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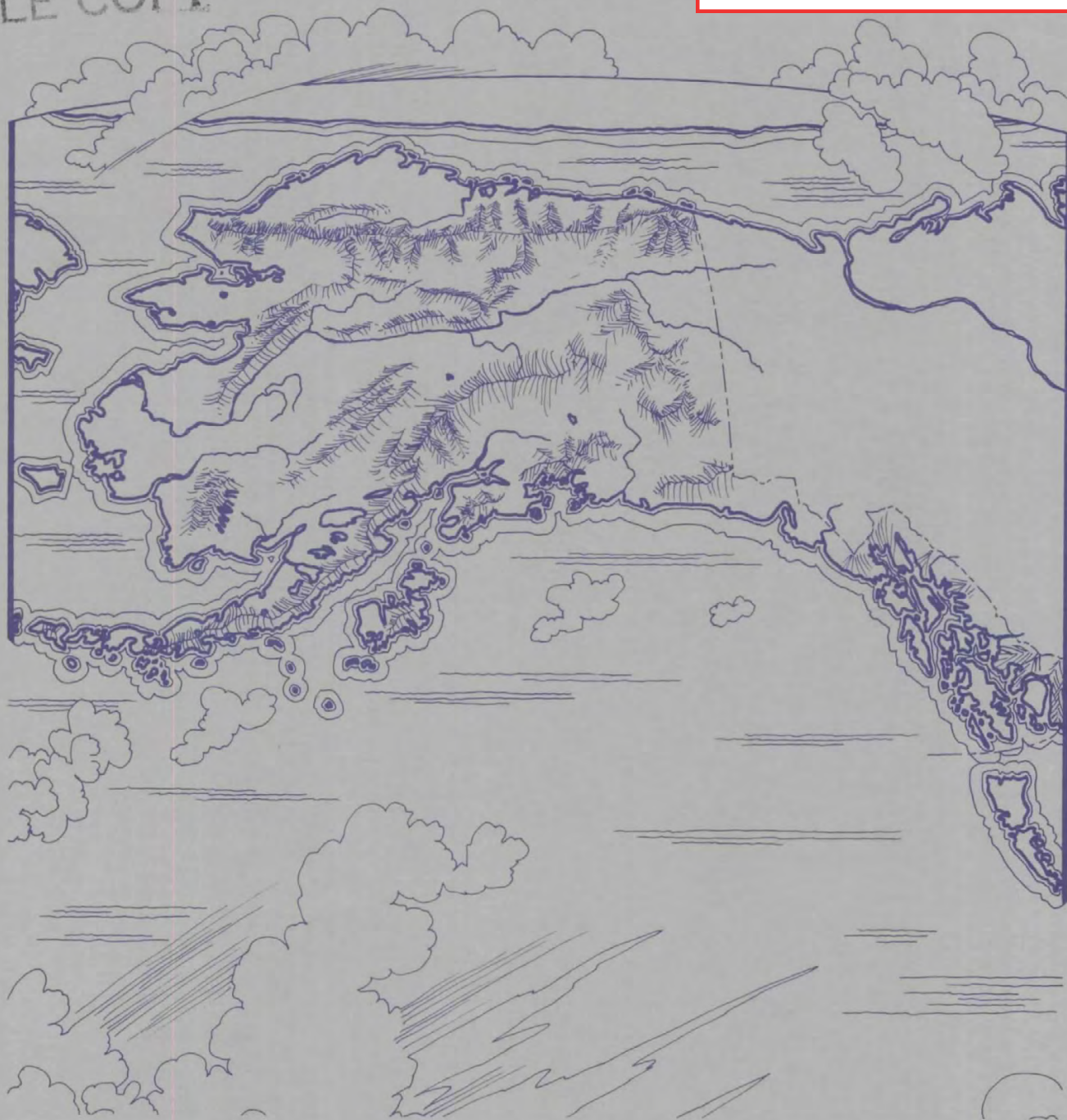


Multivariate Analysis of Climate Along the Southern Coast of Alaska — Some Forestry Implications

Wilbur A. Farr and John S. Hard

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Abstract

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A multivariate analysis of climate was used to delineate 10 significantly different groups of climatic stations along the southern coast of Alaska based on latitude, longitude, seasonal temperatures and precipitation, frost-free periods, and total number of growing degree days. The climatic stations were too few to delineate this rugged, mountainous region into distinct climatic zones.

Keywords: Climate, multivariate analysis, coastal Alaska, Alaska (coastal).

Summary

Ten significantly different climatic groups were delineated along the southern coast of Alaska based on a multivariate analysis of 24 variables. The 60 climatic stations used in the analysis were too few, however, to delineate this long (2,500 miles), rugged coastal region into distinct climatic zones.

Climatic data for the period 1957-71 were used in the analysis because the greatest number of climatic stations had continuous records for that period. Principal component analysis was used to identify the significant factors that accounted for a large percentage of the total variance. Independent station scores were then used as input for a hierarchical grouping procedure. Multiple discriminate analysis was applied to test significance of the grouping procedures.

Differences in climate among most groups was not great. Changes were often gradual rather than abrupt. Only three groups were obviously different. They were (1) the treeless Aleutian Islands, (2) the transition zones between the coast and the interior, and (3) the very wet coastal stations.

Abrupt changes in vegetation do not generally occur along the coast except in the transition zones between the maritime coast and the continental interior, or along elevational transects. Species diversity is greatest in the transition zones. The relative geologic youth of the region contributes to a lack of species diversity.

Introduction

The southern coast of Alaska is a long, narrow strip of land that forms an arc covering a coastal distance of about 2,500 miles. Latitude ranges from 52° N. in the Aleutian Islands to 61° N. in upper Cook Inlet, and longitude from 130° W. in southeast Alaska to 172° E. at the tip of the Aleutian Islands (fig. 1). This region of Alaska lies within the maritime climatic zone, a zone influenced by the Alaska Current. The Alaska Current is part of the Kuroshio Current, which flows northward from the equator (Searby 1969).

Compared to most of the vast interior of Alaska, the southern coast is cooler in summer, warmer in winter, and has more precipitation. Surface winds are moderately strong in most areas, and storm tracks pass from west to east along the coast every month of the year. From Cook Inlet east, the region is rugged and mountainous, and the lower elevations are heavily forested with western hemlock and Sitka spruce.^{1/} Forests reach their western limit on Kodiak and Afognak Islands and on the nearby eastern side of the Alaska Peninsula. Wet tundra and gentler terrain characterize the naturally treeless outer Alaska Peninsula and Aleutian Islands.

Climate along the coast seems to be relatively uniform especially near sea level, but we do know that some areas are climatically and biologically dissimilar. Tree growth, for example, diminishes with increasing latitude (Farr and Harris 1979, 1983), and distribution of plant species and plant communities differs from area to area (Hulten 1968, Viereck and Little 1972). The southern part of southeast Alaska is the northern limit of three tree species—western redcedar, Pacific yew, and Pacific silver fir—and several other plants including salal and swordfern.

Frequency and severity of major outbreaks by defoliators, such as blackheaded budworm and hemlock sawfly, also diminish with increasing latitude and decreasing temperature during the growing season (Hard 1974, 1976), and western hemlock looper has been recorded only in the southern part of southeast Alaska (Torgersen and Baker 1967). Large bark beetle outbreaks in the coastal region occur frequently only around Cook Inlet (Curtis and Swanson 1972, Werner and others 1977).

Two previous studies of climate in relation to tree growth have included climatic data from along the southern coast of Alaska. One study describes climate in southeast Alaska (Andersen 1955); the other discusses potential evapotranspiration and climate in Alaska using Thornthwaite's classification (Patric and Black 1968).

The purpose of the study reported here was to determine if discrete climatic zones or climatic station groupings could be delineated along the coast and, if so, which combinations of variables best distinguish among the zones or groups.

^{1/}Scientific names for plants and insects are given in the appendix.

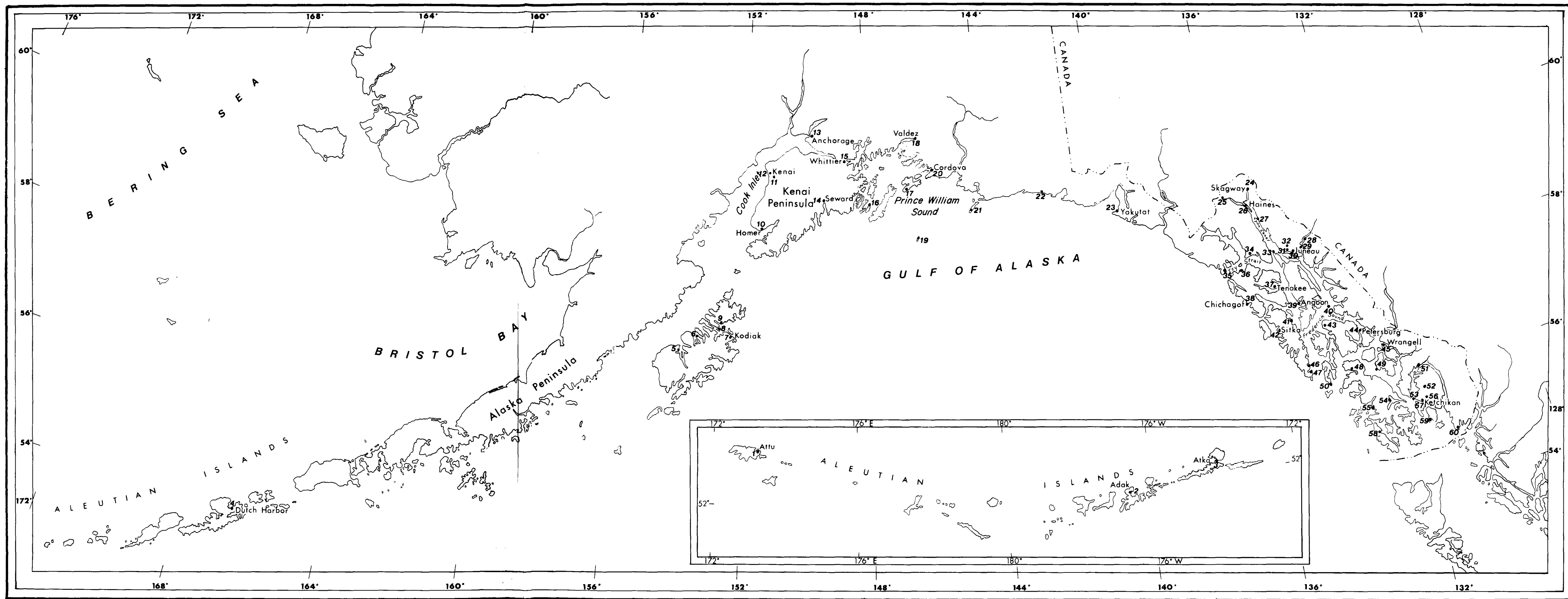


Figure 1—Locations of climatic stations along the southern coast of Alaska.

Several climatic variables and periods of record have been used to analyze climate. Commonly used variables include maximum, minimum, and mean air temperature and precipitation by month or season of the year; number and timing of frost-free periods; degree days above various threshold temperatures; and latitude, longitude, and elevation (Newnham 1968, Nicholson and Bryant 1972). Water deficiency values (Powell and MacIver 1976) and seasonal snowfall (van Groenewoud 1984) have also been used. In most studies the period of measurement has been the same for all stations and is usually 10 to 15 years in length.

Multivariate methods, including principal component analysis, factor analysis, cluster analysis, hierarchical grouping analysis, and discriminant analysis, have been used to delineate climatic zones, especially in Canada. Principal component analysis was the preferred method in some studies (Miller and Auclair 1974, Newnham 1968, Nicholson and Bryant 1972, van Groenewoud 1984, Williams and Masterton 1983) and factor analysis was used in others (MacIver and others 1972; Powell and MacIver 1976, 1977). Principal component analysis and factor analysis have much in common, but there are some important differences (Isebrands and Crow 1975, King 1969). Recently, some form of cluster analysis has been used in addition to principal component or factor analysis to statistically group climatically similar stations (van Groenewoud 1984; Powell and MacIver 1976, 1977).

This study should lead to a better general understanding of climate along the southern coast of Alaska and of climate's potential influence on biological phenomena, and will provide background for more specific studies.

Methods

Climatic data were summarized for 60 coastal stations along the southern coast of Alaska, generally for the 15-year period 1957-71 (table 1, also see appendix for individual station summaries). Some stations had shorter periods of record that occurred 40 to 50 years ago. The years between 1957 and 1971 were chosen because the greatest number of stations had continuous records for that period. Records for several of the lighthouse stations were discontinued by the mid-1970's. Only 19 of the 60 stations had continuous or nearly continuous records for the most recent 30-year reporting period, 1951-80.

Twenty-four variables were used in the analysis (table 2). Temperature, precipitation, and frost data were obtained from monthly weather summaries (U.S. Weather Bureau 1912-1980). Average seasonal temperatures and total seasonal precipitation were calculated by seasons: winter—December, January, February; spring—March, April, May; summer—June, July, August; and fall—September, October, and November. The total number of annual degree days above 41 °F. was calculated from monthly temperatures, then was adjusted upward for those days that were missed at the beginning and end of the growing season because only average monthly temperatures were used.^{2/} Elevational differences could not be evaluated because all but six coastal stations are below 100 feet in elevation (table 1).

^{2/} For 14 representative stations, a regression relationship was developed between degree days based on daily temperatures (Y) and degree days based on monthly temperatures (X). The equation was:

$$Y = 103.40 + 1.063X; r^2 = 0.992 \text{ and } Se = 42.5.$$

Table 1—Climatic stations along the southern coast of Alaska that were used in the analysis

Number	Name	Period of record	Latitude N.	Longitude W.	Elevation
					<u>Feet</u>
1	Attu	1961-71	52°50'	1/ 173°11'	70
2	Adak	1957-71	51°53'	176°39'	15
3	Atka	1936-49	52°13'	174°12'	36
4	Dutch Harbor	1930-34	53°55'	166°30'	47
5	Larsen Bay	1957-65	57°32'	154°00'	15
6	Uganik Bay	1952-64	57°43'	153°19'	50
7	Kodiak NAS	1957-71	57°45'	152°31'	21
8	Whale Island	1924-38	57°58'	152°46'	8
9	Kitoi Bay	1957-71	58°11'	152°21'	15
10	Homer WSO	1957-71	59°38'	151°30'	67
11	Soldotna 6 W	1962-71	60°28'	151°14'	85
12	Kenai FAA AP	1957-71	60°34'	151°15'	86
13	Anchorage WSO AP	1957-71	61°10'	151°01'	114
14	Seward	1957-71	60°07'	149°27'	70
15	Whittier	1957-71	60°47'	148°41'	31
16	Latouche	1940-55	60°03'	147°54'	45
17	Cape Hinchinbrook	1957-71	60°14'	146°39'	185
18	Valdez	1957-71	61°08'	146°21'	20
19	Middleton Island	1943-58	59°28'	146°19'	39
20	Cordova	1957-71	60°30'	145°30'	41
21	Cape St. Elias	1957-71	59°48'	144°36'	58
22	Yakataga FAA	1953-67	60°05'	142°30'	27
23	Yakutat WSO AP	1957-71	59°31'	139°40'	28
24	Skagway	1922-36	59°28'	135°19'	18
25	Linger Longer	1960-71	59°26'	136°17'	700
26	Haines Terminal	1957-71	59°16'	135°27'	175
27	Eldred Rock	1957-71	58°58'	135°13'	55
28	Taku Pass	1936-44	58°33'	133°40'	175
29	Annex Creek	1937-51	58°19'	134°06'	24
30	Juneau NO 2	1957-71	58°18'	134°24'	25
31	Juneau WSO AP	1957-71	58°22'	134°35'	12
32	Juneau 9 NW	1939-43			
		1966-70	58°25'	134°32'	120
33	Point Retreat	1957-71	58°25'	134°57'	20
34	Gustavus	1956-68	58°25'	135°44'	17
35	Cape Spencer	1957-71	58°12'	136°38'	81
36	Gull Cove	1941-52	58°12'	136°09'	18
37	Tenakee	1941-50	57°47'	135°15'	19
38	Radioville	1936-50	57°36'	136°09'	15
39	Angeon	1942-52	57°30'	134°35'	35
40	Five Finger Light	1957-71	57°16'	133°37'	30
41	Baranof	1943-57	57°05'	134°50'	20
42	Sitka FAA AP	1957-71	57°04'	135°21'	15
43	Kake	1920-23			
		1930-34	56°59'	133°57'	8
44	Petersburg	1957-71	56°49'	132°57'	50
45	Wrangell	1957-71	56°28'	132°23'	37
46	Little Port Walter	1957-71	56°23'	134°39'	14
47	Port Alexander	1950-61	56°15'	134°39'	18
48	Calder	1917-31	56°10'	132°27'	20
49	Lincoln Rock	1953-67	56°03'	132°46'	25
50	Cape Decision	1957-71	56°00'	134°08'	39
51	Bell Island	1934-48	55°55'	131°35'	10
52	Fortmann Hatchery	1912-26	55°36'	131°25'	132
53	Guard Island	1957-68	55°27'	131°53'	20
54	Hollis	1954-62	55°28'	132°40'	15
55	Craig	1938-52	55°29'	133°09'	13
56	Beaver Falls	1957-71	55°23'	131°28'	35
57	Ketchikan	1957-71	55°21'	131°39'	15
58	View Cove	1933-46	55°04'	133°04'	13
59	Annette Island	1957-71	55°02'	131°34'	110
60	Tree Point Light	1957-70	54°48'	130°56'	36

1/ Attu is at 173°11' E. longitude.

Table 2—Variables used in the principal component analysis

Number	Abbreviation	Name
1	LAT	Latitude
2	LONG	Longitude
3	MMATWIN	Maximum temperature (°F): <u>1/</u> Winter
4	MMATSPR	Spring
5	MMATSUM	Summer
6	MMATFALL	Fall
7	MMITWIN	Minimum temperature (°F): <u>1/</u> Winter
8	MMITSPR	Spring
9	MMITSUM	Summer
10	MMITFALL	Fall
11	MTWIN	Mean temperature (°F): <u>1/</u> Winter
12	MTSPR	Spring
13	MTSUM	Summer
14	MTFALL	Fall
15	PREWIN	Mean precipitation (inches): Winter
16	PRESPR	Spring
17	PRESUM	Summer
18	PREFALL	Fall
19	FFREPER	Mean frost-free period (days)
20	FFRFALL	Mean date first fall frost <u>2/</u>
21	LAFRSPR	Latest spring frost <u>2/</u>
22	EAFRFALL	Earliest fall frost <u>2/</u>
23	SHFRFRPE	Shortest frost-free period (days)
24	DEGREE	Degree days above 41 °F

1/ Mean daily temperature by season: winter--December, January, February; spring--March, April, May; summer--June, July, August; fall--September, October, November.

2/ Days since January 1.

Principal component analysis was used to identify the significant factors that accounted for a large percentage of the total variance. Principal component analysis produced correlation matrices and their associated eigenvalues and eigenvectors. Eigenvector coefficients multiplied by the input variables for each station were summed to derive weighted station scores for each station.

The independent station scores were used as input for a hierarchical grouping procedure (Powell and MacIver 1976, 1977; Veldman 1967) that, through stepping, groups stations by minimizing the increment of within-group station score variation. In the first step each station is placed in a separate group. The procedure then groups stations, one entry at a time, until all stations are in one group. At each step, the output lists the stations in each group and the aggregate within-group error. The relation between aggregate error and number of groups was used to look for inflection points where large increases occurred in the error between steps.

When a minimum number of groups was selected, multiple discriminate analysis was applied to test significance of the grouping procedures and to identify the major discriminating variables (Mather 1969, Powell and MacIver 1977).

Results and Discussion

Several computer runs using data from various combinations of stations produced similar results. In the final analysis all stations were used, although not all had similar periods of record. The results presented here must be considered first approximations because (1) relatively few data have been collected along the coast, (2) all stations do not have the same period of record, and (3) most data came from stations at or near sea level and immediately adjacent to salt water.

The matrix of correlation coefficients showed that many of the original 24 variables were highly correlated, which made a direct interpretation of them very difficult. The principal component analysis performed on this matrix revealed that five components (eigenvectors), each with eigenvalues greater than 1.00, accounted for 91 percent of the observed variation in climate (table 3). In descending order, the components explain 52, 18, 11, 6, and 4 percent of the observed variation among stations.

The first component is characterized by high positive coefficients for fall, winter, and spring temperatures, length of growing season, and date of first fall frost, and a high negative coefficient for latitude. The second component is characterized by high positive coefficients for mean maximum spring and summer temperatures, mean summer temperature, and total degree days, and a high negative coefficient for longitude.

The third component has high positive coefficients for precipitation during all four seasons. The fourth component is a measure of the latest spring frost, and the fifth component is a measure of the earliest fall frost.

The components were independent, and the sorting of cold-season and warm-season variables into different components demonstrated independence of conditions in the two seasons. Stations warmer in summer were not necessarily warmer in winter.

Weighted station scores, computed from the eigenvector coefficients and input variables, were plotted for the first three components (fig. 2). The distribution of stations in figure 2 shows few distinct groupings in two-dimensional space. Most stations appear grouped in one cluster. A test of possible station groupings was next performed using hierarchical grouping analysis.

Computed weighted station scores were used as input to the hierarchical grouping procedure (Powell and MacIver 1976, 1977; Veldman 1967). Raw data were also used in a separate run. Both gave similar results. The hierarchical procedure groups stations in a stepwise fashion beginning with 60 one-station groups and ending with one 60-station group. A listing of stations in each group and total within-group error are printed following each step. The increase in within-group error was then used to identify points in the process where sharp increases appeared in the within-group error.

Table 3—Climatic variables and the first 5 eigenvalues and eigenvectors from the principal component analysis ^{1/}

Variable		Component (eigenvector)				
Number	Abbreviation	1	2	3	4	5
1	LAT	<u>-0.731</u>	0.072	-0.005	0.190	-0.446
2	LONG	<u>-.128</u>	<u>-.829</u>	-.232	-.109	.212
3	MATWIN	<u>.921</u>	<u>.069</u>	.234	.038	.164
4	MATSPR	<u>.308</u>	<u>.884</u>	.123	-.077	.124
5	MATSUM	-.259	<u>.930</u>	-.008	-.109	.110
6	MATFALL	<u>.779</u>	.472	.211	-.052	.194
7	MITWIN	<u>.936</u>	-.034	.222	.202	.060
8	MITSPR	<u>.861</u>	.238	.137	.364	-.034
9	MITSUM	<u>.432</u>	.550	.070	.557	-.122
10	MITFALL	<u>.916</u>	.143	.213	.263	.030
11	MTWIN	<u>.945</u>	.001	.231	.142	.089
12	MTSPR	<u>.706</u>	.624	.146	.189	.042
13	MTSUM	-.003	<u>.948</u>	.019	.191	.027
14	MTFALL	<u>.911</u>	.278	.208	.147	.085
15	PREWIN	.289	.157	<u>.901</u>	.059	.177
16	PRESPR	.233	.064	<u>.938</u>	.079	.147
17	PRESUM	.115	.010	<u>.910</u>	.207	-.097
18	PREFALL	.242	.201	<u>.918</u>	.124	.096
19	FFREPER	<u>.705</u>	.084	<u>.146</u>	.632	.103
20	FFRFALL	<u>.756</u>	.013	.146	.524	.187
21	LAFRSPR	-.098	-.061	-.173	<u>-.748</u>	-.058
22	EAFRFALL	.294	.068	.220	.225	<u>.808</u>
23	SHFRFRPE	.459	.216	.241	.627	<u>.425</u>
24	DEGREE	.298	<u>.907</u>	.078	.212	.086
Eigenvalues		8.709	5.268	3.952	2.527	1.353
Percent variation accounted for		52.05	17.29	11.17	6.19	4.18
Cumulative percent		52.04	69.33	80.51	86.70	90.88

^{1/} Variables contributing the most variation to each principal component are underlined.

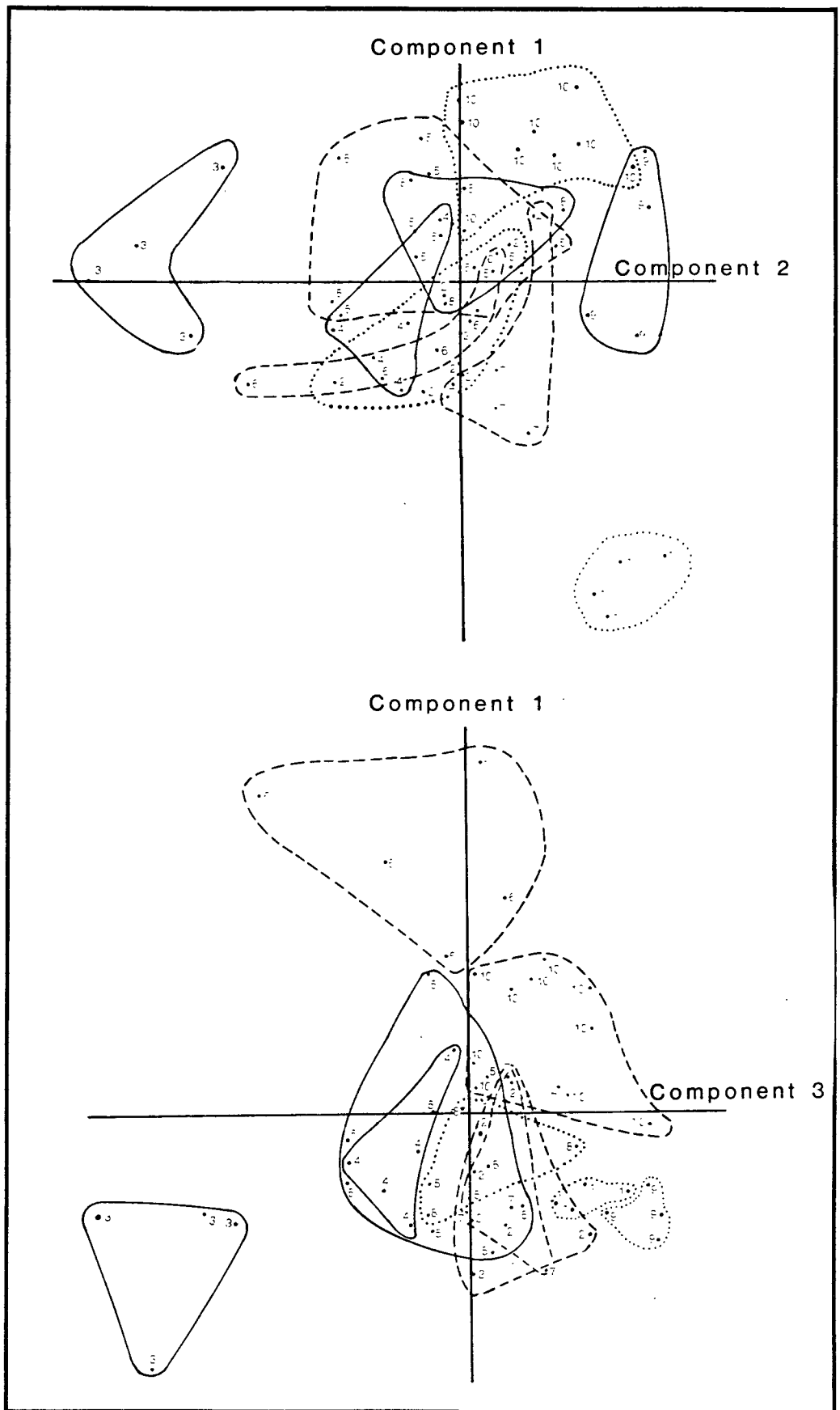


Figure 2—Weighted station scores plotted for the first three components. Groups of similar stations are indicated by group number and are encircled by lines. Stations in each group are given in table 4.

The hierarchical procedure indicated that the optimum number of groups was either 10 or 7. Ten was selected because the within-group error is more than 100 percent higher with 7 groups. The 10 groupings are delineated in figure 2 and listed in table 4.

Multiple discriminant analysis showed that the 10 groups of stations are separate and are mutually exclusive, and that individual stations were correctly placed in their respective group.

Table 4—Climatic stations along the southern coast of Alaska by climatic group

Group	Station number	Station name	Group	Station number	Station name
1	1	Attu	6	15	Whittier
	2	Adak		16	Latouche
	3	Atka		41	Baranof
	4	Dutch Harbor		46	Little Port Walter
2			7	47	Port Alexander
	5	Larsen Bay		17	Cape Hinchinbrook
	6	Uganik Bay		19	Middleton Island
	7	Kodiak NAS		21	Cape St. Elias
	8	Whale Island		35	Cape Spencer
	9	Kitoi Bay		38	Radioville
3	10	Homer WSO	8	26	Haines Terminal
	11	Soldotna 6 W		29	Annex Creek
	12	Kenai FAA AP		45	Wrangell
	13	Anchorage WSO AP	9	40	Five Finger Light
4	25	Linger Longer		49	Lincoln Rock
	20	Cordova		50	Cape Decision
	22	Yakataga FAA		53	Guard Island
	23	Yakutat WSO AP	10	44	Petersburg
	32	Juneau 9 NW		48	Calder
5	34	Gustavus		51	Bell Island
	14	Seward		52	Fortmann Hatchery
	18	Valdez		54	Hollis
	24	Skagway		55	Craig
	27	Eldred Rock		56	Beaver Falls
	28	Taku Pass		57	Ketchikan
	30	Juneau NO 2		58	View Cove
	31	Juneau WSO AP		59	Annette Island
	33	Point Retreat		60	Tree Point Light
	36	Gull Cove			
	37	Tenakee			
	39	Angoon			
	42	Sitka FAA AP			
	43	Kake			

Most groups shown in two-dimensional planes in figure 2 overlap, which suggests similarity among stations in the region. This was expected. Exceptions were group 1 (Aleutian Islands), group 3 (Cook Inlet and one station at the head of Lynn Canal in southeast Alaska), group 6 (scattered but very wet coastal stations), group 9 (four lighthouse stations in southeast Alaska), and group 10 (stations in southern-most part of southeast Alaska). Groups 1, 3, and 6 are extremes.

Stations in group 1 (1, 2, 3, and 4) are in the Aleutian Islands, an area with moderately cool temperatures in the fall, winter, and spring, and much colder summers than other coastal stations. The Aleutians are naturally treeless except where planted (Bruce and Court 1945, Lutz 1963). Faunal diversity is also limited, and the naturally occurring mammalian complex there is composed largely of rodents and marine mammals.

Three stations in group 3 (11, 12, and 13) are along Cook Inlet, and station 25 is 40 miles inland from the head of Lynn Canal. These stations are in a transition zone between the maritime climate of the coast and the dryer continental climate of the interior. They are warm in the summer and cold the rest of the year and have much less precipitation than other coastal stations. Botanical diversity is rich in these transition areas. More species of plants occur around Cook Inlet and Lynn Canal than in other geographic areas along the southern coast of Alaska. White spruce, black spruce, paper birch, aspen, and balsam poplar (typical interior species) reach the coast at Cook Inlet. Lutz spruce, a natural hybrid of white spruce and Sitka spruce, occur extensively around upper Cook Inlet and in the transition area along the Skeena River of coastal British Columbia (Daubenmire 1968). It has also been reported near the international border north of Haines (von Rudloff 1977). Paper birch, aspen, and balsam poplar also reach the coast at the head of Lynn Canal, along with interior form lodgepole pine.

Spruce beetle epidemics are chronic in stands along Cook inlet and occur regularly only in that area of the coast, but a large outbreak occurred north of Haines near the border with Canada in the 1940's, and a current outbreak is located near Gustavus in southeast Alaska. The only known spruce budworm outbreak in southern coastal Alaska occurred in Sitka spruce near Haines, Alaska, in the late 1940's and early 1950's (Downing 1975).

The stations in group 6 all have very high annual precipitation, in excess of 180 inches a year.

Station groupings (table 4) suggest that it is not practical to divide the southern coast of Alaska into distinct climatic zones because stations within the same group are sometimes located in widely separated geographic areas. The region covers a long, narrow, rugged, mountainous strip of land cut by numerous waterways that originate in much dryer areas of interior Alaska and Canada. There are relatively few climatic stations; all are located at or near sea level and have varying periods of record. Temperature and precipitation also fluctuate markedly over short distances (Andersen 1955, Farr and others 1977), and several of the stations are located on islets. Temperatures at these small islands and at other exposed lighthouse stations are greatly influenced by the surrounding water.

Although it may not be practical to delineate distinct climatic zones similar to those prepared for Provinces in Canada (Newnham 1968; Nicholson and Bryant 1972; Powell and MacIver 1976, 1977; Williams and Masterton 1983; van Groenewoud 1984), there are distinct groups of stations that can be described. Means, minimums, and maximums for variables describing these groups of stations are summarized in table 5.

Table 5—Mean, minimum, and maximum for the 24 variables used in the analysis for each of the 10 station groups

Group	Range of values	Latitude N.	Longitude W.	Mean maximum temp.				Mean minimum temp.				Mean temp.				Mean precipitation				Mean frost-free period	First fall frost	Latest spring frost	Earliest fall frost	Shortest frost-free period	Annual degree days
				Win.	Spr.	Sum.	Fall	Win.	Spr.	Sum.	Fall	Win.	Spr.	Sum.	Fall	Win.	Spr.	Sum.	Fall						
				°F 1/																					
1	Mean	52°41'	172°38'	36.6	41.2	53.2	46.8	28.9	32.6	44.2	38.2	32.7	37.0	48.7	42.4	5.8	4.5	3.3	6.3	161	292	151	259	117	1140
	Min	51°53'	166°32'	34.5	38.6	51.1	45.7	28.1	32.0	43.8	37.6	31.1	35.5	47.5	41.5	4.5	3.6	2.3	4.5	158	284	140	225	100	979
	Max	53°53'	176°11'E.	37.9	42.5	56.0	47.4	30.0	33.6	44.9	38.5	33.7	38.1	50.5	42.9	6.9	5.4	4.0	7.7	165	300	166	284	139	1351
2	Mean	58°08'	152°43'	34.2	43.5	59.7	46.7	22.8	30.0	45.6	34.2	28.5	36.7	52.7	40.5	3.9	2.9	3.0	4.8	125	270	168	253	96	1566
	Min	59°32'	151 30'	29.2	42.5	58.1	44.5	16.7	27.4	43.9	30.7	22.9	35.0	51.6	37.6	2.0	1.2	1.5	2.9	107	258	153	243	78	1397
	Max	59°38'	154°00'	36.3	45.3	63.2	48.0	26.2	32.4	47.6	36.8	30.7	37.6	54.2	41.8	5.5	4.4	4.6	6.2	154	279	178	260	119	1749
3	Mean	60°31'	147°09'	23.1	44.0	63.8	42.6	6.2	24.7	45.6	26.4	14.6	34.4	54.7	34.5	1.7	1.1	1.8	2.6	111	256	156	240	88	1782
	Min	59°26'	136°17'	22.4	42.4	60.6	41.2	.7	21.0	43.5	21.2	11.6	32.5	52.8	31.9	.9	.6	1.3	1.6	94	245	142	232	69	1540
	Max	61°10'	151°15'	24.3	47.0	67.5	43.7	10.5	27.4	49.4	30.1	17.4	36.8	56.3	37.0	3.1	1.9	2.1	4.9	135	266	161	249	115	2006
4	Mean	59°20'	139°35'	33.3	45.4	59.1	46.8	20.1	30.2	45.6	34.4	26.7	37.8	52.4	40.6	7.3	5.4	6.7	11.4	120	261	153	238	89	1583
	Min	58°24'	134°33'	32.5	43.4	56.6	46.2	16.9	28.3	43.5	32.2	24.8	36.1	51.0	39.4	4.4	2.4	4.1	7.2	110	254	116	221	64	1447
	Max	60°18'	145°30'	34.6	48.1	62.1	47.8	24.0	31.7	47.3	36.3	29.3	39.9	54.7	42.1	11.5	9.0	8.9	16.2	141	275	172	264	115	1960
5	Mean	58°32'	136°50'	32.9	46.9	62.0	47.4	23.2	33.2	47.3	36.5	28.0	40.0	54.6	42.0	5.2	3.6	3.8	8.3	153	281	149	252	119	1998
	Min	56°59'	133°41'	27.1	44.4	59.5	44.0	13.2	27.9	44.8	29.8	20.5	36.6	52.9	36.9	2.6	1.5	1.5	4.4	111	258	133	236	79	1611
	Max	61°07'	149°27'	39.3	50.1	66.4	50.5	31.1	36.4	50.5	41.4	35.2	42.2	56.6	46.0	8.9	6.0	6.4	13.9	191	304	176	276	151	2344
6	Mean	58°07'	140°08'	34.8	44.7	59.6	47.1	26.6	32.7	47.0	37.7	30.6	38.8	53.2	42.4	16.8	12.5	9.2	21.0	163	289	150	266	128	1768
	Min	56°15'	134°39'	30.8	42.0	58.2	43.2	21.4	30.1	46.3	33.1	26.1	36.1	51.5	38.2	14.1	10.0	4.7	18.2	144	275	140	252	118	1624
	Max	60°47'	148°41'	37.5	47.0	62.0	49.3	30.4	35.8	47.5	40.1	33.9	41.4	54.5	44.8	22.4	14.2	12.3	28.1	175	299	158	279	150	2058
7	Mean	59°04'	142°04'	36.2	44.5	57.3	48.2	30.0	35.5	48.4	40.5	33.4	40.0	52.8	44.4	7.8	6.0	6.7	11.9	194	304	135	254	133	1841
	Min	57°36'	136°09'	34.1	42.3	55.2	46.6	28.7	34.1	47.7	39.6	32.0	38.2	51.5	43.1	5.0	3.4	3.5	7.4	177	292	125	198	89	1628
	Max	60°14'	146°39'	38.8	50.6	61.5	51.7	31.0	36.9	49.2	41.3	34.4	43.6	54.8	46.4	8.9	7.0	8.4	15.2	212	316	157	278	166	2355
8	Mean	58°01'	133°59'	32.0	47.2	62.5	47.0	22.2	33.5	47.3	36.1	27.2	40.4	54.9	41.6	6.7	4.9	5.1	11.1	157	280	141	230	128	1978
	Min	56°28'	132°23'	29.2	45.5	61.4	45.0	20.7	32.2	46.5	35.3	25.1	39.7	54.0	40.5	5.2	3.0	2.0	6.9	148	272	138	179	118	1828
	Max	59°16'	135°27'	35.5	48.5	63.6	49.0	25.1	34.3	48.8	36.9	30.3	41.5	56.2	43.0	8.1	6.5	8.2	16.3	169	290	145	271	141	2103
9	Mean	56°11'	132°58'	39.1	47.3	59.6	49.6	31.6	37.6	49.7	42.0	35.4	42.4	54.6	45.8	6.1	3.9	3.8	8.0	192	303	161	242	120	2218
	Min	55°27'	131°53'	37.1	46.3	56.0	48.0	29.7	36.7	48.1	40.4	33.5	41.5	52.1	44.2	5.1	3.0	3.5	7.1	187	299	149	236	105	1888
	Max	57°16'	134°08'	40.1	48.9	62.6	50.7	33.4	38.5	52.1	43.6	36.7	43.7	57.4	47.2	7.1	4.5	4.1	8.6	198	308	182	251	140	2695
10	Mean	55°34'	132°05'	38.6	49.8	64.0	51.5	28.6	35.0	48.8	40.2	33.5	42.4	56.3	45.6	12.1	8.3	6.1	15.3	172	292	148	270	138	2446
	Min	54°48'	130°56'	34.7	47.6	61.2	48.3	24.5	32.1	45.9	37.0	29.0	39.9	53.6	42.7	9.5	6.4	3.9	12.4	126	270	133	251	106	1907
	Max	56°49'	133°09'	42.1	51.5	67.5	54.7	32.0	37.6	50.8	42.5	36.9	44.2	58.0	48.6	17.4	11.1	9.2	19.2	208	308	167	294	173	2725

1/ Per day.

2/ Per month.

3/ Days since January 1.

Stations in group 1, located in the naturally treeless Aleutian Islands, have much cooler summers and a much lower total number of degree days than do other coastal stations. They are also easily separated by their geographic location.

Group 2 includes the stations on and around Kodiak Island and those at nearby Homer on the Kenai Peninsula. These stations have warmer summers than the Aleutians but are cooler in the fall and winter.

Stations in group 3 are located around Cook Inlet and at the head of Lynn Canal in southeast Alaska in a transition zone between the moist maritime climate of the coast and the continental climate of the interior. Cold winter temperatures and relatively low precipitation throughout the year characterize these stations.

Stations in group 4 are mostly along the Gulf of Alaska, but also include Juneau, NW and Gustavus in the northern part of southeast Alaska. These stations have climates similar to those in group 2 except that they have significantly more precipitation throughout the year.

Group 5 includes 13 stations that cover a wide range of longitude. They form a center group of stations with values close to the mean for all variables. Although there appear to be differences between some of these stations, the differences are not sufficiently large to place them in one of the other nine groups or to form a separate group. They are warmer in spring, summer, and fall than stations in groups 1, 2, or 4.

Stations in group 6 have much more winter rainfall than do other stations. Little Port Walter located on the southern end of Baranof Island in southeast Alaska, for example, has an average monthly rainfall of 21 inches during the winter. Mean monthly precipitation during fall averages 29 inches.

Group 7 includes four northernmost lighthouse stations in southeast Alaska and Radioville on Chicagof Island. These stations have higher maximum and minimum fall temperatures and a longer frost-free period than other nearby stations because of the influence of surrounding salt water.

The three stations in group 8 are similar to those in groups 5 and 9 except that they have cooler winter temperatures.

Group 9 includes four lighthouse stations in the southernmost part of southeast Alaska. Fall and winter temperatures at these stations are moderated by the surrounding salt water; the mean date of the first fall frost is later in the year than for most other stations.

Group 10 includes 10 stations in the southern part of southeast Alaska that have relatively mild fall and winter temperatures and abundant precipitation during the winter. This group encompasses the area where outbreaks of hemlock sawfly, a major defoliator of western hemlock, commonly occur, and where the only known western hemlock looper outbreak in Alaska occurred.

Differences in climate among most groups are not great. Differences may be reflected in mean or maximum temperatures during the fall or winter, length or initiation of the frost-free period, or the abundance of precipitation. Changes are often gradual rather than abrupt.

Abrupt changes in vegetation due to abrupt changes in climate do not generally occur along the coast except in the transition zones between the maritime coast and the continental interior, or along elevational transects that could not be evaluated in this study because all stations are located at or near sea level.

An analysis of occurrence of species of plants along the southern coast of Alaska shows that species diversity is greatest in the transition zones between the maritime climate of the coast and the continental climate of the interior of Alaska (Hulten 1968) (table 6). Otherwise, species diversity decreases with increasing latitude through southeast Alaska and along the Gulf of Alaska. Western redcedar, Pacific yew, and Pacific silver fir reach the northern limit of their ranges in the southern part of southeast Alaska, although climate does not appear to limit their northern ranges. More likely these species are still expanding their ranges following Pleistocene deglaciation (Heusser 1960). Western redcedar and Pacific silver fir both reach large size at their northern limits in southeast Alaska. For example, Pacific silver fir 4 feet in diameter and 150 feet tall have been reported (Harris and Farr 1974). Salal, swordfern, and other species may also be expanding their ranges northward. Information on frequency of seed crops, seed dispersal distances, and requirements for germination for these and other species common to coastal Alaska are generally lacking.

Mountain hemlock is found at upper elevations on productive forest land in southeast Alaska and at sea level along Prince William Sound. The elevational limit of western hemlock decreases with latitude and reaches its western limit along western Prince William Sound. Sitka spruce continues to expand its range westward on Kodiak and Afognak Islands (Griggs 1934, 1946). In southeast Alaska, timberline is at 2,500 to 3,500 feet in elevation; in western Prince William Sound, timberline is at 500 to 1,000 feet.

The relative geologic youth of the region also contributes to a lack of species diversity. Southeast Alaska was covered with glaciers 10,000 years ago, and active glacier recession and isostatic rebound are still in evidence today (Heusser 1960). Species migrations into or through the region from Ice Age refugia have apparently occurred over a relatively short time.

Table 6—Number of plant species^{1/} by geographic area^{2/}

Type of plants	Geographic area								Total
	1	2	3	4	5	6	7	8	
Trees	12	8	15	9	11	14	5	0	22
Shrubs	56	53	82	36	56	75	55	36	107
Herbs	263	282	467	198	275	356	348	275	717
Ferns	18	20	23	10	19	15	11	14	32
Grasses	127	126	206	72	152	197	146	143	321
Mosses and clubmosses	10	8	11	4	7	8	7	10	15
Total	486	497	804	329	520	665	572	478	1214

^{1/} Summarized from Hulten 1968.

^{2/} Geographic areas:

1. Southeast Alaska south of Frederick Sound.
2. Southeast Alaska north of Frederick Sound to Icy Bay.
3. Lynn Canal and Icy Strait.
4. Gulf coast from Icy Bay to Prince William Sound.
5. Prince William Sound and eastern Kenai Peninsula.
6. Cook Inlet.
7. Kodiak-Afognak Islands and Alaska Peninsula.
8. Aleutian Islands.

Conclusions

Based on an exploratory multivariate analysis of climate for 60 coastal stations along the southern coast of Alaska, it was possible to delineate 10 significantly different groups of stations based on latitude, longitude, seasonal mean and maximum temperatures, seasonal precipitation, frost-free periods, and total number of degree days. Because of the rugged, mountainous terrain, relatively few climatic stations, and varying periods of record, the entire coastal region cannot be delineated into tentative climatic zones, although three zones were obviously different from the remaining areas. The treeless Aleutian Islands (group 1), the transition zones between the coast and interior (group 3), and the very wet coastal stations (group 6) could easily be mapped as climatically distinct, but much more information is needed before a useful map of climatic zones can be delineated for the south coastal region. An independent test would also be needed to support such conclusions.

Metric Equivalents

- 1 mile = 1.61 kilometers
- 1 foot = 0.31 meter
- 1 inch = 2.54 centimeters
- 1 °F = (9/5 °C) + 32

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Appendix

Plants

Common and Scientific Names

Quaking aspen, *Populus tremuloides* Michx.
Paper birch, *Betula papyrifera* Marsh.
Pacific silver fir, *Abies amabilis* Dougl. ex Forbes
Mountain hemlock, *Tsuga mertensiana* (Bong.) Carr.
Western hemlock, *Tsuga heterophylla* (Raf.) Sarg.
Lodgepole pine, *Pinus contorta* var. *latifolia* Engelm.
Balsam poplar, *Populus balsamifera* L.
Western redcedar, *Thuja plicata* Donn ex D. Don
Salal, *Gaultheria shallon* Pursh
Lutz spruce, *Picea x lutzii* Little
Black spruce, *Picea mariana* (Mill.) B.S.P.
Sitka spruce, *Picea sitchensis* (Bong.) Carr.
White spruce, *Picea glauca* (Moench) Voss
Swordfern, *Polystichum munitum* (Kaulf.) Presl
Pacific yew, *Taxus brevifolia* Nutt.

Insects

Spruce beetle, *Dendroctonus rufipennis* (Kirby)
Blackheaded budworm, *Acleris gloverana* (Wals.)
Spruce budworm, *Choristoneura* sp.
Western hemlock looper, *Lambdina fuscicollis lugubrosa* (Hulst)
Hemlock sawfly, *Neodiprion tsugae* Midd.

Station Summaries

ADAK: 2

Period: 1957-71

Mean annual degree
days above 41 °F: 1,136

Mean frost-
free period: 159 days

Latitude: 51° 53' N.

Longitude: 176° 39' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	38.3	37.2	39.4	42.2	45.9	49.1	54.0	55.9	52.5	47.0	41.7	38.2	45.1
Minimum	29.4	28.2	30.6	33.3	37.0	40.7	44.5	46.7	43.7	38.4	33.0	30.0	36.3
Average	33.8	32.7	35.0	37.8	41.4	44.9	49.2	51.3	48.1	42.7	37.4	34.1	40.7
Inches													
Precipitation	6.33	4.55	5.69	4.95	3.34	2.29	2.88	3.58	5.54	6.51	7.52	7.23	60.41

ANCHORAGE WSO AP: 13

Period: 1957-71

Mean annual degree
days above 41 °F: 2,006

Mean frost-
free period: 135 days

Latitude: 61° 10' N.

Longitude: 150° 01' W.

Elevation: 114 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	19.3	26.5	31.6	42.8	54.6	62.3	64.6	62.9	54.9	40.7	28.0	21.3	42.4
Minimum	5.2	11.8	15.4	28.6	38.1	47.5	51.0	49.7	41.0	27.7	15.6	8.0	28.3
Average	12.3	19.2	23.5	35.7	46.4	54.9	57.8	56.3	48.0	34.2	21.8	14.6	35.4
Inches													
Precipitation	.85	.85	.57	.63	.74	1.07	2.22	2.08	2.25	1.34	1.11	1.08	14.79

ANGOON: 39

Period: 1942-52

Mean annual degree
days above 41 °F: 1,921

Mean frost-
free period: 165 days

Latitude: 57° 30' N.

Longitude: 134° 35' W.

Elevation: 35 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	32.4	34.7	40.0	45.3	52.3	58.9	60.8	60.4	55.8	47.5	39.1	34.1	46.8
Minimum	23.7	25.8	29.3	34.0	39.7	44.7	48.0	49.1	44.6	38.3	30.7	26.4	36.2
Average	28.0	30.2	34.6	39.6	46.0	51.8	54.4	54.8	50.2	42.9	34.9	30.2	41.6
Inches													
Precipitation	3.91	1.85	2.33	2.19	1.65	1.40	3.22	3.31	5.73	6.77	4.26	2.28	38.90

ANNETTE WSO AP: 59

Period: 1957-71

Mean annual degree
days above 41 °F: 2,718Mean frost-
free period: 205 days

Latitude: 55° 02' N.

Longitude: 131° 34' W.

Elevation: 110 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	38.0	42.8	44.6	50.0	56.8	62.1	65.5	64.8	60.4	52.5	44.3	40.0	51.8
Minimum	28.7	32.7	33.4	37.0	42.3	48.2	52.1	52.0	48.3	42.3	35.4	31.3	40.3
Average	33.4	37.8	39.0	43.5	49.6	55.2	58.8	58.4	54.4	47.4	39.9	35.7	46.1
Inches													
Precipitation	12.18	10.45	9.52	9.15	6.65	4.76	5.39	7.79	10.49	19.20	14.12	13.63	123.23

ANNEX CREEK: 29

Period: 1937-51

Mean annual degree
days above 41 °F: 1,828Mean frost-
free period: 155 days

Latitude: 58° 19' N.

Longitude: 134° 06' W.

Elevation: 24 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	29.5	29.2	37.9	44.8	53.9	61.8	62.3	60.0	54.2	45.8	35.0	28.9	45.3
Minimum	20.4	21.0	28.2	33.9	39.5	45.5	47.7	46.3	43.6	37.2	27.1	21.3	34.4
Average	25.0	25.1	33.1	39.4	46.7	53.7	55.0	53.2	48.9	41.5	31.1	25.1	39.8
Inches													
Precipitation	8.70	6.18	6.53	6.06	6.76	5.87	7.76	11.03	16.47	19.23	13.32	9.56	117.47

ATKA: 3

Period: 1936-49

Mean annual degree
days above 41 °F: 1,093Mean frost-
free period: 165 days

Latitude: 52° 13' N.

Longitude: 174° 12' W.

Elevation: 36 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	37.2	37.9	38.8	42.1	45.2	48.8	52.9	56.8	52.8	46.5	41.7	37.0	44.8
Minimum	30.3	30.2	29.5	32.4	35.7	40.6	44.3	47.0	43.9	37.1	33.4	29.4	36.2
Average	33.8	34.1	34.2	37.3	40.5	44.7	48.6	51.9	48.4	41.8	37.6	33.2	40.5
Inches													
Precipitation	5.21	5.29	4.82	4.19	4.22	3.03	4.17	4.49	7.86	6.42	8.76	6.22	64.68

ATTU: 1

Period: 1961-71

Mean annual degree
days above 41 °F: 979Mean frost-
free period: 162 days

Latitude: 52° 50' N.

Longitude: 173° 11' E.

Elevation: 70 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	34.7	33.1	35.2	38.0	42.7	47.6	51.5	54.3	52.3	45.6	39.1	35.6	42.5
Minimum	28.6	26.7	29.0	31.8	36.4	40.6	44.5	46.3	44.0	37.0	31.9	29.1	35.5
Average	31.7	29.9	32.1	34.9	39.6	44.1	48.0	50.3	48.2	41.3	35.5	32.4	39.0
	Inches												
Precipitation	3.58	4.83	3.83	3.93	2.96	2.63	4.53	4.92	4.95	4.44	4.18	5.00	49.78

BARANOF: 41

Period: 1943-57

Mean annual degree
days above 41 °F: 1,631Mean frost-
free period: 155 days

Latitude: 57° 05' N.

Longitude: 134° 50' W.

Elevation: 20 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	31.9	34.3	39.1	44.2	52.1	54.0	60.4	60.2	55.2	47.3	40.2	35.2	46.2
Minimum	22.5	24.2	25.6	30.8	35.8	43.1	47.6	48.1	44.6	37.1	31.8	27.3	34.9
Average	27.2	29.3	32.4	37.5	44.0	48.6	54.0	54.2	49.9	42.2	36.0	31.3	40.6
Inches													
Precipitation	11.83	11.63	12.36	10.81	6.90	4.18	4.01	5.80	13.83	23.71	22.17	18.72	145.95

BEAVER FALLS: 56

Period: 1957-71

Mean annual degree
days above 41 °F: 2,523Mean frost-
free period: 186 days

Latitude: 55° 23' N.

Longitude: 131° 28' W.

Elevation: 35 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	35.6	40.6	42.5	49.1	56.3	61.7	65.7	64.7	59.0	50.5	42.3	37.9	50.5
Minimum	26.2	30.8	31.5	35.0	40.8	47.7	51.7	51.7	47.8	40.7	33.8	29.4	39.0
Average	30.9	35.7	37.0	42.1	48.6	54.7	58.7	58.2	53.4	45.6	38.1	33.7	44.8
Inches													
Precipitation	14.45	11.96	11.02	10.43	6.83	5.92	6.16	10.63	15.66	24.16	17.15	16.30	150.67

BELL ISLAND: 51

Period: 1934-48

Mean annual degree
days above 41 °F: 2,567

Mean frost-
free period: 173 days

Latitude: 55° 55' N.

Longitude: 131° 35' W.

Elevation: 10 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	33.9	34.9	40.6	45.6	59.8	66.0	67.4	66.8	59.7	49.7	40.2	36.2	50.1
Minimum	26.1	24.7	28.7	32.6	38.7	47.1	50.9	50.2	46.5	40.3	32.3	28.4	37.2
Average	30.0	29.8	34.7	39.1	49.3	56.6	59.2	58.5	53.1	45.0	36.3	32.3	43.7
Inches													
Precipitation	11.42	5.99	8.37	6.77	4.97	4.91	5.60	7.85	11.55	17.34	12.47	11.19	108.43

CALDER: 48

Period: 1917-31

Mean annual degree
days above 41 °F: 1,907

Mean frost-
free period: 126 days

Latitude: 56° 10' N.

Longitude: 132° 27' W.

Elevation: 20 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	35.1	37.2	40.7	48.2	54.0	59.5	61.5	62.7	59.5	49.4	42.0	36.4	48.8
Minimum	26.3	27.2	27.8	31.5	36.9	42.8	46.7	48.2	42.9	38.4	32.6	27.9	35.8
Average	30.7	32.2	34.3	39.9	45.5	51.2	54.1	55.5	51.2	43.9	37.3	32.2	42.3
Inches													
Precipitation	11.00	9.14	8.43	7.69	5.85	3.63	3.38	6.63	10.13	17.34	16.06	13.48	112.76

CAPE DECISION: 50

Period: 1957-71

Mean annual degree
days above 41 °F: 1,888

Mean frost-
free period: 198 days

Latitude: 56° 00' N.

Longitude: 134° 08' W.

Elevation: 39 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	37.5	41.6	42.3	46.3	50.5	54.0	56.6	57.3	54.8	50.1	43.9	39.7	47.9
Minimum	29.6	34.3	34.5	37.3	41.3	46.2	49.0	49.7	47.9	42.5	36.1	32.4	40.1
Average	33.6	38.0	38.4	41.8	45.9	50.1	52.8	53.5	51.4	46.3	40.0	36.1	44.0
Inches													
Precipitation	6.72	6.33	4.81	4.54	4.21	3.63	3.54	5.13	7.30	11.24	7.28	8.12	72.85

CAPE HINCHINBROOK: 17

Period: 1957-71

Mean annual degree
days above 41 °F: 1,760

Mean frost-
free period: 186 days

Latitude: 60° 14' N.

Longitude: 146° 39' W.

Elevation: 185 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	33.9	36.5	36.7	41.7	48.4	55.7	58.0	58.7	54.0	46.0	39.9	35.5	45.4
Minimum	27.5	29.9	29.0	33.5	39.9	46.0	50.3	51.2	47.0	38.6	33.2	28.8	37.9
Average	30.7	33.2	32.8	37.6	44.2	50.8	54.1	55.0	50.5	42.3	36.6	32.2	41.6
Inches													
Precipitation	6.92	7.92	5.75	6.71	7.50	4.95	9.87	10.26	14.62	12.84	8.71	10.30	106.35

CAPE SPENCER: 35

Period: 1957-71

Mean annual degree
days above 41 °F: 1,644

Mean frost-
free period: 212 days

Latitude: 58° 12' N.

Longitude: 136° 38' W.

Elevation: 81 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	34.1	37.2	38.3	43.9	49.0	52.9	55.8	56.8	53.0	46.8	40.2	36.5	45.4
Minimum	28.8	32.4	32.5	36.8	41.3	46.0	48.3	48.8	46.4	41.2	35.0	31.0	39.0
Average	31.5	34.8	35.4	40.4	45.2	49.5	52.1	52.8	49.7	44.0	37.6	33.8	42.2
Inches													
Precipitation	6.61	7.06	6.89	6.03	6.80	4.35	7.21	8.53	13.47	14.03	11.16	9.72	101.86

CAPE ST. ELIAS: 21

Period: 1957-71

Mean annual degree
days above 41 °F: 1,800

Mean frost-
free period: 177 days

Latitude: 59° 48' N.

Longitude: 144° 36' W.

Elevation: 58 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	34.9	37.7	38.2	43.3	48.7	54.3	57.7	58.6	55.3	47.9	40.7	36.6	46.2
Minimum	28.0	31.2	30.0	34.7	40.3	46.4	50.0	50.8	46.9	39.0	33.3	29.8	38.4
Average	31.4	34.4	34.1	39.0	44.5	50.4	53.9	54.7	51.1	43.5	37.0	33.2	42.3
Inches													
Precipitation	7.52	7.67	7.11	6.88	6.91	4.41	9.32	8.62	13.24	12.86	9.49	11.29	105.32

CORDOVA FAA AP: 20

Period: 1957-71

Mean annual degree
days above 41 °F: 1,600Mean frost-
free period: 110 days

Latitude: 60° 30' N.

Longitude: 145° 30' W.

Elevation: 41 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	29.9	35.5	37.0	44.2	52.0	58.4	60.6	61.2	55.9	46.6	37.5	32.0	45.9
Minimum	13.2	20.1	20.3	28.8	35.7	43.3	46.8	45.5	40.3	32.0	24.2	17.5	30.6
Average	21.6	27.8	28.7	36.5	43.9	50.9	53.7	53.4	48.1	39.3	30.9	24.8	38.2
Inches													
Precipitation	4.71	6.89	5.69	5.63	6.49	5.22	7.48	9.03	12.46	11.56	7.36	7.44	89.96

CRAIG: 55

Period: 1938-52

Mean annual degree
days above 41 °F: 2,341Mean frost-
free period: 177 days

Latitude: 55° 29' N.

Longitude: 133° 09' W.

Elevation: 13 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	39.5	40.9	44.0	49.0	55.9	59.7	62.7	63.4	59.5	51.5	44.4	40.5	50.9
Minimum	29.5	30.2	31.2	35.2	40.2	45.4	50.4	50.0	47.0	41.1	34.8	31.4	38.9
Average	34.5	35.6	37.6	42.1	48.1	52.6	56.6	56.7	53.3	46.3	39.6	36.0	44.9
Inches													
Precipitation	12.16	7.69	8.58	8.80	5.22	3.73	4.48	5.75	9.47	14.62	13.49	11.98	105.97

DUTCH HARBOR: 4

Period: 1930-34

Mean annual degree
days above 41 °F: 1,351Mean frost-
free period: 158 days

Latitude: 53° 55' N.

Longitude: 166° 30' W.

Elevation: 47 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	36.3	36.7	37.8	41.6	46.2	51.2	56.9	60.0	54.0	46.6	41.4	36.9	45.5
Minimum	28.1	28.1	28.7	31.5	35.9	41.1	45.4	48.1	44.5	38.2	32.7	28.8	35.9
Average	32.2	32.4	33.3	36.6	41.1	46.2	51.2	54.1	49.3	42.4	37.1	32.9	40.7
Inches													
Precipitation	6.97	7.01	4.58	4.40	4.35	2.81	1.60	2.45	6.16	7.13	6.01	6.72	60.19

ELDRED ROCK: 27

Period: 1957-71

Mean annual degree
days above 41 °F: 2,034

Mean frost-
free period: 184 days

Latitude: 58° 58' N.

Longitude: 135° 13' W.

Elevation: 55 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	29.2	35.2	36.5	44.6	52.1	59.5	61.4	60.7	54.6	46.4	37.6	32.7	45.9
Minimum	22.3	27.0	28.4	35.7	41.6	49.0	51.7	50.8	45.2	37.1	29.4	25.0	36.9
Average	25.8	31.1	32.5	40.2	46.9	54.3	56.6	55.8	49.9	41.8	33.5	28.9	41.4
Inches													
Precipitation	4.15	4.75	2.70	1.93	2.52	1.76	2.61	3.36	6.75	7.99	5.63	4.57	48.72

FIVE FINGER LIGHT STATION: 40

Period: 1957-71

Mean annual degree
days above 41 °F: 1,901

Mean frost-
free period: 187 days

Latitude: 57° 16' N.

Longitude: 133° 37' W.

Elevation: 30 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	34.7	39.0	40.3	46.3	52.3	57.5	59.0	58.8	54.0	48.3	41.6	37.6	47.4
Minimum	27.4	31.3	32.8	36.3	40.7	46.7	49.6	47.9	45.8	40.8	34.5	30.5	38.7
Average	31.1	35.2	36.6	41.3	46.5	52.1	54.3	53.4	49.9	44.6	38.1	34.1	43.1
Inches													
Precipitation	4.78	4.42	2.97	3.21	2.69	2.70	3.78	5.57	6.07	8.76	6.43	6.13	57.51

FORTMAN HATCHERY: 52

Period: 1912-26

Mean annual degree
days above 41 °F: 2,572

Mean frost-
free period: 150 days

Latitude: 55° 36' N.

Longitude: 131° 25' W.

Elevation: 132 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
<u>(°F)</u>													
Maximum	34.4	38.9	43.8	51.0	59.3	66.1	68.3	68.2	61.6	52.1	43.4	36.3	52.0
Minimum	23.7	24.3	27.6	32.6	37.9	44.8	49.2	49.9	44.6	39.6	33.0	26.6	36.2
Average	29.1	31.6	35.7	41.8	48.6	55.5	58.8	59.1	53.1	45.9	38.2	31.5	44.1
<u>Inches</u>													
Precipitation	12.16	12.61	11.75	11.24	8.37	5.31	6.88	8.59	12.03	19.20	20.67	16.39	145.20

GUARD ISLAND: 53

Period: 1957-68

Mean annual degree
days above 41 °F: 2,695

Mean frost-
free period: 187 days

Latitude: 55° 27' N.

Longitude: 131° 53' W.

Elevation: 20 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	38.6	41.5	42.7	48.7	55.3	59.9	64.2	63.8	58.5	50.6	43.1	40.3	50.6
Minimum	31.6	34.0	34.4	38.0	43.0	49.1	53.3	54.0	50.2	44.1	36.6	34.7	42.0
Average	35.1	37.8	38.6	43.4	49.2	54.5	58.8	58.9	54.4	47.4	39.9	37.5	46.3
Inches													
Precipitation	5.43	5.00	4.59	3.78	3.80	3.40	3.53	4.52	6.08	10.81	6.61	6.12	63.67

GULL COVE: 36

Period: 1941-52

Mean annual degree
days above 41 °F: 1,721

Mean frost-
free period: 158 days

Latitude: 58° 12' N.

Longitude: 136° 09' W.

Elevation: 18 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	34.1	35.9	39.3	45.0	53.5	58.4	60.1	59.9	55.0	47.4	39.0	34.8	46.9
Minimum	24.2	25.9	28.9	32.9	38.2	44.1	47.2	47.2	43.9	37.3	30.2	25.5	35.4
Average	29.2	30.9	34.1	39.0	45.8	51.3	53.7	53.6	49.5	42.4	34.6	30.2	41.1
Inches													
Precipitation	11.16	6.07	8.79	5.46	3.78	2.86	5.17	5.09	11.40	17.32	12.88	9.57	99.55

GUSTAVUS: 34

Period: 1956-68

Mean annual degree
days above 41 °F: 1,872

Mean frost-
free period: 114 days

Latitude: 58° 25' N.

Longitude: 135° 44' W.

Elevation: 17 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	31.6	36.0	39.0	47.6	55.0	60.4	63.0	63.0	56.9	47.7	38.9	33.6	47.7
Minimum	19.6	23.5	25.6	31.6	37.8	45.0	48.8	48.1	43.1	37.1	28.8	23.7	34.4
Average	25.6	29.8	32.3	39.6	46.4	52.7	55.9	55.6	50.0	42.4	33.9	28.7	41.1
Inches													
Precipitation	3.71	3.44	2.33	2.14	2.80	2.58	4.20	5.56	6.84	8.32	6.30	5.96	54.18

HAINES TERMINAL: 26

Period: 1957-71

Mean annual degree
days above 41 °F: 2,103

Mean frost-
free period: 148 days

Latitude: 59° 16' N.

Longitude: 135° 27' W.

Elevation: 175 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	26.9	35.2	37.8	48.4	56.5	63.8	64.3	62.8	56.8	47.1	37.1	31.9	47.4
Minimum	16.0	24.3	25.3	32.1	39.2	47.1	50.4	48.8	43.7	35.7	26.6	21.8	34.2
Average	21.5	29.8	31.6	40.3	47.8	55.5	57.4	55.8	50.3	41.4	31.9	26.9	40.8
Inches													
Precipitation	4.56	4.40	4.43	2.34	2.29	1.33	1.79	2.75	6.17	8.60	5.96	6.68	51.30

HOLLIS: 54

Period: 1954-62

Mean annual degree
days above 41 °F: 2,352

Mean frost-
free period: 149 days

Latitude: 55° 28' N.

Longitude: 132° 40' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	36.5	38.0	42.1	48.3	57.5	61.9	66.8	65.5	59.3	49.6	42.1	37.6	50.4
Minimum	27.4	28.0	29.8	33.0	39.5	45.7	49.9	50.1	44.6	39.4	33.6	30.0	37.6
Average	31.9	33.0	36.0	40.7	48.5	53.8	58.4	57.8	52.0	44.5	37.9	33.8	44.0
Inches													
Precipitation	8.68	8.81	7.25	7.59	4.54	3.64	3.11	4.98	7.44	17.90	13.69	12.62	100.25

HOMER WSO: 10

Period: 1957-71

Mean annual degree
days above 41 °F: 1,397

Mean frost-
free period: 108 days

Latitude: 59° 38' N.

Longitude: 151° 30' W.

Elevation: 67 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	27.2	32.3	34.8	42.2	50.5	56.7	60.1	60.0	54.7	43.9	34.8	28.2	43.8
Minimum	14.7	18.9	19.6	28.4	34.2	41.3	45.3	45.1	39.4	29.9	22.7	16.4	29.6
Average	21.0	25.6	27.2	35.3	42.4	49.0	52.8	52.6	47.1	36.9	28.8	22.3	36.7
Inches													
Precipitation	1.38	1.98	1.30	1.21	1.10	.95	1.87	2.30	2.87	3.18	2.56	2.66	23.36

JUNEAU WSO AP: 31

Period: 1957-71

Mean annual degree
days above 41 °F: 1,845

Mean frost-
free period: 131 days

Latitude: 58° 22' N.

Longitude: 134° 35' W.

Elevation: 12 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	27.7	35.0	37.9	46.9	55.0	61.6	63.4	62.0	55.6	47.2	37.1	32.0	46.8
Minimum	16.1	22.7	25.4	31.0	37.7	44.2	47.2	46.3	42.2	36.0	27.1	22.3	33.2
Average	21.9	28.9	31.7	39.0	46.4	52.9	55.3	54.2	48.9	41.6	32.1	27.2	40.0
Inches													
Precipitation	4.00	3.86	3.50	2.91	3.51	2.77	4.76	5.22	6.79	6.78	5.05	4.70	53.85

JUNEAU NO. 2: 30

Period: 1957-71

Mean annual degree
days above 41 °F: 2,344

Mean frost-
free period: 167 days

Latitude: 58° 18' N.

Longitude: 134° 24' W.

Elevation: 25 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	30.8	37.6	40.1	48.9	57.1	64.0	65.0	63.9	57.0	48.7	39.2	36.2	49.0
Minimum	21.5	27.6	29.2	34.4	41.1	46.8	50.2	49.5	45.8	39.0	30.5	27.0	36.9
Average	26.2	32.6	34.7	41.7	49.1	55.4	57.6	56.7	51.4	43.9	34.9	31.6	43.0
Inches													
Precipitation	6.49	6.82	6.07	5.90	6.00	3.79	7.27	8.18	11.47	12.69	9.64	8.30	92.62

JUNEAU 9 NW (MENDENHALL): 32

Period: 1939-43 & 1966-70

Mean annual degree
days above 41 °F: 1,454

Mean frost-
free period: 125 days

Latitude: 58° 25' N.

Longitude: 134° 32' W.

Elevation: 120 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	28.0	37.1	41.2	48.8	54.4	59.0	58.7	57.7	54.1	47.1	37.4	33.2	46.4
Minimum	10.3	21.1	25.8	31.9	37.2	42.4	44.7	43.3	40.3	36.1	26.7	23.4	31.9
Average	19.2	29.1	33.5	40.4	45.8	50.7	51.7	50.5	47.2	41.6	32.0	28.3	39.2
Inches													
Precipitation	6.23	4.67	4.55	4.05	5.16	4.51	7.08	9.33	12.63	11.50	7.46	6.26	83.43

KAKE: 43

Period: 1920-23 & 1930-34

Mean annual degree
days above 41 °F: 1,826

Mean frost-
free period: 151 days

Latitude: 56° 59' N.

Longitude: 133° 57' W.

Elevation: 8 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	34.8	37.2	39.9	46.6	52.3	59.2	60.6	62.1	56.1	49.2	43.4	37.0	48.2
Minimum	25.8	26.8	28.8	33.1	38.0	44.1	46.4	48.6	43.4	37.4	32.1	27.2	36.0
Average	30.3	32.0	34.4	39.9	45.2	51.7	53.5	55.4	49.8	43.3	37.8	32.1	42.1
	Inches												
Precipitation	5.19	5.33	2.99	3.86	3.04	2.16	2.51	4.35	5.20	7.30	6.69	5.55	54.17

KENAI FAA MUNICIPAL AP: 12

Period: 1957-71

Mean annual degree
days above 41 °F: 1,540

Mean frost-
free period: 107 days

Latitude: 60° 34' N.

Longitude: 151° 15' W.

Elevation: 86 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	20.0	28.2	32.4	42.3	52.5	58.6	61.5	61.7	55.8	42.9	30.0	21.4	42.3
Minimum	1.7	8.9	11.0	25.7	34.4	42.3	46.8	45.4	38.8	26.3	13.4	5.0	25.0
Average	10.9	18.6	21.7	34.0	43.5	50.5	54.2	53.6	47.3	34.6	21.7	13.2	33.6
	Inches												
Precipitation	1.07	1.06	1.04	.96	1.08	1.18	2.24	2.87	3.13	2.27	1.45	1.60	19.95

KETCHIKAN: 57

Period: 1957-71

Mean annual degree
days above 41 °F: 2,739

Mean frost-
free period: 182 days

Latitude: 55° 21' N.

Longitude: 131° 39' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	40.0	44.5	45.5	51.0	58.0	63.0	66.3	65.9	61.0	53.3	45.9	41.7	53.0
Minimum	27.7	32.2	32.6	35.6	40.6	46.8	50.8	50.8	47.2	40.7	34.4	30.8	39.2
Average	33.9	38.4	39.1	43.3	49.3	54.9	58.6	58.4	54.1	47.0	40.2	36.3	46.1
	Inches												
Precipitation	15.20	13.36	11.50	12.62	8.73	6.94	8.15	12.43	14.37	25.53	17.67	16.67	163.17

KITOI BAY: 9

Period: 1957-71

Mean annual degree
days above 41 °F: 1,478Mean frost-
free period: 127 days

Latitude: 58° 11' N.

Longitude: 152° 21' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	33.0	35.7	37.2	42.8	50.0	54.7	59.5	60.5	54.4	44.7	37.7	33.1	45.3
Minimum	23.0	24.5	23.8	29.4	35.8	42.3	47.1	47.5	42.6	32.9	27.8	22.3	33.3
Average	28.0	30.1	30.5	36.1	42.9	48.5	53.3	54.0	48.5	38.8	32.7	27.7	39.3
	Inches												
Precipitation	5.52	4.91	4.34	4.10	4.52	3.76	3.85	5.55	6.59	6.41	5.60	6.21	61.36

KODIAK NAS: 7

Period: 1957-71

Mean annual degree
days above 41 °F: 1,636Mean frost-
free period: 154 days

Latitude: 57° 45' N.

Longitude: 152° 31' W.

Elevation: 21 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	34.6	36.4	36.8	42.3	49.2	54.9	59.5	60.0	55.2	45.4	39.2	34.2	45.6
Minimum	26.3	27.0	26.5	31.8	38.8	44.8	48.9	49.1	44.9	35.1	30.5	25.3	35.8
Average	30.5	31.7	31.7	37.1	44.0	49.9	54.2	54.6	50.1	40.3	34.9	29.8	40.7
	Inches												
Precipitation	5.21	5.26	3.91	3.26	2.96	4.75	3.86	5.12	6.65	5.45	5.42	5.86	57.71

LARSEN BAY: 5

Period: 1957-65

Mean annual degree
days above 41 °F: 1,638Mean frost-
free period: 135 uays

Latitude: 57° 32' N.

Longitude: 154° 00' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	36.6	37.6	38.9	44.1	49.7	60.2	61.2	61.4	57.7	46.1	39.6	34.6	47.3
Minimum	24.4	23.9	25.4	29.1	34.7	42.9	46.8	47.1	42.7	33.4	28.1	22.4	33.4
Average	30.5	30.8	32.1	36.6	42.2	51.5	54.0	54.3	50.2	39.8	33.9	28.5	40.4
	Inches												
Precipitation	2.03	1.58	1.41	1.32	.84	.76	1.46	2.15	2.92	2.61	3.37	2.48	22.93

LATOUICHE: 16

Period: 1940-55

Mean annual degree
days above 41 °F: 1,640Mean frost-
free period: 167 days

Latitude: 60° 03' N.

Longitude: 147° 54' W.

Elevation: 45 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	33.5	35.8	37.9	42.2	48.8	55.5	61.0	60.5	55.1	46.2	38.6	34.1	45.8
Minimum	26.1	27.2	27.6	31.2	37.0	43.5	48.1	49.1	44.4	37.0	31.4	27.0	35.8
Average	29.8	31.5	32.8	36.7	42.9	49.5	54.6	54.8	49.8	41.6	35.0	30.6	40.8
Inches													
Precipitation	16.53	14.23	14.15	14.99	11.40	6.88	6.19	11.42	17.78	23.36	16.94	16.75	170.62

LINCOLN ROCK: 49

Period: 1953-67

Mean annual degree
days above 41 °F: 2,390Mean frost-
free period: 194 days

Latitude: 56° 03' N.

Longitude: 132° 46' W.

Elevation: 25 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	38.3	40.8	41.9	47.6	53.5	58.7	62.6	62.3	57.2	50.0	43.6	40.0	49.7
Minimum	29.6	32.1	32.7	36.9	42.6	47.2	51.0	52.1	48.3	42.0	35.7	32.2	40.2
Average	34.0	36.5	37.3	42.3	48.1	53.0	56.8	57.2	52.8	46.0	39.6	36.1	44.9
Inches													
Precipitation	5.44	6.00	4.50	3.74	3.38	2.94	3.19	4.50	6.55	10.42	7.90	8.67	67.23

LINGER LONGER: 25

Period: 1960-71

Mean annual degree
days above 41 °F: 1,989Mean frost-
free period: 107 days

Latitude: 59° 26' N.

Longitude: 136° 17' W.

Elevation: 700 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	20.6	30.9	36.1	46.5	58.3	66.7	69.2	66.5	57.0	44.4	29.8	21.5	45.6
Minimum	6.4	16.0	18.7	27.7	33.7	42.1	46.8	45.1	40.3	31.7	18.4	9.1	28.0
Average	13.5	23.5	27.4	37.1	46.0	54.4	58.0	55.8	48.7	38.1	24.1	15.3	36.8
Inches													
Precipitation	2.74	4.05	2.24	1.56	1.96	.78	1.20	1.97	4.66	6.26	3.78	2.64	33.84

LITTLE PORT WALTER: 46

Period: 1957-71

Mean annual degree
days above 41 °F: 1,888Mean frost-
free period: 172 days

Latitude: 56° 23' N.

Longitude: 134° 39' W.

Elevation: 14 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	35.0	39.4	40.9	45.9	51.9	57.0	60.7	60.2	55.7	48.7	41.6	37.6	47.9
Minimum	27.3	31.2	31.6	34.0	39.1	44.9	48.9	48.6	45.7	40.0	34.0	30.2	38.0
Average	31.2	35.3	36.2	40.0	45.5	51.0	54.8	54.4	50.7	44.4	37.8	33.9	43.0
Inches													
Precipitation	19.75	20.48	15.92	14.61	12.55	8.47	9.43	14.77	24.46	33.45	26.26	26.94	227.09

MIDDLETON ISLAND: 19

Period: 1943-58

Mean annual degree
days above 41 °F: 1,628Mean frost-
free period: 204 days

Latitude: 59° 28' N.

Longitude: 146° 19' W.

Elevation: 39 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	36.5	36.6	38.1	42.6	46.6	51.9	56.4	58.0	54.4	47.5	42.0	37.8	45.7
Minimum	30.7	30.6	31.4	34.4	39.1	44.2	48.7	50.3	47.2	40.8	36.0	31.7	38.8
Average	33.6	33.6	34.8	38.5	42.9	48.1	52.6	54.2	50.8	44.2	39.0	34.8	42.2
Inches													
Precipitation	5.32	3.94	3.35	3.27	3.62	2.23	3.45	4.81	7.13	8.18	6.93	5.78	58.01

PETERSBURG: 44

Period: 1957-71

Mean annual degree
days above 41 °F: 2,005Mean frost-
free period: 140 days

Latitude: 56° 49' N.

Longitude: 132° 57' W.

Elevation: 50 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	31.4	37.9	41.0	48.5	55.8	61.5	63.7	62.7	56.8	48.8	39.3	34.8	48.5
Minimum	21.3	26.4	28.2	32.4	38.1	44.6	47.7	46.7	43.4	38.0	29.6	25.7	35.2
Average	26.4	32.2	34.6	40.5	47.0	53.1	55.7	54.7	50.1	43.4	34.5	30.3	41.9
Inches													
Precipitation	9.33	7.96	6.56	7.37	5.85	5.15	5.68	7.26	11.52	16.99	11.03	11.70	106.40

POINT RETREAT LIGHT STATION: 33

Period: 1957-71

Mean annual degree
days above 41 °F: 2,110Mean frost-
free period: 173 days

Latitude: 58° 25' N.

Longitude: 134° 57' W.

Elevation: 20 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	31.5	36.3	38.4	46.2	53.4	60.7	62.7	61.8	55.3	47.3	39.0	34.9	47.3
Minimum	23.4	28.4	29.9	35.0	40.6	46.2	50.8	50.4	46.5	39.2	31.1	27.5	37.5
Average	27.5	32.4	34.2	40.6	47.0	53.5	56.8	56.1	50.9	43.3	35.1	31.2	42.4
	Inches												
Precipitation	5.08	5.07	3.92	4.36	4.12	2.72	5.79	6.18	9.82	10.03	7.07	6.25	70.41

PORT ALEXANDER: 47

Period: 1950-61

Mean annual degree
days above 41 °F: 2,058Mean frost-
free period: 175 days

Latitude: 56° 15' N.

Longitude: 134° 39' W.

Elevation: 18 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	35.4	38.1	40.6	46.9	53.5	59.9	63.8	62.4	56.9	48.7	42.4	38.9	49.0
Minimum	28.2	30.8	31.7	35.5	40.3	44.6	47.9	48.2	44.9	40.2	35.3	32.1	38.3
Average	31.8	34.5	36.2	41.2	46.9	52.3	55.9	55.3	50.9	44.5	38.9	35.5	43.6
Inches													
Precipitation	14.62	14.82	12.81	10.71	9.35	6.91	9.38	13.72	15.81	22.63	19.05	19.52	169.33

RADIOVILLE : 38

Period: 1936-50

Mean annual degree
days above 41 °F: 2,355Mean frost-
free period: 192 days

Latitude: 57° 36' N.

Longitude: 136° 09' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	39.0	38.5	45.2	50.7	55.9	60.4	62.7	61.5	59.6	51.6	43.8	38.8	50.6
Minimum	30.0	28.6	32.6	36.5	40.8	45.7	49.4	49.1	47.0	41.2	35.0	30.7	38.9
Average	34.5	33.6	38.9	43.6	48.4	53.1	56.1	55.3	53.3	46.4	39.4	34.8	44.8
Inches													
Precipitation	10.17	5.81	7.68	5.76	5.28	4.58	8.17	9.02	14.03	17.33	14.25	10.71	112.79

SEWARD: 14

Period: 1957-71

Mean annual degree
days above 41 °F: 1,847Mean frost-
free period: 152 days

Latitude: 60° 07' N.

Longitude: 149° 27' W.

Elevation: 70 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	28.9	34.0	36.5	45.1	53.0	59.5	62.5	62.5	55.9	44.8	34.0	30.2	45.6
Minimum	18.7	23.5	24.0	32.0	38.3	45.3	49.3	49.0	43.8	34.2	26.8	20.8	33.8
Average	23.8	28.8	30.3	38.6	45.7	52.4	55.9	55.8	49.9	39.5	30.4	25.5	39.7
Inches													
Precipitation	3.45	4.85	3.32	2.96	3.67	2.64	3.32	5.15	10.06	9.12	6.28	6.35	61.17

SITKA FAA AP: 42

Period: 1957-71

Mean annual degree
days above 41 °F: 2,244Mean frost-
free period: 191 days

Latitude: 57° 04' N.

Longitude: 135° 21' W.

Elevation: 15 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	37.1	41.7	42.5	47.5	53.5	57.6	60.6	61.8	57.8	50.5	43.3	39.0	49.4
Minimum	28.6	32.6	32.6	35.7	41.0	46.9	50.8	51.5	47.8	41.4	35.1	32.2	39.4
Average	32.9	37.2	37.6	41.6	47.3	52.3	55.7	56.7	52.8	46.0	39.2	35.6	44.6
Inches													
Precipitation	7.25	6.10	5.93	5.87	4.85	3.95	5.44	7.73	10.93	12.42	9.94	8.16	88.17

SKAGWAY: 24

Period: 1922-36

Mean annual degree
days above 41 °F: 2,175Mean frost-
free period: 111 days

Latitude: 59° 28' N.

Longitude: 135° 19' W.

Elevation: 18 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	29.6	30.4	38.7	48.5	58.6	66.9	66.7	65.5	57.8	47.9	39.4	29.4	48.4
Minimum	19.6	19.6	26.3	31.6	38.8	44.6	48.3	46.9	40.8	36.0	28.5	19.8	33.4
Average	24.6	25.0	32.5	40.1	48.7	55.8	57.5	56.2	49.4	42.0	34.0	24.6	40.9
Inches													
Precipitation	2.76	1.75	1.71	1.65	1.21	.93	1.64	1.96	3.53	5.08	4.70	3.29	30.21

SOLDOTNA 6 W.: 11

Period: 1962-71

Mean annual degree
days above 41 °F: 1,592

Mean frost-
free period: 94 days

Latitude: 60° 28' N.

Longitude: 151° 14' W.

Elevation: 85 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	19.2	27.1	34.0	43.8	53.7	61.5	65.8	64.1	57.6	42.0	28.0	20.9	43.1
Minimum	-2.5	3.4	6.3	24.5	32.3	42.1	45.0	43.4	35.1	21.0	7.6	1.3	21.6
Average	8.4	15.3	20.2	34.2	43.0	51.8	55.4	53.8	46.4	31.5	17.8	11.1	32.4
	Inches												
Precipitation	.89	2.73	1.23	.71	1.12	1.53	1.65	2.49	1.89	2.12	.71	1.49	18.56

TAKU PASS (CANYON ISLAND): 28

Period: 1936-44

Mean annual degree
days above 41 °F: 2,138

Mean frost-
free period: 136 days

Latitude: 58° 33' N.

Longitude: 133° 40' W.

Elevation: 175 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	26.7	28.0	39.0	51.4	60.0	66.3	65.5	64.4	57.7	48.3	33.7	26.7	47.3
Minimum	15.6	16.6	24.0	32.9	39.0	43.8	45.7	44.9	42.1	36.6	24.5	18.3	32.0
Average	21.2	22.3	31.5	42.2	49.5	55.1	55.6	54.7	49.9	42.5	29.1	22.5	39.7
	Inches												
Precipitation	6.81	3.66	3.65	2.54	2.14	2.15	2.79	4.05	6.36	11.21	8.50	6.84	60.70

TENAKEE: 37

Period: 1941-50

Mean annual degree
days above 41 °F: 2,158

Mean frost-
free period: 146 days

Latitude: 57° 47' N.

Longitude: 135° 15' W.

Elevation: 19 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	33.9	36.2	41.8	46.9	57.3	63.0	63.4	64.7	59.1	49.1	38.7	34.5	49.0
Minimum	23.3	25.3	29.3	33.0	38.5	44.5	47.9	47.8	44.9	37.6	28.5	26.1	35.6
Average	28.6	30.8	35.6	40.0	47.9	53.8	55.7	56.3	52.0	43.4	33.6	30.3	42.3
	Inches												
Precipitation	5.07	3.87	4.32	3.29	2.72	2.48	4.71	4.66	7.75	11.28	7.18	5.87	63.20

TREE POINT LIGHT STATION: 60

Period: 1957-70

Mean annual degree
days above 41 °F: 2,554

Mean frost-
free period: 199 days

Latitude: 54° 48' N.

Longitude: 130° 56' W.

Elevation: 36 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	39.3	44.8	45.4	50.1	55.1	59.5	62.6	63.2	59.3	53.1	45.4	42.2	51.7
Minimum	28.4	33.1	33.2	37.1	42.2	48.3	51.6	51.3	48.2	42.8	35.8	32.1	40.3
Average	33.9	39.0	39.3	43.6	48.7	53.9	57.1	57.3	53.8	48.0	40.6	37.2	46.0
Inches													
Precipitation	9.55	8.92	7.33	7.22	4.69	4.56	5.06	7.23	9.82	15.80	11.61	11.08	102.87

UGANIK BAY: 6

Period: 1952-64

Mean annual degree
days above 41 °F: 1,749

Mean frost-
free period: 121 days

Latitude: 57° 43' N.

Longitude: 153° 19' W.

Elevation: 50 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	35.7	37.2	38.5	44.5	52.8	60.9	64.4	64.2	56.7	47.3	39.9	34.3	48.0
Minimum	24.2	24.0	24.4	29.6	35.6	42.4	47.2	45.9	40.2	33.1	27.9	22.6	33.1
Average	30.0	30.6	31.5	37.1	44.2	51.7	55.8	55.1	48.5	40.2	33.9	28.5	40.6
Inches													
Precipitation	4.21	3.18	2.61	3.39	2.75	1.83	2.03	2.44	4.11	6.49	5.91	5.16	44.11

VALDEZ: 18

Period: 1957-71

Mean annual degree
days above 41 °F: 1,611

Mean frost-
free period: 124 days

Latitude: 61° 08' N.

Longitude: 146° 21' W.

Elevation: 20 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	25.7	31.4	35.8	45.8	54.0	60.7	61.9	60.8	54.8	44.1	33.1	26.3	44.5
Minimum	10.9	15.6	18.7	28.9	36.1	44.0	46.5	45.0	38.6	30.8	20.0	13.1	29.0
Average	18.3	23.5	27.3	37.4	45.1	52.4	54.2	52.9	46.7	37.5	26.6	19.7	36.8
Inches													
Precipitation	3.90	4.89	4.77	2.61	3.27	2.31	4.05	5.46	7.65	7.25	6.34	4.65	57.15

VIEW COVE: 58

Period: 1933-46

Mean annual degree
days above 41 °F: 2,725Mean frost-
free period: 208 days

Latitude: 55° 04' N.

Longitude: 133° 04' W.

Elevation: 13 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(°F)												
Maximum	41.6	41.8	45.4	51.3	57.2	62.5	62.6	65.9	62.5	54.6	47.1	42.0	52.9
Minimum	32.5	30.8	32.5	37.4	41.2	46.2	49.9	50.9	47.7	42.6	37.3	32.7	40.1
Average	37.1	36.3	39.0	44.4	49.2	54.4	56.3	58.4	55.1	48.6	42.2	37.4	46.5
	Inches												
Precipitation	20.26	12.36	13.52	12.16	7.73	5.18	6.05	7.53	11.89	22.04	22.64	19.55	160.91

WHALE ISLAND: 8

Period: 1924-38

Mean annual degree
days above 41 °F: 1,501Mean frost-
free period: 107 days

Latitude: 57° 58' N.

Longitude: 152° 46' W.

Elevation: 8 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	34.7	35.0	38.1	42.0	48.2	55.6	59.8	60.9	55.8	47.1	40.3	35.1	46.1
Minimum	22.9	22.9	25.2	30.3	36.2	42.5	46.5	47.5	42.0	34.8	27.5	24.0	33.5
Average	28.8	29.0	31.7	36.2	42.2	49.1	53.2	54.2	48.9	41.0	33.9	29.6	39.8
Inches													
Precipitation	3.87	4.62	2.84	3.52	6.88	4.22	3.16	3.46	3.70	6.74	5.48	4.74	53.23

WHITTIER: 15

Period: 1957-71

Mean annual degree
days above 41 °F: 1,624Mean frost-
free period: 144 days

Latitude: 60° 47' N.

Longitude: 148° 41' W.

Elevation: 31 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	29.8	33.1	33.6	42.4	50.1	58.3	60.1	60.1	53.4	42.3	34.0	29.4	43.9
Minimum	20.6	23.0	22.8	31.0	36.5	45.0	48.5	48.1	42.1	32.2	24.9	20.6	33.0
Average	25.2	28.1	28.2	36.7	43.3	51.7	54.3	54.1	47.8	37.2	29.5	25.0	38.4
Inches													
Precipitation	12.22	10.03	12.23	13.16	15.22	9.88	13.77	13.17	16.86	19.38	18.31	23.68	177.91

WRANGELL: 45

Period: 1957-71

Mean annual degree
days above 41 °F: 2,144Mean frost-
free period: 169 days

Latitude: 56° 28' N.

Longitude: 132° 23' W.

Elevation: 37 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	32.1	38.6	41.6	48.2	55.7	61.1	63.4	63.6	57.0	49.4	40.7	35.9	48.9
Minimum	21.7	27.8	29.7	34.3	39.0	44.9	47.8	47.2	43.5	37.2	30.0	25.8	35.7
Average	26.9	33.2	35.7	41.3	47.4	53.0	55.6	54.9	50.3	43.3	35.4	30.9	42.3
Inches													
Precipitation	6.36	5.92	7.10	4.85	3.95	4.28	4.74	6.07	8.60	13.14	9.00	7.74	81.75

YAKATAGA FAA: 22

Period: 1953-67

Mean annual degree
days above 41 °F: 1,454Mean frost-
free period: 141 days

Latitude: 60° 05' N.

Longitude: 142° 30' W.

Elevation: 27 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	33.6	35.9	37.8	43.4	49.0	54.4	57.5	57.9	54.5	46.8	39.0	34.4	45.3
Minimum	23.0	24.5	25.3	30.6	37.1	44.0	48.1	47.6	42.7	35.1	29.2	24.6	34.3
Average	28.3	30.2	31.6	37.0	43.1	49.2	52.8	52.8	48.6	41.0	34.1	29.5	39.8
Inches													
Precipitation	6.33	8.00	4.78	4.96	5.46	4.14	5.98	8.95	11.72	14.70	10.90	10.93	96.85

YAKUTAT WSO AP: 23

Period: 1957-71

Mean annual degree
days above 41 °F: 1,447Mean frost-
free period: 110 days

Latitude: 59° 31' N.

Longitude: 139° 40' W.

Elevation: 28 feet

Mean temperature	Month												Mean annual
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
(°F)													
Maximum	30.1	35.3	37.4	43.5	50.2	56.4	59.8	59.7	55.0	47.0	37.5	32.6	45.3
Minimum	15.7	21.4	21.6	28.5	35.2	43.4	47.2	45.7	40.9	33.3	25.7	20.2	31.6
Average	22.9	28.4	29.5	36.0	42.7	49.9	53.0	52.7	48.2	40.2	31.6	26.4	38.4
Inches													
Precipitation	9.51	11.09	9.87	8.15	9.02	6.00	10.36	10.46	15.26	19.46	14.01	13.86	137.05

Farr, Wilbur A.; Hard, John S. Multivariate analysis of climate along the southern coast of Alaska—some forestry implications. Res. Pap. PNW-RP-372. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; **1987**. 38 p.

A multivariate analysis of climate was used to delineate 10 significantly different groups of climatic stations along the southern coast of Alaska based on latitude, longitude, seasonal temperatures and precipitation, frost-free periods, and total number of growing degree days. The climatic stations were too few to delineate this rugged, mountainous region into distinct climatic zones.

Keywords: Climate, multivariate analysis, coastal Alaska, Alaska (coastal).

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