Climate of Idaho

Introduction

This publication consists of a narrative that describes some of the principal climatic features and a number of climatological summaries for stations in various geographic regions of the State. The detailed information presented should be sufficient for general use; however, some users may require additional information.

The National Climatic Data Center (NCDC) located in Asheville, North Carolina is authorized to perform special services for other government agencies and for private clients at the expense of the requester. The amount charged in all cases is intended to solely defray the expenses incurred by the government in satisfying such specific requests to the best of its ability. It is essential that requesters furnish the NCDC with a precise statement describing the problem so that a mutual understanding of the specifications is reached.

Unpublished climatological summaries have been prepared for a wide variety of users to fit specific applications. These include wind and temperature studies at airports, heating and cooling degree day information for energy studies, and many others. Tabulations produced as by-products of major products often contain information useful for unrelated special problems.

The Means and Extremes of meteorological variables in the Climatography of the U.S. No.20 series are recorded by observers in the cooperative network. The Normals, Means and Extremes in the Local Climatological Data, annuals are computed from observations taken primarily at airports.

The editor of this publication expresses his thanks to those State Climatologists, who, over the years, have made significant and lasting contributions toward the development of this very useful series.

State and Station Normals are available at:
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Topographic Features- Idaho lies entirely west of the Continental Divide, which forms its boundary for some distance westward from Yellowstone National Park. With a maximum north-south extent of seven degrees of latitude, its east-west extent is six degrees longitude at latitude 42º North, but only one degree of longitude at 49º North. The northern part of the State averages lower in elevation than the much larger central and southern portions, where numerous mountain ranges form barriers to the free flow of air from all directions. In the north, the main barrier is the rugged chain of Bitterroot Mountains forming much of the boundary between Idaho and Montana. The extreme range of elevation in the State is from 710 feet at the Snake River to 12,662 feet at Mt. Borah in Custer County. Comprising rugged mountain ranges, canyons, high grassy valleys, arid plains and fertile lowlands, the State reflects in its topography and vegetation a wide range of climates. Located some 300 miles from the Pacific Ocean, Idaho is, nevertheless influenced by maritime air borne eastward on the prevailing westerly winds. Particularly in winter, the maritime influence is noticeable in the greater average cloudiness, greater frequency of precipitation and mean temperatures, which are above those at the same latitude and altitude in mid-continent. This maritime influence is most marked in the northern part of the State, where the air arrives via the Columbia River Gorge with a greater burden of moisture than at lower latitudes. Eastern Idaho's climate has a more continental character than the west and north, a fact quite evident not only in the somewhat greater range between winter and summer temperatures, but also in the reversal of the wet winter-dry summer pattern.

Climate is the cumulative representation of weather over a long period of time, covering a decade or longer. The climate of Idaho exhibits substantial variability. Two dominant climate types are a maritime climate most evident in the winter, especially in the northern part of the State, and a continental climate that prevails in the summer. The varied topography of the State, including mountains, valleys and plains, plays an important role in its climate. Current climate information can be obtained through *Idaho State Climate Services* at http://www.uidaho.edu/~climate.

Temperature- The pattern of average annual temperatures for the State indicates the effect both of latitude and altitude. The highest annual averages are found in the lower elevations of the Clearwater and Little Salmon river basins, and in the stretch of the Snake River Valley from the vicinity of Bliss downstream to Lewiston, including the open valleys of the Boise, Payette and Weiser rivers. At Swan Falls the annual mean is 55 degrees Fahrenheit (º F), the highest in the State. Obsidian, at an elevation of 6,780 feet in Custer County, has the lowest annual average, 35.4º F, of any reporting station, with such places as Sun Valley, Chilly Barton Flat, Grouse, Island Park Dam and Big Creek not far behind. The range between the mean temperatures of the coldest and warmest months of the year varies from less than 40º F at a number of northern stations, to well over 50º F at stations in the higher elevation of the central and eastern parts of the State. In the basin of the Snake River and its tributaries, between Twin Falls and Idaho Falls, monthly mean temperatures of 32º F or lower persist from December through February, while

downstream from Twin Falls, at the lower elevations, monthly mean temperatures are freezing or below only in December and January. Low-level stations like Riggins and Lewiston show no month in the year with mean temperature 32º F or lower. In general, it can be said that month means are 32º F or lower at stations above 5,000 feet from November through March; between 4,000 and 5,000 feet, November through February; 3,000 to 4,000 feet, December through February; and 2,000 to 3,000 feet, only one or two months. The diurnal range of temperature is, of course, most extreme in high valleys and in the semiarid plains of the Snake River Valley. The magnitude of diurnal range varies with the season, being lowest in winter when cloudiness is much more prevalent and greatest in the warmer part of the year. At Boise, for example, the average diurnal range is only 14º F in January, but exceeds 30º F in July through September. Official temperature extremes have been measured as low as -60º F at Island Park in January 1943, and as high as 118º F at Orofino in July 1934. The coldest monthly mean minimum temperature has been -20, and the warmest monthly mean maximum 104º F. In summer, periods of extreme heat extending beyond a week are quite rare, and the same can be said of periods of extremely low temperatures in winter. In both cases the normal progress of weather systems across the State usually results in a change at rather frequent intervals. In the realm of extremely low temperatures, two winters stand out in the records for the State, 1937 - 1938 and 1948 -1949. The lowest monthly mean temperatures on record occurred through the State in January 1949, and many stations registered their absolute lowest temperature on record during that month.

Precipitation- To a large extent the source of moisture for precipitation in Idaho is the Pacific Ocean. In summer there are some exceptions to this when moisture-laden air is brought in from the south at high levels to produce thunderstorm activity, particularly in the eastern part of Idaho. The source of this moisture from the south is apparently the Gulf of Mexico and Caribbean region. The average precipitation map for Idaho is as complex as the physiography of the State. Partly because of the greater moisture supply in the west winds over the northern part of the State, (less formidable barriers to the west) and partly because of the greater frequency of cyclonic activity in the north, the peaks on the average annual precipitation map are found, however, in nearly all parts of the State at higher elevations. Sizeable areas in the Clearwater, Payette and Boise river basins receive an average of 40 to 50 inches per year, with a few points or small areas receiving in excess of 60 inches. Large areas including the northeastern valleys, much of the Upper Snake River Plains, Central Plains, and the lower elevations of the Southwestern Valleys receive less than 10 inches annually. Seasonal distribution of precipitation shows a very marked pattern of winter maximum and midsummer minimum in the northern and western portions of the State. In the eastern part of the State, however, many reporting stations show maximum monthly amounts in summer and minimum amounts in winter. In the Northeastern Valleys and Eastern Highlands, more than 50 percent of the annual rainfall occurs during the period April through September. Over nearly all of the northern part of the State, however, less than 40 percent of the annual rainfall occurs in this same period, and in portions of the Boise, Payette and Weiser river drainages less than 30 percent of the annual amount comes in that six-month period.

Snowfall distribution is affected both by availability of moisture and by elevation. Annual snowfall totals in Shoshone County have reached nearly 500 inches. The greatest long-term seasonal average was 182 inches at Mullan Pass, while the greatest snow depth (also 182 inches)

was recorded at that station on February 20, 1954. The major mountain ranges of the State accumulate a deep snow cover during the winter months, and the release of water from the melting snowpack in late spring furnishes irrigation water for several million acres, mainly within the Snake River Basin above Weiser. Irrigation water supplies are nearly always plentiful, except on some of the smaller projects where storage facilities are inadequate. Hydroelectric power generated in Idaho provides some of the least expensive power in the United States.

Floods in Idaho occur most often during the period of seasonal snowmelt in spring, particularly in April and May. A few areas in the State are actually flooded or threatened by floodwaters nearly every year. The Kootenai River valley, in the vicinity of Bonners Ferry, is one such area, and another is the Snake River upstream from Idaho Falls in the vicinity of Roberts and Menan. Much has been done to minimize the damage from such seasonal floods through the construction of reservoirs and other flood-control facilities. So-called "out-of-season" floods do occur occasionally at a number of points in the State. For example, wintertime floods have occurred on the Payette, Weiser, Little Salmon and Wood rivers' portions of the upper Boise and Payette basins. Flash floods on small streams, or occasionally in ravines or dry gulches, occur a few times each year as the result of heavy rains associated with thunderstorms. Two areas that seem to be particularly susceptible to this type of flooding lie between Downey and Pocatello in the southeast, and in the north-central part of the State between Grangeville and Moscow.

The diurnal range of relative humidity generally follows a pattern that is the reverse of the diurnal temperature curve. Precipitation or fog interferes with such a pattern, but the averages show maximum humidity at the time of minimum temperature and vice versa. In winter, average relative humidities are considerably higher than during hot weather. Human comfort during the summer months is greatly affected by the moisture content of the air. In Idaho, where maximum temperatures above 90º F are not uncommon in July and August, humidity at the time of maximum temperature is usually below 25 percent, and often down to 15 percent or lower. With any kind of air movement, the higher temperatures are quite within the range of adjustment of the human system. The low relative humidity of summer also permits widespread use of evaporation-type coolers. Field-drying of hay is facilitated by the dry air, especially when air movement is sufficient. Some work has been done on the drying of corn and grain without the addition of heat, but in the season when this activity is carried on, the days are shorter and the periods of low relative humidity are rather brief.

Fogs in Idaho are extremely variable, and statistics are available where regular National Weather Service Offices are maintained at airports, Boise, Lewiston and Pocatello. At Boise, heavy fog (visibility 1/4 mile or less) is experienced on an average of 19 days per year, with a maximum of six occurrences in January. The year-to-year variation is considerable. Lewiston averages 21 days with heavy fog per year, with a peak of five days in December. Pocatello has an average of 17 days of heavy fog per year, the maximum monthly average being four in January. Along with fogs, particularly if they persist for a few days, rime ice occasionally forms on power and communication lines. These occurrences are relatively infrequent.

Windstorms are not uncommon in Idaho, but the State has no destructive storms such as hurricanes, and an extremely small incidence of tornadoes. Windstorms associated with cyclonic

systems, and their cold fronts, do some damage to trees each year, often causing temporary disruption of power and communication facilities, but only minor damage to structures in most instances. Storms of this type may occur at any time from October into July, while during the summer months strong winds almost invariably come with thunderstorms. Hail damage in Idaho is very small in comparison with damage in areas of the central part of the United States. Often the hail that occurs does not grow to a size larger than one-half inch in diameter, and the areas affected are usually small. Quite often hail comes during early spring storms, when it is mostly of the small, soft variety with a limited damaging effect. Later when crops are more mature and more susceptible to serious damage, hail occurs in widely scattered spots in connection with summer thunderstorms. The incidence of summer thunderstorms is greatest in mountainous areas, where lightning often causes serious forest and range fires.

The annual average percentage of possible sunshine ranges from about 50 in the north to about 70 in the south. Winter, with its frequent periods of cloudy weather, has about 40 percent of possible sunshine in the large open valleys of the south and less than 30 percent in the north. In July and August the average percentage rises to the upper 80s in the southwest and to near 80 in the east and north.

The growing season (freeze-free period), like the average temperature, varies greatly throughout the State because of differences in elevations, soil type, topography and vegetative cover. Year-to-year variations are also considerable in many areas. The area in the immediate vicinity of Lewiston has the longest growing season, approximately 200 days, followed by a sizeable area in the central Snake, and lower Boise, Payette and Weiser river basins with 150 days or more. Upstream along the Snake, the growing season shortens, but is still of the order of 125 days in the Pocatello-Idaho Falls area. A few high valleys have no month without freezing temperatures and the land is used entirely for grazing.

Climate and the Economy- Nearly three and a half million acres of farmland are irrigated in Idaho. The upper portion of the Snake River Basin, upstream from the vicinity of Bliss, has large areas of both irrigated and non-irrigated farmland. At some of the higher elevations in the eastern part of the State, the land is used primarily for livestock ranches and for growing seed potatoes, hay, oats, barley and wheat. At somewhat lower elevations, one of the principal crops is the Idaho Russet potato, for which the upper Snake Basin is famous. Approximately 90 percent of Idaho’s potatoes are grown on irrigated land on the Snake River Plain. The area between Gooding and Minidoka Counties is devoted to the production of dry, edible beans. Sugar beets, which rank high in importance because of the large per-acre gross income, are grown on a large scale. Hay, consisting primarily of alfalfa, occupies more than one-third of the crop area in this part of the State. Estimates show only 1,000 dairies in the whole State of Idaho. However, the dairy industry has grown tremendously in the past 15 years to become Idaho's most important agricultural commodity. Field corn acreage has increased in the Magic Valley, mostly to produce silage as feed for the growing dairy industry. According to 2001 county estimates, 80 percent of the 111,000 acres planted in corn east of and including Bliss were harvested as silage. From the vicinity of Bliss on down to Weiser, the Idaho portion of the Snake River Basin contains nearly three-quarters of a million acres of irrigated land, which is a comparatively small percentage of the total acreage of farms and stock ranches. Farms in Southwest Idaho are generally smaller than other areas of the State; however, a large variety of crops is grown. Sugar

beets, onions, grapes, peaches, apples and alfalfa seed all contribute to the area's agricultural income. Most irrigation in this area is furrow irrigation while wheel lines and pivots are more common to the east. Dairy products also constitute an important part of the area's output. The Clark Fork and Clearwater drainages of northern Idaho, like the central Snake Basin in the southwest, have a relatively small percentage of their total areas in croplands. But the Camas and Nez Perce prairies, which form the eastern fringe of the famous Palouse dry-farming area, are highly productive. Forty-five percent of Idaho's winter wheat output comes from this area, as well as significant quantities of lentils and Kentucky bluegrass seed. Spring wheat, barley, peas and a few other crops are also grown, nearly all without irrigation. More information is available through the USDA National Agricultural Statistics Service at http://www.usda.gov/nass/

Approximately two million acres of forest lie within the eastern part of the State, mostly in the higher mountainous areas. Lumbering here is done only on a small scale. The southwestern portion of the State has a greater forested area, running into several million acres, and lumbering is a more important phase of the economy than it is farther east. The northern part of Idaho, because of its higher annual precipitation, is more heavily forested than the southern portion of the State, and lumbering has long occupied a prominent place in the economy of the area. Lewiston, Potlatch and Coeur d'Alene are among the sites of important forest product industries. One of the finest white pine stands in the country lies in northern Idaho, principally in Clearwater and Shoshone counties.

Recreational resources are abundant in Idaho. The large lakes of the north, particularly Coeur d'Alene, Pend Oreille and Priest Lake, provide wonderful boating and fishing, as well as serving as sites for summer homes and camps. Payette Lake in Valley County and Bear Lake on the Utah-Idaho border furnish recreational facilities for thousands of persons each year. Henry's Lake in Fremont County furnishes some of the best trout fishing in the State. Numerous reservoirs have added greatly to the recreational facilities of the State, and hundreds of mountain lakes and streams furnish almost unlimited opportunity for camping, hiking, fishing and hunting. Much of Idaho's area lies within boundaries of several National forests, and the Forest Service has set aside large tracts as wilderness areas. Excellent hunting for deer, elk, bear and Rocky Mountain sheep and goats is afforded the hardier individuals who enter these more inaccessible areas. The three principal areas are the Sawtooth Wilderness, embracing the Salmon and Boise rivers; the much larger Idaho Wilderness, principally between the middle and south forks of the Salmon River; and the Selway Wilderness area in the upper Clearwater drainage. Idaho is a winter recreation paradise for alpine, cross-country skiing, telemark skiing, snowboarding, snowshoeing and snowmobiling. Since Sun Valley Ski Resort opened in 1935 as the first destination ski resort in America, Idaho has offered visitors a wide variety of winter recreation opportunities from sledding to sleigh rides, from ice fishing to ice skating. Sixteen ski resorts now operate across the State. Then in the spring and summer, Idaho boasts of some of the best whitewater rafting rivers to be found. The Salmon River denoted the "River-of-No-Return" by explorers Lewis and Clark, ranks as one of the top 10 whitewater rivers in the world.

Following is a partial listing of sources for more Idaho recreation information:
Idaho Department of Parks and Recreation http://www.idahoparks.org/
Idaho Winter Recreation http://www.idaski.org/

Idaho Travel and tourism Guide http://www.visitid.org/
Idaho Outfitters and Guides Licensing Board http://www2.state.id.us/oglb/oglbhome.htm
Idaho Outfitters and Guides Association http://www.ioga.org/