

1995 WEATHER REPORT

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Introduction

Daily observations of air temperature and precipitation have been recorded at the Malheur Experiment Station since July 20, 1942. Installation of additional equipment in 1948 allowed for evaporation and wind measurements. A recording soil thermometer was added in 1967. A biophenometer, to monitor growing degree days, and pyranometers, to monitor solar and photosynthetic active radiation, were added in 1985.

Since 1962, daily readings from the station have been reported to the U.S. Department of Commerce, Environmental Science Service Administration, National Weather Service. Each day the 8:00 a.m. air temperature, preceding 24-hour air and soil temperature extremes, and 24-hour accumulated precipitation are recorded and transmitted to radio station KSRV in Ontario. KSRV then conveys this information, along with their own daily readings, to the U.S. Weather Station in Boise, Idaho. During the irrigation season (April -October), evaporation, wind, and water temperature are also monitored and reported.

On June 1, 1992, in cooperation with the U.S. Bureau of Reclamation, a fully automated weather station, connected by satellite to the Northwest Cooperative Agricultural Weather Network (AgriMet) computer in Boise, Idaho, began transmitting data from Malheur Experiment Station. The automated station monitors air temperature, relative humidity, dew point temperature, precipitation, wind run, wind speed, wind direction, solar radiation, and soil temperature at 8-inch and 20-inch depths. Stored data is dumped and transmitted to the Boise computer every 4 hours. The database may be accessed via computer modem. During the irrigation season, daily Malheur County crop water-use estimates, which are based on data from this automated weather station, are also available by modem.

1995 Weather

Total precipitation for the year exceeded the 10-year and 53-year station averages by 43.5 percent and 32.8 percent, respectively (Table 1). With the exception of February, monthly precipitation totals from January through July were above both the 10-year and 53-year means (Table 2). Compared to the long term averages, January and December were abnormally wet (Figure 1). Precipitation accumulation for the fall/winter period October 1, 1994, through March 31, 1995, was 150 percent of the 53-year mean (Table 3).

Snowfall totals for January, February, March, October, and November were below the long-term means. Total snowfall accumulation for December was 149 percent of the 53-year average (Table 4). Annual snowfall for 1995 totaled 75 percent and 78 percent of the 10-year and 53-year averages, respectively (Table 5).

Mean monthly maximum air temperatures from April through August were consistently below the long term station means (Table 6). Mean monthly minimum air temperatures for the same period ranged from 1°F above to 4°F below the 53-year monthly means.

From March through August, monthly mean 4-inch soil temperatures tended to be slightly above the long term means (Table 7). From May through August mean monthly 4-inch soil temperature ranged from 1°F to 4°F above the 29-year monthly mean.

Monthly pan-evaporation totals for April through August ranged from 0.67 inches to 1.42 inches below the monthly mean totals for the past 10 years (Table 8). Mean 1995 daily pan-evaporation from March 1 through August 31 was approximately 0.27 inches per day. Monthly wind-run totals for April 1 through October 31 ranged from 2,449 miles for April to 1,532 miles for September (Table 9). The average daily wind-run over the irrigation season (April through October) was 63 miles per day. The average daily wind-run for the calendar year was 61 miles per day. Total pan-evaporation for the season was 9 percent under the 10-year mean and 5 percent over the 48-year mean (Table 10). Total wind-run for the season exceeded the 10-year mean by 4 percent and 48-year mean by 27 percent. The below-average evaporation figure for 1995 resulted from the occurrence of above-average precipitation amounts and below-average air temperatures throughout most of the irrigation season.

Seasonal estimates of crop water-use for those crops commonly grown in northeastern Malheur County, measured by the Bureau of Reclamation - AgriMet weather station at MES, estimated that crop water requirements for 1995 were below the average requirement for the past 4 years (Table 11).

The last spring frost ($\leq 32^{\circ}\text{F}$) occurred 10 days earlier than the 20-year mean date of April 26; the first fall frost occurred on September 22, 12 days earlier than normal. Table 12 shows the dates of the last spring and first fall occurrences of minimum air temperatures equal to or below threshold levels of 24, 28, 32, and 36 degrees Fahrenheit for the past 20 years. Table 13 shows the number of days between the last spring occurrence and the first fall occurrence of those threshold temperatures.

Total cumulative growing-degree-days ($\geq 50^{\circ}\text{F}$ and $\leq 86^{\circ}\text{F}$) for the year were 11 percent below the 10-year mean (Table 14). Although cumulative growing degree days at the end of March were near to the 10-year mean (Figure 2), below-average temperatures from April through September reduced the overall growing-degree-day accumulation.

Record weather events recorded over the 53-year history for the Malheur Experiment Station are listed in Table 15.

Table 1. Annual precipitation totals for 1986 through 1995 and 10-year and 53-year mean annual precipitation totals at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	10 yr mean	53 yr mean
	----- inches -----											
Total	8.64	9.81	7.58	9.15	7.21	9.25	8.64	13.3	10.05	14.01	9.76	10.55

Table 2. Daily and monthly precipitation totals for 1995 and 10-year and 53-year mean monthly precipitation totals at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	----- inches -----											
1		0.02			0.04							0.01
2		0.08			0.48							
3			0.14		0.02	0.08	0.03					
4			0.20						0.03	0.18		0.06
5			T		0.10				0.04			
6	0.06		T	0.03	0.48	0.08						0.32
7	0.29			0.27	0.02	0.01		T			0.02	0.10
8	0.09			0.13				0.02			0.01	
9	0.20		0.12				0.17				0.07	T
10	0.03		0.03		T		0.09				T	0.11
11	0.10	0.06	0.03	0.06	0.21					0.06	T	0.05
12	0.19	0.07	0.05	0.02	T		0.03			0.11		0.45
13	0.57	0.01	0.20	0.03			0.46				0.11	T
14	0.19	T	0.13	T							0.02	0.10
15	0.06		0.09								0.03	0.22
16	0.02				0.06	0.06		0.02			T	0.23
17		0.03				0.46		0.09			0.02	
18	T	0.01	0.11			0.44				0.09	0.02	
19	0.19		0.32			0.38	0.02					
20	0.01		T	0.25		0.09						
21			T	0.12								
22			0.02							0.01		
23			0.14								T	
24											0.01	
25											0.02	T
26	0.12									0.12	0.03	0.03
27											T	0.01
28	T			0.06							0.48	0.02
29	0.03			0.01			0.05		T			0.15
30				0.18			0.25				0.04	0.41
31	0.52											0.29
1995 total	2.67	0.28	1.58	1.16	1.41	1.60	1.10	0.13	0.07	0.57	0.88	2.56
10 year mean	1.22	0.85	1.09	0.97	1.04	0.94	0.28	0.29	0.30	0.60	1.18	1.01
53 year mean	1.32	0.94	0.97	0.80	1.00	0.82	0.22	0.43	0.50	0.71	1.20	1.33

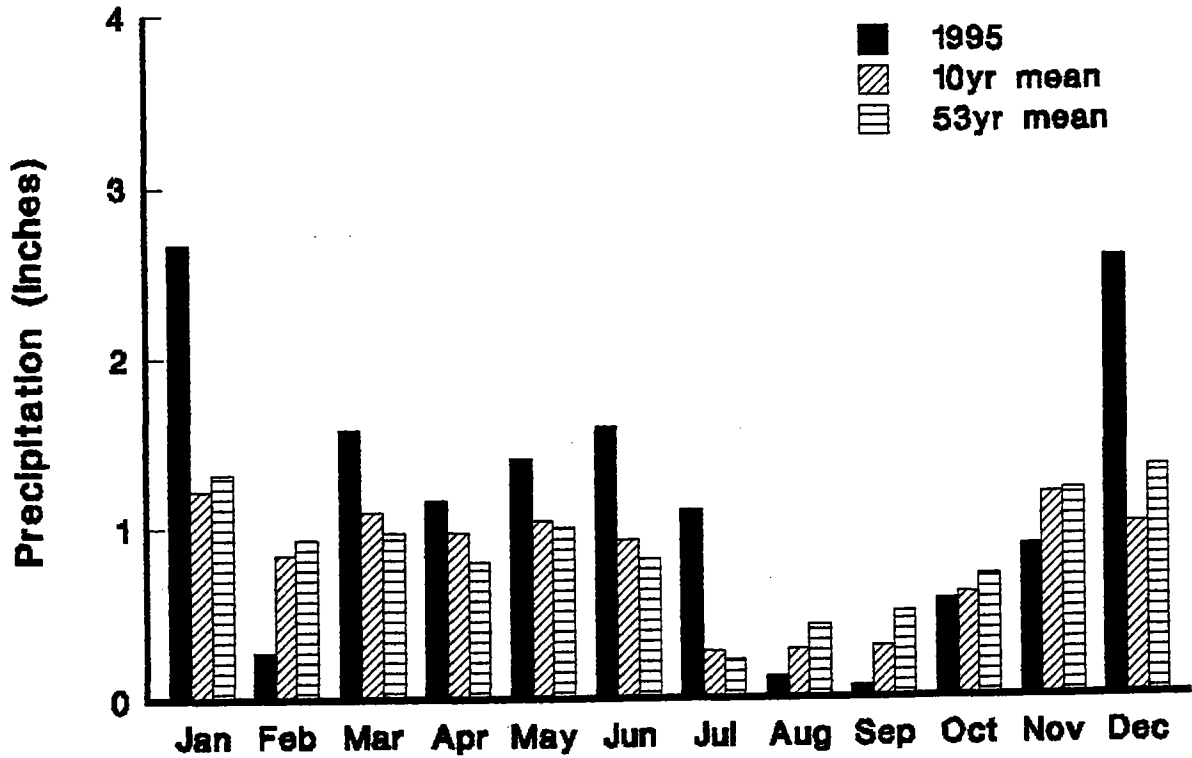


Figure 1. A comparison of the monthly precipitation for 1995 to the 10-year and 53-year monthly precipitation averages at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Table 3. Monthly fall and winter (October through March) precipitation totals from January 1986 through December 1995, and 10-year and 53-year mean monthly and mean seasonal precipitation totals for that six month period at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	10-year	53-year	
	1986	/ 87	/ 88	/ 89	/ 90	/ 91	/ 92	/ 93	/ 94	/ 95	mean	mean	
	----- inches -----												
Oct	-	0.12	0	0	0.86	0.49	1.01	0.95	0.80	1.23	0.57	1.22	1.32
Nov	-	0.22	1.40	2.45	0.24	0.69	1.71	1.15	0.64	2.46	0.88	0.85	0.94
Dec	-	0.22	1.46	1.48	0.01	0.29	0.43	1.51	0.60	1.49	2.56	1.09	0.97
Jan	0.96	1.24	1.25	0.88	0.44	0.59	0.58	2.35	1.20	2.67	-	0.60	0.71
Feb	2.29	0.77	0.14	1.27	0.35	0.44	1.36	1.02	0.57	0.28	-	1.18	1.20
Mar	1.24	1.37	0.26	2.17	0.72	0.88	0.25	2.41	0.05	1.58	-	1.01	1.33
Fall ¹		0.56	2.86	3.93	1.11	1.47	3.15	3.61	2.04	5.18	4.01	3.16	3.23
Spring ²	4.49	3.38	1.65	4.32	1.51	1.91	2.19	5.78	1.82	4.53		2.79	3.24
Total		3.94	4.51	8.25	2.62	3.38	5.34	9.39	3.86	9.71		5.95	6.47

Table 4. Daily and monthly snowfall totals for 1995 and 10-year and 53-year mean monthly snowfall totals at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Jan	Feb	Mar	Oct	Nov	Dec
	----- inches -----					
1						
2						
3						
4						
5						
6	0.5					2.5
7	4.0					0.5
8	T					
9						
10						
11		T				
12		1.0				
13		1.0				
14		T				
15						
16						
17						
18	T					
19						
20						
21						
22						
23						
24						
25						
26						T
27						T
28					T	T
29						1.5
30						4.0
31						
1995 total	4.5	2.0	0	0	0	8.5
10 year mean	7.8	3.1	0.6	0.1	2.2	6.3
53 year mean	7.8	2.8	0.7	0.1	2.1	5.7

Table 5. Annual snowfall totals for 1986 through 1995 and 10-year and 53-year mean annual snowfall totals at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	10 yr mean	53 yr mean
	----- inches -----											
Total	13.0	15.5	34.8	25.1	5.7	7.5	15.5	36.0	32.0	15.0	20.0	19.2

Table 6. Daily maximum and minimum and monthly mean maximum and minimum air temperatures for 1995 and the 10-year and 53-year mean monthly maximum and minimum air temperatures at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
	----- inches -----																							
1	24	1	48	38	52	24	69	43	65	33	86	52	89	57	85	47	91	48	68	40	51	24	59	47
2	21	2	57	34	49	26	57	36	58	45	85	52	92	59	94	56	95	50	68	36	48	13	60	30
3	20	0	58	31	47	31	62	33	63	42	83	53	83	52	95	60	93	54	69	36	46	13	51	25
4	11	0	50	31	50	36	70	37	66	45	83	51	79	52	95	63	93	58	59	41	47	14	50	24
5	23	9	51	32	50	31	74	39	65	48	85	53	82	52	96	60	91	53	61	29	45	16	49	23
6	29	19	52	29	47	24	68	37	57	47	62	39	89	58	100	62	84	50	61	30	54	32	30	17
7	33	23	44	28	45	23	55	41	56	48	58	36	90	56	96	60	86	53	63	35	54	38	29	17
8	35	26	48	34	54	25	63	36	66	49	70	39	92	57	74	43	77	46	67	30	46	34	37	16
9	42	31	53	31	52	34	52	34	64	43	75	51	94	60	77	43	77	47	65	30	51	36	30	16
10	46	38	54	29	60	44	55	30	72	48	71	42	88	62	85	47	80	47	68	34	49	27	33	28
11	54	35	53	27	60	44	59	33	70	49	82	48	89	58	90	51	84	47	63	37	47	27	38	30
12	46	32	32	15	60	41	59	37	63	40	83	49	88	60	82	46	88	47	65	36	49	35	52	32
13	46	32	33	26	57	40	65	38	62	43	87	56	67	48	88	45	90	49	59	27	50	37	65	37
14	44	32	34	20	56	42	53	32	64	40	83	54	76	51	76	42	92	47	60	29	52	42	47	28
15	50	32	33	23	60	43	54	25	70	43	79	51	85	58	86	46	90	47	66	29	51	45	47	29
16	48	31	38	24	56	32	55	30	75	50	70	54	89	57	93	53	92	52	69	28	53	37	43	32
17	45	26	39	24	56	30	61	35	74	52	80	54	93	58	66	50	91	53	72	33	49	39	44	24
18	39	26	45	31	63	34	61	42	77	44	73	48	93	62	74	44	87	51	68	33	52	34	39	24
19	38	31	51	35	55	38	60	34	74	44	69	46	96	66	77	43	89	52	62	29	60	33	41	22
20	41	31	65	32	56	40	56	37	75	43	63	40	94	59	85	45	84	55	62	28	48	30	38	22
21	40	35	62	35	62	34	51	36	81	47	69	43	94	59	91	54	79	42	57	29	53	30	35	23
22	39	22	61	33	52	31	62	39	82	53	73	50	95	60	96	58	67	30	57	34	47	30	35	20
23	40	23	61	34	52	36	66	38	78	52	78	53	90	61	96	63	73	32	59	24	53	29	39	16
24	37	26	63	33	49	29	70	39	78	45	85	53	93	61	95	55	80	37	60	23	50	27	28	17
25	43	32	64	34	48	28	75	46	79	47	89	57	93	57	87	51	77	46	64	32	51	35	23	20
26	41	33	65	42	50	29	70	37	80	48	92	60	95	60	89	50	77	43	60	36	50	36	25	21
27	48	31	62	36	54	29	M	M	75	44	95	62	91	58	89	51	75	50	65	35	53	28	26	22
28	46	29	54	27	57	28	74	40	77	47	85	55	95	62	88	46	74	45	59	29	45	30	26	21
29	41	32			56	27	66	42	83	48	84	49	100	63	89	52	71	43	60	28	41	34	33	23
30	45	35			56	26	57	42	87	52	84	49	79	48	81	47	69	38	62	32	56	37	32	26
31	45	37			63	29			90	55			79	47	86	46			53	23			34	27
1995 mean	39	26	51	30	54	33	62	37	72	46	79	50	89	57	87	51	83	47	63	31	50	31	39	24
10 yr mean	33	16	42	22	55	32	66	38	74	46	83	53	90	57	89	54	80	46	67	35	46	26	36	18
53 yr mean	34	19	43	25	54	31	64	37	74	45	82	52	91	57	89	55	80	46	65	36	47	28	37	22

Table 7. Daily maximum and minimum and monthly mean maximum and minimum 4-inch soil temperatures for 1995 and the 10-year and 29-year mean monthly maximum and minimum 4-inch soil temperatures at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
	----- inches -----																							
1	34	34	41	39	53	39	64	45	70	50	86	69	89	69	90	69	87	68	68	58	52	41	49	46
2	32	32	43	40	51	39	54	44	57	52	85	68	92	72	91	70	88	69	71	57	51	37	49	40
3	30	30	50	39	48	39	62	40	61	49	85	55	81	70	93	75	86	71	70	56	49	36	44	37
4	32	31	47	38	51	42	67	46	68	49	81	67	82	69	94	76	83	71	61	53	48	35	40	37
5	29	29	48	38	47	40	66	50	67	54	84	67	87	67	94	76	86	70	63	50	45	35	42	36
6	30	30	48	39	45	37	66	54	55	51	67	55	91	70	95	77	85	69	64	49	47	42	36	36
7	31	31	43	39	47	36	58	52	52	50	64	54	89	73	93	78	84	69	62	51	48	42	35	35
8	31	31	45	39	51	37	58	48	61	50	74	54	92	74	83	70	81	67	67	52	46	44	35	35
9	31	31	46	38	42	40	54	44	64	53	76	64	91	74	87	69	83	67	62	51	46	44	35	35
10	32	31	48	38	46	43	55	42	74	53	87	62	85	72	87	68	83	67	65	53	45	41	35	35
11	32	32	44	38	46	44	63	41	72	58	79	61	93	72	87	71	84	67	59	53	47	40	35	35
12	32	32	38	37	55	46	62	48	65	51	85	65	91	74	86	69	85	68	58	51	46	44	44	35
13	33	31	36	36	53	45	60	48	65	50	85	67	74	64	86	69	85	68	58	47	47	44	46	42
14	34	34	35	35	49	46	52	42	62	51	82	69	83	63	81	66	86	68	61	46	50	47	42	38
15	42	33	34	34	52	47	59	42	75	51	79	66	89	64	86	65	84	67	62	47	50	49	40	37
16	40	35	34	34	55	43	63	41	76	55	71	63	92	70	87	69	84	67	62	48	51	46	42	38
17	39	35	34	34	57	42	65	44	80	61	80	63	93	72	74	66	82	68	62	51	50	46	43	37
18	35	35	38	34	55	41	63	48	78	60	71	60	95	74	80	64	83	68	60	50	50	46	37	36
19	35	34	44	36	52	45	62	47	79	59	71	58	92	76	82	64	84	69	60	48	51	43	37	36
20	39	36	51	40	52	45	61	47	82	62	68	54	95	76	84	65	82	69	59	46	45	40	35	35
21	41	36	52	41	51	43	54	44	83	61	72	53	94	76	86	66	80	64	55	46	48	40	35	35
22	38	35	53	42	50	41	59	43	82	64	75	57	94	77	87	70	76	60	55	48	43	40	35	35
23	35	35	55	42	43	40	64	45	87	64	85	62	93	76	89	73	74	59	57	45	48	42	35	34
24	35	35	55	43	47	39	71	48	80	63	89	64	93	76	88	74	76	58	56	44	47	41	34	34
25	38	35	54	42	47	38	74	54	80	62	92	68	93	76	87	72	74	60	59	47	48	44	34	33
26	37	35	57	44	47	38	69	53	80	62	93	72	94	75	88	71	74	62	55	47	45	43	33	33
27	43	36	55	44	46	39	M	M	78	61	96	74	92	76	86	70	75	65	61	48	46	38	31	31
28	43	36	54	40	54	40	72	54	82	61	89	72	94	79	88	70	73	63	60	46	40	38	31	31
29	38	36			58	41	68	54	85	63	87	70	95	76	87	69	72	62	58	46	43	39	32	31
30	41	38			60	41	59	51	87	65	88	70	79	66	84	69	72	59	57	46	46	42	32	32
31	40	37			62	41			88	69			87	66	86	69			54	43			32	32
1995 mean	36	34	46	39	51	41	62	47	73	57	81	63	90	72	87	70	81	66	61	49	47	42	38	36
10 yr mean	32	31	38	34	51	41	63	50	73	59	82	67	89	75	87	74	77	65	63	52	44	39	34	32
29 yr mean	33	31	38	34	51	41	62	48	74	58	82	67	90	75	88	74	77	64	61	51	44	39	34	33

Table 8. Daily and monthly pan-evaporation¹ totals for April through October 1995 and 10-year and 48-year mean monthly pan-evaporation totals for the same period at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Apr	May	Jun	Jul	Aug	Sep	Oct
	----- inches -----						
1	0.17	0.21	0.21	0.29	0.29	0.26	0.14
2	0.17	0.13	0.34	0.40	0.36	0.32	0.23
3	0.17	0.24	0.29	0.20	0.42	0.23	0.14
4	0.17	0.21	0.29	0.36	0.37	0.22	0.06
5	0.23	0.16	0.32	0.26	0.36	0.29	0.16
6	0.15	0.07	0.24	0.32	0.42	0.30	0.12
7	0.02	0.15	0.16	0.37	0.44	0.28	0.15
8	0.16	0.16	0.41	0.32	0.28	0.30	0.12
9	0.22	0.12	0.27	0.28	0.29	0.22	0.15
10	0.20	0.12	0.18	0.25	0.27	0.22	0.10
11	0.15	0.24	0.37	0.42	0.34	0.26	0.06
12	0.10	0.25	0.35	0.48	0.30	0.25	0.09
13	0.10	0.26	0.36	0.07	0.48	0.26	0.10
14	0.09	0.18	0.33	0.17	0.20	0.26	0.11
15	0.17	0.17	0.18	0.30	0.28	0.24	0.11
16	0.17	0.31	0.16	0.42	0.32	0.26	0.08
17	0.20	0.27	0.34	0.37	0.16	0.22	0.15
18	0.27	0.40	0.20	0.36	0.31	0.24	0.08
19	0.34	0.38	0.14	0.30	0.24	0.40	0.20
20	0.25	0.34	0.25	0.38	0.26	0.34	0.11
21	0.14	0.31	0.25	0.38	0.27	0.39	0.14
22	0.31	0.47	0.08	0.36	0.30	0.20	0.17
23	0.27	0.47	0.26	0.37	0.25	0.22	0.12
24	0.19	0.28	0.30	0.43	0.28	0.20	0.14
25	0.28	0.26	0.29	0.41	0.34	0.20	0.11
26	0.31	0.38	0.31	0.32	0.35	0.26	0.06
27	M	0.49	0.45	0.45	0.33	0.22	0.14
28	0.38	0.33	0.52	0.37	0.29	0.22	0.09
29	0.18	0.34	0.45	0.46	0.23	0.22	0.08
30	0.04	0.29	0.28	0.37	0.32	0.22	0.12
31		0.38		0.25	0.27		0.11
1995 total	5.60	8.37	8.58	10.49	9.62	7.72	3.74
10 year mean	6.27	9.11	9.84	11.91	10.54	7.49	4.30
48 year mean	5.54	7.59	8.79	11.09	9.47	6.18	3.07

¹ Total water evaporation from a standard 10-inch-deep by 47½-inch-diameter pan over 24 hours.

Table 9. Daily and monthly wind-run¹ totals for 1995 and 10-year and 48-year mean monthly April through October wind-run totals at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	----- miles -----											
1	45	26	58	32	49	44	27	23	31	65	127	124
2	44	49	35	145	64	80	36	49	27	67	48	79
3	46	26	40	59	92	96	56	55	23	31	26	50
4	57	27	73	23	33	66	91	64	42	113	26	62
5	51	15	80	79	50	90	45	37	66	65	37	95
6	9	20	80	65	184	127	41	42	51	33	33	21
7	15	14	27	41	151	79	63	51	50	72	41	57
8	56	57	30	98	79	141	40	110	94	67	30	33
9	184	130	67	108	34	59	48	39	33	38	44	12
10	199	45	157	135	44	24	71	31	26	24	120	37
11	108	93	129	38	47	107	84	81	40	38	61	57
12	32	77	43	20	119	51	108	47	31	60	32	223
13	36	196	85	53	106	65	109	137	28	53	21	220
14	92	70	87	116	70	58	37	44	23	35	18	33
15	42	77	154	100	32	37	37	32	32	30	13	63
16	41	94	69	39	49	65	45	78	29	26	38	99
17	84	35	35	77	68	61	49	58	38	50	30	95
18	24	27	37	91	133	65	42	78	47	51	57	20
19	20	23	66	214	109	51	55	33	77	110	52	35
20	29	31	106	53	31	48	43	26	121	41	25	14
21	38	43	172	183	48	81	41	34	104	67	37	20
22	32	27	57	150	120	36	56	30	52	146	23	13
23	24	30	156	94	125	32	61	26	38	67	31	31
24	32	24	78	40	45	27	71	88	30	40	34	38
25	41	38	143	60	39	27	56	79	45	24	27	14
26	39	33	112	110	113	26	39	43	81	60	63	29
27	28	59	59	M	132	65	78	52	45	71	88	59
28	14	94	96	111	57	124	43	35	43	36	78	32
29	20		66	62	43	81	53	41	113	29	29	27
30	83		33	53	28	36	102	58	72	89	37	45
31	43		33		63		47	27		64		34
1995 total	1608	1480	2463	2449	2357	1949	1774	1628	1532	1762	1326	1771
10 year mean	*	*	*	2168	2367	1926	1861	1617	1504	1480	*	*
48 year mean	*	*	*	2083	1870	1507	1438	1272	1204	1207	*	*

¹ Total wind movement in miles over 24-hour period measured at approximately 24 inches above ground level.
 * Prior to 1990, wind-run data for period between November 1 and March 31 were not recorded at this station.

Table 10. Monthly and seasonal (April through October) pan-evaporation¹ and wind-run² totals for April 1986 through October 1995 and 10-year and 48-year mean monthly and mean seasonal totals for the 7-month irrigation season (April 1 through October 31) at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Pan evaporation								
----- Inches -----								
1986	5.80	8.31	10.91	12.00	11.61	5.05	3.95	57.63
1987	8.13	9.55	9.51	11.46	11.08	8.30	4.92	62.95
1988	5.69	8.76	11.17	13.35	11.25	7.01	4.80	62.03
1989	5.79	8.74	10.78	12.84	9.73	6.65	3.76	58.29
1990	7.03	10.07	10.05	12.12	7.88	8.54	3.70	59.39
1991	6.44	8.42	10.12	12.88	11.15	8.36	5.23	62.60
1992	6.40	11.44	9.80	10.49	11.46	6.70	4.15	60.44
1993	4.92	9.28	7.60	10.03	9.51	7.86	4.38	53.58
1994	6.90	8.14	9.90	13.41	12.09	8.69	4.34	63.47
1995	5.60	8.37	8.58	10.49	9.62	7.72	3.74	54.12
10 yr mean	6.27	9.11	9.84	11.91	10.54	7.49	4.30	59.45
48 yr mean	5.54	7.59	8.79	11.09	9.47	6.18	3.07	51.72
Wind run								
----- miles -----								
1986	2308	2321	1792	2130	1740	1413	1544	13248
1987	2354	2432	1898	2161	1938	1620	1311	13714
1988	1889	2599	2357	2014	1879	1604	1294	13636
1989	1929	2620	1872	1707	1481	1465	1311	12385
1990	1832	2506	1824	1556	1276	1357	1427	11778
1991	2693	2677	2184	1680	1358	1316	1786	13694
1992	1797	2237	1711	1671	1580	1583	1158	11737
1993	1943	2060	2008	2138	1604	1505	1273	12531
1994	2490	1865	1669	1780	1686	1648	1929	13067
1995	2449	2357	1949	1774	1628	1532	1762	13451
10 yr mean	2168	2367	1926	1861	1617	1504	1480	12924
48 yr mean	2083	1870	1507	1438	1272	1204	1207	10581

¹ Inches of water evaporated from a standard 10-inch-deep by 47½-inch diameter evaporation pan over 24 hour period.

² Total wind-run in miles over 24 hour period measured at 6 inches above the evaporation pan.

Note: Due to a accidental draining of the evaporation pan at this station, the value reported for August 1990 is from the Parma Experiment Station, University of Idaho, Parma, Idaho.

Table 11. Crop water use at Ontario, Oregon. Average calendar dates defining the water use period for those crops commonly grown in the Ontario area and their calculated water use for 1995 and their average use from 1992 through 1995. (This information was developed by the U.S. Bureau of Reclamation using evapotranspiration data generated via the AgriMet weather station located at the Malheur Experiment Station, Oregon State University, Ontario, Oregon.)

Crop & parameter ¹	Mean dates defining crop water use period			Mean length of water use period	Annual calculated crop water use	
	Water use starts	Full canopy occurs	Water use ends		1995	Mean 1992-95
	----- date -----			days	----- acre inches -----	
Alfalfa (4 cuts)	Mar 14	May 12	Oct 10	211	37.2	39.7
Pasture	Mar 11	May 2	Oct 10	213	29.4	31.4
Lawn or turf	Mar 11	Apr 17	Oct 10	213	35.6	38.1
Winter grain	Mar 9	May 22	Jul 13	126	18.9	22.1
Spring grain (early)	Mar 22	Jun 21	Jul 22	122	19.9	22.8
Spring grain (late)	Apr 5	Jun 19	Aug 3	120	23.0	24.5
Sugar beet (early)	Apr 7	Jul 3	Oct 10	186	*	33.4
Sugar beet (late)	Apr 20	Jul 12	Oct 5	168	29.0	31.9
Onion (early)	Mar 26	Jul 6	Aug 18	145	25.5	28.3
Onion (mid)	Apr 22	Jul 17	Sep 3	134	28.0	28.1
Onion (late)	May 6	Jul 26	Sep 8	125	*	26.6
Potato (Shepody)	May 2	Jul 3	Aug 29	119	22.7	25.0
Potato (Russet, early)	May 4	Jun 23	Sep 10	129	24.1	27.5
Potato (Russet, late)	May 19	Jul 14	Sep 18	122	23.1	25.4
Bean (early)	May 25	Jul 5	Aug 28	95	25.1	20.1
Bean (late)	Jun 8	Jul 8	Sep 4	88	17.5	18.4
Field corn (early)	May 7	Jul 18	Sep 15	132	24.3	26.9
Field corn (late)	May 22	Jul 28	Sep 18	119	23.0	25.5
Sweet corn (early)	May 7	Jul 18	Aug 25	110	19.8	22.0
Sweet corn (late)	May 22	Jul 25	Sep 4	105	19.1	21.1
Mint	Apr 6	Jun 14	Aug 18	134	30.8	26.9
Apple	Apr 15	May 30	Oct 3	170	32.9	36.4

¹ Conditions on which evapotranspiration calculations are based.

Table 12. Annual and 20-year mean dates for last occurrence in spring and for first occurrence in fall when the minimum recorded daily air temperature between January 1, 1976, and December 31, 1995, was equal to or below a threshold temperature at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Year	Last spring date and first fall date when minimum temperature was \leq threshold							
	Spring				Fall			
	$\leq 24^{\circ}\text{F}$	$\leq 28^{\circ}\text{F}$	$\leq 32^{\circ}\text{F}$	$\leq 36^{\circ}\text{F}$	$\leq 24^{\circ}\text{F}$	$\leq 28^{\circ}\text{F}$	$\leq 32^{\circ}\text{F}$	$\leq 36^{\circ}\text{F}$
1976	Apr 2	Apr 3	Apr 23	Jun 26	Oct 19	Oct 18	Oct 5	Sep 9
1977	Mar 31	Apr 15	Apr 20	May 5	Nov 3	Oct 11	Sep 22	Sep 22
1978	Mar 15	Mar 16	Apr 23	May 25	Oct 26	Oct 23	Oct 14	Sep 19
1979	Feb 7	Mar 19	Mar 20	Mar 26	Nov 10	Nov 2	Oct 27	Oct 10
1980	Mar 17	Mar 26	Apr 13	Apr 16	Oct 23	Oct 17	Oct 17	Sep 22
1981	Mar 18	Apr 14	Apr 14	May 7	Oct 22	Oct 22	Oct 1	Nov 23
1982	Apr 20	Apr 21	May 5	Jun 8	Oct 19	Oct 19	Oct 5	Oct 2
1983	Feb 6	Apr 11	Apr 27	May 14	Dec 2	Oct 16	Sep 20	Sep 10
1984	Mar 5	Apr 7	May 7	May 16	Oct 16	Sep 25	Sep 25	Sep 23
1985	Mar 26	Apr 20	May 13	May 13	Oct 9	Sep 30	Sep 30	Sep 18
1986	Feb 14	Feb 21	May 23	Jul 5	Nov 10	Oct 12	Oct 12	Sep 21
1987	Mar 30	Apr 20	Apr 21	May 2	Nov 18	Oct 11	Oct 11	Sep 27
1988	Mar 13	Apr 10	May 2	May 7	Nov 26	Oct 31	Oct 30	Sep 23
1989	Mar 5	Mar 30	May 19	May 25	Oct 29	Oct 16	Sep 13	Sep 13
1990	Mar 25	Mar 25	May 8	Jun 2	Oct 1	Oct 8	Oct 7	Oct 4
1991	Mar 16	Apr 8	Apr 30	May 9	Oct 30	Oct 30	Oct 4	Oct 4
1992	Feb 6	Apr 8	Apr 24	Apr 25	Nov 11	Oct 7	Sep 14	Sep 9
1993	Mar 12	Mar 12	Apr 20	Jun 12	Oct 30	Oct 27	Oct 11	Sep 17
1994	Mar 24	Mar 28	Apr 15	Jun 8	Nov 8	Oct 28	Oct 6	Oct 6
1995	Mar 7	Apr 15	Apr 16	Jun 7	Oct 23	Oct 13	Sep 22	Sep 22
Mean	Mar 12	Apr 2	Apr 26	May 19	Oct 30	Oct 16	Oct 4	Sep 25

Table 13. Annual and 20-year mean number of consecutive days during the year from January 1, 1976, through December 31, 1995, that the minimum recorded daily air temperature was greater than a threshold temperature at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Year	Number of days minimum air temperature was greater than threshold			
	≤24°F	≤28°F	≤32°F	≤36°F
1976	200	198	165	75
1977	217	179	155	140
1978	225	221	174	117
1979	276	228	221	198
1980	220	205	187	159
1981	218	191	170	200
1982	182	181	153	116
1983	299	188	146	119
1984	225	171	141	130
1985	197	163	140	128
1986	269	233	142	78
1987	233	174	173	148
1988	258	204	181	139
1989	238	200	117	111
1990	190	197	152	124
1991	228	205	157	148
1992	278	182	143	137
1993	232	229	174	97
1994	229	214	174	120
1995	230	181	159	107
Mean	232	197	161	130

Table 14. Monthly cumulative degree days (lower threshold = 50°F, upper threshold = 86°F) for the past 10 years (1986 - 1995) at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	0	16	101	220	558	1197	1847	2643	2939	3097	3111	3111
1987	0	0	43	318	741	1288	1929	2578	3064	3287	3316	3318
1988	0	5	56	236	554	1139	2050	2741	3117	3426	3446	3446
1989	0	0	13	197	469	1018	1751	2332	2721	2838	2852	2852
1990	2	9	88	327	588	1085	1819	2454	3039	3077	3077	3077
1991	0	13	29	153	365	754	1530	2248	2684	2878	2879	2879
1992	0	13	119	321	803	1377	2016	2720	3105	3279	3283	3283
1993	0	0	23	104	527	885	1349	1873	2281	2533	2539	2539
1994	0	2	94	283	652	1175	1969	2743	3252	3396	3398	3398
1995	0	29	61	167	460	893	1573	2161	2633	2734	2737	2747
Mean	0	6	63	240	584	1102	1807	2481	2911	3090	3100	3100

Note: One degree day is accumulated for each one degree of the average daily (24-hour) temperature that is above the lower threshold temperature and below the upper threshold temperature.

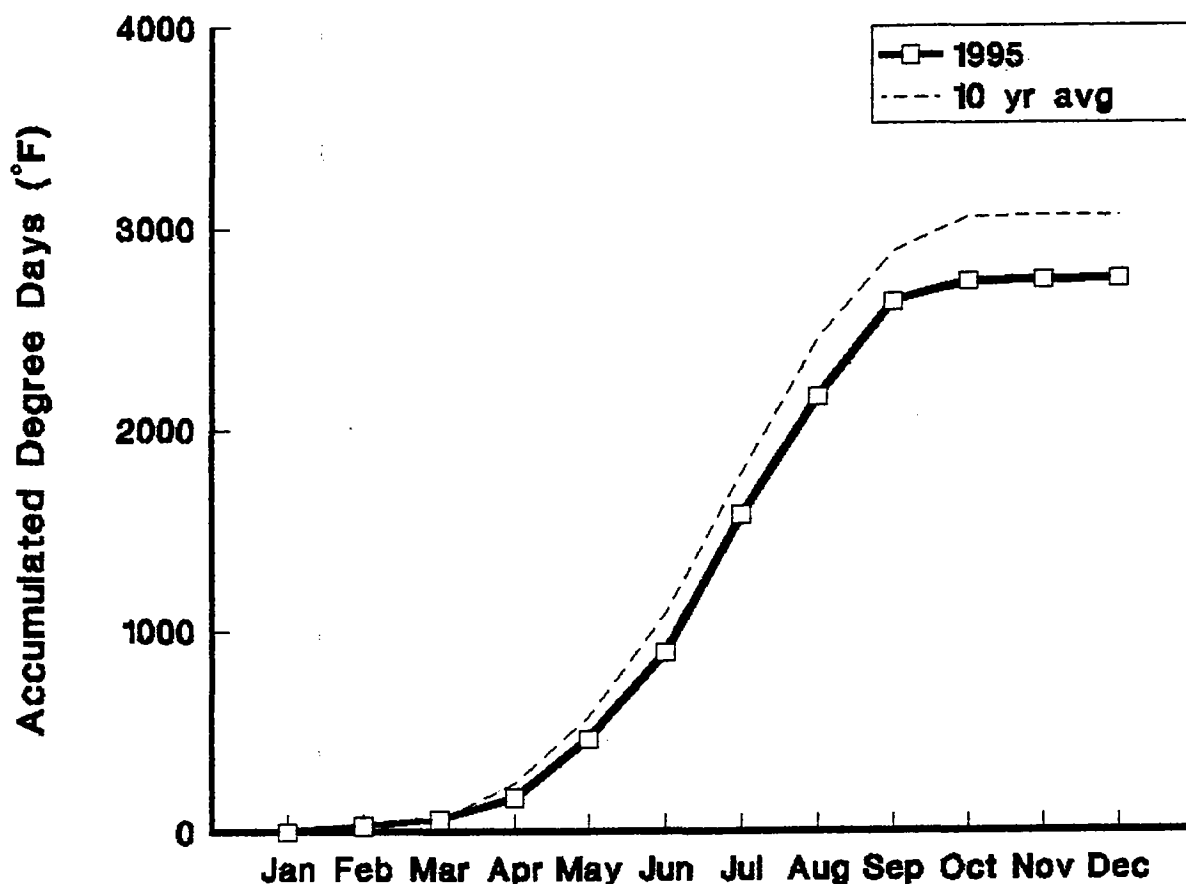


Figure 2. A comparison of the cumulative degree days for 1995 to the 10-year average at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Table 15. Record weather extremes recorded at Malheur Experiment Station, Oregon State University, Ontario, Oregon.

Event	Measurement	Date
Greatest annual precipitation	16.87 inches	1983
Greatest 24-hour precipitation	1.52 inches	Sep 14, 1959
Greatest annual snowfall	40 inches	1955
Greatest 24-hour snowfall	10 inches	Nov 30, 1975
Earliest first winter snowfall	1 inch	Oct 25, 1970
Highest air temperature	108°F	Aug 4, 1961
Total days maximum air temperature $\geq 100^\circ\text{F}$	17 days	1971
Lowest minimum air temperature	-26°F	Feb 21 & 22, 1962
Total days minimum air temperature $\leq 0^\circ\text{F}$	35 days	1985
Lowest 4-inch soil temperature	12°F	Dec 24-26, 1990