

WEEKLY WEATHER AND CROP BULLETIN

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration, National Weather Service

U.S. DEPARTMENT OF AGRICULTURE
National Agricultural Statistics Service and World Agricultural Outlook Board

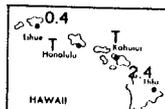
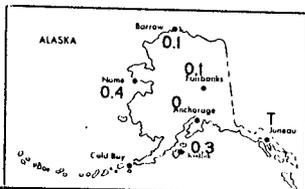
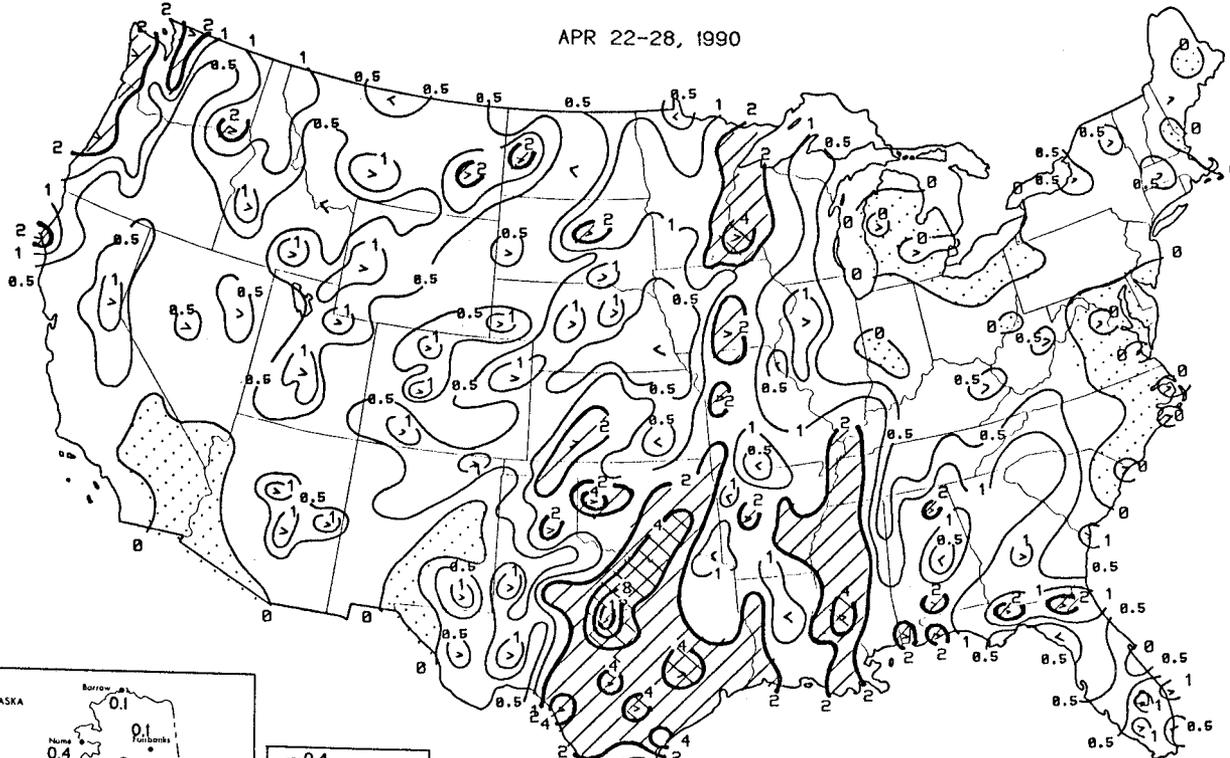
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May 1, 1990

TOTAL PRECIPITATION, INCHES

APR 22-28, 1990



GREATER THAN 2 INCHES
 GREATER THAN 4 INCHES
 NO PRECIPITATION

NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY

Based on preliminary reports

HIGHLIGHTS

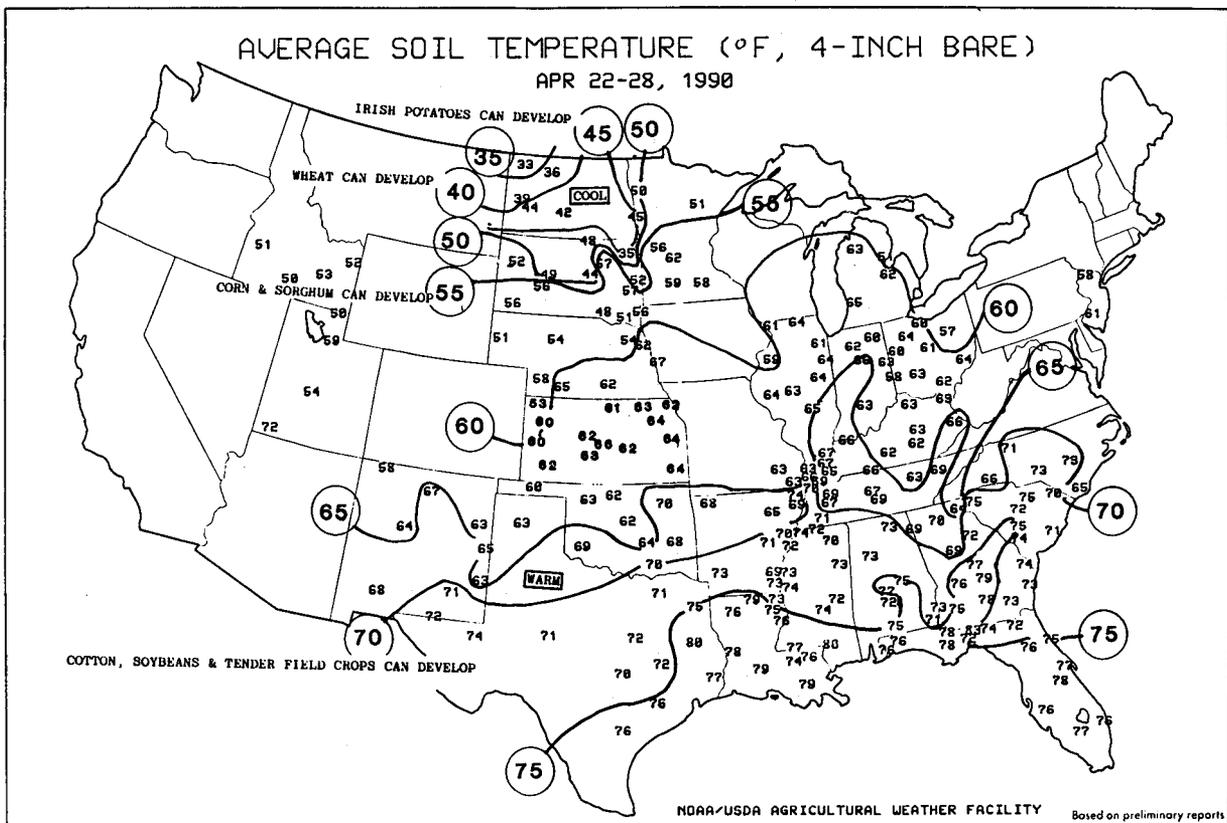
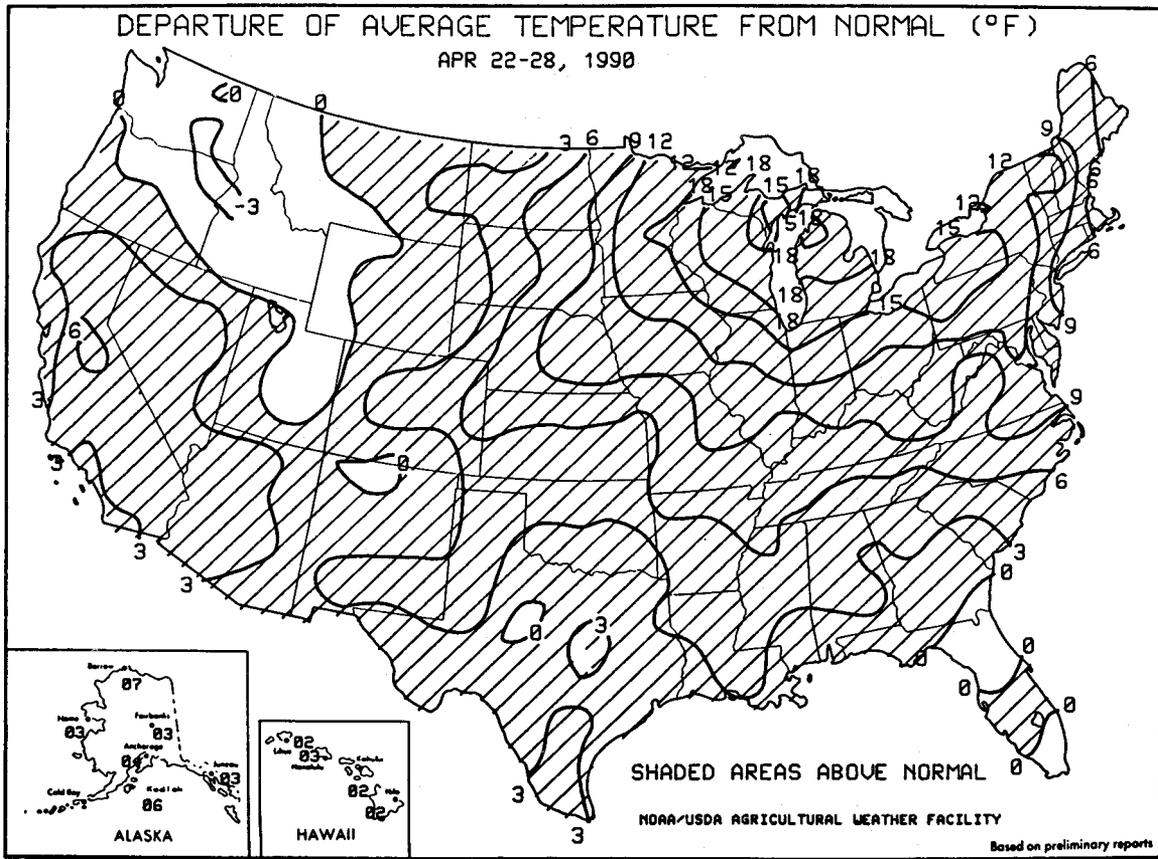
April 22-28, 1990

At the first of the week, welcome rains moved into the West, while thunderstorms were scattered across the Great Plains, upper Mississippi Valley, and the Southeast. Temperatures soared into the 90's as far north as Fargo, ND, with balmy weather spreading over much of the eastern half of the Nation. A stagnant weather pattern developed during the remainder of the week, as a large high pressure system centered on the middle Atlantic coast brought dry conditions and record heat to the East and pumped abundant moisture from the Gulf into the midsection of the Nation. Moderate to heavy rains dampened much of the Plains and Mississippi Valley. The rainfall was much needed over the northern and central Plains and western Corn Belt. Thunderstorms, however, (Continued to p. 16)

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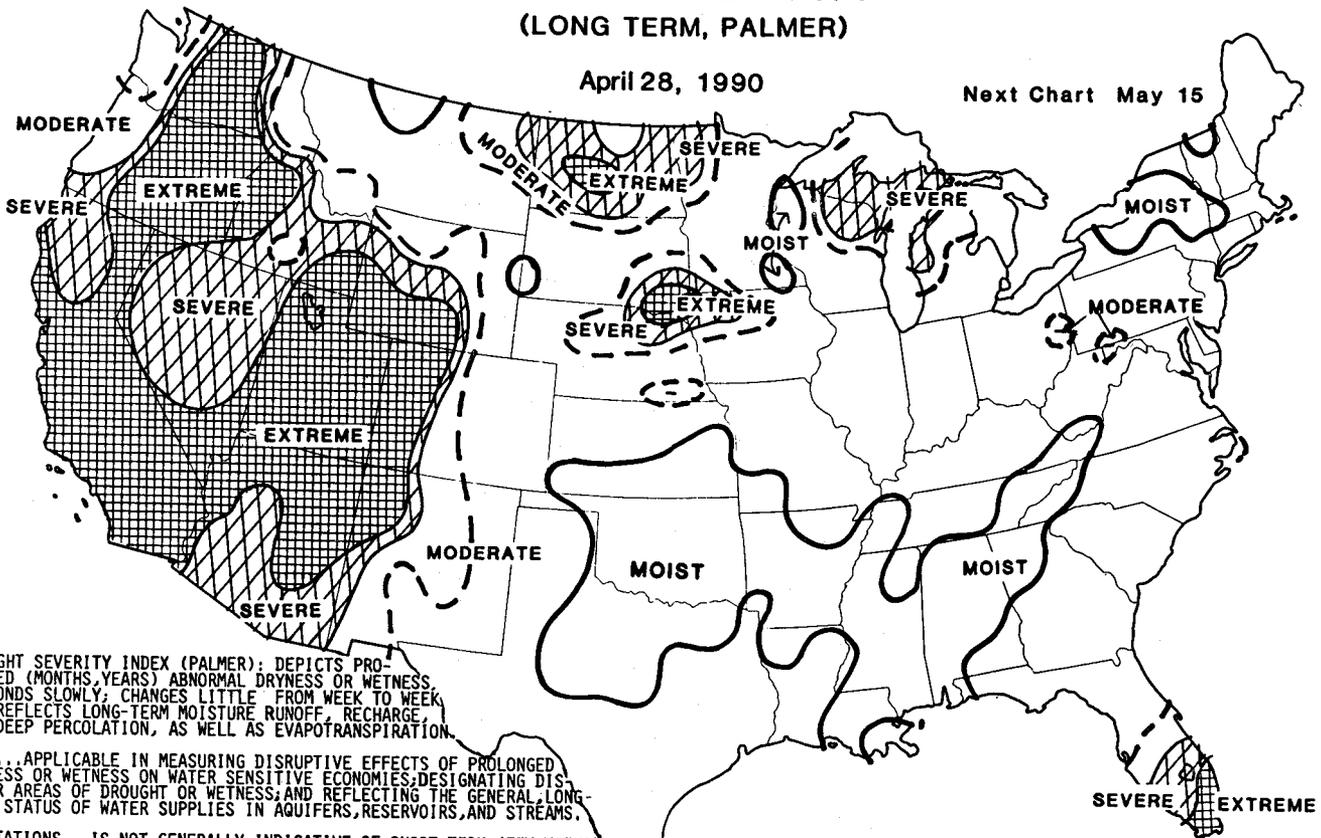
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DROUGHT SEVERITY (LONG TERM, PALMER)

April 28, 1990

Next Chart May 15



DROUGHT SEVERITY INDEX (PALMER): DEPICTS PROLONGED (MONTHS, YEARS) ABNORMAL DRYNESS OR WETNESS. RESPONDS SLOWLY; CHANGES LITTLE FROM WEEK TO WEEK AND REFLECTS LONG-TERM MOISTURE RUNOFF, RECHARGE AND DEEP PERCOLATION, AS WELL AS EVAPOTRANSPIRATION.

USES... APPLICABLE IN MEASURING DISRUPTIVE EFFECTS OF PROLONGED DRYNESS OR WETNESS ON WATER SENSITIVE ECONOMIES; DESIGNATING DISASTER AREAS OF DROUGHT OR WETNESS; AND REFLECTING THE GENERAL, LONG-TERM STATUS OF WATER SUPPLIES IN AQUIFERS, RESERVOIRS, AND STREAMS.

LIMITATIONS... IS NOT GENERALLY INDICATIVE OF SHORT-TERM (FEW WEEKS) STATUS OF DROUGHT OR WETNESS SUCH AS FREQUENTLY AFFECTS CROPS AND FIELD OPERATIONS (THIS IS INDICATED BY THE CROP MOISTURE INDEX).

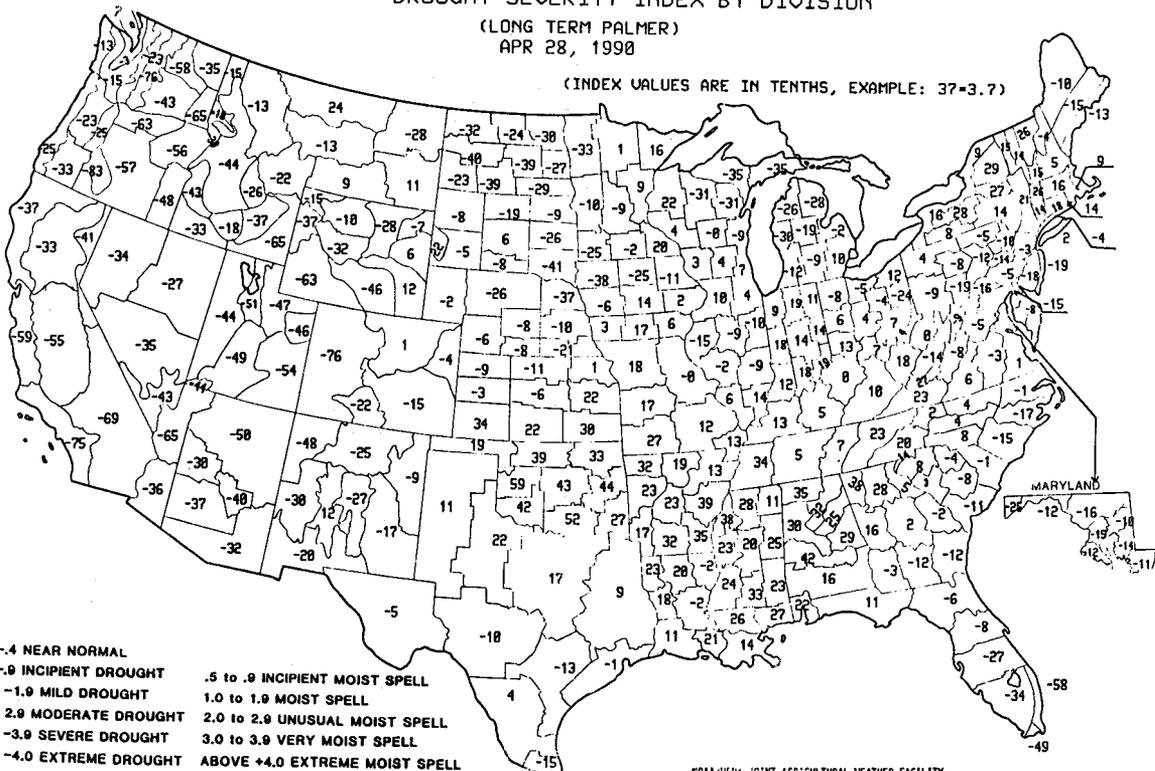
NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY

Based on preliminary reports

DROUGHT SEVERITY INDEX BY DIVISION (LONG TERM PALMER)

APR 28, 1990

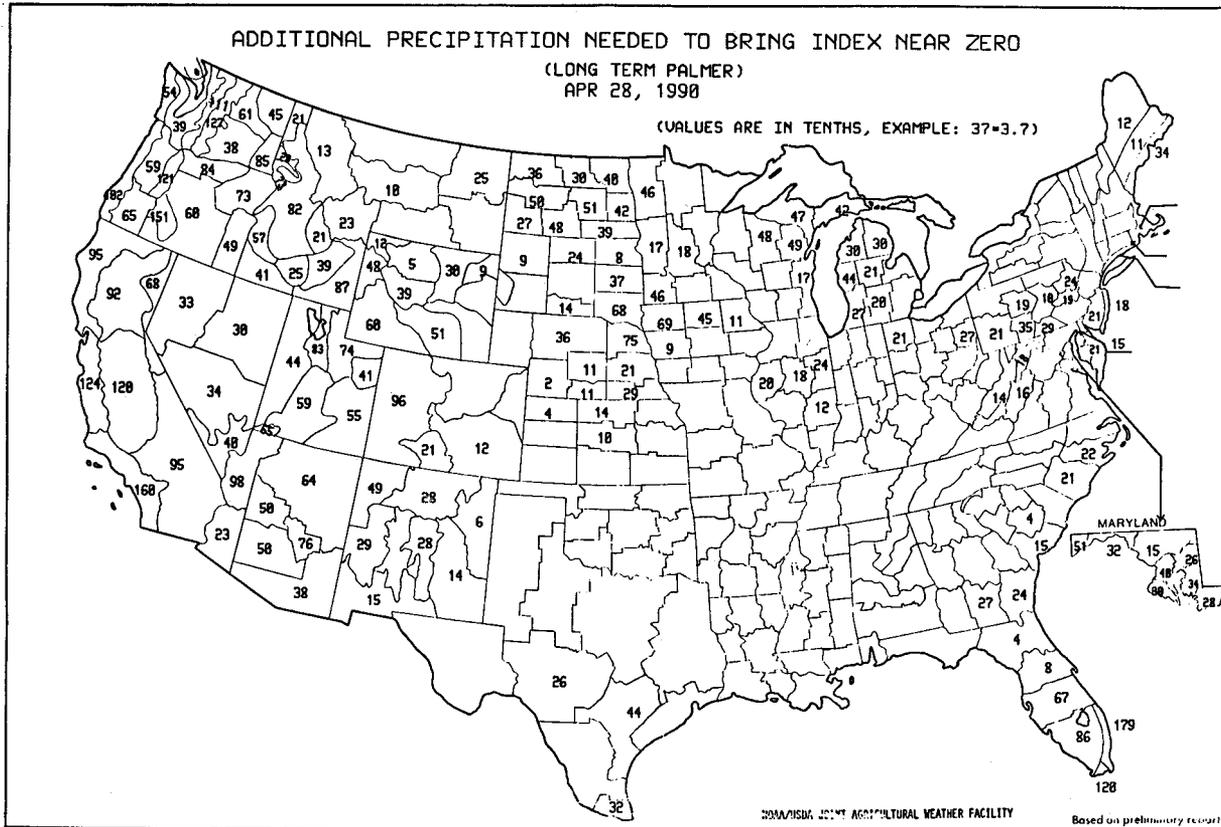
(INDEX VALUES ARE IN TENTHS, EXAMPLE: 37=3.7)



- .4 to -.4 NEAR NORMAL
- .5 to -.9 INCIPIENT DROUGHT
- 1.0 to -1.9 MILD DROUGHT
- 2.0 to 2.9 MODERATE DROUGHT
- 3.0 to -3.9 SEVERE DROUGHT
- BELOW -4.0 EXTREME DROUGHT
- .5 to .9 INCIPIENT MOIST SPELL
- 1.0 to 1.9 MOIST SPELL
- 2.0 to 2.9 UNUSUAL MOIST SPELL
- 3.0 to 3.9 VERY MOIST SPELL
- ABOVE +4.0 EXTREME MOIST SPELL

NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY

Based on preliminary reports



The Drought Severity Index (Long-Term, Palmer)

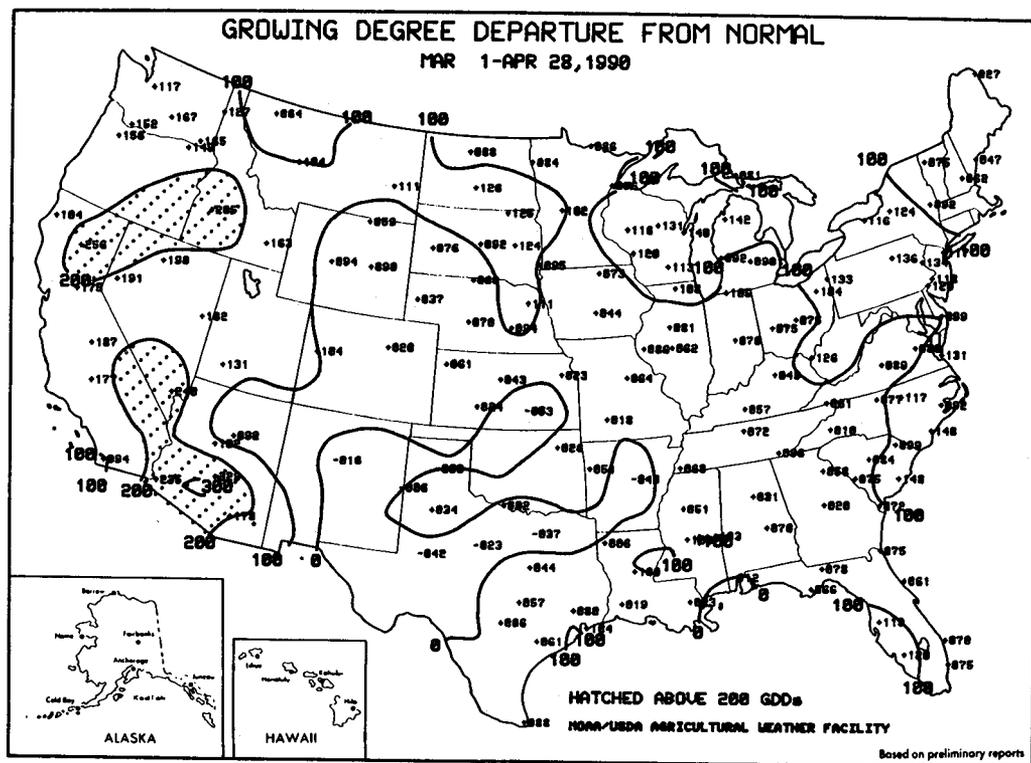
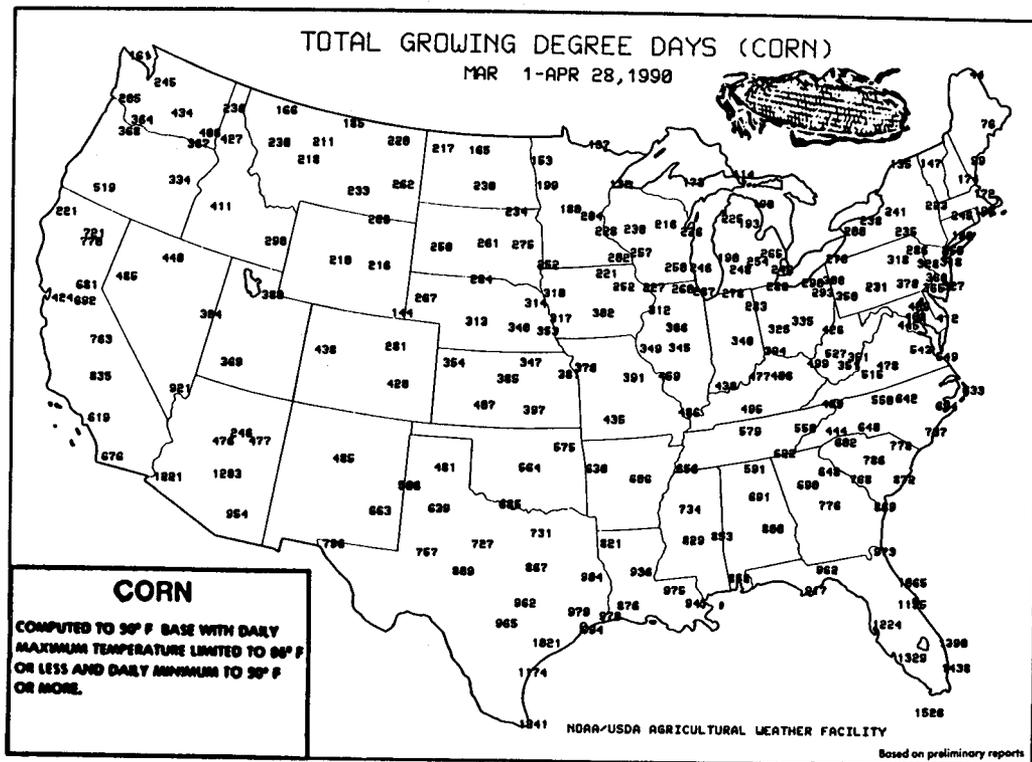
The Drought Severity, or Palmer, Index is an index of meteorological drought (or moisture excess) and indicates prolonged abnormal conditions affecting water-sensitive economies. The index ranges from about -6 to +6, with negative values denoting dry spells and positive values denoting wet spells. Categories of values are given under the accompanying map. The equations for the index were derived from monthly average data and based on the concept of a balance between moisture supply and demand (Palmer, 1965). The equations have been modified to compute the index on a weekly basis for publication in the Bulletin. Input data consist of weekly temperature averages and precipitation totals for 344 climatic divisions in the United States.

The index is a sum of the current moisture anomaly and a portion of the previous index to include the effect of the duration of the drought or wet spell. The moisture anomaly is the product of a climatic weighting factor and the moisture departure. The weighting factor allows the index to have a reasonably comparable significance for different locations and time of year. An index value for a division in Florida would have the same local implication as a similar value in a more arid division in western Kansas. The moisture departure is the difference of water supply and demand. Supply is precipitation and stored soil moisture, and demand is the potential evapotranspiration, the amount needed to recharge the soil, and runoff needed to keep the rivers, lakes, and reservoirs at a normal level. The runoff and soil recharge and loss are computed by keeping a hydrologic

accounting of moisture storage in two soil layers. The surface layer can store 1 inch, while the available capacity in the underlying layer depends on the soil characteristics of the division being measured. Potential evapotranspiration is derived from Thornthwaite's method (1948).

The index, as formulated by Palmer, is calculated from the start of a "wet" or "dry" spell and is ambiguous until a spell is established. Once a weather spell is determined (by computing a 100 percent "probability" that an opposite spell has ended) a value is assigned. For example, the first substantial rain, for an area experiencing a prolonged drought, could signify the beginning of a wet spell or might only be a brief respite in the midst of the drought. This is not necessarily determined until months (or even years) later when enough subsequent precipitation has been accumulated to end the drought according to Palmer's definition (i.e., the probability reaches 100 percent). During this time of uncertainty both an X1 term (for an incipient wet spell) and an X3 term (for an established drought) are computed. If the probability that the drought is over becomes 100 percent, then the positive X1 value is assigned to the index. If, on the other hand, the probability returns to zero, the negative X3 term is assigned and the drought continues. Conversely, a negative X2 term is computed for the opposite situation when dry weather returns to a region receiving abundant rainfall. To make the program have a real-time significance, a value is assigned

(Continued to back cover)



National Weather Data for Selected Cities

Weather Data for the Week Ending April 28, 1990

STATES AND STATIONS	TEMPERATURE °F						PRECIPITATION						RELATIVE HUMIDITY PERCENT		NUMBER OF DAYS						
	AVERAGE MAXIMUM	AVERAGE MINIMUM	EXTREME HIGH	EXTREME LOW	AVERAGE	DEPARTURE FROM NORMAL	WEEKLY TOTAL, IN.	DEPARTURE FROM NORMAL	GREATEST IN 24-HOUR, IN.	TOTAL, IN., SINCE Mar 1	PCT. NORMAL SINCE Mar 1	TOTAL, IN., SINCE Jan 1	PCT. NORMAL SINCE Jan 1	AVERAGE MAXIMUM	AVERAGE MINIMUM	90 AND ABOVE	32 AND BELOW	TEMP. °F		PRECIP.	
																		.01 INCH OR MORE	.50 INCH OR MORE	.01 INCH OR MORE	.50 INCH OR MORE
AL BIRMINGHAM	83	55	87	52	59	4	1.3	-.2	1.1	8.1	71	22.2	105	96	38	0	0	2	1		
MOBILE	81	61	84	57	71	1	2.5	1.3	2.0	16.8	146	32.2	154	99	55	0	0	2	2		
MONTGOMERY	84	57	86	55	70	3	.4	-.6	1.3	16.1	161	33.9	182	100	44	0	0	0	0		
AK ANCHORAGE	53	34	55	30	44	4	0	0	0	.7	60	3.6	126	85	41	0	2	0	0		
BARROW	19	4	31	-7	11	7	.1	0	0	.2	67	.3	44	95	80	0	7	4	0		
FAIRBANKS	49	32	52	28	40	3	.1	0	.1	.2	29	1.4	88	80	35	0	4	1	0		
JUNEAU	54	35	62	32	45	3	.1	-.6	.1	5.9	98	14.1	105	96	37	0	2	1	0		
KODIAK	53	36	61	32	44	5	.3	-.7	.2	11.9	163	21.4	118	86	53	0	1	2	0		
NOME	31	22	33	14	26	3	.4	-.2	.2	1.8	162	3.2	134	97	76	0	7	3	0		
AZ PHOENIX	88	64	98	58	76	5	.2	-.1	.2	.5	50	2.0	86	58	18	3	0	1	0		
PRESCOTT	70	42	79	37	56	4	.3	-.2	.3	1.8	78	4.3	78	63	23	0	0	2	0		
TUCSON	84	54	96	50	69	2	.1	0	.1	.5	49	2.1	89	58	15	2	0	2	0		
YUMA	92	63	101	59	77	4	0	0	0	.1	31	.2	25	42	15	3	0	0	0		
AR FORT SMITH	80	58	87	50	69	5	.8	-.2	.4	13.1	169	24.2	200	99	52	0	0	3	0		
LITTLE ROCK	78	61	84	53	70	4	2.0	-.7	1.0	16.0	165	25.6	147	89	60	0	0	5	2		
CA BAKERSFIELD	81	55	90	50	68	3	.2	0	.2	.6	41	2.3	66	84	32	1	0	1	0		
EUREKA	59	48	62	46	53	3	1.0	.5	.5	4.7	61	16.4	82	95	70	0	0	5	1		
FRESNO	80	55	89	49	67	5	.8	-.6	.8	1.6	59	5.7	87	90	35	0	0	1	1		
LOS ANGELES	68	56	73	51	62	2	.4	-.1	.4	14	4.1	51	92	59	0	0	1	0			
REDDING	78	54	87	49	66	3	.4	-.1	.3	3.7	48	13.0	58	73	27	0	0	2	0		
SACRAMENTO	80	51	89	45	66	6	.9	-.6	.5	1.7	53	9.6	94	92	31	0	0	2	0		
SAN DIEGO	68	59	70	55	64	2	.1	-.1	.1	1.0	37	4.6	73	86	60	0	0	1	0		
SAN FRANCISCO	66	50	74	48	58	2	.2	-.1	.2	1.0	24	6.3	53	93	54	0	0	2	0		
CO DENVER	68	43	80	35	55	5	.1	-.4	.1	4.0	140	5.3	132	72	28	0	0	2	0		
GRAND JUNCTION	68	46	81	40	57	2	.2	0	.1	1.7	124	2.9	112	69	24	0	0	3	0		
PUEBLO	74	40	85	31	57	3	.2	-.1	.2	1.8	110	3.0	145	82	21	0	1	1	0		
CT BRIDGEPORT	70	48	91	46	59	7	.1	-.7	.1	6.2	84	12.0	88	90	47	1	0	1	0		
HARTFORD	76	47	94	40	61	9	.7	-.2	.4	7.0	89	14.4	99	90	35	2	0	2	0		
DC WASHINGTON	85	56	93	48	71	11	0	-.7	0	5.4	88	9.7	84	91	32	2	0	0	0		
FL APALACHICOLA	79	61	84	59	70	1	0	-.7	.1	6.4	90	12.8	89	96	58	0	0	1	0		
DAYTONA BEACH	81	60	85	56	70	-1	.2	-.3	.2	3.4	67	10.4	99	97	54	0	0	2	0		
JACKSONVILLE	82	56	85	51	69	-2	.9	-.2	.6	2.9	47	8.8	69	97	46	0	0	2	1		
KEY WEST	82	72	85	68	77	-2	.9	-.5	.7	1.7	66	2.8	44	85	62	0	0	2	1		
MIAMI	82	70	83	66	76	-1	.9	-.9	.4	9.1	189	10.5	118	78	52	0	0	3	0		
ORLANDO	83	63	86	58	73	-1	.5	-.1	.3	3.7	69	8.1	76	93	45	0	0	3	0		
TALLAHASSEE	85	55	87	52	70	1	2.2	1.3	2.2	6.5	69	17.0	89	98	41	0	0	1	1		
TAMPA	85	63	87	59	74	1	.8	.4	.7	3.2	62	8.3	81	92	44	0	0	2	1		
WEST PALM BEACH	81	68	83	63	75	-1	1.2	.3	.7	4.7	85	7.3	67	82	52	0	0	3	1		
GA ATLANTA	82	59	86	57	71	6	1.3	.3	1.2	11.1	111	29.3	151	84	37	0	0	2	1		
AUGUSTA	85	51	90	48	68	2	.7	0	.7	3.1	39	8.5	53	97	33	1	0	1	1		
MACON	85	54	88	50	70	2	.8	0	.8	6.6	78	14.7	85	96	33	0	0	1	1		
SAVANNAH	82	56	88	51	69	0	.9	.2	.9	5.5	82	12.5	96	93	39	0	0	2	1		
HI HILO	82	68	85	63	75	2	2.4	-.5	.8	14.8	57	59.1	121	95	65	0	0	7	2		
HONOLULU	85	71	88	68	78	3	.4	-.2	.4	1.0	21	9.4	83	82	55	0	0	1	0		
KABULUI	86	67	88	63	77	2	.4	-.1	.4	1.5	40	12.4	116	94	56	0	0	1	0		
LIHUE	80	71	84	68	76	2	.4	-.3	.4	4.9	64	15.5	89	88	67	0	0	2	0		
ID BOISE	57	40	62	31	49	-3	1.4	1.1	.6	2.9	139	4.5	95	92	43	0	1	5	1		
LEWISTON	58	45	64	40	52	-1	1.5	1.2	.7	2.7	134	3.4	79	81	47	0	0	5	1		
POCATELLO	54	38	57	32	46	-1	1.0	.7	.3	3.7	188	4.5	115	94	47	0	0	6	0		
IL CHICAGO	81	56	87	37	69	16	.1	-.8	.1	4.9	78	9.1	101	84	39	0	0	3	0		
MOLINE	80	55	86	39	67	13	1.4	-.4	1.1	10.2	159	13.8	149	89	47	0	0	2	1		
PEORIA	78	56	85	41	67	12	1.2	-.2	.4	6.3	98	11.6	123	100	57	0	0	4	0		
QUINCY	77	57	84	43	67	10	.3	-.6	.2	4.4	66	9.3	98	91	49	0	0	3	0		
ROCKFORD	79	53	86	37	66	14	.4	-.6	.2	4.9	76	7.9	88	90	46	0	0	2	0		
SPRINGFIELD	78	57	84	40	67	10	.3	-.7	.2	4.7	69	11.1	110	97	59	0	0	2	0		
IN EVANSVILLE	82	55	87	49	69	9	1.1	-.1	1.1	5.9	70	15.8	109	93	40	0	0	1	1		
FORT WAYNE	81	53	86	42	67	14	.1	-.8	.1	5.4	86	14.5	140	88	36	0	0	1	0		
INDIANAPOLIS	80	55	85	44	68	12	.2	-.7	.2	4.5	64	11.3	93	82	38	0	0	1	0		
SOUTH BEND	81	56	87	42	68	16	.2	-.7	.2	5.5	81	11.5	103	82	34	0	0	1	0		
IA DES MOINES	75	54	85	34	64	10	2.3	1.5	1.6	9.3	180	11.6	160	91	51	0	0	3	2		
SIoux CITY	77	51	89	31	64	10	.2	-.4	.1	3.7	98	4.3	81	86	42	0	1	4	0		
WATERLOO	75	54	85	36	65	13	1.1	-.2	.8	7.2	132	8.1	112	91	54	0	0	4	1		
KS CONCORDIA	74	52	84	32	63	6	.3	-.3	.3	5.2	133	5.9	110	92	51	0	1	1	0		
DODGE CITY	75	49	83	39	62	8	3.4	2.9	1.5	5.3	171	8.1	200	96	42	0	0	5	3		
GOODLAND	74	45	85	34	60	4	.5	-.2	.5	2.4	117	3.5	128	92	29	0	0	1	1		
TOPEKA	74	45	85	35	65	6	.4	-.3	.3	4.8	94	8.3	119	93	55	0	0	3	0		
WICHITA	74	53	84	38	64	4	.3	-.3	.2	3.5	81	7.4	128	94	55	0	0	4	0		
KY BOWLING GREEN	80	55	88	49	68	7	.1	-.8	.1	5.1	54	17.5	97	96	39	0	0	1	0		
LEXINGTON	83	56	88	48	67	9	.3	-.6	.3	4.2	49	11.8	77	83	38	0	0	1	0		
LOUISVILLE	83	56	88	49	70	10	.1	-.9	.1	6.3	73	16.9	112	86	35	0	0	1	0		
LA ALEXANDRIA	83	63	85	58	73	3	.8	-.5	.6	9.1	91	26.7	139	91	45	0	0	2	1		
BATON ROUGE	84	65	89	63	75	4	1.2	-.2	1.0	8.5	87	27.8	144	95	52	0	0	2	1		
LAKE CHARLES	81	63	83	56	72	1	2.1	1.1	1.3	8.9	133	22.9	157	100	55	0	0	2	2		
NEW ORLEANS	82	64	86	61	73	2	1.5	.4	1.0	10.6	119	33.0	173	98	61	0	0	3	1		

Based on 1951-80 normals

Weather Data for the Week Ending April 28, 1990

STATES AND STATIONS	TEMPERATURE °F						PRECIPITATION						RELATIVE HUMIDITY, PERCENT		NUMBER OF DAYS						
	AVERAGE MAXIMUM	AVERAGE MINIMUM	EXTREME HIGH	EXTREME LOW	AVERAGE	DEPARTURE FROM NORMAL	WEEKLY TOTAL, IN.	DEPARTURE FROM NORMAL	GREATEST IN 24-HOUR, IN.	TOTAL, IN., SINCE Mar 1	PCT. NORMAL SINCE Mar 1	TOTAL, IN., SINCE Jan 1	PCT. NORMAL SINCE Jan 1	AVERAGE MAXIMUM	AVERAGE MINIMUM	90 AND ABOVE	32 AND BELOW	.01 INCH OR MORE		.50 INCH OR MORE	
																		90 AND ABOVE	32 AND BELOW	.01 INCH OR MORE	.50 INCH OR MORE
SHREVEPORT	83	61	86	52	72	4	1.3	.2	.9	9.2	113	26.2	168	96	49	0	0	3	1		
ME CARIBOU	60	37	86	30	49	7		.6		3.5	72	8.7	94	88	45	0	3	0	0		
PORTLAND	64	41	84	36	52	6		.9		6.2	82	11.9	80	95	54	0	0	1	0		
MD BALTIMORE	83	56	92	48	69	12		.8		5.4	79	10.6	83	83	34	2	0	0	0		
SALISBURY	83	51	94	44	67	10		.7		6.1	86	12.1	88	97	41	2	0	0	0		
MA BOSTON	66	46	92	42	56	4		.8		6.7	88	14.0	92	90	51	2	0	0	0		
CHATHAM	57	43	80	40	50	3		.9		6.9	89	16.4	101	83	61	0	0	0	0		
MI ALPENA	82	48	90	31	65	20	.3	.3	.3	5.2	121	8.7	119	88	32	1	1	1	1		
DETROIT	80	54	87	44	67	16		.7		4.6	85	11.5	128	89	44	0	0	0	0		
FLINT	82	55	87	40	68	19		.7		3.5	71	7.9	100	82	33	0	0	0	0		
GRAND RAPIDS	81	54	85	37	68	17		.8		4.2	71	8.7	92	81	34	0	0	0	0		
HOUGHTON LAKE	80	51	84	30	66	19		.6		3.0	69	5.6	79	78	33	0	1	0	0		
LANSING	81	55	85	41	68	18		.4	.2	3.6	71	7.8	97	85	36	0	0	0	0		
MARQUETTE	81	55	89	51	68	26	.3	.6	.2	4.2	67	7.9	78	79	47	0	0	2	0		
MUSKEGON	78	53	82	34	66	16		.7		4.4	81	8.5	90	84	38	0	0	0	0		
SAULT ST. MARIE	76	48	85	36	62	20	.1	.5	.1	4.1	99	8.7	108	89	43	0	0	0	0		
MN ALEXANDRIA	70	50	84	32	60	13	1.8	1.2	1.1	4.2	130	4.6	98	95	55	0	1	5	2		
DULUTH	69	46	82	35	58	15	2.7	2.1	.8	6.3	167	7.3	126	96	58	0	0	6	3		
INT'L FALLS	68	45	85	32	56	13	.7	.3	.4	2.5	97	3.6	89	95	55	0	1	5	0		
MINNEAPOLIS	74	56	86	40	65	14	2.7	2.2	1.2	7.0	196	7.8	151	91	51	0	0	6	2		
ROCHESTER	74	55	82	38	64	15	5.3	4.6	3.9	9.9	242	11.2	200	92	55	0	0	5	2		
MS GREENWOOD	82	62	86	57	72	5	2.1	.9	2.0	9.5	84	23.2	110	95	50	0	0	3	1		
JACKSON	82	60	88	56	71	4	2.2	.9	2.1	7.2	66	27.7	138	100	54	0	0	3	1		
MERIDIAN	83	59	86	53	71	4	1.0	.2	.5	11.6	98	38.7	182	98	50	0	0	2	1		
MO CAPE GIRARDEAU	79	59	85	49	69		1.7	.6	1.1	7.6	82	20.8	138	94	51	0	0	2	2		
COLUMBIA	78	57	85	44	68	9	.6	.4	.6	10.1	145	15.9	150	92	46	0	0	1	1		
KANSAS CITY	76	56	86	36	66	6	1.8	.9	.9	6.4	111	9.7	119	90	52	0	0	3	2		
SAINT LOUIS	81	61	90	50	71	12	.8	.1	.5	5.7	87	10.7	103	87	41	1	0	3	1		
SPRINGFIELD	78	56	84	44	67	8	.6	.4	.4	10.3	143	21.2	194	94	46	0	0	3	0		
MT BILLINGS	59	41	73	24	50	2	.9	.4	.7	3.7	132	4.5	101	87	43	0	2	4	1		
GLASGOW	57	41	77	27	49	1	.6	.3	.3	.9	98	1.4	84	91	51	0	2	4	0		
GREAT FALLS	57	37	69	24	47	1	.5	.1	.4	2.5	110	3.0	75	89	38	0	2	4	0		
HAVRE	58	39	73	27	48	1		.3		.8	52	.9	33	90	46	0	1	1	0		
HELENA	56	37	64	26	46	0	.3	0	.1	1.3	83	2.0	72	87	37	0	2	5	0		
KALISPELL	52	37	63	26	45	-1	1.1	.8	.8	2.6	142	5.2	117	92	50	0	1	6	1		
MILES CITY	60	44	79	29	52	3	2.2	1.8	1.2	2.5	134	2.6	86	87	46	0	1	5	2		
MISSOULA	52	38	63	30	45	-2	.4	.1	.1	2.1	122	3.3	84	92	51	0	1	7	0		
NE GRAND ISLAND	77	50	90	29	64	9	.1	.6	.1	3.5	88	4.3	82	90	42	1	1	2	0		
LINCOLN	77	54	89	33	65	10	.2	.6	.2	3.5	77	4.2	68	87	41	0	0	2	0		
NORFOLK	77	53	92	29	65	12	.1	.5	.1	3.0	86	4.2	87	87	37	1	2	2	0		
NORTH PLATTE	75	45	88	28	60	9	1.3	.8	.6	3.3	118	3.7	101	89	31	0	1	3	1		
OMAHA	76	54	85	30	65	9		.8	.6	3.6	78	4.6	75	83	49	0	1	0	0		
SCOTTSBLUFF	65	39	77	32	52	2	.2	.2	.2	4.3	191	5.7	183	91	39	0	1	3	0		
VALENTINE	71	44	93	27	58	8	1.2	.7	.5	2.5	99	3.0	92	88	38	1	2	4	2		
NV RLY	60	34	71	24	47	3	.5	.3	.3	2.0	112	3.9	123	83	31	0	3	3	0		
LAS VEGAS	84	60	94	55	72	6		.0	.2	3.1	1.7	115	46	17	3	0	0	0	0		
RENO	69	40	79	35	54	5		.1	.4	3.6	3.0	91	75	23	0	0	1	2	0		
WINNEMUCCA	63	39	72	28	51	3	.4	.2	.2	2.0	142	2.9	99	83	33	0	1	2	0		
NH CONCORD	73	42	92	31	58	10		.7	.4	4.3	74	9.7	88	99	37	1	1	1	0		
NJ ATLANTIC CITY	77	49	87	44	63	9		.7	.4	5.7	81	9.4	68	94	45	0	0	0	0		
NM ALBUQUERQUE	72	45	81	35	59	1	.9	.8	.9	2.1	254	2.8	175	66	21	0	0	3	1		
CLOVIS	76	49	85	44	63	3	.4	.1	.4	1.4	110	3.6	166	79	26	0	0	1	0		
ROSWELL	82	53	92	47	68	4		.1	.0	1.6	222	2.3	146	61	17	1	0	0	0		
NY ALBANY	78	46	92	36	62	12	.1	.6	.1	7.5	132	15.3	149	91	33	0	0	2	0		
BINGHAMTON	78	51	88	39	65	16	.3	.4	.3	4.8	84	11.4	108	81	33	0	0	1	0		
BUFFALO	75	53	94	39	64	15	.4	.3	.4	6.7	116	15.3	137	81	42	0	0	1	0		
NEW YORK	75	52	89	48	63	8	.1	.7	.1	6.8	90	12.5	91	88	42	0	0	1	0		
ROCHESTER	80	52	93	37	66	16	.1	.5	.1	5.2	105	10.8	112	84	35	1	0	1	0		
SYRACUSE	80	49	92	36	65	15	.5	.3	.5	7.8	126	13.9	122	93	35	1	0	1	1		
NC ASHEVILLE	77	50	82	46	63	5	1.4	.6	.9	7.9	98	19.2	133	96	38	0	0	2	1		
CHARLOTTE	83	58	90	53	70	7	.8	.1	.8	5.5	70	15.0	98	81	34	1	0	1	1		
GREENSBORO	84	55	91	45	69	8	.2	.5	.2	5.3	78	13.4	98	86	33	0	0	1	0		
HATTERAS	80	59	89	45	69	7		.0	.0	9.1	131	17.9	113	95	46	0	0	0	0		
NEW BERN	86	57	95	46	72	7		.7	.0	8.3	131	13.7	96	86	31	0	0	0	0		
RALEIGH	86	56	93	47	71	9		.7	.0	6.7	105	13.6	102	90	33	0	0	0	0		
WILMINGTON	86	56	94	47	71	5		.7	.0	6.9	101	11.5	83	92	36	0	0	0	0		
ND BISMARCK	65	41	89	21	53	6	.1	.4	.1	.9	42	1.4	45	84	43	0	2	1	0		
FARGO	68	47	91	29	57	10	1.2	.7	.6	3.1	122	3.7	106	82	47	1	2	5	0		
GRAND FORKS	65	42	90	26	54	8	1.4	1.0	.6	3.9	197	4.3	134	84	50	1	3	6	1		
WILLISTON	61	39	84	24	50	3	.3	0	.2	1.0	60	1.4	54	88	42	0	2	2	0		
OR AKRON-CANTON	81	52	87	34	66	14		.8	.0	6.4	101	13.6	123	78	31	0	0	0	0		
CINCINNATI	82	54	86	45	68	11	.2	.6	.2	6.0	82	14.4	110	77	33	0	0	1	0		
CLEVELAND	81	51	87	35	66	14		.8	.0	5.4	90	12.5	117	84	34	0	0	0	0		
COLUMBUS	82	49	88	36	65	10	.2	.6	.2	4.2	65	11.7	104	96	33	0	0	1	0		

Based on 1951-80 normals

Weather Data for the Week Ending April 28, 1990

STATES AND STATIONS	TEMPERATURE °F						PRECIPITATION								RELATIVE HUMIDITY PERCENT		NUMBER OF DAYS					
	AVERAGE MAXIMUM	AVERAGE MINIMUM	EXTREME HIGH	EXTREME LOW	AVERAGE	DEPARTURE FROM NORMAL	WEEKLY TOTAL, IN.	DEPARTURE FROM NORMAL	GREATEST IN 24-HOUR, IN.	TOTAL, IN., SINCE Mar 1	PCT. NORMAL SINCE Mar 1	TOTAL, IN., SINCE Jan 1	PCT. NORMAL SINCE Jan 1	AVERAGE MAXIMUM	AVERAGE MINIMUM	90 AND ABOVE	32 AND BELOW	TEMP. °F		PRECIP.		
																		.01 INCH OR MORE	.50 INCH OR MORE	.01 INCH OR MORE	.50 INCH OR MORE	
DAYTON	80	53	85	42	67	12	.2	-.6	.2	6.7	107	14.7	135	80	34	0	0	1	0	0	0	
TOLEDO	83	51	88	38	67	15	0	-.7	0	5.5	101	13.0	142	90	30	0	0	0	0	0	0	
YOUNGSTOWN	82	51	88	33	67	15	0	-.8	0	4.3	66	10.9	96	79	28	0	0	0	0	0	0	
OK OKLAHOMA CITY	75	58	83	47	66	3	1.4	.6	.5	10.1	214	16.5	238	92	60	0	0	5	5	0	0	
TULSA	75	59	85	47	67	3	1.4	.4	.8	11.8	170	18.9	188	93	62	0	0	4	4	1	1	
OR ASTORIA	54	45	56	42	49	0	3.6	2.7	.9	9.5	81	37.5	124	94	68	0	0	7	7	4	4	
BURNS	56	32	61	22	44	-.2	T	-.1	T	.8	51	1.9	46	90	36	0	3	3	0	0	0	
MDFORD	63	45	69	38	54	-.1	T	-.2	T	2.3	82	6.3	76	88	46	0	0	1	1	0	0	
PENDLETON	57	42	62	36	50	-.3	1.4	1.2	.7	2.6	136	3.7	77	77	41	0	0	0	0	1	1	
PORTLAND	57	44	60	40	50	-.2	2.0	1.5	.7	4.8	84	16.2	103	93	63	0	0	6	6	1	1	
SALEM	58	43	62	38	50	0	1.5	1.0	.7	4.1	62	17.8	98	93	61	0	0	5	5	1	1	
PA ALLENTOWN	82	51	92	43	67	13	.1	-.8	.1	3.7	50	10.7	77	86	33	3	3	1	1	0	0	
ERIE	76	56	89	34	66	17	0	-.8	0	4.6	75	12.6	118	72	38	0	0	0	0	0	0	
HARRISBURG	83	53	91	40	68	12	.1	-.7	.1	4.0	62	11.0	90	87	32	2	2	1	1	0	0	
PHILADELPHIA	81	52	92	46	67	10	T	-.8	T	5.6	78	11.1	85	89	37	3	3	0	0	1	1	
PITTSBURGH	83	52	89	38	68	14	.1	-.7	.1	4.9	74	11.5	97	81	26	0	0	1	1	0	0	
SCRANTON	80	51	91	43	66	14	.1	-.6	.1	4.3	80	10.9	112	82	30	1	1	0	0	1	1	
RI PROVIDENCE	71	45	89	41	58	4	T	-.9	T	7.1	89	15.0	95	95	43	0	0	2	2	0	0	
SC CHARLESTON	83	58	90	52	71	4	0	-.6	0	7.5	111	13.2	98	93	37	1	1	0	0	0	0	
COLUMBIA	86	54	93	49	70	4	1.0	.2	1.0	3.5	41	8.5	51	90	30	3	3	0	0	1	1	
FLORENCE	86	55	93	49	70	4	.9	.2	.9	3.9	56	6.7	49	88	30	2	2	0	0	1	1	
GREENVILLE	81	53	88	50	67	4	1.2	.3	1.2	8.9	88	19.2	103	91	37	0	0	1	1	1	1	
SD ABERDEEN	66	45	90	25	55	6	1.1	.6	.5	2.1	77	2.7	69	90	53	1	2	5	5	0	0	
HURON	69	48	92	26	59	9	1.6	1.1	1.0	3.0	98	3.6	86	88	51	1	2	5	5	1	1	
RAPID CITY	61	39	85	27	50	1	.6	.1	.3	1.9	70	2.5	67	88	49	0	2	4	4	0	0	
SIOUX FALLS	72	50	89	29	61	10	.9	.3	.4	2.7	74	3.1	61	86	47	0	2	7	7	0	0	
TN CHATTANOOGA	82	54	87	52	68	5	1.2	.2	1.2	12.3	116	29.5	144	98	33	0	0	1	1	1	1	
KNOXVILLE	83	54	87	50	68	6	1.5	-.3	.5	8.3	92	21.1	118	95	34	0	0	1	1	0	0	
MEMPHIS	83	62	88	54	73	7	1.4	-.1	.8	10.5	98	23.5	119	92	43	0	0	2	2	2	2	
NASHVILLE	84	56	87	52	70	7	.3	-.7	.3	4.8	50	12.3	68	85	34	0	0	1	1	0	0	
TX ABILENE	78	57	85	50	67	-1	2.3	1.6	1.0	6.9	214	11.2	216	92	51	0	0	4	4	2	2	
AMARILLO	76	49	83	44	63	3	.6	.3	.3	3.7	206	6.5	230	90	30	0	0	2	2	0	0	
AUSTIN	83	65	90	55	74	3	2.4	1.5	2.2	5.2	115	10.1	118	96	52	1	0	3	3	1	1	
BEADWONT	82	65	85	55	74	2	3.5	2.4	3.4	10.7	155	26.9	176	95	57	0	0	2	2	1	1	
BROWNSVILLE	88	70	91	62	79	2	.2	-.3	.2	2.4	124	3.5	75	93	57	1	0	3	3	1	1	
CORPUS CHRISTI	84	69	88	66	76	1	2.1	1.6	2.0	6.4	259	10.7	194	100	68	0	0	3	3	1	1	
DEL RIO	84	64	90	59	74	0	3.0	2.5	3.0	8.0	345	9.9	265	80	41	1	0	1	1	1	1	
EL PASO	82	56	92	46	69	2	T	0	T	.7	143	1.1	86	55	16	1	0	0	0	0	0	
FORT WORTH	80	61	84	51	70	2	3.0	1.9	2.9	12.8	209	22.0	228	95	58	0	0	2	2	1	1	
GALVESTON	79	68	80	63	74	2	2.0	1.4	2.0	7.2	159	14.4	146	95	68	0	0	2	2	1	1	
HOUSTON	83	65	85	54	74	2	3.8	2.9	3.5	11.3	186	19.8	154	94	55	0	0	4	4	1	1	
LUBBOCK	81	56	89	48	68	5	.2	-.2	.1	2.3	127	4.8	176	83	25	0	0	2	2	0	0	
MIDLAND	83	57	93	51	70	3	.2	-.1	.2	2.9	240	4.2	194	87	23	1	0	2	2	0	0	
SAN ANGELO	81	57	89	47	69	0	1.7	1.2	1.0	5.0	212	8.2	216	91	42	0	0	3	3	2	2	
SAN ANTONIO	82	64	86	53	73	2	3.7	3.0	3.6	9.7	254	13.6	189	97	56	0	0	4	4	1	1	
VICTORIA	83	66	86	58	74	1	2.7	1.9	2.6	6.6	179	10.4	134	97	62	0	0	2	2	1	1	
WACO	82	62	88	53	72	3	2.2	1.2	2.2	8.2	150	13.7	150	95	56	0	0	2	2	1	1	
WICHITA FALLS	77	59	85	50	68	1	1.6	.8	1.1	12.5	276	19.3	301	95	56	0	0	4	4	1	1	
UT CEDAR CITY	63	39	75	36	51	1	.8	.6	.7	2.6	129	5.4	157	77	34	0	0	3	3	1	1	
SALT LAKE CITY	63	43	69	32	53	1	.5	-.1	.2	3.3	88	4.2	66	80	36	0	1	4	4	0	0	
VT BURLINGTON	73	45	90	32	59	12	.2	-.5	.2	4.8	101	10.0	120	93	37	2	1	1	0	0	0	
VA NORFOLK	83	58	91	47	71	9	0	-.7	0	6.0	93	12.2	91	90	37	1	0	0	0	0	0	
RICHMOND	87	56	96	45	71	10	T	-.7	T	4.9	78	10.1	80	93	31	2	0	0	0	0	0	
ROANOKE	84	53	90	44	69	9	.4	-.4	.4	5.4	82	10.5	83	89	30	2	0	1	1	0	0	
WA QUILLAYUTE	52	43	57	38	48	1	3.3	1.8	1.1	14.2	75	47.2	104	98	70	0	0	7	7	2	2	
SEATTLE-TACOMA	54	44	59	41	49	-2	1.6	1.1	.5	5.1	86	18.3	114	96	67	0	0	6	6	0	0	
SPOKANE	53	38	58	32	45	-3	.8	.6	.3	2.2	94	5.7	89	94	50	0	1	6	6	0	0	
YAKIMA	60	40	65	32	50	-2	.1	0	.1	.4	38	2.0	63	80	35	0	1	3	3	0	0	
WV BECKLEY	78	52	84	46	65	10	-.1	-.6	.1	5.6	78	13.3	96	77	28	0	0	1	1	0	0	
CHARLESTON	85	53	94	44	69	10	.3	-.5	.3	4.8	67	11.4	83	89	27	2	0	1	1	0	0	
HUNTINGTON	84	54	91	48	69	10	.4	-.4	.4	5.6	77	12.2	91	88	29	1	0	1	1	0	0	
PARKERSBURG	84	50	90	42	67	10	T	-.7	T	4.7	71	11.2	92	91	33	1	0	1	1	0	0	
WI GREEN BAY	81	55	88	43	68	20	.2	-.5	.1	4.5	104	5.7	88	89	40	0	0	2	2	0	0	
LACROSSE	78	59	86	45	69	17	1.6	.8	.5	5.4	116	6.9	106	88	46	0	0	4	4	1	1	
MADISON	79	54	85	38	67	16	.5	-.3	.2	6.1	122	8.7	122	88	47	0	0	3	3	0	0	
MILWAUKEE	79	58	87	47	68	20	T	-.8	T	5.4	94	9.8	114	76	39	0	0	0	0	0	0	
WAUSAU	79	56	85	47	68	20	1.4	.6	.5	4.4	96	5.9	92	88	38	0	0	5	5	0	0	
WY CASPER	60	35	70	21	47	2	.5	-.1	.2	2.4	103	3.4	101	85	36	0	2	5	5	0	0	
CHEYENNE	59	36	74	31	48	3	.9	-.6	.6	5.2	251	6.3	220	92	41	0	3	4	4	1	1	
LANDER	59	36	68	26	47	2	.9	-.3	.9	3.4	109	3.5	83	85	31	0	3	3	3	3	1	1
SHERIDAN	57	36	74	24	46	0	.7	-.2	.4	2.6	89	4.0	90	89	49	0	2	2	2	2	0	0

Based on 1951-80 normals

National Agricultural Summary

April 23-29, 1990

HIGHLIGHTS: Rain improved winter wheat prospects in the northern Great Plains and Pacific Northwest, but additional moisture was needed. Soil moisture remained mostly short to adequate in the northern Great Plains but was adequate or adequate to surplus in the central and southern Great Plains. Rain continued to slow fieldwork in Arkansas, Missouri, and portions of Texas. Early in the week, fieldwork advanced rapidly in portions of the Delta and Southeast. Rain slowed fieldwork in the Delta late in the week. Soil moisture was generally adequate or adequate to surplus in the Delta and the East except in Georgia, Florida, and South Carolina, where it was short to adequate. In the West, soil moisture was mostly adequate to short.

Winter wheat was mostly good to fair with 15 percent (%) of the acreage headed, equal to the 5-year average. Spring wheat seeding was 54% complete, 9 percentage points ahead of the average. Corn planting was 21% complete, 6 points behind normal. Cotton planting was 31% complete, 1 point behind normal.

CORN: Corn planting was 21% complete, 5 points behind normal. Planting was underway in all 17 major producing States. Planting lagged more than 15 points behind normal in Illinois, Kentucky, and Missouri. In Missouri, planting was 24% complete, 32 points behind normal. North Carolina producers planted one-fourth of their crop during the week. Planting was nearly complete in Georgia.

COTTON: Cotton planting was 31% complete, 1 point behind normal. Louisiana producers planted over one-half of their crop, advancing 53 points during the week. Louisiana's planting progress was 19 points ahead of the 36% average. Planting also advanced rapidly in Alabama, California, Mississippi, and the Carolinas. Dry soil conditions slowed planting in Georgia. Rain and wet field conditions slowed planting in Arkansas, Missouri, and Texas.

OTHER FIELD CROPS: Sorghum planting was 18% complete, 2 points behind normal. Planting lagged 34 points behind the 45% average in Arkansas. Louisiana producers planted nearly one-third of their crop during the week. Rice seeding was 28% complete, 24 points behind normal. Seeding lagged 38 and 52 points behind normal in Arkansas and Mississippi, respectively. Peanut planting continued in Alabama, Florida, and Georgia and was underway in Texas. Tobacco was good to fair in Kentucky. Tobacco transplanting was underway in Tennessee. Tobacco was good to fair in Georgia and North Carolina. Soybean planting was underway in portions of the Corn Belt and continued in the Delta and Southeast.

FRUIT AND NUTS: Rain was needed in Florida's citrus producing areas. Moisture stress was evident in nonirrigated groves. Valencia orange harvest was active and grapefruit harvest was virtually complete. Peach harvest was underway in southern

Alabama and Georgia. Peaches were fair in South Carolina. Early variety peach harvest continued in eastern and southern Texas. Pecan sets were good. Grapefruit and Valencia orange harvests continued in central and western Arizona. Lemon harvest was active in southern California and nearly complete in the Central Valley. Almonds continued to size. Valencia orange harvest continued. In Oregon, fruit tree bloom was complete. Fruit trees were in good condition in Idaho.

SMALL GRAIN: Winter wheat was mostly good to fair. Fifteen percent of the acreage was headed, equal to the average. Rain improved crop condition in the northern Great Plains and portions of the Pacific Northwest. Winter wheat was mostly good in Colorado and Montana, good to fair in Nebraska, and fair to good in South Dakota. Russian wheat aphids were still a problem in western Nebraska. Winter wheat condition improved in portions of the Pacific Northwest, but more rain was needed, especially in eastern Oregon and Washington. Crop condition was good in Idaho. Winter wheat was good to excellent in Kansas and good in Oklahoma. Winter wheat was fair to good in Texas. Fields were beginning to head in the Plains. High winds and heavy rains caused some lodging in the Cross Timbers area. Winter wheat was good to fair in the Corn Belt. Lack of moisture stressed winter wheat in Georgia, where crop condition was fair to good. Crop condition was good to fair in North Carolina.

Spring wheat seeding was 54% complete, 9 points ahead of normal. Seeding was 95% complete, 32 points ahead of normal in South Dakota. In North Dakota, seeding was 37% complete, 1 point ahead of normal. Minnesota producers seeded nearly one-third of their crop during the week.

VEGETABLES: Warm days and mild nights with limited rainfall prevailed over Florida's major vegetable producing areas. Spring vegetable harvests were active. Sweet corn harvest began in the Zellwood area. Onion harvest was 42% complete in Georgia. Crop condition was excellent. Watermelons were fair to good in Georgia and South Carolina. Irish potatoes were fair to good in North Carolina. Carrot and onion harvests continued in the Rio Grande Valley, Texas. Some melon harvest was underway. Cabbage harvest was nearly complete in the San Antonio-Winter Garden area. Artichoke and cabbage harvests continued in western Arizona. Asparagus, broccoli, and cauliflower harvests were active in California. Desert melons were blooming and setting fruit. Potato and onion planting was complete in Malheur County, Oregon. In Idaho, potato planting was 41% complete, 18 points ahead of normal. Onion and potato planting was active in Colorado.

PASTURES AND LIVESTOCK: Pastures were good to fair in the East and fair to good in most of the West. In North Dakota, pastures were poor to fair and stockwater supplies were short to adequate. Drought conditions continued to stress ranges and pastures in California. Stockwater supplies were short in most areas.

Crop Progress

FOR WEEK ENDING APRIL 29, 1990

**GRAIN SORGHUM
% PLANTED**

	1990	1989	AVG.
ARK	11	49	45
COLO	0	0	0
ILL	0	1	2
KANS	0	0	0
LA	63	47	48
MISS	28	40	39
MO	3	10	9
NEBR	0	1	0
N MEX	10	NA	NA
OKLA	1	7	3
S DAK	0	0	0
TEX	57	60	60

12 STATES	18	NA	NA
EXCL. STATES WITH NA	18	21	20

THESE 12 STATES PRODUCED 98% OF THE 1989 GRAIN SORGHUM CROP.

NA - NOT AVAILABLE.

**CORN
% PLANTED**

	1990	1989	AVG.
COLO	25	28	37
GA	95	95	96
ILL	21	38	40
IND	16	12	26
IOWA	20	17	22
KANS	35	45	30
KY	20	28	38
MICH	5	5	5
MINN	19	7	14
MO	24	60	56
NEBR	15	26	22
N C	76	38	67
OHIO	28	5	26
PA	8	6	11
S DAK	2	0	0
TEX	84	90	90
WIS	5	3	4

17 STATES	21	23	27
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THESE 17 STATES PRODUCED 95% OF THE 1989 CORN CROP.

**COTTON
% PLANTED**

	1990	1989	AVG.
ALA	63	71	57
ARIZ	92	88	85
ARK	9	22	18
CALIF	90	90	88
GA	14	20	27
LA	55	34	36
MISS	31	39	32
MO	6	10	15
N MEX	45	90	67
N C	28	8	31
OKLA	0	3	3
S C	25	6	35
TENN	5	14	24
TEX	16	16	17

14 STATES	31	32	32
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THESE 14 STATES PRODUCED 99% OF THE 1989 COTTON CROP.

**RICE
% PLANTED**

	1990	1989	AVG.
ARK	9	54	47
CALIF	5	10	7
LA	67	62	69
MISS	15	59	67
TEX	72	89	87

5 STATES	28	54	52
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THESE 5 STATES PRODUCED 97% OF THE 1989 RICE CROP.

**SPRING WHEAT
% PLANTED**

	1990	1989	AVG.
IDAHO	87	64	69
MINN	65	31	50
MONT	52	25	46
N DAK	37	14	36
S DAK	95	54	63

5 STATES	54	26	45
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THESE 5 STATES PRODUCED 89% OF THE 1989 SPRING WHEAT CROP.

**WINTER WHEAT
% HEADED**

	1990	1989	AVG.
ARK	64	58	64
CALIF	90	90	88
COLO	0	0	0
GA	97	98	90
IDAHO	0	0	0
ILL	2	1	3
IND	0	0	0
KANS	2	5	0
MICH	0	0	0
MO	3	2	9
MONT	0	0	0
NEBR	0	0	0
N C	72	52	NA
OHIO	0	0	0
OKLA	25	50	30
OREG	0	0	0
S DAK	0	0	0
TEX	48	41	45
WASH	0	0	0

19 STATES	16	19	NA
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EXCL. STATES WITH NA	15	19	15
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THESE 19 STATES PRODUCED 88% OF THE 1989 WINTER WHEAT CROP.

NA - NOT AVAILABLE.

**Crop Condition
PERCENT**

FOR WEEK ENDING APRIL 29, 1990

STATE	WINTER WHEAT				
	VP	P	F	G	EX
ARK	0	9	46	45	0
CALIF	0	0	10	80	10
COLO	0	3	17	64	16
GA	1	15	53	29	2
IDAHO	0	2	11	66	21
ILL	0	3	19	71	7
IND	1	3	27	58	11
KANS	0	0	11	61	28
MICH	1	4	15	50	30
MO	1	4	47	46	2
MONT	1	2	15	61	21
NEB	0	1	29	64	6
N C	0	0	21	77	2
OHIO	0	3	22	60	15
OKLA	0	0	5	92	3
OREG	0	15	59	24	2
S DAK	1	9	42	43	5
TEX	1	12	34	48	5
WASH	0	0	30	65	5

19 STATE	0	3	21	63	13
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PREV WEEK	0	4	28	56	12
PREV YEAR	21	24	32	20	3

VP - VERY POOR P - POOR F - FAIR
G - GOOD EX - EXCELLENT

State Summaries of Weather and Agriculture

These summaries provide brief descriptions of crop and weather conditions important on a national scale. More detailed data are available in Weather and Crop Bulletins published each Monday by NASS State Statistical Offices in cooperation with the National Weather Service.

ALABAMA: Rainfall 0.50 to 1.00 in.; near 2.00 in. isolated areas. Temperatures 3 to 6° above normal north; 1 to 3° above normal elsewhere.

Days suitable for fieldwork 5.8. Soil moisture 14% short, 80% adequate, 6% surplus. Acreage intended for spring planting 80% prepared, 80% 1989, 86% avg. Fieldwork progress 36% behind normal, 64% on schedule. Mostly dry conditions allowed favorable progress all field activities; weekend rains helped germinate seeds, activate herbicides. Corn 89% planted, 81% 1989, 85% avg. Sorghum 37% planted, 29% 1989, 21% avg. Cotton 63% planted, 71% 1989, 57% avg. Peanuts 35% planted, 34% 1989, 32% avg. Soybeans 8% planted, 7% 1989, 4% avg. Winter wheat 81% headed, 77% 1989, 73% avg.; 27% turning color, 28% 1989, 16% avg.; 1% poor, 30% fair, 65% good, 4% excellent; disease pressure severe few southern counties. Peach harvest underway extreme south. Pastures 2% poor, 38% fair, 57% good, 3% excellent. Livestock 29% fair, 71% good. Primary activities: Planting row crops, vegetables; applying fertilizer, lime, herbicides to cropland; applying fungicides to wheat; spraying, thinning peaches; monitoring fish ponds; general care of livestock, poultry.

ARIZONA: Low pressure system brought cool, gusty winds 22nd, 23rd, 24th; widespread rains 24th; clearing 25th; warmer 26th, 27th. Temperatures normal to 5° above normal. Extremes 52°; 100° deserts: 30°; 93° higher elevations. Precipitation none southwest, 1.08 in. north central.

Cotton planted 92%, 88% 1989, 85% avg.; 65% good, 23% fair, 12% excellent. Wheat, barley headed 97%, 98% 1989, 95% avg.; turning color 55%, 39% 1989, 34% avg.; 69% good, 31% excellent. Alfalfa hay harvest active; 82% good, 18% excellent. Artichoke, cabbage harvests continued west. Red potatoes harvested Tolleson; spring lettuce harvested Aguila, Picacho Eloy. Valencia orange, grapefruit harvests continued central, west.

ARKANSAS: Temperatures above normal. Scattered showers statewide last half of week. Extremes 45°; 93°. Rainfall 0.31 to 3.74 in.

Days suitable for fieldwork 3.0. Soil moisture 27% adequate, 73% surplus. Main activities: Limited seedbed preparation, planting spring crops; pasture fertilization, weed control; bermuda sprigging; scouting wheat diseases, applying fungicides; repairing machinery, fences; vaccinating, worming livestock. Corn 67% planted, 91% 1989, 85% avg.; 2% very poor, 5% poor, 50% fair, 43% good. Oats 48% headed, 62% 1989, 59% avg.; 9% very poor, 22% poor, 35% fair, 34% good. Seedbed preparation, planting progressing as soil, weather conditions allow. Wheat diseases increasing; fungicide application. Tomatoes blooming. Transplanting bell peppers, watermelons. Pasture growth improved. Livestock good. Insect numbers increasing.

CALIFORNIA: Low pressure system produced shower activity over much of the State 23rd, 24th. High pressure warmed temperatures as the week progressed. Precipitation central, northern areas early delayed field activities one or two days.

Small grains good progress. Most headed except late, high elevation fields. Cotton seeding

active, approached completion. Crusting from rain may require some replanting. Earlier fields fertilized, thinned. Rice seeding increased. Flooding, applying controls shrimp, weevils, water grasses active. Overwintered sugarbeets harvested. Seeding corn, dry beans, sudan grass. Harvest active green chop, grain hay, alfalfa hay. Sheep grazed alfalfa seed fields. Thinning, irrigation, pesticide application active. Almonds continued size. Avocado harvest steady new crop blooming. Sulphur applied to grapes. Southern State lemon harvest active. Central Valley lemon picking near completion. Kiwifruit approaching bloom. Navel orange packing winding down. Valencia orange harvest continued. Stone fruits treated for brown rot, mildew, codling moth. Asparagus harvest active. Broccoli continued heavy supply, generally good quality. Cauliflower heavy supply, variable quality. Iceberg head lettuce moderate supply, generally good quality. Desert melons blooming, setting fruit. Strawberries moderate supply, good size, quality. Livestock fair to good statewide. Range, pasture conditions continued to deteriorate due to drought stress. Rainfall earlier in week leached nutrients from already dry grasses. Stockwater, feed short most areas. Supplemental feeding continued. Livestock movement to summer pastures active.

COLORADO: Considerable moisture fell over the State, bringing much needed moisture to all of Colorado's river basins. Precipitation a trace to 0.84 in. Temperatures 2 to 5° above normal except the San Luis Valley had normal temperatures, eastern area 5 to 7° above normal.

Days suitable for fieldwork 4.7. Soil moisture 6% very short, 30% short, 63% adequate, 1% surplus. Spring barley 78% planted, 52% emerged. Oats 71% seeded, 42% emerged. Spring wheat 48% planted; 24% emerged. Corn 25% planted. Dry onions 82% planted. Summer potatoes 54% planted; 13% emerged. Fall potatoes 6% planted. Sugarbeets 90% planted. Winter wheat 48% jointed; mostly good. Cows calved 89%. Ewes lambled 92%. Range, pasture fair to good condition.

FLORIDA: Temperatures 1 to 2° above normal. Extreme highs upper 80s north to mid 90s interior Peninsula. Coolest lows, low to mid 50s north; upper 50s into interior of Peninsula; mid 60s southeast coast. Rain over entire State with mostly 1.00 to 2.00 in. amounts Panhandle, Big Bend. Elsewhere, mostly under 0.50 in., local areas 1.00 to 2.00 in.

Soil moisture Panhandle short to adequate; Peninsula mostly short. Peanut planting active, cotton planting underway. Some winter wheat damaged Hessian fly, rust. Corn, sugarcane good progress. Most pastures poor to good. Late week rain, most prevalent Panhandle, upper, lower southern Peninsula, beneficial. Cattle fair to excellent, most good. Citrus groves need more rain. Moisture supplies now largely dependent upon irrigation. Surface soil dry all areas. Lakes, ponds, streams very low. Some wilt, non-irrigated groves. Valencia orange harvest active. Grapefruit harvest all but complete. Caretakers busy pruning cold damaged trees, cutting cover crops. Warm days, mild nights continued throughout major vegetable producing areas. Rainfall continued mostly limited. Harvest spring

crops active. Volume leaders: Potatoes, tomatoes, watermelons, sweet corn, peppers, cucumbers. Also available good volume cabbage, squash, celery, snap beans, carrots, radishes, lettuce, eggplant. First Zellwood sweet corn picked.

GEORGIA: Warm week, temperatures 3 to 6° above normal north, 1 to 3° above normal elsewhere. Warmest mid, upper 80s. Augusta high 90s. Coolest temperatures low to mid 40s mountains, upper 40s to mid 50s elsewhere. Rainfall 0.50 to 1.00 in. Locally near 2.00 in., southeast under 0.50 in.

Days suitable for fieldwork 6.4. Soil moisture 13% very short, 61% short, 26% adequate. Corn 28% fair, 68% good, 4% excellent. Cotton 5% poor, 37% fair, 58% good; planting slowed because of dry soils, weekend rain helped. Sorghum 37% fair, 63% good; 20% planted, 11% 1989, 21% avg. Peanuts 2% poor, 36% fair, 62% good; 28% planted, 29% 1989, 34% avg.; planting active early in week, slowed late because of dry conditions. Weekend rains beneficial. Soybeans 1% planted, 2% 1989, 4% avg. Tobacco 1% poor, 42% fair, 55% good, 2% excellent; transplanting complete, 99% avg. Tomato spotted wilt virus increasing. Watermelons 17% poor, 37% fair, 46% good; 94% planted, 95% 1989, 94% avg. Wheat 1% very poor, 15% poor, 53% fair, 29% good, 2% excellent; dry conditions hurting, wheat in critical stage. Weekend rains very helpful. Spraying for rust, mildew, Hessian fly. Rye, other small grains fair to good. Apples 1% poor, 64% fair, 35% good. Peaches 2% very poor, 13% poor, 18% fair, 40% good, 27% excellent; picking began central, extreme south one third complete. Onions 4% fair, 13% good, 83% excellent; harvest very active, 42% complete, good yields, quality. Hay harvest began. Pasture 5% poor, 28% fair, 62% good, 5% excellent. Cattle, hogs good. Main activities: Land preparation, planting cotton, peanuts, irrigating corn, tobacco, onions.

HAWAII: Fair conditions dominate island weather. Hot, sunny days, scattered showers. Southerly winds variable 5 to 25 mph with temperatures low 60s to high 80s. Rainfall none to 6.10 in.

Days suitable for farm work 7.0. Papaya production increasing. Sugar, pineapple harvesting continuous.

IDAHO: Temperatures 2 to 5° below normal. Above normal levels of precipitation fell statewide with 1.50 in. or more falling in several areas.

Days suitable for fieldwork 3.0. Soil moisture 3% very short, 29% short, 58% adequate, 10% surplus. Winter wheat mostly good, 59% not yet jointed, 40% jointed, 1% boot stage. Spring wheat planted 87%, 64% 1989, 69% avg.; emerged 64%, 21% 1989, 34% avg. Spring barley planted 88%, 57% 1989, 60% avg.; emerged 68%, 17% 1989, 27% avg. Sugarbeets planted 99%, 89% 1989, 89% avg.; emerged 61%, 27% 1989, 47% avg. Oats planted 68%, 45% 1989, 50% avg.; emerged 35%, 21% 1989, 24% avg. Dry peas planted 80%. Lentils planted 79%. Field corn planted 20%. Potatoes planted 41%, 22% 1989, 23% avg. Fruit tree condition mostly good, slight damage south central. Stone fruit trees warmer areas have set, other trees passed full bloom. Russian wheat aphid infestations increased, other pests: pea leaf weevils, cabbage seedpod weevils, Mormon crickets, red backed cutworms, grasshoppers. Irrigation southern areas. Irrigation water supply fair to good. Range condition variable, rain improved many areas. Stockwater levels low. Livestock good to excellent, to summer range. Branding, bull grading, feeding. Hay, roughage supplies mostly adequate, some shipments south central.

ILLINOIS: Temperatures 12 to 17° above normal north, 7 to 10° above normal central, south. Precipitation generally 0.10 to 0.50 in. north, 0.50 to 1.50 in. west, 0.75 to 2.00 in. south.

Days suitable for fieldwork 4.50. Soil moisture 17% short, 70% adequate, 13% surplus. Soybean planting 1%, 2% 1989, 2% avg. Oats seeded 90%, 92% 1989, 96% avg. Livestock roughage requirements from pasture 55%, 63% 1989, 65% avg. Alfalfa 8% poor, 24% fair, 68% good. Pasture 1% poor, 16% fair, 77% good, 6% excellent.

INDIANA: Temperatures 7 to 17° above normal. Lows mid to upper 50s, highs upper 70s to low 80s. Precipitation up to 0.30 in.

Days suitable for fieldwork 4.8. Topsoil 4% short, 92% adequate, 4% surplus. Subsoil 90%, adequate, 10% surplus. Spring cropland 83% tilled, 81% 1989, 86% avg. Soybeans 1% planted, 1% 1989, 1% avg. Wheat 11 in. high, 10 in. 1989, 11 in. avg.; 55% jointed, 46% 1989, 45% avg. Oats 78% seeded, 73% 1989, 88% avg.; 3 in. high, 3 in. 1989, 4 in. avg. Clover 91% seeded, 85% 1989, 91% avg. Pasture 24% fair, 68% good, 8% excellent. Fieldwork activities prospered during the later part of the week.

IOWA: Temperatures 7 to 13° above normal. Extremes 28°; 88°. Precipitation 0.10 to 2.65 in; average 0.94 in.

Days suitable for fieldwork 5.9. Topsoil 30% short, 68% adequate, 2% surplus. Subsoil 65% short, 35% adequate. Winter wheat 2% poor, 23% fair, 70% good, 5% excellent. Hay 2% very poor, 10% poor, 35% fair, 51% good, 2% excellent. Pasture 2% very poor, 11% poor, 38% fair, 46% good, 3% excellent. Oats 99% sown, 98% 1989, 95% avg. Oats 60% emerged, 55% 1989, 61% avg. Seedbed preparation 85% completed. Fertilizer application 86% completed, 88% 1989, 81% avg. With exception of few reports of flu and pseudorabies in hogs, livestock good to excellent condition. Warm temperatures last week were ideal for calving, farrowing, lambing.

KANSAS: Temperature 5° above normal southern third, 7 to 10° above normal elsewhere. Rainfall all areas; 0.35 in. northeast to 2.75 in. southwest.

Days suitable for fieldwork 3.5. Topsoil 13% short, 60% adequate, 27% surplus. Subsoil 24% short, 70% adequate, 6% surplus. Wheat good to excellent; growth well ahead of schedule. Jointing 90%, 70% 1989, 75% avg. Insect, disease problems light to moderate. Corn planting slow, delayed by recent rains. Range, pastures good growth, adequate grazing. Alfalfa growing, weevil, pea aphid, army cutworm causing problems.

KENTUCKY: Temperatures above normal. Precipitation 1.00 in. Below normal. Highs lower to mid 80s. Lows lower 50s. Temperatures 9 to 15° above normal. Rainfall 0.10 to 1.95 in. Uniontown highest accumulation.

Days suitable for fieldwork 5.0. Soil moisture 1% very short, 14% short, 74% adequate, 11% surplus. Corn plants emerged 7%, 6% 1989, 12% avg. Soybeans 1% planted, 1% 1989, 2% avg. Winter wheat 15% headed or heading, 11% 1989, 15% avg. Wheat 19% poor, 51% fair, 29% good, 1% excellent. Tobacco plants in beds: under 2 in. 78%; 2 to 4 in. 19%; over 4 in. 3%. Tobacco plants in beds 8% poor, 40% fair, 51% good, 1% excellent. Hay 1% very poor, 6% poor, 55% fair, 32% good, 6% excellent. Fruit crops 17% very poor, 48% poor, 30% fair, 5% good.

LOUISIANA: Temperatures 3 to 5° above normal. Extremes 50°; 89°. Rainfall 0.91 to 2.01 in.

Days suitable for fieldwork 5.4. Soil moisture 8% short, 88% adequate, 4% surplus. Spring plowing 72%, 88% 1989, 89% avg. Corn planted 97%, 95% 1989, 93% avg.; emerged 93%, 85% 1989, 83% avg.; 30% fair, 60% good, 10% excellent. Cotton planted 55%, 34% 1989, 36% avg.; emerged 19%, 14% 1989, 16% avg. Hay first cutting 7%, 10% 1989, 9% avg. Rice planted 67%, 62% 1989, 69% avg.; emerged 56%, 53% 1989, 54% avg. Sorghum planted 63%, 47% 1989, 48% avg.; emerged 35%, 33% 1989, 34% avg. Soybeans planted 5%, 1% 1989, 1% avg. Sweet potatoes planted 6%, 9% 1989, 15% avg. Sugarcane 27% very poor, 9% poor, 64% fair. Wheat headed 99%, 97% 1989, 93% avg.; turning color 21%, 19% 1989, 23% avg.; 6% poor, 50% fair, 44% good. Livestock 3% poor, 36% fair, 58% good, 3% excellent. Pasture 13% poor, 36% fair, 48% good, 3% excellent. Vegetable 4% poor, 48% fair, 48% good.

MARYLAND & DELAWARE: **MARYLAND:** Precipitation 0.20 in. Temperature 66°, normal 57°. Extremes 30°; 95°.

Days suitable for fieldwork 6.0. Topsoil 11% short, 84% adequate, 5% surplus. Subsoil 5% short, 90% adequate, 5% surplus. Acreage prepared for planting 71%, 53% 1989, 67% avg. Field corn 23% planted, 11% 1989, 16% avg. Potatoes planted 73%, 83% 1989, 93% avg. Oats 93%, 83% 1989, 81% avg. Small grains good. Barley, rye heading in warmer areas.

DELAWARE: Precipitation 0.25 in. Temperature 66°, normal 56°. Extremes 46°; 97°.

Days suitable for fieldwork 6.0. Topsoil 100% adequate. Subsoil 100% adequate. Acreage prepared for planting 73%, 47% 1989, 67% avg. Field corn 32% complete; 17% 1989, 24% avg. Potatoes planted 96%, 59% 1989, 96% avg. Sweet corn 21% planted, 26% 1989, 28% avg. Small grains good.

MICHIGAN: Temperatures 14 to 23° above normal. Extremes 44°; 84°. Precipitation none to 0.73 in. across State.

Days suitable for fieldwork 6.0. Soil moisture 10% short, 80% adequate, 10% surplus. Corn 5% planted, 5% 1989, 5% avg. Oats 55% planted, 55% 1989, 50% avg. Potatoes 10% planted, 10% 1989, 10% avg. Sugarbeets 55% planted, 60% 1989, 60% avg. Wheat 1% very poor, 4% poor, 15% fair, 50% good, 30% excellent. Major activities: Spring tillage, fertilizer application, corn, oats, barley, potatoes, sugarbeet, alfalfa planting. Asparagus harvested barely begun; will start in earnest this week. Fruit development well ahead of normal. Some fruits have gone from dormant to petal falling in 1 week.

MINNESOTA: Temperatures 6 to 14° above normal. Extremes 22°; 91°. Precipitation 0.58 to 2.89 in. Greatest weekly total 6.48 in.

Days suitable for fieldwork 4.6. Subsoil 50% very short, 39% short, 10% adequate, 1% surplus. Topsoil 19% very short, 34% short, 44% adequate, 3% surplus. Spring wheat 65% acres planted, 31% 1989, 50% avg.; 21% crop emerged, 4% 1989, 14% avg. Oats 74% planted, 51% 1989, 63% avg.; 33% crop emerged, 13% 1989, 23% avg. Barley 53% planted, 15% 1989, 41% avg.; 9% crop emerged, 2% 1989, 9% avg. Corn 51% land prepared, 34% 1989, 39% avg.; 19% planted, 7% 1989, 14% avg. Soybeans 21% land prepared, 11% 1989, 16% avg.; 1% planted, 0% 1989, 0% avg. Sugarbeets 52% planted, 20% 1989, 45% avg. Potatoes 13% planted, 6% 1989, 10% avg. Dry beans 4% planted, 0% 1989, 0% avg. Flax 1% planted, 0% 1989, 4% avg. Sunflowers 1% planted, 0% 1989, 1% avg. Sweet corn 6% planted, 2% 1989, 4% avg. Green peas 34% planted, 35% 1989, 39% avg. Winter freeze damage compared to normal. Alfalfa 6% none, 36% light, 42% moderate,

16% severe. Winter wheat 7% none, 33% light, 33% moderate 27% severe. Rye 16% none, 39% light, 36% moderate, 9% severe.

MISSISSIPPI: Temperatures 4° above normal. Extremes 51°; 89°. Wet south, dry central, north. Rainfall 1.60 in., 0.34 in. above normal. Soil temperature 73°.

Days suitable for fieldwork 4.9, 6.3 1989, 5.1 avg. Soil moisture 89% adequate, 11% surplus. Wheat 92% heading, 85% 1989, 73% avg.; 2% very poor, 9% poor, 64% fair, 22% good, 3% excellent.

Corn 68% planted, 70% 1989, 77% avg.; 2% poor, 33% fair, 61% good, 4% excellent; 50% emerged, 46% 1989, 55% avg. Livestock, pasture fair to good. Cotton 31% planted, 39% 1989, 32% avg.; 5% emerged, 10% 1989, 9% avg. Hay 5% harvested. Peanuts 11% planted, 9% 1989, 19% avg. Rice 15% planted, 59% 1989, 67% avg.; 1% emerged, 14% 1989, 22% avg. Sorghum 28% planted, 40% 1989, 39% avg.; 12% emerged, 18% 1989, 18% avg. Sweet potatoes 8% planted, 19% 1989, 18% avg. Watermelons 52% planted, 70% 1989, 59% avg. Peaches 10% very poor, 20% poor, 50% fair, 20% good. Activities: Planting crops, cutting hay.

MISSOURI: Temperatures 7 to 10° above normal. Rainfall general, less than 1.00 in. northeast, central, east central, south central districts to over 2.00 in. north central, southeastern districts.

Days suitable for fieldwork 3.9. Topsoil 4% short, 66% adequate, 30% surplus. Subsoil 27% short, 61% adequate, 12% surplus. Ground worked at least once for spring crops 68%, 83% 1989, 78% avg. Corn planting week behind avg.; sorghum 5 days behind avg.; cotton 4 days behind avg. Oats sown 98%, 100% 1989, 98% avg.; some intended oat acres prevented by wet weather. Pastures 2% very poor, 2% poor, 29% fair, 62% good, 5% excellent.

MONTANA: Rain, snow over State. Southeast over 2.00 in. Most areas near 0.50 in. Temperatures very warm early, weekend well below normal.

Days suitable for fieldwork 4.8. Topsoil 23% short, 68% adequate, 9% surplus. Subsoil 34% short, 58% adequate, 8% surplus. Northeast remains critically dry. Winter wheat 14% greening, 86% green and growing. Barley 52% planted, 24% 1989, 47% avg. Oats 42% planted, 15% 1989, 40% avg. Sugarbeets 53% planted, 43% 1989, 54% avg. Calving 92% complete; lambing 84% done. Range grass growth 19% slow, 71% average, 10% above average.

NEBRASKA: Temperatures 2° below normal extreme west up to 7° above normal east. Extremes 21°; 88°. Widespread precipitation with light amounts common, a few locations had up to 2.00 in.

Days suitable for fieldwork 6.1. Topsoil 47% short, 52% adequate, 1% surplus. Subsoil 89% short, 11% adequate. Oats 98% seeded, 94% 1989, 94% avg. Winter wheat 50% jointed, 41% 1989, 23% avg. Russian wheat aphids causing damage west, southwest. Many growers spraying insecticides, in other areas population not at high enough levels yet. Army cutworms present in wheat, alfalfa, west, southwest, east. Alfalfa hay 1% very poor, 6% poor, 41% fair, 52% good. Wild hay 6% very poor, 15% poor, 68% fair, 11% good. Some early planted corn emerged east, south central. Range, pasture feed supplies 72% short, 28% adequate. Sugarbeet planting nearly complete. Small hail, Panhandle 24th. Main activities: Planting corn; preparing seedbeds; applying fertilizer, herbicides; working summer fallow; working calves.

NEVADA: Warm, dry early. Some clouds, windy mid week. Temperatures considerably lower last half period. Scattered rain showers common

weekend. Snow accumulations higher elevations. Mostly dry extreme south.

Cool nighttime temperatures slowed growth alfalfa, small grains central, north, calving nearing completion. Ranges improved by recent rain showers. Mormon crickets a threat to agriculture north.

NEW ENGLAND: Precipitation 0.10 to 0.25 in. north, 0.20 to 0.35 in. south. Temperatures 50° near Canadian boarder to 60° along south coast. Temperatures 10° above normal.

Major farm activities: Spreading manure, mending fences, plowing, repairing machinery.

NEW JERSEY: Temperatures much above normal. Extremes 39°; 95°. Rainfall 0.54 in. north, 0.24 in. central, 0.34 in. south. Heaviest 24 hour total 1.17 in. on 29th, 30th. Estimated soil moisture percent field capacity averaged 90% north, 83% central, 80% south. Four inch soil temperatures averaged 59° north, central; 60° south. Wide temperature fluctuations.

Soil moisture about adequate most areas. Fieldwork active. Limited tomato planting began. Asparagus, spinach, radishes, spring greens harvested. Oat planting well advanced. Preparations continued active field corn planting. Rye grazed by livestock. Hay, pasture growth rate increased. Some new fields seeded.

NEW MEXICO: Temperatures variable across State: precipitation recorded west, north central areas. Some wind damage reported scattered locations.

Days suitable for fieldwork 6.8. Soil moisture 85% short, 15% adequate. Cotton planted 45%; milo planting 10% complete. Cattle poor to good, sheep poor to good, range poor to good.

NEW YORK: Cool weather ended abruptly. Early week temperatures several degrees above normal. Highs 70s, lows 30s. Heat wave began mid week, lasted through the weekend. Highs 85 to 95° with many high temperature records falling. Early week dry. Widespread showers, thunderstorms mid week.

Days suitable for fieldwork 5.4. Soil moisture mostly adequate to surplus. Pastures fair to good condition, hay mostly fair, wheat fair to good. Warm weather aided winter wheat growth. Oats 25% seeded, 54% 1989, 27% avg. Corn planting underway. Long Island peaches started to bloom. Apples in Lake Ontario region in tight clusters, peaches in pink bud stage. Bartlett pears, sweet cherries progressed to bud burst. Warm weather promoted vegetable growth. Sweet corn planted under plastic up, doing well, sweet corn planted on bare ground starting to emerge. Orange county onion planting near completion. Lettuce, cabbage, celery planting underway.

NORTH CAROLINA: Temperatures 1 to 5° below normal across State. Precipitation 0.35 to 4.46 in.

Days suitable for fieldwork 4.3. Soil moisture 3% short, 62% adequate, 35% surplus. Pasture 4% poor, 22% fair, 65% good, 9% excellent. Livestock feed from pasture 49%. Corn planted 10%. Crop condition: Wheat 16% fair, 82% good, 2% excellent; oats 1% poor, 22% fair, 76% good, 1% excellent; barley 18% fair, 81% good, 1% excellent; rye 16% fair, 83% good, 1% excellent; tobacco plant beds 33% fair, 60% good, 7% excellent; Irish potatoes 53% fair, 44% good, 3% excellent. Irish potatoes planted 91%; cabbage transplanted 79%. Hay, roughage 6% short, 91% adequate, 3% surplus. Feed grain supplies 6% short, 93% adequate, 1% surplus. Major activities: Land preparation, tending tobacco beds, topdressing small grains, planting corn. Other activities included: Fertilizing

pastures, tending livestock, planting Christmas trees, general farm maintenance.

NORTH DAKOTA: Record high temperatures early, near or below freezing late. Temperatures 4° above normal west central, southwest to 10° above normal southeast. Extremes 14° central; 91° central, east central, southeast. Precipitation rain or snow statewide 0.34 in. south central to 1.37 in. east central.

Days suitable for fieldwork 3.3. Topsoil improved to near normal. Subsoil remained below normal. Topsoil 19% very short, 36% short, 45% adequate. Subsoil 60% very short, 36% short, 4% adequate. Cool, wet weather weekend slowed planting progress. Hard red spring wheat 37% planted, 14% 1989, 36% avg.; durum wheat 16%, 5% 1989, 20% avg.; oats 31%, 11% 1989, 34% avg.; barley 36%, 10% 1989, 35% avg.; sugarbeets 42%, 27% 1989, 48% avg.; corn 1%, 0% 1989, 4% avg.; flax 1%, 0% 1989, 5% avg.; winter wheat 9% very poor, 36% poor, 49% fair, 6% good; 6% dormant, 90% green, 4% stooling. Livestock mostly good, calving 91% complete, lambing 95%, shearing 94%. Pasture 4% dormant, 75% poor, 20% fair, 1% good; furnished 16% roughage requirements. Stockwater 9% very short, 53% short, 38% adequate.

OHIO: Temperatures 10 to 15° above normal. Highs upper 70s to lower 80s. Lows mostly in 50s. Precipitation 0.10 to 0.50 in. mostly south. Soil temperature lows in 50s, highs in mid 60s to low 70s.

Days suitable for fieldwork 4.8. Soil moisture 4% short, 84% adequate, 12% surplus. Main activities: Plowing, seed bed preparation, spreading fertilizer, spraying pesticides, planting. Corn planting advanced rapidly; some farmers finished. Soybean planting just started. Winter wheat mostly good; some powdery mildew. Overall, wheat improving. Oat planting 86% complete, 58% 1989, 79% average. Grasslands mostly good. Alfalfa stunted by frost growing out of setback. Alfalfa weevil noted in south. Fruit crops blooming. Sweet corn emerged statewide. Processing tomato planting underway. Canola blooming. Tobacco seedbed planting almost finished; some slug damage.

OKLAHOMA: Temperatures normal west central to 4° above normal southeast. Precipitation 0.82 in. Panhandle to 5.38 in. south central.

Days suitable for fieldwork 2.9. Topsoil 22% adequate, 78% surplus. Subsoil 100% adequate. Wheat 5% fair, 92% good, 3% excellent; 25% heading, 50% 1989, 30% avg. Cool, wet weather increased disease concern. Head filling well. Tiller count up significantly from last year. Cotton none planted, 3% 1989, 3% avg. Sorghum 1% planted, 7% 1989, 3% avg. Pastures good, improving with warm weather. Cattle good; marketings average, prices steady to slightly less than preceding week. Insect activity light.

OREGON: Temperatures near normal western area, 5° below normal east. Generous amounts rain statewide except Harney. 3.70 in. coast, 1.00 to 1.90 in. interior west. Foothills of coast range, north cascades 3.00 to 6.00 in., high plateau 3.50 in. East of Cascades, 0.30 in. south central, 0.80 in. northeast, southeast, 1.60 in. north central sections. Harney remained dry, only 0.05 in. Burns. Rains across State, slowing fieldwork, improved crop, pasture conditions. More rain needed.

Soil moisture 48% short, 39% adequate, 13% surplus. Improved winter wheat across State. More moisture needed. Winter wheat 15% poor, 59% fair, 24% good, 2% excellent. Reports of Russian

wheat aphid activity spring wheat. Barley seeding, 89% complete, 82% 1989, 90% avg. Winter wheat, grass seed spraying, flaming of mint as weather permitted. Crimson clover in bloom Willamette Valley. Strawberry fields full bloom most western growing areas. Fruit trees for most part finished blooming. Cherry set heavy The Dalles. Fruit orchards irrigated, Umatilla. Watermelons being planted. Potato planting continued central areas, started Baker. Klamath potato seed culling underway. Planting potatoes, onions completed Malheur. Peas need moisture east. Some sweet corn emerged, some still being planted. In west first beans up, planting broccoli continued. Recent rains improved, saved pasture, ranges. Some dry spots still exist east. Pastures west good to excellent, east fair to good. Livestock good to excellent.

PENNSYLVANIA: Plenty of sunshine, little precipitation, summer like temperatures prevailed across the State. Temperature 66°, 16° above normal. Extremes 32°; 92°. Precipitation 0.08 in., 0.74 in. below normal.

Days suitable for fieldwork 6.0. Soil moisture 14% short, 82% adequate, 4% surplus. Plowing 63% complete, 56% 1989, 63% avg. Corn 8% planted, 6% 1989, 11% avg. Soybeans 1% planted, 0% 1989, 2% avg. Oats 67% planted, 62% 1989, 72% avg. Potatoes 32% planted, 26% 1989, 42% avg. Tobacco Beds 90% planted, 98% 1989, 85% avg. Barley 90% pre boot, 95% 1989, 89% avg.; 9% boot, 5% 1989, 10% avg; 1% heading or headed, 0% 1989, 1% avg. Wheat 94% pre boot, 98% 1989, 96% avg.; 6% boot, 2% 1989, 4% avg. 0% heading or headed, 0% 1989, 0% avg. Wheat 2% very poor, 3% poor, 19% fair, 54% good, 22% excellent. Oats 3% very poor, 4% poor, 20% fair, 45% good, 28% excellent. Hay stands mostly fair. Feed from pastures mostly average to below average. Peaches 34% pre pink, 32% 1989, 27% avg.; 23% pink, 23% 1989, 23% avg.; 43% full bloom or past, 45% 1989, 50% avg. Cherries 39% pre pink, 38% 1989, 24% avg.; 16% pink, 33% 1989, 23% avg.; 45% full bloom or past, 29% 1989, 53% avg. Apples 41% pre pink, 69% 1989, 45% avg.; 29% pink, 27% 1989, 28% avg.; 30% full bloom or past, 4% 1989, 27% avg. Activities: Spring plowing; planting corn, oats, soybeans, potatoes, tobacco, hay, vegetables, fruit trees, christmas trees; repairing fence; spraying; hauling manure; spreading fertilizer; maintaining machinery; caring for livestock.

PUERTO RICO: No Data Available.

SOUTH CAROLINA: Temperatures 3 to 5° above normal. Rainfall 0.50 in. northeast to 1.50 in. northwest.

Days suitable for fieldwork 6.0. Soil moisture 13% very short, 65% short, 22% adequate. Cotton 25% planted, 6% 1989, 35% avg. Tobacco fair to good; 97% planted, 64% 1989, 74% avg. Corn fair to good; 96% planted, 83% 1989, 91% avg. Watermelons fair to good; 77% planted, 83% 1989, 83% avg. Cantaloupes fair to good; 71% planted, 72% 1989, 70% avg. Peaches fair. Tomatoes good. Oats fair to good; 86% headed, 94% 1989, 71% avg.; 15% turning color, 4% 1989, 4% avg. Wheat fair to good; 89% headed, 81% 1989, 70% avg.; 8% turning color, 3% 1989, 5% avg.

SOUTH DAKOTA: Temperatures 1 to 14° above normal. Extremes 17°; 96°. Precipitation much above normal 1.00 to 2.00 in. heaviest central, northwest, Black Hills. Maximum 2.27 in. Yearly precipitation above normal Black Hills, Central, below normal elsewhere. Range 2.05 in. above to 2.52 in. below normal. Growing degree days above normal.

Winter wheat good to fair, winterkill 12%. Major activities: Seeding, field preparation, working calves, fencing.

TENNESSEE: High pressure brought warm, dry conditions to State most of week. However, scattered showers occurred west 24th, statewide 27th, 28th. Temperatures above normal. Rainfall 2.00 to 3.00 in. west; 0.25 to 0.75 in. middle, east.

Days suitable for fieldwork 4.6. Soil moisture 11% short, 80% adequate, 9% surplus. Cotton, corn, sorghum, soybean planting slow. Tobacco transplanting getting underway. Some alfalfa cut. Pasture growth picking up. Cattle rated good.

TEXAS: Wet conditions aggravated by more heavy rains. High pressure east blocked progress of storm system moving across southwest. System stalled, southerly flow provided moisture needed to trigger heavy rains across State. Slow movement thunderstorms added to accumulations over many areas State. Precipitation above normal all areas. Greatest departures north, south. Rainfall closer to normal west. Temperature above normal. Rolling Plains below normal.

Crops: Small grains good progress most areas. Showers Plains increased growth; isolated hail damaged some fields. Fields beginning to head. Insect pressures slowed some. Lodging some fields Cross Timbers high winds, heavy rain. Sunny, open weather needed. Open weather benefit fields Blacklands, central. Some producers cutting hay as weather permitted. Harvest getting underway some south central fields. Corn planting delayed part week Plains. Planted fields emerging good stands with warmer weather. Some low lying areas flooded parts Cross Timbers, causing losses. Producers cultivating central as weather allowed. Growth, development good throughout Coastal Bend, Valley. Rain delayed planting Upper Coast. Grain sorghum planting remained slow Plains. Some losses low areas Cross Timbers. Fields central, south responded to rain, good development. Some cultivating occurred before rains. Cotton planting Plains limited until late week. Some planting Blacklands, east; wet conditions still causing delays. Fields squaring Coastal Bend, Valley. Planting also remained behind schedule parts Upper Coast. Stands central look good. Cotton 2% squaring, 1% 1989, none avg. Soybean planting slow Black lands, Upper Coast because wet conditions. Planted fields up to good stands, showing good growth. Rice fields continued emerge Upper Coast. Planting slow progress. Rice emerged 41%, 69% 1989, 61% avg. Peanut planting underway south. Producers other areas trying get fields ready; rain slowed progress. Other Field Crops: Peanuts planted 1%, 4% 1989, 4% avg. Soybeans planted 16%, 12% 1989, 8% avg. Sugarbeets planted 78%, 96% 1989, 93% avg. Sunflowers 8% planted, 0% 1989, 3% avg.

Commercial Vegetables: Rio Grande Valley, carrot, onion harvest continued. Onion harvest started to wind down. Light melon harvest getting underway. San Antonio Winter Garden, cabbage harvest continued wind down. Onion harvest begin soon. East Texas, some problems sweet potato fields because excessive moisture. High Plains, onions, potatoes emerging to good stands. Some carrot planting continued late week. Trans Pecos, chiles emerging. Onion harvest begin soon around Presidio. Some melon planting continued. Peach crop looked good most major growing areas. Early varieties harvested east, south central. Thinning continued Hill Country. Pecan crop shaping up to be good crop most areas. Producers spraying zinc, awaiting first generation of casebearers. Good sets central, south.

Range and Livestock: Additional rainfall across State allowed ranges, pastures continue improving. Army worms invading some pastures. Fertilizing activities slowed by rain. Livestock conditions good. Some losses from rapidly rising flood waters Brownwood area. Rain slowed sheep shearing Hill Country.

UTAH: Temperatures 3° above normal; precipitation was generally moderate, individual stations light to heavy.

Days suitable for fieldwork 4.0. Soil moisture 45% short, 55% adequate. Freezing temperatures damaged fruit crops. Insect infestations varied from heavy to light, depending on location. Russian wheat aphids, army cut worms causing most severe problems. Planting continued to progress ahead of normal. Spring wheat, barley planting virtually completed. Spring wheat emergence 78% completed, 56% 1989, 48% avg. Barley emergence 75% completed, 57% 1989, 54% avg. Oats planted 74%, 77% 1989, 65% avg. Oats emerged 42%, 36% 1989, 31% avg. Corn planted 28%, 19% 1989, 17% avg.; corn emerged 20%, 9% 1989, 16% avg. Potato acreage 18% planted. Winter wheat avg. height 8 in. Alfalfa hay avg. height 11 in. Calving, lambing death loss below normal due to mild spring weather. Range conditions benefitted from recent rain showers.

VIRGINIA: Temperatures above normal. Extremes 35°; 96°. Very little precipitation recorded.

Days suitable for fieldwork 5.8. Topsoil 7% surplus, 81% adequate, 12% short. Pastures 4% poor, 22% fair, 59% good, 15% excellent. Winter wheat 1% poor, 51% fair, 46% good, 2 excellent, 46% good, 51% fair, 1% poor. Barley 4% excellent,

Apples mostly poor to fair. Peaches mostly very poor. Corn 33% planted, 10% 1989, 28% avg.; corn 5% excellent, 39% good, 50% fair, 6% poor. Potatoes mostly good. Alfalfa, other hay mostly fair to good. Soybean, peanut planting just started. Flue tobacco land preparation in full swing with planting just started, continued clipping. Cotton planting progressing well ahead of schedule.

WASHINGTON: Temperatures 2° above normal to 6° below normal, east; normal to 2° below normal, west. Precipitation none to 1.20, east; 0.78 to 2.54, west.

Days suitable for fieldwork 4.0. Soil moisture 60% short, 40% adequate. Range, pasture 60% short, 40% adequate. Hay, other roughage 20% very short, 35% short, 40% adequate, 5% surplus.

Fieldwork continued across the State with interruptions due to rain. Crop development remained ahead of normal. Spring wheat planted 96%, 89% 1989, 88% avg. Spring wheat emerged 85%, 63% 1989, 71% avg. Barley planted 89%, 74% 1989, 79% avg.; emerged 75%, 54% 1989, 58% avg. Potatoes planted 75%, 71% 1989, 68% avg. Rains received during the week improved prospects for dryland producers, soil moisture still reported short in many eastern counties.

WEST VIRGINIA: Temperature 65°, 10° above normal. Extremes 32°; 94°. Precipitation 0.27 in. below normal.

Days suitable for fieldwork 5.5. Soil moisture 17% short, 79% adequate, 4% surplus. Cattle, calves, sheep, lambs good to fair. Calving 90% complete; lambing 90% complete. Feed supplies adequate to surplus. Wheat, barley good. Oat planting 78% complete, 36% emerged. Corn planting 25% complete. Tobacco beds good; 100% planted; 72% emerged. Hay good to fair. Apples, peaches poor. Farm activities: Corn, oat planting, plowing, fertilizer spreading.

WISCONSIN: Temperatures 66°, 16° above normal. Extremes 34°; 91°. Precipitation 0.20 to 3.50 in.

Days suitable for fieldwork 4.2. Soil moisture 53% short, 47% adequate, 1% surplus. Oats 60% planted, 50% 1989, 55% avg. Corn 5% planted, 3% 1989, 4% avg. Fieldwork very active. Temperatures, surface moisture near ideal. Vegetables being planted.

WYOMING: Temperatures mostly above normal. Precipitation well above normal except parts of west, extreme southeast.

Days suitable for fieldwork 4.0. Topsoil 18% short, 78% adequate, 4% surplus. Spring wheat 60% planted, 55% 1989, 50% avg.; emerged 25%, 15% 1989, 20% avg. Oats 50% planted, 50% 1989, 40% avg.; emerged 30%, 15% 1989, 10% avg. Barley 80% planted, 80% 1989, 65% avg.; emerged 65%, 45% 1989, 35% avg. Sugarbeets 75% planted, 75% 1989, 65% avg.; emerged 15%, 5% 1989, 10% avg. Corn 10% planted, 10% 1989, 5% avg. Potatoes 20% planted, 15% 1989, 15% avg. Winter wheat mostly good. Alfalfa prospects good. Russian aphids, army cutworms continue to be a problem in eastern State. Livestock mostly good. Spring calves born 85%, 85% 1989, 80% avg. Farm flock: Ewes lambed 90%, 90% 1989, 85% avg.; shorn 90%, 90% 1989, 80% avg. Range flock: Ewes lambed 50%, 50% 1989, 45% avg.; shorn 70%, 65% 1989, 50% avg. Calf, lamb losses light to normal. Ranges, pastures good.

(Continued from front cover)

caused severe weather with damaging wind, large hail, tornadoes, and drenching rain in the **southern Plains**. Locally torrential rains produced flooding in **Texas**, where **De Leon** was pounded with 17.5 inches while **Brownwood** was deluged with over 16 inches. At week's end, the heavy rain shifted eastward into the **Southeast** as snow blanketed parts of the **northern Plains** and **northern Rockies**. Above-average temperatures prevailed across most of the Nation as record-high temperatures for the date were broken daily. Conditions were unseasonably hot from the **upper Mississippi Valley** to the **Northeast**, where over 35 records were broken or tied on Friday. Cold air dipped into the **North Central States** toward the end of the week.

International Weather and Crop Summary

April 22-28, 1990

HIGHLIGHTS

USSR ... Soaking rain in the southwestern Ukraine and the western North Caucasus boosts soil moisture, benefiting winter grains and spring sown crops.

EUROPE ... Moderate to heavy rain ends dryness in the northeast. Rain benefits winter grains in the south.

SOUTH ASIA ... Warm, dry weather favors maturing wheat. Rain in the east benefits immature rice.

EASTERN ASIA ... Heavy rain continues in the southeast. Rain benefits winter grains in sections of the North China Plain.

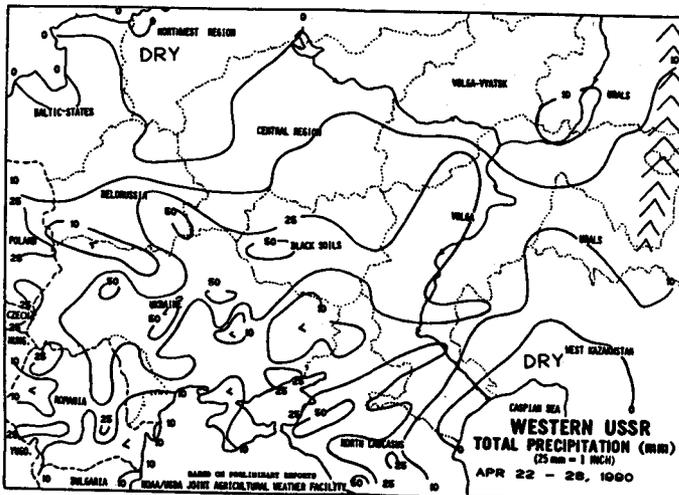
SOUTHEAST ASIA ... Scattered showers bring some relief to newly planted Thai rice. Timely planting showers help local areas of the southern Philippines.

SOUTH AMERICA ... In Argentina, periodic showers until week's end slow corn harvesting. Heavy downpours soak northeastern Argentina, southern Paraguay, Uruguay, and Rio Grande do Sul, Brazil. Dryness favors harvesting in Brazil's northern soybean area.

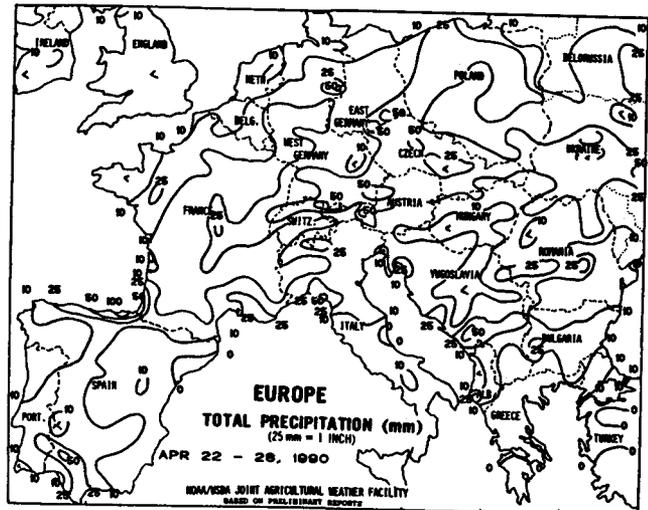
SOUTH AFRICA ... Unfavorably wet weather covers mature corn. Heavy rain improves planting conditions in southern winter wheat areas.

AUSTRALIA ... Beneficial dry weather returns to eastern crop areas.

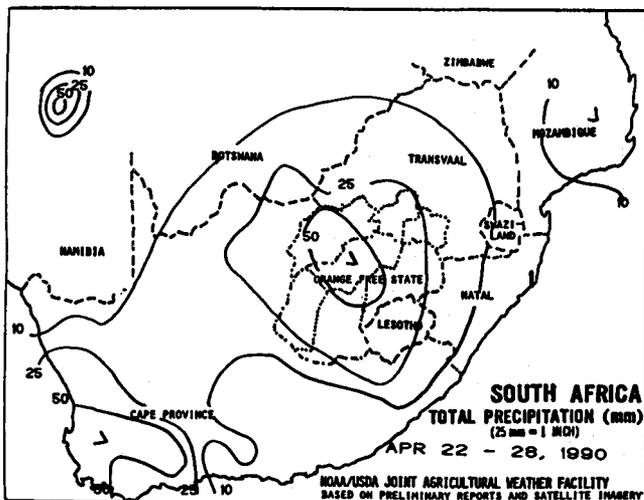
NORTHWESTERN AFRICA ... Widespread, mostly light precipitation benefits filling winter grains in eastern Algeria and Tunisia, but arrives too late to significantly improve yield prospects.



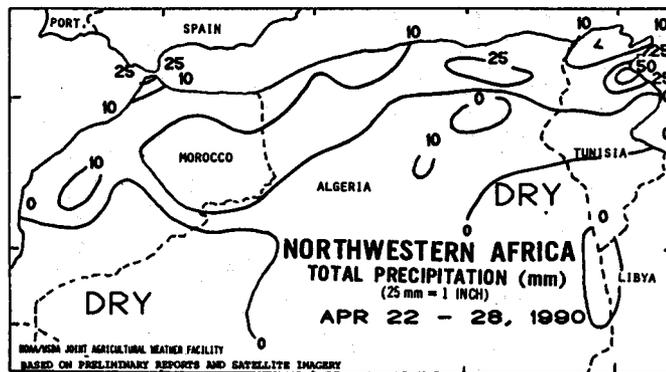
WESTERN USSR ... Soaking rain (25-64mm) covered crop areas in the southwestern and northern Ukraine, the central portion of the Black Soils Region, the western Volga, and the western North Caucasus. The rain that covered the southwestern Ukraine and the western North Caucasus boosted soil moisture reserves, benefiting winter grains in the jointing stage and spring grains in the early vegetative stage. Generally dry weather prevailed over the northern one-third of the region, aiding fieldwork in preparation for spring grain planting. Weekly average temperatures were near-normal in the south and 1-2 degrees Celsius (C) above normal in the north.



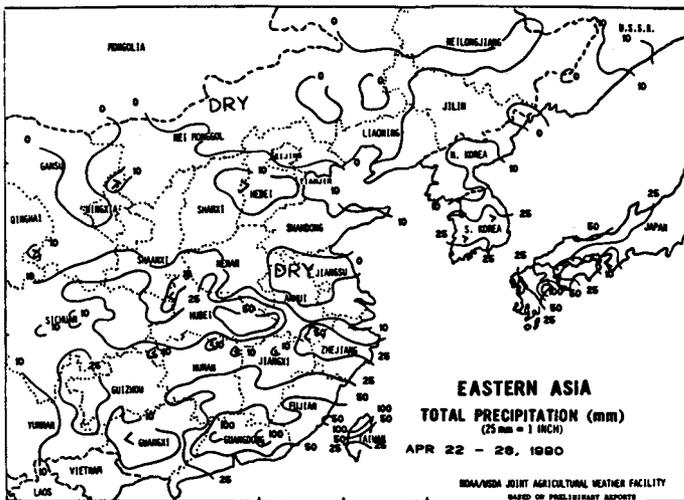
EUROPE ... Moderate to heavy rain (15-40mm, with isolated amounts greater than 40mm) fell across much of Poland, East Germany, and Czechoslovakia, ending up to 6 weeks of below-normal rainfall and dry topsoils. Light to moderate rain (5-20mm, with isolated rainfall greater than 25mm) favored jointing to heading winter grains across the remainder of the north with the exception of Great Britain and Ireland, where only scattered, light rain (less than 10mm) fell. In the south, scattered rain (5-40mm, with isolated amounts in excess of 50mm) benefited heading to reproductive winter grains in most growing areas. Mean weekly temperatures ranged from below normal in the south and east to slightly above normal in the northwest.



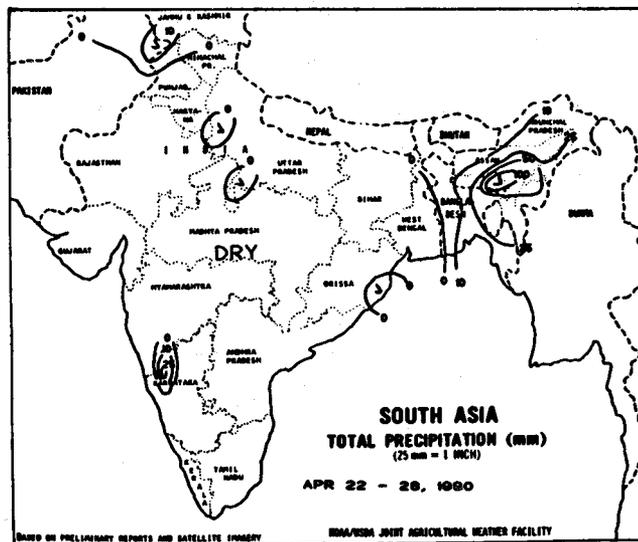
SOUTH AFRICA ... Late-week, unseasonably heavy showers (25-65mm) over the western and central Maize Triangle were unfavorable for maturing crops and, especially in the west, brought harvests to a halt. Temperatures, although averaging near to above normal, were seasonably cooler, with highs generally in the low to middle 20's C. Rainfall was lower (1-20mm) from the eastern Maize Triangle southward through Natal and the eastern Cape Province, but heavy rain (20-93mm) returned to winter wheat areas of the southern Cape Province. The heavy rain halted fieldwork but provided timely topsoil moisture for wheat planting.



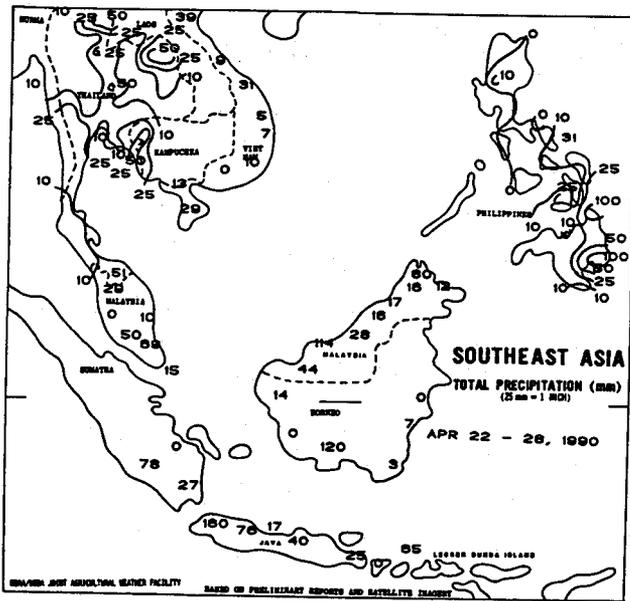
NORTHWESTERN AFRICA ... Winter grains ranged from filling to mature over the region. Widespread light precipitation (10-25mm, with localized amounts in excess of 25mm) over winter grain areas in eastern Algeria and Tunisia benefited that portion of the crop still in the filling stage. Although the rain in these areas came too late to significantly improve yield prospects, it helped to stabilize crop conditions, halting further declines in potential yields. Minimal rain (generally less than 10mm) covered winter grain areas in Morocco and western Algeria. Weekly average temperatures were 2-4 degrees C below normal over the region.



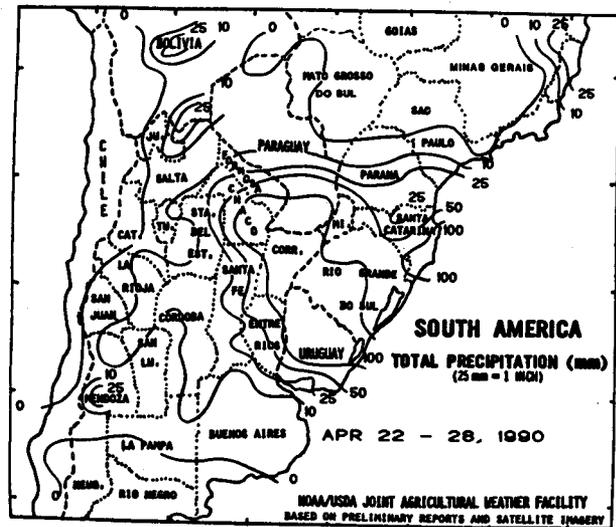
EASTERN ASIA ... Heavy rain (25-60mm, with scattered amounts greater than 75mm) continued in sections of Guangdong, Fujian, and southern Jiangxi, possibly causing localized flooding. Up to 5 consecutive weeks of above-normal rainfall has left soils saturated in many sections of the southeast. In the Yangtze Valley, widespread rain (20-60mm, with isolated rainfall in excess of 60mm) benefited heading to reproductive winter grains and recently planted spring crops. Light to moderate rain (5-15mm) favored jointing winter grains in northern sections of the North China Plain, while southern sections remained mostly dry. In Japan, heavy rain (40-60mm, with isolated amounts greater than 60mm) caused fieldwork and planting delays in much of Hokkaido. Below-normal temperatures (1-4 degrees C below normal) slowed germination and early growth of spring grains across most northern crop areas.



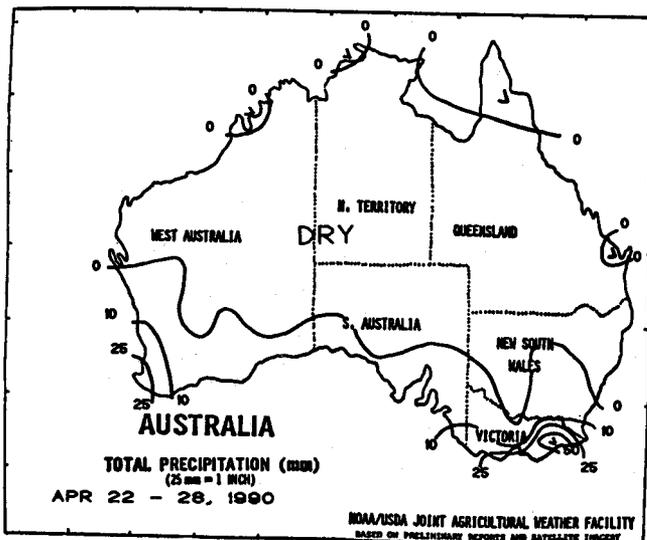
SOUTH ASIA ... Dry, warmer-than-normal weather again dominated the primary wheat areas of India and Pakistan, favoring crop drydown, although scattered, light showers (2-13mm) continued in northernmost areas. Temperatures across the north averaged 1-4 degrees C above normal with highs of 40-44 degrees C common even into northern portions of Pakistan's Punjab state. In the east, variable showers (10-49mm) fell from eastern Bangladesh eastward, with locally heavy rain (110mm) in western Assam. April rainfall in the far east has been highly beneficial for irrigation of immature rice and new plantings. Mostly dry, warmer-than-normal weather continued over southern India.



SOUTHEAST ASIA ... Variable showers (10-50mm or more) returned to Thailand's primary rice areas, bringing some relief to newly planted crops. Temperatures, however, continued to average 1-2 degrees C above normal, with daily high temperatures of 38-42 degrees C increasing evaporative losses. In the Philippines, much needed rain (10-25mm or more) fell from southeastern Luzon to southern Mindanao, with locally heavier amounts (33-100mm or more) providing timely planting moisture in the central islands and eastern Mindanao. Mostly dry, locally hot weather, however, continued elsewhere with highs in central and northern Luzon again reaching 38-41 degrees C. Further south, rainfall tapered off from recent weeks in peninsular Thailand, but moderate to heavy rain (25-50mm or more) continued over most crop areas of Malaysia, as well as much of southern Indonesia.



SOUTH AMERICA ... In Argentina, light showers (1-6mm) over most of Buenos Aires caused minimal interference for harvesting. Heavier showers (10-34mm) over extreme northern Buenos Aires, Cordoba, and Santa Fe during midweek continued to slow harvest progress, although welcomed drier weather covered the region late in the week. Further north, persistent almost daily rain (50-176mm) soaked northeastern Argentina, including cotton areas of Chaco and Formosa, southern Paraguay, Uruguay, and Rio Grande do Sul, Brazil. The soybean harvest in Rio Grande do Sul has fallen well behind average due to excessive wetness. Rainfall diminished over the remainder of south-central Brazil, with mostly dry weather covering northern Parana, Mato Grosso do Sul, Sao Paulo, Goias, and Minas Gerais. The dryness favored soybean harvesting in these areas.



AUSTRALIA ... Beneficial dry weather returned to most eastern crop areas, allowing a resumption of summer crop harvest and winter grain planting following 3-5 weeks of torrential rains and flooding. The rate of drying was limited, however, by below-normal temperatures (2-4 degrees below normal) during much of the week. Elsewhere, light to moderate rain (10-20mm, with scattered amounts greater than 20mm) continued to increase preplanting soil moisture for winter grains in Western Australia and sections of Victoria. Scattered, light rain (less than 10mm) provided only limited relief to dryness in crop areas of South Australia.

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(Continued from p. 4)

based on the sum of the wet and dry terms after they have been weighted by their probabilities. This allows for a smooth transition between weather spells and makes the index continuous. During transition periods the preliminary index would not be the same as the final value defined by Palmer, but would be the same during established weather spells (i.e., when the probability is 0 or 100 percent).

A detailed explanation and examination of the index is given by Alley (1984). Both Alley and Karl (1983) address the sensitivity of the index and list some limitations.

A parameter derived from the calculations of the Drought Severity Index is the additional precipitation in inches needed to bring the index to near zero. This parameter is computed for all values of the current week's index less than -0.5 (the upper limit of an incipient drought) and left blank for all values greater than or equal to -0.5. The precipitation values are theoretically the additional amounts required to end the drought defined by the index in each climatic division. In using this parameter to make projections, it must be realized that these values are instantaneous, valid only for the current week. To end drought in a given climatic division for the oncoming week, the precipitation amount listed plus near-normal rainfall must occur.

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