
APPENDIX G-7

METEROLOGICAL DATA

**METEOROLOGICAL DATA FOR
AIR AND NOISE SAMPLING DAYS AT MMR**

Monthly Normals and Extremes for Honolulu International Airport
Table G7-1

MMR RAWS Station Hourly Data Tables for sampling days

- Table G7-2: Makua Range station, May 22, 2002
- Table G7-3: Makua Valley station, May 22, 2002
- Table G7-4: Makua Range station, October 30, 2002
- Table G7-5: Makua Valley station, October 30, 2002
- Table G7-6: Makua Range station, January 29, 2003
- Table G7-7: Makua Valley station, January 29, 2003
- Table G7-8: Makua Range station, January 31, 2003
- Table G7-9: Makua Valley station, January 31, 2003
- Table G7-10: Makua Range station, April 10, 2003
- Table G7-11: Makua Valley station, April 10, 2003

MMR RAWS Station Wind Rose charts for sampling days

- Figure G7-1: Makua Range station, May 22, 2002
- Figure G7-2: Makua Valley station, May 22, 2002
- Figure G7-3: Makua Ridge station, May 22, 2002
- Figure G7-4: Makua Range station, October 30, 2002
- Figure G7-6: Makua Ridge station, October 30, 2002
- Figure G7-7: Makua Range station, January 29, 2003
- Figure G7-8: Makua Valley station, January 29, 2003
- Figure G7-9: Makua Ridge station, January 29, 2003
- Figure G7-10: Makua Range station, January 31, 2003
- Figure G7-11: Makua Valley station, January 31, 2003
- Figure G7-12: Makua Ridge station, January 31, 2003
- Figure G7-13: Makua Range station, April 10, 2003
- Figure G7-14: Makua Valley station, April 10, 2003

Introduction and Discussion

This appendix provides a summary of meteorological data illustrating typical conditions expected for the western coast of Oahu and specific conditions for days when air quality or noise monitoring was conducted at MMR.

Table G7-1 illustrates monthly averages and extremes for weather conditions monitored at Honolulu International Airport. As is clear from Table G7-1, there are no strong seasonal variations in temperatures for coastal locations in Hawaii. While there is a seasonal variation in total precipitation, the number of days per month with measurable precipitation does not show any strong seasonal variation. Similarly, there are no strong seasonal variations in average wind speeds, prevailing wind directions, or extent of cloud cover.

Also shown in Table G7-1 is data for the days on which air quality and noise monitoring was conducted at MMR. As is clear from this data summary, the days on which monitoring studies were conducted fall well within the expected range of typical weather conditions for the western coast of Oahu.

Weather conditions at MMR are typically similar to those at Honolulu International Airport. Wind directions are the major difference in conditions between these locations. Topographic features at MMR result in wind patterns that differ from those at Honolulu International Airport.

Tables G7-2 through G7-11 summarize hourly meteorological data from remote automated weather stations (RAWS) at MMR on the days when air quality or noise monitoring studies were conducted. Three RAWS systems were operating at MMR during the period when air quality and noise monitoring studies were conducted, but only two of the stations were representative of conditions affecting the air and noise sampling instruments. The Makua Range station was located near the MMR administration trailer area, and the Makua Valley station was located on the floor of Makua Valley west of the OBOD area, at an elevation of about 520 feet. The third RAWS system at MMR, the Makua Ridge station, was located at an elevation of about 1,750 feet on the western ridge above Kahanahaiki Valley. Wind conditions at the Makua Ridge station were not representative of conditions on the floor of Makua Valley.

As can be seen by comparing Table G7-1 to Tables G7-2 through G7-11, temperature ranges at MMR were similar to the data from Honolulu International Airport. Precipitation amounts at MMR varied according with the elevation of the RAWS system. On most days, the Makua Valley station recorded slightly more precipitation than did the Makua Range station or Honolulu International Airport. None of the days when air sampling occurred had significant precipitation amounts. Average wind speeds at the Makua Range station tended to be higher than those at the Makua Valley station. On some days, Honolulu reported higher average wind speeds than did the MMR stations, and on other days MMR stations reported higher average wind speeds than did Honolulu. Wind directions were generally more variable at MMR than at Honolulu International Airport, as would be expected from the differences in nearby topographic features.

Figures G7-1 through G7-14 illustrate wind direction patterns from the three RAWS systems at MMR. The various air and noise sampling days illustrate the expected range of wind direction patterns for MMR: persistent easterly winds blowing down the valley, alternating off-shore/on-shore wind patterns, and variable winds rotating through most compass directions. The wind pattern at the Makua Ridge station was typically quite different from the wind patterns recorded on the floor of Makua Valley.

Table G7-1. Monthly Normals and Extremes for Honolulu International Airport

MONTHLY NORMALS AND EXTREMES FOR HONOLULU INTERNATIONAL AIRPORT, WBAN # 22521

PARAMETER	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL
Record High Temperature	87.0	88.0	88.0	89.0	93.0	92.0	94.0	93.0	95.0	94.0	93.0	89.0	95.0
Mean Daily High Temperature	80.1	80.5	81.6	82.8	84.7	86.5	87.5	88.7	88.5	86.9	84.1	81.2	84.4
Mean Daily Low Temperature	65.6	65.4	67.2	68.7	70.3	72.2	73.5	74.2	73.5	72.3	70.3	67.0	70.0
Record Low Temperature	53.0	53.0	55.0	57.0	60.0	65.0	66.0	67.0	66.0	61.0	57.0	53.0	53.0
Days with 0.01+ inches Precipitation	9.4	9.2	8.8	8.9	7.2	5.7	7.3	6.2	7.0	8.7	9.0	10.2	97.6
Record High Precipitation, inches	14.74	13.80	20.79	8.92	7.23	2.46	2.33	3.74	2.74	11.15	18.79	17.29	42.78
Mean Precipitation, inches	3.55	2.21	2.20	1.54	1.13	0.50	0.59	0.44	0.78	2.28	3.00	3.80	22.02
Record Low Precipitation, inches	0.18	0.06	0.01	0.01	0.03	Trace	0.03	Trace	0.05	0.07	0.03	0.04	4.52
Mean Wind Speed, mph	9.5	10.1	11.3	11.8	11.8	12.6	13.1	12.9	11.2	10.5	10.7	10.4	11.3
Prevailing Direction	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE	ENE
% of Possible Sunshine	65%	67%	71%	70%	71%	73%	76%	77%	77%	70%	63%	62%	70%
Mean Daytime Sky Cover (%)	54%	55%	58%	61%	59%	55%	53%	52%	52%	56%	57%	55%	56%

Data Sources:

Climate Data Summary for Honolulu, Hawaii. Data downloaded from Western Regional Climate Center website (www.wrcc.dri.edu) on October 14, 2005.

Monthly Total Precipitation, Honolulu WB Airport 703, Hawaii. Data downloaded from Western Regional Climate Center website (www.wrcc.dri.edu) on November 02, 2005.

AIR AND NOISE SAMPLING DAY DATA	JAN 29 2003	JAN 31 2003	FEB	MARCH	APRIL 10 2003	MAY 22 2002	JUNE	JULY	AUG	SEPT	OCT 30 2002	NOV	DEC
Daily High Temperature	79	80			86	83					86		
Daily Low Temperature	71	70			72	70					73		
Precipitation, inches	0.03	0.02			0.13	0.02					T		
Ending Time for Hours with Precipitation:	9am; 5pm	3am			8pm; 11pm	4pm; 5pm					10pm - M		
Resultant Wind Speed	2.5	8.7			12.9	2.3					9.2		
Average Wind Speed	6.6	9.5			13.1	4.5					10.3		
Resultant Direction	WNW	NE			ENE	SW					NE		

Data Sources:

National Climatic Data Center. Local Climatological Data for Honolulu, HI, May 2002.

National Climatic Data Center. Local Climatological Data for Honolulu, HI, October 2002.

National Climatic Data Center. Local Climatological Data for Honolulu, HI, January 2003.

National Climatic Data Center. Local Climatological Data for Honolulu, HI, April 2003.

Table G7-2. Makua Range Station Data for May 22, 2002

MAKUA RANGE STATION: 3266B468

LATITUDE: 21:31:43

LONGITUDE: 158:13:34

ELEVATION (ft): 20

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
22-May-02	1	0.00	70	6	122	ESE	10	87	66	67	67	15	0.0
22-May-02	2	0.00	71	7	110	ESE	11	85	66	68	68	15	0.0
22-May-02	3	0.00	69	6	120	ESE	11	88	65	66	69	15	0.0
22-May-02	4	0.00	71	8	108	ESE	11	86	67	68	68	15	0.0
22-May-02	5	0.00	68	6	122	ESE	11	90	65	66	68	16	0.0
22-May-02	6	0.00	70	6	120	ESE	11	88	66	67	69	16	0.5
22-May-02	7	0.00	73	6	115	ESE	11	88	69	70	71	16	4.6
22-May-02	8	0.00	79	4	105	ESE	9	76	71	73	80	15	6.6
22-May-02	9	0.00	79	3	313	NW	7	81	73	74	80	15	16.3
22-May-02	10	0.00											
22-May-02	11	0.00	79	3	318	NW	6	80	72	74	84	15	22.6
22-May-02	12	0.00	82	5	315	NE	8	79	75	77	90	15	96.8
22-May-02	13	0.00	83	6	293	WNW	9	76	75	77	96	14	70.3
22-May-02	14	0.00	85	8	323	NW	18	70	74	77	95	14	89.5
22-May-02	15	0.00	87	8	62	ENE	22	61	72	76	100	14	54.1
22-May-02	16	0.00	85	10	66	ENE	20	61	70	74	93	13	30.5
22-May-02	17	0.00	84	10	67	ENE	20	64	71	74	90	13	32.3
22-May-02	18	0.00	82	9	69	ENE	19	64	69	72	84	13	14.0
22-May-02	19	0.00	77	6	70	ENE	17	76	69	71	78	13	0.0
22-May-02	20	0.00	75	5	79	E	12	83	69	71	74	14	0.0
22-May-02	21	0.00	72	3	129	SE	11	88	68	69	72	14	0.0
22-May-02	22	0.00	72	4	138	SE	7	91	69	70	69	15	0.0
22-May-02	23	0.00	71	3	122	ESE	7	88	67	68	68	15	0.0
22-May-02	24	0.00	71	6	119	ESE	8	90	68	69	68	15	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-3. Makua Valley Station Data for May 22, 2002

MAKUA VALLEY STATION: 3264C075A

LATITUDE: 21:31:34
 LONGITUDE: 158:12:15
 ELEVATION (ft): 520

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moistr, %	Solar Rad, ly
22-May-02	1	0.00	68	3	130	SE	8	84	63	64	66	14	0.0
22-May-02	2	0.00	67	3	131	SE	7	84	62	64	66	14	0.0
22-May-02	3	0.00	67	2	127	SE	6	84	62	64	66	14	0.0
22-May-02	4	0.00	68	4	123	ESE	7	83	63	64	66	14	0.0
22-May-02	5	0.00	68	3	127	SE	7	85	63	65	67	14	0.0
22-May-02	6	0.00	69	3	128	SE	7	84	64	65	66	15	0.3
22-May-02	7	0.00	70	2	120	ESE	8	86	66	67	69	15	12.4
22-May-02	8	0.00	76	3	91	E	8	78	69	71	75	15	7.9
22-May-02	9	0.00	78	2	286	WNW	7	75	69	72	79	15	17.9
22-May-02	10												
22-May-02	11	0.00	79	3	294	WNW	6	76	71	73	82	14	22.0
22-May-02	12	0.00	79	3	292	WNW	8	74	70	72	84	14	27.3
22-May-02	13	0.00	78	5	266	W	9	75	69	72	84	14	25.9
22-May-02	14	0.00	83	4	101	E	10	62	69	72	94	13	26.5
22-May-02	15	0.00	84	5	102	ESE	13	54	66	71	106	12	75.7
22-May-02	16	0.00	82	5	135	SE	15	58	66	70	95	11	31.0
22-May-02	17	0.00	81	4	122	ESE	15	61	66	70	86	11	27.8
22-May-02	18	0.00	81	4	130	SE	16	58	65	69	84	11	16.9
22-May-02	19	0.00	78	2	120	ESE	13	66	66	69	77	12	0.5
22-May-02	20	0.00	73	2	145	SE	11	79	66	68	72	12	0.0
22-May-02	21	0.00	72	3	140	SE	9	84	67	68	70	13	0.0
22-May-02	22	0.00	70	2	136	SE	6	80	64	65	70	13	0.0
22-May-02	23	0.00	70	3	155	SSE	6	79	63	65	69	14	0.0
22-May-02	24	0.02	68	3	129	SE	6	84	63	64	67	14	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-4. Makua Range Station Data for October 30, 2002

MAKUA RANGE STATION: 3266B468

LATITUDE: 21:31:43

LONGITUDE: 158:13:34

ELEVATION (ft): 20

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
30-Oct-02	1	0.00	73	3	91	E	7	86	69	70	69	15	0.0
30-Oct-02	2	0.00	70	3	100	E	8	90	67	68	67	15	0.0
30-Oct-02	3	0.00	74	6	58	ENE	9	86	70	71	70	15	0.0
30-Oct-02	4	0.00	71	3	82	E	11	86	67	68	69	15	0.0
30-Oct-02	5	0.00	71	5	83	E	16	84	66	67	67	16	0.0
30-Oct-02	6	0.00	72	4	84	E	14	78	65	67	68	15	0.0
30-Oct-02	7	0.00	68	2	37	NE	12	88	64	65	63	16	1.0
30-Oct-02	8	0.00	77	1	149	SSE	7	70	66	69	78	15	23.6
30-Oct-02	9	0.00	84	3	314	NW	12	58	68	72	91	14	41.7
30-Oct-02	10	0.00	85	4	90	E	12	58	69	73	100	13	57.6
30-Oct-02	11	0.00	84	11	82	E	17	59	68	72	97	13	73.6
30-Oct-02	12	0.00	86	11	122	ESE	25	49	65	71	100	12	73.6
30-Oct-02	13	0.00	86	9	59	ENE	25	49	65	71	102	11	72.5
30-Oct-02	14	0.00	86	11	67	ENE	23	53	67	72	98	11	65.7
30-Oct-02	15	0.00	86	10	79	E	27	56	68	73	98	11	60.6
30-Oct-02	16	0.00	84	10	90	E	23	59	68	72	88	11	
30-Oct-02	17	0.00	81	13	79	E	24				82	11	
30-Oct-02	18	0.00	79	7	89	E	26	71	69	71	77	11	
30-Oct-02	19	0.00	76	9	69	ENE	23	84	71	72	75	13	
30-Oct-02	20	0.00	76	6	97	E	17	80	69	71	74	13	
30-Oct-02	21	0.00	76	7	71	ENE	20	83	70	72	75	13	
30-Oct-02	22	0.00	74	5	82	E	15	90	71	72	71	15	
30-Oct-02	23	0.00	72	5	72	ENE	18	93	70	70	72	23	
30-Oct-02	24	0.01	72	8	65	ENE	20	93	70	70	72	32	

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-5. Makua Valley Station Data for October 30, 2002

MAKUA VALLEY STATION: 3264C075A

LATITUDE: 21:31:34

LONGITUDE: 158:12:15

ELEVATION (ft): 520

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
30-Oct-02	1	0.00	72	3	100	E	8	75	64	66	72	13	0.0
30-Oct-02	2	0.00	72	3	116	ESE	18	75	64	66	70	13	0.0
30-Oct-02	3	0.00	73	3	78	ENE	14	77	65	68	71	13	0.0
30-Oct-02	4	0.00	73	6	92	E	13	76	65	67	71	14	0.0
30-Oct-02	5	0.00	71	4	111	ESE	17	75	63	65	70	14	0.0
30-Oct-02	6	0.00	72	2	95	E	16	69	61	65	68	14	0.0
30-Oct-02	7	0.00	71	3	61	ENE	15	64	58	62	69	14	0.7
30-Oct-02	8	0.00	77	5	106	ESE	14	56	60	65	73	13	19.9
30-Oct-02	9	0.00	80	5	122	ESE	13	54	62	67	80	12	38.1
30-Oct-02	10	0.00	82	7	94	E	17	54	64	69	84	12	53.9
30-Oct-02	11	0.00	82	7	96	E	17	51	62	68	94	12	66.1
30-Oct-02	12	0.00	85	5	101	E	21	44	61	68	99	11	70.0
30-Oct-02	13	0.00	84	7	159	SSE	22	43	59	67	99	10	69.3
30-Oct-02	14	0.00	86	6	247	WSW	25	45	62	69	102	10	62.8
30-Oct-02	15	0.00	84	8	139	SE	25	51	64	70	97	10	55.0
30-Oct-02	16	0.00	83	8	143	SE	23	53	64	69	96	10	36.6
30-Oct-02	17	0.00	79	6	140	SE	21	63	65	69	83	10	22.6
30-Oct-02	18	0.00	76	6	107	ESE	25	69	65	68	75	11	0.3
30-Oct-02	19	0.00	75	8	97	E	18	77	67	69	73	11	0.0
30-Oct-02	20	0.00	73	8	93	E	23	76	65	67	73	12	0.0
30-Oct-02	21	0.00	73	7	117	ESE	21	78	66	68	74	12	0.0
30-Oct-02	22	0.01	70	6	136	SE	17	88	66	67	69	31	0.0
30-Oct-02	23	0.01	72	7	132	SE	20	88	68	69	69	32	0.0
30-Oct-02	24	0.04	71	3	137	SE	20	94	69	70	69	32	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-6. Makua Range Station Data for January 29, 2003

MAKUA RANGE STATION: 3266B468

LATITUDE: 21:31:43

LONGITUDE: 158:13:34

ELEVATION (ft): 20

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
29-Jan-03	1	0.00	71	1	106	ESE	9	95	69	70	70	17	0.0
29-Jan-03	2	0.00	74	2	19	NNE	9	92	72	72	72	17	0.0
29-Jan-03	3	0.00	73	4	43	NE	13	91	70	71	72	17	0.0
29-Jan-03	4	0.00	75	6	221	SW	15	87	71	72	72	17	0.0
29-Jan-03	5	0.00	76	4	222	SW	18	88	72	73	75	16	0.0
29-Jan-03	6	0.00	74	3	48	NE	13	88	70	71	73	16	0.0
29-Jan-03	7	0.00	72	9	309	NW	20	95	70	71	73	17	0.0
29-Jan-03	8	0.00	71	3	177	S	19	100	71	71	70	26	0.0
29-Jan-03	9	0.05	70	3	113	ESE	7	100	70	70	68	55	1.6
29-Jan-03	10	0.05	70	3	95	E	12	100	70	70	71	55	5.3
29-Jan-03	11	0.00	71	3	113	ESE	8	100	71	71	70	55	8.4
29-Jan-03	12	0.01	72	1	208	SSW	6	95	70	71	77	52	31.1
29-Jan-03	13	0.00	76	1	80	E	8	81	70	71	79	31	18.0
29-Jan-03	14	0.00	80	6	272	W	9	77	72	74	86	22	28.3
29-Jan-03	15	0.00	77	7	270	W	11	85	72	73	89	20	46.1
29-Jan-03	16	0.00	74	3	355	N	12	89	71	71	79	18	31.3
29-Jan-03	17	0.00	73	4	328	NNW	12	89	70	70	76	18	6.5
29-Jan-03	18	0.00	72	2	164	SSE	6	95	70	71	72	20	3.6
29-Jan-03	19	0.01	68	4	125	SE	10	100	68	68	69	52	0.5
29-Jan-03	20	0.00	69	7	105	ESE	6	100	69	69	67	55	0.0
29-Jan-03	21	0.01	69	7	6	N	10	100	69	69	68	55	0.0
29-Jan-03	22	0.00	68	6	40	NE	9	100	68	68	67	51	0.0
29-Jan-03	23	0.00	67	6	70	ENE	11	100	67	67	68	55	0.0
29-Jan-03	24	0.01	69	7	83	E	9	100	69	69	68	55	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-7. Makua Valley Station Data for January 29, 2003

MAKUA VALLEY STATION: 3264C075A

LATITUDE: 21:31:34

LONGITUDE: 158:12:15

ELEVATION (ft): 520

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moistr, %	Solar Rad, ly
29-Jan-03	1	0.00	68	2	27	N	6	94	66	67	66	18	0.0
29-Jan-03	2	0.00	70	1	283	WNW	5	91	67	68	67	18	0.0
29-Jan-03	3	0.00	71	3	203	SSW	5	80	65	66	70	17	0.0
29-Jan-03	4	0.00	72	4	36	NE	13	81	66	68	72	17	0.0
29-Jan-03	5	0.00	73	4	349	N	13	83	68	69	70	17	0.0
29-Jan-03	6	0.00	73	6	294	WNW	15	86	69	70	73	17	0.0
29-Jan-03	7	0.00	67	3	269	WNW	22	99	67	67	67	36	0.0
29-Jan-03	8	0.04	68	1	17	NNE	10	100	68	68	67	34	1.5
29-Jan-03	9	0.07	67	3	106	ESE	5	100	67	67	68	37	7.5
29-Jan-03	10	0.02	70	0	40	NE	7	100	70	70	72	39	6.5
29-Jan-03	11	0.01	70	1	66	ENE	5	95	69	69	75	42	21.3
29-Jan-03	12	0.00	76	1	116	ESE	6	78	69	71	79	26	27.3
29-Jan-03	13	0.00	78	2	348	NNW	4	72	68	71	80	19	22.8
29-Jan-03	14	0.00	76	3	298	WNW	6	75	68	70	79	17	25.2
29-Jan-03	15	0.00	71	3	320	NW	11	91	68	69	75	17	23.0
29-Jan-03	16	0.00	74	1	290	WNW	10	84	69	70	75	16	7.1
29-Jan-03	17	0.00	68	2	206	SSW	6	93	66	67	68	30	2.8
29-Jan-03	18	0.01	67	1	81	E	6	99	67	67	68	34	0.4
29-Jan-03	19	0.01	66	1	106	ESE	4	100	66	66	68	35	0.0
29-Jan-03	20	0.01	67	1	95	E	3	100	67	67	66	36	0.0
29-Jan-03	21	0.00	66	1	88	E	4	100	66	66	67	39	0.0
29-Jan-03	22	0.01	67	1	93	E	8	100	67	67	67	38	0.0
29-Jan-03	23	0.02	66	5	105	ESE	6	94	64	65	67	39	0.0
29-Jan-03	24	0.03	66	2	297	WNW	13	94	64	65	65	39	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-8. Makua Range Station Data for January 31, 2003

MAKUA RANGE STATION: 3266B468

LATITUDE: 21:31:43

LONGITUDE: 158:13:34

ELEVATION (ft): 20

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
31-Jan-03	1	0.07	68	19	77	ENE	36	100	68	68	68	55	0.0
31-Jan-03	2	0.12	68	20	80	E	31	100	68	68	66	55	0.0
31-Jan-03	3	0.32	69	21	80	E	38	99	69	69	66	55	0.0
31-Jan-03	4	0.01	68	18	84	E	39	97	67	67	66	55	0.0
31-Jan-03	5	0.00	68	16	90	E	32	92	66	66	67	55	0.0
31-Jan-03	6	0.00	69	9	102	ESE	25	86	65	66	67	55	0.0
31-Jan-03	7	0.00	71	13	109	ESE	26	87	67	68	68	52	0.0
31-Jan-03	8	0.00	71	11	118	ESE	26	85	66	68	68	47	0.0
31-Jan-03	9	0.00	70	9	94	E	23	85	65	67	69	42	3.4
31-Jan-03	10	0.00	73	11	113	ESE	21	77	65	68	75	34	31.7
31-Jan-03	11	0.00	77	9	93	E	22	74	68	70	84	27	48.3
31-Jan-03	12	0.00	78	8	79	E	17	76	70	72	86	23	67.1
31-Jan-03	13	0.00	77	12	66	ENE	20	77	69	71	87	20	26.2
31-Jan-03	14	0.00	78	13	74	ENE	29	80	71	73	84	18	31.0
31-Jan-03	15	0.00	76	9	86	E	24	80	69	71	84	17	29.8
31-Jan-03	16	0.00	75	13	72	ENE	26	85	70	71	84	16	23.1
31-Jan-03	17	0.00	76	9	72	ENE	21	85	71	72	82	16	15.8
31-Jan-03	18	0.00	73	9	71	ENE	21	90	70	71	76	16	11.6
31-Jan-03	19	0.00	73	8	63	ENE	17	91	70	71	73	17	3.5
31-Jan-03	20	0.00	71	4	92	E	16	99	71	71	69	18	0.0
31-Jan-03	21	0.00	70	7	110	ESE	9	99	70	70	68	19	0.0
31-Jan-03	22	0.00	70	5	124	SE	10	96	69	69	66	19	0.0
31-Jan-03	23	0.00	71	7	104	ESE	12	93	69	69	69	19	0.0
31-Jan-03	24	0.00	69	7	94	E	12	95	68	68	68	19	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-9. Makua Valley Station Data for January 31, 2003

MAKUA VALLEY STATION: 3264C075A

LATITUDE: 21:31:34

LONGITUDE: 158:12:15

ELEVATION (ft): 520

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
31-Jan-03	1	0.10	68	10	127	SE	28	94	66	67	65	55	0.0
31-Jan-03	2	0.28	66	11	135	SE	28	96	65	65	65	55	0.0
31-Jan-03	3	0.05	66	13	113	ESE	33	92	64	64	66	55	0.0
31-Jan-03	4	0.00	68	13	89	E	31	89	65	66	65	55	0.0
31-Jan-03	5	0.01	67	14	84	E	32	84	62	64	65	51	0.0
31-Jan-03	6	0.00	68	9	75	ENE	30	85	63	65	63	47	0.0
31-Jan-03	7	0.00	68	8	83	E	29	86	64	65	63	46	0.0
31-Jan-03	8	0.00	69	3	110	ESE	21	84	64	65	64	45	1.5
31-Jan-03	9	0.00	71	7	107	ESE	22	76	63	65	71	42	27.0
31-Jan-03	10	0.00	74	6	82	E	20	71	64	67	73	36	44.5
31-Jan-03	11	0.00	76	5	67	ENE	19	71	66	69	82	27	63.9
31-Jan-03	12	0.00	76	6	75	ENE	17	70	66	68	88	21	86.9
31-Jan-03	13	0.00	76	5	91	E	18	71	66	69	86	18	33.8
31-Jan-03	14	0.00	74	5	100	E	15	81	68	69	79	17	29.3
31-Jan-03	15	0.00	71	6	91	E	16	87	67	68	75	22	15.8
31-Jan-03	16	0.00	73	6	105	ESE	17	84	68	69	76	18	18.8
31-Jan-03	17	0.00	73	3	244	WSW	18	85	68	70	78	18	13.1
31-Jan-03	18	0.00	71	2	13	NNE	15	88	67	68	69	35	4.3
31-Jan-03	19	0.00	69	2	145	SE	12	95	68	68	66	37	0.0
31-Jan-03	20	0.00	66	2	165	SSE	7	96	65	65	66	36	0.0
31-Jan-03	21	0.00	66	3	113	ESE	5	93	64	65	64	35	0.0
31-Jan-03	22	0.00	68	2	102	ESE	7	90	65	66	64	34	0.0
31-Jan-03	23	0.00	66	2	105	ESE	10	93	64	65	65	35	0.0
31-Jan-03	24	0.00	68	4	96	E	7	87	64	65	66	36	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-10. Makua Range Station Data for April 10, 2003

MAKUA RANGE STATION: 3266B468

LATITUDE: 21:31:43

LONGITUDE: 158:13:34

ELEVATION (ft): 20

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moist, %	Solar Rad, ly
10-Apr-03	1	0.00	70	5	113	ESE	9	74	61	64	66	18	0.0
10-Apr-03	2	0.00	72	4	105	ESE	11	71	62	65	68	18	0.0
10-Apr-03	3	0.00	71	10	56	NE	13	72	62	64	70	18	0.0
10-Apr-03	4	0.00	71	6	121	ESE	16	77	63	66	69	18	0.0
10-Apr-03	5	0.00	72	5	68	ENE	11	74	63	66	67	18	0.0
10-Apr-03	6	0.00	69	5	101	E	14	81	63	65	64	18	0.0
10-Apr-03	7	0.00	69	6	99	E	9	77	61	64	66	19	2.4
10-Apr-03	8	0.00	78	7	58	ENE	11	66	66	69	79	18	43.2
10-Apr-03	9	0.00	81	8	61	ENE	12	59	65	70	93	16	63.0
10-Apr-03	10	0.00	83	7	69	ENE	19	57	66	71	99	15	86.2
10-Apr-03	11	0.00	86	3	258	WSW	14	53	67	72	106	15	81.7
10-Apr-03	12	0.00	82	6	249	WSW	17	59	66	71	102	14	90.7
10-Apr-03	13	0.00	82	7	236	SW	15	57	65	70	100	14	38.2
10-Apr-03	14	0.00	83	6	236	SW	14	59	67	71	96	13	23.8
10-Apr-03	15												
10-Apr-03	16	0.05	81	3	131	SE	12	69	70	73	84	19	59.3
10-Apr-03	17	0.00	77	13	104	ESE	19	65	64	68	80	16	15.1
10-Apr-03	18	0.00	78	11	95	E	24	67	66	69	79	15	15.9
10-Apr-03	19	0.00	74	15	85	E	21	70	64	67	72	16	0.0
10-Apr-03	20	0.00	74	11	102	ESE	24	76	66	68	69	20	0.0
10-Apr-03	21	0.00	73	6	107	ESE	19	70	63	66	69	18	0.0
10-Apr-03	22	0.00	74	12	92	E	24	69	63	66	68	18	0.0
10-Apr-03	23	0.00	72	4	82	E	19	66	60	64	69	17	0.0
10-Apr-03	24	0.00	74	8	85	E	23	60	59	64	67	17	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Table G7-11. Makua Valley Station Data for April 10, 2003

MAKUA VALLEY STATION: 3264C075A

LATITUDE: 21:31:34

LONGITUDE: 158:12:15

ELEVATION (ft): 520

Date	Hour	Hourly Precip, in	Air Temp, Deg F	Wind Speed, mph	Wind Dir, Deg	Wind Dir, quadrant	Max Gust Speed, mph	Rel Humidity, %	Dew Pt Temp, Deg F	Wet Bulb Temp, Deg F	Fuel Temp, Deg F	Av Fuel Moistr, %	Solar Rad, ly
10-Apr-03	1	0.00	70	3	88	E	10	69	59	63	68	15	0.0
10-Apr-03	2	0.00	70	3	83	E	13	69	59	63	67	16	0.0
10-Apr-03	3	0.00	71	3	318	NW	12	75	63	65	68	16	0.0
10-Apr-03	4	0.00	68	2	128	SE	12	77	61	63	66	16	0.0
10-Apr-03	5	0.00	70	2	225	SW	6	72	61	64	68	16	0.0
10-Apr-03	6	0.00	68	2	113	ESE	9	74	59	62	64	17	0.0
10-Apr-03	7	0.00	69	2	123	ESE	7	78	62	64	66	18	1.7
10-Apr-03	8	0.00	76	2	75	ENE	10	67	64	68	75	17	34.6
10-Apr-03	9	0.00	77	3	78	ENE	9	59	62	66	79	16	15.3
10-Apr-03	10	0.00	81	3	117	ESE	11	54	63	68	86	16	22.4
10-Apr-03	11	0.00	83	4	102	ESE	12	50	62	68	95	15	80.6
10-Apr-03	12	0.00	83	3	123	ESE	13	53	64	69	96	14	32.5
10-Apr-03	13	0.00	84	3	112	ESE	17	49	63	69	104	14	39.0
10-Apr-03	14	0.00	83	5	272	W	14	57	66	71	97	13	16.1
10-Apr-03	15												
10-Apr-03	16	0.16	80	3	55	NE	7	66	68	71	86	19	63.2
10-Apr-03	17	0.00	74	5	83	E	16	70	64	67	76	18	12.3
10-Apr-03	18	0.00	74	7	67	ENE	19	69	63	66	78	16	9.7
10-Apr-03	19	0.00	73	7	76	ENE	17	74	64	67	72	17	0.0
10-Apr-03	20	0.04	70	8	74	ENE	20	81	64	66	68	23	0.0
10-Apr-03	21	0.00	72	3	128	SE	27	70	62	65	68	23	0.0
10-Apr-03	22	0.00	71	6	88	E	19	71	61	64	68	23	0.0
10-Apr-03	23	0.00	72	2	99	E	16	67	60	64	67	22	0.0
10-Apr-03	24	0.00	73	5	106	ESE	22	60	58	63	67	20	0.0

Data Source:

RAWS data downloaded from Western Regional Climatic Center website (www.wrcc.dri.edu/wraws) on November 1, 2005.

Figure G7-1
May 22, 2002 Wind Rose Chart, Makua Range RAWS Site

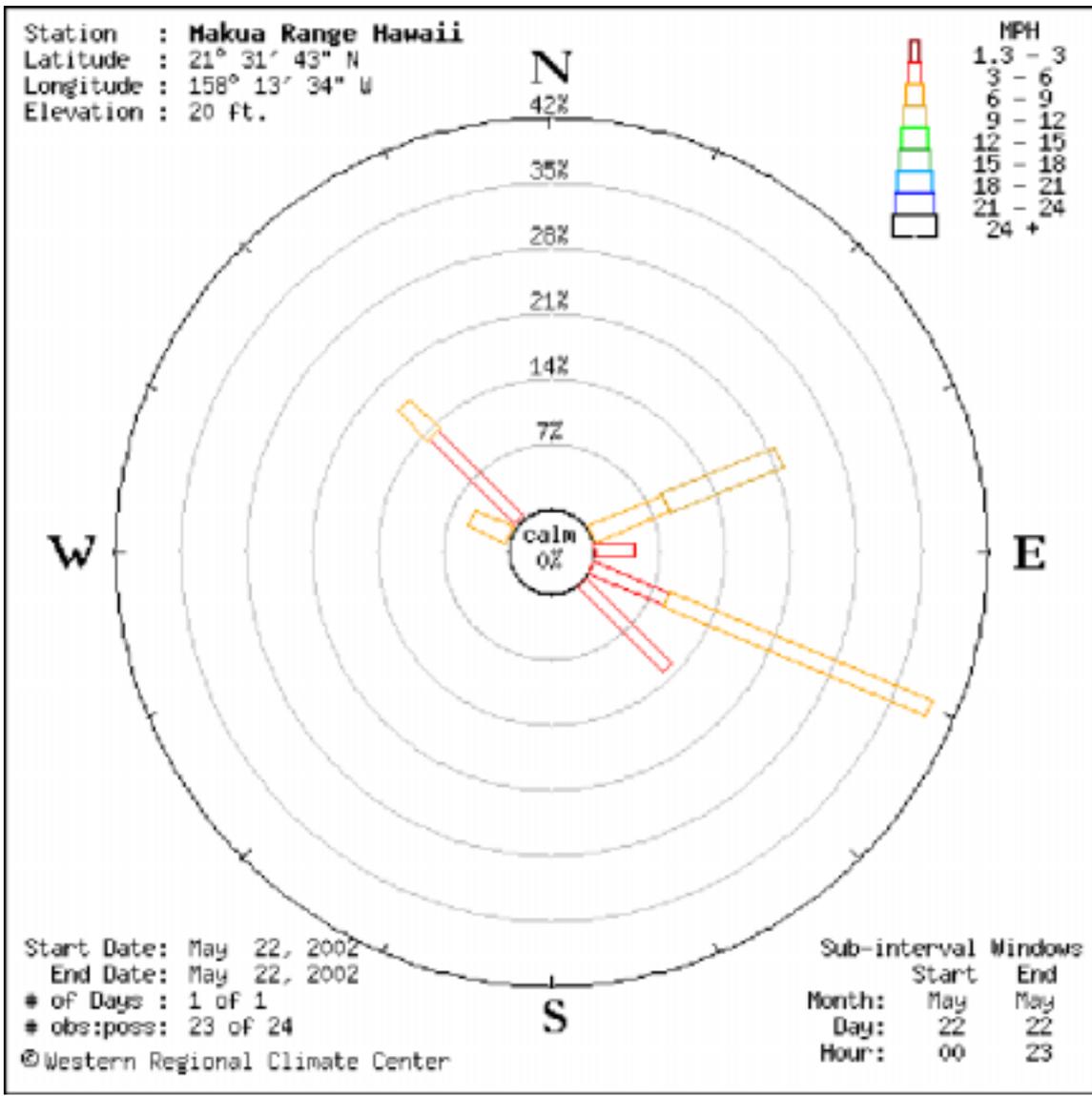


Figure G7-2
May 22, 2002 Wind Rose Chart, Makua Valley RAWS Site

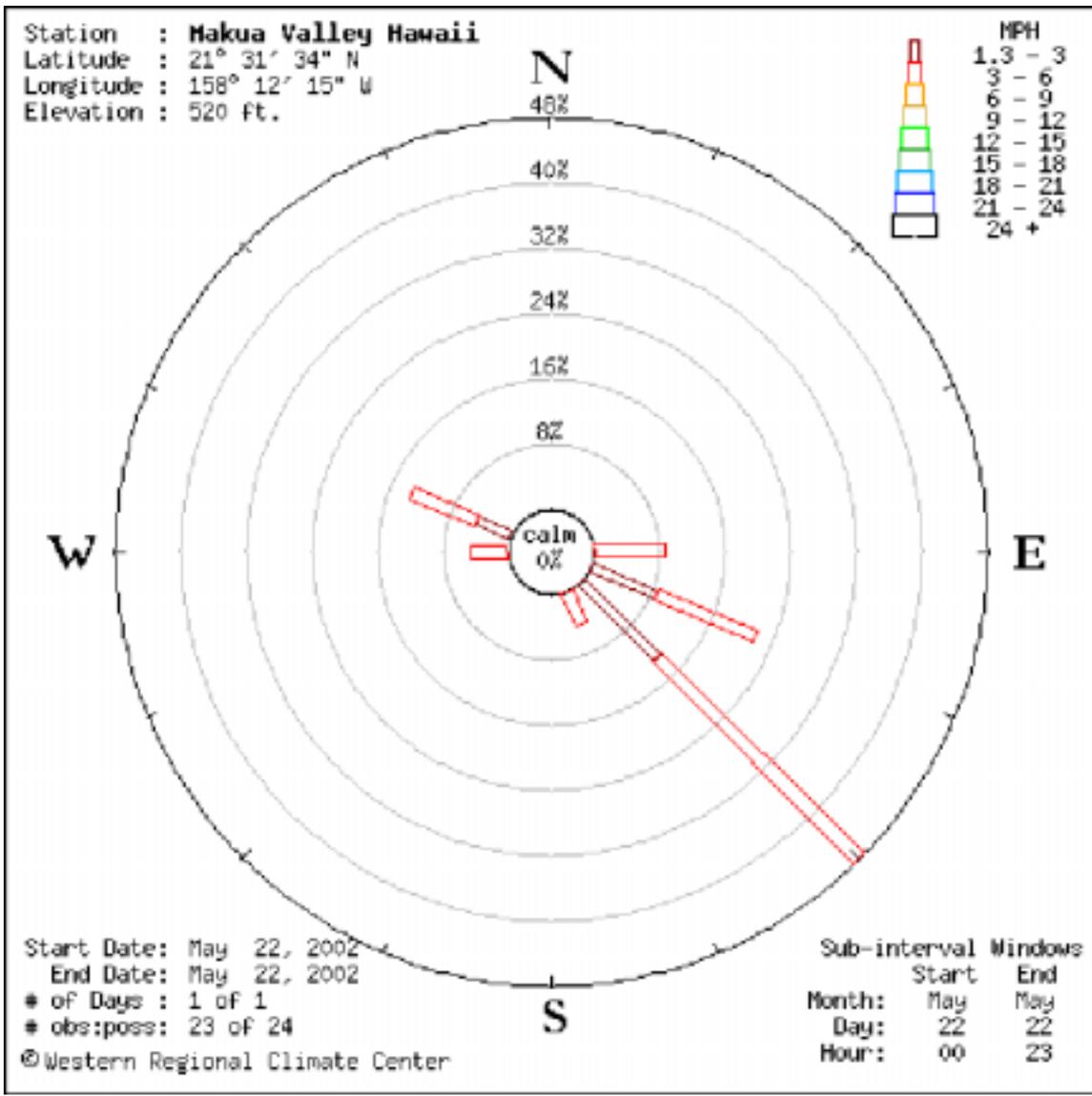


Figure G7-3
May 22, 2002 Wind Rose Chart, Makua Ridge RAWS Site

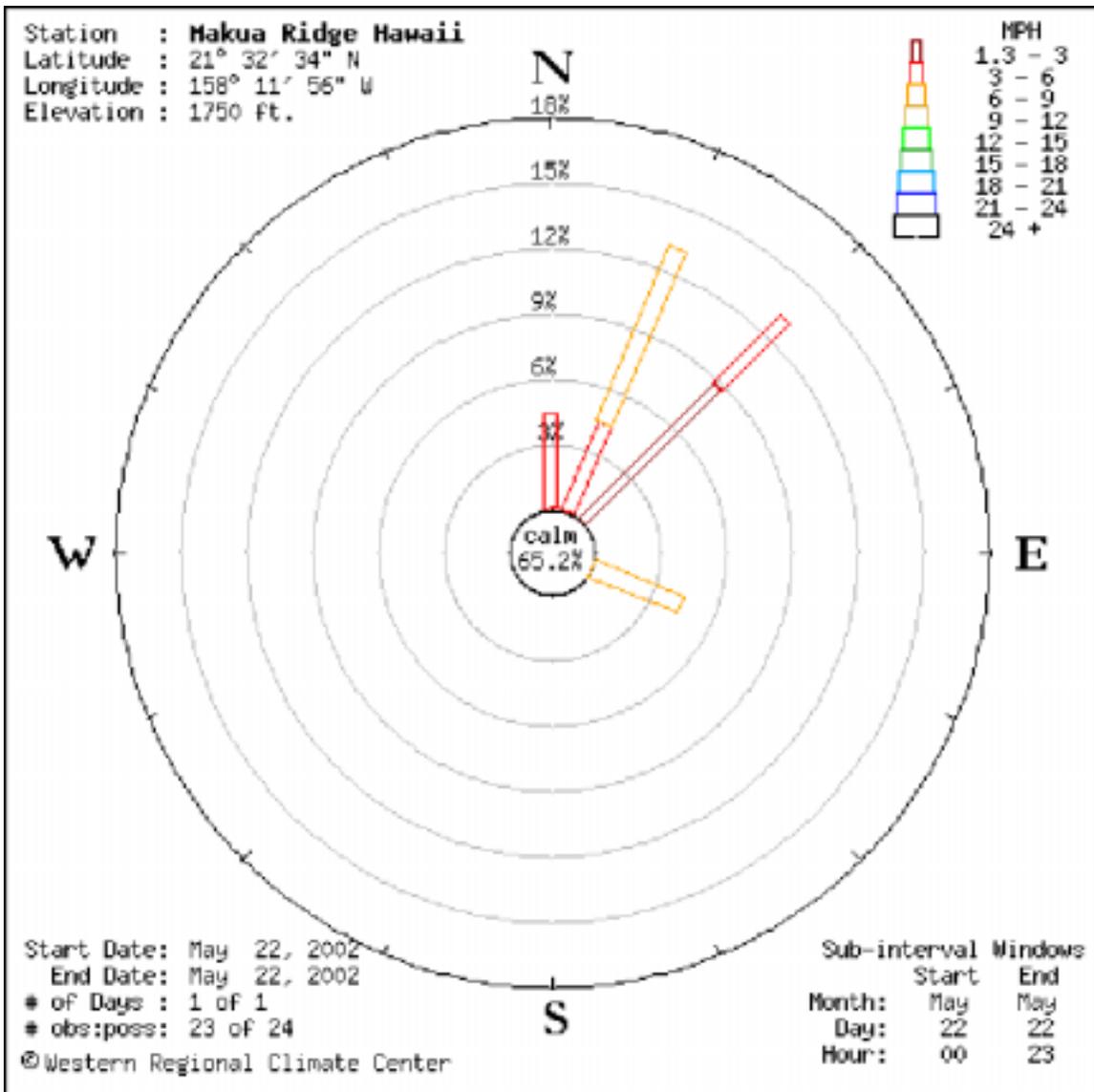


Figure G7-4
October 30, 2002 Wind Rose Chart, Makua Range RAWS Site

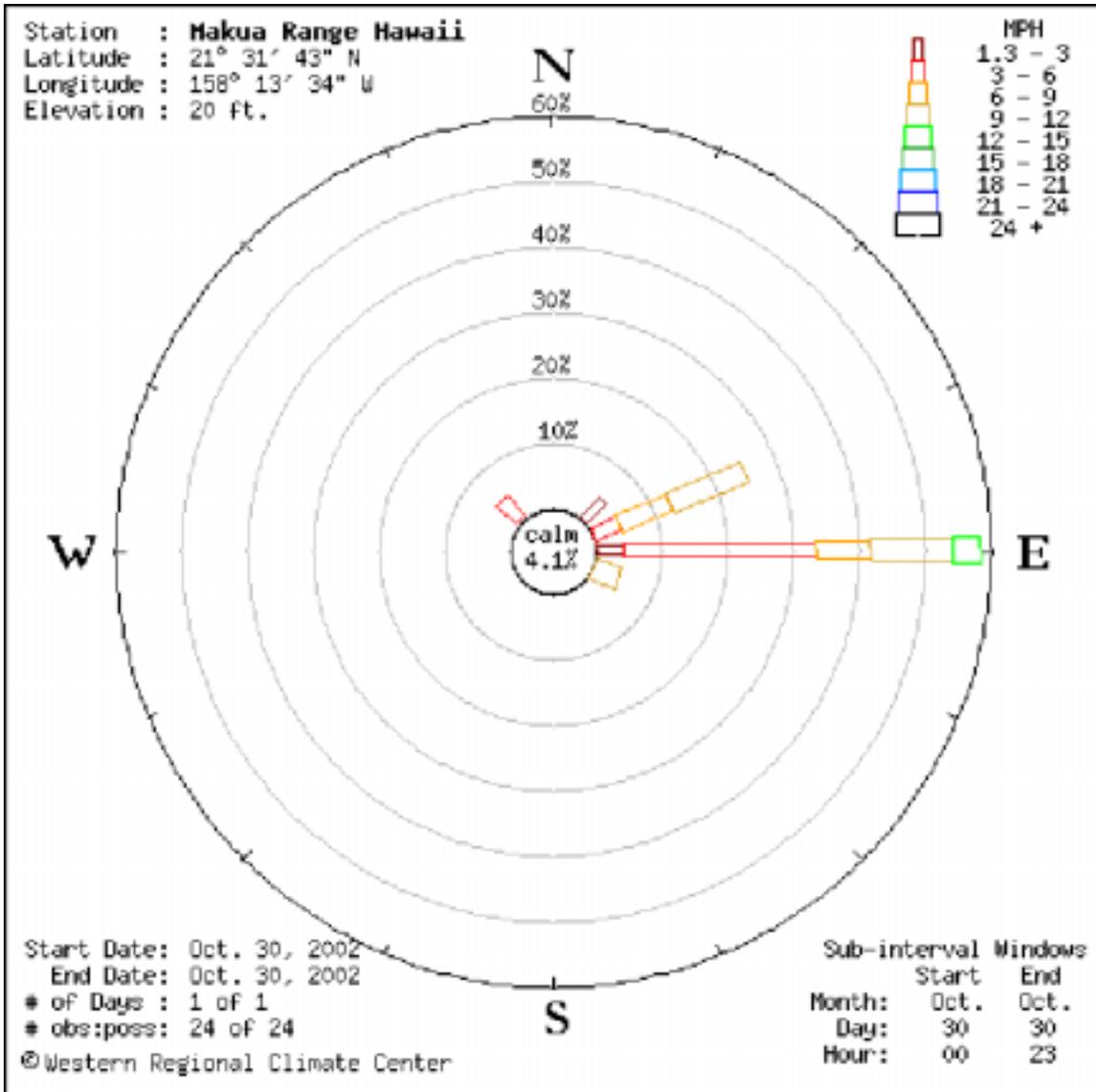


Figure G7-5
October 30, 2002 Wind Rose Chart, Makua Valley RAWS Site

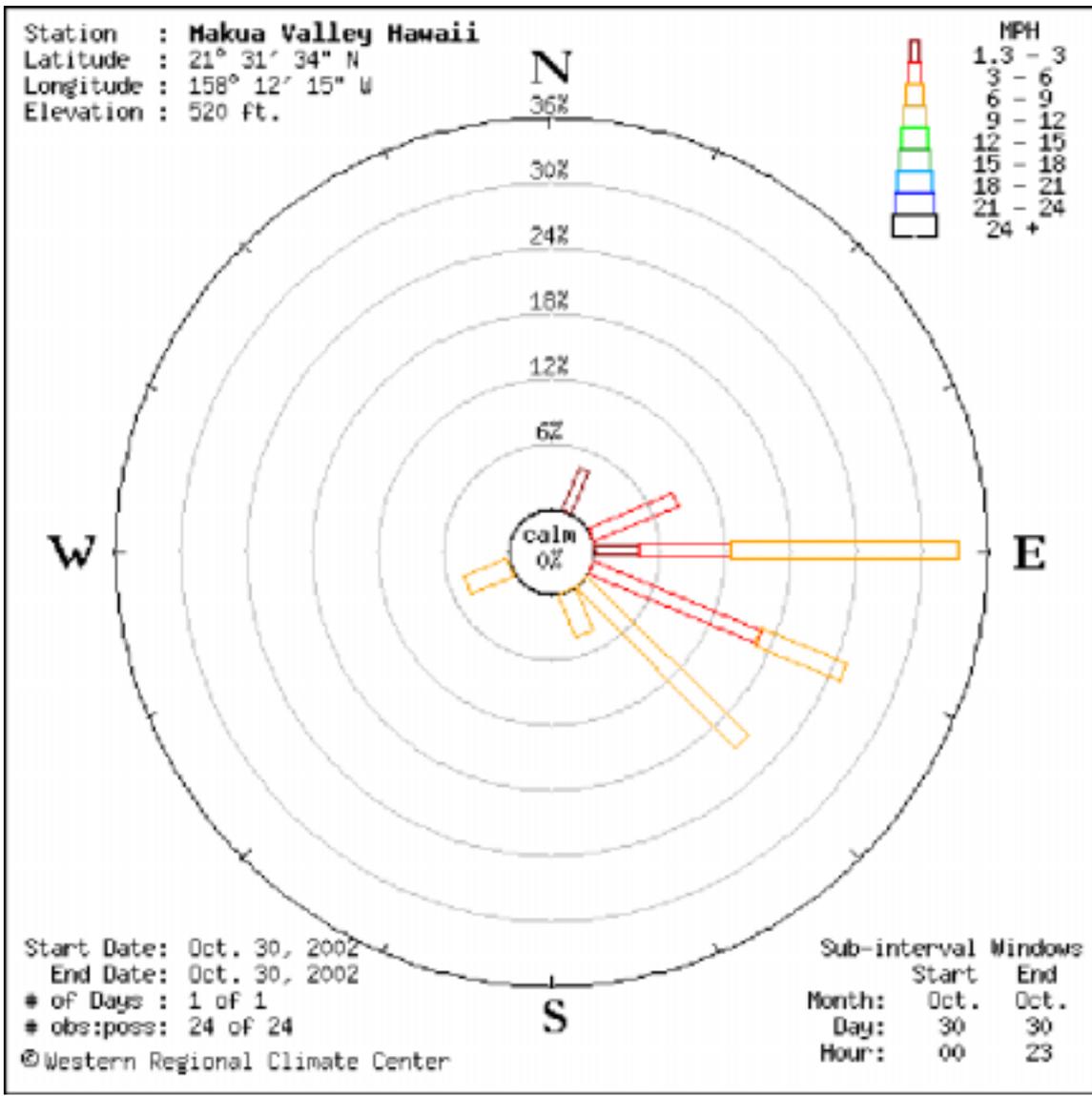


Figure G7-6
October 30, 2002 Wind Rose Chart, Makua Ridge RAWS Site

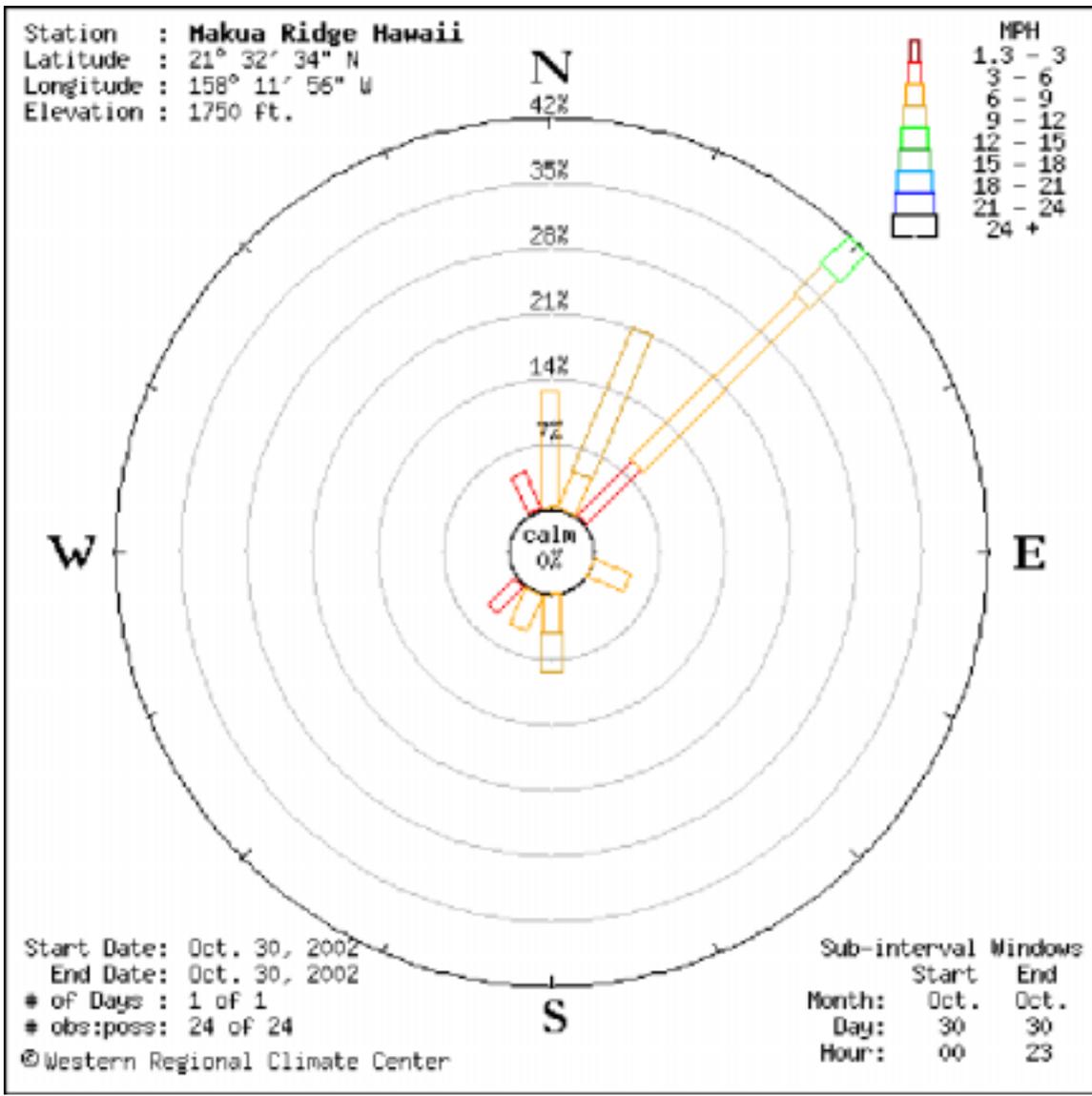


Figure G7-7
January 29, 2003 Wind Rose Chart, Makua Range RAWS Site

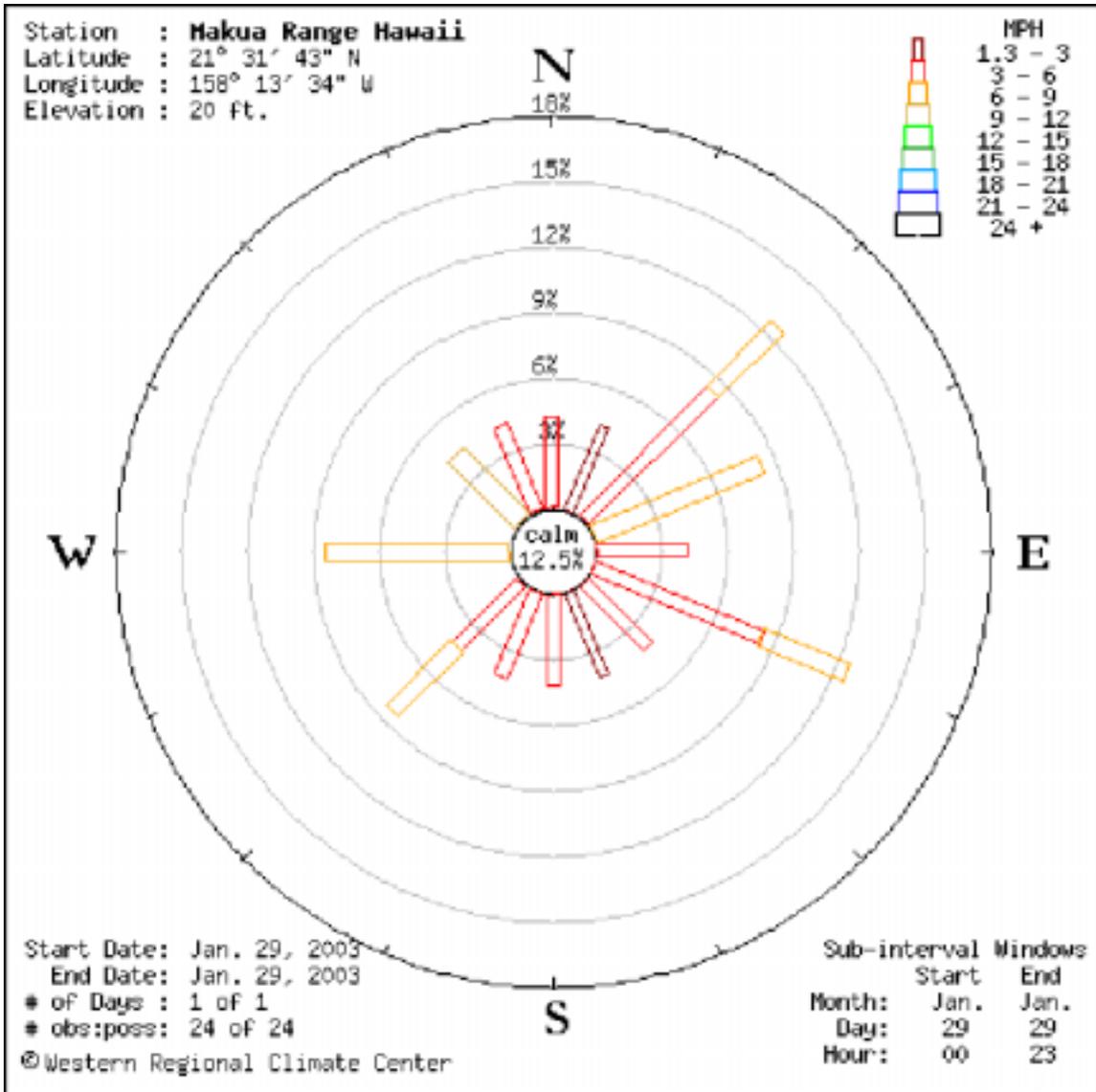


Figure G7-8
January 29, 2003 Wind Rose Chart, Makua Valley RAWS Site

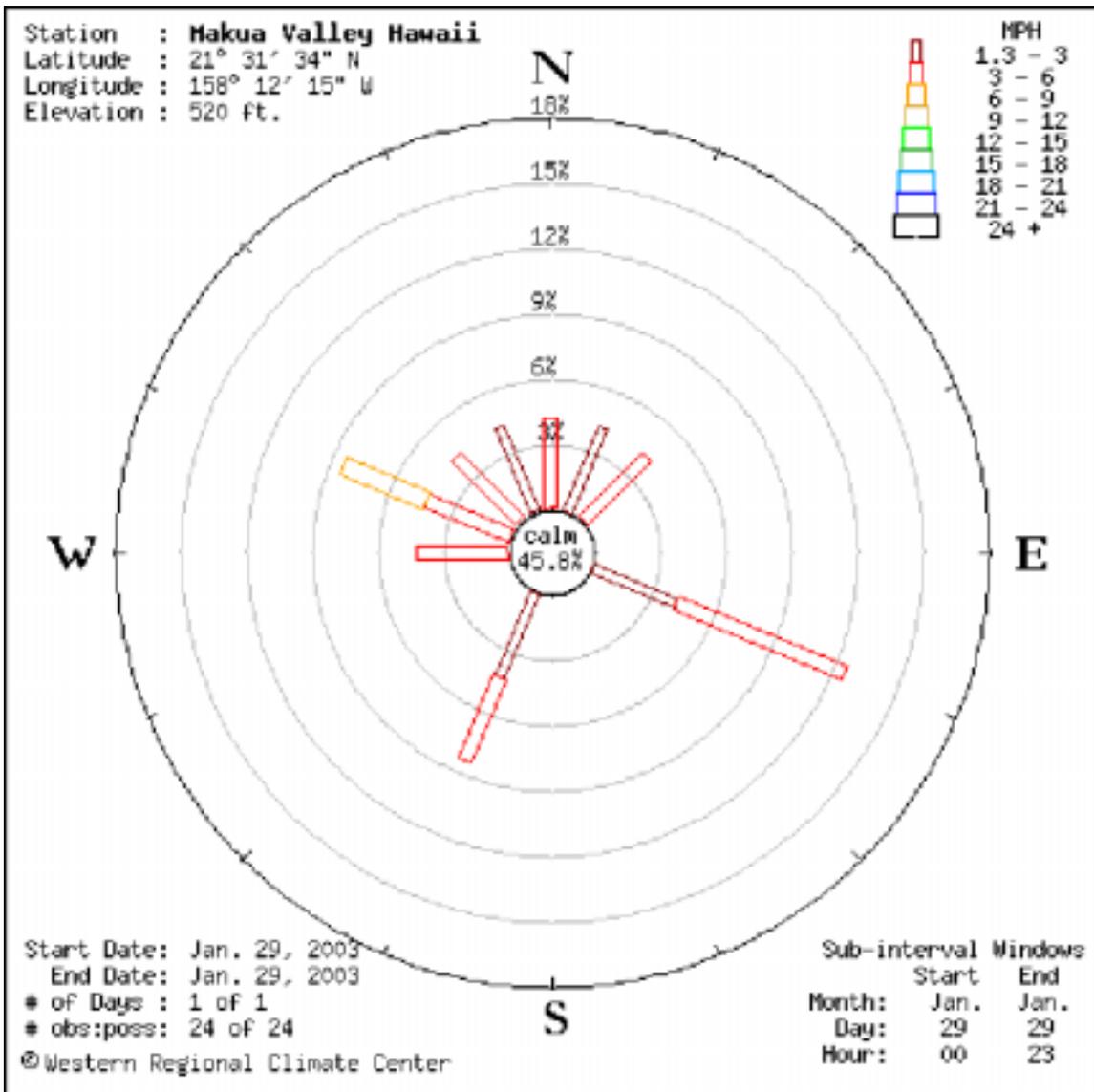


Figure G7-9
January 29, 2003 Wind Rose Chart, Makua Ridge RAWS Site

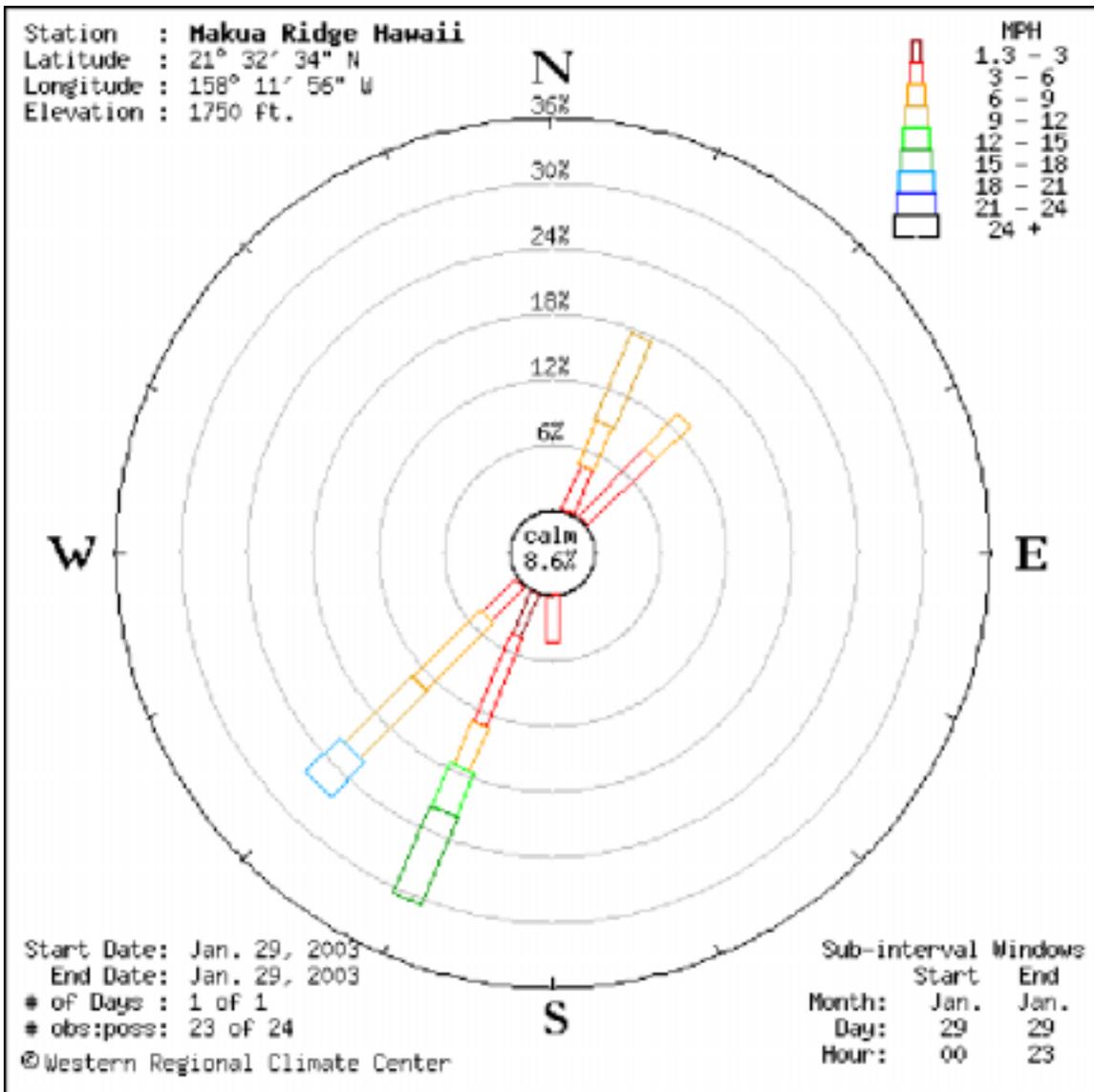


Figure G7-10
January 31, 2003 Wind Rose Chart, Makua Range RAWS Site

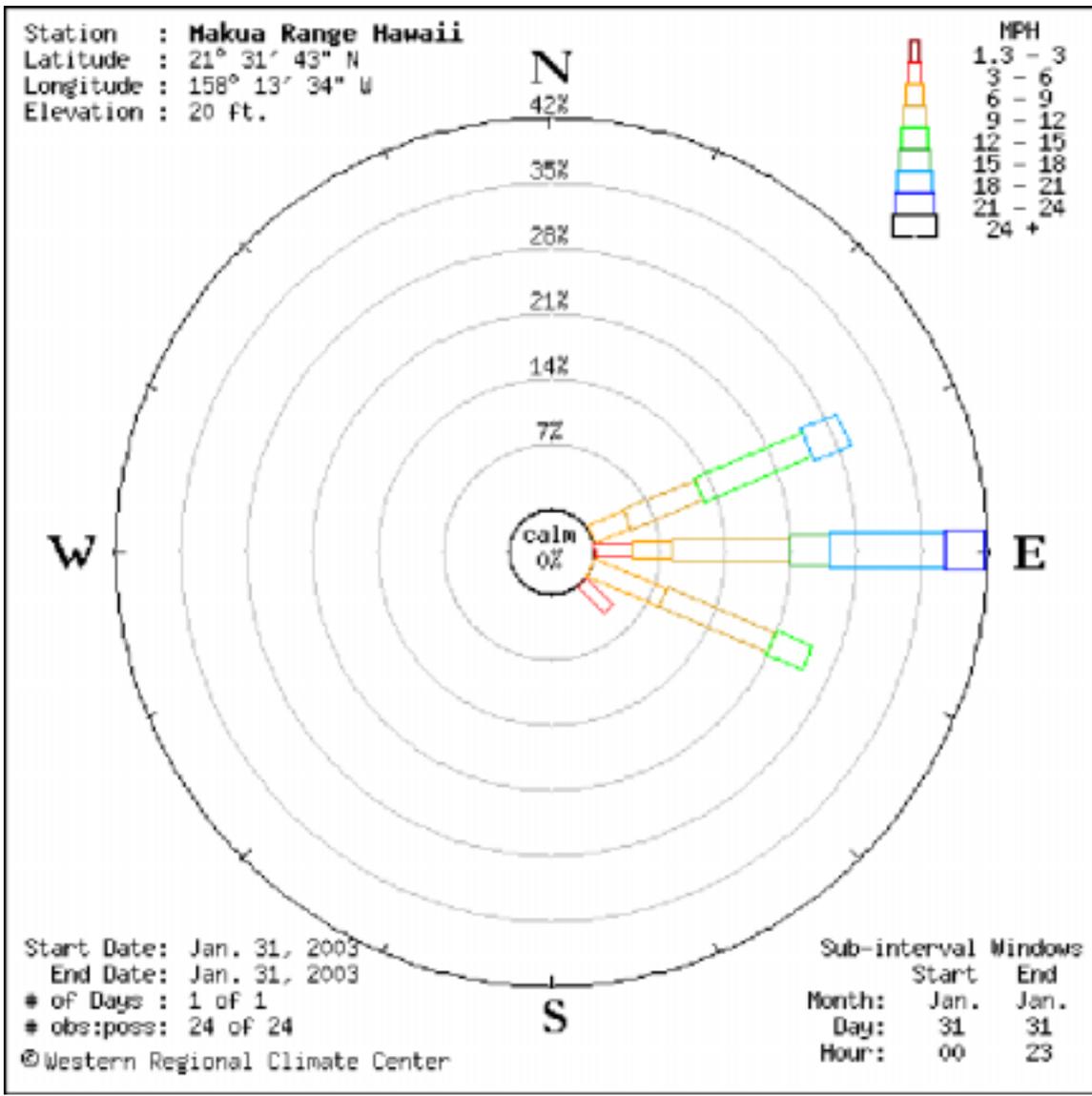


Figure G7-11
January 31, 2003 Wind Rose Chart, Makua Valley RAWS Site

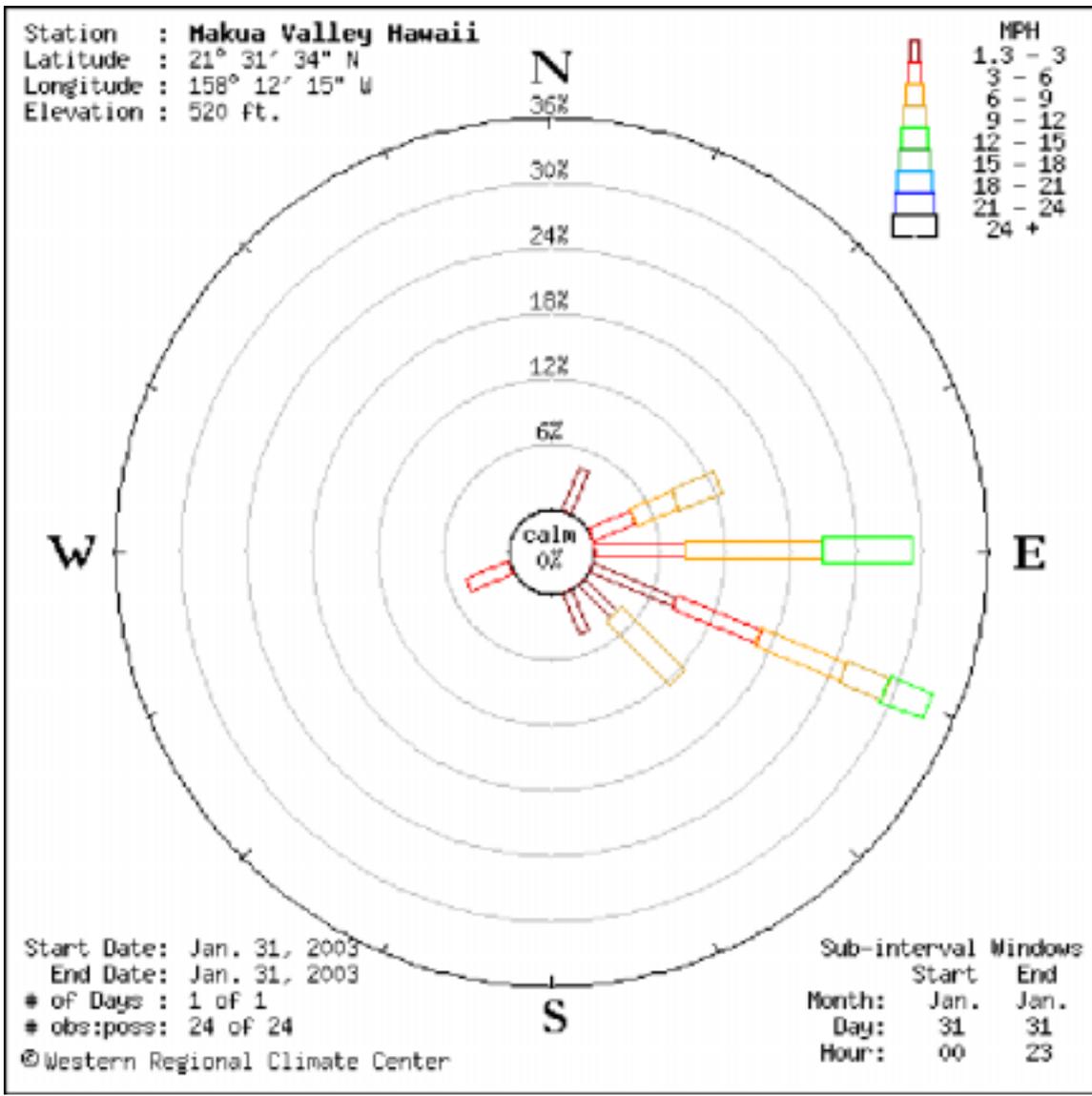


Figure G7-12
January 31, 2003 Wind Rose Chart, Makua Ridge RAWS Site

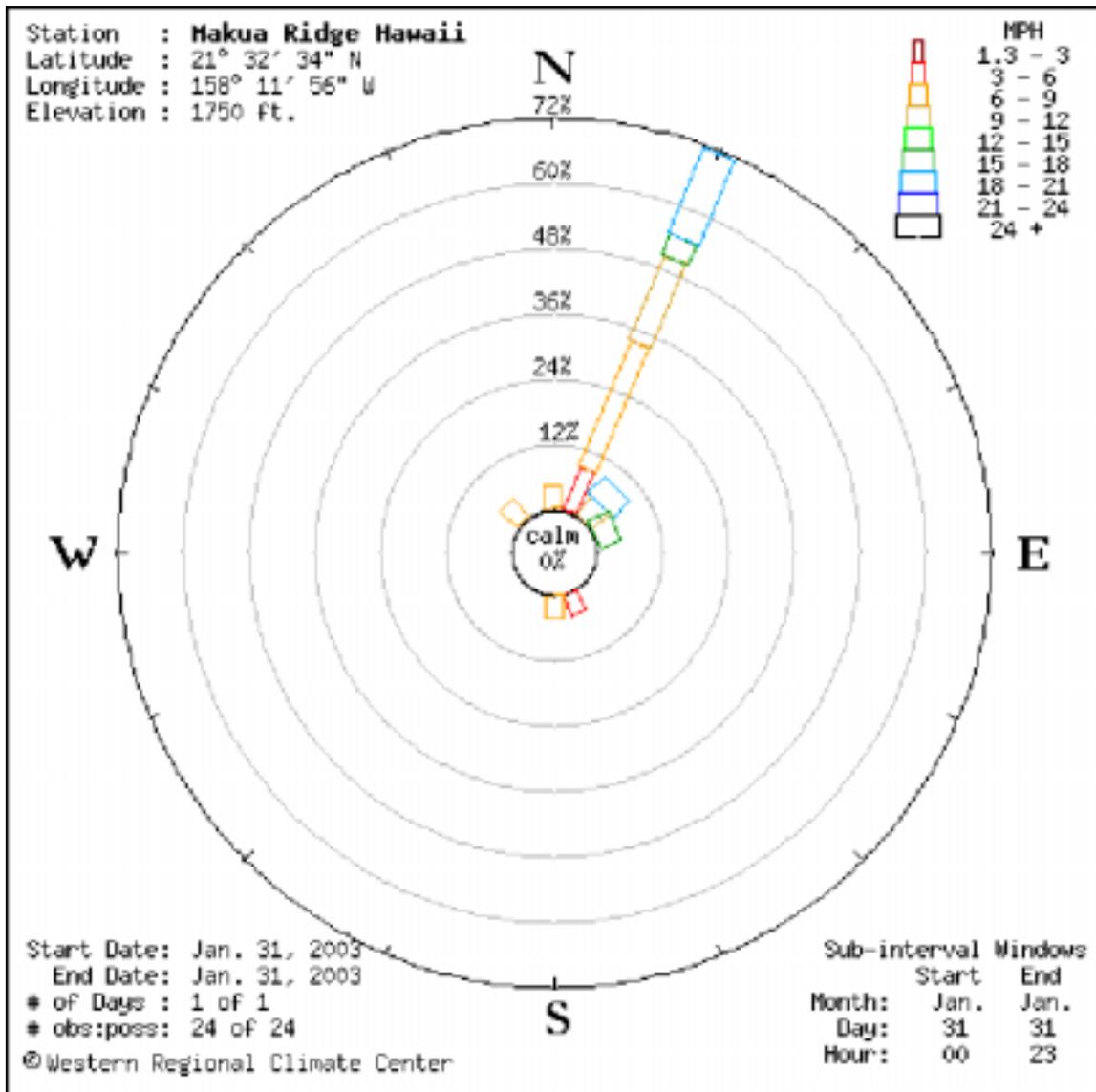


Figure G7-13
April 10, 2003 Wind Rose Chart, Makua Range RAWS Site

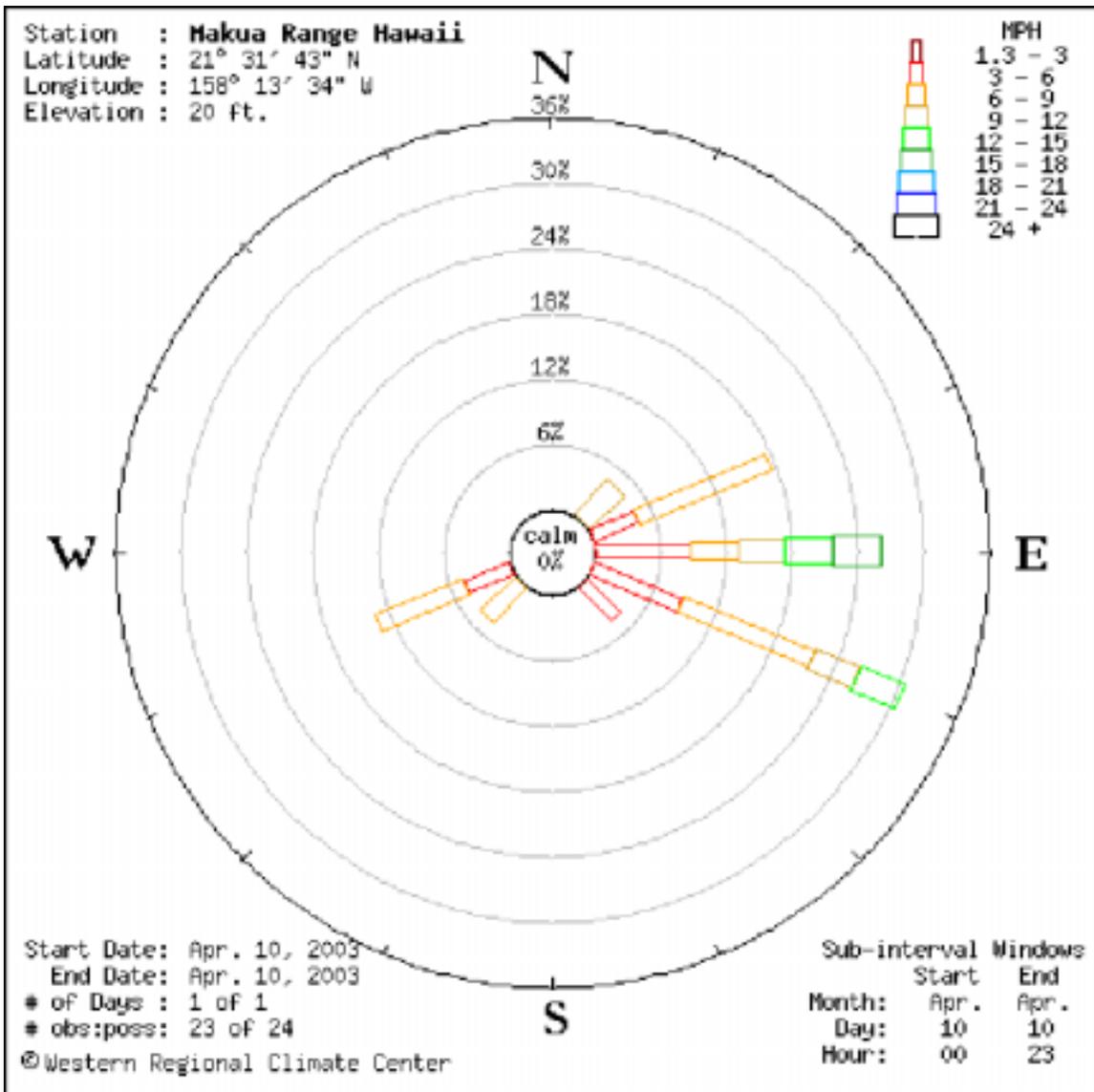


Figure G7-14
April 10, 2003 Wind Rose Chart, Makua Valley RAWS Site

