

3.0 Physical Geography

Location

Southwest Alaska is a vast area that includes portions of mainland Alaska as well as hundreds of islands. The region encompasses four incorporated boroughs and two federally recognized census areas: the Aleutians East Borough, the Aleutians West Census Area, the Bristol Bay Borough, the Dillingham Census Area, the Kodiak Island Borough and the Lake & Peninsula Borough.

As the name implies, the region is located in the southwest portion of Alaska. It is bordered by the Yukon-Kuskokwim to the northwest, the Bering Sea to the west, the North Pacific Ocean to the south, the Gulf of Alaska to the south and east, and portions of the Kenai Peninsula Borough and an unorganized portion of southcentral Alaska to the east and northeast. Map 3.1 shows the location of Southwest Alaska in relation to the entire state.

From Anchorage, Alaska’s largest city and population center, it is 180 air miles to the nearest Southwest community of Port Alsworth. In contrast, to reach Attu Island, the farthest west community in the region, it would require a flight of nearly 1,700 miles. Table 3.1 provides air mileage distances to selected communities in Southwest Alaska. Table 3.2 shows mileage distances to those communities served by the Alaska Marine Highway, the only form of surface transportation into the region.

Table 3.1: Air Mileage from Anchorage to Selected Communities in Southwest Alaska

From Anchorage to:	Air Miles
Port Alsworth	180 miles SW
Kodiak	252 miles SW
King Salmon	289 miles SW
Dillingham	329 miles SW
Sand Point	571 miles SW
Saint Paul	750 miles SW
Akutan	766 miles SW
Unalaska	795 miles SW
Adak	1,250 miles SW
Attu	1,694 miles SW

Sources: U.S. Coast Guard, Lake Clark Air LLC, FAA

Map 3.1 Location of Southwest Alaska



Land Area

The combined area of the four boroughs and two census areas equal 93,875 square miles. Of that total area, nearly 61,000 square miles is land mass and an additional 33,000 square miles is water surface. It is an area roughly equivalent to the State of Oregon, the tenth largest state in the U.S, or 16.5% of the total area of the State of Alaska.

The Lake & Peninsula Borough accounts for roughly one-third of the total area of the region. Together, the Dillingham Census Area and the Lake & Peninsula Borough make up more than half of the area of the region. At 888 square miles, the Bristol Bay Borough is the smallest sub-region comprising less than one percent of the region. For two sub-regions, the Aleutians East Borough (53%) and the Aleutians West Census Area (69%), the water surface area is greater than the land mass. Table 3.3 enumerates the area of each borough or census area in Southwest Alaska. Map 3.2 illustrates the boundaries and locations for each borough or census area.

Table 3.2: Mileage to Southwest Alaska Communities via the Alaska Marine Highway

City	to	City	Running Time (Hours)	Nautical Miles	Statute Miles
Homer	to	Kodiak	9.5	136	155
Kodiak	to	Chignik	18.5	249	283
Chignik	to	Sand Point	9.25	138	157
Sand Point	to	King Cove	6.5	98	111
King Cove	to	Cold Bay	2	25	28
Cold Bay	to	False Pass	4.25	58	66
False Pass	to	Akutan	10.5	134	152
Akutan	to	Unalaska	3.3	45	51

Source: Alaska Department of Transportation/AMHS

Table 3.3: Southwest Alaska Area by Boroughs and Census Areas

Borough or Census Area	Land Area (sq. miles)	Water Area (sq. miles)	Total Area (sq. miles)	%
Aleutians East Borough	6,988.10	8,023.5	15,011.6	16.0%
Aleutians West Census Area	4,397.00	9,719.7	14,116.5	15.0%
Bristol Bay Borough	504.9	382.8	887.7	0.9%
Dillingham Census Area	18,675.00	2,253.6	20,928.40	22.3%
Kodiak Island Borough	6,559.80	5,463.8	12,023.70	12.8%
Lake & Peninsula Borough	23,782.00	7,125.0	30,907.00	32.9%
Southwest Region Total	60,906.80	32,968.5	93,874.80	100.0%

Source: U.S. Census Bureau and Alaska Department of Community & Economic Development

Map 3.2: Alaska Boroughs and Census Areas



Geology

The physical features of Southwest Alaska have origins in the forces that helped to create the Alaska landform. Based on plate tectonics theory, the earth's surface is a collection of gigantic plates that move over the shifting, underlying mantle. Alaska is formed by three terranes or bands of similar plates that have drifted toward the North American continental plate. Southwest Alaska is composed entirely of terranes that originated in the Pacific Ocean region, drifted northward, and abutted to the edge of the continental plate.¹

Plate tectonic theory offers explanation for the seismically active nature of Southwest Alaska. Where the Pacific Plate meets the North American Continental Plate, a subduction zone is formed. The Aleutian Trench is a dramatic drop in the ocean floor that parallels the Aleutian Chain and extends into the Gulf of Alaska. This subduction zone has created a trench nearly five miles deep that forms a concave arc just south of the region.

Southwest Alaska is a zone of frequent earthquakes and volcanic eruptions. It is part of a series of volcanic arcs and ocean trenches around the Pacific Basin that form the so-called Ring of Fire.² About 80 major volcanic centers consisting of one or more volcanoes dot the Alaska Peninsula and the Aleutian Islands.³ According to the U.S. Geological Survey and the Alaska Volcano Observatory, 36 of the 41 active volcanoes in Alaska are in Southwest Alaska. Four other historically active volcanoes border the northeastern boundary of the Lake & Peninsula Borough along Cook Inlet.⁴

Shifting tectonic plates also result in earthquakes. Two of the world's top ten magnitude earthquakes have had epicenters in Southwest Alaska (see Map 3.3).⁵ Each year Alaska has about 5,000 earthquakes, including 1,000 that measure above a magnitude of 3.5. Alaska typically sees half a dozen quakes each year above magnitude 6. According to the Alaska Earthquake Information Center (AEIC) there are over 200 earthquakes with magnitude 4 and greater per year in the region from Kodiak Island westward through Attu Island. There were about 60 earthquakes with magnitude 7 and greater in that region in the past 100 years. Due to limited seismic tracking stations in the Aleutians, the AEIC data focuses on moderate to large magnitude events.⁶

Southwest Alaska is also vulnerable to the aftereffects of seismic activity in other regions. The 1964 Good Friday earthquake, with an epicenter near Valdez, generated tsunamis that wiped out villages on the Alaska Peninsula, destroyed much of downtown Kodiak, and caused land subsidence that resulted in the abandonment of still more villages. Similarly, earthquakes in Southwest Alaska have impacted Hawaii, California, Oregon, Japan, and the Russian Far East.

With the exception of numerous cirque and valley glaciers scattered throughout the region, significant areas of present day glaciation are limited to four areas on the Alaska Peninsula, the northeastern reaches of the Lake & Peninsula Borough, and the Aleutian Islands. Much of the glaciated areas are contained within Lake Clark National Park and Katmai National Park and Preserve. Estimated total area for present day glaciations in the region is

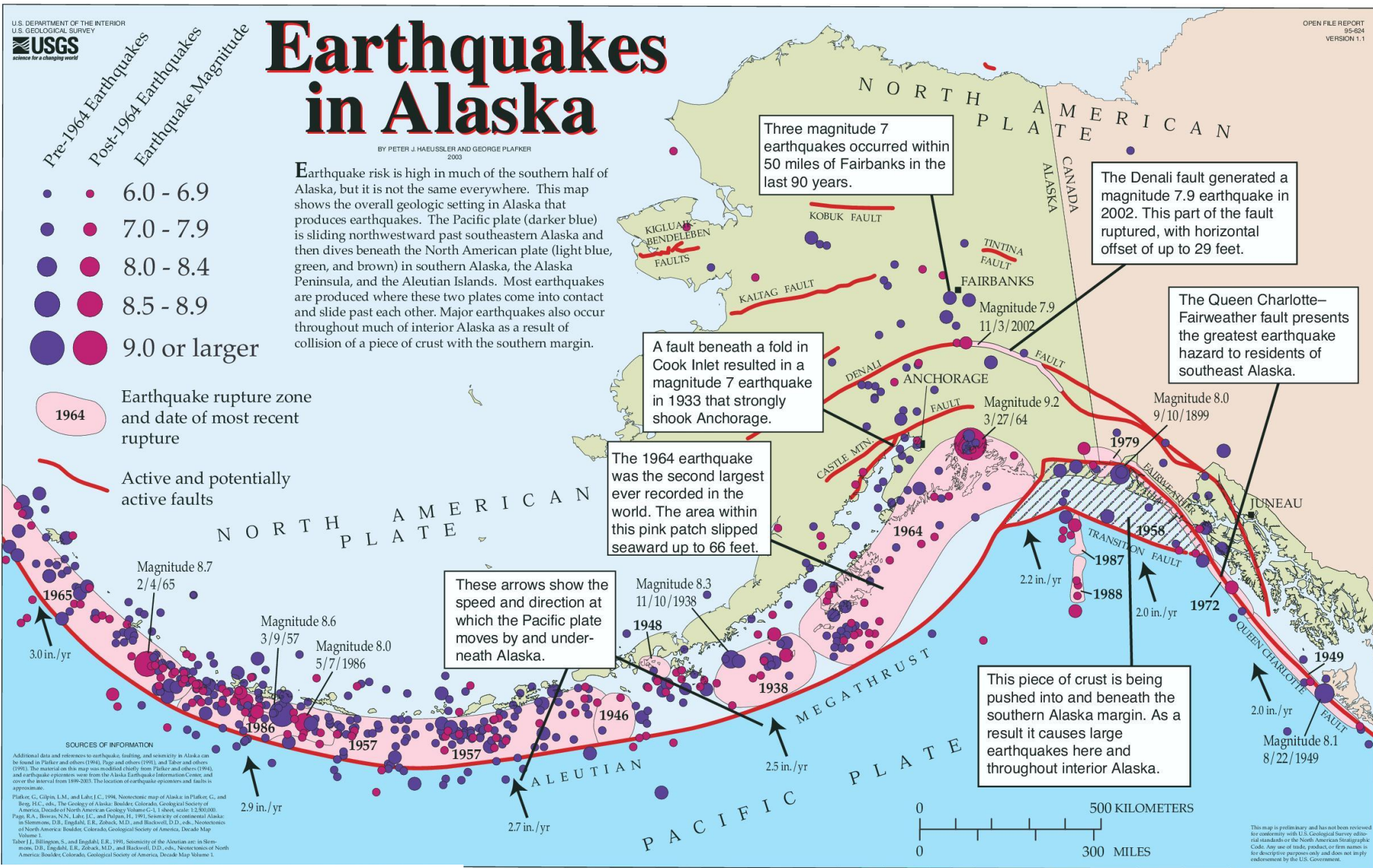
854 square miles. However, during the Great Ice Age and the Little Ice Age, most of Southwest Alaska was covered by glaciers. Glacial advances and retreats left a profound impact on the topography of the region, creating vast lakes, carved peaks, and expansive valleys.

Southwest Alaska is divided into two physiographic divisions: the Pacific Mountain System and the Intermontane Basins and Plateaus. Both systems extend throughout western North America.⁷

The Pacific Mountain System splits into northern and southern arcs as it reaches into Alaska. Shelikof Strait and the Kodiak Archipelago are the farthest southwest extension of the southern arc, while the northern arc includes the Alaska Range, the Aleutian Range, and the Aleutian Islands.

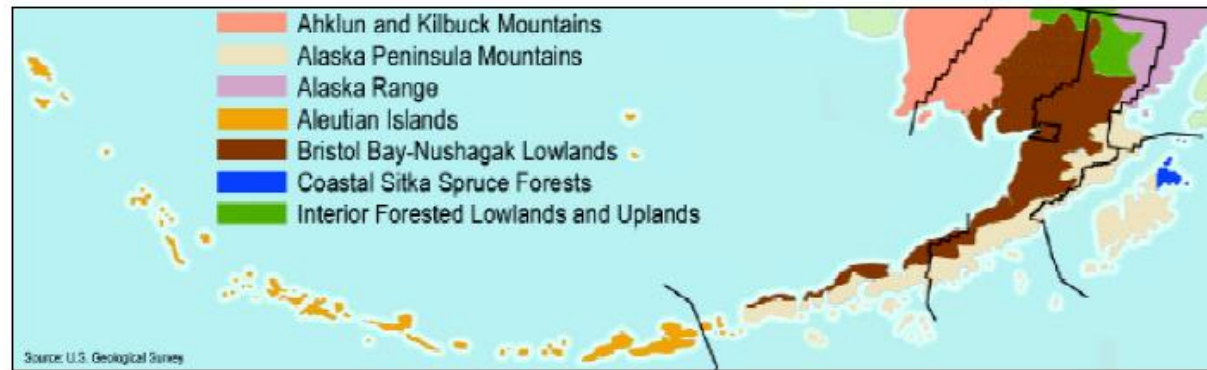
A broad expanse of uplands, valleys and lowland basins form the Intermontane Basins and Plateaus. This physiographic system includes the Nushagak-Bristol Bay Lowlands, the Ahklun and Kilbuck Mountains, and Interior Forested Lowlands and Uplands.

Map 3.3: Earthquakes, Active Faults and Rupture Zones in Alaska



Source: Alaska Earthquake Information Center

Map 3.4: Ecoregions of Southwest Alaska



Ecosystems

Map 3.4 delineates the seven ecoregions of Southwest Alaska as determined by the U.S. Geological Survey. A variety of natural habitats can be found within each ecosystem including: estuaries and lagoons; wetlands and tideflats; rocky islands and seacliffs; exposed high-energy coasts; rivers, streams and lakes; boreal forests/taiga; alpine and low arctic tundra; glaciers and barren alpine; and temperate rainforests. Each ecoregion has distinctive topography, vegetation patterns, climate zones and fauna.⁸

The following ecoregion descriptions were developed by the U.S. Geological Survey:

Ahklun-Kilbuck Mountains: This coastal group of rugged steep-walled mountains forms a boundary to the west of the Bristol Bay Lowlands. Here, strongly-deformed sedimentary and volcanic rocks are cut by great northeast-trending faults including portions of the Denali Fault. Mountain glaciers formed

during the Pleistocene ice age carved many broad U-shaped valleys. On the south side of the mountains, these valleys have subsequently filled with water forming large “finger” lakes. These lakes have resident rainbow trout and nurture abundant runs of sockeye salmon during the summer. Mountain soils have formed in very stony and gravelly colluvium over bedrock, whereas valley soils have formed in glacial till. Dwarf shrub-lichen tundra dominates mountain crests and upper slopes where permafrost is discontinuous. Shrubs (willows, birches, and alders) become progressively more abundant and robust at lower elevations as permafrost becomes more fragmented. In valleys, shrublands are punctuated by sedge-tussock tundra meadows (on very wet areas) and mixed forests. Moose, beavers, and Arctic hares thrive in these shrubby habitats. Walrus and sea lions haul-out in great numbers along the rocky beaches. Seabirds also inhabit these areas. At this latitude, ice normally spans the Bering Sea in winter allowing access for cold Siberian air.⁹

Alaska Peninsula Mountains: The Aleutian Range serves as the spine of this peninsula which divides Bristol Bay from the North Pacific Ocean. The Alaska Peninsula narrows progressively towards the south-west as the range becomes increasingly submerged. The folded and faulted sandstone bedrock is dotted with symmetrical cinder cones clad with ice, pumice, and volcanic ash. Earthquakes are common and some of the most active volcanoes on the continent occur here. The Pleistocene Glaciation has produced strongly contrasting topographies along this peninsula with smooth glacial moraines and colluvial shields on the north side and rugged deeply-cut fjordlands on the south side. In turn, glacial-fed streams flowing northward have low-energy, shallow channels whereas those flowing southward have high-energy, deeply-incised channels. Along the north side, huge lakes have filled behind young glacial moraines that act as dams.

The peninsula is generally free of permafrost, however sea ice occasionally forms in Bristol Bay demarcating the northern extent of sea otters. The coastline habitat supports numerous shorebirds and sea mammals. Many Steller sea lion rookeries and haul outs are present. Large populations of brown bears survive on abundant pink, chum, and silver salmon runs. Dominant vegetation is low shrublands of willow, birch, and alder interspersed with ericaceous/ heath and Dryas-lichen communities. Alpine tundra and glaciers occur on mountaintops.¹⁰

Alaska Range: A series of accreted terranes conveyed from the Pacific Ocean have fused to form this arcing mountain range. In turn, these

towering mountains harbor a complex mix of folded, faulted, deformed metamorphic rocks. Landslides and avalanches frequently sweep the steep, scree-lined slopes. Discontinuous permafrost underlies shallow and rocky soils. Because of its height, a cold continental climate prevails and much of the area is barren of vegetation. Occasional streams of Pacific moisture are intercepted by the highest mountains and help feed small icefields and glaciers. At their termini, swift glacial streams with heavy sediment loads course down mountain ravines and braid across valley bottoms. Alpine tundra supports populations of Dall sheep and pikas on mid and upper slopes. Shrub communities of willow, birch, and alder occupy lower slopes and valley bottoms. Forests are rare and relegated to the low-elevation drainages. Brown bears, gray wolves, caribou, Dall sheep, and wolverines are common denizens in the Alaska Range.¹¹

Aleutian Islands: These sometimes fog-shrouded islands represent volcanic summits of a submarine ridge extending from the Alaska Peninsula to the Kamchatka Peninsula. The Aleutian island arc and deep sea trench are products of the Pacific plate subducting beneath the North America plate. It is one of the most seismically and volcanically active areas in the world. The topography features glaciated and rubble-strewn volcanic cones indented with fjords and bordered by sea cliffs or wave-beaten platforms. These islands are free of permafrost, covered by volcanic-ash soils, and dissected radially by short, swift streams. A cool maritime climate with abundant year-around precipitation prevails over these permafrost-free islands. Terrestrial warming is subdued by incessant cold ocean

winds, perpetual overcast clouds and fog which limit solar insolation. The flora is a blend of species from two continents, grading from North American to Asian affinities from east to west. Mountain flanks and coastlines dominated by low shrubs of willow, birch, and alder interspersed with ericaceous-heath, *Dryas*-lichen, and grass communities. Alpine tundra and glaciers occur on mountains. This island chain demarcates the southern boundary of the Bering Sea and the North Pacific Ocean, which are important grounds for marine mammals (northern fur seals, Steller sea lions, and sea otters), waterfowl (Aleutian Canada geese, emperor geese) and seabirds (various species of auklet, red-legged kittiwakes). With their vast numbers, seabirds serve as important nutrient suppliers by splattering these islands with guano.¹²

Interior Forested Lowlands and Uplands:

This ecoregion represents a patchwork of ecological characteristics. Regionwide unifying features include a lack of Pleistocene glaciation, a continental climate, a mantling of undifferentiated alluvium and slope deposits, a predominance of forests dominated by spruce and hardwood species, and a very high frequency of lightning fires. On this backdrop of characteristics is superimposed a finer grained complex of vegetation communities resulting from the interplay of permafrost, surface water, fire, local elevational relief, and hillslope aspect.¹³

Bristol Bay-Nushagak Lowlands: This flat to gently-rolling lowland is comprised mainly of glacial till and outwash deposited by various Pleistocene glaciers from the surrounding Ahklun Mountains and Aleutian Range. This

basin is underlain with mixes of glacial, alluvial, and marine sediments all cloaked with varying amounts of loess. Regardless of substrate, these lowlands harbor large concentrations of lakes, ponds, meandering rivers, and wetlands that serve as important staging and migration areas for an abundance of waterfowl. This habitat supports the largest run of sockeye salmon in the world which, in turn, sustains large populations of brown bear, eagles and osprey. Permafrost occurs in scattered isolated masses. Wet organic soils support low and dwarf shrub communities of willow, birch, and alder. Mosses and lichens are abundant groundcovers. The climate is maritime polar with substantial moderation afforded by the southern Bering Sea and the North Pacific Ocean. At this latitude, ice occasionally spans the Bering Sea in winter allowing access for cold Siberian air.¹⁴

Coastal Western Hemlock-Sitka Spruce

Forest: Part of a temperate rain forest zone that extends from southeast Alaska across the Gulf of Alaska with a western boundary that ends in the northern reaches of the Kodiak Archipelago. West of Cook Inlet, Sitka spruce dominates within this forest and is the lone native conifer on Kodiak and Afognak Islands. This forest requires cool temperatures, high humidity, and abundant rainfall. Soil types and conditions vary greatly throughout the forest. This vegetation type generally occurs in areas where permafrost is absent. The terrain of this ecoregion is a result of intense glaciation during late advances of the Pleistocene. The deep, narrow bays, steep valley walls that expose much bedrock, thin moraine deposits on hills and in valleys, very irregular coastline, high sea cliffs, and deeply dissected glacial

Map 3.5 Climatic Zones of Southwest Alaska



moraine deposits covering the lower slopes of valley walls are all evidence of the effects of glaciation. The region has the mildest winter temperatures in Alaska, accompanied by large amounts of precipitation.¹⁵

Climate

Climate dramatically influences daily life in Southwest Alaska. It can facilitate or prevent economic activity. Air and marine transportation and other forms of human activity can be significantly curtailed or enhanced by the right climatic conditions. While many Americans can pay only cursory attention to weather conditions without any consequences, the residents of Southwest Alaska must pay particular attention to current weather conditions and forecasts for climatic changes. In addition to standard weather forecasts, marine and aviation forecasts are of particular importance to the region.

Based on variations in temperature and precipitation, there are four climatic regions in Southwest Alaska.¹⁶ Latitude and topography

contribute to variations across climatic zones. Most of the region has a distinctive maritime influence, but transition zones in the northern reaches of the Dillingham Census Area and the Lake & Peninsula Borough are also impacted by continental influences. Map 3.5 illustrates the four climatic zones, which are briefly described below.¹⁷

Western Maritime Climatic Zone: All of the Aleutians East Borough, the Aleutians West Census Area, and the Kodiak Island Borough are within the Western Maritime Climatic Zone. The southern portion of the Lake & Peninsula Borough is also in this zone. Characterized by equable temperatures, this area is not impacted by continental influences that produce extreme temperature variations in Alaska's interior. Ocean influences can serve a dual role, bringing both warming and cooling effects. Overcast skies and foggy conditions are common. Wind conditions are generally moderate to strong. Severe winter storms with hurricane or cyclone force winds are not uncommon. Wind chill factors can be extreme during such storms.¹⁸

Southcentral Climatic Zone: A substantial portion of the Lake & Peninsula Borough from the Alaska Peninsula through the Lake Clark region, the eastern portion of the Bristol Bay Borough, and most of the Kodiak Island Borough land on the Alaska Peninsula are in the Southcentral Climatic Zone. Impacted by both maritime and continental influences, this area is characterized as a transitional zone. Warming from the Gulf of Alaska and cooling influences from the interior converge in this area generating greater temperature variation. Weather is generally more variable, manifesting aspects of interior, maritime and combination conditions. On average, temperatures are more extreme than in the maritime zone, but less than in the interior. Precipitation amounts also fluctuate between the two zonal influences. Surface winds are generally light with numerous exceptions.¹⁹

For an indication of typical characteristics of this climatic zone, please refer to the climatic conditions for Iliamna in Table 3.5.F.

West Coast Climatic Zone: Most of the Dillingham Census Area, the Bristol Bay Borough, and a portion of the Lake & Peninsula Borough are in the West Coast Climatic Zone. While the primary climatic influence is maritime, continental influences from the Interior also affects the Bristol Bay coast. Temperatures vary more than the Western Maritime Zone. Both precipitation and snowfall are lower than in the Western Maritime Zone, but greater than the Southcentral Zone. In general, conditions are cool, humid and windy.²⁰

Chart 3.1: Average Annual Temperatures for Selected Southwest Regions

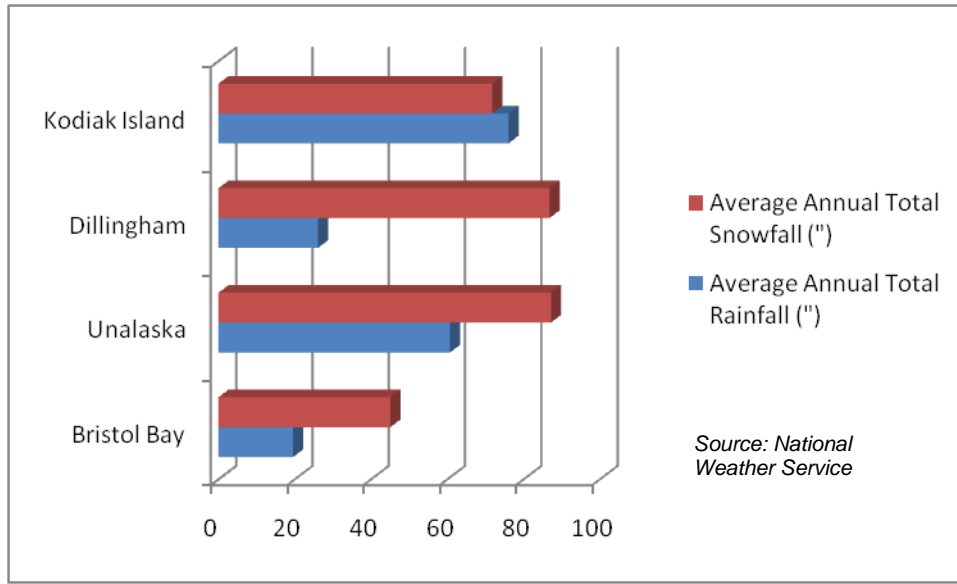
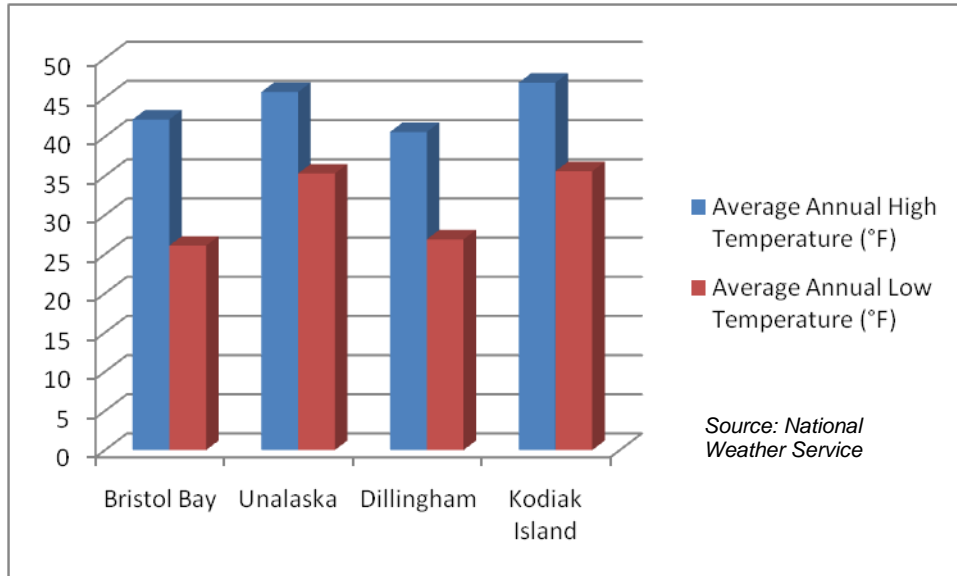


Chart 3.2: Average Annual Precipitation for Selected Southwest Regions



Interior Climatic Zone: The colder continental influences of interior Alaska reach into the region forming a small Interior Climatic Zone that spans the boundary between the Dillingham Census Area and the Lake & Peninsula Borough. This zone is also characterized as a transition zone because maritime influences do moderate the colder temperatures that define the zone as it extends to the north. In comparison to the rest of the region, temperature varies more in this zone.²¹

Hydrology

Given the extensive coastline and density of islands within Southwest Alaska, the hydrosphere is a major element of the region. Both fresh and salt waters are essential to the primary economic activity of commercial seafood harvesting and processing. Bordered by the Bering Sea, the North Pacific Ocean, and the Gulf of Alaska, these important marine ecosystems serve as the basis for much of the region's economy. Southwest Alaska has nearly 12,000 miles of shoreline, which accounts for nearly 40% of the shoreline for the State of Alaska. In comparison, the contiguous 48 states have a combined shoreline of 16,900 miles. Table 3.6 presents shoreline comparisons for the boroughs and census areas, as well as for the state.

Ocean basin topography, currents, the extent of sea ice, water temperature and other environmental characteristics influence the productivity of the region's salt water environments. The Kuroshio Current flows across the Pacific Ocean from Japan, splitting into two currents as it approaches North

America. One current, the Alaska Current, turns north creating a counterclockwise flow into the Gulf of Alaska. Currents from the North Pacific move through passes in the Aleutian Chain into the Bering Sea. Currents in the Bering Sea are very complex, but generally tend to move counterclockwise. The interaction of ocean currents with nutrient-rich freshwater runoff from the region's uplands is part of what makes the area such a productive fisheries ecosystem.

The ocean basin topography around Southwest Alaska forms three basic structures. A relatively shallow expanse of the continental shelf (less than 1,600 m below sea level) begins at the Albatross Shelf east of Kodiak, continues across Bristol Bay and the Bering Sea past Unimak Island in the Aleutian Chain, and then narrows along the remainder of the Aleutian Chain. Just south of the Aleutians, the topography drops to a narrow band of greater depth (1,601 – 2,800 m) before dropping off into the much deeper North Pacific (greater than 4,000 m). To the north of the Aleutians, the Bering Sea drops into the enormous Aleutian Basin with depths ranging between 1,600 – 4,000 m.²²

Historically, the formation of sea ice in the Bearing Sea usually advances into Bristol Bay, arcing from Goodnews Bay to just south of Egegik. The maximum winter advance of sea ice has extended as far south as Unimak Island. Sea ice formation and its impact on ocean temperatures has been an area of increasing interest as scientists examine regime shifts in the Bering Sea. In recent years, the formation of sea ice has been less predictable. Sea ice formation has not extended as far south as

Table 3.6: Shoreline of Southwest Alaska by Boroughs and Census Areas

Borough or Census Area	Miles of Shoreline	% of Region
Aleutians East Borough	2,547	21.3%
Aleutians West Census Area	3,700	30.9%
Bristol Bay Borough	156	1.3%
Dillingham Census Area	984	8.2%
Kodiak Island Borough	2,774	23.1%
Lake & Peninsula	1,824	15.2%
Southwest Region Total	11,985	*35.3%
Alaska Total	33,904	**38.3%

*% of State
 **% of U.S.

Source: U.S. Department of Commerce; National Oceanic and Atmospheric Administration

usual in some years, while in others it has reached near maximum advance. The far west reaches of the Aleutians, the south side of the Alaska Peninsula, and the Kodiak Archipelago are free from sea ice formation.

Tidal action and tidal variation are also important aspects of the ocean environment around Southwest Alaska. Although tidal variation is not as great in Southwest Alaska as it is in other regions of Alaska, it is still significant in some parts of the region Table 3.7 illustrates high and low tidal ranges within the boroughs and census areas. Tidal variation tends to be greatest at river outlets and nearly nonexistent on some of the Aleutian Islands.

Lakes: The State of Alaska is estimated to have more than three million freshwater lakes. According to the U.S. Geological Survey, seven of the ten largest lakes in the state are in

Southwest Alaska. Table 3.8 enumerates the largest lakes in the region. With the exception of Naknek Lake, all of these lakes are within the boundaries of the Lake & Peninsula Borough. The westernmost portion of Naknek Lake falls within the boundaries of the Bristol Bay Borough.

Lake Iliamna and Becharof Lake are the first and second largest lakes in the state, respectively. These lakes also hold the distinction of being the second and fourth largest lakes in the U.S. Lake Iliamna is situated between Lake Clark and Katmai National Parks. At 1,150 square miles in area and 80 miles in length, the lake is approximately the size of the state of Connecticut. Lake Iliamna is the centerpiece of a large lake system that also includes Lake

Table 3.7: Largest Lakes in Southwest Alaska

Lake	Area (sq. mi.)	Ranking in Alaska
Lake Iliamna	1,150	1
Becharof Lake	458	2
Naknek Lake	242	4
Lake Clark	110	6
Upper Ugashik	75	8
Lower Ugashik	72	9
Kukaklek Lake	72	10

Source: U.S. Geological Survey

Clark. Iliamna has a mean depth of 144 feet and is over 900 feet deep in some areas.²³ The system drains into Bristol Bay via the Kvichak River.

Becharof Lake is situated in the Becharof National Wildlife Refuge on the Alaska Peninsula. It covers 458 square miles and has a mean depth of 186 feet. Becharof Lake is located in the Egegik River watershed and feeds into Bristol Bay. Numerous other lakes dot the region. The extensive Wood-Tikchik lake system in the Dillingham Census Area includes Nunavaugaluk Lake, Lake Aleknagik, Lake Nerka, Lake Middle Nerka, Lake Beverly, Lake Kulik, Nuyakuk Lake, and Tikchik Lake.

Numerous other lakes dot the region. The extensive Wood-Tikchik lake system in the Dillingham Census Area includes Nunavaugaluk Lake, Lake Aleknagik, Lake Nerka, Lake Middle Nerka, Lake Beverly, Lake Kulik, Nuyakuk Lake and Tikchik Lake.

In the Aleutians East Borough, small lakes such as Bear Lake, Shishkof Pond, Sandy Lake and Sapsuk Lake can be found. Long, shallow lakes are common on the southwest portion of Kodiak Island, including Karluk Lake, Fraser Lake, and Red Lake. Several other large lakes in this area are Uganik Lake and Afognak Lake. In addition to these larger lakes, there are many unnamed pothole lakes that pockmark the lowlands of virtually every area of Southwest Alaska.

Rivers, Streams, and Creeks: The Alaska Department of Fish & Game lists 3,174 entries for Southwest Alaska in the *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes*.²⁴ It is estimated that only half of all anadromous waters are currently listed in the catalog. Most streams and creeks in the region remain unnamed.

There are two drainage zones within the region. Most drainage and river discharge falls into the Southwest Alaska Drainage Region, as

Map 3.6: Wetlands Distribution in Southwest Alaska



designated by the U.S. Geological Survey. Waters in the Kodiak Archipelago and on the southeast ridge of the Aleutian Range flow into the Southcentral Alaska Drainage Region.

The most extensive river systems in Southwest Alaska can be found in the Bristol Bay lowlands encompassing the Dillingham Census Area, the Bristol Bay Borough, and portions of the Lake & Peninsula Borough on the north side of the Alaska Peninsula. There are eight major river systems in this region: the Wood River, Nushagak River, Kvichak River, Naknek River, Egegik River, Ugashik River, Meshik River, and Chignik River. Elsewhere in the region, most rivers and creeks are generally shallow and short in length, frequently originating from lakes or glaciers. Many are steep with swift moving water, especially along the Aleutian Range.

Five rivers in Southwest Alaska have been designated National Wild & Scenic Rivers (WSR) by the U.S. Government. Each of the five rivers is designated for wild and scenic values within a unit of the National Park system. Within Katmai National Park, the Alagnak River (74 mi.) has WSR designation. Within the boundaries of the Aniakchak National Monument & Preserve, 63 miles of the Aniakchak River has WSR designation. Three rivers in Lake Clark National Park & Preserve have WSR designation: the Chilikadrotna River (11 mi.), the Mulchatna River (24 mi.), and the Tlikakila River (51 mi.).

Ground Water: Wetlands within Southwest Alaska are generally confined to the Dillingham Census Area, the Bristol Bay

Borough, the Lake & Peninsula Borough and the Aleutians East Borough. The largest concentrations of wetlands are in the Bristol Bay-Nushagak Lowlands ecosystem. Map 3.6 identifies the distribution of wetlands in the region.

According to the U.S. Geological Survey, information about the aquifers or water-bearing geologic formations outside of Alaska's urban areas is sparse. Alaska's groundwater is generally of good quality and is suitable for most uses, although hard water and naturally high iron concentrations are common. There are localized water quality problems with various natural and man-made causes. These include natural geologic conditions, such as aquifers in marine sedimentary rocks that can produce brackish water. Natural biologic processes and contamination from septic tank discharges can cause high nitrate concentrations, and intensive pumping in aquifers near the coasts can mix sea water with freshwater, making it unfit for most uses.²⁵

Most of the groundwater pumped in Alaska comes from sand and gravel aquifers that are typical of a relatively small part of the state. The consolidated bedrock that covers more than 70 percent of Alaska forms aquifers with great variability, and much remains to be learned about the groundwater that might potentially be tapped.²⁶

Endnotes

¹ Alaska in Maps, page 22 with supplemental information from: <http://www.usgs.gov>

2

<http://pubs.usgs.gov/publications/text/fire.html>

3

<http://pubs.usgs.gov/gip/volcus/ustext.html#Alaskan>

4

<http://www.avo.alaska.edu/avo4/pdfs/usgsfs118-00.pdf>

⁵ Alaska Earthquake Information Center
<http://www.aeic.alaska.edu/>

⁶ Natalia Ratchkovski, Ph.D., Seismologist, Alaska Earthquake Information Center, Personal communication, June 19, 2003

⁷ Pearson, Roger. Alaska in Maps: A Thematic Atlas, page 21. July 1998.

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<http://www.fs.fed.us/land/pubs/ecoregions/index.html>

⁹ IBID

¹⁰ IBID

¹¹ IBID

¹² IBID

¹³ IBID

¹⁴ IBID

¹⁵ IBID

¹⁶ Pearson, Roger. Alaska in Maps: A Thematic Atlas, page 23 and 33. July 1998.

¹⁷ IBID

¹⁸ IBID

¹⁹ IBID

²⁰ IBID

²¹ IBID

²² IBID

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http://www.lakeandpen.com/index.asp?Type=B_BASIC&SEC={AFCFD48C-BDE5-47FF-BD61-FB50625F46CE}

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<http://www.sf.adfg.state.ak.us/SARR/AWC/index.cfm/FA/main.overview>

²⁵ Jay Johnson, ADF&G, personal communication with additional data manipulation by author, June 2003

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<http://waterdata.usgs.gov/ak/nwis/>