

Characterizing Environmental Conditions in the **ALEUTIAN ISLANDS**

Report to the Aleutian Islands Risk Assessment Advisory Panel

February 22, 2013



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1. INTRODUCTION

The National Fish and Wildlife Foundation (NFWF), the U.S Coast Guard (USCG), and the Alaska Department of Environmental Conservation (ADEC) initiated the Aleutian Islands Risk Assessment (AIRA) to assess the risks and potential mitigation measures associated with maritime transportation in the Bering Sea and the Aleutian Archipelago (see Figure 1). At the conclusion of Phase A, an Advisory Panel recommended that emergency towing, salvage, and spill response services should generally be enhanced in the Aleutian Islands. Phase B will produce a recommended optimal response system that takes into consideration the cost, management, applicable regulations, and environmental conditions in which the system and its components must operate. This document presents a characterization of the environmental conditions in the Aleutian Islands (as well as adjacent areas of the Bering Sea and North Pacific) that have the potential to influence the effective deployment of emergency towing, salvage, and oil spill response equipment and tactics.

Once the environmental conditions have been characterized, the AIRA Analysis Team will determine the operating limits at which different components of a response system can operate safely and effectively. These limits will be compared to the environmental conditions described in this document to estimate a response gap for emergency towing, salvage, and spill response operations. The response gap estimates will be presented in terms of the percentage of time during which these operations would be precluded due to environmental conditions.

This document describes the methodology, data sources, and compiled environmental data used for the response gap analysis.

For more information on the AIRA, see www.aleutiansriskassessment.com.

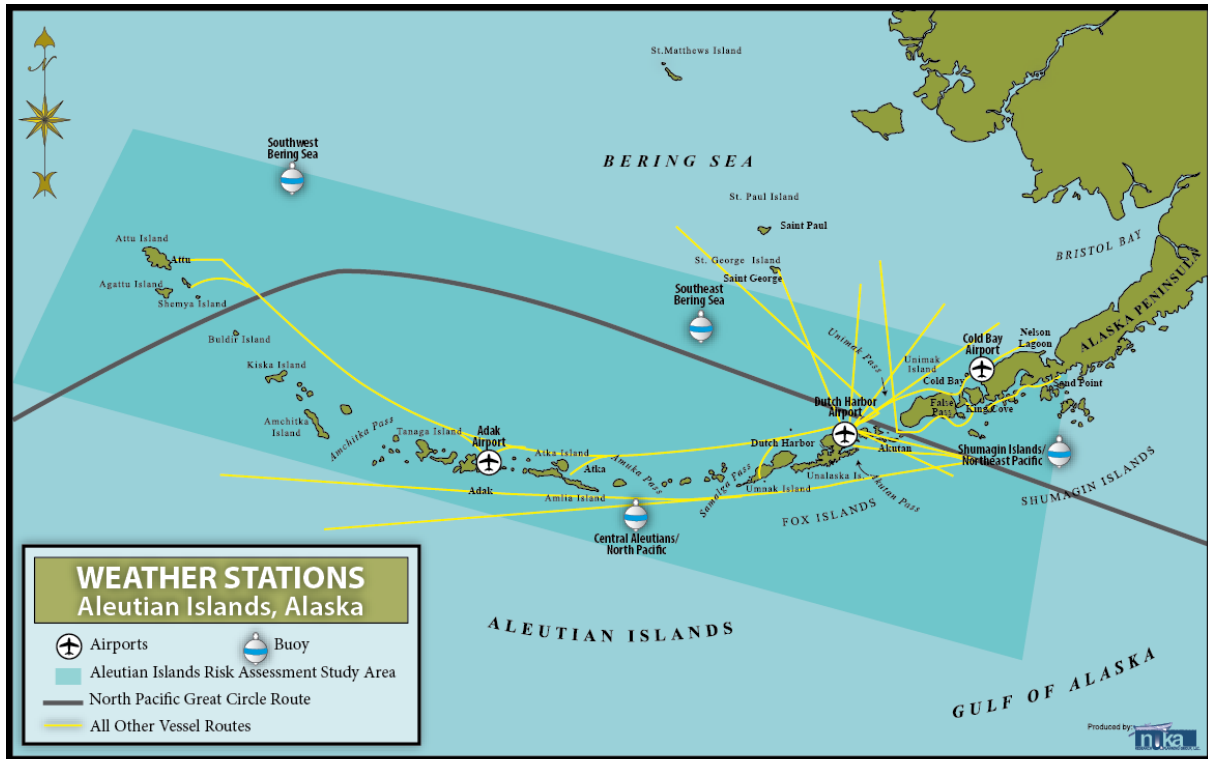
2. METHODOLOGY

This section describes the approach used to develop the environmental data sets, data sources, and the completeness of the data used.

2.1 Data Sources

Nuka Research compiled, prepared, and summarized environmental data from seven National Oceanographic and Atmospheric Administration (NOAA) weather stations located near typical vessel routes through the Aleutian Islands and adjacent areas of the Bering Sea and North Pacific. As shown in Figure 1, these weather stations are all within the AIRA study area, and include three shore stations (Adak, Dutch Harbor/Unalaska, and Cold Bay airports) and four buoys (Southwest Bering Sea, Southeast Bering Sea, Central Aleutians/North Pacific, and Northeast Pacific/Shumagin Islands).

The National Climatic Data Center (NCDC) manages the shore stations, while the National Data Buoy Center (NDBC) manages the buoys. The data was collected for a range of years, beginning in 2002 and ending in 2012. The completeness of the data and other considerations related to the datasets are discussed in Sections 2.3 and 2.4.



WEATHER STATIONS				
Station	Data Source	Identifier / Location	Record Begins	Record Ends
Southwest Bering Sea	NDBC	Buoy #46070	September 2006	August 2012
Central Aleutians/ North Pacific	NDBC	Buoy #46072	July 2002	August 2012
Southeast Bering Sea	NDBC	Buoy #46073	May 2005	April 2011
Northeast Pacific/ Shumagin Island	NDBC	Buoy #46075	May 2004	August 2012
Cold Bay Airport	NCDC	Cold Bay, AK	January 2005	September 2012
Dutch Harbor/ Unalaska Airport	NCDC	Unalaska, AK	February 2005	August 2012
Adak Airport	NCDC	Adak, AK	January 2005	September 2012

Figure 1. Weather stations used for environmental data characterization (vessel traffic routes taken from DNV and ERM, 2010)

The seven weather stations in Figure 1 were selected because, of the relatively limited number of weather stations in the region, these were considered to be the best locations to represent conditions along the primary shipping routes. However, conditions vary widely across the study area and the buoys and ground stations do not capture the same data: the ground stations do not capture data related to sea state, while the buoys do not capture visibility.

2.2 Data Collection and Handling

Data on the following parameters were collected: wind speed and gusts; temperature; significant wave height and dominant wave period (buoys only); and visibility (shore stations at airports only). Wave steepness was calculated based on significant wave height and dominant wave period. Table 1 describes the data collected for each parameter. In the case of temperature, wind speed, and wave height, the data was then converted, as noted in the table.

Table 1. Description of parameters used

PARAMETER	DESCRIPTION: BUOYS <i>Southwest Bering Sea, Central Aleutians/North Pacific, Southeast Bering Sea, Northeast Pacific/Shumagin Islands</i>	DESCRIPTION: SHORE STATIONS <i>Cold Bay Airport, Dutch Harbor Airport, Adak Airport</i>
Wind		
Wind direction	Average wind direction (degrees) measured over an 8-minute period.	Average wind direction (tens of degrees) measured over a 2-minute period.
Wind speed	Average wind speed (m/s) measured over an 8-minute period. (Converted to knots.)	Average wind speed (m/s) measured over a 2-minute period. (Converted to knots.)
Gusts	Peak 5-second wind speed (m/s) over an 8-minute period. (Converted to knots.)	N/A
Sea State		
Significant Wave Height	Average of the tallest one-third of all waves (m) during a 20-minute period. (Converted to feet.)	N/A
Dominant Wave Period	Wave period with the maximum energy, i.e., the most pronounced wave period.	N/A
Wave Steepness	Calculated from dominant wave period and significant wave height. Wave Steepness = $WHT / (g * DWP^2)$ where: <ul style="list-style-type: none"> • WHT = Wave Height • g = acceleration from gravity (32.174 ft/s²) • DWP = dominant wave period 	N/A
Visibility		
Horizontal Visibility	N/A	Measured in statute miles (SM).
Ceiling	N/A	Measured in feet above ground level (AGL).
Daylight	Daylight is calculated for all stations based on station coordinates.	
Temperature		
Air Temperature	Temperature measured (C°) at time of recording. (Converted to F°.)	Temperature measured (C°) at time of recording. (Converted to F°.)

Nuka Research compiled the available data for the parameters listed in Table 1, removed duplicate records, and culled the dataset for anomalous records. The latter were identified with the input of a meteorologist (Gramman, 2012) and focused on records representing extremes that were out of sync with the location and/or season, such as 17m wave heights in January, or 10m wave heights in July.

2.3 Completeness of Data

The datasets for each station all have gaps resulting from periods of hours, weeks, or months when one or more sensors did not function properly. Sensors may have been disabled by heavy weather, freezing spray, internal malfunction, or other causes. Assuming that sensors are more likely to malfunction (or less likely to be accessed for maintenance or repair) during harsh weather, the data gaps may result in a slight bias towards underreporting bad weather.

Records were considered to be valid for no more than one hour. If a subsequent record was not provided for a specific parameter after one hour due to instrument malfunction, the first record was considered to be finished at one hour and the difference in time was identified as a data gap.

Data gaps were distributed irregularly throughout the datasets, so a custom-built computer program was used to collate monthly statistics and remove entries for which the data was unavailable or rejected (see Section 2.2). Annual statistics were generated from the collation of monthly data, thereby normalizing for data gaps. Environmental conditions during the data gaps were assumed to conform to the general weather patterns established in the data overall.

Figure 2 shows hourly data completeness at all stations, represented as complete, partial, and absent records. Section 3 describes the number of records for each parameter at each location.

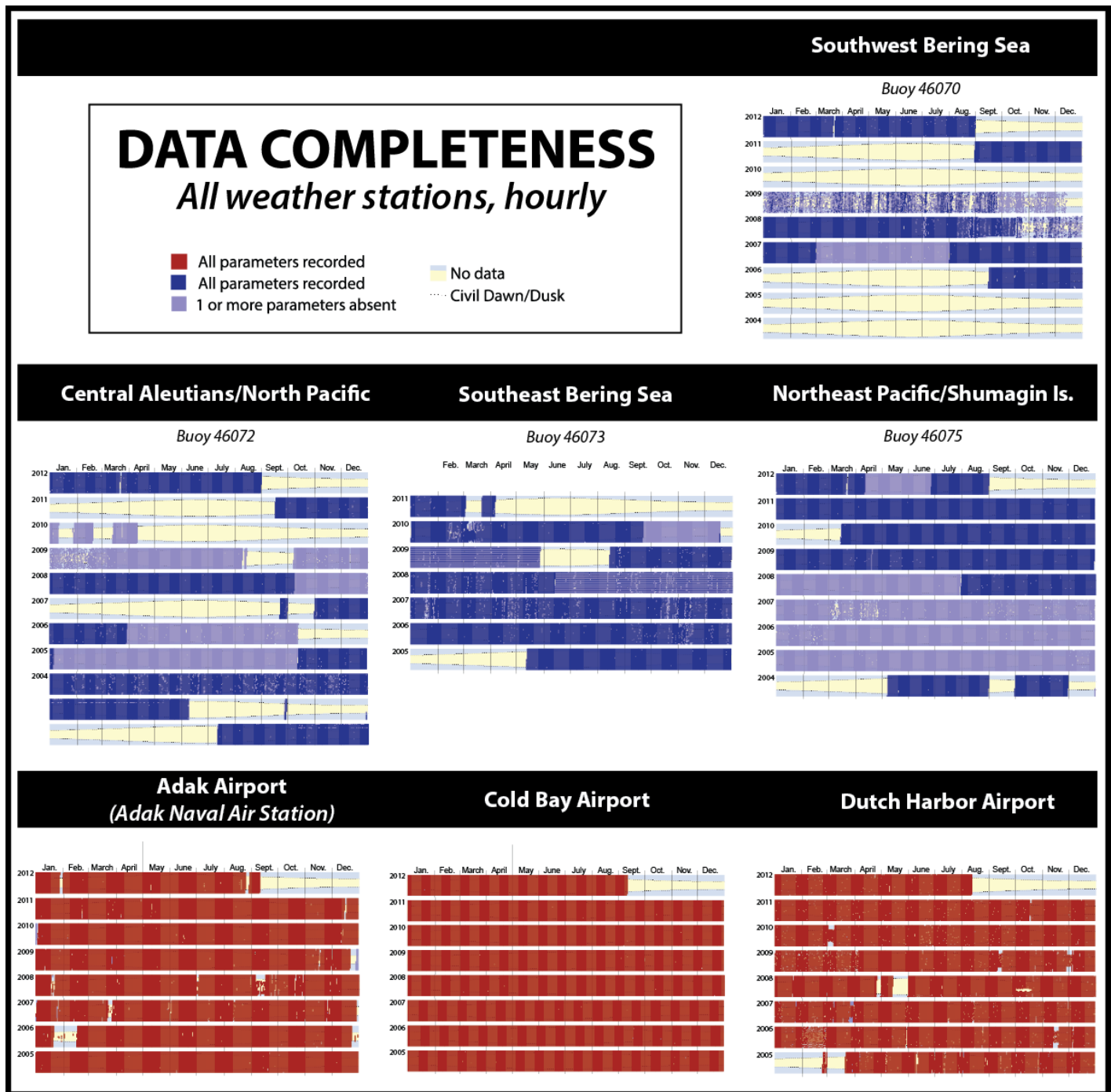


Figure 2. Hourly data completeness for all weather stations

2.4 Conditions Not Captured in Data Collected

Due to the nature of the Aleutian Islands marine environment and the limitations of data recording devices, there are several key features that are not included in the datasets but should be noted for their potential to impact response operations (even if that impact cannot be quantified).

- **Extreme/rogue waves:** Isolated, severe waves or wave sets can be very significant in the Aleutians and may threaten vessels or equipment. Extreme readings from rogue waves may have been culled from the data if they appeared anomalous in context.
- **Nearshore winds and currents:** The complexity of the nearshore and island microclimates is not fully captured in the data. Winds close to shore may be very different than the winds measured on buoys farther out to sea. This is due to a channeling effect caused by the coastal mountains. The mountains can also have significant lee-side gravity winds as cool air builds on the leeward sides of the islands and cascades down the slopes (Fett et al., 1993). While this may be reflected in airport data to a limited extent, the paucity of nearshore and onshore data stations creates an overly simplified picture of the environmental regimen. Likewise, currents, which are particularly relevant between and among the islands, are not reflected in these data sets at all.
- **Visibility in the marine environment:** Visibility is measured at the airport stations, but there are recognized differences in both the cloud ceiling and surface visibility (which may be hampered by sea fog, fog, or precipitation) between the onshore and marine environments (Fett et al., 1993). In particular, sea fog is known to challenge operations in the study area, especially in summer. None of the stations used in this study measures offshore sea fog.

During July and August, when visibility is typically the most limited, a previous study reports that visibility is less than one nautical mile for 30% of the time, with a cloud ceiling below 1000 ft. (Fett et al., 1993). Interpretation of Fett et al. suggests that these statistics pertain directly to Adak Airport, and therefore may not be applicable to the broader region. The lack of systematic visibility and ceiling observations throughout the islands and surrounding seas means this cannot be quantitatively substantiated for the shipping routes. This same source reports that similar very low-visibility conditions occur only 10% to 15% of the time, throughout the rest of the year.

- **Sea ice:** Seasonal sea ice can be found along shipping routes, particularly near Unimak Pass, and can migrate rapidly depending on prevailing winds (Fett et al., 1993). However, this sea ice has never been a hindrance to shipping along the major east-west routes.¹ It does affect shipping throughout Bristol Bay and along Alaska's west coast. Neither the buoy stations nor the onshore stations record the presence of ice.

¹ Personal communication from Capt. David Arzt, Alaska Marine Pilots and AIRA Risk Assessment Advisory Panel member. January 29, 2013.

Figure 3 shows the extent of solid sea ice in the Bering Sea from 2001 – 2009.

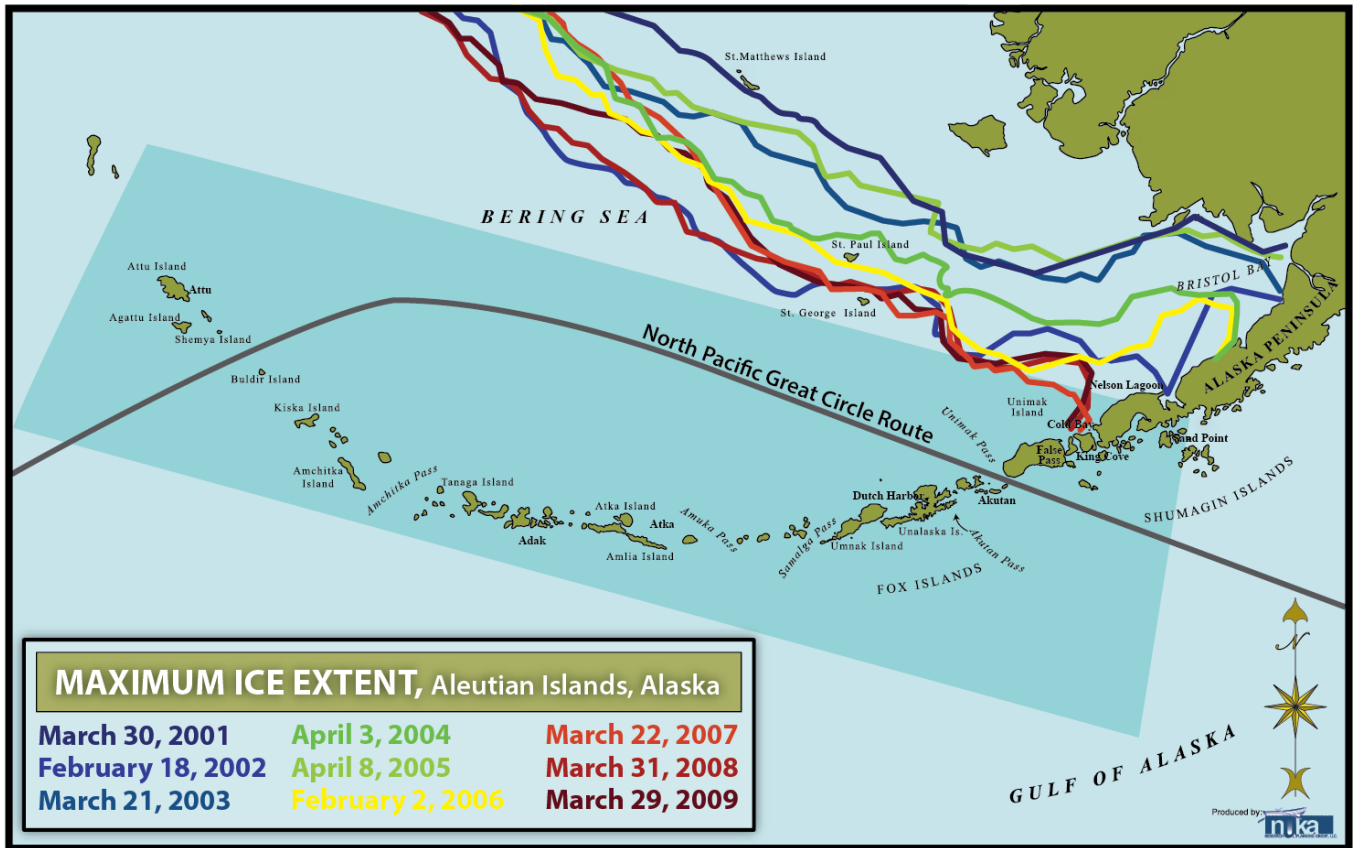


Figure 3. Bering Sea solid sea ice extent, 2001-2009 (based on Overland et al., 2009)

Nuka Research makes no attempt to forecast changes in the environmental parameters used in this report, though differences in future conditions as compared to the historical data presented here can be expected to occur due to global climate change.

3. ENVIRONMENTAL CONDITIONS IN THE ALEUTIAN ISLANDS

This section presents the data collected and collated from each airport shore station and buoy. The data is presented by parameter so that the conditions (for each parameter) at the different locations can be compared. The completeness of the data is also shown as percentage of total possible records that were available for each parameter and each station. Full datasets are available on request from Nuka Research.

3.1 Wind

Wind data are presented in terms of both wind speed and wind direction. The Beaufort Scale, used to describe wind speeds and their associated sea states, is shown in Table 2.

Table 2. Beaufort Scale of wind speed, ocean conditions, and probable sea state (Environment Canada, 1996)

Beaufort Scale	Wind Speed (Knots)	Probable Sea State (Feet)	Effects at Sea
0	< 1	Calm	Sea is mirror-like.
1	1 to 3	< .25	Scale-like ripples form. No crests.
2	4 to 6	.5 to 1	Small wavelets: short but more pronounced. Crests are glassy and do not break.
3	7 to 10	2 to 3	Large wavelets: crests begin to break. Foam is glassy. Scattered white horses possible.
4	11 to 16	3.5 to 5	Waves small but lengthening. More frequent white horses.
5	17 to 21	6 to 8.5	Moderate waves take longer form. Many white horses.
6	22 to 27	9.5 to 13	Large waves. White foam crests are more extensive and there is probably spray.
7	28 to 33	13.5 to 19	Sea heaps up. White foam from breaking waves begins to be blown in streaks.
8	34 to 40	18 to 25	Moderately high waves. Breaking crests form spindrift. Streaks of foam appear.
9	41 to 47	23 to 32	High waves. Dense streaks of foam along the direction of the wind. Crests unstable. Spray may affect visibility.
10	48 to 55	29 to 41	Very high waves with long over-hanging crests. Foam blown in dense, white streaks along the direction of the wind. Sea looks white. Sea tumbling becomes heavy and shock-like. Visibility affected.
11	55 to 63	37 to 52	Exceptionally high waves. Sea completely covered with long, white patches of foam lying along the direction of the wind. Edges of wave crests blown into froth. Visibility affected.

3.1.1 Wind Speed

Figure 4 summarizes this information, showing the median wind speed for each month and the wind speeds that are 25%, 75%, 95% and 98% of maximum. The figure also shows the maximum and minimum readings for

each month (after the data was prepared, as described in Section 2.2). Figure 5 shows the monthly wind speeds and gusts for the buoy stations. See Appendix A for detailed summary tables of data on the sustained wind speed for each location and gusts recorded at the buoy locations.

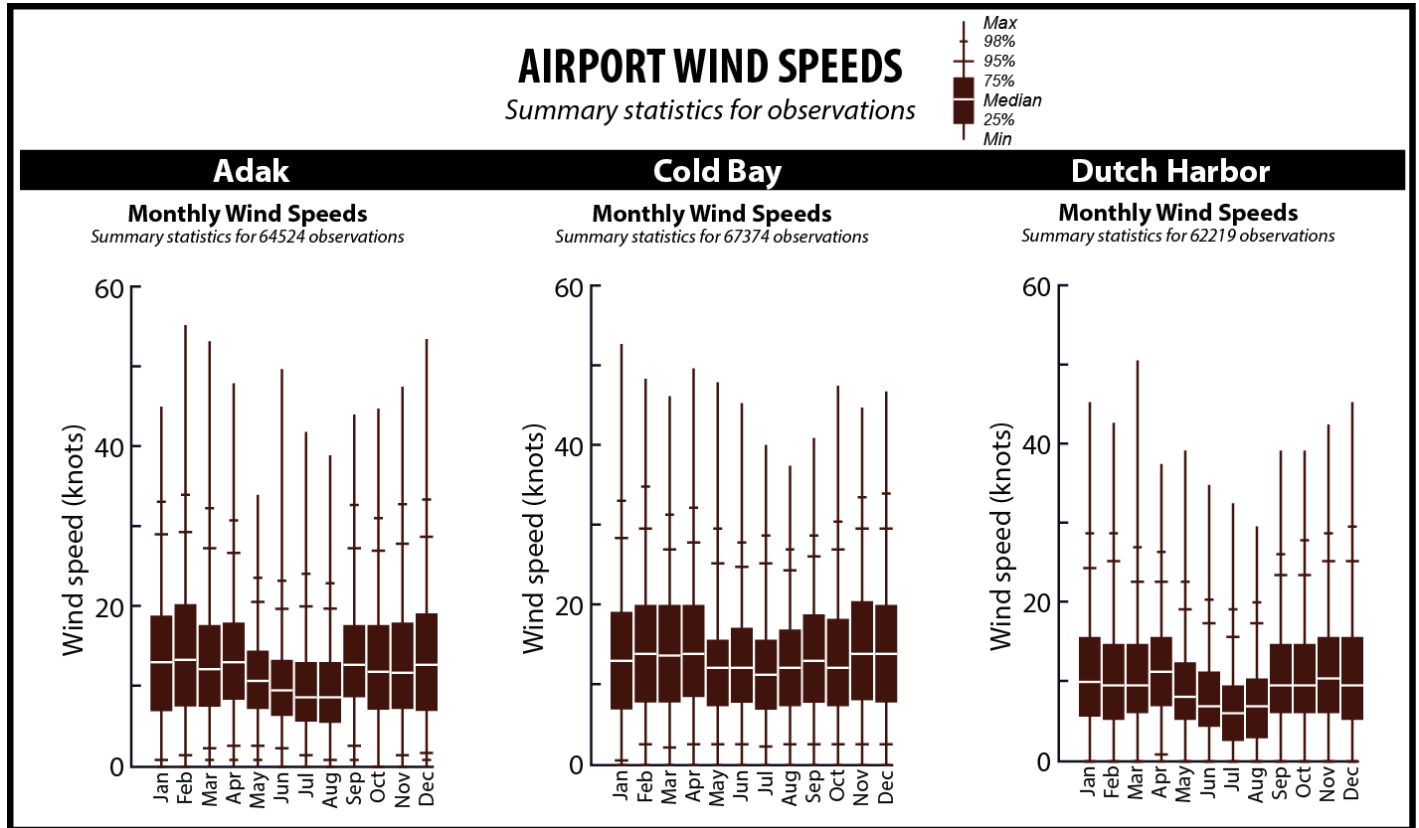


Figure 4. Wind speeds recorded at airport shore stations

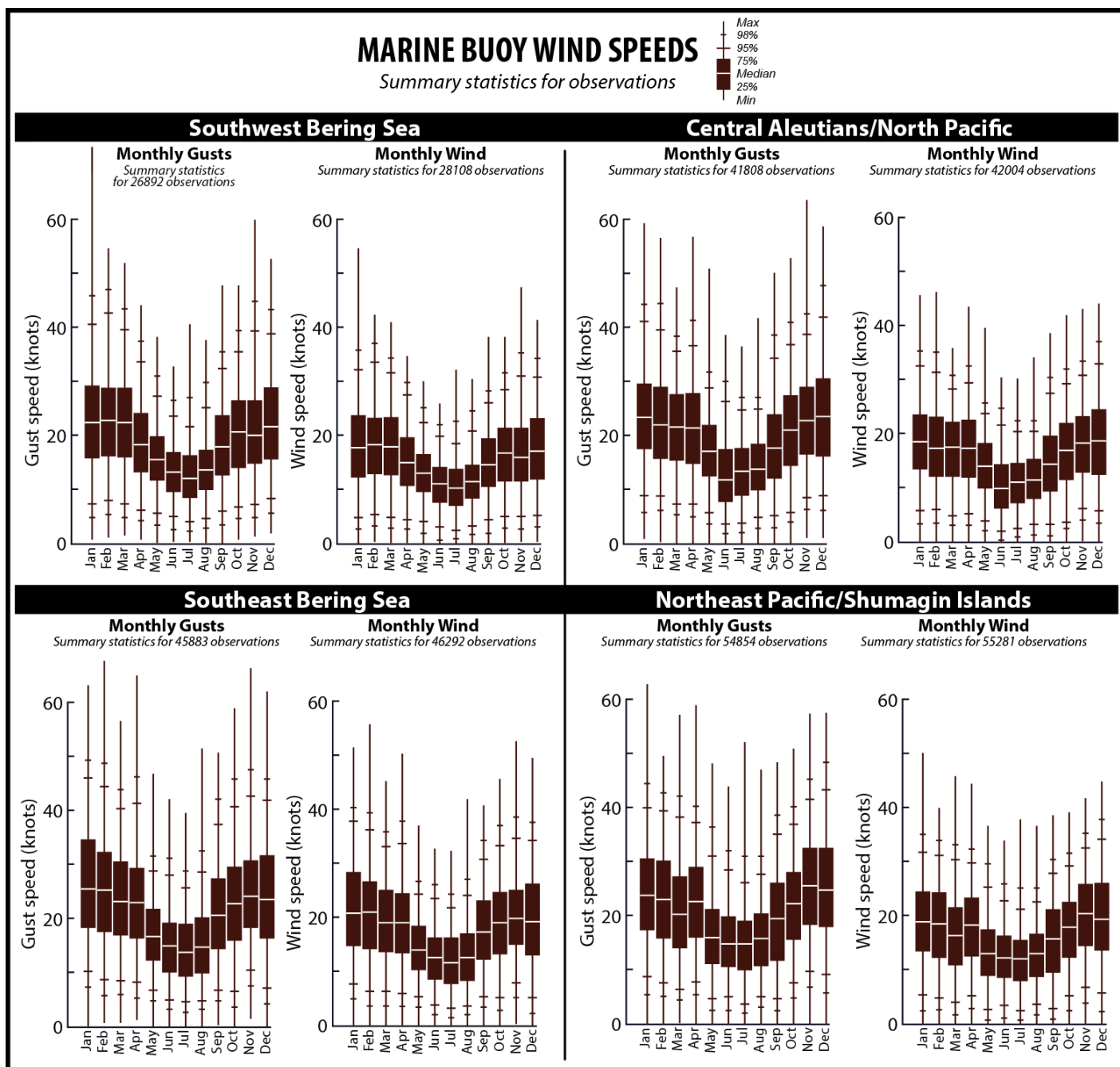


Figure 5. Wind speeds and gusts at buoy stations

3.1.2 Wind Direction

Figures 6-12 present the wind direction recorded at each station, along with the associated wind speeds (and gusts, for the buoy locations), which are presented to highlight the strong, gale force, and storm winds recorded there. The tables shown with each figure indicate the completeness of the records.

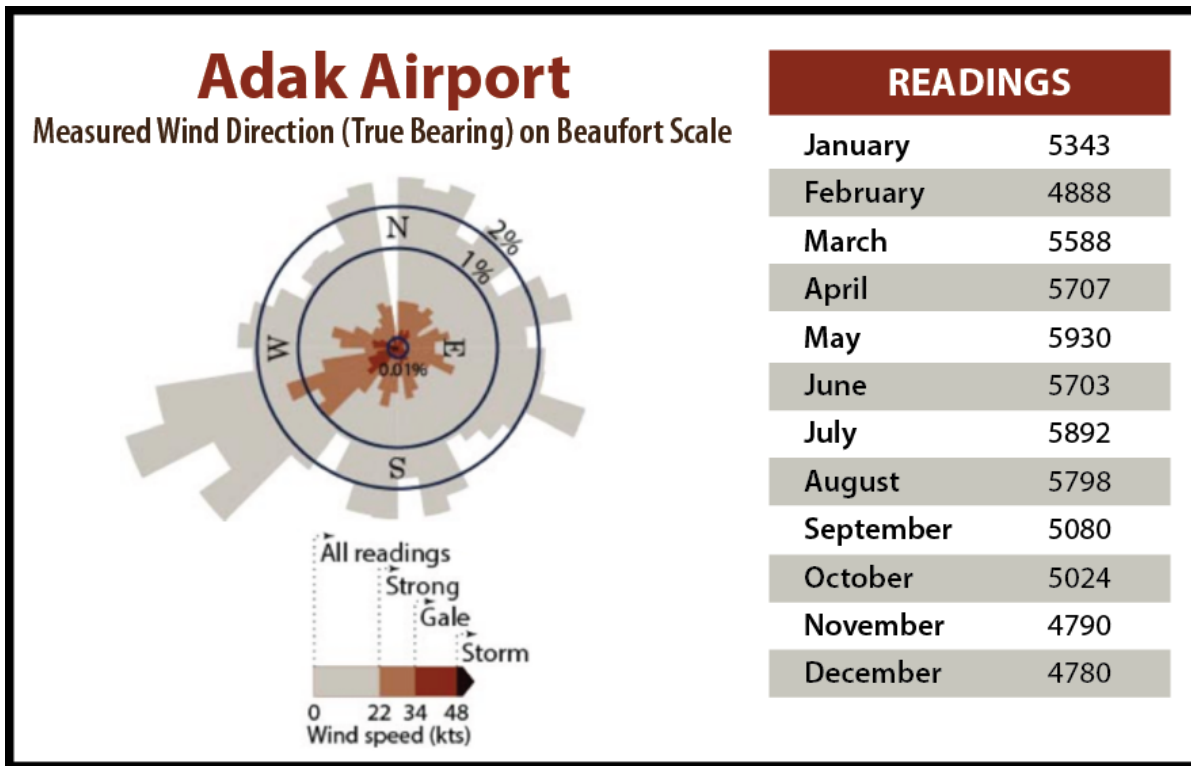


Figure 6. Wind direction, wind speed, and number of readings at Adak Airport

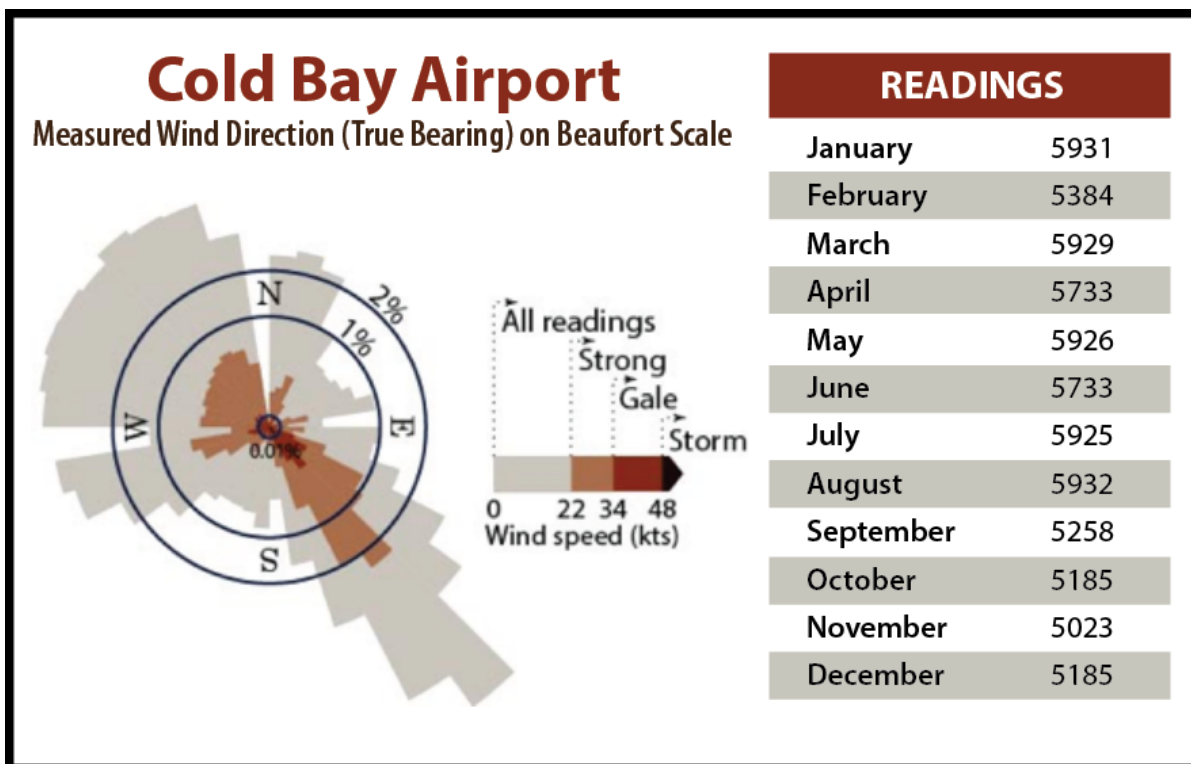


Figure 7. Wind direction, wind speed, and number of readings at Cold Bay Airport

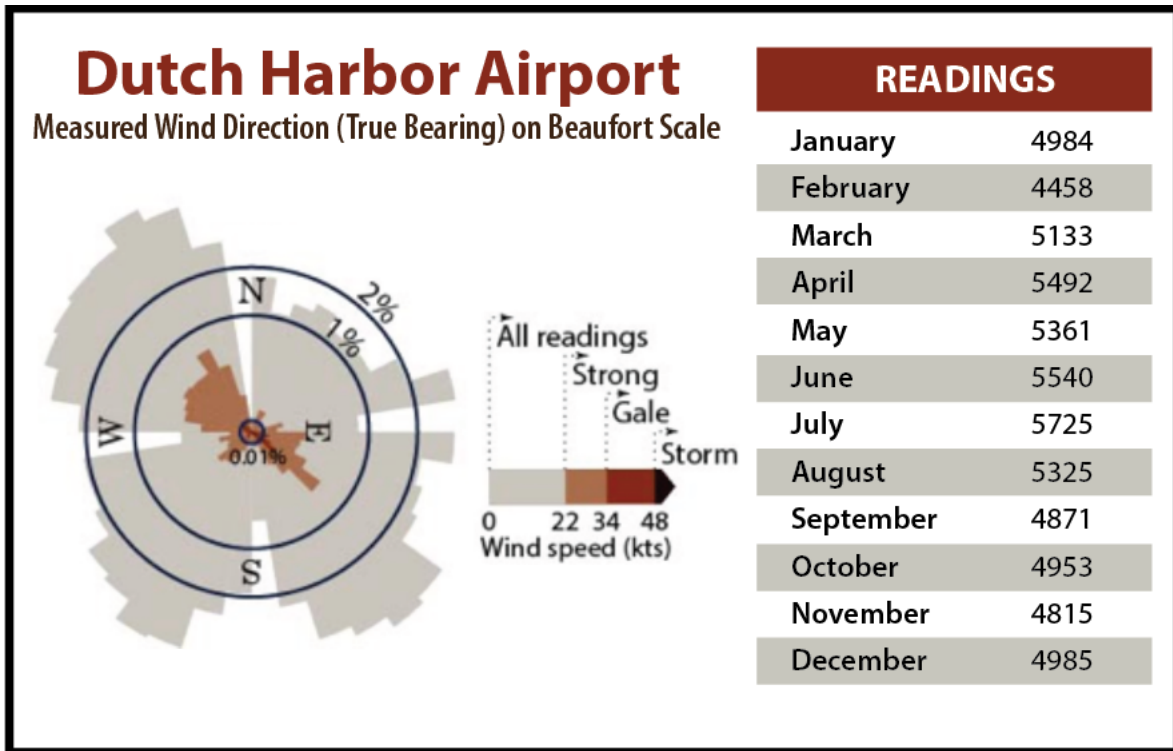


Figure 8. Wind direction, wind speed, and number of readings at Dutch Harbor Airport

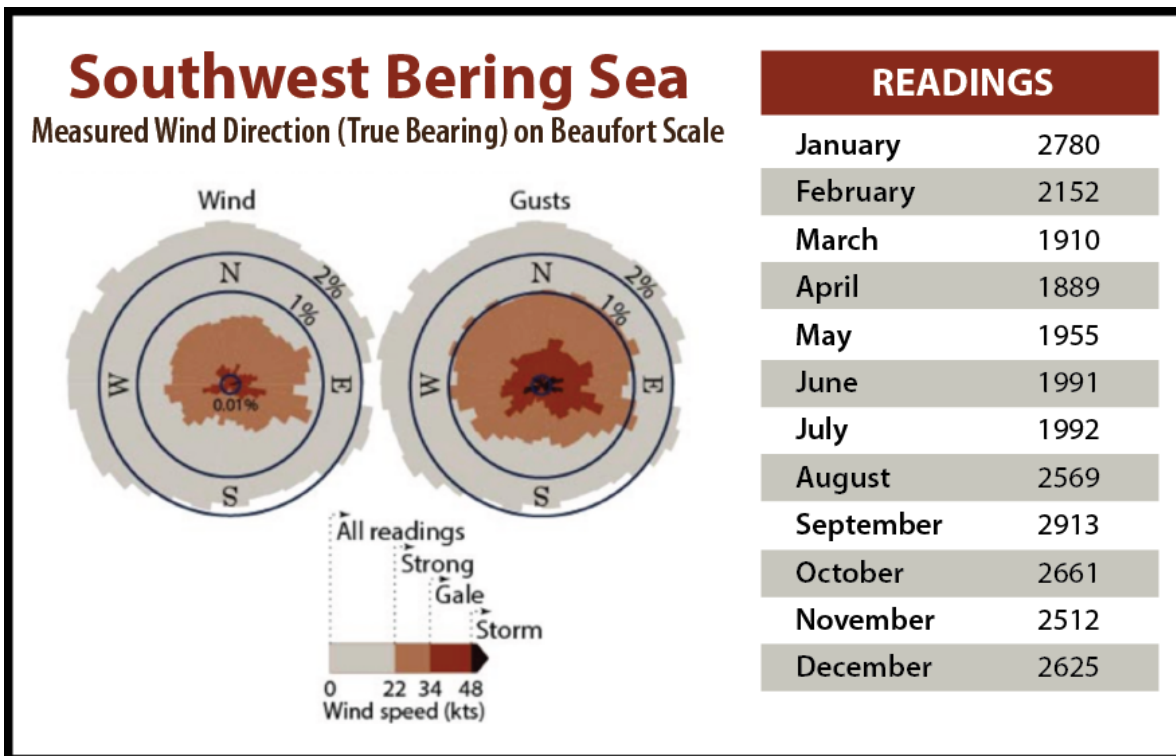


Figure 9. Wind direction, wind speed, and number of readings at Southwest Bering Sea

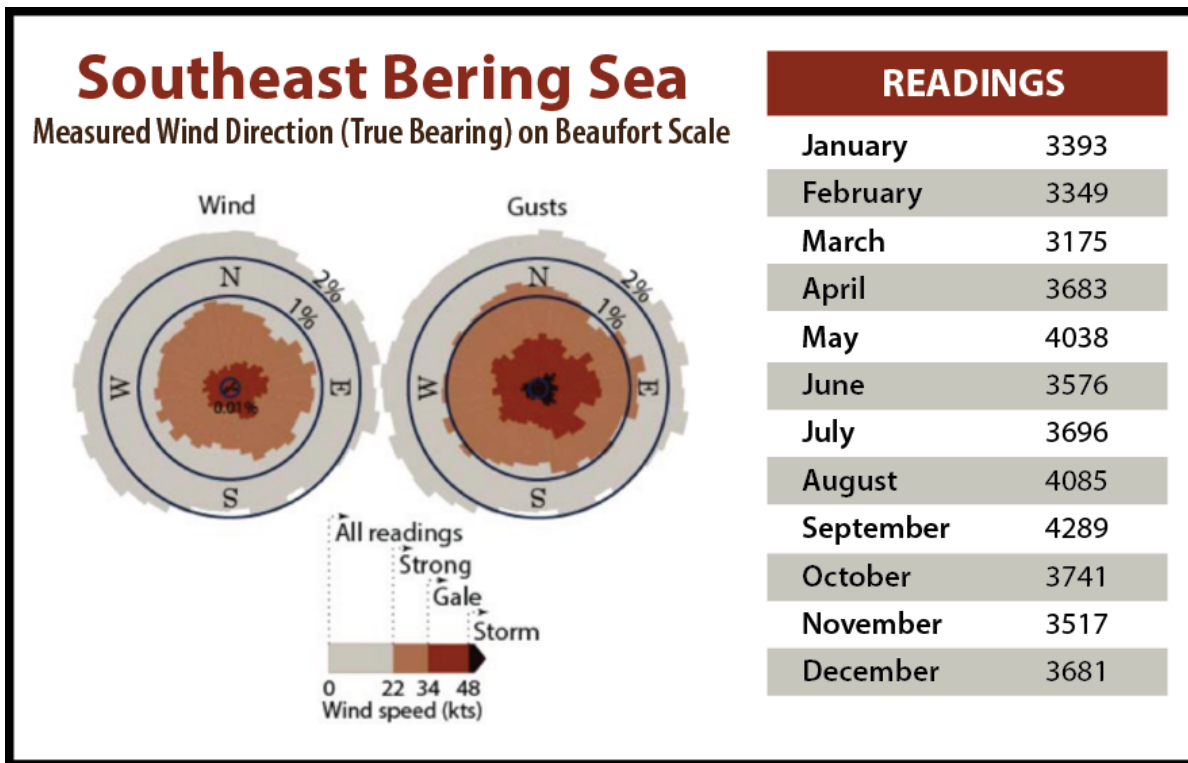


Figure 10. Wind direction, wind speed, and number of readings at Southeast Bering Sea

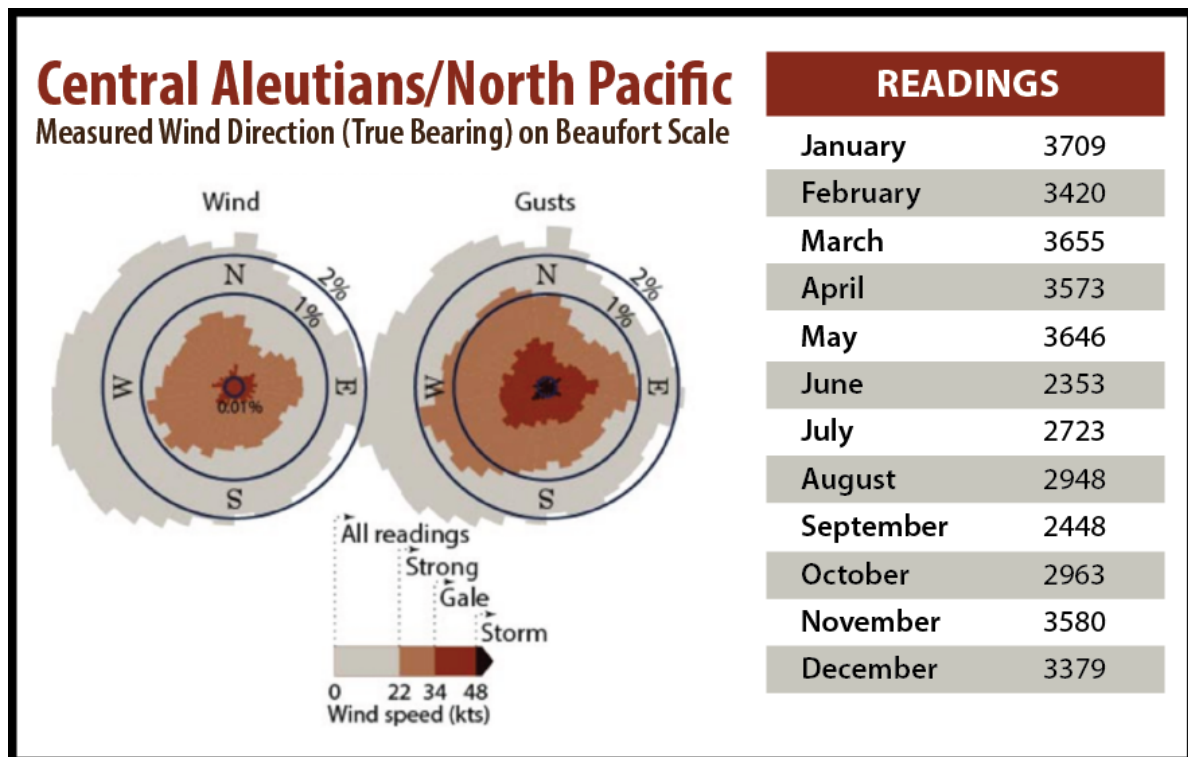


Figure 11. Wind direction, wind speed, and number of readings at Central Aleutians/North Pacific

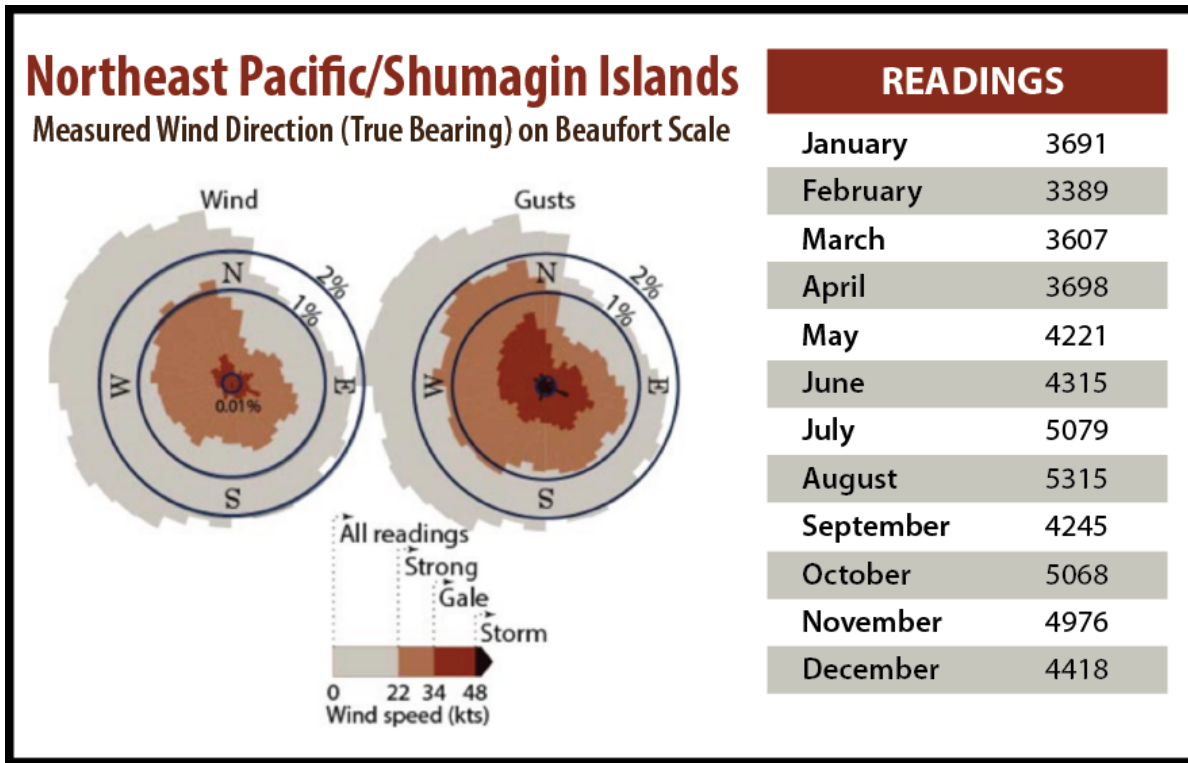


Figure 12. Wind direction, wind speed, and completeness of wind data at Northeast Pacific/Shumagin Islands

3.2 Sea State

As discussed above, the key parameters related to sea state are recorded at the four buoy stations used in this study. The data collected is summarized in Figure 13, which shows the distribution of wave height and wave period. See Appendix B for detailed summary tables of the wave height, wave period, and wave steepness data for each buoy location.

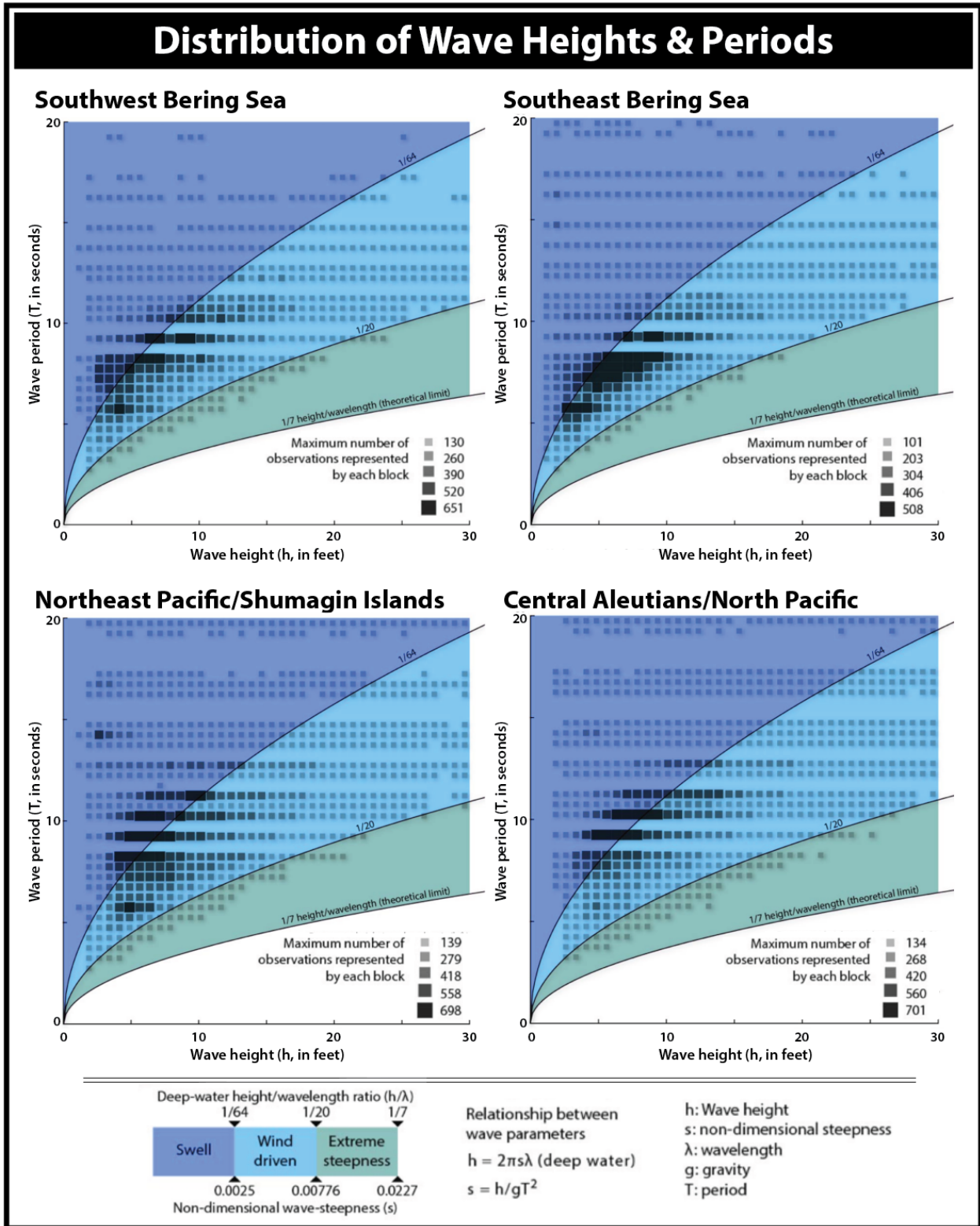


Figure 13. Distribution of wave heights and periods recorded at buoy stations. This figure omits very large, outlying average wave heights above 30 feet (greater than 98th percentile for all buoys). For maximum recorded average wave heights, see Appendix B: Summary Data Tables for Wave Height, Period, and Steepness.

3.3 Temperature

Figure 14 shows the median, maximum, and minimum temperatures collated for each month at each location. It also shows the temperatures that represent 25% and 75% of the maximum. See Appendix C for detailed summary tables of the air temperature data for each location.

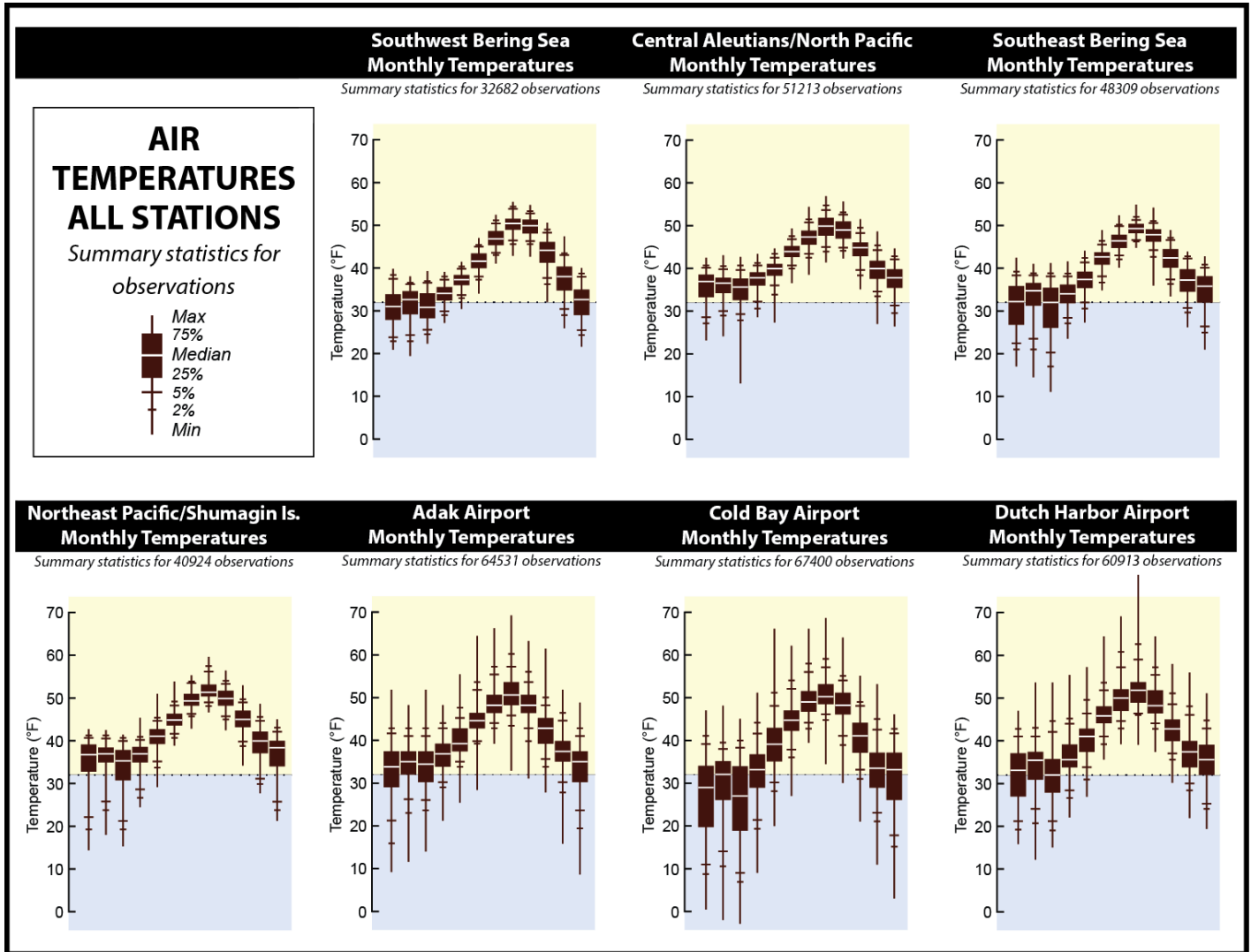


Figure 14. Monthly temperature data for all seven stations

3.4 Visibility

Visibility is recorded at the airport stations based on the number of statute miles of horizontal visibility and the height of the cloud ceiling. Aside from weather conditions, the area experiences large seasonal variations in daylight, which will affect operations. See Appendix D for detailed summary tables of the visibility data for each airport location.

3.4.1 Prevailing Visibility at Airport Stations

As Figure 15 shows, horizontal visibility varies among the three airports and throughout the year. This figure presents the horizontal visibility as it applies to Class E Airspace (general, unrestricted airspace) flight rules. In simplified form, Class E instrument flight rules (IFR) require a visibility of at least one mile, and visual flight rules (VFR) require a visibility of three miles or more (Federal Aviation Administration, 14 CFR Part 91).

FAA flight rules themselves are more complex; these simplified flight rules are used only to provide context for the visibility data, indicating the possible impact on operations. Marginal zones are identified at 3-5 miles of visibility (where VFR is possible but may be marginal), and at less than one mile of visibility (where even instrument flight may not be recommended).

As discussed above, visibility at the airports may be different than visibility on the water. For instance, conditions that permit flight from airports might still preclude effective search, rescue, or surveillance of spilled oil on the water.

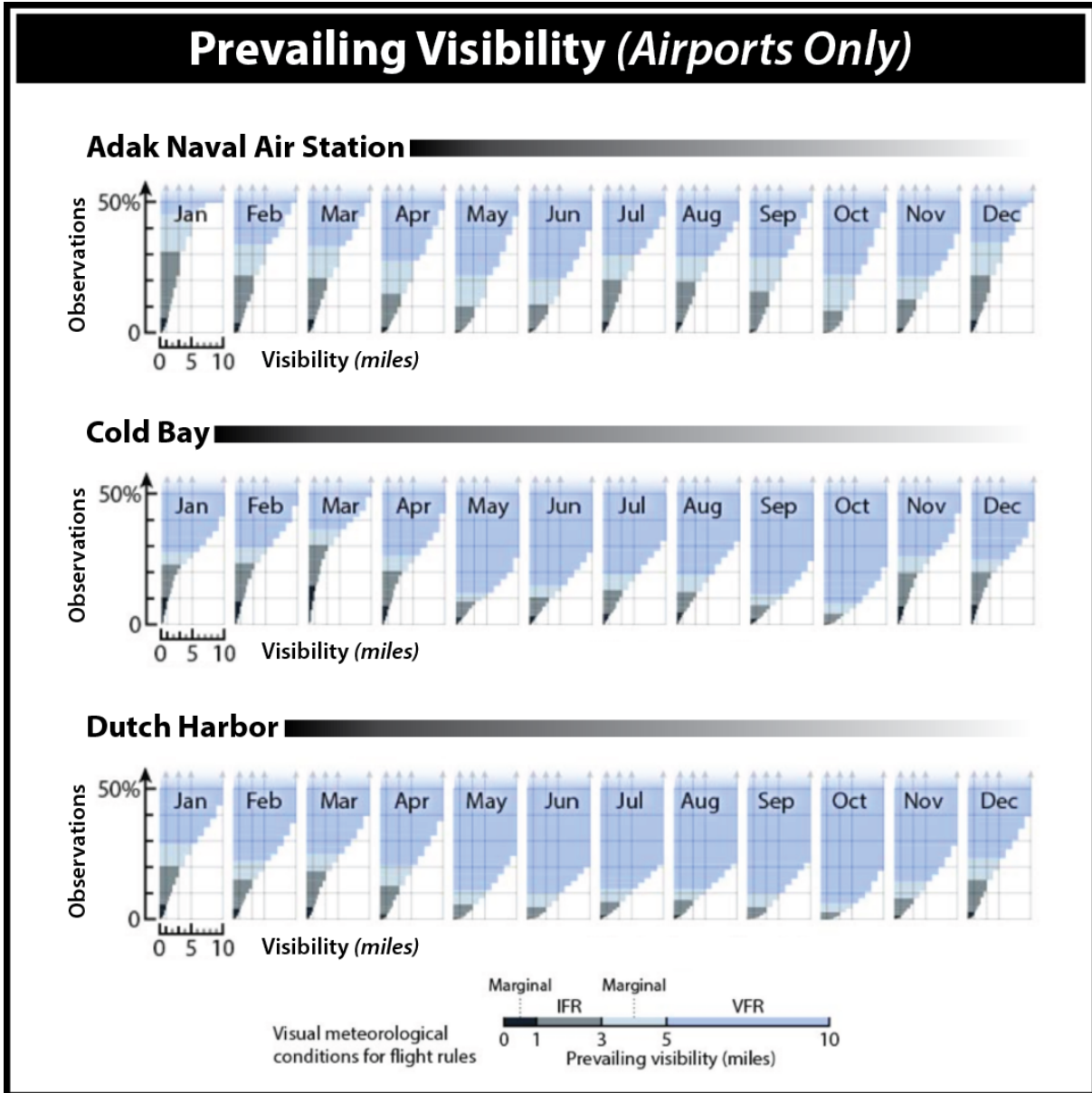


Figure 15. Prevailing visibility at the three airport stations, year-round

3.4.2 Observed Ceiling at Airport Stations

Airport stations also record the observed ceiling (height of cloud cover above ground level), which are summarized in Table 3.

Some ceiling records, primarily at Adak, are of uncertain quality due to the possible conflation of very low ceilings with no recording. Zero ceilings are recorded for a full range of visibility conditions, including horizontal visibility of up to 10 miles (the maximum measured), suggesting that many such records actually correspond to clear sky or no ceiling recording being taken, rather than foggy conditions. Ceiling requirements for flight vary; there is not one universal limit.

Table 3. Observed ceiling at Adak, Cold Bay, and Dutch Harbor airports

	PERCENTAGE OF TOTAL OBSERVATIONS		
	<i>Ceilings of 1000 ft. or lower</i>	<i>Ceilings of 200 ft. or lower</i>	<i>Zero or unrecorded ceiling</i>
Adak Airport	8%	1%	53%
Cold Bay Airport	18%	3%	< 1%
Dutch Harbor Airport	11%	1%	1%

3.4.3 Daylight

Daylight in the study area varies slightly from north to south among the weather stations, and substantially throughout the year at all stations. Civil daylight along the northern margin of the study area lasts approximately 9 to 19 hours per day, depending on the time of year. This includes daytime hours, from sunrise to sunset, as well as the half-hours before sunrise and after sunset (civil twilight).

Dutch Harbor, the logistical hub of the region, sees a similar range (Figure 16). The area has an east-west span of over 1,100 miles between the Shumagin Islands and Attu Island. As a result, actual local time-of-day varies by more than 2 hours, at the approximate latitude of Unalaska (54° N). The chain is divided between Alaska Standard Time (UTC-9) east of 169° 30 W and Hawaii-Aleutian Standard Time (UTC-10) to the west.

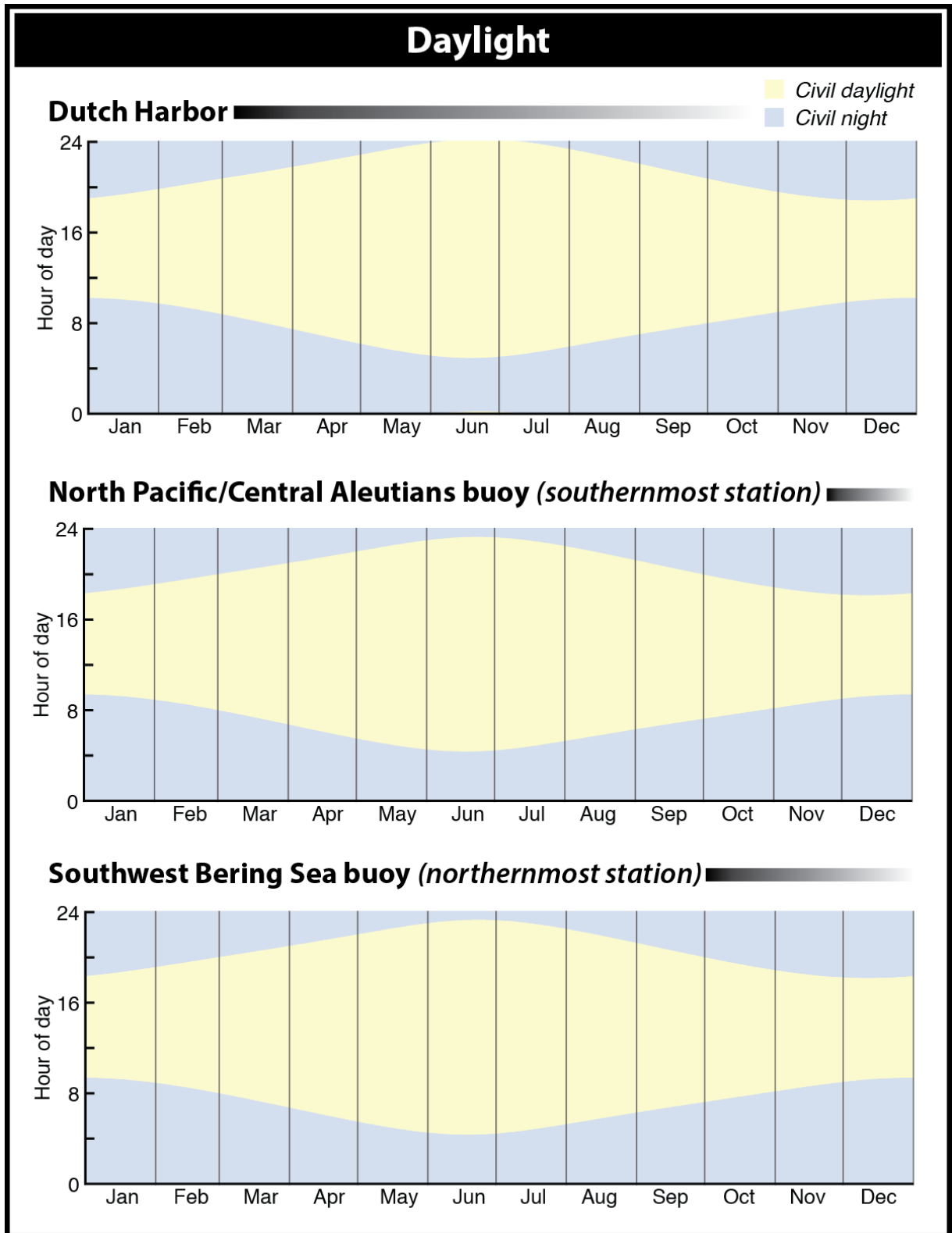


Figure 16. Annual daylight for Unalaska and the northernmost and southernmost weather stations.

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Appendix A: Summary Data Tables for Wind Speed and Gusts

The tables below show sustained wind speeds (in knots) for each of the seven stations used. Following the tables for wind speed is a series of tables that shows the gusts measured at the four buoy stations.

Wind Speed

Wind speed (knots), Adak Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	5344	90%	14	45	13	0	29	33	9
February	4888	90%	14	55	13	0	29	34	9
March	5588	94%	13	53	12	0	27	32	8
April	5707	99%	14	48	13	0	27	31	7
May	5930	100%	11	34	11	0	21	24	5
June	5703	99%	10	50	10	0	20	23	5
July	5892	99%	10	42	9	0	20	24	6
August	5798	97%	10	39	9	0	20	23	6
September	5080	88%	14	44	13	0	27	33	7
October	5024	96%	13	45	12	0	27	31	8
November	4790	95%	13	47	12	0	28	33	8
December	4780	92%	14	53	13	0	29	33	8
Total Completeness:		95%							
Mean of Averages:			12						
Maximum Recorded Value:				55					

Wind speed (knots), Cold Bay Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	5952	100%	14	52	13	0	28	33	8
February	5399	100%	15	48	14	0	30	35	9
March	5947	100%	14	46	14	0	27	31	8
April	5756	100%	14	50	14	0	28	32	8
May	5951	100%	12	48	12	0	25	30	7
June	5758	100%	13	45	12	0	25	28	7
July	5947	100%	12	40	11	0	25	29	7
August	5952	100%	12	37	12	0	24	27	7
September	5271	92%	14	41	13	0	26	29	7
October	5202	100%	13	47	12	0	27	30	8
November	5034	100%	15	45	14	0	30	33	8
December	5205	100%	14	47	14	0	30	34	9
Total Completeness:		99%							
Mean of Averages:			13						
Maximum Recorded Value:				52					

Wind speed (knots), Dutch Harbor Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	5035	97%	11	45	10	0	24	29	7
February	4504	83%	11	43	10	0	25	29	8
March	5179	87%	11	50	10	0	23	27	7
April	5518	96%	11	37	11	0	23	26	7
May	5418	91%	9	39	8	0	19	23	6
June	5587	97%	8	35	7	0	17	20	5
July	5816	98%	7	32	6	0	16	19	5
August	5378	90%	7	30	7	0	17	20	5
September	4892	97%	11	39	10	0	23	26	7
October	5006	96%	11	39	10	0	23	28	7
November	4863	96%	11	42	10	0	25	29	7
December	5023	96%	11	45	10	0	25	30	8
Total Completeness:		94%							
Mean of Averages:			10						
Maximum Recorded Value:				50					

Wind speed (knots), Southwest Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	2773	62%	18	54	18	0	32	36	8
February	2340	57%	18	42	18	0	33	37	8
March	1945	44%	18	41	18	0	31	34	8
April	1884	44%	15	35	15	0	27	30	7
May	1944	44%	13	30	13	0	22	25	5
June	1982	46%	11	26	11	0	20	22	5
July	1987	45%	10	32	10	0	18	23	5
August	2559	57%	12	30	11	0	21	24	5
September	2908	67%	15	38	15	0	26	28	6
October	2660	60%	17	38	17	0	28	31	7
November	2508	58%	17	47	16	0	31	35	8
December	2618	59%	18	41	17	0	31	34	8
Total Completeness:		53%							
Mean of Averages:			15						
Maximum Recorded Value:				54					

Wind speed (knots), Southeast Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	4067	91%	22	51	21	0	38	40	9
February	4021	99%	21	56	21	0	36	39	9
March	3907	88%	19	45	19	0	33	36	8
April	3682	85%	19	50	19	0	34	38	8
May	4038	90%	14	37	14	0	24	27	6
June	3576	83%	13	33	13	0	24	26	6
July	3694	83%	12	32	12	0	22	24	6
August	4084	91%	13	42	13	0	24	27	6
September	4288	99%	18	41	17	0	31	34	8
October	3739	84%	19	45	19	0	33	37	8
November	3516	81%	20	52	20	0	35	38	8
December	3680	82%	20	49	19	0	34	38	9
Total Completeness:		88%							
Mean of Averages:			17						
Maximum Recorded Value:				56					

Wind speed (knots), Northeast Pacific / Shumagin Islands									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	3691	62%	19	50	19	0	32	35	8
February	3388	62%	18	40	18	0	31	34	8
March	4048	68%	17	46	16	0	30	33	8
April	3806	66%	18	44	18	0	30	32	8
May	4956	74%	13	37	13	0	25	30	7
June	5032	78%	13	34	12	0	23	26	6
July	5822	87%	12	38	12	0	21	25	6
August	5834	87%	13	37	13	0	23	25	6
September	4244	74%	16	38	16	0	28	30	8
October	5067	85%	17	39	18	0	29	31	7
November	4977	86%	20	42	20	0	32	35	8
December	4416	74%	20	45	19	0	34	38	9
Total Completeness:		75%							
Mean of Averages:			16						
Maximum Recorded Value:				50					

Wind speed (knots), North Pacific / Central Aleutians									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	3824	51%	19	45	18	0	32	35	8
February	3419	50%	18	46	17	0	31	35	8
March	3657	49%	17	36	17	0	28	31	7
April	3574	50%	17	43	17	0	29	32	7
May	3697	50%	14	39	14	0	24	26	6
June	3071	43%	10	30	10	0	22	25	6
July	3466	42%	11	30	11	0	20	22	5
August	3691	45%	12	34	11	0	20	22	5
September	3159	44%	15	38	14	0	27	30	7
October	3150	42%	17	42	17	0	29	32	7
November	3579	50%	18	43	18	0	31	33	7
December	3717	50%	19	44	19	0	33	37	8
Total Completeness:		47%							
Mean of Averages:			16						
Maximum Recorded Value:				46					

Gusts

Gusts (knots), Southwest Bering Sea							
	Readings	Average	Maximum	Median	95 th Percentile	98 th Percentile	Standard Deviation
January	2651	23	73	22	40	46	10
February	2228	23	54	23	43	47	10
March	1820	23	52	22	39	43	10
April	1773	19	44	18	34	37	8
May	1843	16	38	16	27	31	6
June	1879	14	33	13	24	26	6
July	1871	13	40	12	22	27	6
August	2460	14	38	14	25	30	6
September	2821	18	48	18	32	35	8
October	2610	21	48	21	35	39	9
November	2428	21	60	20	39	45	10
December	2508	22	52	22	39	43	9
Maximum Recorded Value:			73				

Gusts (knots), Southeast Bering Sea							
	Readings	Average	Maximum	Median	95 th Percentile	98 th Percentile	Standard Deviation
January	4017	27	63	25	46	49	11
February	4001	25	67	25	44	49	11
March	3864	24	56	23	40	44	10
April	3636	23	65	23	41	46	10
May	3995	17	47	17	29	31	7
June	3569	15	42	15	28	31	7
July	3679	14	39	14	26	29	7
August	4061	16	51	15	29	32	7
September	4254	21	51	21	37	42	9
October	3683	23	59	23	41	46	10
November	3471	25	66	24	43	47	10
December	3653	24	62	24	42	46	11
Maximum Recorded Value:			67				

Gusts (knots), Northeast Pacific / Shumagin Islands							
	Readings	Average	Maximum	Median	95 th Percentile	98 th Percentile	Standard Deviation
January	3661	24	63	24	40	44	10
February	3372	23	49	23	39	43	10
March	4029	21	57	20	38	42	10
April	3787	23	59	23	37	40	9
May	4960	17	48	16	31	36	8
June	4987	16	44	15	28	32	7
July	5772	15	52	15	26	31	7
August	5797	16	47	16	28	31	7
September	4187	19	48	19	35	38	9
October	4993	22	51	22	37	40	9
November	4934	25	57	25	41	45	10
December	4375	25	57	25	43	48	10
Maximum Recorded Value:			63				

Gusts (knots), North Pacific / Central Aleutians							
	Readings	Average	Maximum	Median	95 th Percentile	98 th Percentile	Standard Deviation
January	3818	24	59	23	41	44	9
February	3412	23	56	22	39	44	9
March	3645	22	47	22	36	38	8
April	3554	22	57	21	37	41	9
May	3677	17	51	17	29	32	7
June	3057	13	38	12	26	30	7
July	3459	14	36	13	25	27	6
August	3667	14	42	14	25	27	6
September	3119	18	50	18	34	38	9
October	3141	21	53	21	37	41	9
November	3548	23	63	23	39	42	9
December	3711	24	59	24	42	48	10
Maximum Recorded Value:			63				

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Appendix B: Summary Data Tables for Wave Height, Period, and Steepness

The tables below show wave height (feet), dominant wave period (seconds), and steepness for each of the four buoy stations.

Wave Height

Wave Height (feet), Southwest Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	2397	54%	12	48	11	4	24	29	6
February	2118	52%	12	39	11	0	24	29	6
March	2297	51%	10	30	10	3	21	23	5
April	2324	54%	9	24	8	0	15	18	4
May	2439	55%	6	17	5	0	11	13	3
June	2415	56%	5	13	4	2	8	9	2
July	2408	54%	4	19	3	0	7	9	2
August	2269	51%	5	17	4	0	9	11	2
September	2642	61%	8	21	7	0	15	17	4
October	2733	61%	10	27	10	3	18	21	4
November	2441	57%	11	35	10	3	21	25	5
December	2384	53%	12	31	11	0	21	23	5
Total Completeness:		55%							
Mean of Averages:			9						
Maximum Recorded Value:				48					

Wave Height (feet), Southeast Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	3546	79%	10	36	10	3	21	23	5
February	3615	89%	10	32	10	2	19	22	5
March	3365	75%	9	27	8	2	17	19	4
April	3165	73%	9	41	8	0	18	22	5
May	3591	80%	5	19	5	1	10	12	3
June	3334	77%	4	15	4	1	9	11	2
July	3292	74%	4	14	3	1	8	9	2
August	3661	82%	5	18	4	0	9	11	2
September	3864	89%	8	26	7	1	16	19	4
October	3837	86%	10	28	9	2	19	21	4
November	3702	86%	10	31	9	0	19	22	4
December	3951	89%	10	34	10	3	20	23	5
Total Completeness:		82%							
Mean of Averages:			8						
Maximum Recorded Value:				41					

Wave Height (feet), Northeast Pacific / Shumagin Islands									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	5099	86%	11	40	11	3	21	24	5
February	4676	86%	12	36	11	3	22	25	5
March	5393	91%	10	34	9	0	17	20	4
April	5592	97%	10	37	9	2	17	20	4
May	6323	94%	7	22	6	1	13	15	3
June	6445	99%	6	24	5	2	11	14	3
July	6646	99%	5	24	5	2	10	12	2
August	6637	99%	6	16	5	2	10	12	2
September	4848	84%	8	26	8	2	15	17	4
October	5852	98%	10	33	9	3	18	21	4
November	5328	93%	11	37	11	2	22	25	5
December	4988	84%	12	44	11	0	22	29	6
Total Completeness:		93%							
Mean of Averages:			9						
Maximum Recorded Value:				44					

Wave Height (feet), North Pacific / Central Aleutians									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	4718	63%	13	38	12	0	23	25	5
February	4491	66%	13	40	12	3	23	27	5
March	5027	68%	11	37	10	0	19	22	4
April	5185	72%	11	36	10	2	19	23	5
May	5109	69%	7	24	7	2	13	15	3
June	4430	62%	6	18	5	2	11	13	2
July	4920	60%	6	19	6	2	10	12	2
August	4630	57%	6	16	5	2	10	12	2
September	4057	56%	9	34	8	2	16	20	4
October	4451	60%	10	33	10	0	19	22	4
November	4863	68%	12	39	11	0	23	27	5
December	5054	68%	13	44	12	4	24	28	6
Total Completeness:		64%							
Mean of Averages:			10						
Maximum Recorded Value:				44					

Wave Period

Dominant Wave Period (seconds), Southwest Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	2397	54%	10.1	19.1	10.0	4.6	6.7	6.2	2.30
February	2116	52%	10.0	16.0	10.0	3.9	6.7	5.9	1.98
March	2297	51%	9.2	19.1	9.1	3.9	5.9	5.3	2.19
April	2322	54%	8.7	17.4	8.3	2.9	5.3	5.0	2.22
May	2438	55%	7.8	19.1	7.7	3.5	5.0	4.6	2.11
June	2415	56%	7.3	19.1	7.1	3.1	4.6	4.2	1.69
July	2406	54%	7.4	17.4	7.1	3.0	4.6	4.0	2.38
August	2268	51%	7.1	14.8	7.1	2.9	4.6	4.0	1.83
September	2639	61%	8.5	19.1	8.3	2.9	5.3	4.8	2.03
October	2733	61%	9.5	19.1	9.1	3.6	6.3	5.6	2.03
November	2441	57%	9.9	16.0	10.0	4.2	6.7	5.9	1.93
December	2383	53%	10.1	16.0	10.0	4.8	7.1	6.7	1.94
Total Completeness:		55%							
Mean of Averages:			8.8						

Dominant Wave Period (seconds), Southeast Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	3547	79%	9.7	19.1	9.1	4.2	6.3	5.6	2.41
February	3620	89%	9.7	21.1	9.1	3.6	6.3	5.6	2.55
March	3385	76%	9.2	17.4	9.1	2.9	5.6	5.0	2.53
April	3170	73%	8.7	19.1	8.3	0.0	5.6	5.0	2.21
May	3591	80%	7.5	17.4	7.1	3.3	4.8	4.4	2.27
June	3336	77%	7.7	21.1	7.1	3.0	4.8	4.2	2.62
July	3292	74%	7.5	17.4	7.1	2.9	4.6	4.4	2.56
August	3662	82%	7.4	17.4	7.1	3.2	4.6	4.2	2.15
September	3864	89%	8.6	23.5	8.3	3.2	5.6	5.0	2.14
October	3839	86%	9.5	21.1	9.1	4.0	6.3	5.6	2.20
November	3706	86%	9.6	19.1	9.1	0.0	6.3	5.9	2.13
December	3952	89%	9.7	19.1	10.0	4.0	6.7	5.9	2.01
Total Completeness:		82%							
Mean of Averages:			8.7						

Dominant Wave Period (seconds), Northeast Pacific / Shumagin Islands									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5099	86%	11.0	20.0	11.1	3.7	6.7	5.9	2.72
February	4676	86%	10.9	25.0	11.1	4.0	6.7	5.9	2.80
March	5372	90%	10.2	21.1	10.0	3.5	6.3	5.6	2.58
April	5592	97%	9.8	20.0	10.0	3.2	5.9	5.0	2.50
May	6323	94%	8.9	17.4	9.1	3.3	5.3	5.0	2.27
June	6445	99%	9.0	20.0	8.3	2.7	5.3	4.6	3.05
July	6646	99%	8.6	20.0	8.3	3.2	5.0	4.6	2.78
August	6637	99%	8.3	19.1	7.7	3.1	5.0	4.6	2.58
September	4848	84%	9.3	21.1	9.1	3.5	5.9	5.3	2.35
October	5852	98%	9.5	20.0	9.1	3.2	5.9	5.3	2.24
November	5327	92%	10.0	20.0	10.0	3.7	6.3	5.6	2.40
December	4986	84%	10.7	25.0	11.1	0.0	6.7	5.8	2.59
Total Completeness:		93%							
Mean of Averages:			9.7						

Dominant Wave Period (seconds), North Pacific / Central Aleutians									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	4717	63%	11.3	25.0	11.1	4.8	7.7	6.7	2.25
February	4491	66%	11.3	25.0	11.1	3.9	7.1	6.3	2.49
March	5026	68%	10.6	20.0	10.8	4.0	6.7	6.1	2.35
April	5185	72%	10.0	20.0	10.0	3.3	6.3	5.6	2.19
May	5109	69%	9.0	17.4	9.1	3.3	5.9	5.0	2.18
June	4430	62%	8.8	20.0	8.3	3.0	5.6	5.0	2.70
July	4920	60%	8.6	20.0	8.3	3.3	5.6	4.8	2.52
August	4630	57%	8.4	17.4	8.3	3.1	5.0	4.4	2.52
September	4057	56%	9.5	16.7	9.1	3.7	5.9	5.3	2.39
October	4451	60%	10.1	21.1	10.0	0.0	6.7	5.9	2.21
November	4862	68%	10.6	20.0	10.8	3.6	7.1	6.3	2.12
December	5054	68%	11.2	25.0	11.1	4.6	7.7	6.7	2.25
Total Completeness:		64%							
Mean of Averages:			10.0						

Wave Steepness

Wave Steepness, Southwest Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	2397	54%	0.0038	0.0107	0.0035	0.0006	0.0065	0.0073	0.0014
February	2116	52%	0.0039	0.0101	0.0036	0.0012	0.0066	0.0073	0.0014
March	2297	51%	0.0040	0.0094	0.0039	0.0006	0.0067	0.0075	0.0015
April	2322	54%	0.0036	0.0100	0.0034	0.0006	0.0066	0.0073	0.0015
May	2438	55%	0.0032	0.0095	0.0030	0.0002	0.0060	0.0070	0.0016
June	2415	56%	0.0030	0.0083	0.0027	0.0002	0.0059	0.0065	0.0015
July	2406	54%	0.0027	0.0081	0.0025	0.0002	0.0056	0.0065	0.0016
August	2268	51%	0.0032	0.0097	0.0029	0.0004	0.0062	0.0068	0.0016
September	2639	61%	0.0036	0.0096	0.0034	0.0006	0.0064	0.0072	0.0015
October	2733	61%	0.0037	0.0108	0.0033	0.0007	0.0067	0.0076	0.0015
November	2441	57%	0.0036	0.0095	0.0034	0.0004	0.0066	0.0074	0.0015
December	2383	53%	0.0037	0.0110	0.0035	0.0008	0.0064	0.0073	0.0014
Total Completeness:		55%							
Maximum Recorded Value:				.0110					

Wave Steepness, Southeast Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	3546	79%	0.0038	0.0101	0.0038	0.0004	0.0062	0.0068	0.0016
February	3615	89%	0.0037	0.0096	0.0036	0.0003	0.0061	0.0068	0.0015
March	3364	75%	0.0034	0.0089	0.0035	0.0002	0.0060	0.0066	0.0016
April	3164	73%	0.0036	0.0091	0.0037	0.0003	0.0060	0.0066	0.0014
May	3591	80%	0.0031	0.0086	0.0031	0.0002	0.0052	0.0058	0.0013
June	3334	77%	0.0027	0.0084	0.0028	0.0001	0.0051	0.0056	0.0015
July	3292	74%	0.0027	0.0080	0.0026	0.0002	0.0052	0.0059	0.0015
August	3660	82%	0.0029	0.0085	0.0028	0.0002	0.0053	0.0058	0.0014
September	3863	89%	0.0035	0.0093	0.0034	0.0001	0.0061	0.0067	0.0014
October	3837	86%	0.0034	0.0082	0.0033	0.0004	0.0059	0.0065	0.0014
November	3700	86%	0.0035	0.0094	0.0033	0.0007	0.0060	0.0067	0.0013
December	3951	89%	0.0036	0.0096	0.0034	0.0003	0.0061	0.0067	0.0014
Total Completeness:		82%							
Maximum Recorded Value:				0.0101					

Wave Steepness, Northeast Pacific / Shumagin Islands									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	5099	86%	0.0033	0.0106	0.0028	0.0004	0.0066	0.0074	0.0018
February	4676	86%	0.0035	0.0108	0.0031	0.0003	0.0067	0.0074	0.0017
March	5372	90%	0.0034	0.0115	0.0030	0.0002	0.0065	0.0073	0.0018
April	5592	97%	0.0034	0.0103	0.0031	0.0003	0.0065	0.0075	0.0017
May	6323	94%	0.0030	0.0106	0.0028	0.0002	0.0059	0.0069	0.0016
June	6445	99%	0.0029	0.0097	0.0028	0.0002	0.0058	0.0068	0.0016
July	6646	99%	0.0028	0.0098	0.0027	0.0002	0.0057	0.0065	0.0016
August	6637	99%	0.0031	0.0089	0.0031	0.0002	0.0059	0.0066	0.0016
September	4848	84%	0.0033	0.0111	0.0032	0.0002	0.0062	0.0070	0.0017
October	5852	98%	0.0037	0.0111	0.0035	0.0003	0.0065	0.0074	0.0016
November	5327	92%	0.0039	0.0115	0.0038	0.0004	0.0067	0.0074	0.0017
December	4985	84%	0.0036	0.0114	0.0033	0.0004	0.0066	0.0074	0.0017
Total Completeness:		93%							
Maximum Recorded Value:				0.0115					

Wave Steepness, North Pacific / Central Aleutians									
	Readings	Completeness	Average	Maximum	Median	Minimum	95 th Percentile	98 th Percentile	Standard Deviation
January	4717	63%	0.0033	0.0107	0.0030	0.0003	0.0064	0.0073	0.0015
February	4491	66%	0.0034	0.0119	0.0030	0.0006	0.0066	0.0076	0.0016
March	5026	68%	0.0033	0.0116	0.0030	0.0004	0.0063	0.0072	0.0015
April	5185	72%	0.0036	0.0112	0.0032	0.0005	0.0065	0.0074	0.0015
May	5109	69%	0.0031	0.0102	0.0028	0.0003	0.0061	0.0071	0.0015
June	4430	62%	0.0028	0.0094	0.0025	0.0002	0.0059	0.0068	0.0016
July	4920	60%	0.0030	0.0094	0.0028	0.0002	0.0059	0.0067	0.0016
August	4630	57%	0.0030	0.0115	0.0028	0.0003	0.0064	0.0073	0.0018
September	4057	56%	0.0033	0.0113	0.0031	0.0003	0.0062	0.0069	0.0016
October	4450	60%	0.0034	0.0125	0.0031	0.0006	0.0062	0.0073	0.0015
November	4862	68%	0.0035	0.0117	0.0032	0.0006	0.0066	0.0075	0.0016
December	5054	68%	0.0034	0.0109	0.0031	0.0003	0.0066	0.0078	0.0015
Total Completeness:		64%							
Maximum Recorded Value:				0.0125					

Appendix C: Summary Data Tables for Air Temperature

The tables below show air temperature (Fahrenheit) for each of the seven stations.

Air Temperature (Fahrenheit), Southwest Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	2750	62%	31	40	31	21	24	23	36
February	2337	57%	32	38	33	19	24	23	36
March	2620	59%	31	39	31	22	26	24	36
April	2596	60%	34	39	34	27	30	29	34
May	2682	60%	37	41	37	30	34	33	34
June	2691	62%	42	47	42	34	38	37	34
July	2715	61%	47	52	47	41	44	43	34
August	2597	58%	50	55	50	43	46	46	34
September	2950	68%	50	55	50	43	46	46	34
October	3106	70%	44	51	44	32	38	36	35
November	2910	67%	37	47	38	26	30	29	36
December	2728	61%	32	40	33	22	25	24	36
Total Completeness:		62%							
Mean of Averages:			39						
Minimum Recorded Value:				21					

Air Temperature (Fahrenheit), Southeast Bering Sea									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	4059	91%	31	42	32	17	22	21	37
February	4020	99%	33	41	35	15	24	21	37
March	3904	87%	31	41	32	11	20	17	38
April	3673	85%	34	42	34	24	28	27	35
May	4034	90%	37	44	37	27	32	31	35
June	3574	83%	42	49	43	35	38	37	34
July	3691	83%	46	52	46	40	43	42	34
August	4080	91%	49	55	49	45	47	46	33
September	4280	99%	48	54	48	36	44	43	34
October	4351	97%	42	49	42	33	37	36	35
November	4233	98%	37	44	37	26	31	30	36
December	4410	99%	35	43	36	21	26	25	36
Total Completeness:		92%							
Mean of Averages:			39						
Minimum Recorded Value:				11					

Air Temperature (Fahrenheit), Northeast Pacific / Shumagin Islands									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	2973	50%	35	43	37	14	22	19	38
February	2706	50%	36	42	37	18	26	24	36
March	3321	56%	34	41	35	15	21	19	38
April	3340	58%	36	45	37	24	29	27	35
May	3641	54%	41	51	41	29	35	34	35
June	3596	55%	45	54	45	39	42	41	34
July	3753	56%	50	55	49	43	46	46	34
August	4440	66%	52	60	51	47	49	48	34
September	2884	50%	50	56	50	42	46	45	34
October	3716	62%	45	53	45	34	40	39	35
November	3583	62%	39	49	40	28	31	30	36
December	2971	50%	37	45	38	21	26	24	37
Total Completeness:		56%							
Mean of Averages:			42						
Minimum Recorded Value:				14					

Air Temperature (Fahrenheit), North Pacific / Central Aleutians									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	4972	67%	36	42	37	23	29	27	36
February	4546	67%	36	43	37	24	30	29	35
March	5083	68%	35	43	36	13	29	28	35
April	4300	60%	37	43	38	29	32	31	35
May	4442	60%	40	45	40	27	36	34	34
June	3801	53%	44	49	44	37	41	40	34
July	4206	51%	47	54	47	38	43	42	34
August	3979	49%	50	57	50	41	45	44	35
September	3455	48%	49	56	49	42	45	44	34
October	3688	50%	44	51	45	35	40	38	35
November	4291	60%	40	49	40	27	35	33	35
December	4450	60%	37	45	38	26	31	29	35
Total Completeness:		58%							
Mean of Averages:			41						
Minimum Recorded Value:				13					

Air Temperature (Fahrenheit), Adak Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5407	91%	33	52	34	9	21	16	38
February	4984	92%	34	48	35	12	26	23	37
March	5818	98%	34	52	34	14	26	24	37
April	5723	99%	37	48	37	21	30	29	36
May	5800	97%	40	55	39	25	35	34	35
June	5446	95%	45	64	45	28	40	39	35
July	5866	99%	49	66	48	39	44	43	36
August	5644	95%	51	69	51	33	46	43	36
September	5013	87%	48	63	48	31	43	40	36
October	5117	98%	42	61	43	28	36	34	36
November	4943	98%	37	52	37	16	30	28	36
December	4770	92%	34	49	35	9	24	19	38
Total Completeness:		95%							
Mean of Averages:			40						
Minimum Recorded Value:				9					

Air Temperature (Fahrenheit), Cold Bay Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5952	100%	27	47	29	0	11	9	41
February	5424	100%	29	48	32	-2	14	10	39
March	5947	100%	26	45	27	-3	9	7	41
April	5756	100%	33	51	33	9	21	19	38
May	5948	100%	39	66	39	20	30	28	38
June	5758	100%	45	62	45	27	38	36	36
July	5949	100%	49	66	49	39	44	43	36
August	5952	100%	51	69	50	35	46	45	35
September	5272	92%	48	64	48	30	41	39	36
October	5202	100%	40	55	41	21	33	31	37
November	5035	100%	33	53	33	11	23	21	38
December	5205	100%	31	46	33	3	18	15	39
Total Completeness:		99%							
Mean of Averages:			38						
Minimum Recorded Value:				-3					

Air Temperature (Fahrenheit), Dutch Harbor Airport									
	Readings	Completeness	Average	Maximum	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5064	97%	32	47	33	16	21	19	38
February	4503	83%	34	54	35	12	24	21	37
March	4738	80%	32	54	32	15	21	19	38
April	4973	86%	36	55	36	22	28	27	36
May	5140	86%	40	57	41	27	34	31	36
June	5585	97%	46	64	46	36	41	39	35
July	5804	98%	50	69	50	39	45	43	36
August	5339	90%	52	79	52	39	46	46	36
September	4894	97%	49	64	48	37	44	43	36
October	5001	96%	43	58	43	30	37	36	36
November	4862	96%	37	56	37	22	30	28	37
December	5010	96%	35	51	36	19	25	24	37
Total Completeness:		92%							
Mean of Averages:			40						
Minimum Recorded Value:				12					

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Appendix D: Summary Data Tables for Visibility

The tables below show visibility (statute miles) for each of the three airport stations.

Visibility (statute miles), Adak Airport							
	Readings	Completeness	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5350	90%	7.0	0.0	1.0	0.5	3.5
February	5029	93%	9.0	0.0	1.2	0.7	3.3
March	5818	98%	10.0	0.0	1.0	0.7	3.3
April	5733	100%	10.0	0.0	1.7	1.0	3.0
May	5930	100%	10.0	0.0	2.5	1.5	2.7
June	5702	99%	10.0	0.0	2.5	1.2	2.7
July	5891	99%	10.0	0.0	1.2	0.5	3.3
August	5805	98%	10.0	0.0	1.2	0.5	3.3
September	5080	88%	9.0	0.0	2.0	1.2	3.0
October	5143	99%	10.0	0.5	3.0	2.0	2.6
November	4949	98%	10.0	0.3	2.0	1.2	2.8
December	4722	91%	9.0	0.0			3.3
<i>10 miles is recorded for 10 miles or more of visibility. As a result, average and maximum visibilities are not meaningful. 10-mile median visibility indicates prevailing clear conditions.</i>							
Total Completeness:		96%					
Visibility less than or equal to 1 km (0.6 miles):					2% of records		
Visibility less than or equal to 2 km (1.25 miles):					6% of records		
Visibility less than or equal to 5 km (3.1 miles):					20% of records		

Visibility (statute miles), Cold Bay Airport							
	Readings	Completeness	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5951	100%	10.0	0.0	0.5	0.2	3.6
February	5424	100%	10.0	0.0	0.7	0.2	3.6
March	5947	100%	10.0	0.0	0.2	0.2	3.9
April	5756	100%	10.0	0.0	0.7	0.5	3.4
May	5951	100%	10.0	0.0	2.0	0.7	2.6
June	5758	100%	10.0	0.0	1.7	0.7	2.7
July	5950	100%	10.0	0.0	1.5	0.5	3.0
August	5952	100%	10.0	0.0	1.5	0.5	3.0
September	5271	92%	10.0	0.0	2.5	1.0	2.4
October	5201	100%	10.0	0.3	4.0	2.0	2.0
November	5034	100%	10.0	0.0	0.7	0.5	3.4
December	5205	100%	10.0	0.0	0.7	0.5	3.4
<i>10 miles is recorded for 10 miles or more of visibility. As a result, average and maximum visibilities are not meaningful. 10-mile median visibility indicates prevailing clear conditions.</i>							
Total Completeness:		99%					
Visibility less than or equal to 1 km (0.6 miles):					8% of records		
Visibility less than or equal to 2 km (1.25 miles):					16% of records		
Visibility less than or equal to 5 km (3.1 miles):					31% of records		

Visibility (statute miles), Dutch Harbor Airport							
	Readings	Completeness	Median	Minimum	5 th Percentile	2 nd Percentile	Standard Deviation
January	5060	97%	10.0	0.0	1.0	0.7	3.3
February	4502	83%	10.0	0.0	1.2	0.7	3.1
March	5182	87%	10.0	0.0	1.2	0.7	3.2
April	5517	96%	10.0	0.0	2.0	1.2	2.9
May	5420	91%	10.0	0.0	3.0	2.0	2.2
June	5601	97%	10.0	0.0	4.0	2.5	2.1
July	5814	98%	10.0	0.0	3.0	1.5	2.3
August	5371	90%	10.0	0.0	2.5	1.5	2.4
September	4892	97%	10.0	0.0	4.0	2.5	2.1
October	5005	96%	10.0	1.3	5.0	3.0	1.7
November	4861	96%	10.0	0.0	2.5	1.5	2.5
December	5022	96%	10.0	0.0	1.7	1.0	3.0
<i>10 miles is recorded for 10 miles or more of visibility. As a result, average and maximum visibilities are not meaningful. 10-mile median visibility indicates prevailing clear conditions.</i>							
Total Completeness:		94%					
Visibility less than or equal to 1 km (0.6 miles):					2% of records		
Visibility less than or equal to 2 km (1.25 miles):					7% of records		
Visibility less than or equal to 5 km (3.1 miles):					19% of records		