

SAPPORO	JP	
Latitude = 43.05 N		WMO No. 474120
Longitude = 141.33 E		Elevation = 62 feet
Period of Record = 1973 to 1996		Average Pressure = 29.80 inches Hg

Design Criteria Data

	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(°F)				
Median of Extreme Highs	90	76	111	6.2	ESE
0.4% Occurrence	84	73	104	7.0	SSE
1.0% Occurrence	82	72	101	6.7	SE
2.0% Occurrence	79	69	93	6.8	SE
Mean Daily Range	12	-	-	-	-
97.5% Occurrence	18	16	10	3.6	SE
99.0% Occurrence	15	14	8	3.3	SE
99.6% Occurrence	12	11	7	3.3	SE
Median of Extreme Lows	7	6	6	2.4	SE
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T_{wb})	(°F)				
Median of Extreme Highs	76	85	120	6.3	ESE
0.4% Occurrence	75	83	117	6.2	SE
1.0% Occurrence	73	80	111	6.0	SE
2.0% Occurrence	71	77	104	5.8	SE
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)	(gr/lb)				
Median of Extreme Highs	127	81	0.84	5.5	SE
0.4% Occurrence	118	80	0.78	5.2	SE
1.0% Occurrence	113	78	0.75	5.7	SE
2.0% Occurrence	106	76	0.71	5.9	SE
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		1	144	110	602

Other Site Data

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
6	N/A	N/A	0.4 + 0.1
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft ²)	Average Annual Freeze-Thaw Cycles (#)
50.5	N/A	N/A	51

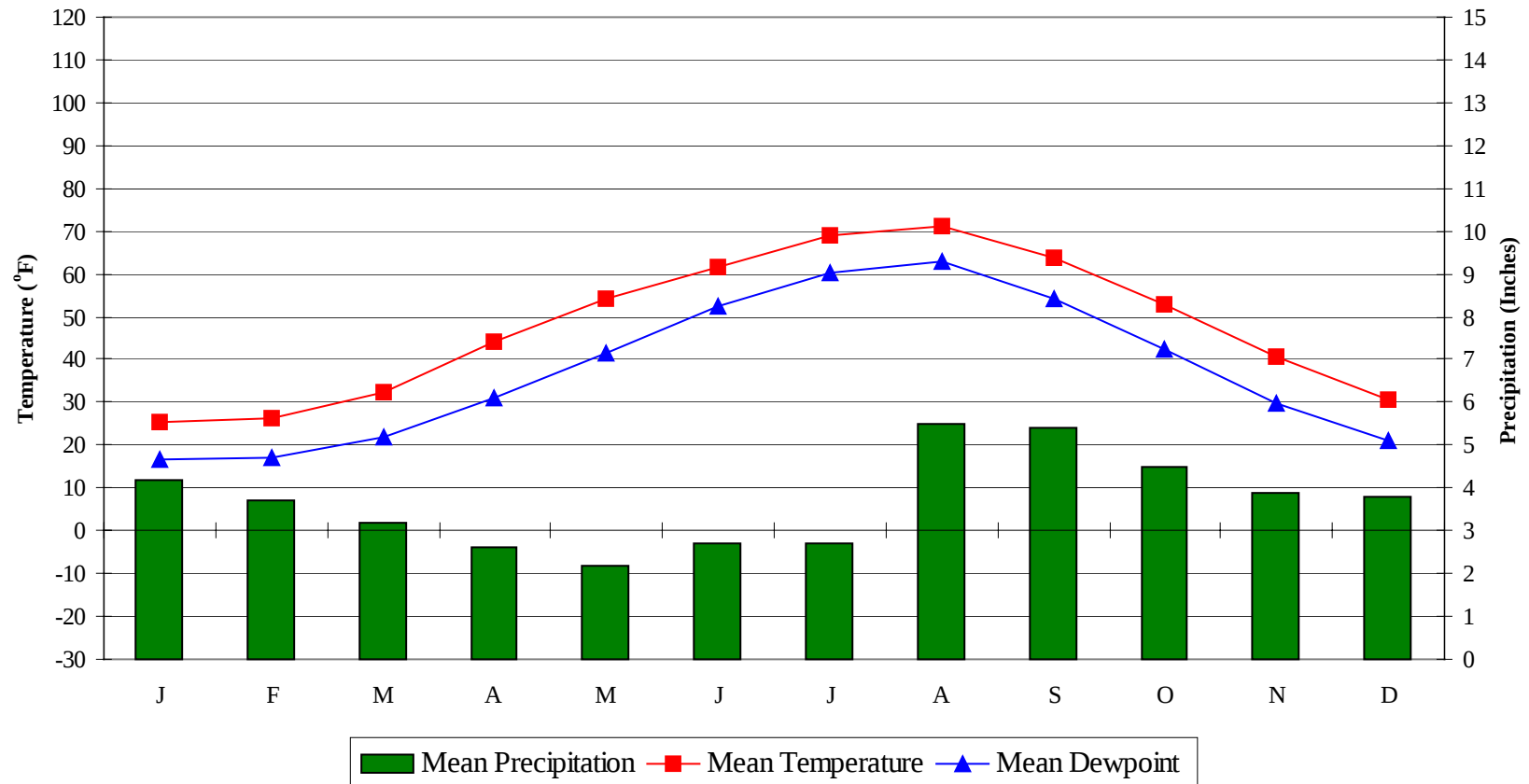
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

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Average Annual Climate

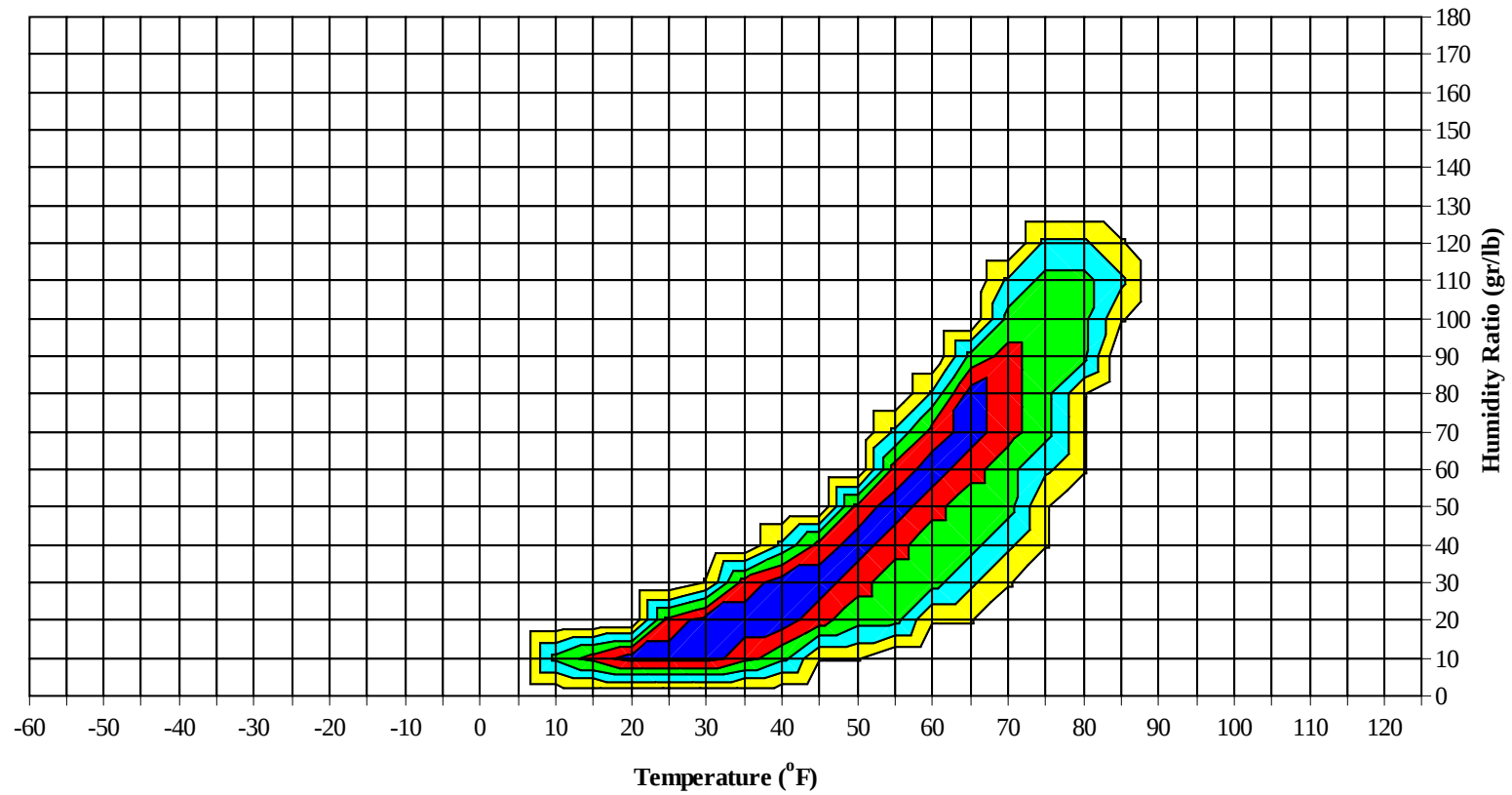


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Long Term Psychrometric Summary



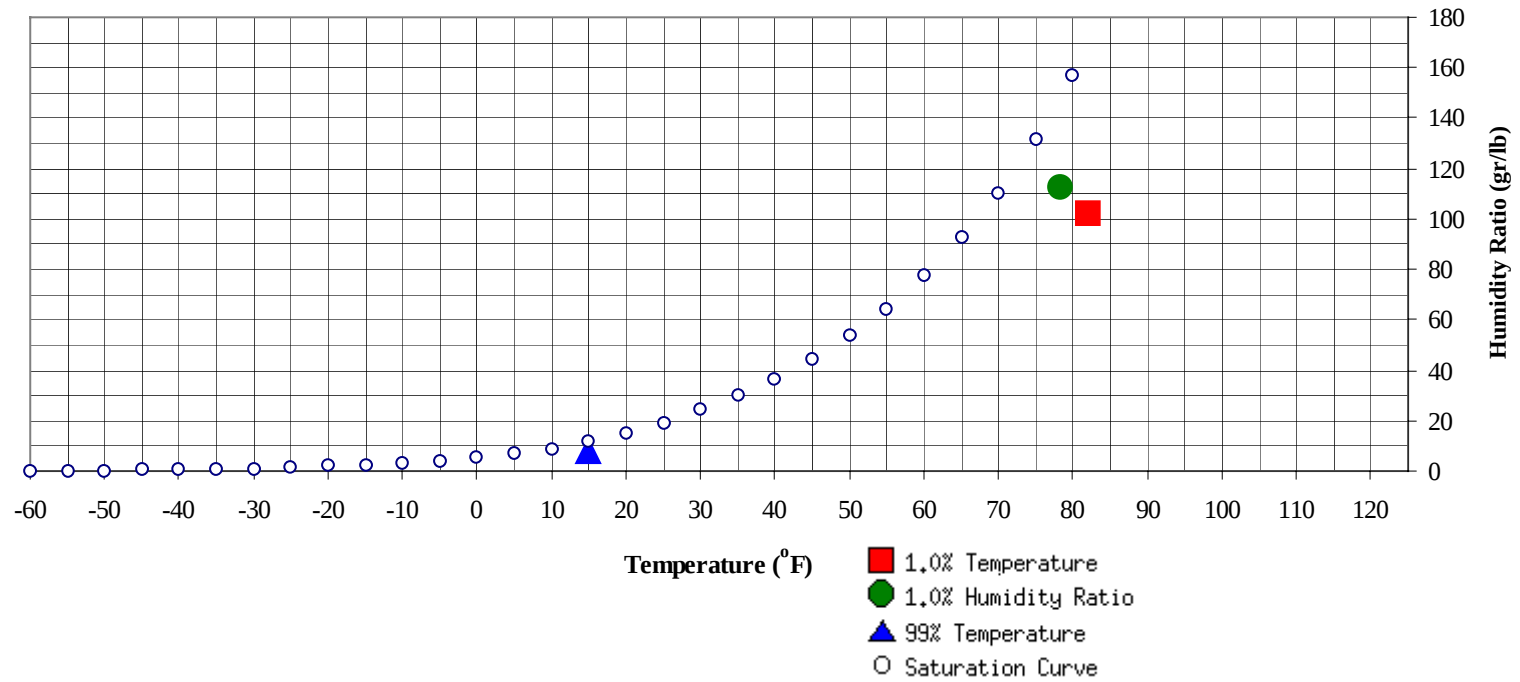
- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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Psychrometric Summary of Peak Design Values



99% Dry Bulb	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
	15	7.9	4.8		112.7	78.3	72.7	70.3	36.4

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	82	102.1	71.9	35.7

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Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	January					February					March				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74															
65 / 69															
60 / 64															
55 / 59												1	0	1	45.3
50 / 54							0		0	42.0		6	0	6	41.5
45 / 49		0	0	0	39.8		0	0	0	41.4	1	15	5	21	39.0
40 / 44	0	5	2	7	36.7	1	7	3	11	36.4	9	38	20	67	36.0
35 / 39	9	26	15	51	33.1	9	30	14	53	32.4	39	73	58	171	32.5
30 / 34	39	59	41	139	28.7	36	66	52	154	28.5	73	76	85	233	28.6
25 / 29	57	79	73	209	24.0	61	69	73	203	24.1	75	34	63	172	24.4
20 / 24	66	52	63	181	19.8	47	33	46	125	19.9	34	5	15	53	20.3
15 / 19	51	23	43	117	15.7	43	16	30	89	15.7	14	1	3	18	16.3
10 / 14	21	5	10	36	11.1	21	4	6	30	11.0	2	0	0	2	11.5
5 / 9	5	0	1	6	6.9	4	0	1	4	6.5	0		0	0	7.0
0 / 4	0		0	0	2.0	1	0	0	1	1.4	0			0	2.0

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	April					May					June				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
95 / 99															
90 / 94															
85 / 89												0		0	64.5
80 / 84							1	0	1	62.2		5	0	5	65.5
75 / 79							7	1	8	59.1					
70 / 74		1		1	53.1	0	21	3	23	56.0	0	22	2	24	63.6
65 / 69		5	1	6	50.9	1	27	8	37	54.3	2	46	10	59	61.9
60 / 64	0	12	2	14	49.1	1	27	8	37	54.3	15	61	32	108	59.5
55 / 59	2	29	8	40	46.5	10	52	24	86	52.3	61	69	80	210	57.2
50 / 54	15	51	28	94	43.9	40	59	60	159	50.3	61	69	80	210	57.2
45 / 49	44	59	57	159	41.0	83	46	76	205	47.4	102	33	84	219	53.9
40 / 44	63	49	68	180	37.2	68	27	50	145	43.2	47	5	27	79	49.4
35 / 39	75	29	56	160	33.6	40	8	23	71	39.0	11	0	4	15	44.8
30 / 34	37	5	19	60	29.9	6	1	3	9	35.6	1		0	1	40.5
25 / 29	5	0	1	6	25.1						0			0	38.0
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	July					August					September				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
95 / 99						0			0	78.0					
90 / 94		2		2	75.4	3	0	3	76.8		0			0	77.0
85 / 89	0	10	1	11	73.8	0	14	1	15	74.7	0			0	74.4
80 / 84	1	29	7	37	71.3	2	39	9	51	72.3	7	0	7	71.1	
75 / 79	8	56	23	86	68.3	18	79	39	136	69.5	1	22	5	28	66.7
70 / 74	40	79	58	177	65.8	66	76	94	236	66.6	15	74	24	113	63.6
65 / 69	76	53	84	213	62.6	92	31	74	197	63.2	31	77	60	169	60.7
60 / 64	92	18	62	171	59.1	57	6	29	91	59.4	79	44	86	209	57.5
55 / 59	26	2	12	41	54.6	13	0	2	15	54.8	67	14	48	129	53.4
50 / 54	5		2	6	50.8						38	2	15	55	49.3
45 / 49											8		2	10	44.7
40 / 44											1		0	1	40.9
35 / 39															
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	October					November					December				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79		0		0	64.0										
70 / 74	0	7		7	60.2										
65 / 69	1	27	3	31	57.0		0		0	56.0					
60 / 64	9	63	27	99	54.7	1	4	1	6	52.3					
55 / 59	40	68	62	170	51.4	6	17	8	30	50.0		0		0	48.0
50 / 54	63	50	68	182	47.2	14	36	20	69	46.1	1	3	1	5	47.0
45 / 49	66	24	54	144	42.6	26	52	35	112	41.5	3	9	6	19	42.0
40 / 44	50	8	24	82	38.9	44	53	54	151	37.2	11	24	15	50	37.5
35 / 39	16	1	8	26	34.9	71	43	66	180	33.1	29	48	36	112	32.9
30 / 34	2	0	1	3	31.9	56	26	39	121	28.9	66	80	72	218	28.6
25 / 29						20	9	15	44	24.4	72	58	72	202	24.2
20 / 24						3	0	3	6	20.0	42	21	36	99	19.9
15 / 19						0		0	0	18.3	19	5	9	34	15.9
10 / 14											3	0	2	5	11.3
5 / 9															
0 / 4															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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WMO No. 474120

Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
95 / 99		0		0	78.0
90 / 94		5	0	5	76.3
85 / 89	0	25	2	27	74.3
80 / 84	3	83	17	103	71.4
75 / 79	29	188	69	285	68.1
70 / 74	125	309	190	624	64.8
65 / 69	221	283	265	769	61.1
60 / 64	315	270	314	899	56.9
55 / 59	299	224	287	811	52.0
50 / 54	269	198	239	707	47.1
45 / 49	229	188	214	631	42.1
40 / 44	222	189	211	623	37.5
35 / 39	253	249	255	756	33.1
30 / 34	306	308	304	918	28.7
25 / 29	283	244	291	818	24.2
20 / 24	186	107	160	453	19.9
15 / 19	122	43	83	248	15.8
10 / 14	46	8	18	72	11.1
5 / 9	9	0	2	11	6.8
0 / 4	1	0	0	1	1.6

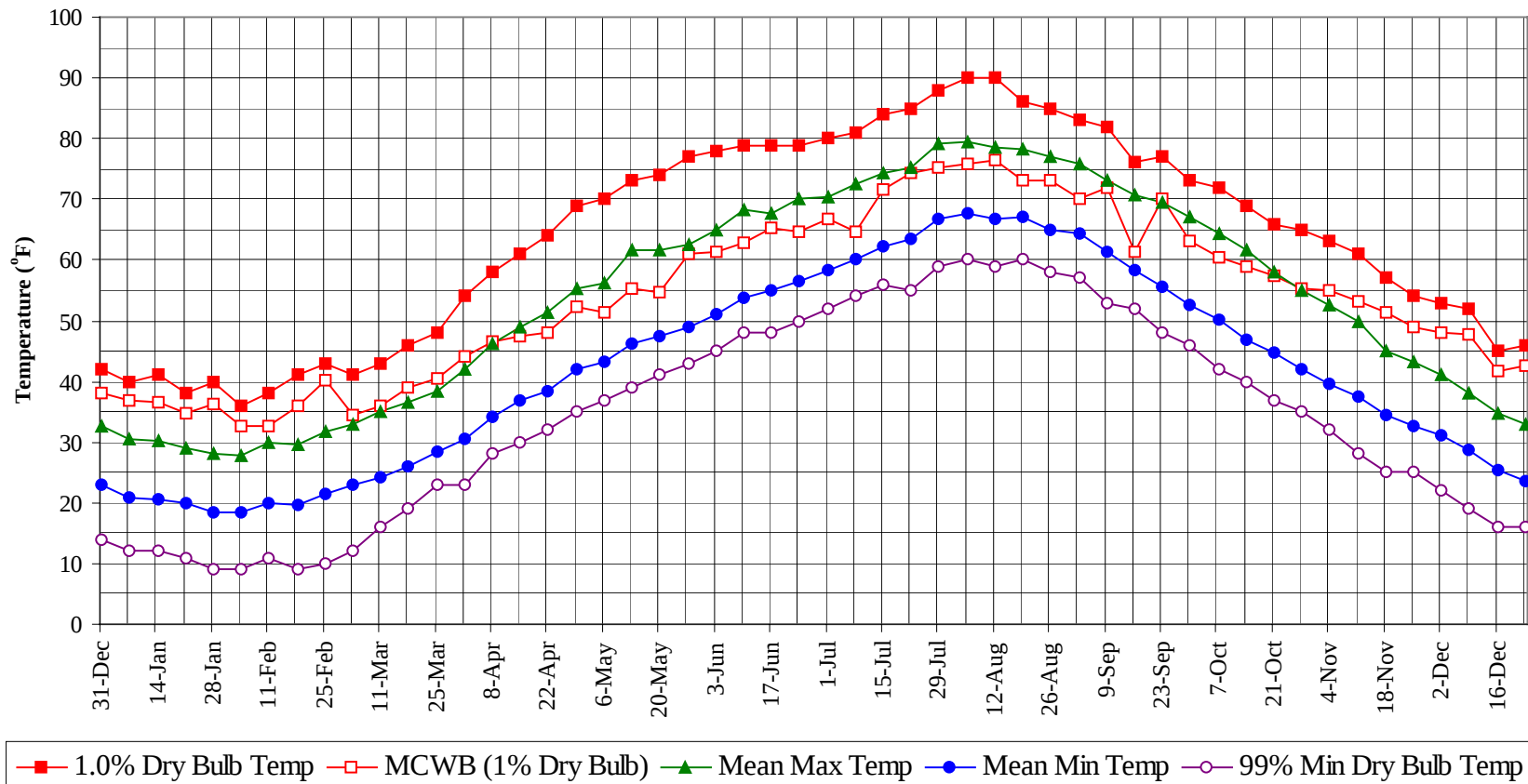
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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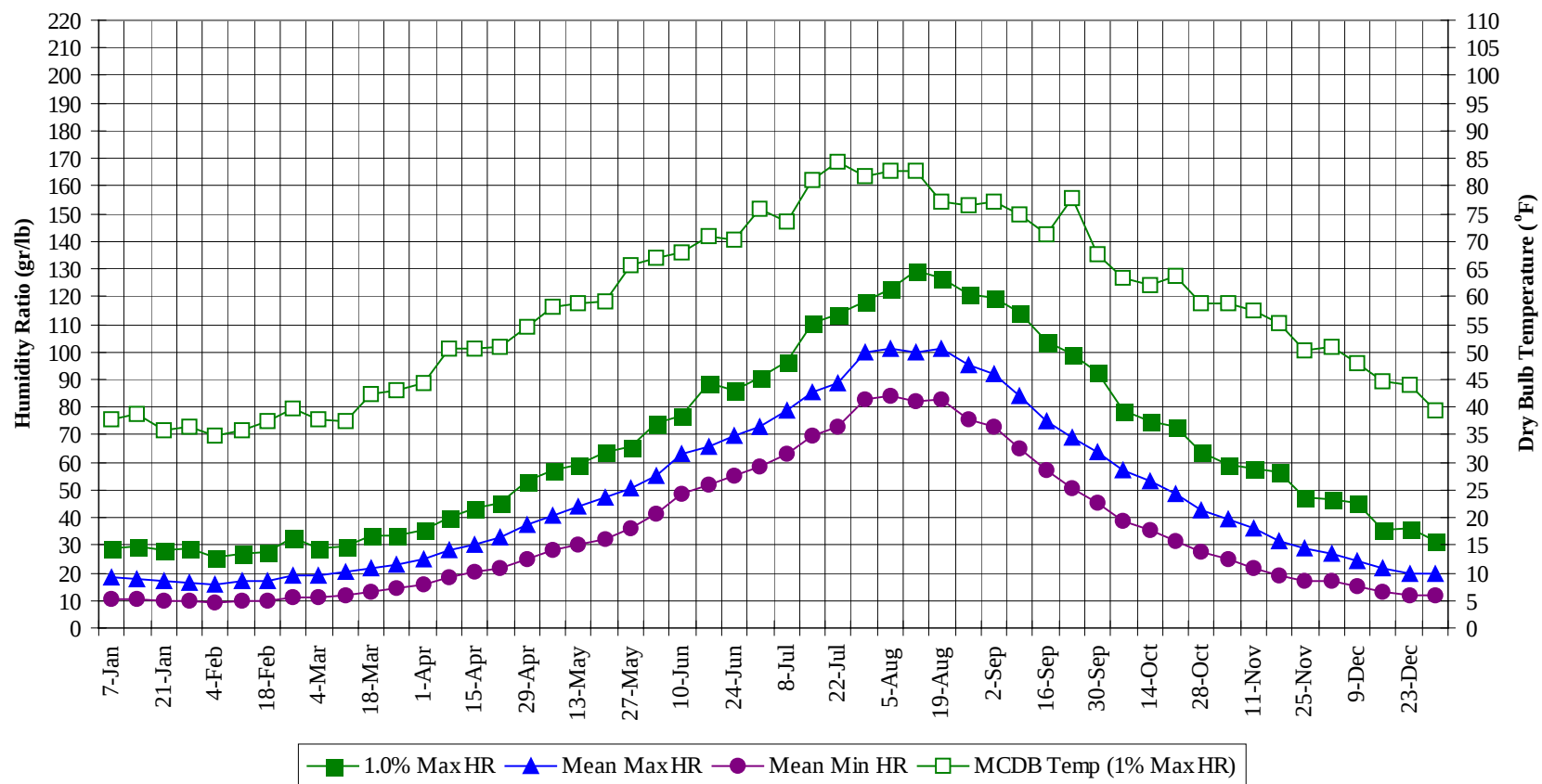
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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary



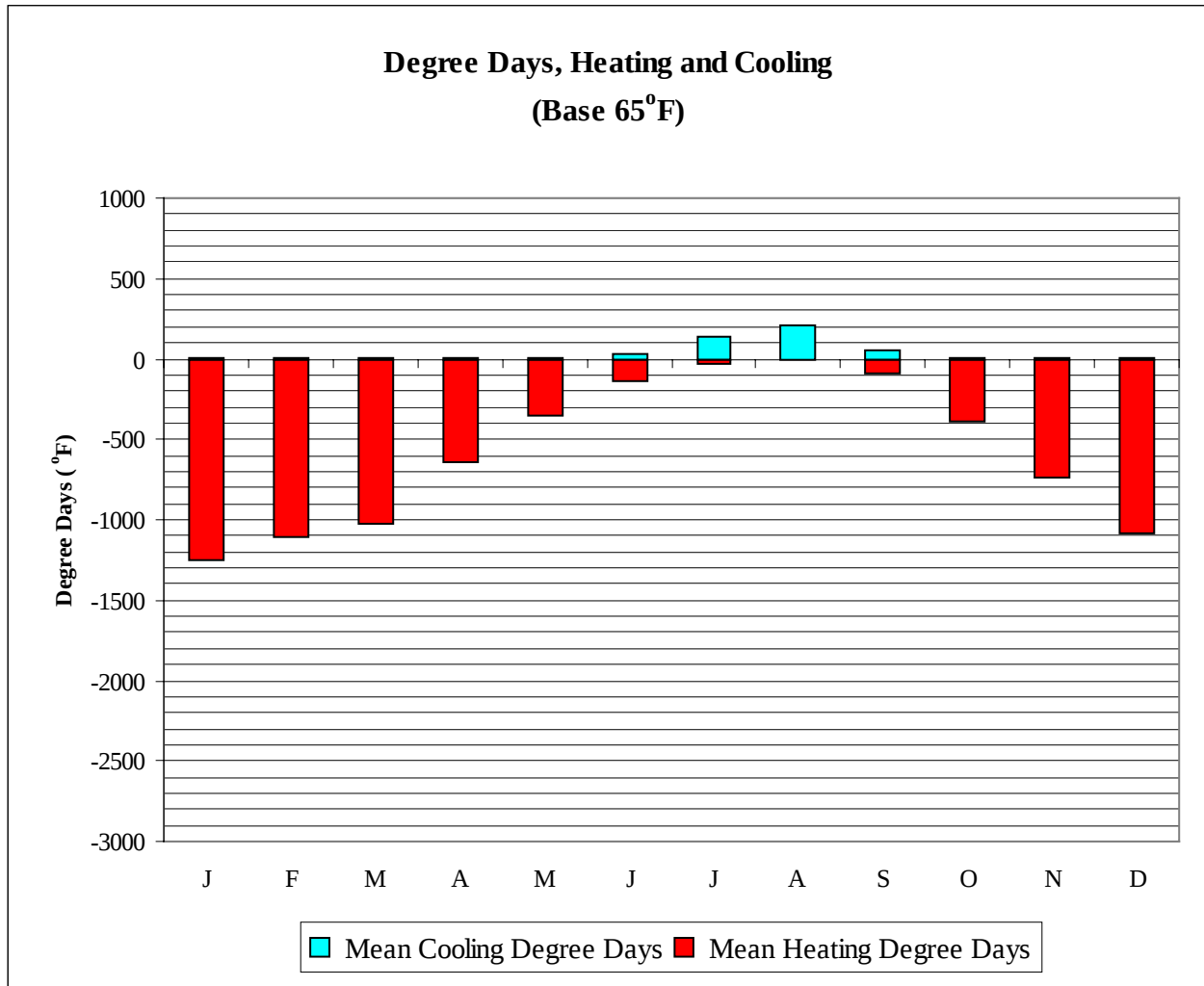
SAPPORO**JP****WMO No. 474120****Long Term Dry Bulb Temperature and Humidity Summary**

Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	40.0	36.7	30.6	20.9	12.0	28.7	37.8	18.4	10.5
14-Jan	41.0	36.7	30.2	20.5	12.0	29.4	38.6	18.0	10.5
21-Jan	38.0	34.9	29.1	19.8	11.0	28.0	35.8	17.2	10.1
28-Jan	40.0	36.3	28.2	18.6	9.0	28.7	36.5	16.4	9.7
4-Feb	36.0	32.5	27.9	18.5	9.0	25.9	34.8	15.8	9.3
11-Feb	38.0	32.8	30.0	20.0	11.0	26.6	35.8	17.1	9.7
18-Feb	41.0	36.1	29.7	19.7	9.0	27.3	37.5	17.0	10.0
25-Feb	43.0	40.2	31.7	21.3	10.0	32.9	39.6	18.8	11.2
4-Mar	41.0	34.5	33.0	22.9	12.0	28.7	37.9	19.2	11.4
11-Mar	43.0	35.9	35.1	24.2	16.0	29.4	37.4	20.4	12.0
18-Mar	46.0	39.1	36.7	26.1	19.0	33.6	42.4	21.7	13.3
25-Mar	48.0	40.4	38.5	28.5	23.0	33.6	43.0	23.2	14.8
1-Apr	54.0	44.2	41.9	30.5	23.0	35.7	44.3	24.8	15.6
8-Apr	58.0	46.7	46.4	34.2	28.0	39.9	50.6	28.4	18.4
15-Apr	61.0	47.4	48.9	36.9	30.0	43.4	50.5	30.3	20.2
22-Apr	64.0	48.0	51.4	38.4	32.0	45.5	50.8	32.9	21.4
29-Apr	69.0	52.1	55.2	41.9	35.0	53.2	54.4	37.7	24.9
6-May	70.0	51.5	56.1	43.3	37.0	57.4	58.0	40.4	27.9
13-May	73.0	55.3	61.6	46.3	39.0	58.8	58.7	44.3	30.1
20-May	74.0	54.8	61.6	47.4	41.0	63.7	59.0	47.0	32.5
27-May	77.0	61.0	62.6	48.8	43.0	65.8	65.8	50.5	36.4
3-Jun	78.0	61.3	64.9	51.0	45.0	74.2	67.0	55.4	41.7
10-Jun	79.0	62.9	68.4	53.9	48.0	77.0	68.1	62.9	48.6
17-Jun	79.0	65.2	67.8	54.9	48.0	88.9	70.8	65.8	52.2
24-Jun	79.0	64.7	70.1	56.5	50.0	86.1	70.3	69.4	55.1
1-Jul	80.0	66.8	70.4	58.2	52.0	90.3	75.8	72.9	58.6
8-Jul	81.0	64.6	72.6	60.0	54.0	96.6	73.4	78.7	63.4
15-Jul	84.0	71.6	74.2	62.3	56.0	110.6	81.1	85.5	69.8
22-Jul	85.0	74.3	75.3	63.4	55.0	113.4	84.4	88.9	72.7
29-Jul	88.0	75.3	79.1	66.7	59.0	118.3	81.8	99.6	82.9
5-Aug	90.0	75.8	79.5	67.7	60.0	122.5	82.9	100.8	83.8
12-Aug	90.0	76.5	78.4	66.9	59.0	129.5	82.6	99.8	82.0
19-Aug	86.0	73.0	78.1	67.1	60.0	126.7	77.1	101.0	82.5
26-Aug	85.0	73.0	77.1	65.0	58.0	120.8	76.5	95.2	75.8
2-Sep	83.0	70.1	75.7	64.2	57.0	119.7	77.2	91.9	72.7
9-Sep	82.0	71.9	73.0	61.4	53.0	114.1	74.9	84.4	64.7
16-Sep	76.0	61.4	70.8	58.4	52.0	103.6	71.3	74.9	57.3
23-Sep	77.0	70.2	69.5	55.5	48.0	99.4	77.7	68.9	50.3
30-Sep	73.0	63.0	67.0	52.7	46.0	92.4	67.6	64.0	45.4
7-Oct	72.0	60.4	64.3	50.1	42.0	79.1	63.4	57.4	38.8
14-Oct	69.0	59.0	61.7	46.8	40.0	74.9	62.2	53.3	35.4
21-Oct	66.0	57.4	58.2	44.7	37.0	72.8	63.6	48.4	31.6
28-Oct	65.0	55.2	55.1	42.0	35.0	63.7	58.7	42.7	27.8
4-Nov	63.0	54.9	52.5	39.5	32.0	58.8	58.9	39.1	24.6
11-Nov	61.0	53.1	49.7	37.5	28.0	58.1	57.6	36.3	22.0
18-Nov	57.0	51.4	44.9	34.3	25.0	56.7	55.1	31.4	19.4
25-Nov	54.0	49.0	43.1	32.7	25.0	47.6	50.2	29.1	17.3
2-Dec	53.0	48.0	41.2	31.1	22.0	46.9	50.9	27.0	16.9
9-Dec	52.0	47.6	37.9	28.8	19.0	45.5	48.0	24.1	14.8
16-Dec	45.0	41.6	34.7	25.5	16.0	35.7	44.5	21.6	12.8
23-Dec	46.0	42.6	32.8	23.4	16.0	36.4	44.0	19.8	11.7
31-Dec	42.0	38.0	32.6	23.1	14.0	31.5	39.5	19.7	11.5

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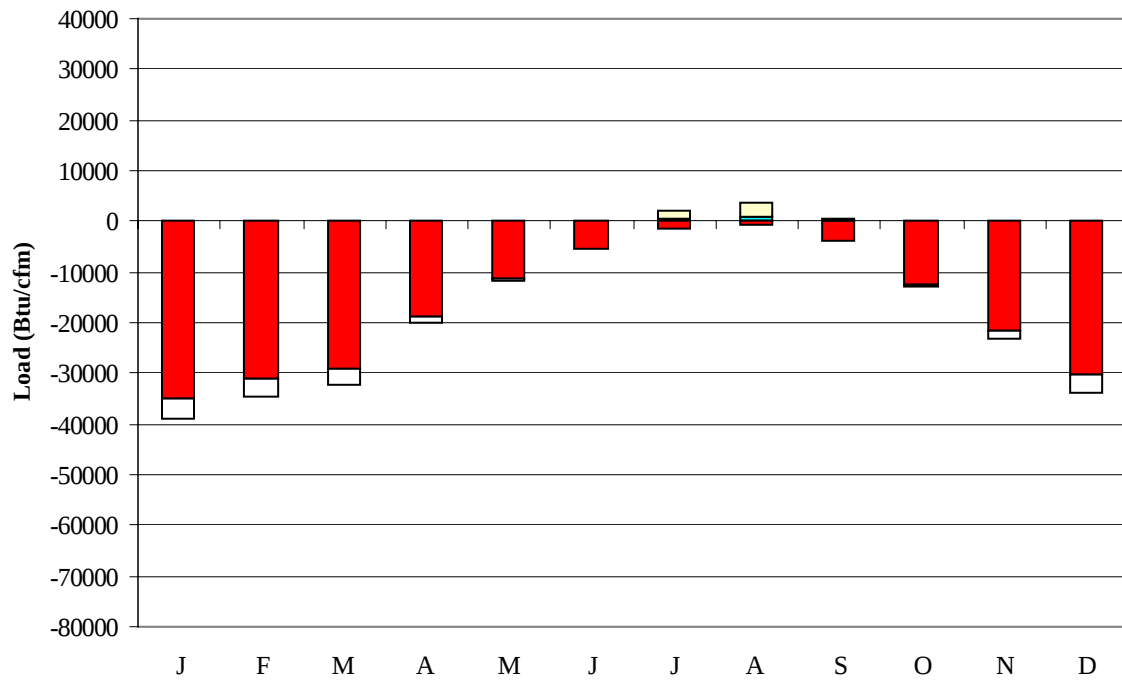
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1249
FEB	0	1112
MAR	0	1018
APR	0	635
MAY	8	358
JUN	30	136
JUL	140	26
AUG	211	8
SEP	50	88
OCT	2	394
NOV	0	742
DEC	0	1078
ANN	442	6844

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Average Ventilation and Infiltration Loads
(Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)



■ Average Sensible Cooling Load	■ Average Sensible Heating Load
■ Average Latent Cooling (Drying) Load	■ Average Latent Heating (Humidifying) Load

	Average Sensible Cooling Load	Average Sensible Heating Load	Average Latent Cooling Load	Average Latent Heating Load
	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)
JAN	0	-34852	0	-4030
FEB	0	-31088	0	-3578
MAR	0	-28890	0	-3187
APR	0	-18668	0	-1469
MAY	12	-11401	0	-270
JUN	36	-5254	46	-2
JUL	487	-1480	1650	0
AUG	843	-599	2977	0
SEP	62	-3863	487	-2
OCT	0	-12575	2	-276
NOV	0	-21569	0	-1783
DEC	0	-30390	0	-3445
ANN	1440	-200629	5162	-18042

Average Annual Solar Radiation – Nearest Available Site
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

No Solar Radiation
Data Available

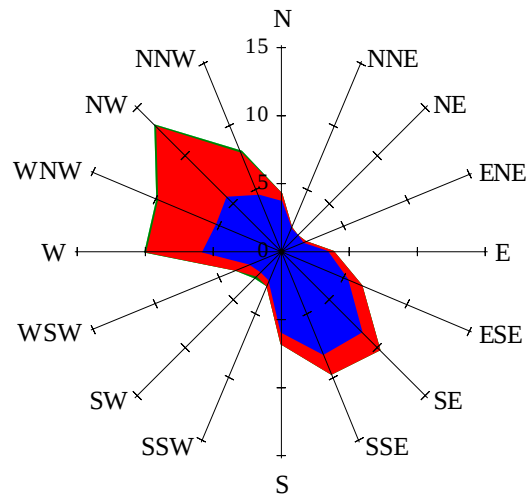


Average Annual Solar Heat and Illumination – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

Wind Summary - December, January, and February

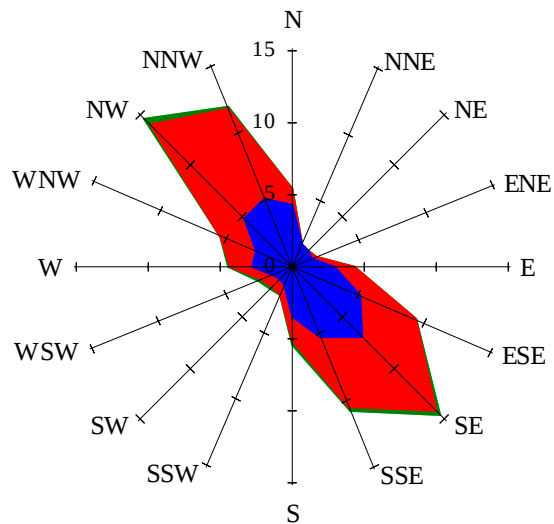
Labels of Percent Frequency on North Axis



Percent Calm = 4.78

Wind Summary - March, April, and May

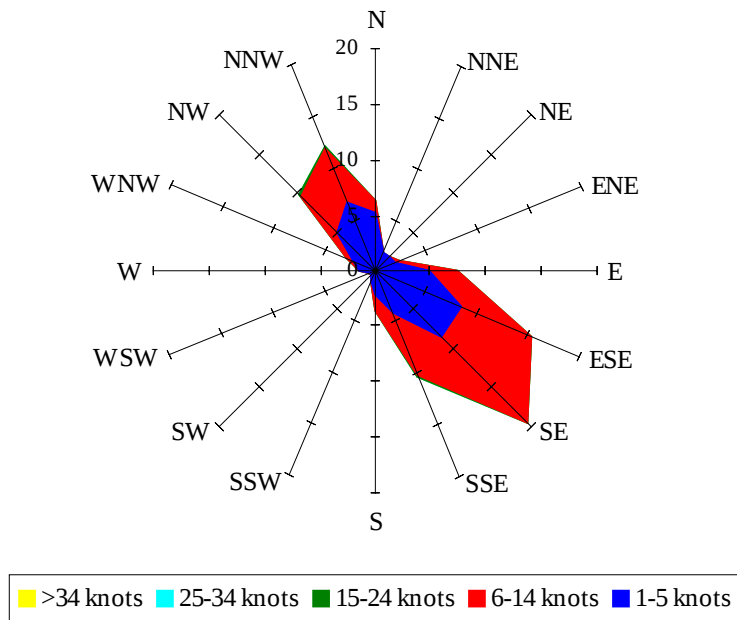
Labels of Percent Frequency on North Axis



Percent Calm = 3.01

Wind Summary - June, July, and August

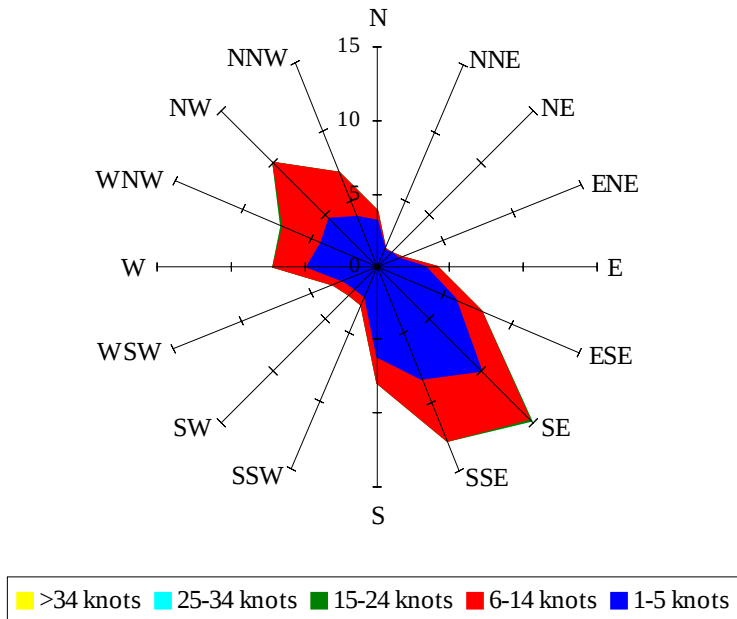
Labels of Percent Frequency on North Axis



Percent Calm = 3.49

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 4.34