	291	205	152
Lookout Point Dam	350	311	253	188
North Willamette Exp. Stn.	321	246	182	147
Noti 1 NW	301	204	144	105
Oregon City	336	290	215	172
Portland	329	281	223	179
Salem	270	204	165	130
Scotts Mills	285	216	159	114
Silver Creek	268	189	143	96
Silverton	326	266	207	170
Stayton	317	256	185	145
Troutdale Sub	***	293	225	174
Vernonia	251	198	146	91

*** Did Not Occur

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1993