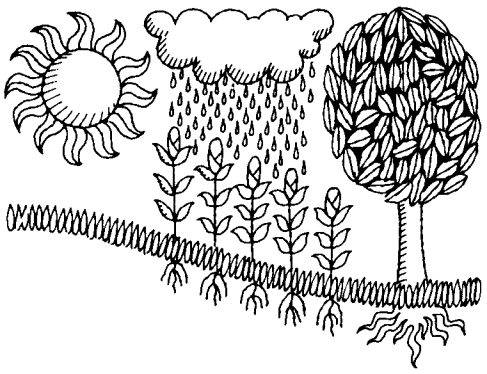

Weekly Weather & Crop Bulletin

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Environmental Data Service

U.S. DEPARTMENT OF AGRICULTURE
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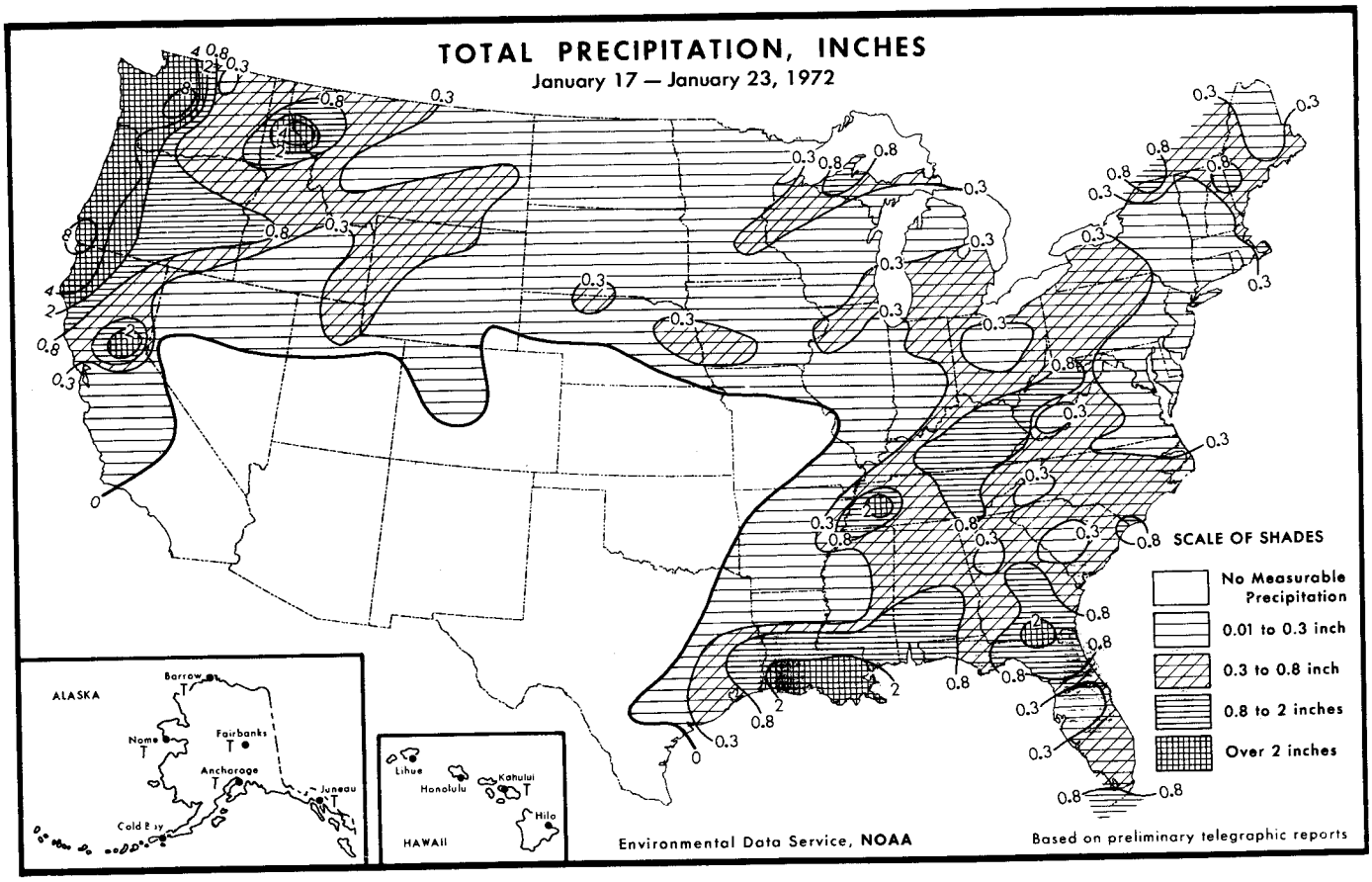
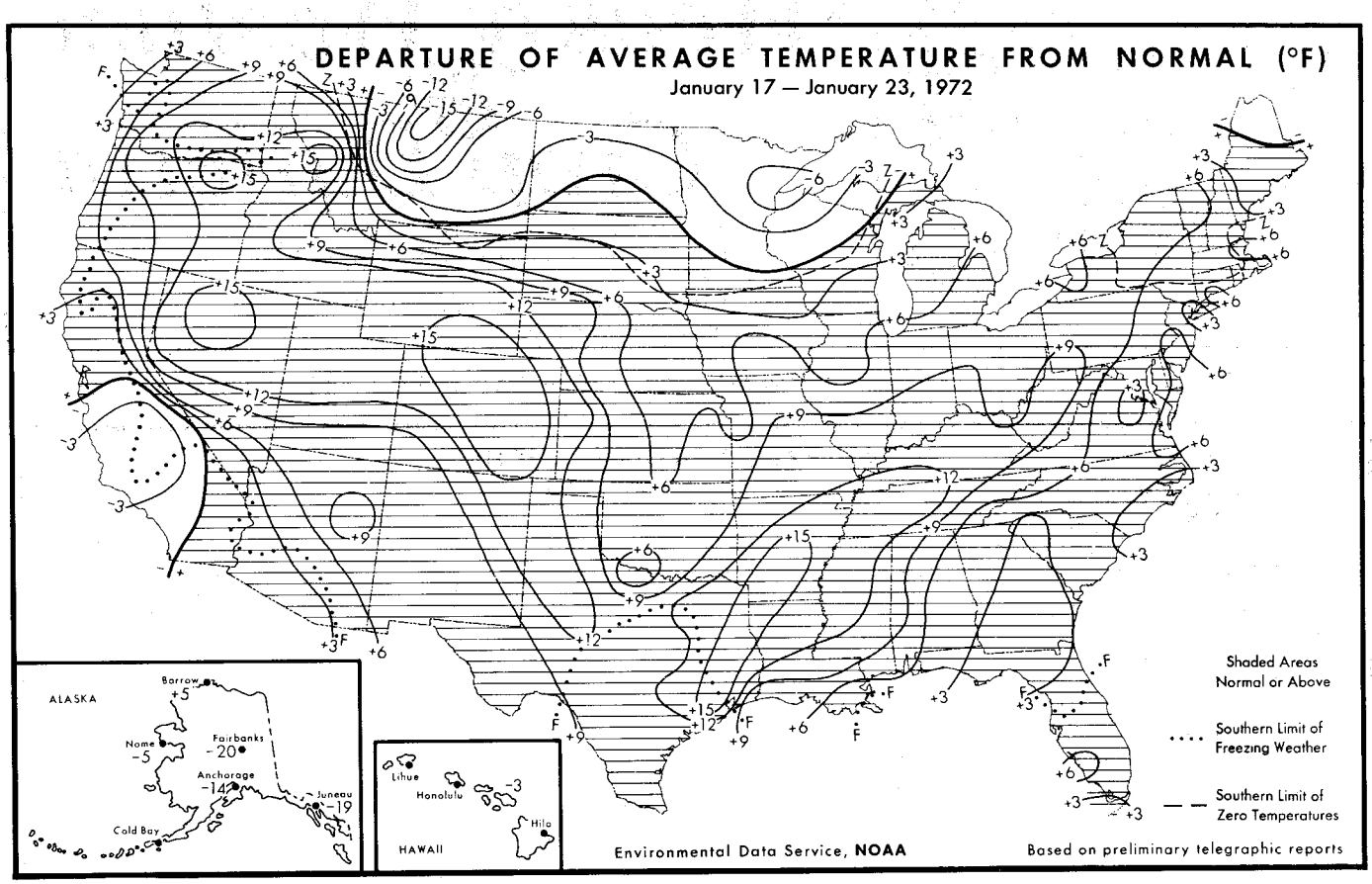


NATIONAL WEATHER SUMMARY

HIGHLIGHTS: A warming trend caused most of the Nation to average above normal last week. Some parts of mid-America averaged 20° warmer than the previous week. Heavy rains and melting snow caused flooding along some streams west of the Cascades. Flooding also occurred along the eastern Gulf and southern Atlantic Coasts.

PRECIPITATION: Precipitation was sparse over most of the Nation Monday, January 17. Skies were clear and sunshine was abundant due to two large high pressure systems--one over the Great Basin, the other over the East. By Monday evening, however, cold air was pouring into Montana. Snow accompanied the outbreak and by midnight 3 inches had fallen at Great Falls. Winds at Livingston, Montana, gusted to 67 m.p.h. By Tuesday morning, Billings, Montana, lay under 3 inches of new snow and the wind at Lander, Wyoming, had gusted to 75 m.p.h.

By Wednesday, the pattern for the week was getting fairly well established. A quasi-stationary front stretched from the central Great Plains to Virginia. Snow fell from the northern Rocky Mountains to the Upper Mississippi River Valley. Northerly wind caused snow flurries on the southern shore of Lake Superior. Moist southerly winds caused cloudy skies with showers and thunderstorms from the Ohio River to the Gulf of Mexico. Dense fog covered parts of Kansas and Missouri Thursday morning. Snow mixed with sleet and freezing rain slicked the highways and made travel difficultover a narrow strip which separated the snow zone on the north from the showers and thunderstorms on the south. By Thursday evening the snow had spread eastward to western New York and freezing rain iced central Pennsylvania and central New York.



West of the Continental Divide, rain or drizzle fell along the Washington, Oregon, and northern California Coast and a mixture of snow and freezing rain occurred in northern Idaho and Montana. Snow fell in the higher mountains.

The weekend was gloomy and damp over much of the Nation. Southerly winds from the Gulf of Mexico caused fog, rain, or drizzle from the Great Lakes to the Gulf and eastward to the Atlantic Ocean. Freezing drizzle or rain in the Upper Mississippi River Valley and Great Lakes Region slicked the highways and made automobile travel hazardous. Heavy rain fell along the northern Pacific Coast with snow inland over the mountains. Gales accompanied some of the rain and snow.

The heavy rains west of the Cascades — up to more than 10.00 inches -- plus the snow melt due to the mild temperatures caused damaging floods in western Washington and Oregon. Flooding also occurred along the principal streams of the eastern Gulf Coast and in Georgia and South Carolina. Wide areas from southern California to Missouri received no rain or, in the eastern portion of that area, widely-scattered light sprinkles.

TEMPERATURE: Two large polar highs -- one over the Great Basin, the other in the East -- caused clear skies over much of the Nation early in the week. Subzero temperatures occurred over northern New York and much of New England Monday morning and east of the Continental Divide from Montana to northern Wisconsin at midweek. Subfreezing temperatures covered most of the Nation Monday morning. The main exceptions included the Pacific Coast, central Texas, and central and southern Florida.

Brisk southerly winds behind the eastern High warmed the southern and central Great Plains. By midweek the central Great Plains had warmed to the 60's and 70's. Ardmore, Oklahoma registered 76° Tuesday afternoon. Brisk northerly winds held the temperatures down over the northern Great Plains. Stations near the Canadian border from Cut Bank, Montana to Duluth, Minnesota, remained below zero all day Wednesday. In contrast, Tempa, Florida, registered 82° Wednesday afternoon. At midweek, a front stretched from the central Great Plains to Virginia. Northerly winds cooled the area north of the front. Southerly breezes warmed the Southland. Temperatures reached the 80's over much of Texas Saturday and Sunday afternoons. Cotulla registered 91° Sunday when temperatures from the Ohio River to the Gulf of Mexico reached the 60's and 70's. Temperatures averaged colder than normal along the southern coast of California, along the Canadian Border from Montana to Lake Superior, and in northern Maine. The rest of the Nation averaged warmer than normal. The Great Basin, the central Rocky Mountains, and a large area from eastern Texas to western Tennessee averaged 12° or more warmer than normal.

L. W. Dye

NATIONAL AGRICULTURAL SUMMARY

AGRICULTURAL HIGHLIGHTS: Above normal temperature prevailed over most of the Nation during the week. Livestock rebounded well from extremely cold temperatures a week earlier. Supplemental feeding is necessary in most areas although winter pastures and small grains are providing some grazing. Fieldwork and final harvest operations were delayed by local rains during the week. Some flooding occurred. Farm activities during the week consisted primarily of feeding and caring for livestock, machinery repairs, end-of-year recordkeeping, pruning fruit trees, and other farm chores.

SMALL GRAINS: Fall-seeded small grains continued in good condition over most of the Nation. Soil moisture is adequate to surplus. Snow cover has protected small grains in the North-Central States. Only light damage occurred from winds. Mild temperatures over much of the country promoted growth and resulted in increased grazing. Small grains have been topdressed with fertilizer in some areas. Extremely low temperatures in the northeast a week earlier caused some tipburn and yellowing of small grains. Planting continued in Arizona.

COTTON: Open weather and mild temperatures enabled growers to make progress in harvesting cotton. Harvest in Oklahoma is nearing completion in several localities. In Texas harvest made good progress and was 92 percent complete compared with 100 percent a year earlier. Harvest is virtually over in Arizona and California. Scattered cleanup harvesting continued in some other Southeast States.

OTHER CROPS: Cleanup harvest of soybeans, corn, and grain sorghum continued on a limited scale. Sugarcane harvest in Florida continued in full swing and light in Hawaii. Growth of young cane is good. Preparation of tobacco plant beds continued active in some areas and is nearing completion in other areas. Sugar beet processing continued in Utah. Sugar beets are making good progress in Arizona. Harvest of winter potatoes is underway in California and Florida. Land preparation and planting of Irish potatoes in Alabama continued on a limited scale. In California weed control in alfalfa is active.

Fruits: Citrus trees in Florida are in good condition. Flushes of new growth and buds are appearing on young trees. Harvest is active. Harvest in Texas is active in the Lower Valley. Grapefruit volume has been heavy. Harvest of early and mid-season oranges is nearing completion with light harvest of Valencias underway. In Arizona, limited harvest of grapefruit continues. Harvest of grapefruit, navels, and lemons continued in the Yuma area. In California, picking of navels continues at a slow pace. Some light frost damage is beginning to appear. In Coachella Valley tangerines are showing severe frost damage. Frost damage to avocado trees is now apparent. Some damaged fruit are showing up in packing houses. Damage to grapefruit appears minimal. Pruning of fruit trees and grape vines is active in most areas of the Country.

Vegetables: Shipments in Florida are below the previous week but supplies are generally adequate. More rain is needed for vegetables. Tomatoes lead in volume but are one-third lighter than a week earlier. In North Carolina, the cabbage crop was damaged by cold weather. Mild temperatures promoted vegetable harvest. In the Lower Valley of Texas there is a moderate supply of cabbage and lettuce, but a light supply of carrots, broccoli, cauliflower, beets, spinach, and greens. Winter vegetables and spring onions made good progress. Planting of cantaloupes, honeydews, watermelons, peppers and tomatoes is becoming active in the Lower Valley with early fields up to a stand. Harvest is active in the Winter Garden area. Cabbage and spinach are making fair recovery from freeze damage. Harvest of vegetables in the Yuma area of Arizona continues. Growth of young vegetables is good. Lettuce harvest is active in the Salt River Valley. Artichoke harvest in California is at a standstill. Asparagus harvest is slowly underway. Cabbage improved in Imperial Valley but declined in Cochella area. Carrot shipments are light in Imperial Valley and increasing in Coachella area. Celery supplies are lower. Lettuce supplies in the Imperial Valley are moderate. Vegetable supplies are adequate in Hawaii.

PASTURES AND LIVESTOCK. Above average temperatures during most of the week promoted growth and enabled grazing of small grains in many areas. However, supplemental feeding is active throughout most of the Nation. Many ranges and fields in the extreme north-central States are snow-covered. Some areas experienced difficulty feeding animals due to muddy pastures and feedlots caused by rains and melting snow. In Kansas some cattle have been removed from wheat pastures where growth was short. Livestock are in generally good condition and supplemental feeding has reduced weight loss. Some reports were received of respiratory disease in newborn stock. Death loss in most areas is about normal. Early calving and lambing are underway in many areas. Feed supplies are generally adequate in most areas. More rain is needed for California Range land. Heavy feeding of livestock is necessary. Milk and egg production is normal.

Carl A. Ouzts
Agricultural Statistician

Temperature and Precipitation Data for the Week Ending Midnight, l.s.t., JANUARY 23, 1972

States and Stations	Temperature °F		Precipitation Inches	
	Average	Departure*	Total	Departure*
ALA.Birmingham. . .	53	+ 6	.4	- .7
Mobile.	61	+ 8	1.7	+ .7
Montgomery. . . .	54	+ 5	1.7	+ .8
ALASKA.Anchorage. .	- 1	-14	T	- .2
Barrow.	-12	+ 5	T	0
Fairbanks	-31	-20	T	- .2
Juneau.	6	-19	T	- .9
Nome.	0	- 5	T	- .2
ARIZ.Flagstaff. . .	34	+ 7	0	- .4
Phoenix	54	+ 4	0	- .1
Tucson.	53	+ 3	0	- .2
Winslow	41	+10	0	- .1
Yuma.	55	+ 1	0	- .1
ARK.Fort Smith. . .	51	+11	T	- .6
Little Rock . . .	57	+16	.2	-1.0
CALIF.Bakersfield .	43	- 5	T	- .2
Eureka.	51	+ 4	5.9	+4.4
Fresno.	43	- 4	T	- .5
Los Angeles . . .	54	- 2	0	- .6
Red Bluff	46	0	.5	- .5
San Diego	55	0	T	- .4
San Francisco . .	50	+ 1	.2	- .7
Stockton.	45	0	.2	- .4
COLO.Denver	45	+17	0	- .2
Grand Junction. .	38	+12	T	- .2
Pueblo.	46	+16	0	- .1
CONN.Bridgeport . .	36	+ 6	.1	- .8
Hartford.	32	+ 4	.1	- .7
D.C.Washington. . .	40	+ 3	.3	- .5
FLA.Apalachicola. .	56	+ 1	2.5	+1.8
Ft. Myers	69	+ 6	.7	+ .3
Jacksonville. . .	59	+ 3	1.2	+ .6
Key West.	72	+ 2	.9	+ .6
Lakeland.	65	+ 3	.2	- .3
Miami	71	+ 4	.4	- .1
Orlando	66	+ 5	.1	- .3
Tallahassee . . .	56	+ 2	1.9	+1.1
Tampa	65	+ 4	T	- .5
GA.Atlanta.	49	+ 4	.3	- .8
Augusta	51	+ 3	.3	- .4
Macon	51	+ 1	.9	+ .1
Savannah.	55	+ 3	.7	+ .1
HAWAII.Hilo	--	---	---	----
Honolulu.	--	---	---	----
Kahului	69	- 3	T	-1.0
Lihue	--	---	---	----
IDAHO.Boise	41	+12	1.8	+1.5
Lewiston.	43	+13	.9	+ .6
Pocatello	35	+13	1.0	+ .7
ILL.Cairo	--	---	---	----
Chicago	33	+ 7	.1	- .3
Moline.	28	+ 6	.6	+ .3
Peoria.	30	+ 5	.2	- .2
Rockford.	26	+ 4	.3	- .2
Springfield . . .	35	+ 7	.1	- .3
IND.Evansville. . .	45	+11	T	-1.0
Fort Wayne. . . .	35	+ 8	.4	- .2
Indianapolis. . .	39	+10	.1	- .7
South Bend. . . .	34	+ 8	.7	+ .2
IOWA.Burlington . .	30	+ 6	.3	- .1
Des Moines. . . .	26	+ 7	.3	0
Dubuque	22	+ 3	.2	- .2
Sioux City. . . .	22	+ 4	.3	+ .1
KANS.Concordia. . .	33	+ 6	T	- .2
Dodge City. . . .	40	+ 9	T	- .2
Goodland.	41	+14	T	- .1
Topeka.	36	+ 8	T	- .2
Wichita	37	+ 6	T	- .2
KY.Lexington. . . .	45	+10	1.0	- .2
Louisville. . . .	48	+13	.4	- .6
LA.Baton Rouge. . .	62	+ 9	1.7	+ .6
Lake Charles. . .	60	+ 6	2.7	+1.7
New Orleans . . .	60	+ 5	3.0	+2.1
Shreveport. . . .	62	+15	.1	-1.0
MAINE.Caribou . . .	10	- 1	.3	- .2
Portland.	25	+ 3	.5	- .5
MD.Baltimore. . . .	40	+ 5	.3	- .5
MASS.Boston	36	+ 6	.3	- .6
Nantucket	36	---	.5	----
MICH.Alpena	24	+ 4	.2	- .2
Detroit	33	+ 7	.6	+ .1
Flint	30	+ 8	.4	0
Grand Rapids. . .	28	+ 4	.4	0
Houghton Lake . .	24	+ 5	.3	- .1
Lansing	30	+ 6	.5	0
Marquette	18	- 1	.4	0
Muskegon.	29	+ 3	.6	+ .1
S.Ste.Marie . . .	19	+ 3	.7	+ .2
MINN.Duluth	2	- 7	.3	0
Internatl Falls .	- 2	- 5	.1	- .1
Minneapolis . . .	11	- 1	.4	+ .2
Rochester	13	0	.2	0
St. Cloud	7	- 3	.3	+ .2
MISS.Jackson. . . .	61	+13	.3	- .8
Meridian.	58	+10	.8	- .3
MO.Columbia	40	+10	T	- .4
Kansas City . . .	37	+ 5	T	- .4
St. Louis	42	+10	T	- .4
Springfield . . .	44	+11	T	- .5
MONT.Billings . . .	19	- 3	.6	+ .5
Glasgow	4	- 5	.3	+ .2
Great Falls . . .	12	- 9	.3	+ .2
Havre	- 2	-15	.3	+ .2
Helena.	24	+ 6	.2	+ .1
Kalispell	29	+10	.9	+ .6
Miles City. . . .	11	- 5	.6	+ .5
Missoula.	34	+15	.8	+ .6
NEBR.Grand Island .	31	+ 9	.1	0
Lincoln	31	+ 7	.1	- .2
Norfolk	24	+ 5	.4	+ .2
North Platte. . .	32	+ 4	T	- .1
Omaha	26	+ 5	.3	+ .1
Valentine	28	+ 9	.4	+ .3
NEV.Ely	35	+13	0	- .2
Las Vegas	44	+ 1	0	- .1
Reno.	42	+12	T	- .3
Winnemucca. . . .	43	+16	.1	- .1
N.H.Concord	26	+ 4	.3	- .5
N.J.Atlantic City .	41	+ 6	.1	- .8
Trenton	39	+ 6	.1	- .8
N.MEX.Albuquerque .	42	+ 7	0	- .1
Roswell	--	---	---	----
N.Y.Albany.	27	+ 4	.2	- .4
Binghamton. . . .	30	+ 6	.4	- .2
Buffalo	31	+ 6	.6	0
New York.	37	+ 3	.1	- .7
Rochester	32	+ 7	.3	- .2
Syracuse.	31	+ 7	.1	- .6
N.C.Asheville . . .	46	+ 6	.3	- .4
Charlotte	47	+ 4	.4	- .3
Greensboro. . . .	45	+ 5	.3	- .5
Hatteras.	49	+ 2	.7	- .2
Raleigh	46	+ 4	.4	- .4
Wilmington. . . .	50	+ 2	.7	+ .1
N.DAK.Bismarck. . .	10	+ 1	.2	+ .1
Fargo	5	- 1	.1	0
Williston	4	- 3	.2	0
OHIO.Akron-Canton .	34	+ 6	.3	- .4
Cincinnati. . . .	42	+10	.4	- .6
Cleveland	36	+ 8	.3	- .3
Columbus.	37	+ 7	.2	- .6
Dayton.	39	+10	.4	- .4
Toledo.	34	+ 8	.7	+ .2
Youngstown. . . .	34	+ 7	.3	- .4
OKLA.Okla. City . .	45	+ 8	T	- .3
Tulsa	44	+ 8	T	- .4
OREG.Astoria. . . .	47	+ 6	5.3	+2.6
Burns	36	+12	1.8	+1.4
Medford	44	+ 8	3.5	+2.8
Pendleton	46	+15	.7	+ .4
Portland.	48	+10	3.6	+2.4
Salem	47	+ 9	5.4	+4.0
PA.Allentown. . . .	34	+ 5	.1	- .6
Erie	33	+ 8	.7	0
Harrisburg. . . .	37	+ 6	.2	- .5
Philadelphia. . .	39	+ 7	.1	- .7
Pittsburgh. . . .	38	+ 9	.4	- .3
Scranton.	32	+ 4	.3	- .2
R.I.Providence. . .	34	+ 5	.1	- .8
S.C.Charleston. . .	54	+ 4	.6	+ .1
Columbia.	51	+ 4	.2	- .5
Greenville. . . .	47	+ 2	.6	- .3
S.DAK.Aberdeen. . .	12	+ 2	.2	0
Huron	15	+ 3	.2	+ .1
Rapid City. . . .	26	+ 5	T	- .1
Sioux Falls . . .	16	+ 2	T	- .2
TENN.Chattanooga. .	48	+ 6	1.0	- .3
Knoxville	48	+ 6	.8	- .3
Memphis	56	+14	.9	- .5
Nashville	54	+14	.5	- .8
TEX.Abilene	56	+11	0	- .1
Amarillo.	48	+12	T	- .1
Austin.	62	+12	T	- .5
Beaumont.	61	+ 7	1.8	+ .9
Brownsville . . .	72	+11	0	- .3
Corpus Christi. .	68	+11	T	- .3
Dallas	58	+13	T	- .5
Del Rio	61	+ 9	T	- .2
El Paso	50	+ 7	0	- .1
Fort Worth. . . .	56	+10	T	- .5
Galveston	65	+10	.7	- .1
Houston	67	+16	.7	- .1
Lubbock	53	+14	0	- .1
Midland	54	+10	0	- .2
San Angelo. . . .	59	+12	0	- .2
San Antonio . . .	61	+ 9	T	- .4
Victoria.	67	+11	T	- .5
Waco.	59	+11	T	- .5
Wichita Falls . .	47	+ 4	0	- .3
UTAH.Blanding . . .	35	+ 8	0	- .2
Salt Lake City. .	40	+14	.5	+ .2
VT.Burlington . . .	24	+ 8	.3	- .1
VA.Lynchburg. . . .	42	+ 4	.8	0
Norfolk	48	+ 7	.1	- .7
Richmond.	42	+ 3	.2	- .6
Roanoke	45	+ 7	.7	0
WASH.Colville . . .	33	+10	.6	+ .2
Omak.	30	+ 9	.2	- .1
Quillayute. . . .	41	+ 2	5.5	+2.1
Seattle-Tacoma. .	44	+ 6	4.3	+3.0
Spokane	35	+10	.8	+ .3
Walla Walla . . .	47	+14	.7	+ .3
Yakima.	40	+13	.4	+ .1
W.VA.Beckley. . . .	43	+ 9	1.1	+ .2
Charleston. . . .	47	+10	1.2	+ .2
Huntington. . . .	45	+ 8	1.1	+ .2
Parkersburg . . .	42	+ 8	.3	- .5
WIS.Green Bay . . .	18	+ 1	.2	- .1
La Crosse	17	+ 1	.1	- .2
Madison	21	+ 4	.1	- .2
Milwaukee	25	+ 5	.5	+ .1
WYO.Casper.	36	+13	.1	0
Cheyenne.	41	+16	T	- .1
Lander.	38	+19	T	- .1
Sheridan.	24	+ 3	.4	+ .3
P.R. San Juan . . .	78	+ 3	.4	- .7

* Departures are from 30-year means (1931-60). **Based on preliminary reports.**

CONDENSED STATE SUMMARIES

These summaries provide brief descriptions of condition and activities important on a national scale. Detailed reports of crop and weather conditions during the growing season are contained in State issues of Weekly Weather and Crop Bulletins published by field offices of the Statistical Reporting Service, U.S.D.A. in cooperation with NOAA Climatologists

ALABAMA: Clear and very cold first of period, then cloudy and much warmer on Tuesday with light rain beginning in south and central sections. Cloudy and quite warm with frequent rains Wednesday through Saturday. Partly sunny and warm Sunday. Average temperatures for week about 12° above normal. Precipitation generally light southeast and moderate to heavy elsewhere. Cold weather first of period created hardship on many farms. Livestock suffered and poultry required more intensive management. Temperatures moderated sharply about midweek and general rains began. Growth of small grains curtailed by low temperature. Most fields too wet to graze. Land preparation and planting late spring Irish potatoes continued on limited scale. Crops damaged by low temperatures. Livestock in fair to good condition as a result of heavy supplemental feeding.

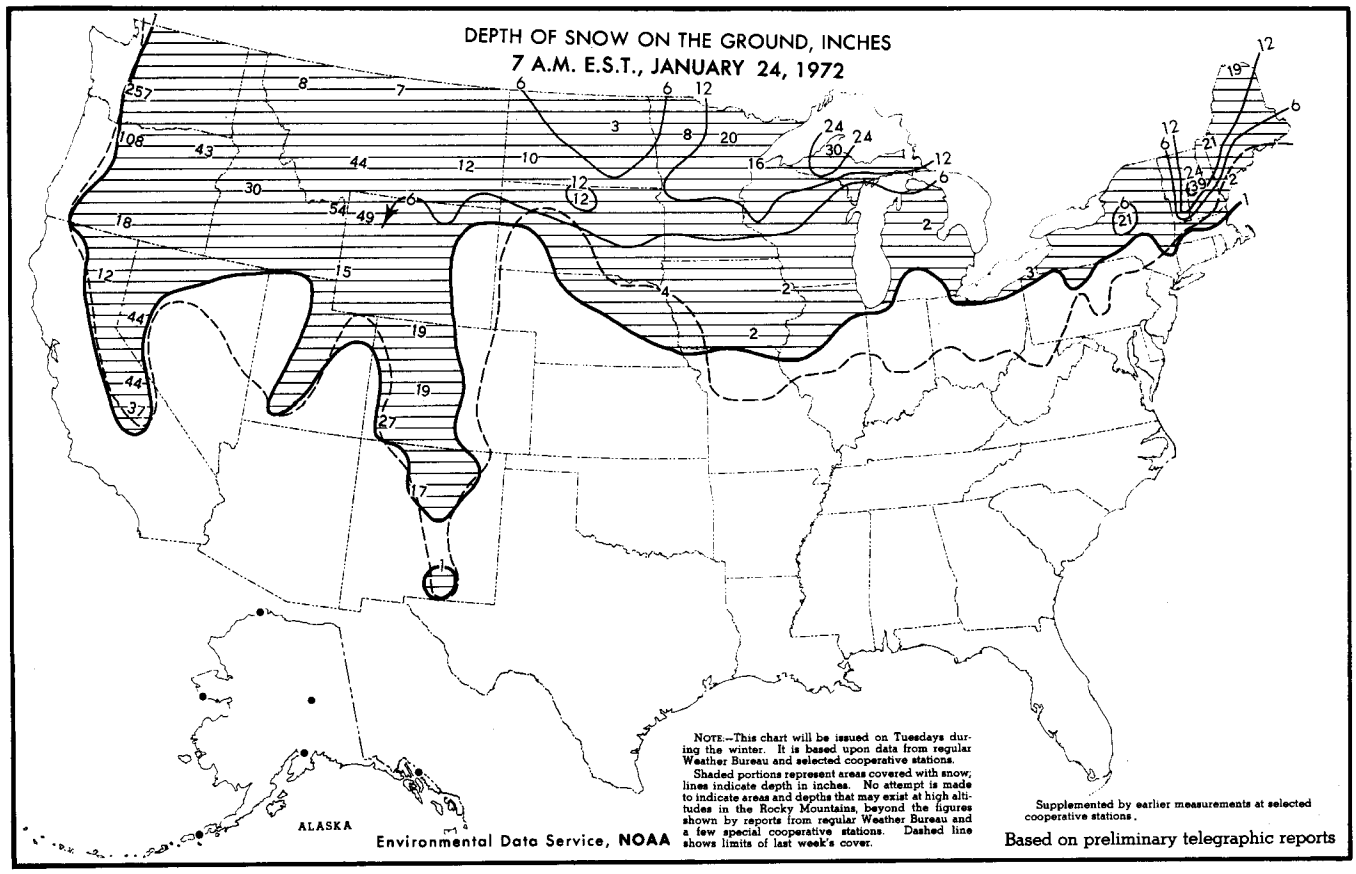
ARIZONA: No snow. Temperatures above normal most of State but skies mostly clear and minimum temperatures dropped to feeezing in colder sections of both Salt River Valley and Yuma area on 6 nights. No precipitation. Planting small grains continued Yuma, central, southeastern areas. Seedings over 2/3 complete. Planting safflower active central, western areas. Clean-up of 1971 cotton crop continued. Yuma area, field preparations underway. Sugar beets making good growth. Lettuce, romaine, cabbage, and other mixed vegetables harvest continues Yuma area. Immature winter vegetables growing well. Final preparations underway melons. Lettuce harvest active Salt River Valley. Harvest sweets, lemons, and a few grapefruit continued Salt River Valley. Orlando and Algerian complete. Harvest grapefruit, navels, sweet oranges, and lemons continued Yuma area. Range conditions fair to good. Moderate winter weather continues. Stockwater adequate. Cattle and calves good condition.

ARKANSAS: A pronounced warming trend Monday through Thursday with a change to cooler Thursday night and Friday before another warming trend Sunday and Sunday night. Average temperatures ranged from 10° above normal at Jonesboro to 16° above normal at Pine Bluff, Camden, and Texarkana. The lowest reading in State was 29° at Fayetteville on 23d and highest 77° at Gilbert on 20th and at Pine Bluff, Camden, and El Dorado on 23d. Precipitation was generally light. Georgetown had 0.66 inch with most other stations reporting less than 0.25 inch and no precipitation was reported at Ozark, Fort Smith, and Danville. Wet fields continued to delay most fieldwork. Minor preparation mostly for gardens. Mild weather with ample moisture beneficial for small grains. However, grazing limited and heavy feeding still required. Livestock condition mostly normal for this date. Machinery repair, farm records, and the like were major activities most farms.

CALIFORNIA: Fog Central Valley, Coastal Valleys until Tuesday. Continued cold temperatures. Warming rest of State. Moderate to heavy precipitation last 3 days. Snow above about 4,000 feet. Crop development slow due to cold weather. Soil moisture supplies dwindling. Rains at end of week temporarily aided conditions, but warm weather and rain needed. Weed and gopher control measures active many alfalfa fields. Fieldwork slow. Winter cultural activity continues. Picking of navel oranges continues at slow pace. Some light frost damage beginning to show. In Southern California harvest is accelerating but sizes below normal. In Coachella Valley tangerines showing severe frost damage. Damage to grapefruit appears minimal. Frost damage to avocado trees apparent. Some damaged fruit showing in packing houses. Rain benefited range lands, more needed Southern California. Cold weather slowed grass growth. Heavy supplemental feeding to maintain livestock. Stockwater adequate. Milk and egg production normal. Artichoke harvest at standstill. Desert asparagus slowly starting. Brussel sprouts completed. Broccoli at Watsonville improved later. Imperial cabbage improved, lower at Coachella. Carrot shipments light Imperial, increasing Coachella. Cauliflower Bay Area increased. Celery supplies lower. Imperial lettuce moderate. Winter potato moderate. San Diego strawberries first supplies.

COLORADO: Temperatures much above normal. Daily maximums reached 40's mountains, 50's and 60's lower elevations. No precipitation most areas. Scattered mostly light snow mountains and northwest. High winds some areas. Soil moisture supplies adequate except local areas Eastern Plains and San Luis Valley. Strong winds caused light damage to small grains local areas Eastern Plains and Arkansas Valley. Condition winter wheat and barley excellent. Approximately 25% fall grains being pastured. Most fields remained snow-covered western areas. Range and pastures fair. Livestock cleaning up stubblefields Eastern Plains. Condition of livestock good. Early calving underway southern areas. Most livestock receiving supplemental feed to minimize weight loss through the remainder of winter. Hay and forage supplies adequate most areas.

FLORIDA: The trend of well above normal temperatures which has persisted since early December was broken. Temperatures averaged 3° to 7° above normal in the northern and western portions of State and near or slightly above normal in southern sections. A warming trend set in during middle portion of week. Some low temperatures recorded this week were 17° at De Funiak Springs, 18° at Milton, and 19° at Smith Creek. Rainfall averaged 0.50 to 0.75 inch in the northern and western portions of Florida and 0.25 to 0.50 inch elsewhere. Rain fell mainly in the vicinity of front and again on Saturday when thunderstorms were prevalent throughout State. Apalachicola reported the largest amount of rainfall for week with 2.54 inches. Sunday was generally fair with temperatures rising to above normal readings. Small grain growth resumed with warm weather. Sugarcane harvest continues full swing. Growth of young cane good. Most pastures fair. Cattle and calves good with only light supplemental feeding. Citrus trees condition good to excellent. Flushes of new growth and buds appearing on young trees. Weather generally favorable for vegetables. Rain needed most areas. Vegetable shipments below



previous week. Supplies generally adequate. Tomatoes lead in volume but 1/3 lighter than week earlier. Harvest of winter potatoes just starting. Seeding and planting active.

GEORGIA: Cold beginning of period, mild to warm remainder of week. Lows mostly in 40's and 50's and highs in 60's and low 70's after Tuesday. Averages ranged from 4° to 9° above normal. Weekly averages have been above normal most areas for 7 straight weeks. Rain on 2 to 3 days during last half of week. Amounts mostly light to moderate except in extreme south and southeast where some heavy rain occurred during weekend. Soil moisture adequate to mostly excessive. Small grain and pasture conditions remain fair to good. Livestock and poultry care and tobacco bed preparation made up bulk of farmwork.

HAWAII: Weather during week clear but cool with heavy weekend rain on Oahu and Kauai. Some flooding but damage to crops light. Farm activities slowed by wet fields. Harvesting of sugarcane and pineapples light but increasing gradually. Vegetable and fruit supplies adequate despite west coast shipping tie up. Pasture condition poor on Maui, but fair to good elsewhere. Cattle in fair to good condition.

IDAHO: Below normal temperatures first half of week increased to average 5° to 15° above normal for week. Precipitation last half week was heavy southwest and south-central Idaho, moderate to heavy Panhandle and light to moderate elsewhere. Snow depth changes were variable with 15-inch increase in the Ketchum-Sun Valley area for the greatest. Warmer weather coupled with rains caused some lowland flooding. Feed lots were generally muddy. Many farm roads closed because of mud.

ILLINOIS: Cloudy damp week. Temperatures averaged 10° above normal and ranged from high teens in north at midweek to the warm 60's in the south over the weekend. The northwest had up to 5 inches of snow over the weekend. Precipitation ranged from few hundredths in south to few tenths in north after the 19th. A front stalled over weekend induced fog, drizzle, and some freezing rain. Soil moisture adequate. Winter wheat, other small grains, and legumes in good condition. Livestock fair to good condition. Some livestock health problems in few areas. Main activities include routine farm chores and livestock care.

INDIANA: Warm and wet. Temperatures averaged 8° above normal north, 13° above normal south. Daily minimum temperatures mostly in 30's, maximums in 40's or 50's north, some 60's south. Soils mostly unfrozen and wet. Precipitation 0.1 to 0.6 inch on weekend with much fog and drizzle. One inch of snow near Lake Michigan. Field activity at minimum. Soils too wet for equipment. Activities confined to care of livestock and other chores.

IOWA: Mild early in week becoming seasonal by midweek. Precipitation latter half of week, as rain, glaze, and snow. Two to five inches snow cover most of State at weekend.

KANSAS: Unseasonably warm. Weekly mean temperatures averaged 5° to 15° above normal. Maxima

over 70° extreme southwestern Kansas 23d. Cloudy and foggy much of period; little or no precipitation. Moderating temperatures following recent cold spell permitted small grain grazing and some fieldwork last week. Greening of wheat few localities. Wheat and barley good to excellent with adequate moisture statewide. Nitrogen topdressing applied to wheat fields some areas. Oats seeded very limited scale south-central area. Land tillage progressed as fields dried. Some cattle removed from wheat pastures where top growth short. Early calving underway favored by milder weather. Supplemental feeding of cattle increased where stalk and stubble field residues exhausted. Hay and other roughage getting scarce few localities but mostly ample.

KENTUCKY: Temperatures 4° to 10° below normal on 17th and unseasonably mild balance averaging 9° to 13° above normal. Sunny 17th. Rain one or more areas other 6 days. Totals generally less than 0.25 inch along border from Covington in north to Hichman in southwest. Moderate to heavy balance. Two and one-half to 3.00 inches portions of south-central and southeast. Upper Cumberland River rose to flood stage at Barberville and to near flood stage at Williamsburg. Temperatures continue favorable for outside work. Many activities hampered by scattered showers. Pastures still supplying considerable feed but supplemental feeding on increase. Most farmers have ample roughage supply and livestock remain in good condition.

LOUISIANA: Temperatures moderated sharply from extreme cold of last weekend resulting in very warm week. Extensive heavy early morning fog on several days. Weekly temperatures averaged in middle 60's. Departures ranged from 5° to 9° above normal along coast and 12° to 17° above normal remainder of State. Temperature extremes: 13° Homer January 17 and 82° Lafayette and Shreveport January 23. Weekly rainfall amounts from midweek thundershowers less than 0.30 inch northwest near 1.00 inch to locally more than 3.00 inches northeast, central, and south. Greatest 1-day rain total 3.82 inches measured Oberlin Thursday afternoon. Some scattered fieldwork possible but halted by rain at midweek. Soil moisture excessive all districts except northwest. Some cotton picked, stalks cut, soybeans combined, and winter pastures topdressed. Cattle feeding active where winter pastures not available. Strawberries growing rapidly and need cold weather for optimum development of crop. Livestock showing effects of pasture forage deterioration but mostly in fair to good condition.

MARYLAND AND DELAWARE: Weekly temperatures averaged 3° to 5° above normal. Very cold on 17th but normal to above normal rest of week. Warmest day, 19th when temperatures reached into 60's. Cloudy mild weather with fog, drizzle, and light rain 20th and 23d. Precipitation mostly 0.30 inch or less. Small grains rated fair to good. Some spots killed by standing water. Some harvest corn and soybeans while ground frozen. Most of corn harvested. Some fields of soybeans remain especially central Eastern Shore and Delaware. Respiratory diseases more severe than usual with newborn livestock.

MICHIGAN: Cold early, rapid warming with above normal temperatures rest of period except some subzero temperatures Friday night northern portions. Temperatures averaged normal western Upper Peninsula to 5° above normal eastern Upper Peninsula, and 3° to 8° above normal Lower Michigan. Precipitation averaged 0.25 to 0.65 inch except over 1.00 inch western Upper Peninsula. Lower Michigan generally 0.50 inch except less than 0.25 inch Traverse City and Alpena areas.

MINNESOTA: Temperatures varied from 2° above normal in south to 5° below normal in north. Extremes 45°, -31°. Precipitation across the State was about 1 inch of snowfall except east-central and northeast districts had 3. Snow depth 6 to 20 inches across State. The 15-inch and greater depths are north of a line from Alexandria-Moose Lake-Grand Portage.

MISSISSIPPI: Below freezing temperatures 17th. Weekly temperatures averaged much above normal. Temperatures warmer by Wednesday with a high of 81°. Weekly rainfall totals averaged less than 0.50 inch except in southeast and coastal divisions: A 1-day amount of 3.60 inches was reported at Picayune on 19th. Some dense fog on several days. Temperatures remained warm over weekend with scattered rainfall Friday afternoon of 1.00 to 2.00 inches in southeast. Warmer weather permitted farmers to clean up harvesting and begin some plowing few well-drained fields. Average of 2 days suitable for fieldwork. Soil moisture mostly surplus. Wheat and oats are fair go good condition. Livestock and pastures mostly fair to good condition.

MISSOURI: Rapid warming early in week, coupled with frequent periods of cloudiness, resulted in temperatures averaging 3° to 6° above normal for the week. Except for light showers in the southeast, precipitation was confined to trace amounts of drizzle or snow.

MONTANA: Mild week western divisions as temperatures averaged up to 17° above normal. Cold elsewhere, very cold north-central division. Heavy precipitation throughout State, especially western division. Winter wheat continues in good condition with fields generally snow covered and only light wind damage reported. Some range areas opened to grazing. Hay and roughage feeds are short to adequate while grain and concentrate feeds are generally adequate. Virtually all livestock receiving supplemental feed. Both shrinkage and death losses about normal.

NEBRASKA: Warm week with little precipitation until 3 to 7 inches of snow in northeast near weekend. Normal farm activities during week with most time spent on livestock care. Weather conditions have permitted continued grazing of stalkfields, thus conserving hay and forage feed supplies. Above 90% of reporters indicated average or better feed grain supplies and 85% of hay and forage feed supplies are average or better. Strong winds in western areas caused some minor soil erosion on lighter soil especially where ground cover was sparse. Livestock conditions are variable with fluctuating temperatures causing some problems. There are a few reports of respiratory sickness but losses have not been abnormal.

NEVADA: Temperatures in north averaged about 10° above normal, near normal in south. Light to heavy precipitation in north from trace at Fallon to almost 2.00 inches at Sheldon. Light in south. Locally strong winds over weekend. Partial snow ground cover over north. Ranchers experiencing difficulty feeding and caring for livestock in mud caused by melting snow. Feed and water supplies adequate most areas. Live-

stock continue to winter generally fair to good condition. Radishes continue to be planted on limited amount of acreage in Moapa Valley.

NEW ENGLAND: Second unseasonably mild week in a row. Means 5° to 10° above normal. Maxima nearly all above freezing in south and frequently above in north. Precipitation frequent but generally light. Totals mostly 0.10 to 0.50 inch but a few to 0.70 inch. Snow cover generally decreased in week, with ground mostly bare in southern half.

NEW JERSEY: Mild week with an almost steady temperature rise. Averages 10° to 15° above normal past weekend. After readings as high as 60° Wednesday southern counties set high mark for week. Although precipitation fell at midweek and over weekend totals averaged only 0.10 inch over northern and interior southern sections and only 0.20 inch over coastal. Largest total was 0.30 inch.

NEW MEXICO: Continued fair and dry with much above normal average temperatures especially during the day and in the east. Lowest temperatures Monday and warming on weekend to highest temperatures. Soil moisture adequate. Wheat good to excellent. Heavy pasturing wheat continues. Wrap up cotton harvest. Planting spring lettuce and onions active. Ranges fair to good. Livestock holding own.

NEW YORK: Temperatures averaged above normal for 6th warm week since early December. Coldest on 17th as minimums 10° to 20° below zero. Adirondacks and northern valleys, 0° to -8° in southern Plateau. Maximums 45° to low 50's western half to near 55° and Lower Hudson Valley on 18th and 19th. Mild weekend. Precipitation very light southeast quarter but weekly totals ranging up to 0.70 inch in northwest. Snowfall 3 to 6 inches along Lake Ontario to St. Lawrence Valley and northern mountains on 20th. By end of week, snow cover none to 3 inches southern Upstate with 4 to 6 inches in northern valleys and up to 20 inches parts of Adirondacks. In coastal sections total winter snowfall through late January has been little more than trace.

NORTH CAROLINA: Coldest weather of season January 16 and 17. Lows below zero mountains and zero to 10° most other areas. Rapid warming midweek. Highs 70's and lows 50's warmer areas 21st, remaining above freezing all areas after 20th. Rain 21st and 22d 0.10 to 1.00 inch, mostly 0.50 inch or less. Soil moisture adequate to surplus, mostly surplus. Hard freeze dropped small grain condition, mostly fair to good. Pastures poor to good, generally good. Feed grains, hay, and roughage remain adequate. Commercial cabbage crop damaged extensively by subnormal temperatures. Farming activities include corn, cotton, and soybean late harvest, fruit tree pruning, tobacco plant bed activity, livestock feeding, etc.

NORTH DAKOTA: Temperatures averaged near normal. Mild Monday. Colder remainder of week except higher temperatures Friday. Precipitation light to 0.60 inch. Occasional snow becoming heavier on weekend. Snow cover 2 inches in northeast to 10 inches in southwest. Continued cold and snowy conditions caused additional work for farmers and ranchers caring for livestock. Some feed supplies could become inaccessable. No grazing possible. Main activities include snow removal, farm chores and, yearend bookkeeping.

OHIO: Temperature contrast in Ohio continues. The week was substantially warmer than the much-below-normal temperatures of last week. Minimum temperatures averaged 5° to 10° above normal while maximum temperatures climbed in the upper 50's and low 60's during the week. Precipitation, generally in small amounts, was recorded on almost everyday. Small amounts of snow reported in northern Ohio. Snow cover continues to be very limited. Winter wheat shows much tip-burn and leaf yellowing from extreme low temperatures occuring a week earlier. Most farm activities have been limited mainly to maintenance and care of livestock, repair and maintenance of machinery and farm buildings. Pruning of fruit trees and grapevines have begun in some areas of the State.

OKLAHOMA: Precipitation averaged trace all areas State. Temperatures averaged 5° to 13° above normal. Extremes 76° and 17°. Several days with heavy fog. Cotton harvest active during week, nearly completed several localities. Cleanup sorghum grain, soybeans, and pecans continued. Wheat semi-dormant or dormant but grazing still adequate most areas. Condition rated 90% good or better, sharply above year earlier. Most ranges furnishing some feed but quantity and quality declining. Livestock generally good condition. Supplemental feeding necessary most areas. Hay supply generally adequate. Some death losses from bloat and wheat poisoning continues. Soil moisture supplies adequate most areas. Seedbed preparation for spring seeded oats and barley about 1/2 completed.

OREGON: Mild wet week with significant warming trend caused damaging floods on north coastal streams and flood stages most other western Oregon rivers. Temperatures averaged mostly 3° to 6° above normal with 9° to 16° above northeast quandrant. Minima, 5° to 42°; maxima, 38° to 62°. Considerable snowbelt lower elevations with snow pack increase above 4,000 feet. Precipitation totaled 0.30 to 0.60 inch east of the Cascades, 1.70 to 3.00 inches north-central and southwestern valleys, 5.00 to 7.00 inches remaining Cascades and westside with up to 9.50 inches on south coast. Pruning orchards and spraying weeds in seed and grain fields continued about normal. Livestock feeding remains heavy. Early lambing progressing. Heavy rains caused local flooding and some damage to fall-planted crops in Willamette Valley counties.

PENNSYLVANIA: Another very mild week across State. Average temperatures in low 30's to 40's 40's were 7° to 11° above normal. Brief cooling end of week but milder weekend. Rainfall under 0.25 inch southeast, near 0.50 northeast and southwest up to 1.50 to 1.75 inches parts of northwest. Several inches snow extreme northwest Sunday night. Otherwise, ground bare across State except 1 inch or less parts of northern tier counties.

PUERTO RICO: A cool rainy week islandwide. Rainfall averaged 2.10 inches or about 1.30 inches above normal. Highest weekly total, 4.48 inches eastern mountains. Rest of Island averaged about 1.50 to 2.50 inches. Crop moisture conditions generally near normal except some excess rains in interior divisions. Temperatures averaged 75° on coast and 69°-70° interior divisions with average departure of about 1.5° below normal. Sugar cane plantations report good development of new crop but harvesting operations delayed by rain showers in

some zones. Coffee plantations report generally good progress, fertilizing and cultivating. Tobacco plantations delayed harvesting operations due to rains. Rainy weather also hindered curing operations. Pastures report good progress planting and fertilizing but interior zones report too cool and rainy for optimum development and some zones in south too dry. Minor crops harvesting yams and taniers. Good progress reported planting of yams and soil preparation.

SOUTH CAROLINA: Very cold early in period but warm by end of week. Greer had a low of 7° on 16th and a high of 70° on 19th. Temperatures for week averaged 2° to 4° above normal. Rainfall amounts were about 0.20 inch except 1.00 to 2.00 inches along coast. Farmers were busy, weather land condition permitting, preparing land for spring planting season. Tobacco bed preparation practically complete. Pruning, topping peach trees continues all areas. Some soybean, cotton fields, particularly upper portion State, still standing for harvest. General maintenance jobs make up remainder of daily schedule and many instances majority of schedule.

SOUTH DAKOTA: Weekly temperatures averaged from 2° to 6° above normal. Extremes ranged from 8° below zero at Lemmon on 24th to 62° at Rapid City on 17th. Precipitation fell as light rain or snow scattered through the week with amounts from a trace to about 0.25 inch. Freezing rain reported on 21st. Snow cover at end of week ranged from zero in southwest to 1 foot in portions of north-central and northeast. Temperatures and weather conditions improved during the week easing the previous week's cold weather strain on livestock. No abnormal death losses were reported. Supplemental feeding remains active. Several production areas of winter wheat and rye could use more snow cover. Feeding and caring for livestock remain the main farm activities.

TENNESSEE: Unseasonably mild most of week. Mean temperatures ranged 6° to 14° above normal with greatest departures in west half of State. Rainfall totals generally less than 1.00 inch except some in west up to over 2.00 inches. Heaviest rainfall on January 20 and 21. Feeding and care of livestock continue to dominate farmwork. Mild weather latter half of the week allowed farmers and stockmen to catch up on fence building and other outside work. Cattle are in mostly good shape as entire winter has been on mild side. Small grains are in good condition with soil moisture adequate.

TEXAS: Precipitation during week was limited to few moderate to locally heavy showers in southeast Texas first half of week. Temperatures were unseasonably warm with maxima reaching low 90's in South Texas over weekend. Freezing weather covered part of State. Oats sustained freeze damage southern part. Recovery slow and dependent upon mild temperatures. Harvest of cotton making good progress and nearing completion on High Plains. Increased seeding necessary as result of recent freezing temperatures. Harvest of cotton 92% this year 100% last year. Mild open weather allowed vegetable harvest to progress on schedule all South Texas areas. Lower Valley moderate volume cabbage, lettuce and light supplies carrots, broccoli, cauliflower, beets, spinach, and greens. Winter vegetables and spring onions good progress in mild temperatures. Planting spring cantaloupes, honeydews, watermelons, peppers, and tomatoes becoming more active Lower Valley with early fields up to stand. Winter Garden harvest cabbage, carrots, and spinach in moderate volume. Cabbage and spinach making fair recovery from freeze damage early January. Citrus harvest active Lower Valley. Grapefruit volume heavy. Harvest early and midseason oranges near completion with light harvest Valencia oranges underway.

UTAH: Recurring periods light snow or rain northwest. Rising trend in temperatures to average generally 2° to 14° above normal for period. Local strong winds caused drifting snow some northern Utah areas, creating difficulty keeping some farm roads open. Care and feeding cattle and sheep on feedlots and valley farms. Dairy cattle and poultry flocks continue leading activity. Two turkey plants still processing in January. Placing of poults for 1972 turkey crop just started. Sugar beet processing in full force. Sorting, grading, and marketing potatoes, dry onions, and apples from storage continues.

VIRGINIA: Temperatures below normal 1 to 2 days at beginning and above normal thereafter. Rain from Thursday to Sunday with totals mostly less than 0.50 inch. Livestock care and feeding major activities with cold at beginning of period. Livestock required extra feed and newborn stock extra care. Winter grains and grazing crops condition reduced but still very good. Feed from grazing off 6% for beef cattle and sheep. Little plowing, lime, and fertilizer spreading. Prepared tobacco plant beds. Marketed fire cured tobacco.

WASHINGTON: Western Washington: Mild and wet weather brought many rivers to flood stage with heavy damage in some lowland areas. Most farm activity limited to routine chores and home orchard pruning. Standing water damaged some seed crops and wet weather posed problems for lambing and calving operations. Digging of rhubard crowns continuing and harvest of forced daffodils well underway. Livestock doing well on winter rations. Eastern Washington: Warm windy weather prevailed with near normal precipitation amounts. Heavy rains in Palouse area brought rivers to flood stage at end of period. Pruning of grape vines and fruit trees continues although somewhat hampered by weather. Most farm activity limited to equipment repair. Warm weather favored wheat growth but some erosion occurred. Lambing and calving continued with yearling calves moved to markets during the week. Hay continued to move out of area in volume and prices were excellent.

WEST VIRGINIA: Rapid warmup after below-zero readings January 16. Spring-like weather continues. Most of week had temperatures in high 50's with rain on January 18, 19, 20, 22 and 23. Heaviest rain on January 20. Most areas had weekly totals over 1.00 inch. Cattle wintering extremely well. Feeding requirements light to moderate. Present hay supplies appear adequate to surplus. Considerable fall and winter plowing.

WISCONSIN: Temperatures during week averaged near normal in north and above normal in south. Some thawing as the mercury rose into the 40's south on Tuesday along with high humidities. Snow depths generally 12 to 24 inches across the north half while depths in the south mostly range between 2 and 4 inches. Frost penetration continues shallow in the north while frost depths in the south average between 12 and 24 inches. Farm activities mainly care and feeding of livestock.

(Continued on back page)

A REPORT OF THE PHENOLOGICAL SURVEY IN THE WESTERN REGION OF THE UNITED STATES, 1971

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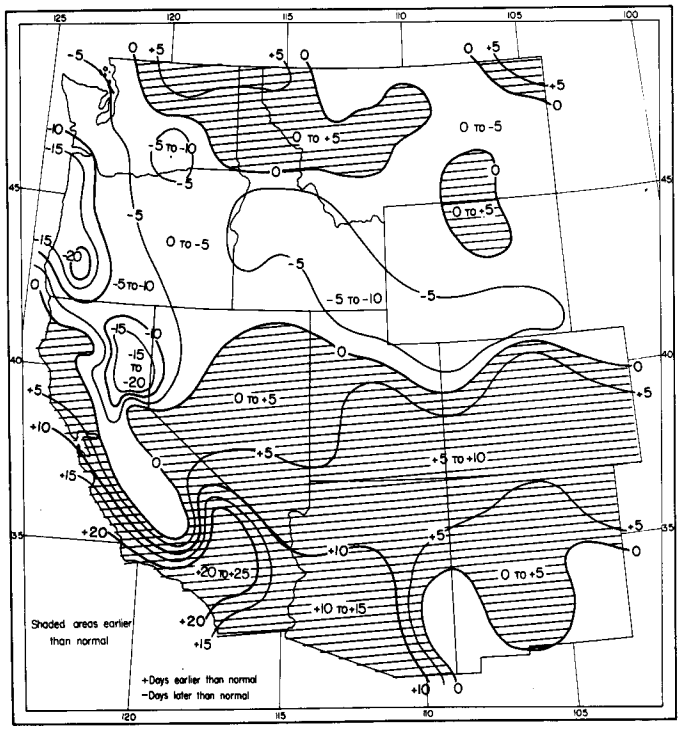
Montana Agricultural Experiment Station, Boseman

A. Departure of Lilac Bloom Date in 1971 from the 10-year Normal (1957-66) Throughout the Western Region of the United States

The average dates of the time when purple common lilacs begin to bloom have been determined from phenological data collected during the 10-year period 1957-66. The dates of begin bloom in the spring of 1971 were compared with the 10-year mean. These 1971 departures from the average or normal time of bloom are shown on the map below.

In general, the time of bloom departed from normal by less than 10 days except in the northern California-western Oregon area where the time of bloom was more than 15 days later than normal and in southern California and southwestern Arizona where bloom was more than 10 days earlier than normal. Bloom was more than 20 days earlier than normal in parts of southern California.

Associated with the earlier than normal bloom in southern areas were warmer than average temperatures in January, February and March. April and May were cooler than normal over most of the Western Region, but the earlier than normal lilac bloom area of eastern Washington, northern Idaho and northwestern Montana averaged warmer than normal for the month of May.



DEPARTURE OF BEGIN-LILAC-BLOOM-DATE FROM NORMAL IN DAYS - 1971

Model Developed Linking Time of Lilac Bloom to Weather Factors[1]

For the past several years lilac bloom data and weather records have been studied in an effort to determine which climatic factors control the timing of lilac bloom. These studies have led to a theory linking the climatic environment to the rate at which lilacs and many crop plants advance through their seasonal development. The equation below shows a relationship based on phenological information on the purple common lilac recorded over a 10-year period by hundreds of phenological observers throughout the 11 western States.

$$STU = \sum_{Te>0}^{BB} \left[\frac{\text{calories (.3-4 micron } \lambda)}{\text{centimeter}^2\ \text{day}}\right]\left[\left(\frac{T\ max + T\ min}{2}\right) - 31.0\right] = 380{,}000$$

where: T max = daily maximum temperature in degrees Fahrenheit
T min = daily minimum temperature in degrees Fahrenheit
λ = wavelengths of solar radiation measured on a horizontal surface
Σ = (sigma) summation of daily Solar-Thermal Units from the time when mean daily temperature becomes effective (Te>0) to the time when lilacs begin to bloom (BB).

$$Te = \left[\frac{T\ max + T\ min}{2}\right] - 31.0 = \text{effective temperature}$$

Energy received from the sun is one facet of this equation. The other element is mean daily temperature computed by adding the highest and lowest temperature for that day and dividing by two. These temperatures are measured each day in standard Weather Service climatological shelters at a height of about 5 feet. Mean daily temperature becomes "effective" in advancing plant development when it rises above 31.0°F. At a given effective temperature the number of Solar-Thermal Units increases in direct proportion to the amount of solar radiation. Likewise, at a given solar radiation level, Solar-Thermal Units accumulate in direct proportion to the effective temperature. According to this equation, 380,000 Solar-Thermal Units are required to bring the common purple lilac into bloom. It has been observed that many kinds of plants advance in parallel with the lilac in the spring, so this response of the lilac is characteristic of many agricultural crops.

While total solar radiation, direct and indirect, is an element in the Solar-Thermal Unit equation, some parts of the solar spectrum (mostly included in the 0.3 to 4.0 micron wavelength range) might actually be more important than other parts. Also, while these relations with plant development appear to hold over extensive areas,

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environmental extremes such as very low atmospheric moisture could interfere with normal functioning of the plant. These are finer points that can be resolved through further research.

Solar-Thermal Units (STU) also were compared with experimental results of different researchers who have related potential evapotranspiration[2] to daily solar radiation and mean daily temperature. It was apparent that the multiplication of Solar-Thermal Units by 10^{-5} provides an estimate of potential evapotranspiration in inches that is near the mean of estimates derived by these researchers through field experimentation. Associated with the time when lilacs begin to bloom in the spring are 380,000 STU or STU x 10^{-5} = 3.80 inches of accumulated potential evapotranspiration. Thus, Solar-Thermal Units are indicative of both plant development and potential evapotranspiration.

The developmental status of different species of plants can be related through the Solar-Thermal Unit concept. For example, when lilacs begin to bloom the development of alfalfa toward one-tenth bloom stage for harvest is about 50 percent complete since bloom of lilacs requires 380,000 STU and one-tenth bloom of alfalfa requires roughly 800,000 STU. By the end of lilac bloom, which requires about 660,000 STU, alfalfa has completed about 80 percent of its development toward one-tenth bloom or harvest stage.

Work is presently underway to determine the number of Solar-Thermal Units required to bring different kinds of plants (native, garden and crop species) into various stages of development. It is known, for example, that the timing of developmental phases for some plants can be influenced by other environmental factors such as the length of night, available moisture, etc. Historical phenological records for the various plant species are serving as a basis for these determinations.

In areas along the northern Pacific Coast where the weather in winter and spring is cloudy and where mean temperatures do not fall below freezing during the winter months, it may be possible to determine the date when plant rest is broken by accumulating Solar-Thermal Units backwards in time from the normal time of bloom. The data indicate that this occurs late in the fall of the previous year in some Pacific coastal areas.

If normal temperatures and average date of lilac bloom are known for a given location it will be possible to estimate the normal pattern of solar radiation at the site during the early part of the growing season. This principle may prove to be important because instruments that measure solar radiation are expensive and cannot feasibly be located at many sites. When using the plant for this purpose, it may not be possible to indicate solar radiation as conveniently and accurately as the sophisticated instrumentation now in use, but estimates of solar radiation by this method may have wide application. A plant used in this way can be thought of as a plant "pyranometer," a technical term for an instrument which measures solar radiation. If an instrument should be built to register Solar-Thermal Units it could be called a phytophenometer.

Listed below are other ways in which this knowledge about the response of plants to climate may be applied:

1. Length of freeze-free season can be more rationally defined for many purposes as the total number of Solar-Thermal Units accumulated during the year rather than in number of degree-days or consecutive freeze-free days.

2. Freeze hazard for plants at any particular time of year can be expressed as the probability of a freeze occurrence in connection with the average accumulated number of Solar-Thermal Units at particular times of year.

3. Plant hardiness zones may be related not only to minimum winter temperatures but also to the total seasonal accumulation of Solar-Thermal Units.

4. Easily computed estimates of potential evapotranspiration have many uses including applications in hydrology and irrigation practice.

5. Knowing this response of plants to climate, more rational decisions concerning plant care and crop management can be made. Examples are the forecasting of seasonal plant development, the scheduling of planting to provide for an orderly flow of produce at harvest time, the proper control of micro-climatic conditions through plant spacing, row orientation, artificial shading, etc., and the selection of the most suitable crop and variety for given local conditions.

6. This plant response could be an important factor in the interpretation of field and greenhouse research results, in the planning of crop breeding programs and in decisions relative to the introduction of new plant species.

7. Weed and pest control personnel can use this kind of information in conjunction with the planning of field operations.

8. Knowledge of this plant-climate relation could be a factor in the proper interpretation of ecological data. Natural resource inventories, for this reason, should include an assessment of the number of available Solar-Thermal Units.

9. The relation between Solar-Thermal Units and plant development could be important in the interpretation of tree-ring records and, more generally, of paleoclimatological data.

10. Basic findings of the relation between living organisms and their environment provide man with information he needs to intelligently deal with environmental problems.

The Solar-Thermal Unit concept presently provides the best model available for estimating the rate of development for many plant species. More research will be required to learn to what extent these relations apply throughout the plant kingdom. For some kinds of plants, for example, it may be necessary to use a value other than 31.0°F. in the equation. Further study should also establish the environmental limits to which this theory can be applied and to determine whether other associated environmental factors may have a more direct influence on the rate of plant development. Future phenological investigations could play an important role in elucidating further on the basic mechanisms involved in the response of plants to their climatic environment.

[1] The following is extracted from Montana Agricultural Experiment Station Circular 251, "The Solar-Thermal Unit Theory in Relation to Plant Development and Potential Evapotranspiration."

[2] Potential-evapotranspiration is the amount of water that escapes by evaporation and transpiration from a field that has an abundant supply of water and is completely covered with actively-growing vegetation such as alfalfa.

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(Continued from page 9)

WYOMING: Widely scattered light snows over most of Wyoming, heavy northwestern mountains. Moran reported the most moisture with 1.15 inches. Temperatures averaged 5° to 13° above normal except isolated near normal areas in Big Horn Wind River Drainages. Maxima were mostly 35° to 45° west of Divide and Upper Platte Drainage, 40's to mid 50's elsewhere. Minima were mostly -15° to 10° west of Divide and Upper Platte Drainage, 5° to -28° elsewhere. Temperature extremes: 56° at Alba, Sheridan, and Torrington and -28° Torrington. Livestock have rebounded well from weather stress of recent weeks and are now in good condition over most of the State. Feed and stockwater supplies continue to be adequate.