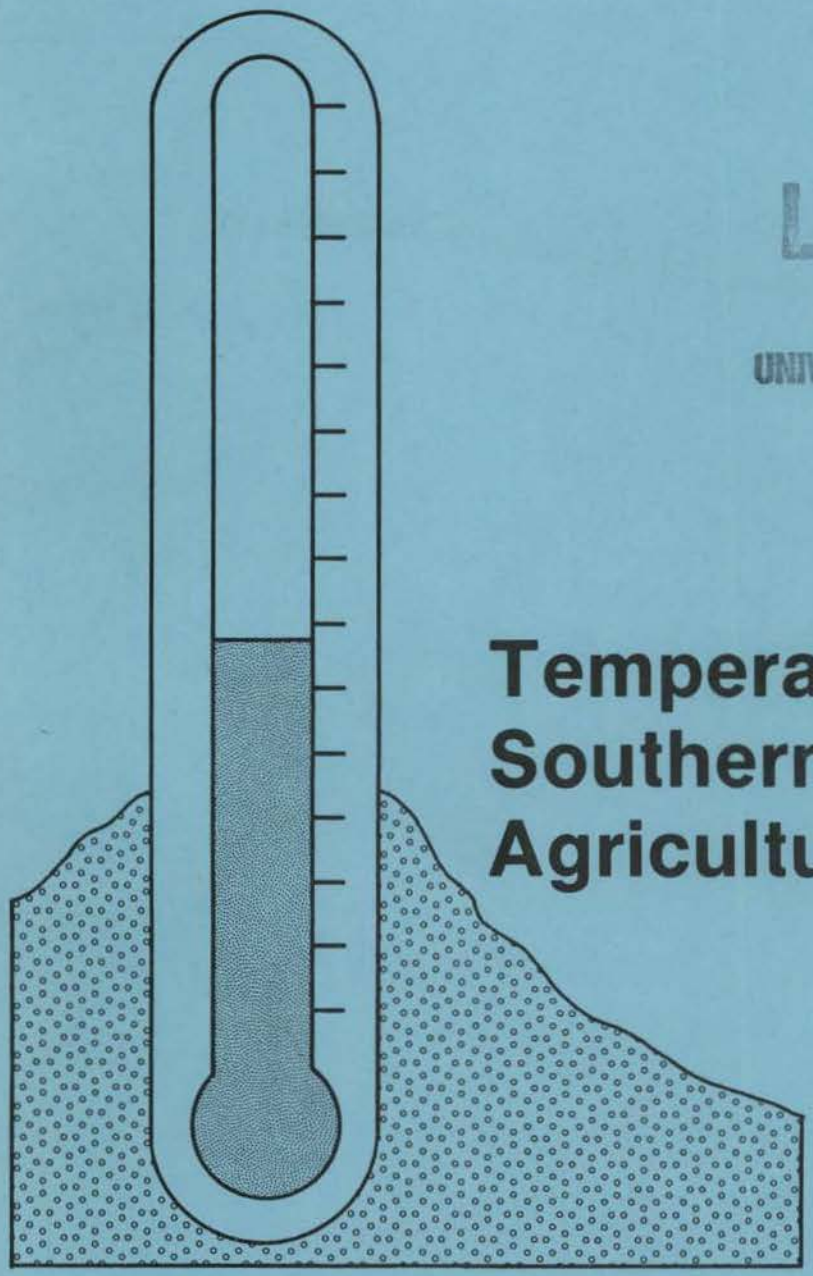
Bulletin No. 594
April 1980



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# Temperatures of Southern Idaho Agricultural Soils

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**Published and distributed by the**
**Idaho Agricultural Experiment Station**
**R. J. Miller, Director**

**University of Idaho College of Agriculture**
**Moscow 83843**

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# Temperatures of Southern Idaho Agricultural Soils

R. E. McDole, Maurice Faubion, D. O. Everson, Deborah Amos

Interpretive information on Idaho's atmospheric climate has been published by the National Weather Service (Rice 1971) and the University of Idaho (Everson et al. 1978). However, information on temperatures of Idaho soils has been published only for a small area in southeastern Idaho (McDole and Fosberg 1974b).

Many people can make use of soil temperatures. Farmers and others in agriculture are particularly interested in soil temperatures which play a major role in seed germination, plant growth, crop harvest, chemical soil reaction and other biological activities. Contractors use knowledge of soil temperatures in certain phases of their construction operations to prevent damage from soil freezing.

During the past decade the Soil Conservation Service, USDA, has developed an interest in soil temperature data for use as a basis for soil classification and mapping (U.S. Department of Agriculture 1975). Use of soil temperature data makes it possible to classify and group soils having similar management requirements. Considerable soil temperature data have been collected but unfortunately little has been summarized and published. Summaries of climatological data, which include minimum and maximum soil temperatures for several stations in Idaho, are published monthly (U.S. Department of Commerce 1978).

The National Weather Service uses radio, TV and other media to report and forecast soil temperatures at critical periods during the growing season. These critical periods are at planting time and at harvest time. These reports or forecasts can be useful for short-term or day-to-day planning of planting and harvest. However, for long-range planning, interpretive analyses of long-term records of soil temperatures are essential. This is the primary purpose of this publication.

## Factors Influencing Soil Temperature

Contrary to appearances, soils are dynamic or ever-changing. Soil temperature changes with the seasons and with the time of day. The magnitude of these changes is influenced by the physical properties of the soil. Since soils are heterogeneous in composition, a change in location can result in a change in soil characteristics which may directly or indirectly affect its temperature.

The climate at the soil surface and the amount of solar radiation absorbed by soil greatly influence the soil temperature.

Soil particles are good conductors of heat, much better than water. Water is more than twice as effective as air in conducting heat. Under natural conditions, soil is comprised of about equal parts solid particles and voids or pore spaces. When these pores are filled with air, soil is an excellent insulating material. As the amount of water in the pore spaces increases, heat conductance increases. Irrigation or heavy rains may cause large temperature changes to depths of 20 inches or more. Compaction of soils results in fewer pore spaces and more rapid changes in temperature.

Seasonal soil temperature variations are obvious. During winter months, the frozen portion of the soil will be 32°F (0°C) or colder, depending on air temperature. At the other extreme, summer temperatures of the surface soil can reach 130° to 150°F (55° to 66°C) where the sun directly strikes the soil surface.

The diurnal or daily temperature fluctuations in the soil vary with time of day as the air temperature varies. Both the amount and magnitude of daily change and the daily maximum and minimum temperatures depend not only on depth within the soil

profile but also on other soil characteristics. Soil temperatures change more slowly than air temperatures because the heat capacity of soil is greater than that of air. Factors which affect change in soil temperatures are cloud cover, vegetative cover, soil color, temperature at lower depths in the soil profile, the angle at which the sun's rays strike the ground surface, soil moisture content (or soil air content) and the temperature of the air above the soil. At a depth of 4 inches (10 cm) in the soil profile, maximum and minimum soil temperatures lag 2 to 3 hours behind maximum and minimum air temperatures. The magnitude of this lag will vary with soil texture, soil moisture, soil color and vegetative cover.

## Importance of Soil Temperature

The importance of atmospheric climate is readily recognized since it dictates the clothes we wear, our outside activities, plant growth and other factors that influence our lives. "Soil climate" is not as noticeable as atmospheric climate but nevertheless is important because of its effect on plant growth. Soil temperature is one of the important factors comprising soil climate. According to Smith et al. (1964), the soil does not really come to life until its temperature exceeds 42°F (5°C). The life or activity in the soil increases rapidly as the temperature rises above 46°F (7°C) and decreases after it reaches temperatures above 95°F (35°C). This activity includes biological, chemical and physical processes.

Soil temperatures influence many biological processes of economic importance to agriculture.

**Table 1. Minimum or threshold temperatures for seed germination for commonly grown crops in southern Idaho.**

| Crop | Threshold temperature for seed germination | |
|---|---|---|
| | °F | °C |
| Clover, alfalfa | 34-38 | 1-3 |
| Small grains, onions | 34-36 | 1-2 |
| Peas, sugarbeets, carrots | 38-41 | 3-5 |
| Potatoes | 45-48 | 7-9 |
| Corn, tomatoes | 48-50 | 9-10 |
| Beans | 50-55 | 10-13 |
| Melons | 55-60 | 13-16 |

Unpublished data from C. B. Nelson, former Advisory Agricultural Meteorologist, U.S. Weather Bureau, Kimberly, Idaho.

Crop performance is affected both directly and indirectly. Seed germination and plant growth are directly affected since they take place only after the soil reaches a certain "threshold" temperature level. Below this threshold, seeds and plants remain dormant. Even when the soil exceeds the threshold temperature for seed germination (Table 1), plant growth continues to be influenced by soil temperature (Table 2).

A plant's physiology is influenced by both soil and atmospheric factors. For example, tillering and length of internodes in grain and bruise damage in potato tubers are affected by soil and air temperature. Potato tubers are less susceptible to bruise injury when they are maintained at temperatures above 44°F (7°C). Thus in potato harvesting operations, knowing the temperature of the soil is critical.

Soil temperature indirectly affects crop performance since it has a definite regulatory effect on root growth and on the availability of nutrients by controlling biological and chemical processes in the soil. For example, conversion of ammonium fertilizer to the more available nitrate form depends on microbial activity. Microbes are ineffective below soil temperatures of approximately 50°F (10°C). Since we also know the ammonium form of nitrogen is less subject to leaching than the nitrate form of nitrogen, we should apply ammonium fertilizer when the soil temperature is below 50°F (10°C) to minimize leaching problems. Effectiveness of herbicides, fungicides and other pesticides also is related to temperature. Before these materials can function properly, a specific range in soil temperature is necessary for chemical reactions to take place or for crop plants and pests to be in the proper stage of growth. These are a few examples of the importance of soil temperatures.

**Table 2. Soil temperature ranges for optimum growth and maximum yield of various crops.***

| Low temperature | Medium temperature | High temperature |
|---|---|---|
| Barley | Oats | Bromegrass |
| Ryegrass | Sugarbeets | Alfalfa |
| Peas | Wheat | Beans |
| Potatoes | Tomatoes | Corn |

*Within each category, crops are arranged from top to bottom in approximate order of increasing temperature requirement (from Baker and Swan, 1966).

# Methods and Procedures

Daily soil temperatures* have been collected from 12 sites across southern Idaho and Malheur County in eastern Oregon (Fig. 1). The length of record for most of these sites ranges from 8 to 13 years. The world standard for soil temperature measurement is 4-inch (10 cm) depth, but this report includes data on both shallower and deeper depths. At 6 of the 12 sites, soil temperatures were measured only at 4-inch (10 cm) depth. At 3 sites, soil temperatures were measured only at 3-inch (7.5 cm) depth and 3 others (Kuna, Twin Falls and Idaho Falls) had thermometer probes at more than one depth (Table 3). The King Hill site was a seasonal site, with soil temperatures recorded only during the growing season. The Hagerman and Ribgy sites were limited in years of record, and primarily used as seasonal stations. For this reason King Hill, Hagerman and Rigby have not been included in the graphical presentation of data in this report (see appendix).

Soil temperatures were collected at each of the sites with the aid of thermometers which recorded maximum and minimum temperatures. These thermometers consist of a metal probe approximately 14 inches (35 cm) in length and ½ inch (1 cm) in diameter, buried horizontally in the soil at the depth from which the temperature was to be obtained. This probe is connected by a flexible cable to the dial portion of the thermometer. The thermometers were read daily and were found to have an accuracy of ±1°F (0.5°C). Most observation sites were checked yearly for accuracy of thermometer readings and depth of placement.

Soil temperature information given in this publication can only be used as a general guide for broad areas of southern Idaho's agricultural land. If soil temperatures are needed for a specific area, on-site measurements are necessary. For example, in monitoring soil temperatures for potato harvest, soil temperatures must be taken in the field to be harvested. Several readings throughout the field should be taken and averaged. Soil thermometers are available at farm supply stores at a reasonable cost.

Soil temperature data reported here were generally taken under a bare soil surface. Shading of the soil surface by vegetation will influence soil temperatures. Thus, these soil temperatures may be different from soil temperatures under a crop. They will, however, approximate spring temperatures where plant cover has not developed or fall temperatures where vegetative cover has died or been removed in preparation for harvest.

*Soil temperature data were made possible through the cooperation of the National Weather Service, U.S. Department of Commerce, the University of Idaho and several cooperators who assisted in establishing and maintaining soil temperature stations. These cooperators included University of Idaho Research and Extension Centers, federal agencies, agricultural commodity companies, radio and television stations and private individuals.

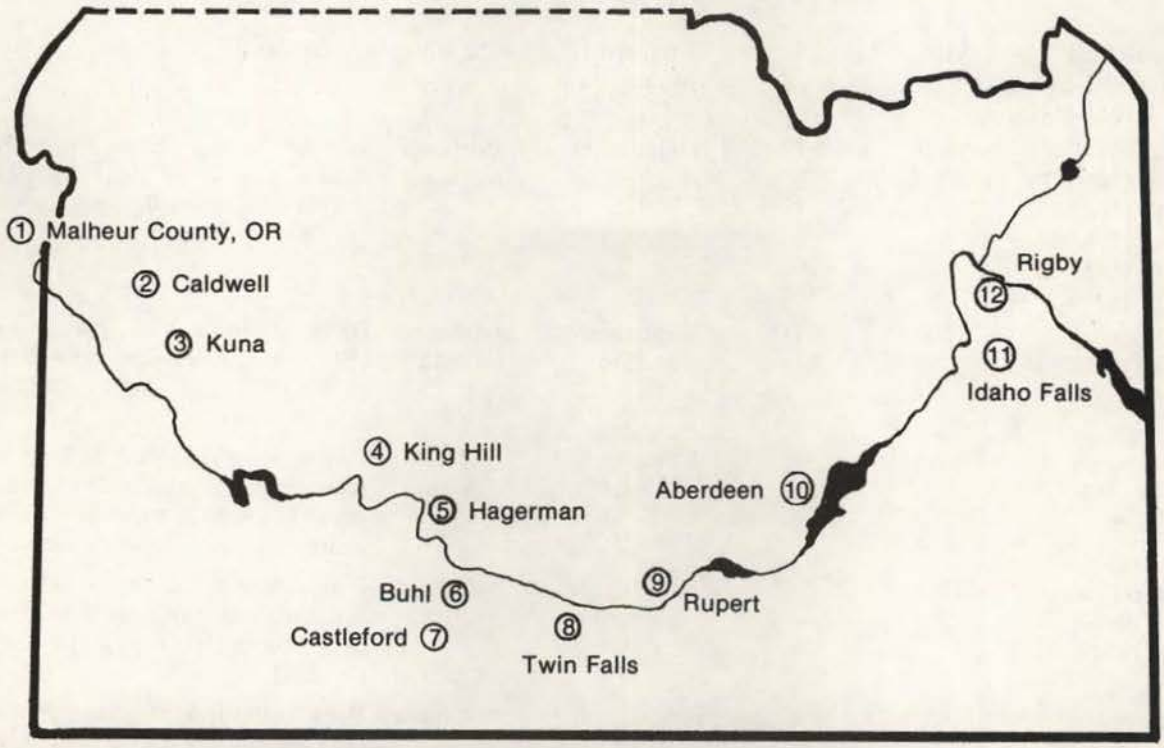



**Fig. 1. Location of soil temperature sites in southern Idaho.**

# Results

## Mean Annual Soil Temperature

The mean annual soil temperature (MAST) obtained for each year for each site is given in Table 4. In general, for nearly level sites with medium-textured soils, the MAST decreases as the elevation increases (Fig. 2). MAST values for some of the sites appear to deviate from a straight line curve. Some of these deviations can be explained by characteristics of the temperature sites. For example, the Kuna site is probably cooler than expected because it has an irrigated, clipped grass cover. The Rupert site is

**Table 3. Characteristics and location of temperature sites.**

| Site, years of data | Elevation (ft.) | Temperature depth (inches) | Site description | Soil | Location, site characteristics |
|---|---|---|---|---|---|
| 1. Malheur, OR 9 (1967-75) | 2230 | 4 | Nonirrigated, bare | Malheur silt loam | Oregon State University Experiment Station, 7 miles southwest of Ontario; light brownish gray (10YR 6/2) when dry; dark grayish brown (10YR 4/2) when moist. |
| 2. Caldwell 12 (1964-75) | 2505 | 4 | Nonirrigated, usually bare, some light vegetation | Purdam silt loam | University of Idaho R & E Center; north-facing slope; light brownish gray (10YR 6/2) when dry; dark grayish brown (10YR 4/2) when moist. |
| 3. Kuna (1967-75) | 2774 | 4 and 8 | Irrigated, clipped grass | Elijah silt loam | Excellent data, representative of irrigated pasture. |
| 4. King Hill 11 (1964-75) | 2700 | 3 | Irrigated, usually bare | Sandy | Summer season only; Green Giant Co. station; moved from year to year. |
| 5. Hagerman 2 (1973-74) | 3095 | 4 | Nonirrigated, bare to weedy | Sandy loam | Light gray (10YR 6/1) when dry; dark gray (10YR 4/1) when moist. |
| 6. Buhl 13 (1963-75) | 3800 | 3 | Irrigated, bare | Sandy | Green Giant Co.; nearly level; 24-inch square in grass; medium brown (10YR 5/3) when dry; dark brown (10YR 3/3) when moist. |
| 7. Castleford 6 (1963-64 and (1966-69) | 3825 | 3 | Irrigated, usually bare | Sandy | Green Giant Co.; moved from year to year. |
| 8. Twin Falls 3 (1970, 73, 74)<br>13 (1963-75)<br>11 (1963-73)<br>13 (1963-75)<br>11 (1964, 66-75) | 3960 | 2<br>4<br>8<br>20<br>36 | Irrigated, bare | Portneuf silt loam | Weather Service Office, Kimberly; 24-inch square in irrigated grass; light brown (10YR 6/3) when dry; medium brown (10YR 4/3) when moist. |
| 9. Rupert 8 (1968-75) | 4200 | 4 | Nonirrigated, bare | Loamy sand | Radio station KAYT; grayish brown (10YR 5/2) when dry; very dark grayish brown (10YR 3/2) when moist; shaded by pole at times |
| 10. Aberdeen 11 (1965-75) | 4405 | 4 | Nonirrigated, bare | Declo loam | University of Idaho R & E Center; 30 ft. from irrigated cropland; light brownish gray (10YR 6/2) when dry; dark grayish brown (10YR 4/2) when moist. |
| 11. Idaho Falls 4 (1964-72)<br>2 (1964-66) | 4788 | 4<br>20 | Nonirrigated, weedy | Silt loam | 6 miles northwest Idaho Falls (Osgood area), pale brown (10YR 6/3) when dry; dark brown (10YR 3/3 moist; question on reliability. |
| 12. Rigby 2 (1967-68) | 4835 | 4 | Irrigated, bare | Silt loam | Brown (10YR 5/3) when dry; dark brown (10YR 3/3) when moist; bare area in garden; mostly seasonal data. |

Table 4. Mean annual soil temperature for each year for each site.

| Year | Malheur | Caldwell | Kuna* | Hagerman | Buhl | Castleford | Twin Falls* | Rupert | Aberdeen | Idaho Falls* | Rigby |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1963 | — | — | — | — | 53.3 | 49.8 | 50.3 | — | — | — | — |
| 1964 | — | 52.4 | — | — | 51.0 | 47.5 | 48.2 | — | — | — | — |
| 1965 | — | 54.1 | — | — | 51.5 | — | 50.5 | — | 48.3 | — | — |
| 1966 | — | 54.6 | — | — | 50.8 | 51.2 | 50.6 | — | 50.4 | — | — |
| 1967 | 58.4 | 53.1 | 51.2 | — | 52.3 | 52.2 | 51.6 | — | 50.2 | — | 48.4 |
| 1968 | 56.9 | 50.5 | 51.9 | — | 49.8 | 49.9 | 50.5 | 54.3 | 49.3 | — | 49.4 |
| 1969 | 56.8 | 50.9 | 51.0 | — | 51.1 | 50.1 | 51.5 | 54.4 | 50.9 | 47.0 | — |
| 1970 | 56.0 | 51.4 | 51.8 | — | 51.4 | — | 50.9 | 52.0 | 49.1 | 46.9 | — |
| 1971 | 55.9 | 50.6 | 51.5 | — | 53.3 | — | 49.7 | 52.1 | 48.9 | 47.5 | — |
| 1972 | 56.9 | 51.0 | 51.2 | — | 51.7 | — | 50.5 | 55.4 | 50.3 | 48.6 | — |
| 1973 | 57.9 | 51.5 | 50.2 | 54.6 | 51.1 | — | 50.8 | 55.9 | 50.3 | — | — |
| 1974 | 58.0 | 52.2 | 51.0 | 54.4 | 52.1 | — | 51.8 | 56.5 | 51.1 | — | — |
| 1975 | 55.4 | 53.0 | 49.6 | — | 50.6 | — | 49.2 | 53.7 | 49.5 | — | — |
| Average | 56.9 | 52.1 | 51.0 | 54.5 | 51.5 | 50.1 | 50.5 | 54.3 | 49.8 | 47.5 | 48.9 |

*Data from 4 inch depth only.

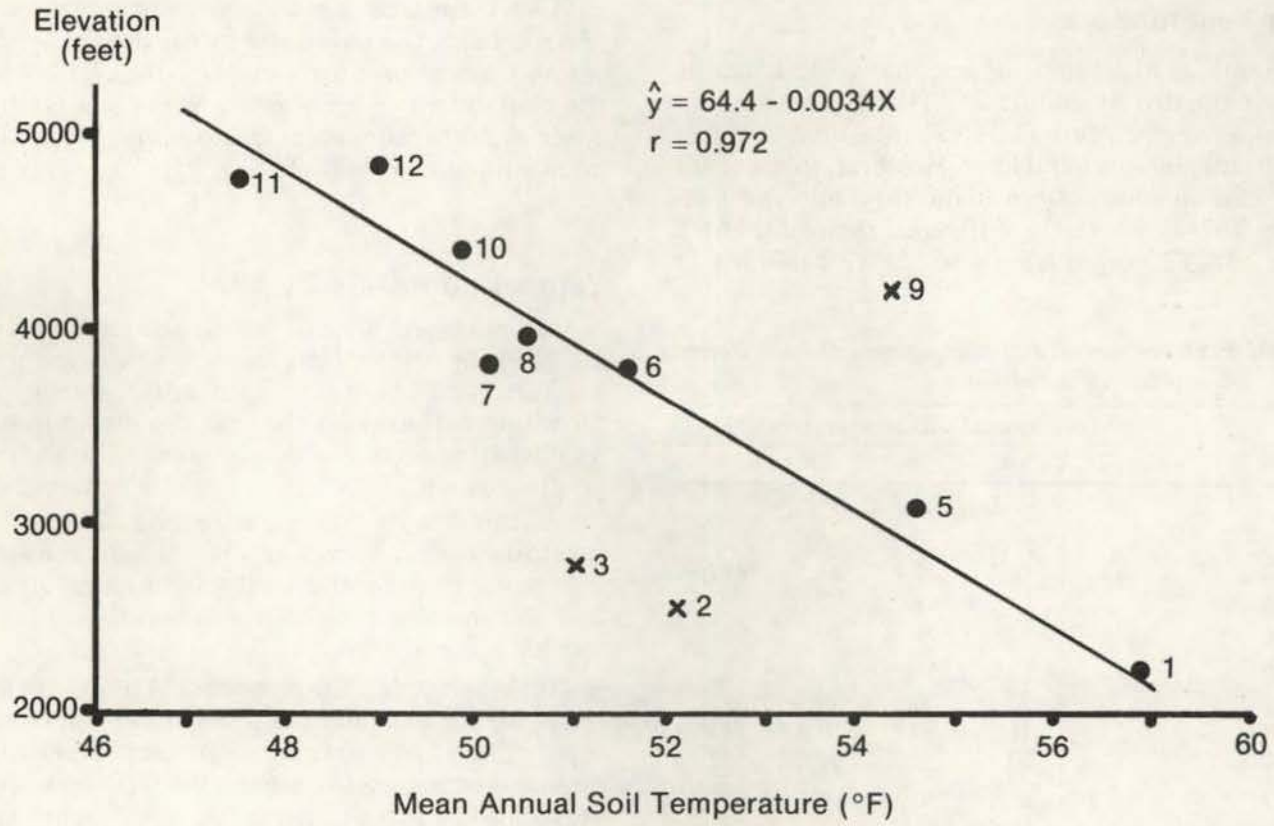



**Fig. 2 Change in mean annual soil temperature (MAST) with change in elevation for nearly level sites having medium textured soils. Calculations do not include Caldwell (2), Kuna (3) and Rupert sites due to atypical site and soil characteristics (see narrative on site characteristics).**

warmer than expected due to a loamy sand soil texture (McDole and Fosberg 1974b). The cooler than expected temperature at the Caldwell site has no apparent explanation.

## MAST and Soil Profile Depth

According to Smith et al. (1964) and McDole and Fosberg (1974a), MAST is the same for all depths within the soil profile. The validity of this assumption could be checked by data from the Twin Falls site since temperatures were collected from several depths. MAST calculations for depths of 4, 8 and 20 inches (10, 20 and 50 cm) were nearly identical (Table 5), but at the 36-inch (90 cm) depth MAST was approximately 3°F (1.7°C) warmer than the shallower depths. Comparison of data for individual years showed MAST at 36 inches (90 cm) was 3 to 4°F (1.7 to 2.2°C) warmer than at 4, 8 and 20 inches (10, 20 and 50 cm) every year except 1964. These results question either the validity of assuming a constant MAST throughout the profile or the validity of the 36-inch (90 cm) temperature data from the Twin Falls site.

## MAST vs. Mean Annual Air Temperature

Smith et al. (1964) suggest that MAST can be approximated by adding 2°F (1.1°C) to mean annual air temperature (MAAT) measured at 5 feet (150 cm) above ground level. However, this was not the case in southeastern Idaho (McDole and Fosberg 1974a) where the difference between MAST and MAAT ranged from 4 to 5°F (2.2 to 2.8°C).

**Table 5. Mean annual soil temperature from different depths, Twin Falls site.**

| Year | Mean annual soil temperature (°F) | | | | |
|---|---|---|---|---|---|
| | 2 | 4 | 8 | 20 | 36 |
| | Depth (inches) | | | | |
| 1963 | — | 50.3 | 49.2 | 50.0 | — |
| 1964 | — | 48.2 | 47.7 | 48.0 | 47.0 |
| 1965 | — | 50.5 | 49.7 | 50.1 | — |
| 1966 | — | 50.6 | 50.1 | 50.8 | 54.3 |
| 1967 | — | 51.6 | 51.2 | 51.9 | 55.5 |
| 1968 | — | 50.5 | 50.1 | 50.3 | 53.7 |
| 1969 | — | 51.5 | 50.9 | 50.8 | 53.9 |
| 1970 | 51.3 | 50.9 | 51.0 | 50.9 | 54.0 |
| 1971 | — | 49.7 | 50.2 | 49.7 | 52.6 |
| 1972 | — | 50.5 | 51.2 | 51.0 | 54.2 |
| 1973 | 51.4 | 50.8 | 51.3 | 50.9 | 54.4 |
| 1974 | 52.8 | 51.8 | — | 51.9 | 55.6 |
| 1975 | — | 49.2 | — | 50.6 | 54.3 |
| Average | 51.8 | 50.5 | 50.2 | 50.5 | 53.5 |

Toy et al. (1978) compared MAAT with MAST at 8 different locations across the United States. They derived the equation

$$Y = 4.646 + 0.986X$$

for predicting MAST (Y) for a given MAAT (X). They showed a standard error of the estimate for this equation as 5.15°F. Use of this equation for the Idaho sites gave estimated MAST surprisingly close — within 2°F (1.1°C) — to the measured MAST except for the Caldwell site. The predicted value for the Caldwell site was 4.4°F (2.3°C) warmer than the measured value.

Data from this study show that, except for the Caldwell site, MAST is warmer than MAAT (Table 6). The Rupert site has the greatest difference between MAST and MAAT, an average of 6.7°F (3.7°C) which again reflects the effects of the loamy sand soil texture. The Kuna site has a relatively small difference — 1.2°F (0.7°C) — which reflects the irrigated, clipped grass cover. Again the Caldwell site appears to be an anomaly, since MAST is cooler than MAAT. The difference between MAST and MAAT for sites having similar soil texture and vegetative cover range from 2.4°F (1.3°C) at the Buhl site to 5.6°F (3.1°C) at Aberdeen.

MAAT apparently is only a rough estimator of MAST. Using this parameter we can predict MAST within a range of ±3 to 4°F (1.7 to 2.2°C) when site characteristics are similar. When soil texture, cover and other site characteristics vary, MAAT is a poor estimator of MAST.

## Temperature Data By Sites

Maximum and minimum daily soil temperatures are given in Appendix A for each of the soil temperature sites. Mean maximum daily soil temperatures for each week of the year are shown in odd numbered appendix tables 1 through 29 and are graphically represented in odd numbered appendix figs. 1 through 29. Mean minimum daily soil temperatures for each week of the year are shown in even numbered appendix tables 2 through 30 and and graphically represented in even numbered appendix figs. 2 through 30.

The graphic data in Appendix A show the extreme high maximum and minimum temperatures (upper lines) and extreme low maximum and minimum temperatures (lower lines) for each week of the year. The line in the center of the crosshatched area represents either the average maximum soil temperature or average minimum soil temperature obtained during the period of record. The crosshatched area represents the range of soil temperatures which occurred 50% of the time.

**Table 6. Mean annual soil temperature (MAST) and mean annual air temperature (MAAT) for soil sites.**

| Year | Malheur | | Caldwell | | Kuna | | Buhl | | Twin Falls | | Rupert | | Aberdeen | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAST | MAAT | MAST | MAAT | MAST | MAAT | MAST | MAAT | MAST | MAAT | MAST | MAAT | MAST | MAAT |
| 1963 | — | — | — | — | — | — | 53.3 | 49.4 | — | — | — | — | — | — |
| 1964 | — | — | 52.4 | 50.3 | — | — | 51.0 | 46.9 | 48.2 | 46.2 | — | — | — | — |
| 1965 | — | — | 54.1 | 51.7 | — | — | 51.5 | 49.2 | 50.5 | 47.8 | — | — | 48.3 | 44.3 |
| 1966 | — | — | 54.6 | 53.0 | — | — | 50.8 | 49.5 | 50.6 | 48.7 | — | — | 50.4 | 44.9 |
| 1967 | 58.4 | 52.5 | 53.1 | 53.8 | 51.2 | 50.8 | 52.3 | 50.4 | 51.6 | 48.8 | — | — | 50.2 | 45.3 |
| 1968 | 56.9 | 51.6 | 50.5 | 52.5 | 51.9 | 49.7 | 49.8 | 48.5 | 50.5 | 47.5 | 54.3 | 47.5 | 49.3 | 43.9 |
| 1969 | 56.8 | 51.5 | 50.9 | 52.2 | 51.0 | 49.5 | 51.1 | 49.8 | 51.5 | 48.5 | 54.4 | 47.8 | 50.9 | 44.4 |
| 1970 | 56.0 | 51.4 | 51.4 | 53.4 | 51.8 | 49.9 | 51.4 | 50.1 | 50.9 | 47.7 | 52.0 | 48.3 | 49.1 | 44.2 |
| 1971 | 55.9 | 51.2 | 50.6 | 52.6 | 51.5 | 49.4 | 53.3 | 49.1 | 49.7 | 47.2 | 52.1 | 47.2 | 48.9 | 43.9 |
| 1972 | 56.9 | 50.3 | 51.0 | 51.6 | 51.2 | 49.1 | 51.7 | 48.5 | 50.5 | 46.8 | 55.4 | 47.1 | 50.3 | 44.1 |
| 1973 | 57.9 | 52.5 | 51.5 | 54.1 | 50.2 | 50.8 | 51.1 | 49.9 | 50.8 | 47.8 | 55.9 | 48.2 | 50.3 | 43.4 |
| 1974 | 58.0 | 51.9 | 52.2 | 53.3 | 51.0 | 50.0 | 52.1 | 49.4 | 51.8 | 47.8 | 56.5 | 48.5 | 51.1 | 44.5 |
| 1975 | 55.4 | 49.8 | 53.0 | 52.1 | 49.6 | 48.7 | 50.6 | 47.6 | 49.2 | 46.4 | 53.7 | 46.3 | 49.5 | 43.4 |
| Average | 56.9 | 51.4 | 52.1 | 52.6 | 51.0 | 49.8 | 51.5 | 49.1 | 50.5 | 47.8 | 54.3 | 47.6 | 49.8 | 44.2 |

MAAT taken at 5 feet above ground level.

The average daily soil temperatures for each of the sites are also presented graphically for each week in Appendix B figs. 31 through 44. This average daily temperature is derived from the maximum and minimum daily temperatures (maximum plus minimum divided by 2). The upper and lower lines represent the extreme high and extreme low average daily temperatures respectively. The line through the center of the crosshatched area represents the average daily soil temperature. The crosshatched area represents the range in mean soil temperatures which has occurred 50% of the time.

# Conclusions

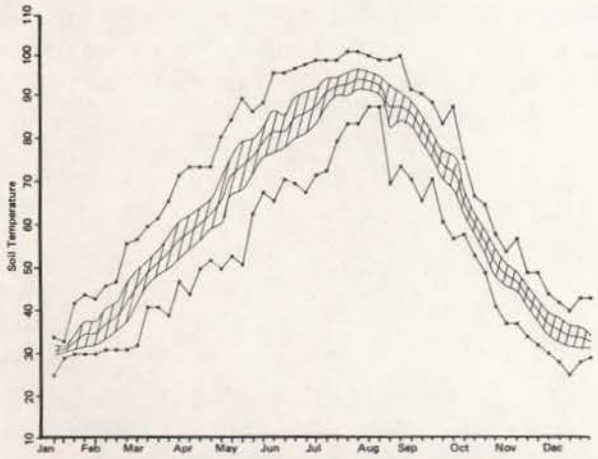
Average daily soil temperatures, average annual soil temperatures and minimum and maximum soil temperatures may be of value to many people for long range planning of activities and for predicting the feasibility of cropping and cultural practices. This information can readily be obtained from data included in this publication.

However, average temperatures or minimum and maximum temperatures will not replace on-site temperature measurements where an exact knowledge of soil temperatures is needed at any specific time. For example, at a potato harvest specific field temperatures are needed and they cannot be replaced by the long-term averages shown here. Neither can an average value for a reporting station be used for all areas adjacent to the station, since differences in the soil, exposure, cover, moisture and other factors can result in different temperatures. For this reason when exact measurement of soil temperature is needed, on-site data must be obtained.

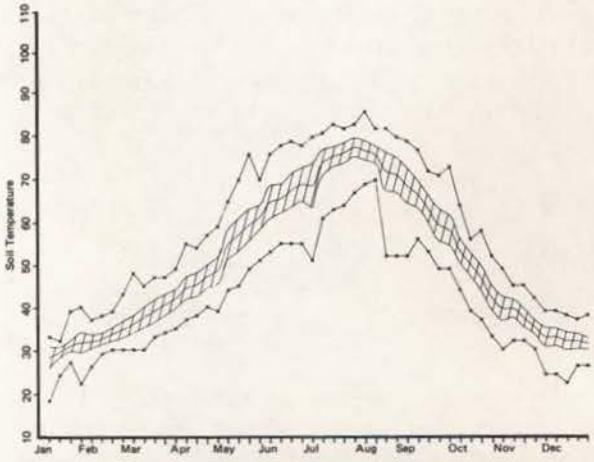
# Appendix A

**Appendix Table 1. Mean maximum daily soil temperature (°F) at 4 inches for Malheur, OR.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1967 | 37.5 | 40.4 | 49.0 | 55.6 | 70.4 | 80.8 | 91.1 | 90.7 | 80.8 | 63.7 | 46.2 | 31.5 | 62.9 |
| 1968 | 30.9 | 42.2 | 57.5 | 64.7 | 77.7 | 88.7 | 98.1 | 87.9 | 79.9 | 61.1 | 45.4 | 35.4 | 64.2 |
| 1969 | 31.0 | 31.4 | 51.1 | 65.9 | 81.3 | 88.1 | 95.5 | 96.8 | 84.3 | 58.0 | 43.1 | 35.5 | 63.7 |
| 1970 | 34.1 | 43.6 | 50.0 | 57.7 | 73.0 | 83.5 | 92.1 | 91.0 | 74.5 | 56.6 | 44.3 | 34.4 | 61.3 |
| 1971 | 32.7 | 40.1 | 45.6 | 61.5 | 75.1 | 80.2 | 89.9 | 92.0 | 75.1 | 58.6 | 42.1 | 34.3 | 60.6 |
| 1972 | 31.6 | 36.7 | 52.7 | 62.4 | 77.9 | 86.9 | 91.5 | 92.0 | 76.0 | 61.3 | 44.5 | 31.8 | 62.2 |
| 1973 | 30.9 | 38.0 | 51.9 | 64.3 | 79.1 | 84.7 | 92.6 | 90.2 | 80.6 | 60.5 | 42.3 | 38.0 | 63.2 |
| 1974 | 34.1 | 39.7 | 50.3 | 61.9 | 73.8 | 87.4 | 91.0 | 91.0 | 82.1 | 62.5 | 45.7 | 34.8 | 63.0 |
| 1975 | 33.0 | 34.7 | 48.3 | 54.5 | 70.0 | 79.6 | 91.8 | 85.9 | 79.3 | 59.0 | 42.9 | 36.6 | 60.4 |
| Ave. | 32.5 | 38.5 | 50.7 | 60.9 | 75.4 | 84.4 | 92.6 | 90.7 | 79.2 | 59.8 | 44.3 | 34.6 | |




**Appen. Fig. 1. Mean maximum daily soil temperature (°F) for each week at 4 inches for Malheur, OR.**



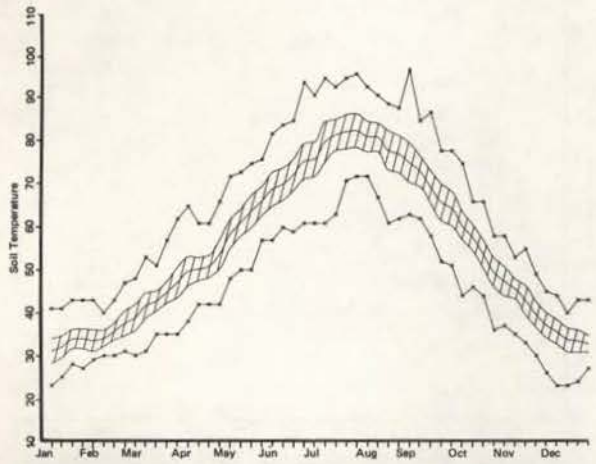

**Appen. Fig. 2. Mean minimum daily soil temperature (°F) for each week at 4 inches for Malheur, OR.**

**Appendix Table 2. Mean minimum daily soil temperature (°F) at 4 inches for Malheur, OR.**

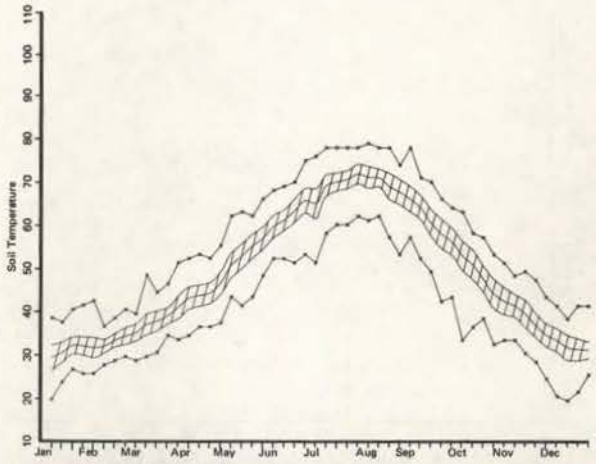
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1967 | 34.3 | 36.1 | 41.6 | 46.4 | 58.0 | 67.4 | 80.7 | 80.6 | 71.1 | 54.6 | 38.7 | 29.9 | 54.4 |
| 1968 | 29.2 | 35.0 | 40.4 | 44.7 | 56.5 | 66.8 | 74.6 | 67.4 | 61.1 | 47.3 | 38.6 | 33.3 | 49.6 |
| 1969 | 30.6 | 31.1 | 36.2 | 47.0 | 60.1 | 67.6 | 72.9 | 72.9 | 63.2 | 47.2 | 37.1 | 32.5 | 50.0 |
| 1970 | 31.6 | 36.0 | 39.8 | 44.8 | 57.0 | 67.6 | 75.2 | 75.9 | 59.0 | 48.1 | 38.6 | 32.9 | 50.6 |
| 1971 | 30.1 | 34.7 | 37.6 | 48.3 | 60.4 | 63.6 | 75.1 | 78.3 | 63.0 | 49.8 | 37.0 | 34.1 | 51.1 |
| 1972 | 31.0 | 33.8 | 41.0 | 47.2 | 61.2 | 69.3 | 75.7 | 75.7 | 61.1 | 51.3 | 39.7 | 31.5 | 51.6 |
| 1973 | 29.8 | 33.4 | 40.2 | 48.4 | 61.3 | 69.3 | 77.0 | 75.6 | 66.3 | 50.8 | 40.0 | 36.0 | 52.6 |
| 1974 | 33.0 | 35.3 | 40.8 | 48.1 | 58.8 | 72.8 | 75.5 | 75.4 | 67.4 | 53.3 | 40.3 | 33.9 | 53.0 |
| 1975 | 33.0 | 33.6 | 38.9 | 43.6 | 56.6 | 65.6 | 78.3 | 71.8 | 66.4 | 50.8 | 38.0 | 34.7 | 51.5 |
| Ave. | 31.2 | 34.3 | 39.6 | 46.5 | 58.9 | 67.8 | 76.1 | 74.9 | 64.3 | 49.9 | 38.7 | 33.1 | |

**Appendix Table 3. Mean maximum daily soil temperature (°F) at 4 inches for Caldwell.**

| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1963 | | | | 53.1 | 67.5 | 74.0 | 77.1 | 76.5 | 71.1 | 61.1 | 47.5 | 35.7 | |
| 1964 | 33.9 | 32.9 | 41.0 | 51.4 | 61.8 | 70.6 | 79.3 | 75.2 | 65.6 | 57.5 | 44.9 | 38.7 | 54.5 |
| 1965 | 36.7 | 39.9 | 43.8 | 54.5 | 62.8 | 73.9 | 79.9 | 78.2 | 65.9 | 59.1 | 50.2 | 34.9 | 56.7 |
| 1966 | 36.1 | 37.4 | 48.0 | 58.6 | 68.2 | 75.9 | 77.9 | 72.9 | 71.6 | 55.9 | 46.2 | 38.9 | 57.4 |
| 1967 | 37.3 | 38.9 | 42.9 | 47.6 | 58.6 | 69.3 | 86.0 | 83.2 | 69.2 | 55.2 | 41.6 | 29.2 | 55.0 |
| 1968 | 28.5 | 36.6 | 46.3 | 51.3 | 63.4 | 74.1 | 81.4 | 69.6 | 61.9 | 52.9 | 41.7 | 34.7 | 53.6 |
| 1969 | 32.7 | 32.5 | 38.8 | 49.4 | 60.0 | 70.0 | 83.5 | 84.2 | 74.0 | 51.1 | 39.3 | 32.8 | 54.2 |
| 1970 | 33.2 | 36.6 | 42.5 | 47.6 | 58.3 | 77.2 | 89.6 | 87.9 | 68.6 | 52.4 | 40.2 | 32.5 | 55.7 |
| 1971 | 30.5 | 34.6 | 38.1 | 49.0 | 60.3 | 65.9 | 75.5 | 81.0 | 67.3 | 53.1 | 39.7 | 33.1 | 52.5 |
| 1972 | 31.5 | 32.7 | 43.1 | 48.3 | 61.2 | 71.4 | 77.5 | 78.3 | 66.2 | 54.6 | 41.8 | 30.6 | 53.2 |
| 1973 | 30.6 | 34.4 | 42.3 | 49.1 | 62.0 | 70.8 | 77.9 | 77.8 | 67.5 | 54.0 | 41.6 | 36.1 | 53.8 |
| 1974 | 30.6 | 34.7 | 40.9 | 49.1 | 57.9 | 67.6 | 79.1 | 81.8 | 77.4 | 61.2 | 45.5 | 35.1 | 55.2 |
| 1975 | 31.1 | 33.5 | 42.5 | 46.5 | 64.8 | 77.0 | 90.6 | 83.8 | 80.0 | 60.1 | 44.7 | 35.2 | 57.7 |
| Ave. | 32.7 | 35.4 | 42.5 | 50.3 | 62.1 | 72.1 | 81.2 | 79.3 | 69.7 | 56.0 | 43.5 | 34.4 | |




**Appen. Fig. 3. Mean maximum daily soil temperature (°F) for each week at 4 inches for Caldwell.**



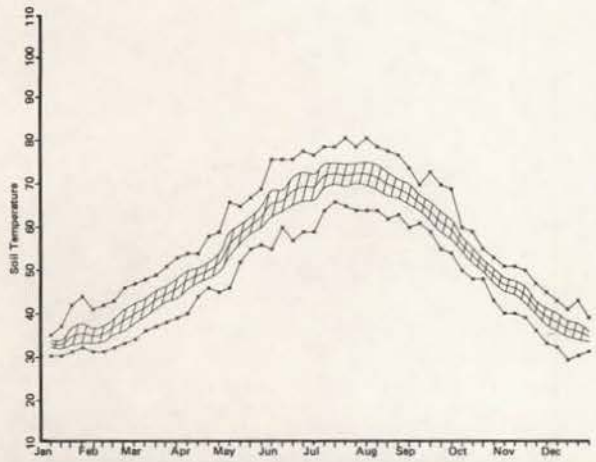

**Appen. Fig. 4. Mean minimum daily soil temperature (°F) for each week at 4 inches for Caldwell.**

**Appendix Table 4. Mean minimum daily soil temperature (°F) at 4 inches for Caldwell.**

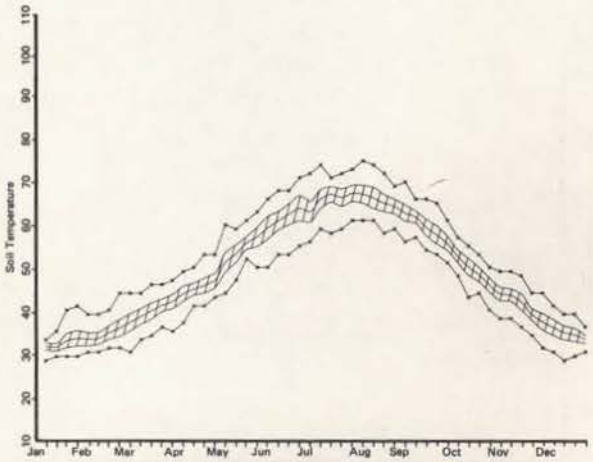
| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1963 | | | | 46.6 | 58.4 | 64.5 | 68.5 | 69.8 | 66.0 | 57.1 | 45.3 | 35.1 | |
| 1964 | 32.9 | 32.9 | 37.6 | 45.5 | 55.1 | 64.1 | 70.8 | 68.6 | 60.2 | 53.6 | 43.3 | 37.5 | 50.3 |
| 1965 | 35.6 | 37.3 | 38.2 | 49.3 | 55.6 | 65.5 | 70.7 | 71.6 | 60.4 | 54.1 | 46.1 | 33.3 | 51.6 |
| 1966 | 34.5 | 35.0 | 41.2 | 50.3 | 59.7 | 65.9 | 68.7 | 68.6 | 64.7 | 51.5 | 43.9 | 37.5 | 51.9 |
| 1967 | 36.0 | 37.5 | 41.3 | 45.4 | 54.8 | 63.4 | 76.1 | 76.3 | 66.2 | 50.8 | 38.3 | 27.6 | 51.2 |
| 1968 | 27.5 | 33.3 | 39.6 | 42.9 | 52.6 | 63.0 | 67.9 | 63.7 | 57.5 | 48.5 | 39.8 | 33.4 | 47.5 |
| 1969 | 31.5 | 30.9 | 34.8 | 44.7 | 54.3 | 62.5 | 70.5 | 70.5 | 62.7 | 42.7 | 34.8 | 30.8 | 47.7 |
| 1970 | 31.0 | 33.0 | 36.2 | 39.8 | 50.2 | 63.2 | 72.5 | 72.2 | 54.5 | 43.9 | 36.5 | 30.9 | 47.1 |
| 1971 | 28.7 | 32.1 | 34.2 | 42.2 | 55.3 | 61.4 | 71.0 | 75.3 | 63.0 | 49.5 | 38.2 | 32.1 | 48.7 |
| 1972 | 30.5 | 31.1 | 39.1 | 43.3 | 54.5 | 64.8 | 70.9 | 71.5 | 60.5 | 50.6 | 39.9 | 29.2 | 48.9 |
| 1973 | 29.6 | 32.9 | 39.0 | 44.3 | 54.3 | 63.3 | 70.9 | 71.0 | 61.0 | 49.1 | 39.8 | 34.8 | 49.3 |
| 1974 | 29.3 | 32.9 | 37.7 | 44.0 | 51.5 | 64.5 | 69.3 | 70.7 | 64.8 | 51.5 | 40.2 | 33.1 | 49.2 |
| 1975 | 29.9 | 31.8 | 37.7 | 40.7 | 51.9 | 61.1 | 72.8 | 67.2 | 63.9 | 50.0 | 37.9 | 33.9 | 48.4 |
| Ave. | 31.4 | 33.4 | 38.1 | 44.4 | 54.5 | 63.6 | 70.8 | 70.5 | 61.9 | 50.2 | 40.3 | 33.0 | |

**Appendix Table 5. Mean maximum daily soil temperature (°F) at 4 inches for Kuna.**

| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | 71.8 | 76.4 | 73.8 | 67.8 | 54.0 | 46.3 | 38.3 | |
| 1967 | 36.3 | 39.1 | 44.1 | 49.7 | 57.3 | 65.6 | 70.5 | 70.0 | 65.1 | 53.5 | 45.3 | 33.1 | 52.5 |
| 1968 | 31.8 | 38.6 | 47.2 | 50.6 | 61.9 | 71.0 | 75.3 | 70.7 | 65.0 | 53.4 | 44.4 | 36.9 | 53.9 |
| 1969 | 34.6 | 34.5 | 41.1 | 52.5 | 61.5 | 66.2 | 66.6 | 73.6 | 67.1 | 53.0 | 43.3 | 36.2 | 52.5 |
| 1970 | 36.1 | 39.9 | 43.9 | 48.2 | 57.6 | 70.6 | 76.2 | 72.8 | 63.1 | 51.7 | 44.1 | 36.8 | 53.5 |
| 1971 | 33.3 | 37.2 | 39.9 | 49.3 | 60.2 | 68.0 | 74.7 | 75.8 | 63.1 | 53.2 | 42.4 | 36.2 | 52.8 |
| 1972 | 34.2 | 33.6 | 43.9 | 48.3 | 57.1 | 70.2 | 73.3 | 70.8 | 62.1 | 54.2 | 44.4 | 35.7 | 52.4 |
| 1973 | 33.7 | 35.4 | 41.7 | 48.0 | 57.1 | 61.7 | 68.9 | 68.2 | 61.2 | 52.4 | 45.1 | 39.3 | 51.2 |
| 1974 | 32.8 | 36.1 | 40.8 | 48.2 | 62.2 | 69.6 | 69.6 | 67.5 | 62.0 | 53.0 | 44.7 | 37.6 | 52.1 |
| 1975 | 33.0 | 34.3 | 41.6 | 46.2 | 57.9 | 62.9 | 69.5 | 64.6 | 60.6 | 52.5 | 42.9 | 38.0 | 50.6 |
| Ave. | 34.0 | 36.5 | 42.7 | 49.0 | 59.2 | 67.8 | 72.1 | 70.8 | 63.7 | 53.1 | 44.3 | 36.8 | |




**Appen. Fig. 5. Mean maximum daily soil temperature (°F) for each week at 4 inches for Kuna.**



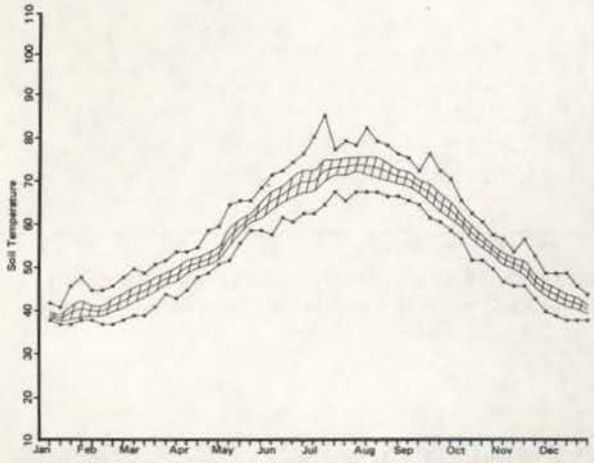

**Appen. Fig. 6. Mean minimum daily soil temperature (°F) for each week at 4 inches for Kuna.**

**Appendix Table 6. Mean minimum daily soil temperature (°F) at 4 inches for Kuna.**

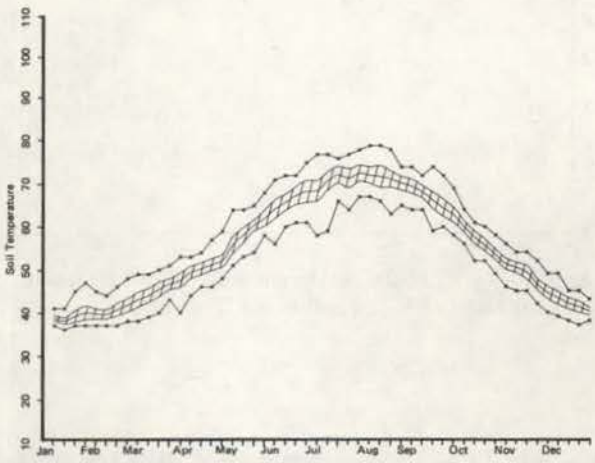
| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | 61.5 | 68.2 | 67.7 | 63.1 | 50.7 | 44.5 | 37.5 | |
| 1967 | 34.8 | 37.6 | 41.1 | 45.8 | 53.4 | 61.9 | 66.3 | 66.2 | 62.4 | 51.6 | 43.0 | 32.5 | 49.8 |
| 1968 | 31.5 | 36.7 | 43.1 | 45.5 | 55.3 | 63.8 | 68.5 | 65.3 | 60.1 | 50.2 | 42.5 | 35.7 | 49.9 |
| 1969 | 33.8 | 33.7 | 37.9 | 48.0 | 57.1 | 63.3 | 63.7 | 67.9 | 63.0 | 49.1 | 41.2 | 35.0 | 49.5 |
| 1970 | 35.1 | 37.7 | 40.9 | 45.0 | 54.2 | 64.7 | 69.7 | 67.0 | 59.3 | 49.2 | 42.6 | 36.1 | 50.2 |
| 1971 | 32.8 | 36.1 | 38.4 | 46.3 | 56.6 | 63.3 | 68.9 | 70.6 | 59.9 | 51.4 | 41.6 | 35.8 | 50.2 |
| 1972 | 33.5 | 32.8 | 42.3 | 45.9 | 54.2 | 65.1 | 68.0 | 67.0 | 59.9 | 52.7 | 43.0 | 34.9 | 50.0 |
| 1973 | 33.2 | 34.9 | 40.7 | 46.1 | 53.9 | 58.7 | 65.8 | 65.7 | 59.3 | 50.8 | 43.6 | 38.3 | 49.3 |
| 1974 | 32.0 | 35.3 | 39.5 | 45.9 | 57.1 | 65.1 | 66.7 | 65.1 | 59.4 | 51.3 | 43.7 | 36.8 | 49.9 |
| 1975 | 32.6 | 33.8 | 39.8 | 44.0 | 53.8 | 60.5 | 67.5 | 63.1 | 58.8 | 51.4 | 41.8 | 37.1 | 48.9 |
| Ave. | 33.3 | 35.4 | 40.4 | 45.8 | 55.1 | 62.8 | 67.3 | 66.7 | 60.5 | 50.8 | 42.8 | 36.0 | |

**Appendix Table 7. Mean maximum daily soil temperature (°F) at 8 inches for Kuna.**

| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | 69.9 | 76.1 | 75.6 | 71.4 | 59.0 | 51.6 | 44.4 | |
| 1967 | 41.2 | 43.1 | 46.6 | 51.5 | 58.9 | 67.3 | 72.9 | 72.7 | 68.9 | 59.2 | 51.2 | 40.4 | 56.2 |
| 1968 | 38.1 | 42.1 | 49.3 | 51.9 | 61.3 | 70.2 | 75.2 | 72.7 | 67.5 | 57.7 | 50.0 | 43.0 | 56.6 |
| 1969 | 40.2 | 39.5 | 43.7 | 54.0 | 62.0 | 68.0 | 68.4 | 74.5 | 70.5 | 57.3 | 48.6 | 42.0 | 55.8 |
| 1970 | 41.5 | 43.6 | 47.0 | 50.8 | 59.6 | 70.7 | 76.3 | 73.3 | 66.7 | 56.8 | 49.2 | 43.1 | 56.6 |
| 1971 | 38.5 | 41.9 | 43.5 | 51.6 | 61.9 | 69.1 | 74.7 | 76.9 | 66.6 | 58.3 | 47.9 | 42.3 | 56.2 |
| 1972 | 39.8 | 38.9 | 47.5 | 51.4 | 59.2 | 71.0 | 74.3 | 72.9 | 66.6 | 59.3 | 50.3 | 41.6 | 56.1 |
| 1973 | 39.4 | 40.5 | 46.0 | 51.4 | 59.3 | 61.9 | 71.7 | 72.0 | 65.8 | 57.8 | 50.4 | 45.1 | 55.4 |
| 1974 | 38.6 | 40.8 | 44.9 | 51.1 | 63.1 | 70.3 | 72.4 | 71.0 | 66.3 | 58.2 | 50.9 | 43.5 | 56.0 |
| 1975 | 39.1 | 40.0 | 45.2 | 49.3 | 59.6 | 65.7 | 72.0 | 68.6 | 65.0 | 58.3 | 49.2 | 43.6 | 54.8 |
| Ave. | 39.6 | 41.2 | 46.0 | 51.4 | 60.5 | 68.6 | 73.4 | 73.0 | 67.5 | 58.2 | 49.9 | 42.9 | |




**Appen. Fig. 7. Mean maximum daily soil temperature (°F) for each week at 8 inches for Kuna.**



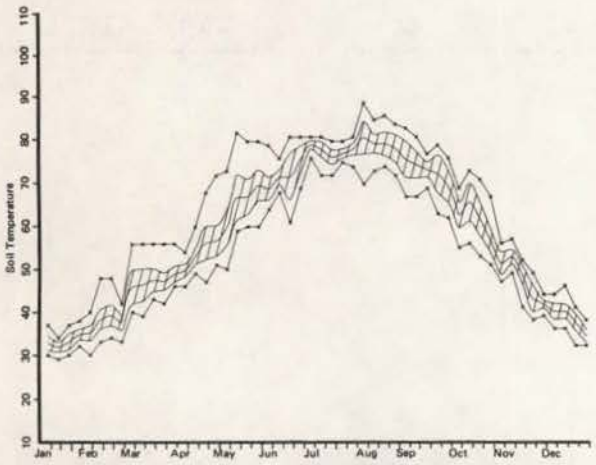

**Appen. Fig. 8. Mean minimum daily soil temperature (°F) for each week at 8 inches for Kuna.**

**Appendix Table 8. Mean minimum daily soil temperature (°F) at 8 inches for Kuna.**

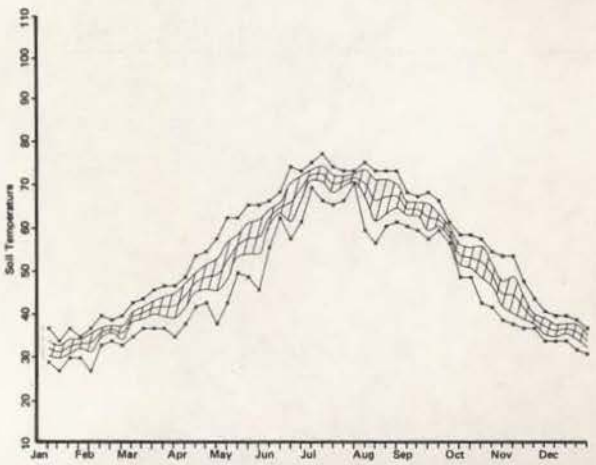
| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | 67.5 | 74.0 | 73.9 | 70.0 | 58.1 | 50.5 | 44.0 | |
| 1967 | 40.6 | 42.4 | 45.9 | 50.8 | 57.6 | 65.3 | 69.9 | 70.0 | 67.7 | 58.3 | 50.2 | 40.0 | 55.0 |
| 1968 | 37.9 | 41.5 | 48.5 | 50.7 | 59.3 | 67.9 | 72.7 | 71.1 | 66.2 | 56.9 | 49.2 | 42.4 | 55.4 |
| 1969 | 39.8 | 39.3 | 43.0 | 52.6 | 60.5 | 66.9 | 67.0 | 72.0 | 69.1 | 55.9 | 47.9 | 41.2 | 54.6 |
| 1970 | 40.7 | 42.8 | 45.8 | 49.3 | 57.9 | 68.1 | 73.5 | 71.7 | 65.4 | 55.9 | 48.6 | 42.4 | 55.2 |
| 1971 | 38.0 | 41.3 | 42.7 | 50.4 | 60.5 | 66.9 | 72.6 | 74.9 | 65.5 | 57.4 | 47.4 | 42.0 | 55.0 |
| 1972 | 39.2 | 38.2 | 46.6 | 50.0 | 57.5 | 68.8 | 72.0 | 71.1 | 65.6 | 58.3 | 49.5 | 41.1 | 54.9 |
| 1973 | 38.9 | 39.9 | 45.2 | 50.4 | 57.5 | 62.2 | 70.4 | 70.5 | 64.8 | 57.1 | 49.8 | 44.4 | 54.4 |
| 1974 | 38.1 | 40.0 | 44.1 | 50.0 | 61.4 | 68.7 | 70.8 | 69.7 | 65.0 | 57.2 | 50.0 | 42.7 | 54.9 |
| 1975 | 39.0 | 39.6 | 44.0 | 48.2 | 57.4 | 64.4 | 70.8 | 67.6 | 63.9 | 57.5 | 48.2 | 42.7 | 53.8 |
| Ave. | 39.1 | 40.5 | 45.1 | 50.2 | 58.8 | 66.7 | 71.4 | 71.3 | 66.3 | 57.3 | 49.1 | 42.3 | |

**Appendix Table 9. Mean maximum daily soil temperature (°F) at 4 inches for Hagerman.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1973 | 35.6 | 37.7 | 44.1 | 50.9 | 62.1 | 69.5 | 78.4 | 77.0 | 68.7 | 59.2 | 46.8 | 39.2 | 55.9 |
| 1974 | 32.2 | 37.6 | 45.2 | 52.9 | 64.3 | 75.9 | 76.6 | 81.7 | 77.6 | 65.6 | 50.5 | 38.2 | 58.1 |
| 1975 | 32.3 | 37.5 | 51.6 | 56.2 | 70.2 | | | | | | | | 49.7 |
| Ave. | 33.4 | 37.6 | 47.0 | 53.2 | 65.6 | 72.7 | 77.6 | 79.3 | 73.1 | 62.4 | 48.6 | 38.7 | |




Appen. Fig. 9. Mean maximum daily soil temperature (°F) for each week at 4 inches for Hagerman.



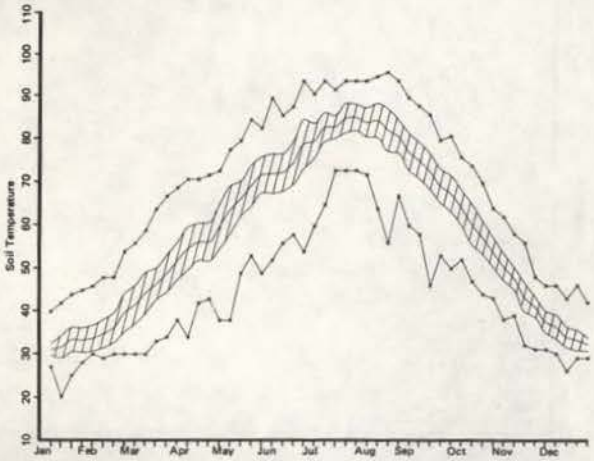

Appen. Fig. 10. Mean minimum daily soil temperature (°F) for each week at 4 inches for Hagerman.

**Appendix Table 10. Mean minimum daily soil temperature (°F) at 4 inches for Hagerman.**

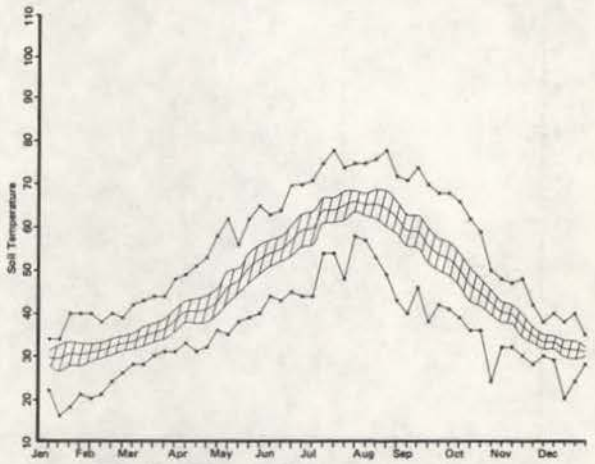
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1973 | 35.1 | 36.9 | 42.5 | 48.9 | 58.8 | 64.7 | 73.3 | 73.1 | 65.2 | 55.9 | 45.1 | 38.0 | 53.2 |
| 1974 | 31.4 | 36.3 | 42.2 | 49.6 | 59.5 | 69.7 | 70.9 | 63.6 | 61.2 | 50.4 | 39.5 | 34.5 | 50.7 |
| 1975 | 31.4 | 33.9 | 38.9 | 41.8 | 50.1 | | | | | | | | 39.3 |
| Ave. | 32.6 | 35.7 | 41.2 | 47.1 | 56.2 | 67.2 | 72.2 | 68.5 | 63.2 | 53.2 | 42.4 | 36.3 | |

**Appendix Table 11. Mean maximum daily soil temperature (°F) at 3 inches for Buhl.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 72.2 | 85.7 | 83.9 | 77.1 | 59.4 | 45.8 | 36.5 | |
| 1963 | 29.3 | 41.2 | 46.9 | 51.2 | 67.1 | 72.3 | 86.0 | 87.9 | 78.8 | 66.2 | 44.9 | 31.0 | 58.7 |
| 1964 | 29.3 | 30.8 | 38.4 | 53.9 | 65.1 | 68.5 | 84.9 | 87.6 | 74.5 | 63.8 | 42.6 | 35.0 | 56.3 |
| 1965 | 32.5 | 37.8 | 45.2 | 58.8 | 64.2 | 75.6 | 83.9 | 80.4 | 68.7 | 64.8 | 50.8 | 34.9 | 58.2 |
| 1966 | 33.3 | 34.4 | 47.6 | 63.1 | 71.4 | 75.0 | 80.3 | 75.6 | 69.7 | 57.3 | 45.3 | 33.8 | 57.3 |
| 1967 | 33.6 | 40.0 | 46.3 | 54.6 | 70.1 | 75.8 | 86.4 | 88.5 | 78.4 | 59.8 | 47.1 | 32.0 | 59.5 |
| 1968 | 30.1 | 38.0 | 52.5 | 58.4 | 69.2 | 75.3 | 82.0 | 74.5 | 69.5 | 56.7 | 43.4 | 33.1 | 56.9 |
| 1969 | 32.7 | 32.3 | 42.5 | 57.3 | 71.6 | 74.7 | 83.2 | 82.6 | 70.9 | 54.6 | 44.4 | 35.7 | 57.0 |
| 1970 | 35.6 | 41.2 | 46.7 | 55.5 | 67.8 | 78.0 | 84.2 | 80.7 | 66.2 | 55.1 | 43.8 | 34.5 | 57.5 |
| 1971 | 34.2 | 38.6 | 48.6 | 56.0 | 68.2 | 79.2 | 85.8 | 87.3 | 74.4 | 59.2 | 43.4 | 34.0 | 59.7 |
| 1972 | 34.3 | 36.0 | 51.7 | 56.4 | 68.6 | 79.5 | 84.4 | 84.4 | 69.5 | 57.5 | 41.6 | 33.7 | 58.2 |
| 1973 | 31.0 | 34.9 | 47.1 | 57.7 | 70.2 | 76.4 | 81.3 | 81.4 | 68.1 | 59.2 | 44.1 | 37.3 | 57.5 |
| 1974 | 33.0 | 34.8 | 43.1 | 56.5 | 67.7 | 78.8 | 83.2 | 81.9 | 75.1 | 60.5 | 46.7 | 35.3 | 58.1 |
| 1975 | 32.1 | 32.4 | 44.0 | 46.2 | 60.8 | 71.6 | 83.9 | 83.6 | 75.3 | 57.4 | 43.3 | 36.9 | 56.1 |
| Ave. | 32.4 | 36.4 | 46.1 | 55.8 | 67.8 | 75.2 | 83.9 | 82.9 | 72.6 | 59.4 | 44.8 | 34.6 | |




**Appen. Fig. 11. Mean maximum daily soil temperature (°F) for each week at 3 inches for Buhl.**



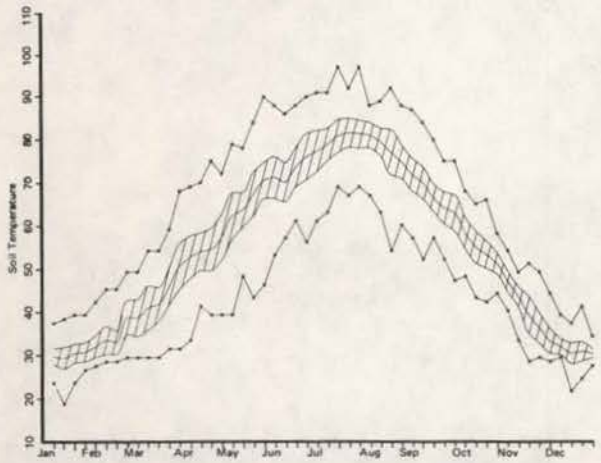

**Appen. Fig. 12. Mean minimum daily soil temperature (°F) for each week at 3 inches for Buhl.**

**Appendix Table 12. Mean minimum daily soil temperature (°F) at 3 inches for Buhl.**

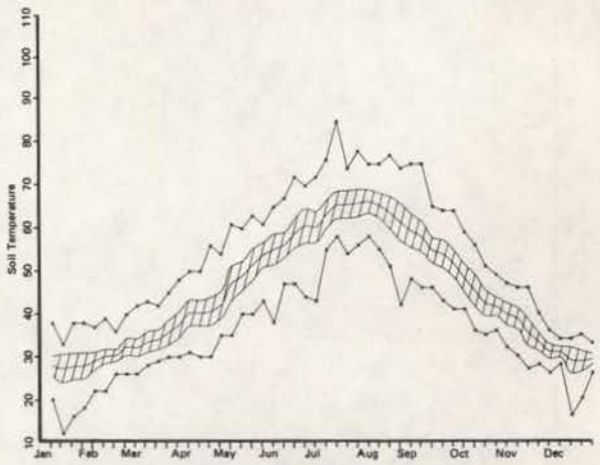
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 60.6 | 70.2 | 70.4 | 65.5 | 48.2 | 38.7 | 33.5 | |
| 1963 | 25.7 | 34.8 | 36.7 | 39.3 | 52.9 | 57.8 | 68.3 | 69.3 | 63.8 | 56.0 | 38.4 | 30.2 | 47.9 |
| 1964 | 25.2 | 27.4 | 31.9 | 40.7 | 48.2 | 55.2 | 66.6 | 70.2 | 60.2 | 52.6 | 36.5 | 32.4 | 45.7 |
| 1965 | 31.7 | 32.7 | 35.0 | 45.3 | 49.4 | 54.1 | 60.1 | 61.2 | 51.1 | 46.2 | 40.0 | 30.0 | 44.8 |
| 1966 | 30.3 | 30.9 | 35.0 | 43.0 | 49.0 | 52.6 | 60.5 | 59.9 | 55.9 | 44.7 | 38.1 | 31.4 | 44.4 |
| 1967 | 31.7 | 33.5 | 36.6 | 38.1 | 49.8 | 55.4 | 64.6 | 63.4 | 56.8 | 43.6 | 36.6 | 30.4 | 45.1 |
| 1968 | 28.4 | 31.9 | 35.5 | 38.9 | 45.5 | 54.1 | 59.8 | 57.0 | 52.0 | 42.4 | 35.4 | 30.8 | 42.7 |
| 1969 | 30.5 | 30.0 | 32.3 | 43.1 | 51.2 | 57.7 | 62.9 | 62.6 | 55.6 | 44.3 | 37.2 | 33.4 | 45.1 |
| 1970 | 32.8 | 34.2 | 37.0 | 38.2 | 49.2 | 58.7 | 65.3 | 63.9 | 50.9 | 43.1 | 37.9 | 32.7 | 45.3 |
| 1971 | 31.4 | 33.4 | 38.0 | 42.5 | 50.9 | 57.4 | 64.2 | 68.3 | 55.1 | 44.7 | 37.3 | 33.2 | 46.9 |
| 1972 | 33.1 | 32.5 | 38.8 | 41.9 | 47.7 | 58.6 | 61.7 | 63.4 | 52.0 | 44.8 | 35.9 | 31.7 | 45.2 |
| 1973 | 28.2 | 29.8 | 32.9 | 39.5 | 49.5 | 57.0 | 64.3 | 62.7 | 54.1 | 46.4 | 39.0 | 33.9 | 44.8 |
| 1974 | 31.4 | 32.0 | 35.9 | 41.2 | 49.1 | 59.6 | 65.5 | 62.8 | 57.1 | 46.8 | 38.3 | 33.0 | 46.1 |
| 1975 | 31.2 | 31.3 | 35.0 | 36.9 | 45.4 | 54.2 | 66.6 | 62.5 | 57.3 | 47.7 | 37.0 | 33.9 | 45.2 |
| Ave. | 30.1 | 31.9 | 35.3 | 40.6 | 49.1 | 56.7 | 64.3 | 64.1 | 56.2 | 46.5 | 37.6 | 32.2 | |

**Appendix Table 13. Mean maximum daily soil temperature (°F) at 3 inches for Castleford.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 74.3 | 77.6 | 74.5 | 66.9 | 56.1 | 44.1 | 34.8 | |
| 1963 | 27.4 | 38.8 | 44.8 | 51.5 | 64.6 | 67.7 | 80.6 | 79.2 | 70.5 | 59.4 | 41.9 | 31.2 | 54.9 |
| 1964 | 29.7 | 30.9 | 33.4 | 51.3 | 65.3 | 71.6 | 81.7 | 79.3 | 65.8 | 55.6 | 37.3 | 31.7 | 52.9 |
| 1965 | 30.5 | 34.3 | 42.7 | 59.0 | | | | | | | | 31.6 | |
| 1966 | 32.4 | 33.8 | 47.4 | 63.0 | 72.7 | 75.9 | 86.4 | 81.7 | 68.9 | 57.9 | 43.5 | 33.3 | 58.2 |
| 1967 | 32.2 | 39.2 | 48.5 | 52.8 | 67.2 | 76.1 | 86.2 | 86.2 | 73.1 | 57.8 | 44.6 | 29.2 | 57.9 |
| 1968 | 29.1 | 35.7 | 47.3 | 52.6 | 68.3 | 75.6 | 81.3 | 72.0 | 70.2 | 58.1 | 39.9 | 31.2 | 55.3 |
| 1969 | 31.9 | 30.7 | 41.0 | 60.8 | 66.2 | 69.6 | 78.1 | 82.0 | 70.0 | 49.8 | 39.8 | 32.2 | 54.5 |
| 1970 | 32.1 | 38.0 | 42.4 | 53.1 | 67.6 | 78.4 | 84.7 | 82.3 | 64.5 | | | | 61.2 |
| 1971 | | | | 50.3 | 62.0 | 69.5 | 77.9 | 78.5 | 72.3 | | | | |
| 1972 | | | | 54.1 | 64.3 | 74.6 | 76.2 | 76.2 | 61.0 | | | | |
| 1973 | | | | 60.1 | 70.8 | 78.7 | 84.5 | 80.1 | 64.1 | 55.7 | | | |
| 1974 | | | | 56.0 | 68.0 | 77.8 | 78.6 | 76.9 | 68.9 | 55.6 | | | |
| 1975 | | | | 48.5 | 62.9 | 72.7 | 83.9 | 76.8 | 69.2 | 58.6 | | | |
| Ave. | 30.6 | 35.1 | 43.5 | 54.5 | 66.7 | 74.0 | 81.4 | 78.9 | 68.0 | 56.5 | 41.6 | 31.9 | |




**Appen. Fig. 13. Mean maximum daily soil temperature (°F) for each week at 3 inches for Castleford.**



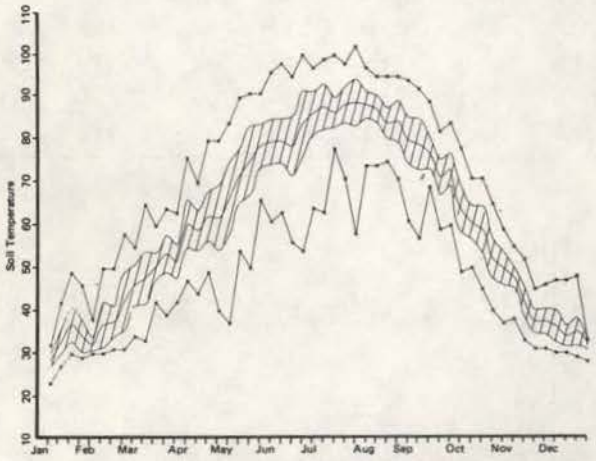

**Appen. Fig. 14. Mean minimum daily soil temperature (°F) for each week at 3 inches for Castleford.**

**Appendix Table 14. Mean minimum daily soil temperature (°F) at 3 inches for Castleford.**

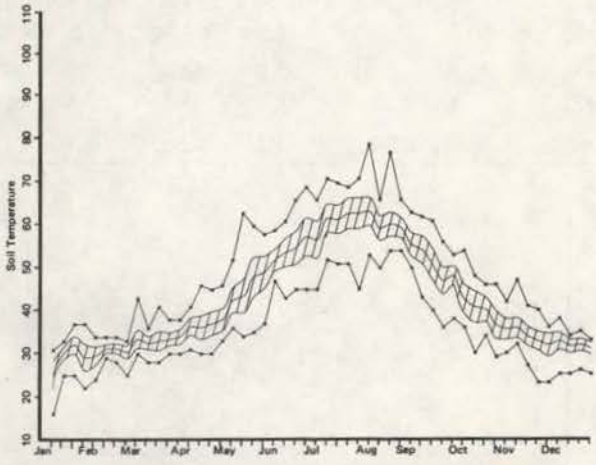
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 57.0 | 60.5 | 59.7 | 53.1 | 46.1 | 38.3 | 31.5 | |
| 1963 | 22.5 | 31.6 | 36.4 | 40.5 | 52.4 | 55.5 | 60.5 | 61.7 | 57.1 | 49.8 | 37.9 | 30.1 | 44.7 |
| 1964 | 26.9 | 27.7 | 29.9 | 37.2 | 48.7 | 55.3 | 63.5 | 60.0 | 50.1 | 43.3 | 32.7 | 29.2 | 42.2 |
| 1965 | 29.4 | 30.1 | 32.4 | 42.0 | | | | | | | | 28.9 | |
| 1966 | 29.0 | 30.9 | 36.0 | 42.8 | 50.8 | 53.7 | 61.2 | 61.3 | 54.2 | 42.2 | 37.0 | 31.1 | 44.3 |
| 1967 | 29.9 | 31.6 | 35.8 | 38.5 | 49.1 | 57.4 | 69.1 | 72.0 | 61.9 | 46.2 | 37.9 | 26.8 | 46.4 |
| 1968 | 26.0 | 31.6 | 37.3 | 40.5 | 48.1 | 57.0 | 64.9 | 59.5 | 56.4 | 45.4 | 35.2 | 29.8 | 44.2 |
| 1969 | 30.1 | 28.5 | 32.0 | 43.0 | 53.9 | 58.8 | 65.7 | 68.3 | 58.1 | 41.5 | 35.8 | 30.6 | 45.6 |
| 1970 | 29.6 | 33.1 | 34.9 | 39.0 | 50.9 | 60.5 | 66.2 | 65.8 | 53.3 | | | | 48.7 |
| 1971 | | | | 40.9 | 50.7 | 59.2 | 65.3 | 68.8 | 59.3 | | | | |
| 1972 | | | | 38.6 | 45.4 | 56.6 | 59.0 | 60.9 | 51.4 | | | | |
| 1973 | | | | 42.5 | 52.1 | 58.4 | 66.3 | 61.9 | 53.2 | 46.6 | | | |
| 1974 | | | | 42.0 | 50.9 | 63.7 | 65.9 | 63.2 | 56.4 | 48.1 | | | |
| 1975 | | | | 37.4 | 47.7 | 59.2 | 70.8 | 65.8 | 58.9 | 51.7 | | | |
| Ave. | 27.9 | 30.6 | 34.3 | 40.2 | 50.0 | 57.9 | 64.5 | 63.7 | 55.5 | 45.5 | 36.4 | 29.7 | |

**Appendix Table 15. Mean maximum daily soil temperature (°F) at 2 inches for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1969 | | | | | | 81.7 | 88.3 | 88.9 | 82.4 | 60.6 | 45.2 | 34.6 | 68.8 |
| 1970 | 36.1 | 45.0 | 54.2 | 59.7 | 74.3 | 84.2 | 89.7 | 86.7 | 72.6 | 57.8 | 44.0 | 33.3 | 61.5 |
| 1971 | | | | | | | | | | | | | |
| 1972 | | | | | | | | | | | 42.9 | 34.8 | 38.8 |
| 1973 | 31.3 | 34.1 | 50.0 | 60.0 | 77.4 | 81.1 | 86.6 | 84.1 | 69.4 | 58.8 | 42.2 | 35.5 | 59.4 |
| 1974 | 31.7 | 33.6 | 44.8 | 59.5 | 72.9 | 81.3 | 85.5 | 86.5 | 75.5 | 63.0 | 45.5 | 36.1 | 61.3 |
| 1975 | | | | 48.2 | 67.6 | 76.1 | 89.4 | 83.3 | 80.2 | 60.7 | 42.4 | 37.1 | 66.7 |
| Ave. | 33.0 | 37.6 | 49.7 | 59.1 | 73.0 | 80.9 | 87.9 | 85.9 | 76.0 | 60.2 | 43.7 | 35.1 | |




**Appen. Fig. 15. Mean maximum daily soil temperature (°F) for each week at 2 inches for Twin Falls.**



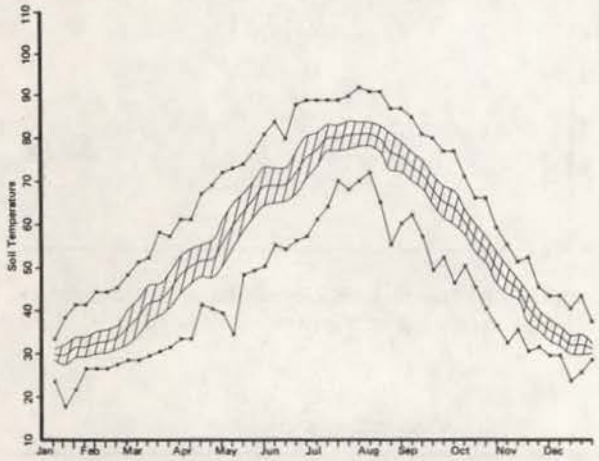

**Appen. Fig. 16. Mean minimum daily soil temperature (°F) for each week at 2 inches for Twin Falls.**

**Appendix Table 16. Mean minimum daily soil temperature (°F) at 2 inches for Twin Falls.**

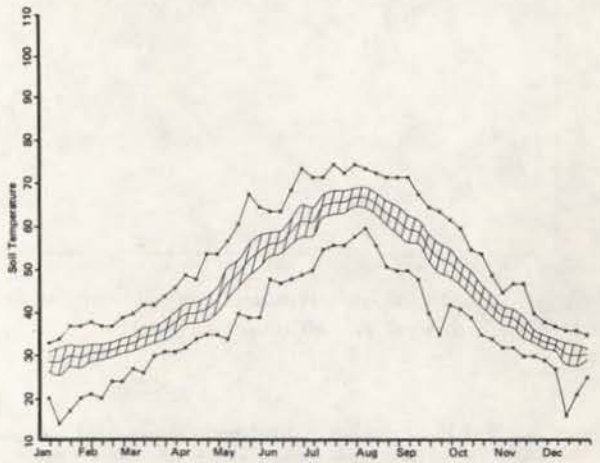
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1969 | | | | | | 53.9 | 60.6 | 59.4 | 51.6 | 36.7 | 31.0 | 30.0 | 46.2 |
| 1970 | 29.0 | 30.8 | 31.6 | 33.6 | 45.3 | 54.8 | 58.9 | 59.5 | 45.6 | 37.9 | 34.2 | 30.6 | 41.1 |
| 1971 | | | | | | | | | | | | | |
| 1972 | | | | | | | | | | | 34.4 | 32.5 | 33.4 |
| 1973 | 28.0 | 29.5 | 33.4 | 38.2 | 48.0 | 54.7 | 61.5 | 60.5 | 52.1 | 43.0 | 36.6 | 33.0 | 43.3 |
| 1974 | 30.7 | 31.6 | 35.0 | 37.6 | 46.1 | 56.6 | 61.8 | 61.9 | 51.7 | 43.1 | 34.0 | 31.6 | 44.3 |
| 1975 | | | | 36.4 | 42.5 | 53.7 | 65.6 | 60.7 | 54.0 | 43.3 | 35.5 | 33.7 | 48.3 |
| Ave. | 29.3 | 30.7 | 33.3 | 36.5 | 45.5 | 54.7 | 61.7 | 60.4 | 51.0 | 40.8 | 34.3 | 31.9 | |

**Appendix Table 17. Mean maximum daily soil temperature (°F) at 4 inches (Taylor) for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 72.8 | 78.4 | 77.1 | 71.2 | 58.7 | 44.8 | 35.0 | 62.6 |
| 1963 | 27.9 | 39.1 | 44.3 | 49.1 | 64.9 | 68.1 | 78.4 | 77.2 | 65.0 | 59.2 | 42.0 | 30.4 | 54.4 |
| 1964 | 27.5 | 29.6 | 34.9 | 52.1 | 64.8 | 68.7 | 82.3 | 81.3 | 68.0 | 57.5 | 39.5 | 34.0 | 53.5 |
| 1965 | 31.9 | 35.8 | 43.5 | 55.7 | 65.2 | 74.0 | 80.9 | 78.9 | 66.0 | 59.8 | 46.0 | 31.2 | 55.8 |
| 1966 | 30.9 | 31.1 | 42.4 | 56.3 | 67.3 | 73.7 | 80.9 | 77.8 | 71.6 | 56.2 | 44.5 | 34.1 | 55.7 |
| 1967 | 33.0 | 38.8 | 46.9 | 49.1 | 63.9 | 72.3 | 83.3 | 81.2 | 74.8 | 58.3 | 45.3 | 30.8 | 56.6 |
| 1968 | 30.7 | 36.6 | 48.5 | 53.7 | 53.9 | 71.8 | 84.7 | 71.9 | 68.5 | 57.0 | 42.0 | 33.1 | 50.5 |
| 1969 | 33.8 | 32.4 | 69.9 | 57.2 | 70.3 | 73.2 | 80.2 | 80.9 | 72.8 | 54.9 | 42.7 | 34.2 | 56.2 |
| 1970 | 34.3 | 39.7 | 45.9 | 49.2 | 63.9 | 74.3 | 80.3 | 80.2 | 65.8 | 53.6 | 42.7 | 34.6 | 55.5 |
| 1971 | 32.5 | 36.5 | 41.3 | 51.4 | 63.9 | 74.3 | 65.6 | 80.1 | 65.2 | 53.7 | 39.1 | 31.9 | 54.5 |
| 1972 | 31.5 | 33.5 | 47.4 | 53.8 | 64.8 | 75.8 | 79.6 | 81.5 | 66.3 | 55.3 | 41.1 | 34.1 | 55.5 |
| 1973 | 30.9 | 32.3 | 43.0 | 51.9 | 66.3 | 73.8 | 79.6 | 77.4 | 65.0 | 55.5 | 42.5 | 35.7 | 54.6 |
| 1974 | 31.5 | 33.1 | 42.0 | 54.4 | 67.6 | 77.5 | 82.0 | 82.9 | 72.3 | 59.9 | 44.4 | 33.3 | 56.9 |
| 1975 | 30.6 | 31.5 | 41.5 | 44.3 | 59.8 | 70.4 | 84.6 | 79.5 | 73.8 | 56.4 | 39.9 | 35.0 | 54.1 |
| Ave. | 31.3 | 34.6 | 43.2 | 52.2 | 65.1 | 72.9 | 81.8 | 79.2 | 69.4 | 56.9 | 42.6 | 33.4 | |




**Appen. Fig. 17. Mean maximum daily soil temperature (°F) for each week at 4 inches for Twin Falls.**



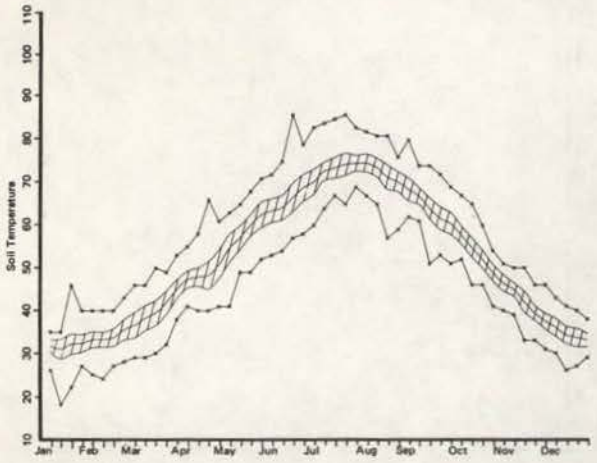

**Appen. Fig. 18. Mean minimum daily soil temperature (°F) for each week at 4 inches for Twin Falls.**

**Appendix Table 18. Mean minimum daily soil temperature (°F) at 4 inches (Taylor) for Twin Falls.**

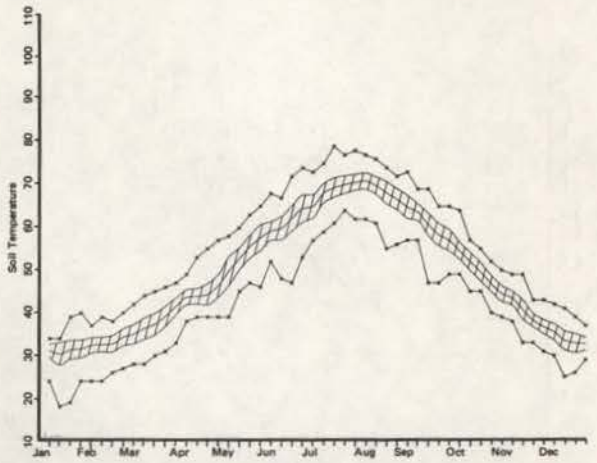
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 58.8 | 63.5 | 61.0 | 54.8 | 45.4 | 37.1 | 31.8 | 50.3 |
| 1963 | 24.8 | 33.7 | 36.0 | 39.3 | 52.9 | 57.8 | 65.2 | 65.5 | 64.7 | 51.5 | 37.6 | 29.0 | 46.3 |
| 1964 | 23.3 | 25.9 | 30.3 | 39.3 | 50.2 | 55.1 | 65.0 | 63.6 | 52.0 | 44.5 | 34.7 | 31.1 | 43.0 |
| 1965 | 30.9 | 31.5 | 33.7 | 42.6 | 48.5 | 58.5 | 63.9 | 63.9 | 51.8 | 47.2 | 39.5 | 29.2 | 45.2 |
| 1966 | 29.0 | 29.6 | 34.0 | 42.5 | 50.9 | 58.2 | 64.1 | 62.5 | 59.1 | 44.3 | 38.4 | 32.0 | 45.6 |
| 1967 | 31.6 | 33.4 | 37.0 | 39.7 | 50.1 | 57.7 | 68.2 | 67.2 | 60.7 | 46.9 | 38.3 | 28.3 | 46.7 |
| 1968 | 27.7 | 32.9 | 37.1 | 40.6 | 53.5 | 60.5 | 68.5 | 60.0 | 55.7 | 45.3 | 37.2 | 32.5 | 50.1 |
| 1969 | 32.5 | 31.3 | 33.6 | 44.3 | 54.8 | 58.8 | 65.6 | 66.3 | 59.2 | 44.6 | 36.5 | 32.3 | 46.7 |
| 1970 | 31.2 | 33.5 | 36.0 | 38.4 | 50.9 | 60.7 | 65.3 | 67.3 | 54.4 | 44.7 | 38.2 | 33.0 | 46.2 |
| 1971 | 30.1 | 33.0 | 34.1 | 39.4 | 50.1 | 58.4 | 65.4 | 66.2 | 52.5 | 44.0 | 35.0 | 30.6 | 45.0 |
| 1972 | 30.3 | 30.9 | 36.3 | 39.6 | 50.4 | 60.9 | 63.8 | 65.2 | 53.0 | 45.8 | 36.8 | 32.5 | 45.5 |
| 1973 | 29.5 | 30.8 | 35.2 | 41.9 | 53.4 | 59.8 | 66.8 | 66.2 | 57.0 | 48.5 | 39.0 | 33.8 | 46.9 |
| 1974 | 30.5 | 32.0 | 36.3 | 41.7 | 51.6 | 60.7 | 66.1 | 65.7 | 57.2 | 48.2 | 37.3 | 31.5 | 46.7 |
| 1975 | 29.9 | 30.3 | 34.2 | 35.8 | 44.6 | 56.3 | 68.1 | 62.6 | 56.4 | 45.5 | 34.9 | 32.1 | 44.3 |
| Ave. | 29.3 | 31.5 | 34.9 | 40.4 | 50.7 | 58.7 | 65.7 | 64.5 | 56.1 | 46.2 | 37.2 | 31.4 | |

**Appendix Table 19. Mean maximum daily soil temperature (°F) at 8 inches for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 62.5 | 68.5 | 68.0 | 61.9 | 53.7 | 44.2 | 35.2 | 56.3 |
| 1963 | 28.2 | 35.0 | 39.5 | 44.3 | 57.4 | 62.4 | 70.0 | 70.7 | 65.5 | 56.6 | 41.5 | 30.6 | 50.3 |
| 1964 | 26.9 | 28.4 | 31.8 | 46.6 | 58.3 | 63.2 | 74.5 | 73.9 | 62.2 | 53.4 | 39.3 | 34.4 | 49.5 |
| 1965 | 32.4 | 34.5 | 38.7 | 49.7 | 57.8 | 67.5 | 73.0 | 72.4 | 60.9 | 54.4 | 44.6 | 32.1 | 51.6 |
| 1966 | 31.0 | 30.9 | 38.0 | 50.0 | 59.9 | 66.5 | 73.2 | 71.4 | 66.3 | 52.7 | 44.0 | 35.7 | 51.7 |
| 1967 | 33.4 | 36.5 | 42.4 | 45.3 | 57.0 | 65.7 | 75.7 | 75.4 | 68.8 | 55.5 | 44.6 | 32.6 | 52.9 |
| 1968 | 30.9 | 35.0 | 43.7 | 48.2 | 57.9 | 66.0 | 75.6 | 66.7 | 63.6 | 53.3 | 42.0 | 34.2 | 51.5 |
| 1969 | 34.3 | 32.5 | 37.0 | 51.6 | 62.4 | 67.5 | 72.4 | 73.0 | 66.7 | 52.0 | 42.1 | 35.2 | 52.3 |
| 1970 | 34.9 | 37.8 | 42.4 | 46.4 | 57.5 | 67.8 | 73.5 | 74.1 | 62.6 | 51.7 | 42.6 | 36.6 | 52.4 |
| 1971 | 32.3 | 36.1 | 38.0 | 47.7 | 58.6 | 67.5 | 73.1 | 73.1 | 62.0 | 52.4 | 40.7 | 34.8 | 51.4 |
| 1972 | 33.5 | 34.3 | 43.1 | 48.3 | 58.5 | 69.7 | 73.2 | 73.8 | 63.8 | 53.8 | 42.2 | 35.6 | 52.5 |
| 1973 | 32.9 | 33.3 | 40.2 | 47.5 | 59.3 | 68.0 | 73.8 | 72.1 | 62.4 | 54.0 | 44.2 | 37.2 | 52.2 |
| 1974 | 32.5 | 34.1 | 40.2 | 49.5 | 60.8 | 69.3 | 75.1 | 74.8 | 66.1 | 56.8 | 44.2 | 39.6 | 54.6 |
| 1975 | | | | 44.4 | 53.7 | 63.4 | 76.9 | 73.4 | 68.3 | 55.7 | 43.4 | 38.9 | 58.9 |
| Ave. | 31.9 | 34.0 | 39.6 | 47.9 | 58.4 | 66.2 | 73.5 | 72.4 | 64.4 | 54.0 | 42.8 | 35.0 | |




**Appen. Fig. 19. Mean maximum daily soil temperature (°F) for each week at 8 inches for Twin Falls.**



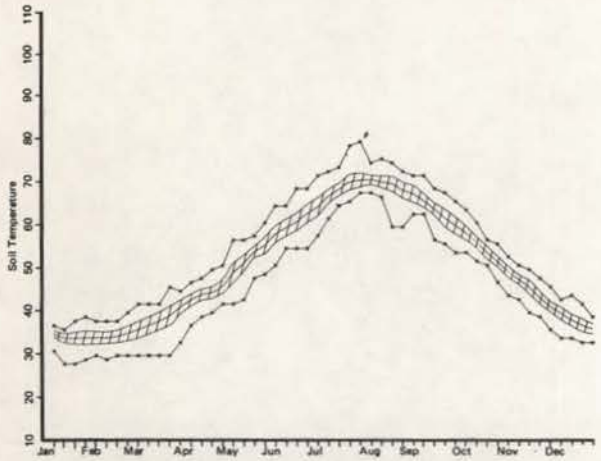

**Appen. Fig. 20. Mean minimum daily soil temperature (°F) for each week at 8 inches for Twin Falls.**

**Appendix Table 20. Mean minimum daily soil temperature (°F) at 8 inches for Twin Falls.**

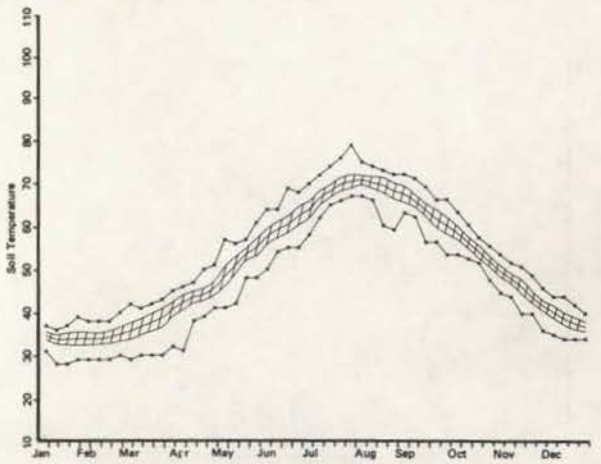
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | 60.4 | 66.3 | 66.2 | 60.5 | 52.2 | 42.8 | 34.4 | 54.7 |
| 1963 | 27.3 | 34.0 | 37.9 | 41.4 | 53.8 | 59.1 | 66.6 | 67.9 | 63.0 | 54.5 | 40.3 | 30.4 | 48.1 |
| 1964 | 25.5 | 27.5 | 30.4 | 41.3 | 52.5 | 57.7 | 68.3 | 68.5 | 57.3 | 49.7 | 38.0 | 33.0 | 45.9 |
| 1965 | 32.1 | 33.1 | 35.9 | 45.1 | 51.6 | 61.1 | 66.8 | 67.1 | 56.0 | 50.6 | 42.8 | 31.5 | 47.9 |
| 1966 | 30.7 | 30.5 | 35.6 | 45.1 | 54.0 | 61.3 | 67.2 | 66.5 | 62.4 | 49.5 | 42.1 | 35.1 | 48.4 |
| 1967 | 32.9 | 35.1 | 39.3 | 41.9 | 52.4 | 60.6 | 70.1 | 70.9 | 64.6 | 51.9 | 42.6 | 31.4 | 49.6 |
| 1968 | 30.4 | 33.9 | 40.2 | 43.9 | 53.5 | 62.6 | 70.5 | 63.1 | 59.7 | 50.2 | 40.5 | 34.0 | 48.6 |
| 1969 | 33.8 | 32.3 | 35.3 | 47.0 | 57.5 | 63.0 | 67.8 | 69.2 | 63.0 | 49.2 | 40.8 | 34.6 | 49.5 |
| 1970 | 33.7 | 36.9 | 39.8 | 42.4 | 53.3 | 63.0 | 69.1 | 70.4 | 59.0 | 49.4 | 41.2 | 35.7 | 49.5 |
| 1971 | 31.4 | 34.8 | 36.4 | 44.1 | 53.8 | 62.4 | 69.3 | 70.6 | 59.6 | 49.9 | 39.6 | 34.0 | 48.9 |
| 1972 | 32.7 | 33.1 | 40.7 | 44.9 | 55.1 | 64.9 | 69.4 | 70.2 | 60.4 | 51.3 | 40.4 | 34.9 | 49.9 |
| 1973 | 32.6 | 32.9 | 38.7 | 45.4 | 55.5 | 63.4 | 70.6 | 70.1 | 61.1 | 52.7 | 43.2 | 36.7 | 50.3 |
| 1974 | 32.3 | 33.6 | 38.6 | 45.8 | 55.7 | 65.1 | 71.7 | 71.1 | 62.9 | 53.4 | 43.1 | 38.6 | 51.9 |
| 1975 | | | | 42.4 | 49.1 | 60.0 | 72.9 | 70.3 | 64.8 | 53.5 | 42.8 | 38.5 | 56.2 |
| Ave. | 31.3 | 33.1 | 37.4 | 44.0 | 53.7 | 61.8 | 69.0 | 68.7 | 61.0 | 51.3 | 41.4 | 34.3 | |

**Appendix Table 21. Mean maximum daily soil temperature (°F) at 20 inches for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | | | | | | | 39.3 | 39.3 |
| 1963 | 32.8 | 34.5 | 39.1 | 43.2 | 52.5 | 60.2 | 66.5 | 68.7 | 65.0 | 58.6 | 45.6 | 34.5 | 50.2 |
| 1964 | 30.3 | 29.8 | 30.6 | 41.8 | 52.2 | 57.7 | 68.8 | 71.3 | 61.6 | 54.0 | 43.7 | 37.3 | 48.3 |
| 1965 | 34.4 | 35.4 | 37.7 | 45.4 | 52.6 | 61.9 | 67.5 | 68.9 | 60.7 | 54.7 | 47.6 | 36.8 | 50.4 |
| 1966 | 33.9 | 32.4 | 36.1 | 45.8 | 54.7 | 61.6 | 68.9 | 69.2 | 65.6 | 55.5 | 47.6 | 39.9 | 51.0 |
| 1967 | 36.0 | 37.4 | 40.9 | 43.8 | 51.5 | 60.8 | 70.0 | 72.1 | 67.9 | 58.1 | 48.5 | 37.8 | 52.2 |
| 1968 | 34.4 | 35.5 | 41.5 | 45.2 | 53.1 | 60.9 | 68.6 | 65.4 | 62.1 | 54.2 | 45.9 | 38.0 | 50.5 |
| 1969 | 35.9 | 34.2 | 36.2 | 46.5 | 55.5 | 63.2 | 66.3 | 69.4 | 65.0 | 54.5 | 45.9 | 38.3 | 51.0 |
| 1970 | 36.0 | 37.4 | 40.5 | 43.6 | 50.9 | 61.7 | 69.0 | 71.2 | 63.7 | 54.4 | 45.6 | 39.4 | 51.2 |
| 1971 | 34.3 | 36.3 | 36.6 | 44.0 | 52.7 | 61.1 | 66.9 | 69.7 | 61.9 | 53.7 | 43.8 | 37.5 | 49.9 |
| 1972 | 34.2 | 33.4 | 39.7 | 44.4 | 53.1 | 63.7 | 70.4 | 70.4 | 65.3 | 55.3 | 45.8 | 38.5 | 51.2 |
| 1973 | 34.8 | 33.9 | 38.1 | 44.0 | 52.6 | 62.5 | 68.9 | 70.0 | 63.6 | 55.6 | 47.6 | 40.0 | 51.0 |
| 1974 | 34.9 | 35.0 | 38.4 | 49.5 | 60.8 | 63.5 | 71.7 | 71.5 | 66.1 | 56.7 | 47.5 | 40.0 | 52.1 |
| 1975 | 35.6 | 34.6 | 37.7 | 39.9 | 47.0 | 56.2 | 70.8 | 72.5 | 67.5 | 58.3 | 47.7 | 41.5 | 50.9 |
| Ave. | 34.4 | 34.6 | 37.9 | 44.0 | 52.5 | 61.2 | 68.8 | 70.0 | 64.3 | 55.7 | 46.4 | 38.5 | |




**Appen. Fig. 21. Mean maximum daily soil temperature (°F) for each week at 20 inches for Twin Falls.**



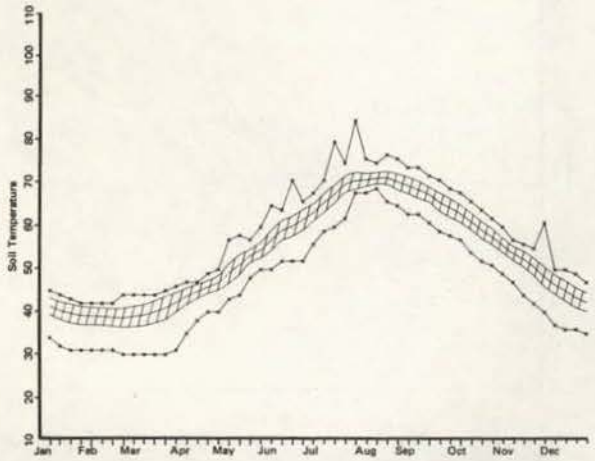

**Appen. Fig. 22. Mean minimum daily soil temperature (°F) for each week at 20 inches for Twin Falls.**

**Appendix Table 22. Mean minimum daily soil temperature (°F) at 20 inches for Twin Falls.**

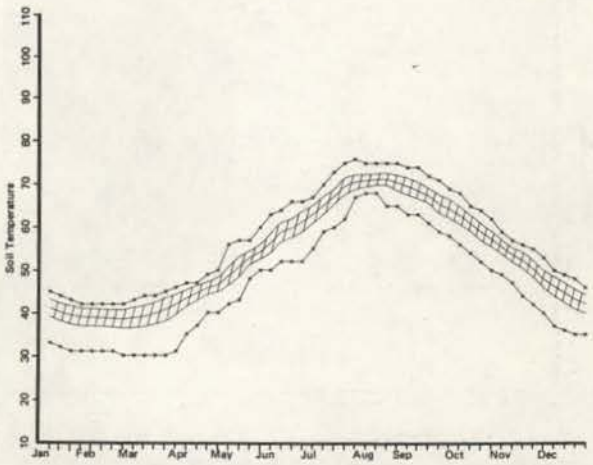
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1962 | | | | | | | | | | | | 39.0 | 39.0 |
| 1963 | 32.7 | 34.0 | 38.6 | 42.6 | 51.8 | 59.3 | 65.8 | 68.5 | 64.7 | 58.1 | 45.2 | 34.3 | 49.7 |
| 1964 | 29.9 | 29.6 | 30.4 | 40.8 | 51.4 | 56.9 | 67.8 | 70.5 | 61.2 | 53.5 | 43.2 | 36.6 | 47.7 |
| 1965 | 34.2 | 34.8 | 37.0 | 44.9 | 51.8 | 60.9 | 67.0 | 68.6 | 60.1 | 54.5 | 47.2 | 36.5 | 49.9 |
| 1966 | 33.7 | 32.3 | 35.7 | 45.2 | 53.9 | 60.9 | 68.1 | 68.6 | 65.0 | 47.1 | 47.1 | 39.6 | 50.5 |
| 1967 | 35.9 | 37.0 | 40.5 | 43.2 | 50.6 | 60.1 | 69.4 | 71.7 | 67.4 | 57.4 | 47.9 | 37.3 | 51.6 |
| 1968 | 34.3 | 35.3 | 41.2 | 44.6 | 52.4 | 60.4 | 68.3 | 64.9 | 61.6 | 53.8 | 45.4 | 37.8 | 50.1 |
| 1969 | 35.7 | 34.1 | 35.9 | 45.9 | 54.9 | 62.7 | 65.6 | 69.0 | 64.5 | 53.8 | 45.4 | 38.0 | 50.5 |
| 1970 | 35.5 | 37.3 | 40.1 | 42.7 | 50.3 | 60.6 | 68.1 | 70.8 | 62.9 | 53.8 | 45.1 | 38.9 | 50.6 |
| 1971 | 33.9 | 35.9 | 36.1 | 43.6 | 51.9 | 60.3 | 66.5 | 69.5 | 61.5 | 53.0 | 43.2 | 37.0 | 49.4 |
| 1972 | 34.7 | 33.0 | 39.1 | 43.9 | 52.5 | 62.8 | 69.9 | 70.0 | 64.5 | 54.7 | 45.4 | 38.1 | 51.9 |
| 1973 | 34.4 | 33.7 | 37.9 | 43.7 | 52.3 | 61.8 | 68.6 | 69.5 | 63.3 | 55.4 | 47.2 | 39.7 | 50.7 |
| 1974 | 34.8 | 34.9 | 38.1 | 45.8 | 55.7 | 62.9 | 71.2 | 71.1 | 62.9 | 56.4 | 47.1 | 39.5 | 51.7 |
| 1975 | 35.4 | 34.3 | 37.2 | 39.1 | 46.2 | 55.8 | 69.8 | 72.0 | 66.9 | 57.8 | 47.2 | 41.1 | 50.3 |
| Ave. | 34.2 | 34.3 | 37.5 | 43.4 | 51.8 | 60.4 | 68.2 | 69.6 | 63.8 | 55.2 | 45.9 | 38.1 | |

**Appendix Table 23. Mean maximum daily soil temperature (°F) at 36 inches for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1963 | | | | | | | | | | | | 37.4 | 37.3 |
| 1964 | 32.6 | 30.9 | 30.2 | 38.2 | 47.1 | 52.6 | 63.2 | 68.5 | 61.7 | 54.5 | 46.2 | 39.1 | 47.1 |
| 1965 | 35.7 | 35.4 | 36.0 | 47.6 | 52.5 | 61.4 | 67.5 | 70.0 | 64.6 | 59.0 | 53.4 | 44.6 | 53.5 |
| 1966 | 39.7 | 37.7 | 38.8 | 46.3 | 54.9 | 61.5 | 69.2 | 71.2 | 68.5 | 62.0 | 54.5 | 47.6 | 54.4 |
| 1967 | 42.3 | 42.0 | 43.5 | 46.2 | 51.5 | 60.8 | 69.4 | 73.1 | 71.3 | 64.3 | 55.4 | 46.5 | 55.6 |
| 1968 | 41.1 | 40.3 | 44.0 | 47.1 | 53.9 | 60.3 | 67.3 | 68.0 | 65.1 | 59.5 | 52.5 | 46.0 | 53.8 |
| 1969 | 41.6 | 39.5 | 39.6 | 46.9 | 54.8 | 63.5 | 65.8 | 69.8 | 67.4 | 60.4 | 52.7 | 45.1 | 54.0 |
| 1970 | 41.4 | 41.0 | 42.4 | 44.7 | 49.8 | 60.0 | 68.3 | 72.4 | 68.6 | 60.6 | 52.5 | 46.5 | 54.1 |
| 1971 | 41.9 | 40.0 | 40.3 | 44.8 | 51.8 | 59.1 | 65.6 | 69.8 | 66.0 | 59.0 | 50.5 | 44.1 | 52.7 |
| 1972 | | | | | | | | | | | 53.3 | 45.8 | 48.7 |
| 1973 | 42.0 | 40.0 | 40.6 | 45.0 | 52.3 | 62.5 | 68.8 | 70.8 | 68.3 | 61.6 | 54.4 | 47.3 | 54.5 |
| 1974 | 42.1 | 40.0 | 40.9 | 45.3 | 54.2 | 62.9 | 72.6 | 73.9 | 69.7 | 63.1 | 55.5 | 47.8 | 55.8 |
| 1975 | 42.5 | 40.3 | 41.0 | 42.8 | 47.6 | 55.4 | 68.7 | 74.5 | 70.7 | 64.4 | 55.2 | 48.7 | 54.4 |
| Ave. | 40.2 | 38.8 | 40.0 | 44.9 | 51.9 | 60.0 | 67.9 | 71.1 | 67.5 | 60.8 | 53.0 | 45.1 | |




Appen. Fig. 23. Mean maximum daily soil temperature (°F) for each week at 36 inches for Twin Falls.




Appen. Fig. 24. Mean minimum daily soil temperature (°F) for each week at 36 inches for Twin Falls.

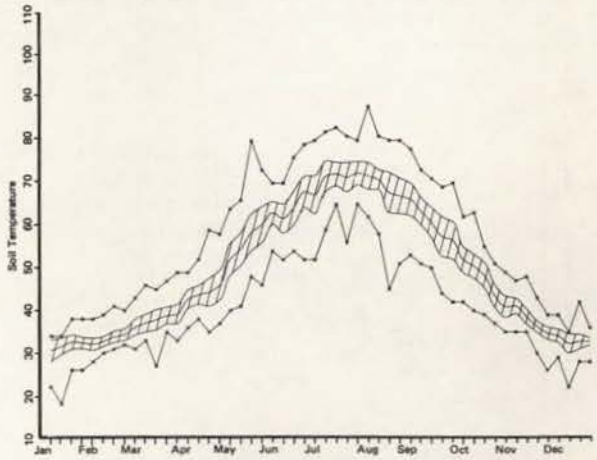
**Appendix Table 24. Mean minimum daily soil temperature (°F) at 36 inches for Twin Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1963 | | | | | | | | | | | | 37.2 | 37.2 |
| 1964 | 32.5 | 30.9 | 30.1 | 37.8 | 46.7 | 52.3 | 62.5 | 68.2 | 61.4 | 54.2 | 45.9 | 38.8 | 46.8 |
| 1965 | 35.6 | 35.3 | 35.8 | 47.3 | 52.3 | 60.9 | 67.1 | 69.8 | 64.4 | 58.8 | 53.2 | 44.4 | 53.3 |
| 1966 | 39.7 | 37.7 | 38.6 | 46.0 | 54.4 | 61.2 | 68.9 | 71.0 | 68.3 | 61.6 | 54.2 | 47.4 | 54.2 |
| 1967 | 42.3 | 42.0 | 43.3 | 46.2 | 51.0 | 60.5 | 69.1 | 72.8 | 71.1 | 63.9 | 55.2 | 46.1 | 55.4 |
| 1968 | 41.0 | 40.3 | 43.9 | 47.0 | 53.5 | 60.0 | 67.1 | 67.8 | 65.0 | 59.2 | 52.2 | 45.9 | 53.6 |
| 1969 | 41.4 | 39.5 | 39.5 | 46.6 | 54.3 | 63.3 | 65.5 | 69.7 | 67.2 | 60.0 | 52.4 | 44.9 | 53.8 |
| 1970 | 41.2 | 41.0 | 42.4 | 44.6 | 49.5 | 59.6 | 68.0 | 72.2 | 68.2 | 60.3 | 52.3 | 46.2 | 53.9 |
| 1971 | 40.8 | 40.0 | 40.2 | 44.6 | 51.5 | 58.8 | 65.4 | 69.6 | 65.7 | 58.5 | 50.1 | 43.9 | 52.5 |
| 1972 | 41.3 | | | | | | | | | | 53.0 | 45.6 | 48.4 |
| 1973 | 41.8 | 39.9 | 40.6 | 44.8 | 52.1 | 62.0 | 68.7 | 70.7 | 67.8 | 61.3 | 54.0 | 46.9 | 54.3 |
| 1974 | 41.8 | 39.9 | 40.8 | 45.2 | 53.8 | 62.1 | 71.5 | 73.6 | 69.5 | 62.6 | 55.0 | 47.6 | 55.4 |
| 1975 | 42.3 | 40.1 | 40.9 | 42.6 | 47.5 | 55.2 | 68.2 | 74.4 | 70.5 | 64.1 | 54.9 | 48.4 | 54.2 |
| Ave. | 40.1 | 38.7 | 40.0 | 44.7 | 51.5 | 59.6 | 67.4 | 70.9 | 67.2 | 60.4 | 52.7 | 44.9 | |

**Appendix Table 25. Mean maximum daily soil temperature (°F) at 4 inches for Rupert.**

| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1967 | | 42.9 | 49.8 | 54.3 | 73.1 | 80.4 | 95.4 | 95.2 | 82.6 | 63.5 | 49.0 | 31.3 | |
| 1968 | 30.7 | 37.7 | 53.7 | 60.9 | 74.7 | 85.7 | 94.4 | 79.0 | 77.5 | 63.6 | 45.2 | 33.8 | 61.6 |
| 1969 | 33.5 | 32.1 | 42.1 | 66.7 | 83.9 | 82.4 | 81.5 | 83.5 | 71.3 | 54.1 | 43.4 | 35.5 | 59.3 |
| 1970 | 34.7 | 40.7 | 44.6 | 50.6 | 68.4 | 76.7 | 74.9 | 79.1 | 63.8 | 53.7 | 42.8 | 35.2 | 55.7 |
| 1971 | 32.9 | 37.2 | 42.2 | 54.9 | 67.5 | 72.3 | 78.4 | 85.1 | 71.8 | 57.2 | 41.6 | 33.7 | 56.3 |
| 1972 | 32.5 | 35.8 | 51.1 | 58.2 | 74.1 | 85.4 | 91.1 | 89.9 | 77.3 | 34.0 | 32.5 | 46.9 | 61.9 |
| 1973 | | | | 60.9 | 80.4 | 86.9 | 94.5 | 92.4 | 77.9 | 65.1 | 44.0 | 35.9 | |
| 1974 | 35.1 | 38.2 | 47.7 | 59.9 | 69.6 | 83.0 | 89.4 | 86.5 | 80.4 | 62.8 | 45.9 | 34.8 | 61.2 |
| 1975 | 32.5 | 33.2 | 42.3 | 47.6 | 61.8 | 78.9 | 90.8 | 80.1 | 79.3 | 61.1 | 46.5 | 38.3 | 57.9 |
| Ave. | 33.2 | 36.6 | 46.7 | 57.1 | 72.7 | 81.4 | 87.8 | 85.6 | 75.8 | 60.7 | 44.8 | 35.0 | |

**Appen. Fig. 25. Mean maximum daily soil temperature (°F) for each week at 4 inches for Rupert.**



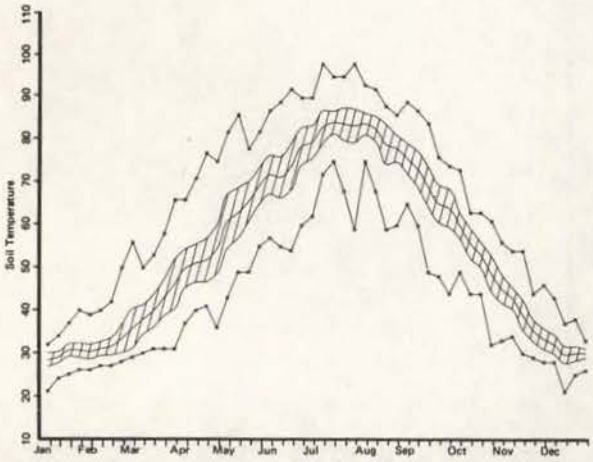

**Appen. Fig. 26. Mean minimum daily soil temperature (°F) for each week at 4 inches for Rupert.**

**Appendix Table 26. Mean minimum daily soil temperature (°F) at 4 inches for Rupert.**

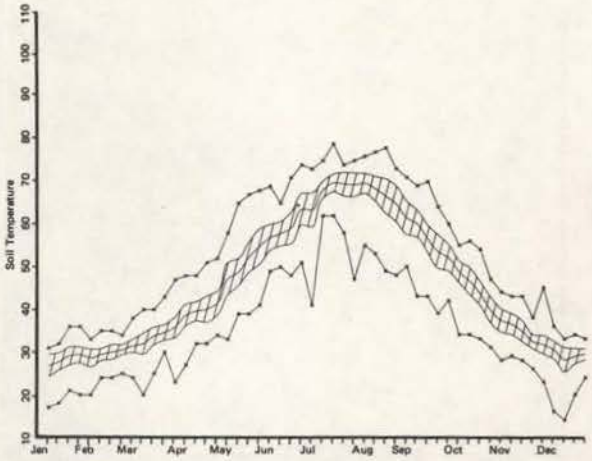
| Year | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1967 | | 35.6 | 40.7 | 43.1 | 57.6 | 64.8 | 77.4 | 77.9 | 67.7 | 50.0 | 39.3 | 29.3 | |
| 1968 | 27.5 | 33.3 | 38.7 | 42.1 | 54.8 | 63.5 | 69.6 | 61.2 | 56.6 | 45.9 | 37.6 | 32.8 | 47.1 |
| 1969 | 32.5 | 31.7 | 35.1 | 46.2 | 59.5 | 62.5 | 68.4 | 70.7 | 63.3 | 48.2 | 39.5 | 34.5 | 49.4 |
| 1970 | 32.8 | 35.8 | 38.3 | 41.6 | 50.8 | 62.1 | 69.2 | 68.2 | 57.1 | 47.7 | 39.1 | 34.1 | 48.4 |
| 1971 | 30.8 | 33.9 | 35.5 | 42.9 | 55.0 | 63.1 | 69.0 | 70.7 | 56.8 | 47.6 | 37.6 | 33.3 | 48.0 |
| 1972 | 32.4 | 33.3 | 40.1 | 44.4 | 56.9 | 64.7 | 69.0 | 67.6 | 55.6 | 33.0 | 31.4 | 36.1 | 48.8 |
| 1973 | | | | 44.6 | 58.5 | 65.4 | 68.9 | 68.6 | 58.9 | 49.4 | 38.5 | 33.6 | |
| 1974 | 33.8 | 33.8 | 37.2 | 45.2 | 58.8 | 69.6 | 73.8 | 72.0 | 67.1 | 53.7 | 40.8 | 34.1 | 51.8 |
| 1975 | 32.1 | 32.7 | 37.0 | 40.3 | 50.2 | 65.1 | 77.1 | 67.2 | 64.5 | 51.5 | 39.0 | 34.6 | 49.5 |
| Ave. | 31.9 | 33.4 | 37.6 | 43.4 | 55.9 | 64.6 | 71.3 | 69.3 | 60.9 | 49.2 | 38.8 | 33.4 | |

**Appendix Table 27. Mean maximum daily soil temperature (°F) at 4 inches for Aberdeen.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | 84.0 | 79.8 | 68.3 | 57.1 | 37.7 | 31.3 | |
| 1965 | 29.7 | 30.5 | 36.0 | 49.3 | 58.3 | 71.0 | 78.2 | 76.4 | 61.9 | 57.0 | 43.5 | 29.4 | 51.8 |
| 1966 | 29.2 | 28.9 | 36.5 | 52.9 | 65.5 | 73.1 | 82.8 | 79.6 | 70.6 | 55.0 | 42.0 | 31.8 | 54.2 |
| 1967 | 29.4 | 32.7 | 41.3 | 46.6 | 61.8 | 69.0 | 83.6 | 83.0 | 72.2 | 56.8 | 44.9 | 27.8 | 54.3 |
| 1968 | 27.7 | 35.4 | 49.8 | 56.7 | 67.6 | 79.3 | 89.3 | 77.1 | 73.9 | 59.3 | 40.5 | 30.7 | 57.3 |
| 1969 | 30.7 | 29.7 | 38.6 | 62.5 | 76.3 | 72.0 | 81.8 | 83.4 | 72.2 | 52.4 | 39.8 | 31.3 | 56.0 |
| 1970 | 31.8 | 36.0 | 40.4 | 44.1 | 59.5 | 72.8 | 79.6 | 79.6 | 64.2 | 51.1 | 39.2 | 32.6 | 52.5 |
| 1971 | 29.7 | 33.8 | 35.5 | 49.5 | 63.0 | 72.7 | 81.8 | 82.9 | 65.5 | 50.3 | 36.7 | 29.7 | 52.7 |
| 1972 | 29.0 | 30.6 | 43.9 | 52.7 | 65.8 | 76.0 | 81.5 | 81.5 | 67.8 | 55.1 | 39.7 | 31.0 | 54.6 |
| 1973 | 30.4 | 29.9 | 38.6 | 50.4 | 66.3 | 75.2 | 82.6 | 81.6 | 67.1 | 55.3 | 39.0 | 32.0 | 54.3 |
| 1974 | 30.1 | 31.1 | 40.0 | 49.9 | 64.5 | 78.0 | 83.2 | 79.2 | 72.0 | 56.5 | 41.2 | 31.8 | 54.9 |
| 1975 | 29.1 | 29.8 | 36.9 | 44.2 | 59.6 | 77.2 | 91.5 | 85.5 | 78.0 | 57.9 | 37.9 | 33.6 | 55.6 |
| Ave. | 29.7 | 31.7 | 39.8 | 50.8 | 64.4 | 74.3 | 83.3 | 80.8 | 69.5 | 55.3 | 40.2 | 31.0 | |




**Appen. Fig. 27. Mean maximum daily soil temperature (°F) for each week at 4 inches for Aberdeen.**



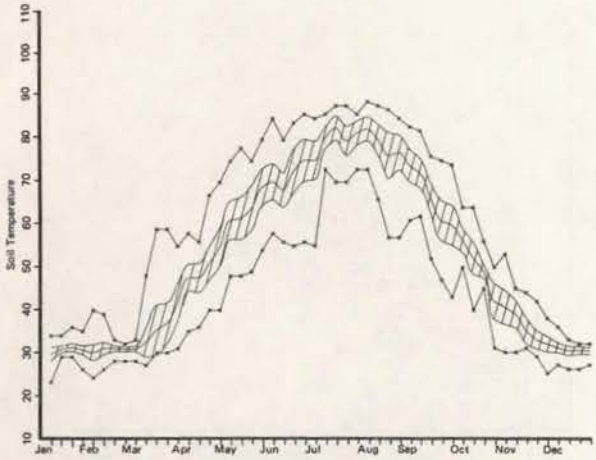

**Appen. Fig. 28. Mean minimum daily soil temperature (°F) for each week at 4 inches for Aberdeen.**

**Appendix Table 28. Mean minimum daily soil temperature (°F) at 4 inches for Aberdeen.**

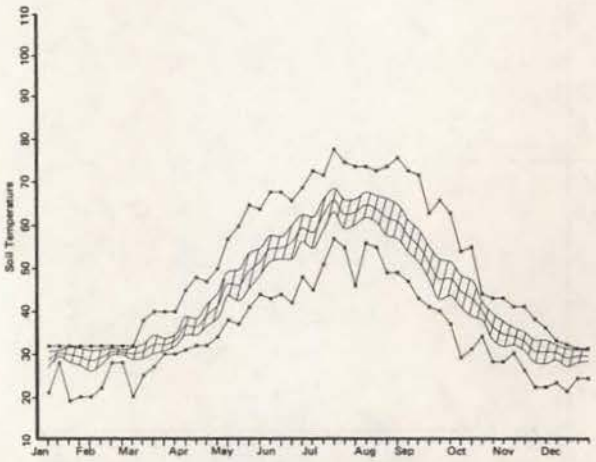
| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | 68.9 | 66.8 | 56.2 | 47.5 | 34.3 | 29.6 | |
| 1965 | 29.6 | 30.2 | 32.1 | 41.3 | 47.9 | 58.2 | 66.2 | 64.8 | 52.4 | 47.2 | 39.4 | 28.9 | 44.9 |
| 1966 | 28.8 | 28.6 | 32.0 | 42.6 | 53.1 | 61.6 | 70.1 | 68.2 | 60.0 | 45.4 | 37.1 | 30.9 | 46.7 |
| 1967 | 29.0 | 31.3 | 35.1 | 38.6 | 50.3 | 58.2 | 70.8 | 71.7 | 62.4 | 46.8 | 33.1 | 24.7 | 46.2 |
| 1968 | 23.0 | 28.6 | 32.0 | 36.1 | 46.5 | 56.6 | 65.3 | 57.4 | 50.2 | 39.7 | 31.5 | 28.5 | 41.3 |
| 1969 | 29.2 | 27.1 | 29.5 | 38.5 | 53.7 | 59.6 | 68.3 | 70.4 | 61.9 | 44.5 | 35.0 | 30.9 | 45.8 |
| 1970 | 30.8 | 33.0 | 35.4 | 37.9 | 49.7 | 60.6 | 67.6 | 68.9 | 54.4 | 44.0 | 35.3 | 31.2 | 45.7 |
| 1971 | 27.5 | 31.5 | 31.7 | 40.2 | 51.1 | 59.3 | 68.0 | 71.2 | 53.9 | 43.3 | 33.6 | 28.6 | 45.1 |
| 1972 | 26.8 | 28.5 | 36.0 | 40.2 | 52.6 | 62.2 | 67.3 | 68.5 | 57.1 | 47.0 | 35.7 | 29.6 | 46.0 |
| 1973 | 29.9 | 29.6 | 33.1 | 39.4 | 52.3 | 61.3 | 69.0 | 68.4 | 55.8 | 46.3 | 36.2 | 31.3 | 46.2 |
| 1974 | 29.2 | 30.8 | 35.3 | 41.3 | 52.3 | 64.1 | 70.7 | 66.8 | 60.5 | 48.2 | 36.8 | 31.1 | 47.3 |
| 1975 | 28.1 | 28.4 | 33.1 | 37.0 | 45.2 | 56.3 | 69.5 | 62.2 | 56.5 | 44.3 | 32.1 | 30.4 | 43.9 |
| Ave. | 28.4 | 29.8 | 33.2 | 39.4 | 50.4 | 59.8 | 68.5 | 67.1 | 66.8 | 45.3 | 35.0 | 29.6 | |

**Appendix Table 29. Mean maximum daily soil temperature (°F) at 4 inches for Idaho Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | | | | 51.5 | 39.4 | 33.5 | |
| 1965 | 32.2 | 32.5 | 31.5 | 46.9 | 55.8 | 65.3 | 73.3 | 71.2 | 58.0 | 51.0 | 43.2 | 31.1 | 49.2 |
| 1966 | 30.8 | 30.5 | 34.6 | 43.4 | 59.0 | | 74.5 | 73.8 | 70.0 | | | | |
| 1967 | | | | 50.3 | 64.9 | 67.0 | 83.7 | 83.7 | 74.5 | 60.8 | | | |
| 1968 | | | | | 62.5 | 72.4 | 82.6 | 73.7 | 67.6 | | 35.2 | 29.2 | |
| 1969 | 30.7 | 29.3 | 32.3 | 51.6 | 71.8 | 71.7 | 81.8 | 80.5 | 69.7 | 49.1 | 37.9 | 29.8 | 52.9 |
| 1970 | 29.8 | 31.5 | 33.1 | 44.3 | 63.5 | 74.1 | 80.4 | 80.6 | 65.1 | 48.8 | 36.5 | 31.5 | 51.7 |
| 1971 | 29.7 | 30.6 | 34.2 | 48.1 | 64.9 | 75.6 | 82.1 | 84.9 | 66.6 | 48.7 | 31.8 | 31.5 | 52.6 |
| 1972 | 31.0 | 31.0 | 43.7 | 53.2 | 63.1 | 72.3 | 81.3 | 79.7 | 67.0 | | 41.0 | 29.7 | |
| 1973 | 20.0 | 30.0 | 31.6 | 50.4 | 66.5 | 69.1 | 80.1 | | 57.5 | 51.3 | | | |
| 1974 | | | 32.3 | 49.4 | 59.5 | 74.3 | 78.8 | 73.9 | 67.7 | 51.3 | | 31.0 | |
| 1975 | 31.0 | 31.0 | 31.4 | 36.1 | | 50.5 | | | | | | | |
| Ave. | 30.6 | 30.8 | 33.8 | 47.7 | 63.9 | 69.4 | 80.7 | 78.8 | 66.9 | 50.7 | 37.4 | 30.7 | |




Appen. Fig. 30. Mean minimum daily soil temperature (°F) for each week at 4 inches for Idaho Falls.




Appen. Fig. 29. Mean maximum daily soil temperature (°F) for each week at 4 inches for Idaho Falls.

**Appendix Table 30. Mean minimum daily soil temperature (°F) at 4 inches for Idaho Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | | | | 45.9 | 36.4 | 32.7 | |
| 1965 | 32.0 | 32.0 | 31.4 | 41.2 | 47.5 | 57.0 | 64.1 | 62.6 | 52.1 | 45.5 | 39.2 | 30.4 | 44.5 |
| 1966 | 30.2 | 30.0 | 31.6 | 34.2 | 41.0 | | 63.7 | 64.0 | 55.0 | | | | |
| 1967 | | | | 42.5 | 54.5 | 59.1 | 72.6 | 72.4 | 65.3 | 51.7 | | | |
| 1968 | | | | | 46.4 | 55.0 | 61.4 | 57.7 | 51.4 | | 32.2 | 27.4 | |
| 1969 | 26.6 | 26.9 | 29.6 | 36.7 | 53.0 | 55.6 | 60.8 | 60.2 | 52.7 | 36.6 | 29.4 | 26.5 | 41.2 |
| 1970 | 29.1 | 29.6 | 31.2 | 34.6 | 46.7 | 57.8 | 63.4 | 62.6 | 47.0 | 38.8 | 33.1 | 31.5 | 42.2 |
| 1971 | 29.0 | 29.9 | 30.9 | 35.8 | 46.7 | 56.6 | 61.7 | 66.9 | 48.6 | 38.5 | 31.0 | 31.5 | 42.4 |
| 1972 | 31.0 | 31.0 | 34.7 | 39.4 | 48.2 | 57.1 | 61.7 | 61.7 | 49.7 | | 33.7 | 29.6 | |
| 1973 | 30.0 | 30.0 | 31.2 | 37.0 | 48.8 | 53.8 | 63.7 | | 46.5 | 42.8 | | | |
| 1974 | | | 31.3 | 37.9 | 44.9 | 58.5 | 60.6 | 60.5 | 55.6 | 42.0 | | 30.8 | |
| 1975 | 31.0 | 31.0 | 31.3 | 33.1 | | 42.4 | | | | | | | |
| Ave. | 29.7 | 30.0 | 31.5 | 37.2 | 48.4 | 55.2 | 63.1 | 62.9 | 52.0 | 41.6 | 33.0 | 29.8 | |

**Appendix Table 31. Mean maximum daily soil temperature (°F) at 20 inches for Idaho Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | | | | 56.7 | 48.7 | 43.4 | |
| 1965 | 40.3 | 40.3 | 39.0 | 44.4 | 52.6 | 63.8 | 69.2 | 70.1 | 62.7 | 56.2 | 49.9 | 42.2 | 52.4 |
| 1966 | 39.6 | 39.0 | 38.4 | 40.8 | 49.0 | | 70.5 | 73.5 | 70.0 | | | | |
| 1967 | | | | 44.8 | 55.7 | 63.4 | 77.0 | 78.2 | 72.1 | 62.2 | | | |
| Ave. | 40.1 | 40.1 | 38.9 | 44.1 | 54.0 | 63.6 | 72.7 | 74.7 | 67.1 | 57.7 | 49.3 | 42.7 | |

**Appendix Table 32. Mean minimum daily soil temperature (°F) at 20 inches for Idaho Falls.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | | | | | | | 56.6 | 48.1 | 43.2 | |
| 1965 | 40.0 | 40.0 | 38.9 | 43.5 | 52.0 | 62.3 | 68.4 | 68.4 | 61.8 | 55.8 | 49.4 | 42.2 | 51.7 |
| 1966 | 39.4 | 39.0 | 38.0 | 39.6 | 41.0 | | 66.0 | 65.0 | 65.0 | | | | |
| 1967 | | | | 44.5 | 55.4 | 63.0 | 76.6 | 78.0 | 71.8 | 61.5 | | | |
| Ave. | 39.9 | 39.9 | 38.8 | 43.5 | 53.4 | 62.7 | 71.7 | 72.9 | 66.4 | 57.3 | 48.7 | 42.6 | |

**Appendix Table 33. Mean maximum daily soil temperature (°F) at 3 inches for King Hill.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | 57.3 | 73.4 | 78.0 | 92.1 | 92.1 | | | | | |
| 1965 | | | | | 70.5 | 81.7 | 94.5 | 91.2 | | | | | |
| 1966 | | | | | 82.6 | 89.8 | 96.9 | 96.4 | | | | | |
| 1967 | | | | 56.5 | 72.1 | 79.1 | 92.7 | 96.6 | | | | | |
| 1968 | | | | 59.3 | 76.1 | 88.6 | 96.4 | 96.2 | | | | | |
| 1969 | | | | 68.0 | 60.0 | 88.0 | 92.7 | 88.9 | | | | | |
| 1970 | | | | | | | | | | | | | |
| 1971 | | | | 67.7 | 82.2 | 87.7 | 95.2 | 93.8 | | | | | |
| 1972 | | | | 62.3 | 77.9 | 84.6 | 84.8 | | | | | | |
| 1973 | | | | 61.0 | 72.4 | 72.2 | 78.3 | 95.0 | | | | | |
| 1974 | | | | 67.1 | 81.2 | 90.5 | 94.1 | 95.1 | | | | | |
| 1975 | | | | 58.4 | 79.3 | 86.3 | 100.9 | 90.6 | | | | | |
| Ave. | | | | 61.9 | 75.1 | 84.2 | 92.3 | 93.3 | | | | | |

**Appendix Table 34. Mean minimum daily soil temperature (°F) at 3 inches for King Hill.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1964 | | | | 38.5 | 51.6 | 58.0 | 67.3 | 68.8 | | | | | |
| 1965 | | | | | 49.8 | 59.8 | 69.8 | 67.2 | | | | | |
| 1966 | | | | | 55.7 | 62.2 | 67.3 | 70.6 | | | | | |
| 1967 | | | | 38.0 | 53.4 | 61.9 | 74.2 | 76.1 | | | | | |
| 1968 | | | | 42.0 | 54.4 | 62.4 | 72.1 | 76.0 | | | | | |
| 1969 | | | | 44.3 | 54.3 | 61.6 | 65.6 | 62.4 | | | | | |
| 1970 | | | | | | | | | | | | | |
| 1971 | | | | 44.6 | 54.0 | 59.8 | 65.8 | 74.0 | | | | | |
| 1972 | | | | 42.6 | 52.7 | 62.4 | 63.6 | | | | | | |
| 1973 | | | | 41.2 | 54.3 | 59.4 | 66.9 | 74.1 | | | | | |
| 1974 | | | | 43.7 | 52.3 | 67.1 | 75.0 | 74.0 | | | | | |
| 1975 | | | | 40.8 | 55.2 | 65.0 | 75.1 | 68.5 | | | | | |
| Ave. | | | | 41.7 | 53.4 | 61.8 | 69.2 | 70.9 | | | | | |

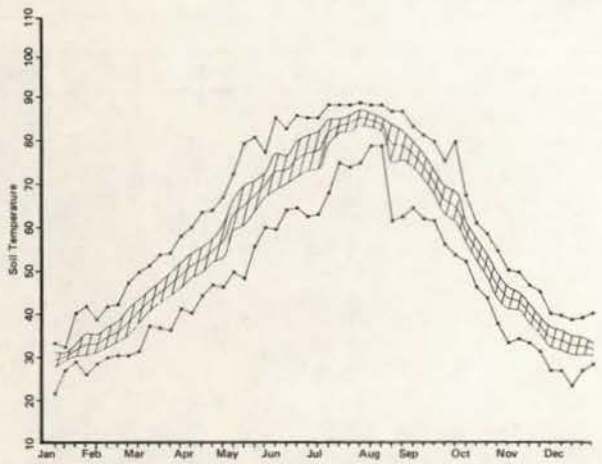
**Appendix Table 35. Mean maximum daily soil temperature (°F) at 4 inches for Rigby.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | | | | | | | 31.1 | |
| 1967 | 30.8 | 31.2 | 38.7 | 50.4 | 63.2 | 70.4 | 79.6 | 76.4 | 64.4 | 48.8 | 37.9 | 32.0 | 52.2 |
| 1968 | 32.0 | 32.8 | 42.5 | 52.4 | 62.0 | 72.4 | 79.2 | 68.8 | 64.4 | 47.6 | 38.2 | 33.7 | 53.4 |
| 1969 | 32.3 | 31.0 | 41.5 | 53.9 | 71.4 | 71.0 | 80.3 | 82.4 | 69.8 | 58.4 | 37.8 | 30.0 | 60.7 |
| 1970 | 32.0 | 36.0 | 42.3 | 48.1 | 61.8 | 70.4 | | | 57.0 | 49.8 | 38.7 | 37.5 | |
| 1971 | 33.5 | 33.0 | 40.1 | 49.0 | 60.6 | | | | | | | | 47.0 |
| 1972 | | | | | | | | | | | | | |
| 1973 | | | | | | | | | 65.1 | 55.6 | | | |
| 1974 | | | | 53.8 | 67.4 | | | | 71.1 | 54.8 | | | |
| 1975 | | | | | | | | | 77.0 | 53.4 | | | |
| Ave. | 31.6 | 31.8 | 40.8 | 51.4 | 64.9 | 71.3 | 79.7 | 75.3 | 66.7 | 51.9 | 38.1 | 32.0 | |

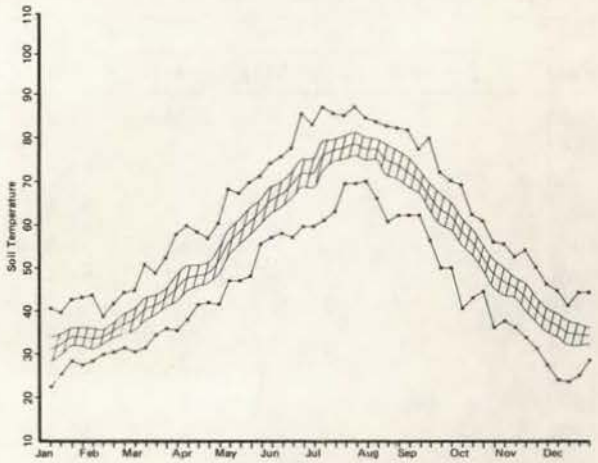
**Appendix Table 36. Mean minimum daily soil temperature (°F) at 4 inches for Rigby.**

| | Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ave. |
| 1966 | | | | | | | | | | | | 30.8 | |
| 1967 | 30.8 | 31.1 | 34.7 | 39.3 | 49.5 | 57.2 | 63.6 | 62.0 | 54.9 | 42.8 | 35.5 | 32.0 | 44.6 |
| 1968 | 32.0 | 32.2 | 36.6 | 41.7 | 49.3 | 57.8 | 63.3 | 58.7 | 53.1 | 41.7 | 36.2 | 33.7 | 45.4 |
| 1969 | 32.0 | 31.0 | 35.1 | 42.5 | 55.5 | | 63.0 | 64.1 | 52.4 | 45.6 | 32.0 | 27.0 | 48.9 |
| 1970 | 30.2 | 31.0 | 33.0 | 36.9 | 48.2 | 55.1 | | | 47.4 | 44.8 | 33.3 | 34.5 | |
| 1971 | 33.0 | 33.0 | 33.6 | 40.2 | 48.2 | | | | | | | | 39.1 |
| 1972 | | | | | | | | | | | | | |
| 1973 | | | | | | | | | 49.6 | 40.2 | | | |
| 1974 | | | | 43.5 | 50.0 | | | | 48.7 | 41.5 | | | |
| 1975 | | | | | | | | | 39.7 | 39.1 | | | |
| Ave. | 31.4 | 31.5 | 35.2 | 40.8 | 50.4 | 57.1 | 63.3 | 61.3 | 50.2 | 41.6 | 34.9 | 31.4 | |

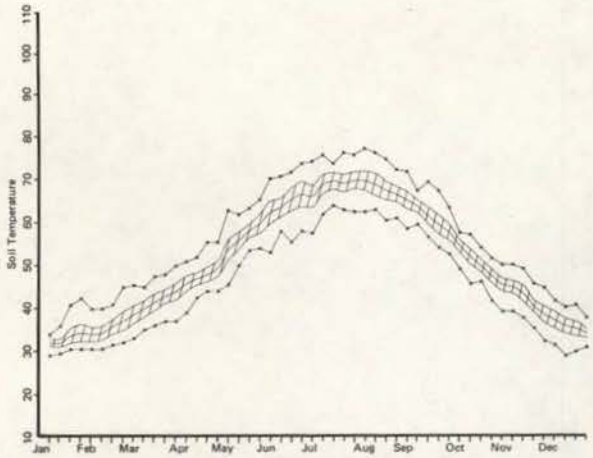
# Appendix B



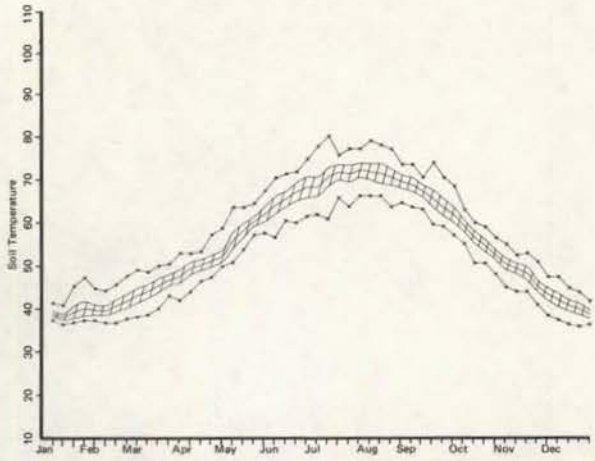

Appen. Fig. 31. Mean daily soil temperature (°F) for each week at 4 inches for Malheur.



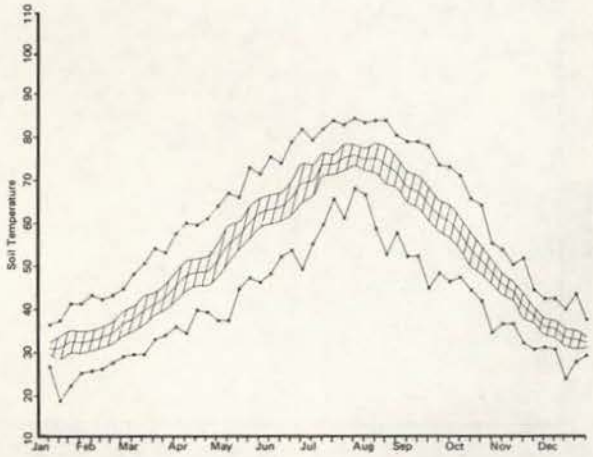

Appen. Fig. 32. Mean daily soil temperature (°F) for each week at 4 inches for Caldwell.



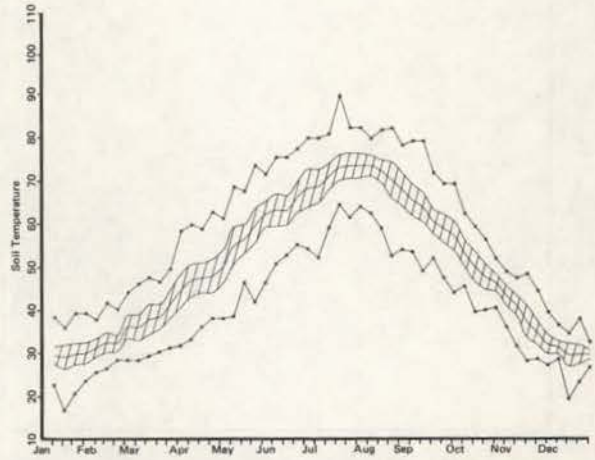

Appen. Fig. 33. Mean daily soil temperature (°F) for each week at 4 inches for Kuna.



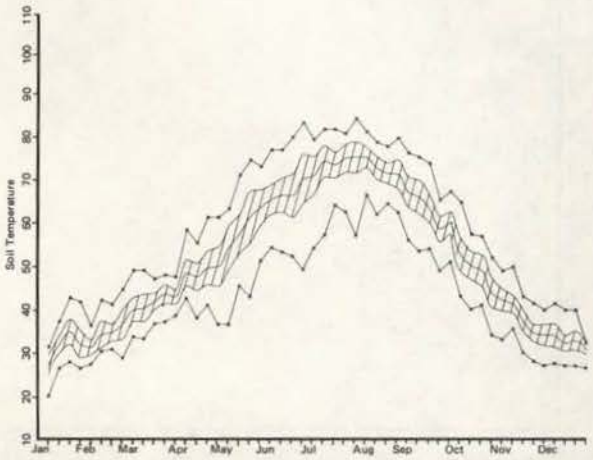

Appen. Fig. 34. Mean daily soil temperature (°F) for each week at 8 inches for Kuna.



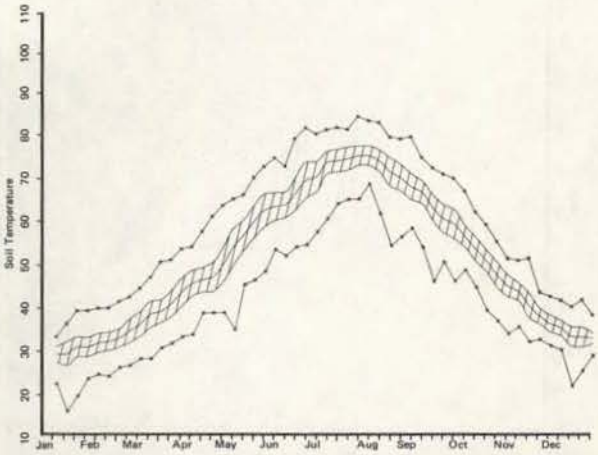

Appen. Fig. 35. Mean daily soil temperature (°F) for each week at 3 inches for Buhl.



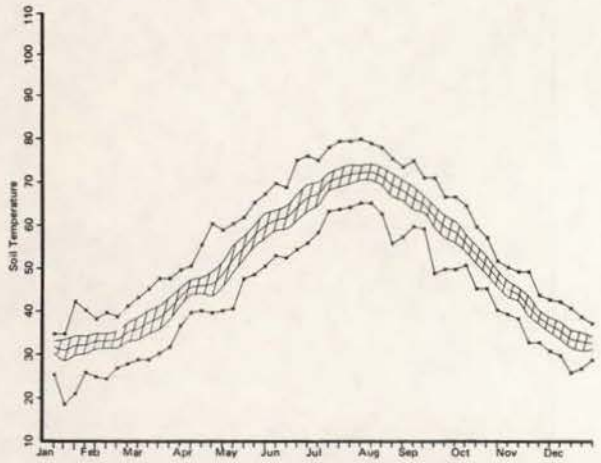

Appen. Fig. 36. Mean daily soil temperature (°F) for each week at 3 inches for Castleford.



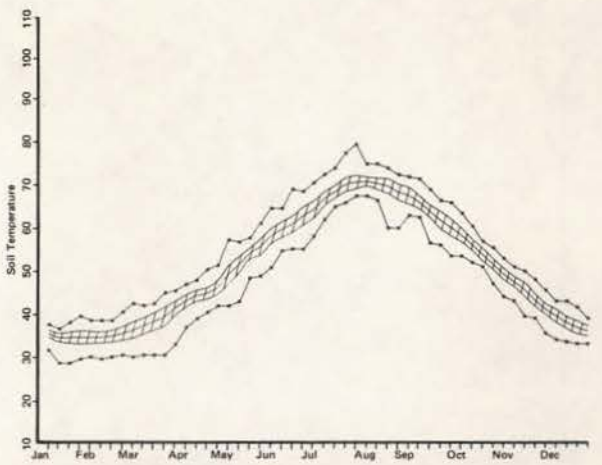

Appen. Fig. 37. Mean daily soil temperature (°F) for each week at 2 inches for Twin Falls.



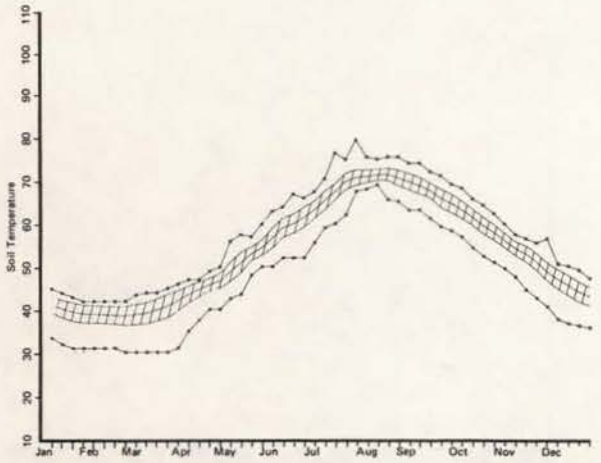

Appen. Fig. 38. Mean daily soil temperature (°F) for each week at 4 inches for Twin Falls.



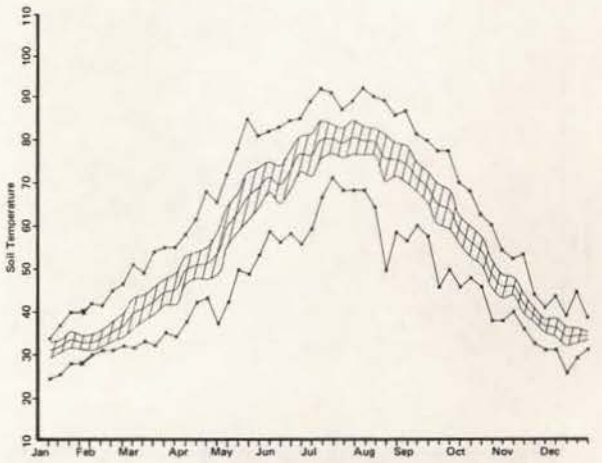

**Appen. Fig. 39. Mean daily soil temperature (°F) for each week at 8 inches for Twin Falls.**



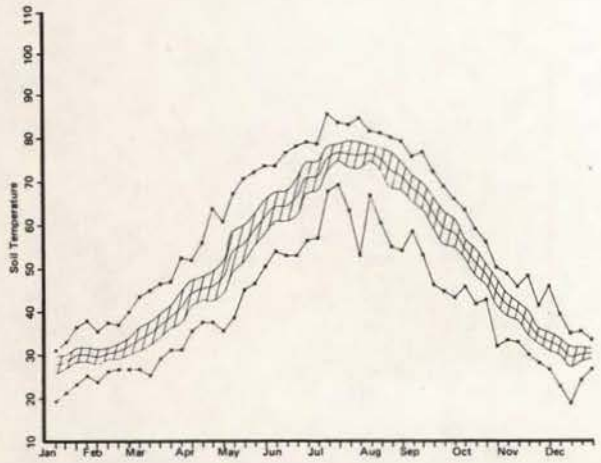

**Appen. Fig. 40. Mean daily soil temperature (°F) for each week at 20 inches for Twin Falls.**



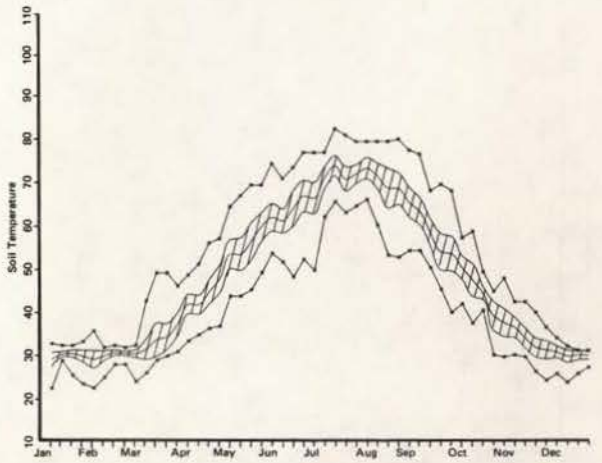

**Appen. Fig. 41. Mean daily soil temperature (°F) for each week at 36 inches for Twin Falls.**




**Appen. Fig. 42. Mean daily soil temperature (°F) for each week at 4 inches for Rupert.**




**Appen. Fig. 43. Mean daily soil temperature (°F) for each week at 4 inches for Aberdeen.**




**Appen. Fig. 44. Mean daily soil temperature (°F) for each week at 4 inches for Idaho Falls.**

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# SERVING THE STATE

Teaching . . . Research . . . Service . . . this is the three-fold charge of the College of Agriculture at your state Land-Grant institution, the University of Idaho. To fulfill this charge, the College extends its faculty and resources to all parts of the state.

**Service** . . . The Cooperative Extension Service has offices in 42 of Idaho's 44 counties under the leadership of men and women specially trained to work with agriculture, home economics and youth. The educational programs of these College of Agriculture faculty members are supported cooperatively by county, state and federal funding.

**Research** . . . Agricultural Research scientists are located at the campus in Moscow, at Research and Extension Centers near Aberdeen, Caldwell, Parma, Tetonia and Twin Falls and at the U. S. Sheep Experiment Station, Dubois and the USDA/ARS Soil and Water Laboratory at Kimberly. Their work includes research on every major agricultural program in Idaho and on economic activities that apply to the state as a whole.

**Teaching** . . . Centers of College of Agriculture teaching are the University classrooms and laboratories where agriculture students can earn bachelor of science degrees in any of 20 major fields, or work for master's and Ph.D. degrees in their specialties. And beyond these are the variety of workshops and training sessions developed throughout the state for adults and youth by College of Agriculture faculty.