

1998

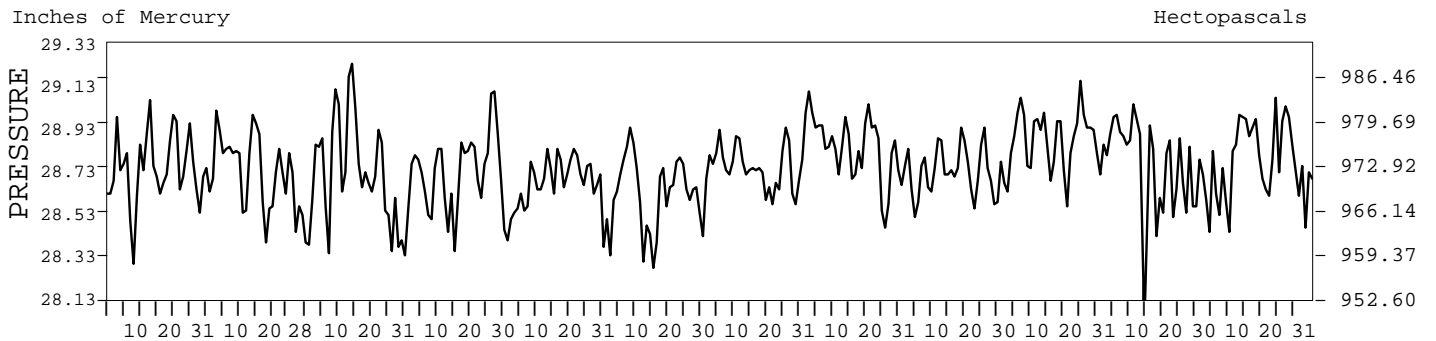
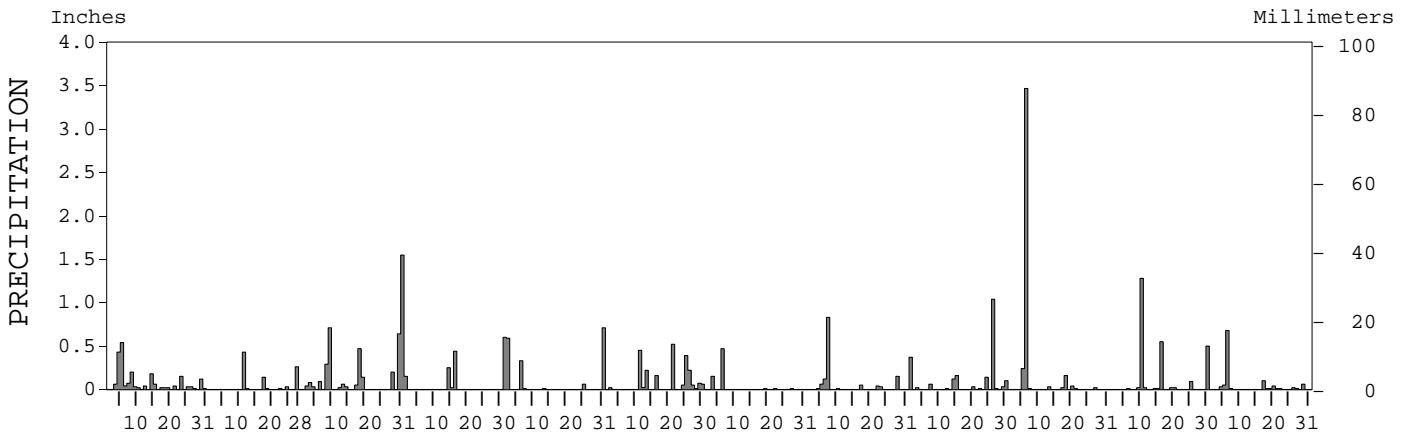
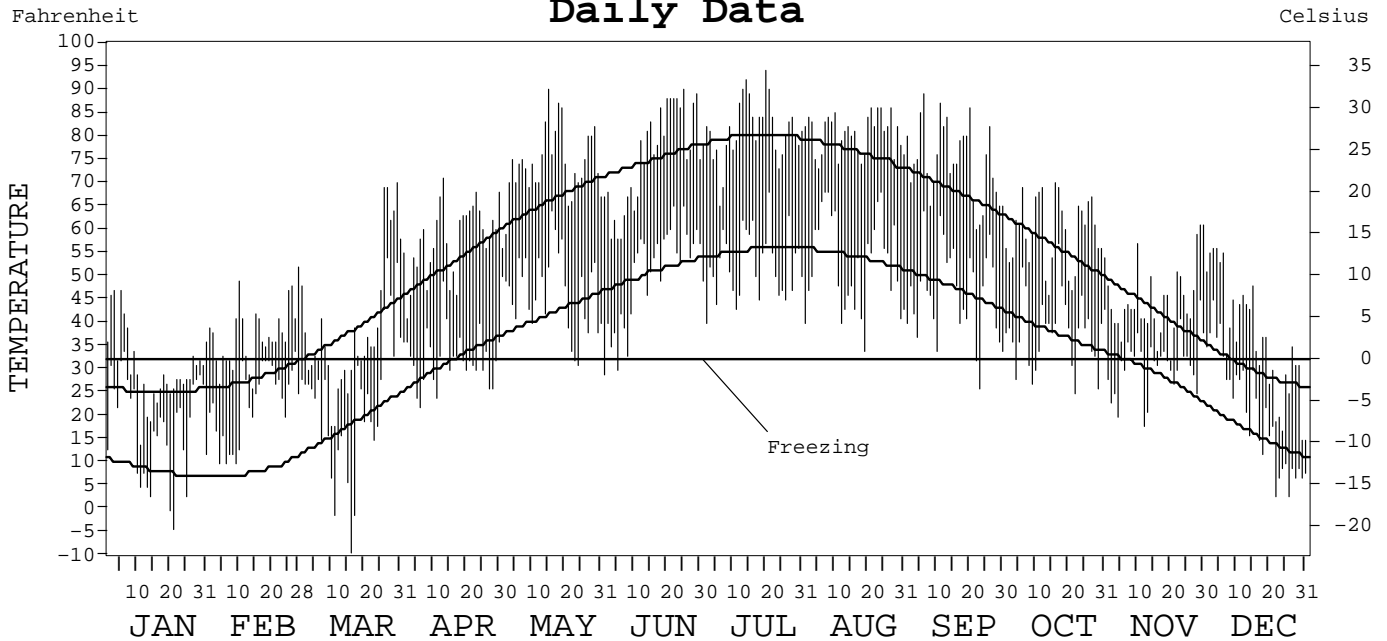
LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA



ISSN 0198-2605

HOUGHTON LAKE,
MICHIGAN (HTL)

Daily Data



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Thomas R. Karl

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METEOROLOGICAL DATA FOR 1998

HOUGHTON LAKE, MI (HTL)

LATITUDE: 44° 22' 04" N LONGITUDE: 84° 41' 27" W ELEVATION (FT): GRND: 1149 BARO: 1157 TIME ZONE: EASTERN (UTC+ 5) WBAN: 94814

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	
TEMPERATURE °F	MEAN DAILY MAXIMUM	30.5	37.4	39.2	57.9	73.8	75.6	81.0	80.5	74.4	59.3	44.8	36.7	57.6	
	HIGHEST DAILY MAXIMUM	47	52	70	71	90	90	94	86	89	70	61	56	94	
	DATE OF OCCURRENCE	05+	28	30	13	15	25	20	27+	06	16	30+	04+	JUL 20	
	MEAN DAILY MINIMUM	17.7	22.9	23.1	32.4	46.7	50.3	52.4	52.9	46.3	38.3	31.0	20.7	36.2	
	LOWEST DAILY MINIMUM	-4	10	-9	22	31	29	40	34	26	25	18	3	-9	
	DATE OF OCCURRENCE	21	09+	16	6	24	01	02	19	23	22	12	26+	MAR 16	
	AVERAGE DRY BULB	24.1	30.2	31.2	45.2	60.3	63.0	66.7	66.7	60.4	48.8	37.9	28.7	46.9	
	MEAN WET BULB	23.6	28.3	29.2	38.9		57.5	60.6	61.8	56.1	45.4		28.1		
	MEAN DEW POINT	21.3	25.2	24.5	29.4		53.0	55.6	58.1	52.3	42.0		24.8		
	NUMBER OF DAYS WITH:														
	MAXIMUM ≥ 90°	0	0	0	0	1	1	4	0	0	0	0	0	0	6
	MAXIMUM ≤ 32°	22	7	12	0	0	0	0	0	0	0	1	12	54	
	MINIMUM ≤ 32°	30	27	25	16	2	2	0	0	2	7	17	25	153	
MINIMUM ≤ 0°	2	0	3	0	0	0	0	0	0	0	0	0	5		
H/C	HEATING DEGREE DAYS	1260	968	1041	592	175	146	34	48	176	499	805	1118	6862	
	COOLING DEGREE DAYS	0	0	0	0	34	93	98	110	45	0	0	0	380	
RH	MEAN (PERCENT)	87	83	77	60	66	72	68	75	76	80	81	83	76	
	HOUR 01 LST	88	88	82	78	84	87	86	92	90	89	87	88	87	
	HOUR 07 LST	89	89	86	80	81	84	86	93	93	91	88	88	87	
	HOUR 13 LST	83	76	67	41	50	56	49	55	56	64	74	74	62	
	HOUR 19 LST	86	80	71	45	53	58	52	62	69	77	79	79	68	
S	PERCENT POSSIBLE SUNSHINE														
W/O	NUMBER OF DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	7	7	5	3	5	3	6	7	4	4	3	4	58	
	THUNDERSTORMS	0	0	2	1	6	12	5	3	6	2	1	1	40	
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
	MIDNIGHT-MIDNIGHT: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
NUMBER OF DAYS WITH:															
CLEAR															
PARTLY CLOUDY															
CLOUDY															
PR	MEAN STATION PRESS. (IN.)	28.75	28.74	28.71	28.72	28.67	28.62	28.76	28.84	28.73	28.89		28.79		
	MEAN SEA-LEVEL PRESS. (IN.)	30.04	30.02	29.99	29.98		29.85	29.99	30.07	29.96	30.15		30.07		
WINDS	RESULTANT SPEED (MPH)	0.8	2.3	1.4	1.0	0.4	2.3	3.1	1.2	2.9	2.1		6.0		
	RES. DIR. (TENS OF DEGS.)	23	08	35	03	07	28	29	25	28	27		25		
	MEAN SPEED (MPH)	8.4	6.9	9.5	8.2	7.7	7.7	6.5	6.2	6.5	7.8	8.8	9.4	7.8	
	PREVAIL. DIR. (TENS OF DEGS.)	09	10	08	07	06	32	24	09	24	25	30	24	24	
	MAXIMUM 2-MINUTE WIND:														
	SPEED (MPH)	29	25	26	31	40	32	25	21	30	26	39	30	40	
	DIR. (TENS OF DEGS.)	25	11	32	06	26	28	26	29	29	27	22	28	26	
	DATE OF OCCURRENCE	10	26	14	09	31	26	14	29+	26+	18	10	22	MAY 31	
	MAXIMUM 5-SECOND WIND:														
	SPEED (MPH)	37	32	33	38	54	41	32	28	39	34	51	38	54	
DIR. (TENS OF DEGS.)	25	09	31	06	23	30	26	32	29	25	21	28	23		
DATE OF OCCURRENCE	10	27	14	09	31	21	21	21	25+	26	18	10	22	MAY 31	
PRECIPITATION	WATER EQUIVALENT:														
	TOTAL (IN.)	2.12	0.89	4.40	0.86	2.31	2.24	0.65	1.30	2.10	4.00	2.53	1.04	24.44	
	GREATEST 24-HOUR (IN.)	0.60	0.43	1.86	0.46	0.71	0.61	0.47	0.83	1.05	3.47	1.28	0.69	3.47	
	DATE OF OCCURRENCE	04-05	11	30-31	15-16	31	25-26	06	07	26-27	06	10	06-07	OCT 06	
	NUMBER OF DAYS WITH:														
	PRECIPITATION ≥ 0.01	21	7	15	4	7	13	5	9	13	9	11	13	127	
PRECIPITATION ≥ 0.10	6	3	7	3	4	6	2	3	6	3	3	2	48		
PRECIPITATION ≥ 1.00	0	0	1	0	0	0	0	0	1	1	1	0	4		
SNOWFALL	SNOW, ICE PELLETS, HAIL:														
	TOTAL (IN.)														
	GREATEST 24-HOUR (IN.)														
	DATE OF OCCURRENCE														
	MAXIMUM SNOW DEPTH (IN.)														
	DATE OF OCCURRENCE														
NUMBER OF DAYS WITH:															
SNOWFALL ≥ 1.0															

NORMALS, MEANS, AND EXTREMES

HOUGHTON LAKE, MI (HTL)

LATITUDE: 44° 22' 04" N LONGITUDE: 84° 41' 27" W ELEVATION (FT): GRND: 1149 BARO: 1157 TIME ZONE: EASTERN (UTC+ 5) WBAN: 94814

ELEMENT		POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	25.3	28.1	38.2	52.7	66.1	74.8	79.6	76.4	67.8	55.8	42.0	29.5	53.0
	MEAN DAILY MAXIMUM	34	25.6	28.6	38.6	52.7	66.2	75.2	79.5	76.7	68.0	55.6	41.4	30.5	53.2
	HIGHEST DAILY MAXIMUM	34	54	59	76	86	90	103	98	94	92	85	70	63	103
	YEAR OF OCCURRENCE		1996	1984	1990	1980	1998	1995	1995	1988	1985	1971	1990	1982	JUN 1995
	MEAN OF EXTREME MAXS.	34	42.2	44.9	59.6	74.3	82.9	88.0	90.0	87.8	82.5	73.8	60.1	46.6	69.4
	NORMAL DAILY MINIMUM	30	8.4	8.2	18.2	31.6	42.0	50.6	55.4	53.8	46.9	37.5	28.4	15.7	33.1
	MEAN DAILY MINIMUM	34	9.2	9.3	18.5	31.4	42.0	51.0	55.5	54.1	46.9	37.3	28.0	17.1	33.4
	LOWEST DAILY MINIMUM	34	-26	-34	-23	3	21	29	33	29	21	16	-5	-21	-34
	YEAR OF OCCURRENCE		1981	1979	1967	1982	1966	1998	1965	1982	1989	1969	1995	1976	FEB 1979
	MEAN OF EXTREME MINS.	34	-14.8	-16.3	-6.3	15.4	28.2	36.1	41.1	39.2	29.7	22.9	11.6	-5.4	15.1
	NORMAL DRY BULB	30	16.9	18.2	28.2	42.2	54.1	62.7	67.5	65.1	57.3	46.7	35.2	22.6	43.1
	MEAN DRY BULB	34	17.5	18.9	28.7	42.0	54.3	63.1	67.5	65.3	57.4	46.5	34.8	23.6	43.3
	MEAN WET BULB	15	19.2	20.6	28.3	39.0	49.4	58.7	58.9	62.2	54.9	41.1	32.6	24.2	40.8
	MEAN DEW POINT	15	14.3	14.4	20.1	30.5	38.3	52.4	53.8	58.0	50.5	36.6	28.4	20.4	34.8
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	*	0.8	1.9	0.5	*	0.0	0.0	0.0	3.2
MAXIMUM ≤ 32°	30	23.6	18.5	9.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	19.3	77.0	
MINIMUM ≤ 32°	30	30.8	27.6	27.5	17.2	5.1	0.3	0.0	*	1.7	9.8	21.9	29.6	171.5	
MINIMUM ≤ 0°	30	8.8	8.1	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.3	23.5	
H/C	NORMAL HEATING DEG. DAYS	30	1491	1310	1141	684	358	120	35	70	234	567	894	1314	8218
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	20	51	112	73	0	0	0	0	256
RH	NORMAL (PERCENT)	30	80	76	74	68	65	70	71	76	78	77	82	83	75
	HOUR 01 LST	30	83	81	80	77	78	84	85	88	88	85	85	85	83
	HOUR 07 LST	30	82	82	83	80	78	81	85	90	92	88	87	85	84
	HOUR 13 LST	30	72	69	64	55	50	55	54	60	63	65	73	77	63
	HOUR 19 LST	30	77	72	67	58	53	57	58	66	73	74	79	81	68
S	PERCENT POSSIBLE SUNSHINE														
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	35	2.1	1.7	2.7	1.5	1.5	1.4	2.3	3.7	3.4	2.5	2.6	2.5	27.9
	THUNDERSTORMS	35	0.2	0.1	0.8	2.0	3.8	5.2	5.4	5.6	3.7	1.4	0.5	0.2	28.9
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	31	6.4	5.9	5.6	5.5	5.1	4.8	4.5	4.6	5.0	5.6	6.5	6.4	5.5
	MIDNIGHT-MIDNIGHT (OKTAS)	16	5.9	5.2	5.1	4.7	4.4	4.4	3.9	3.9	4.7	5.0	6.1	6.2	5.0
	MEAN NO. DAYS WITH:														
	CLEAR	31	2.9	4.2	5.9	6.2	7.0	7.0	7.3	7.8	6.3	5.3	2.4	2.4	64.7
PARTLY CLOUDY	31	6.3	6.7	7.2	7.2	9.3	11.2	13.2	11.1	9.3	7.7	5.0	5.9	100.1	
CLOUDY	31	21.8	17.4	17.8	16.6	14.1	11.8	10.1	12.1	14.4	18.0	22.6	22.8	199.5	
PR	MEAN STATION PRESSURE (IN)	9	28.70	28.72	28.71	28.70	28.70	28.69	25.92	28.81	28.78	28.80	28.72	28.70	28.50
	MEAN SEA-LEVEL PRES. (IN)	15	30.02	30.06	30.04	29.95	29.98	29.95	27.98	30.04	30.03	30.04	30.02	30.03	29.84
WINDS	MEAN SPEED (MPH)	7	9.9	8.9	9.8	9.5	8.7	7.9	7.4	7.0	7.6	8.5	9.4	9.1	8.6
	PREVAIL. DIR (TENS OF DEGS)	9	27	27	32	32	27	27	27	23	23	27	27	27	27
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	2	30	28	26	37	40	33	30	24	30	29	39	30	40
	DIR. (TENS OF DEGS)		31	06	29	24	26	23	33	29	29	28	22	28	26
	YEAR OF OCCURRENCE		1997	1997	1997	1997	1998	1997	1997	1997	1998	1997	1998	1998	MAY 1998
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	2	39	34	36	52	54	45	44	40	39	37	51	38	54
DIR. (TENS OF DEGS)		31	06	09	22	23	23	30	29	29	28	21	28	23	
YEAR OF OCCURRENCE		1997	1997	1997	1997	1998	1997	1997	1997	1998	1997	1998	1998	MAY 1998	
PRECIPITATION	NORMAL (IN)	30	1.50	1.16	2.02	2.22	2.57	3.02	2.58	3.37	3.41	2.18	2.27	1.95	28.25
	MAXIMUM MONTHLY (IN)	34	3.13	3.36	5.67	4.73	5.99	6.67	5.33	7.18	9.49	8.08	5.10	4.48	9.49
	YEAR OF OCCURRENCE		1974	1971	1976	1991	1983	1969	1994	1975	1986	1991	1988	1971	SEP 1986
	MINIMUM MONTHLY (IN)	34	0.60	0.29	0.62	0.86	0.40	0.85	0.55	0.85	0.01	0.47	0.45	0.34	0.01
	YEAR OF OCCURRENCE		1977	1982	1993	1998	1966	1988	1989	1969	1979	1971	1986	1997	SEP 1979
	MAXIMUM IN 24 HOURS (IN)	34	1.39	1.52	2.18	1.81	1.94	3.28	3.83	3.12	2.55	3.47	1.82	1.70	3.83
	YEAR OF OCCURRENCE		1974	1997	1976	1991	1973	1996	1984	1981	1985	1998	1988	1971	JUL 1984
	NORMAL NO. DAYS WITH:														
PRECIPITATION ≥ 0.01	30	14.9	11.3	12.2	11.7	10.3	10.7	9.0	10.0	11.6	11.9	13.2	15.7	142.5	
PRECIPITATION ≥ 1.00	30	0.0	*	0.1	0.3	0.3	0.7	0.5	0.7	0.8	0.1	0.1	0.2	3.8	
SNOWFALL	NORMAL (IN)	30	19.3	12.9	12.0	4.2	0.3	0.0	0.0	0.0	0.*	0.9	9.7	16.9	76.2
	MAXIMUM MONTHLY (IN)	32	38.0	23.6	28.7	11.6	2.3	0.0	T	T	0.1	4.4	41.9	30.4	41.9
	YEAR OF OCCURRENCE		1982	1971	1971	1979	1979		1996	1993	1967	1980	1995	1968	NOV 1995
	MAXIMUM IN 24 HOURS (IN)	32	15.4	8.5	11.7	7.6	3.2	0.0	T	T	0.1	3.5	14.4	13.2	15.4
	YEAR OF OCCURRENCE		1978	1974	1970	1979	1994		1970	1993	1967	1980	1981	1980	JAN 1978
	MAXIMUM SNOW DEPTH (IN)	31	24	21	22	7	3	0	0	0	0	1	17	14	24
	YEAR OF OCCURRENCE		1979	1979	1978	1973	1994					1992	1995	1972	JAN 1979
	NORMAL NO. DAYS WITH:														
SNOWFALL ≥ 1.0	30	6.3	4.7	3.5	1.4	0.1	0.0	0.0	0.0	0.0	0.3	3.0	5.6	24.9	

PRECIPITATION (inches) 1998 HOUGHTON LAKE, MI (HTL)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	1.87	0.32	0.86	2.59	3.57	6.67	3.57	0.85	1.63	5.45	2.19	0.94	30.51
1970	1.16	0.70	1.86	1.50	2.67	4.15	3.93	1.26	5.85	2.75	3.79	2.00	31.62
1971	1.30	3.36	1.79	2.19	1.52	2.84	3.14	1.76	1.20	0.47	1.96	4.48	26.01
1972	0.82	0.99	2.36	1.40	1.79	2.00	2.52	4.63	2.67	2.50	0.99	3.48	26.15
1973	1.22	1.33	1.95	1.66	4.88	2.84	2.34	2.29	1.95	3.11	1.34	1.81	26.72
1974	3.13	1.14	1.44	3.47	2.92	4.60	4.70	2.78	2.53	1.40	1.41	1.43	30.95
1975	1.97	1.14	1.50	2.63	2.79	3.79	4.96	7.18	1.52	0.85	2.20	1.33	31.86
1976	1.77	2.49	5.67	1.86	2.86	2.77	1.22	1.07	0.99	1.31	0.75	0.65	23.41
1977	0.60	1.46	2.40	2.29	1.39	0.94	1.72	5.70	4.19	1.89	2.14	2.20	26.92
1978	1.93	0.55	1.20	1.35	2.42	2.38	0.91	4.10	6.70	1.43	1.28	2.08	26.33
1979	1.51	0.63	3.05	3.18	1.85	4.46	0.87	3.90	0.01	2.43	2.47	1.71	26.07
1980	1.61	0.69	1.10	3.30	1.55	3.44	2.29	2.01	3.75	1.91	1.55	1.95	25.15
1981	0.79	2.10	0.88	3.88	1.73	4.02	1.89	7.06	1.89	2.61	2.07	1.08	30.00
1982	2.43	0.29	2.41	2.46	2.98	3.21	3.31	3.25	3.58	1.86	2.52	3.47	31.77
1983	1.20	0.79	3.11	1.86	5.99	0.95	1.40	3.89	4.63	3.66	1.60	1.69	30.77
1984	1.06	0.88	2.28	1.96	2.60	3.01	4.30	2.95	2.74	2.17	1.99	2.93	28.87
1985	1.64	1.99	3.55	2.42	1.87	1.71	2.28	4.76	6.14	1.63	3.56	2.14	33.69
1986	1.06	1.73	2.20	1.73	3.20	5.43	4.38	1.76	9.49	1.75	0.45	0.85	34.03
1987	1.06	0.61	0.78	0.97	1.56	1.04	1.62	6.69	4.35	2.21	2.63	2.45	25.97
1988	2.09	0.75	2.39	2.37	0.56	0.85	2.49	4.50	3.63	3.38	5.10	1.86	29.97
1989	0.97	0.70	2.99	0.98	3.19	2.90	0.55	2.62	1.03	1.30	2.08	0.92	20.23
1990	2.43	1.09	1.47	1.77	4.15	2.57	3.82	3.28	3.00	2.94	2.90	1.55	30.97
1991	1.22	0.62	3.02	4.73	5.03	1.48	4.43	2.36	3.05	8.08	1.88	1.76	37.66
1992	1.29	1.35	1.84	3.13	0.49	1.91	2.86	3.45	3.63	2.75	4.65	1.98	29.33
1993	1.73	0.89	0.62	2.96	2.50	4.84	1.28	5.67	2.10	1.78	1.58	0.74	26.69
1994	1.88	1.44	1.57	2.72	1.45	1.72	5.33	5.52	1.56	1.04	2.86	0.53	27.62
1995	2.10	0.65	1.61	2.96	1.51	3.83	2.52	5.64	1.67	2.20	4.82	1.38	30.89
1996	1.71	1.46	0.96	2.99	1.59	5.84	2.76	3.56	4.41	2.84	0.72	2.29	31.13
1997	2.46	2.60	1.51	1.30	3.33	1.26	2.63	3.58	3.45	1.85	1.40	0.34	25.71
1998	2.12	0.89	4.40	0.86	2.31	2.24	0.65	1.30	2.10	4.00	2.53	1.04	24.44
POR= 81 YRS	1.49	1.25	1.93	2.41	2.73	3.03	2.67	3.00	3.11	2.51	2.37	1.68	28.18

WBAN : 94814

AVERAGE TEMPERATURE (°F) 1998 HOUGHTON LAKE, MI (HTL)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	18.3	19.4	23.2	43.1	52.9	56.9	67.5	68.4	57.2	45.4	33.4	21.6	42.3
1970	12.5	15.8	22.9	42.2	53.9	63.2	69.2	66.1	58.1	49.5	35.5	21.9	42.6
1971	14.7	18.7	23.4	38.8	51.6	67.0	64.7	63.4	60.8	54.7	34.4	26.2	43.2
1972	16.3	16.4	22.3	36.6	56.9	59.1	66.5	64.4	56.8	41.7	33.6	22.0	41.1
1973	22.1	18.1	38.1	43.1	50.6	64.9	67.7	68.9	57.4	51.3	35.8	22.9	45.1
1974	20.3	14.4	27.0	43.2	50.0	61.6	67.8	65.0	53.9	44.3	36.3	26.1	42.5
1975	22.0	20.7	24.3	37.0	59.7	64.1	68.1	65.0	53.7	49.6	40.8	23.8	44.1
1976	14.0	24.1	30.8	45.5	50.8	66.1	67.0	64.6	55.6	42.3	28.3	13.8	41.9
1977	8.7	17.8	34.8	46.6	60.3	61.0	70.1	62.1	58.3	45.1	35.8	21.4	43.5
1978	14.5	10.8	23.6	39.1	56.9	61.6	65.1	66.4	58.6	44.3	35.9	21.8	41.6
1979	11.5	10.4	30.9	40.0	52.6	62.3	66.9	62.7	59.2	45.7	35.0	27.6	42.1
1980	19.1	15.7	25.0	41.9	56.0	59.2	67.4	68.0	56.7	41.6	33.9	18.9	42.0
1981	14.8	24.0	32.5	44.3	53.0	63.6	66.8	65.6	55.9	42.9	35.6	25.3	43.7
1982	11.4	17.9	25.8	37.3	60.9	57.4	68.6	61.9	57.2	48.9	36.2	31.2	42.9
1983	21.8	25.9	32.4	40.3	48.5	63.3	71.5	68.6	59.7	46.4	36.6	16.8	44.3
1984	12.4	28.2	24.1	44.8	50.1	65.2	66.4	68.8	56.1	49.2	35.4	27.0	44.0
1985	14.9	17.9	30.3	46.5	57.0	59.5	66.1	63.9	59.8	47.5	34.5	18.0	43.0
1986	17.3	18.4	30.9	47.3	56.9	60.5	69.7	62.8	58.1	46.8	32.3	26.8	44.0
1987	21.6	23.4	33.6	47.3	58.1	67.1	71.4	65.6	59.5	43.9	37.7	28.7	46.5
1988	17.3	16.3	28.0	43.7	58.6	64.8	71.4	68.8	57.9	42.4	36.6	23.7	44.1
1989	24.9	15.5	25.0	41.1	54.5	62.2	69.5	64.8	56.2	47.9	30.7	12.9	42.1
1990	26.2	21.3	32.1	44.9	51.9	63.4	66.8	65.0	57.9	45.3	38.9	25.8	45.0
1991	16.1	24.5	33.1	46.9	61.1	67.7	68.6	68.0	55.8	47.9	33.4	25.4	45.7
1992	22.8	24.1	28.6	39.4	54.3	60.4	63.0	62.0	56.8	44.8	33.6	26.1	43.0
1993	21.0	16.2	28.7	40.2	54.6	61.9	70.2	68.8	52.9	44.6	34.7	25.9	43.3
1994	9.3	12.9	30.1	43.2	55.0	65.3	68.1	64.4	61.9	50.9	39.3	30.7	44.3
1995	23.1	18.2	34.3	40.1	54.5	68.9	70.7	72.3	56.9	50.1	29.1	19.5	44.8
1996	15.9	19.8	25.7	36.8	50.8	64.0	64.0	66.3	58.6	47.0	30.6	24.8	42.0
1997	17.0	20.4	27.2	40.3	46.6	64.8	65.8	61.6	57.0	46.0	32.3	28.2	42.3
1998	24.1	30.2	31.2	45.2	60.3	63.0	66.7	66.7	60.4	48.8	37.9	28.7	46.9
POR= 80 YRS	18.7	19.5	28.5	42.3	54.5	63.6	67.6	65.6	58.0	47.6	35.1	24.0	43.8

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HEATING DEGREE DAYS (base 65°F) 1998 HOUGHTON LAKE, MI (HTL)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969-70	38	28	250	601	939	1342	1621	1373	1296	682	348	122	8640
1970-71	30	54	225	478	878	1330	1556	1289	1282	781	415	65	8383
1971-72	70	95	183	327	912	1197	1502	1401	1320	847	254	191	8299
1972-73	77	92	242	716	933	1326	1324	1307	829	653	442	54	7995
1973-74	26	25	280	420	871	1298	1380	1411	1171	649	463	135	8129
1974-75	27	56	337	633	856	1197	1327	1234	1254	836	215	101	8073
1975-76	44	68	333	472	720	1272	1575	1180	1054	590	434	53	7795
1976-77	24	92	296	698	1094	1582	1743	1315	932	544	199	159	8678
1977-78	29	134	200	610	869	1347	1556	1513	1276	769	289	144	8736
1978-79	79	46	220	636	869	1333	1655	1530	1053	742	396	135	8694
1979-80	48	109	196	597	893	1153	1416	1424	1233	690	286	209	8254
1980-81	18	27	258	716	928	1423	1553	1143	1001	613	368	80	8128
1981-82	50	44	280	676	872	1222	1658	1315	1209	824	148	224	8522
1982-83	12	139	255	494	855	1040	1331	1087	1003	733	505	116	7570
1983-84	25	29	209	569	846	1487	1628	1062	1262	599	458	53	8227
1984-85	42	28	270	481	881	1168	1547	1313	1071	571	248	172	7792
1985-86	46	88	209	535	908	1451	1474	1297	1048	532	274	148	8010
1986-87	23	109	212	557	975	1179	1335	1159	963	523	271	57	7363
1987-88	41	60	169	649	813	1117	1473	1406	1140	636	225	106	7835
1988-89	7	75	218	692	847	1276	1236	1381	1234	711	333	126	8136
1989-90	19	79	277	520	1025	1607	1196	1217	1009	627	398	97	8071
1990-91	32	51	248	604	773	1208	1509	1127	985	540	219	33	7329
1991-92	37	30	295	525	939	1219	1298	1178	1123	763	341	161	7909
1992-93	83	132	257	619	934	1196	1359	1358	1119	737	331	123	8248
1993-94	4	37	358	627	904	1205	1722	1457	1073	649	320	79	8435
1994-95	26	75	132	431	763	1059	1293	1307	947	741	320	35	7129
1995-96	22	2	260	461	1072	1403	1515	1307	1214	840	440	91	8627
1996-97	65	37	212	552	1021	1240	1481	1246	1162	737	561	64	8378
1997-98	79	134	239	582	972	1135	1260	968	1041	592	175	146	7323
1998-	34	48	176	499	805	1118							

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COOLING DEGREE DAYS (base 65°F) 1998 HOUGHTON LAKE, MI (HTL)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1969	0	0	0	0	10	18	120	138	24	0	0	0	310
1970	0	0	0	6	15	74	167	95	24	1	0	0	382
1971	0	0	0	0	5	131	68	50	62	17	0	0	333
1972	0	0	0	0	11	19	131	78	4	0	0	0	243
1973	0	0	0	1	0	58	119	155	60	2	0	0	395
1974	0	0	0	1	6	41	120	62	11	0	0	0	241
1975	0	0	0	0	58	83	146	78	2	2	0	0	369
1976	0	0	0	13	0	92	93	86	24	0	0	0	308
1977	0	0	0	0	61	46	192	50	5	0	0	0	354
1978	0	0	0	0	44	49	85	96	34	0	0	0	308
1979	0	0	0	0	18	58	112	45	31	7	0	0	271
1980	0	0	0	2	17	43	98	124	16	0	0	0	300
1981	0	0	0	0	3	47	114	70	13	0	0	0	247
1982	0	0	0	0	27	3	132	52	29	3	0	0	246
1983	0	0	0	0	0	73	235	148	56	0	0	0	512
1984	0	0	0	1	2	65	90	151	11	0	0	0	320
1985	0	0	0	22	8	11	86	61	60	0	0	0	248
1986	0	0	0	8	29	22	175	46	15	0	0	0	295
1987	0	0	0	1	64	125	250	86	12	0	0	0	538
1988	0	0	0	0	35	108	213	199	11	0	0	0	566
1989	0	0	0	0	10	49	164	83	19	0	0	0	325
1990	0	0	0	29	0	55	94	56	41	0	0	0	275
1991	0	0	0	2	104	120	157	130	26	0	0	0	539
1992	0	0	0	0	15	31	28	46	19	0	0	0	139
1993	0	0	0	0	16	34	175	161	4	0	0	0	390
1994	0	0	0	0	19	97	130	64	45	0	0	0	355
1995	0	0	0	0	4	160	202	233	24	5	0	0	628
1996	0	0	0	0	10	67	41	85	25	0	0	0	228
1997	0	0	0	0	0	63	112	39	7	0	0	0	221
1998	0	0	0	0	34	93	98	110	45	0	0	0	380

SNOWFALL (inches) 1998 HOUGHTON LAKE, MI (HTL)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1969-70	0.0	0.0	0.0	2.0	17.6	20.0	22.7	12.8	24.5	3.8	T	0.0	103.4
1970-71	T	0.0	0.0	T	17.7	23.1	27.5	23.6	28.7	3.5	T	0.0	124.1
1971-72	0.0	0.0	0.0	T	16.7	16.7	15.0	18.7	26.8	2.9	0.0	0.0	96.8
1972-73	0.0	0.0	0.0	0.6	4.1	29.2	8.3	15.2	5.3	7.9	0.8	0.0	71.4
1973-74	0.0	0.0	0.0	T	4.8	13.0	11.2	17.5	12.3	3.1	1.0	0.0	62.9
1974-75	0.0	0.0	T	T	6.0	18.0	11.8	12.4	14.0	4.5	0.0	0.0	66.7
1975-76	0.0	0.0	T	T	5.9	14.6	29.6	20.8	17.6	6.0	0.6	0.0	95.1
1976-77	0.0	0.0	0.0	0.7	13.6	18.6	16.3	11.4	3.9	2.7	0.0	0.0	67.2
1977-78	0.0	0.0	0.0	T	16.0	14.0	33.3	13.1	12.5	0.3	0.0	0.0	89.2
1978-79	0.0	0.0	0.0	T	10.5	29.0	21.8	8.3	5.7	11.6	2.3	0.0	89.2
1979-80	0.0	0.0	0.0	0.7	5.0	7.1	14.4	12.3	12.1	7.7	0.0	0.0	59.3
1980-81	0.0	0.0	0.0	4.4	3.2	25.6	19.3	16.3	5.4	0.2	0.0	0.0	74.4
1981-82	0.0	0.0	0.0	3.0	16.1	15.7	38.0	6.1	14.3	5.5	0.0	0.0	98.7
1982-83	0.0	0.0	0.0	0.2	7.7	4.8	15.4	6.4	13.3	2.7	1.0	0.0	51.5
1983-84	0.0	0.0	0.0	0.0	5.0	19.8	17.0	6.3	6.5	5.1	0.4	0.0	60.1
1984-85	0.0	0.0	0.0	0.0	0.6	11.7	25.3	18.7	14.1	10.0	0.0	0.0	80.4
1985-86	0.0	0.0	0.0	0.0	12.6	23.1	12.7	14.0	8.9	0.3	0.0	0.0	71.6
1986-87	0.0	0.0	0.0	T	3.4	10.3	14.1	6.4	2.3	2.0	0.0	0.0	38.5
1987-88	0.0	0.0	0.0	2.4	8.7	18.6	13.4	12.9	10.3	1.4	0.0	0.0	67.7
1988-89	0.0	0.0	0.0		7.8	12.3	9.3	13.5	18.7	3.1	T	0.0	
1989-90	0.0	0.0	T	0.6	12.2	15.0	21.7	11.0	2.4	2.1	0.9	0.0	65.9
1990-91	0.0	0.0	0.0	T	9.1	15.3	22.6	8.5	4.5	1.8	0.0	0.0	61.8
1991-92	0.0	0.0	T	T	4.9	17.5	15.0	15.8	9.5	3.6	0.0	0.0	66.3
1992-93	0.0	0.0	0.0	3.2	11.8	14.3	14.7	13.1	8.1	2.9	0.0	0.0	68.1
1993-94	0.0	T	0.0	0.1	2.3	9.0	26.2	12.7	9.0	3.9	0.1	0.0	63.3
1994-95	0.0	0.0	0.0	0.0	6.6	7.6	12.2	10.2	7.4	1.9	0.0	0.0	45.9
1995-96	0.0	0.0	T	T	41.9	16.4	26.0	8.7	13.4	10.6		0.0	
1996-97	T	0.0	T	T	8.9								
1997-98													
1998-													
POR= 31 YRS	T	T	0.0	0.7	10.5	16.4	19.3	12.3	11.3	4.2	0.5	0.0	75.2

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REFERENCE NOTES:

<p>PAGE 1: THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).</p> <p>PAGE 2 AND 3: H/C INDICATES HEATING AND COOLING DEGREE DAYS. RH INDICATES RELATIVE HUMIDITY W/O INDICATES WEATHER AND OBSTRUCTIONS S INDICATES SUNSHINE. PR INDICATES PRESSURE. CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).</p> <p>GENERAL: T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE. + INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES. BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA. NORMALS ARE 30-YEAR AVERAGES (1961 - 1990). ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM. PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH. POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING. WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED. 0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05. CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET. THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.</p>	<p>GENERAL CONTINUED: CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED. WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH. RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION. AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2. SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL. A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F. DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR. DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY. WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.</p> <p>ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTHS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.</p>
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1998
HOUGHTON LAKE,
MICHIGAN (HTL)

Houghton Lake is located in north-central lower Michigan. The present station is on the northeast shore of Houghton Lake, the largest inland lake in Michigan, with a circumference of about 32 miles. The Muskegon River source is Higgins Lake, 8 miles to the north. It flows through Houghton Lake, then southwestward to Lake Michigan. The station lies within an elongated bowl shaped 1,000-foot plateau, which extends roughly 50 miles north, 75 miles southwest, and about 20 miles southeast of Houghton Lake. In the immediate area, the land is level to rolling, but there are hills and ridges from 100 to 300 feet higher in elevation surrounding the station. Soils are generally sand, or sandy loam supporting little agricultural production, but the area is rich in natural resources of forests, lakes, and streams.

The interior location diminishes the influence of the larger Great Lakes, which lie 70 to 80 miles east and west of Houghton Lake. Hence, the daily temperature range is larger, especially in summer, and temperature extremes are greater than are found nearer the shores of either Lake Michigan or Lake Huron. Temperatures reach the 100 degree mark about one summer out of ten, and at the other extreme, fall below zero an average of twenty-two times during the winter season.

Precipitation is normally a little heavier during the summer season. About 60 percent of the annual total falls in the six-month period from April through September. The heaviest precipitation occurs with summertime thunderstorms.

Snowfall averages above 80 inches per year at Houghton Lake, with considerable variation from year to year. Much heavier snows, averaging over 100 inches a season, fall within a 30- to 60-mile radius to the north and west of Houghton Lake. Seasonal totals have ranged from 24 inches to over 124 inches. Measurable amounts of snow have occurred in nine of the twelve months, and the average number of months with measurable snowfall is six.

Cloudiness is greatest in the late fall and early winter, while sunshine percentage is highest in the spring and summer. Cloudiness is increased in the late fall due to the moisture and warmth picked up by the westerly and northwesterly winds while crossing Lake Michigan.

The growing season is normally quite short, averaging about 90 days between spring and fall freezes.

STATION LOCATION

HOUGHTON LAKE, MICHIGAN

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE											REMARKS	
						SEA LEVEL	GROUND											AUGMENTED
							WIND	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY		
<u>COOPERATIVE</u>																		
James H. Ostrander 5 miles NE of Houghton Lake P. O.	12/01/12	10/01/16		44° 22'	84° 41'	1150		a										Broken record. Coordinates and elevation are approximate.
Houghton Lake State Forest	10/01/16	1/01/52	7 mi. SSW	44° 16'	84° 44'	1200		a										
Houghton Lake Wildlife Experiment Station	1/01/52	Present	6 miles NW	44° 20'	84° 48'	1136		a										a - Ground exposures.
<u>AIRPORT</u>																		
Hangar Building Roscommon County AP	4/20/64	1/21/65		44° 22'	84° 41'	1149	42	5	5				5	4				First Order Weather Bureau. 24-hour operation beginning November 1964.
Weather Bureau and Administration Building Roscommon County AP	1/21/65	Present	100 feet S	44° 22'	84° 41'	1149	b50	5 c5	5 c5	NA	NA		5 c5	4 c5	d5	NA		b - 42 feet to 4/23/68. c - Minor relocation 10/1/76. d - 10/1/85. S ASOS Commissioned 04/01/96

SUBSCRIPTION: Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.
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