lg Clustering of
deficits

Per Bob Otte

Van Bavel - N.C. exp. sta.

& Va. Exp Sta. reports, on

drought days analysis.

Tucson Ariz., ARS,

Soil & Water research dem.

Rationale for index of clustering deficits. Summarize construct.

Construct
Make moving sum of deficits below mean, but for index take deficit of this sum below something less than mean. This cuts out brief deficits, lets protracted deep deficits dominate index. Remember, tho, it's like drawing a line 11 to 2 below mean, take deficits below that — dive + plunge suddenly into heavy cum deficit values.

Present general rationale for index. Concede is rough, can be sharpened by more intensive study of any area, but gives idea.

1. ~~Moving~~ total selected bcs affected by consecutive days deficit

2. Moving total of fairly short span bcs recovers quickly when wtr returns, - cumulative Σ from beginning wd not — & recovers same rate, any season.

3. Only negative deficits counted bcs + ones, above capac, are lost anyway, whether consecutive or not.

4. Weakness of moving Σ is fails to show worse index for distinguish sharply a ~~long~~ drought longer than pd from 2 or more does not retain consecutive feature longer than its pd. To compensate, need means exagg's extremes — more than ∇ does. To do so, cut off ~~values~~ small cumulative deficits

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Another elaboration: do not count the part of any daily flow above capacity, even if moving Σ is below mean.

Count surpluses above mean, too. Original object of not doing so was bcs of cumulative problem. Moving total system takes care of that. Now mean loses meaning. Might as well just count cum deficits below line you choose. And encounter same problem with this line.

Summary: Technique & rationale, index of discontinuity, or bunching of deficits

1. Establish base value, probably the mean

~~2. Record deficits below mean~~

~~3. Cube them,~~

~~4. Record 7 day~~

2. Take ~~cube of~~ 7-day moving ~~total~~ ave. of net deficits below mean, as % of mean. Ignore surpluses, except as they reduce 7-day deficits. Count no, daily surplus above daily capacity.

3. Take as index, sum of cubes of 7-day moving ~~totals~~ aves, ÷ no. days in season.

Rationale:

Bunching or grouping or clustering of deficit days is problem not reflected in dispersion measurements.

Is reflected in periodic data, but crudely, bec (1) overlapp'g, & also (2) gives no weight to continuity among periods.

Moving period meets first objection. 10 days seems about right – about a normal rotation period, at least in larger systems.

To meet 2d, gives extra weight to lower reaches of moving pd. By cubing, – roughly seems to best reflect relative dangers various likely patterns, but room for judgement here.

Make basic ~~efforts~~ not with Kwik R, but the cream of it, which Σ ditches have skimmed.

Purpose of cubing: moving total technique takes depth factor & turns it into duration factor. This cubing compensates by emphasizing depth duration at a min. value at expense of duration ~ i.e. those long bottoms

(Mov'g ℓ also sets min. possible value)

Another benefit of cubing, reduce weight of values near 0, which are arbitrary bcs base line is arbitrary.

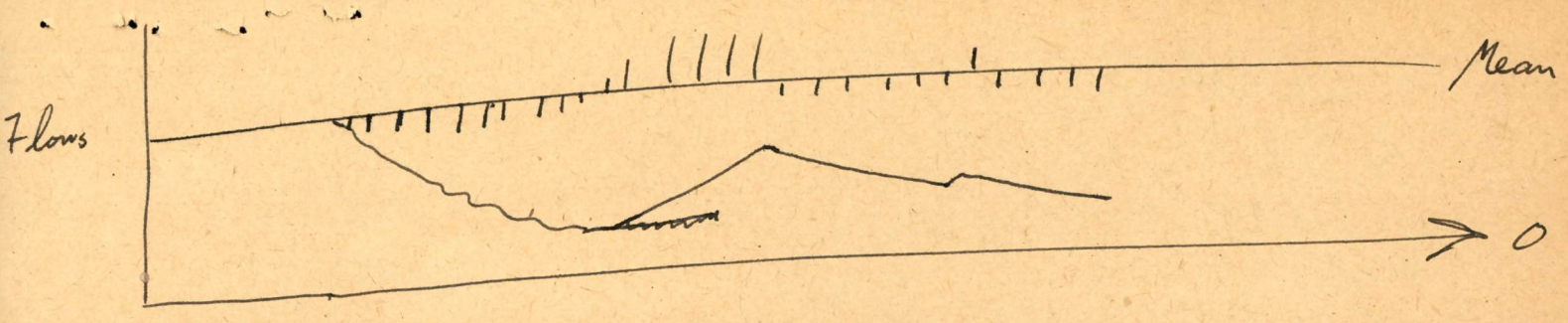
As to base line, it shd reflect entire irrn season, bcs distribn between ends of whole season is also part of picture.

But take less than mean, bcs (a) lower base gives more weight to lowest bands. (b), can't expect w/o storage to use seasonal mean anyway. ½ mean is ok.

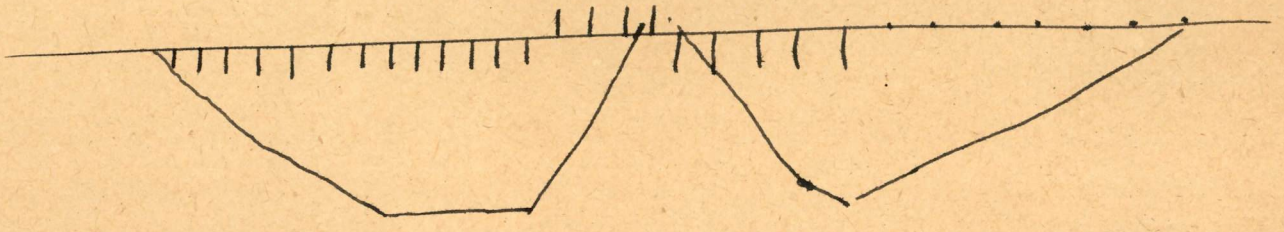
Were it not for pumping, flows above mean wd be largely useless. With pumping, they can be used, but then with pump's all variability is of little bother, object then is to see to what extent variability has necessitated pump's.

Occasional flows above mean can be used; bunched flows above mean saturate soil, are lost. So bunching above mean is also bad - if no pump's, is not as bad, but with pump's is worse, bes lose wtr, whereas dry spell is no bother.

So is 2 separate problems. Bunching below mean shows drought threat, w/o pumps. Bunching above mean shows waste after soil saturation. Altho that is qualified, bes with supplemental pumps can A area regularly served as soil capacity is very hi. Main problem remains simul flows above distrib. capac. Skew is index to these, or LCR.



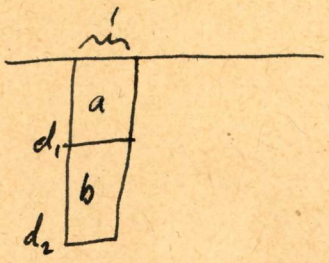
Take a 7-day moving ~~cumulation~~ total or departure ~~from~~ below mean;
then its σ is an index to both duration & severity of dry spells.
Let length of moving ave. be time it takes to serve all land with mean flow?



Movg ave. of deviations below mean is as good as cumulative deviations.
~~But averaging is needless step. Make it a moving total.~~

Mean is wrong baseline. Better to choose mean of utilizable flows, i.e. excluding hi flows beyond capac. But this calls for separate analysis of each ditch. Mean is too hi for some, too low for others. Best it's as good as any.

Value of wtr after drought becomes greater & greater, then falls to 0 after is too late. So so many consec. days w/o wtr shd count same as whole dry summer. This probly overstates problem some.



$d_2 - d_1 = d_1$

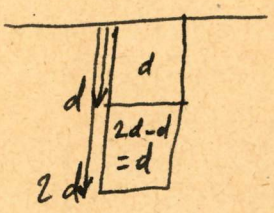
$d_2^2 - d_1^2 > d_1^2$

$d_2^2 > 2d_1^2$

But $d_2 = 2d_1$

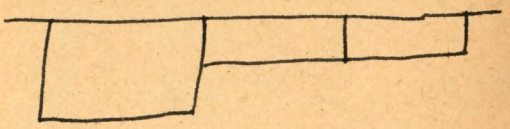
$(2d)^2 > 2d^2$

$4d^2 > 2d^2$



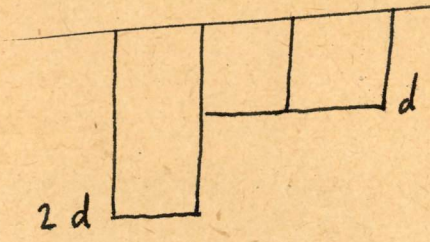
$(2d)^2 = 4d^2$

$(2d)^2 - d^2 = 3d^2$



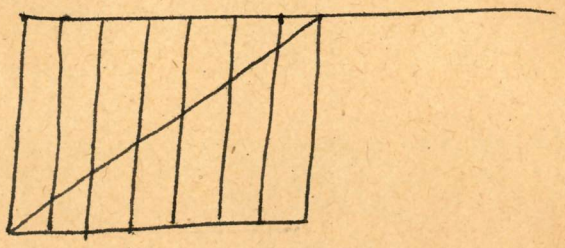
Contribution of (a) to index is d^2

.. (b) .. .. .. $(2d)^2 - d^2 = 3d^2$, or 3 times as much as (a).



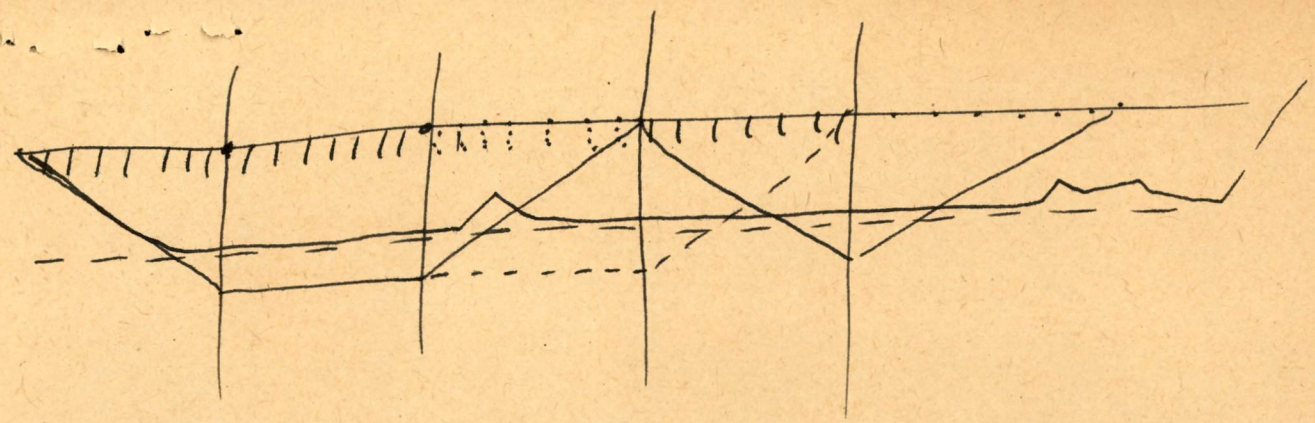
$(2d)^2 > 2d^2$

$4d^2 = 2 \times 2d^2$

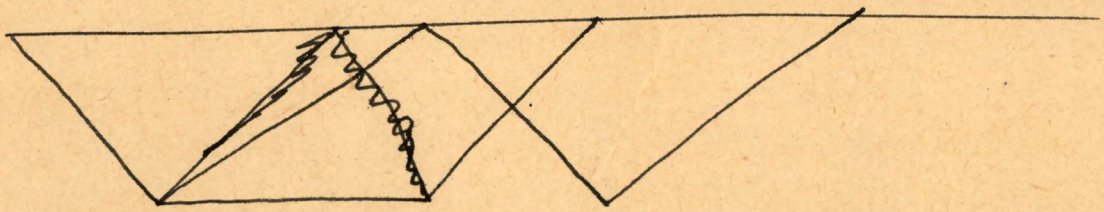


~~$(3d)^3 = 9d^3$~~

$(2d)^3 = 8d^3 = 4 \times 2d^3$



Arbitrary lines make for fallacies. Must choose some other method of emphasizing lower depths. Could be a zone system, but try cubing, maybe better.



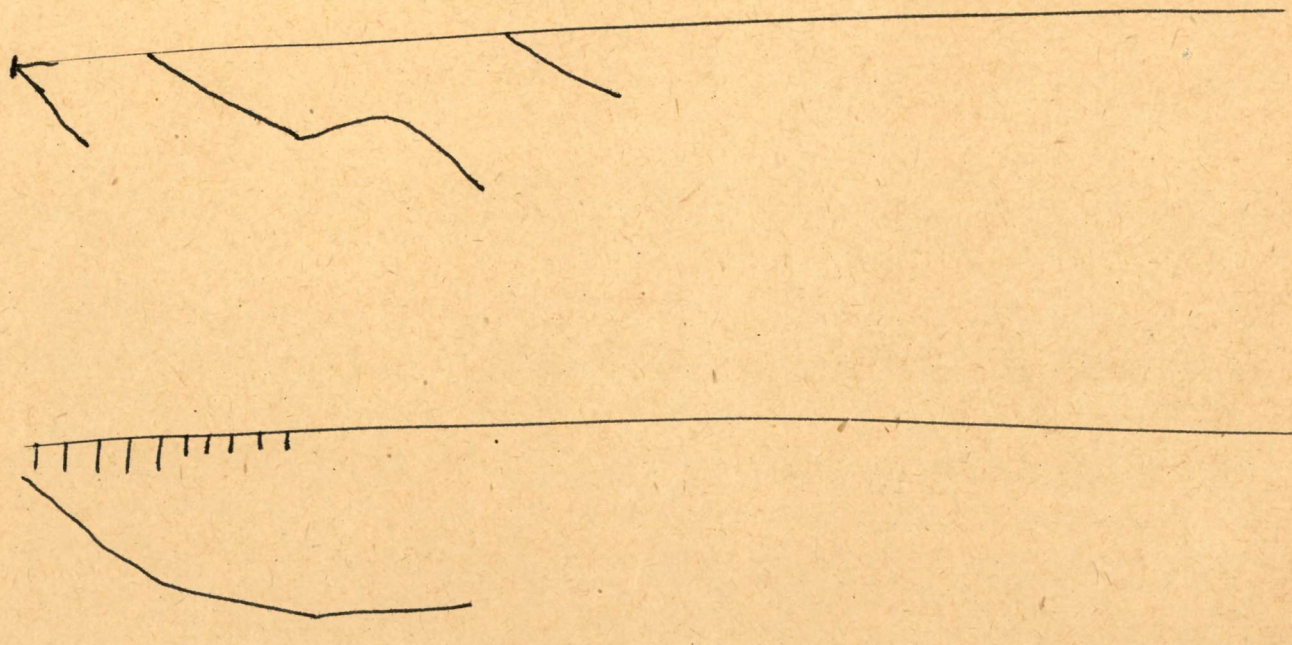
$$\frac{dx^2}{dx} = 2x$$

$$\frac{\frac{dy}{dx}}{y} = \frac{2x}{x^2} = \frac{2}{x}, \text{ of } \frac{1}{x}$$

$$\frac{dx^3}{dx} = 3x$$

$$\frac{\frac{dx^3}{dx}}{x^3} = \frac{3x}{x^3} = \frac{3}{x^2}$$

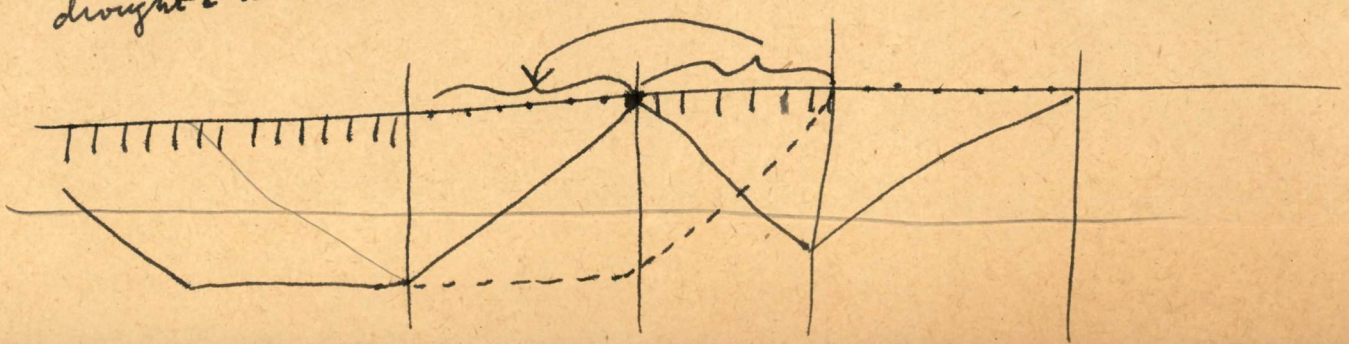
Cumulative sum of deviations below mean



You can evaluate by the single severest dry period. So take cum. devns below mean, & lowest pt reached. But many diff. combos and same place and summer.

Suppose we have just mean days & deficit days, no surplus days, over a stretch. Then it makes no diff. in moving total method, how they are distrib. Method cuts off surplus days when they are bunched, but not mean days or below.

We must let deficit days accumulate, otherwise a broken drought & a continuous one get same rating, as below. (count identical triangles)



So must accumulate deficits ~~dep~~ Or take longer mov'g ave pd.

Or take not just area, but distance ~~bel~~ below mean into account. Of course distance below mean is part of area. But give it more weight. σ does so.

Take an e.g. & see how much.

28
49
21
98

28
28
49
405

28
21
28
21
98

140
343
91
514

140
91
140
91
462

$\frac{462}{574} = .805$

$\sigma_1 = \sqrt{\frac{574}{28}}$

$\sigma_2 = \sqrt{\frac{462}{28}}$

$\frac{\sigma_2}{\sigma_1} = \frac{\sqrt{462}}{\sqrt{574}} = \sqrt{.805} = .891$

So don't take σ_1 but σ_1^2, the "variance". Even this probly gives too little weight to consecutiveness of deficits.

E.g. cf'g σ with area. 7 yr moving sum

	Case 1			Case 2		
Yr	Neg dum.	7 yr moving sum	7 yr sum squared	Neg dum	7 yr moving sum	7 yr sum squared
1	1	1	1	1	1	1
2	1	2	4	1	2	4
3	1	3	9	1	3	9
4	1	4	16	1	4	16
5	1	5	25	1	5	25
6	1	6	36	1	6	36
7	1	7	49	1	7	49
8	1	7	49	0	6	36
9	1	7	49	0	5	25
10	1	7	49	0	4	16
11	1	7	49	0	3	9
12	1	7	49	0	2	4
13	1	7	49	0	1	1
14	1	7	49	0	0	0
15	0	6	36	1	1	1
16	0	5	25	1	2	4
17	0	4	16	1	3	9
18	0	3	9	1	4	16
19	0	2	4	1	5	etc
20	0	1	1	1	6	
21	0	0	0	1	7	
22	0	0	0	0	6	
23	0	0	0	0	5	
24	0	0	0	0	4	
25	0	0	0	0	3	
26	0	0	0	0	2	
27	0	0	0	0	1	
28	0	0	0	0	0	
Σ	14	98	514	14	98	462

Case 1 - Upper triangle Case 2 - Lower triangle

Day	Base	Squared	Cubed	Base Value	Upper Value	Base^2	Upper^2	Subtraction of squares	Base^3	Upper^3	Subtraction of cubes
1	7	49	343	7	7	49	49	0	343	343	0
2	6	36	216	7	6	1	36	13	343	216	127
3	5	25	125	7	5	1	25	24	1	125	218
4	4	16	64	7	4	1	16	33	1	64	279
5	3	9	27	7	3	1	9	40	1	27	316
6	2	4	8	7	2	1	4	45	1	8	335
7	1	1	1	7	1	1	1	48	1	1	342
		140	784					203			1617

$\frac{140}{203} = .690$

$\frac{784}{1617} = .485$

I have been troubled to find a good measure of demand for water.

Res varies w. crop.

But Blaney & Thornthwaite emphasize that need for wtr mainly varies w. heat supply. Use temp. data to measure this.

Can plug this into Kanwah cumulative deficit data, get deficits of supply under demand.

My original unsuccessful effort to show benefits of combining CV streams was erroneously based on mean annual flows. But it is the extremes ~~where~~ which are least coordinated. And it is these which most need ironing out.

So: take min flows for each year. Combine them, find extreme minima sharply reduced. And of course moreso because they are not simultaneous minima.

This is essentially the idea of my Kaweah R. analysis. Can apply same idea to CV streams: take specific months and days, over years.

For minima and maxima, find relative range of combined flows, cf vs relative ranges of individual flows. This, which we already did on Kaweah, is more significant than I had thought, where extremes are important.

Might work this into index of clustering of deficits, too. The extreme dry period is what counts. You cannot plant any crop that cannot stand that, regardless of how good your water supply is the rest of the time. So we might just take the most unfavorable period for each ditch, ignore the rest.

Sued 13

Diff. between mean devn & σ is σ becomes greater as deviations of given total value are more bunched in a few deviant values.

I think there is no purely stat. reason to expect that c.v. will be higher for one month than for whole yr, (each taken over many years). Except that a year is longer, hence more inclined to be near average.

From viewpt. of adding a new source of variation, this will push some points nearer the mean, & others farther. So Σ devns remains fixed. But now devns will be more bunched. Consider all the points in a given column, or freq. range. Half go closer to mean, half farther from it. Net result: Δ Σ squared devns.

In any event, what I am getting at is Δ diff. of diversions of Kuch &/or Σ devns.

Cut out, reject, highest flow yrs.? For summer mos., cdn't reject as many as for spring, wd. interfere then with intermonth cfsons. We'd be throwing out good data on what ditch cos. did in those years. So use all the years.

Devise this important index of variability: s.d. of cumulative departures from mean. Probly computer can handle easily.

Better, take monthly figs. σ of cum. departures from given annual supply, according to fixed seasonal pattern, & various fluctuating patterns.

Weight each point by + those before it?

Make 2 indices. One for flows above mean. % of flows unusable, Due to bunching.

Are 2 kinds of capacity involved: simul cap. of canals; & periodic capac. of soil. Latter exceeded when 7 day ave exceeds 7 day capac.

So index above mean is simply % of flows not usable: daily flows above simul cap: + 7-day flows above 7-day capac. / ÷ all flows above mean

Reduce workload, on daily clustering of deficits, by taking only driest years, where deficits are more of a problem.

Index of Clustering of deficits

Rancocas R.; March - Sept 1952

(March) ($\frac{1}{2}$ mean = 808)

	daily net deficits below $\frac{1}{2}$ mean	% of $\frac{1}{2}$ mean	10 day moving ave.	10 day ave. cubed
1	14	1.7		
2	130	16.1		
3	188	23.3		
4	193	23.9		
5	218	27.0	13.4	2406
6	228	28.2	13.2	2300
7	0	0	11.6	1561
8	22	2.7	9.3	804
9	89	11.0	6.9	329
10	0	0	4.2	74
11	0	0	1.4	3
12	0	0	1.4	3
13	0	0	1.0	1
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0		

use an ave. year.

1. take net deficits below $\frac{1}{2}$ mean for each day
2. take moving ave.
3. % of $\frac{1}{2}$ mean
4. Cube this
5. take ave. of the cubes

final result = a single number for the whole year.

~~period (year, [illegible])~~

1950 - 51

Hancock R.; March Sept. 1952

	Aug. daily net deficit below ½ mean	% of ½ mean	10 day moving ave.	10 day ave. cubed
1	0		3.4	39
2	0	moving ave.	6.9	329
3	0	0	10.6	1191
4	20	2.5	14.3	2924
5	258	31.9	18.6	6435
6	283	35.0	23.2	12,487
7	293	36.3	28.3	22665
8	303	37.5	33.7	38,273
9	342	42.3	39.3	60698
10	374	46.3	45.0	91,125
11	410	50.8	48.0	110,592
12	435	53.9	51.0	132,651
13	455	56.3	53.9	156,591
14	483	59.8	56.8	183,250
15	506	62.6	59.2	207475
16	520	64.4	61.3	230,346
17	528	65.4	63.2	252,436
18	531	65.7	64.9	273,359
19	538	66.6	66.5	294,080
20	548	67.8	67.9	313,047
21	557	69.0	69.1	329,939
22	573	70.9	70.3	347,429
23	585	72.4	71.6	367,062
24	597	73.9	72.9	387,420
25	606	75.0	74.3	410,172
26	618	76.5	75.6	432,081
27	630	78.0	76.9	454,756
28	638	79.0		
29	647	80.1		
30	655	81.1		
31	660	81.7		

Hawkah River ; March - Sept. 1952

Sept.

	daily net deficits below ½ mean	% of ½ mean	10 day moving ave.	10 day ave. cubed
1	663			
2	668			
3	670			
4	673			
5	668			
6	673			
7	676			
8	68			
9	68			
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11				
12				
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Index of Clustering of Deficits

days	net deficits below ½ mean	10 day moving ave.	% of ½ mean	cubed
1				
2				
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Prepared by
State Climatologist
U. S. Weather Bureau
Columbia, Missouri
March 7, 1957

PRECIPITATION IN MISSOURI

Much has been written about precipitation patterns, using long-term average figures. Some studies have included frequency distributions, showing the extent of variations from the mean. Other studies have portrayed cumulative sums of various combinations of weeks, months, and years, and departures of these cumulative values from the long-term average. All of these studies show important aspects of our climatic patterns.

In general, the precipitation which falls on Missouri is "used" in several ways. Some of it evaporates back into the air almost immediately, some soaks into the topsoil, where part of it is "pumped" back into the air by growing plants, or is evaporated from the surface of the soil layer. Some sinks in through the soil profile and is stored in the root zone, or becomes "ground water" at lower levels. Some runs off into surface drainage ways and finds its way into our major river systems.

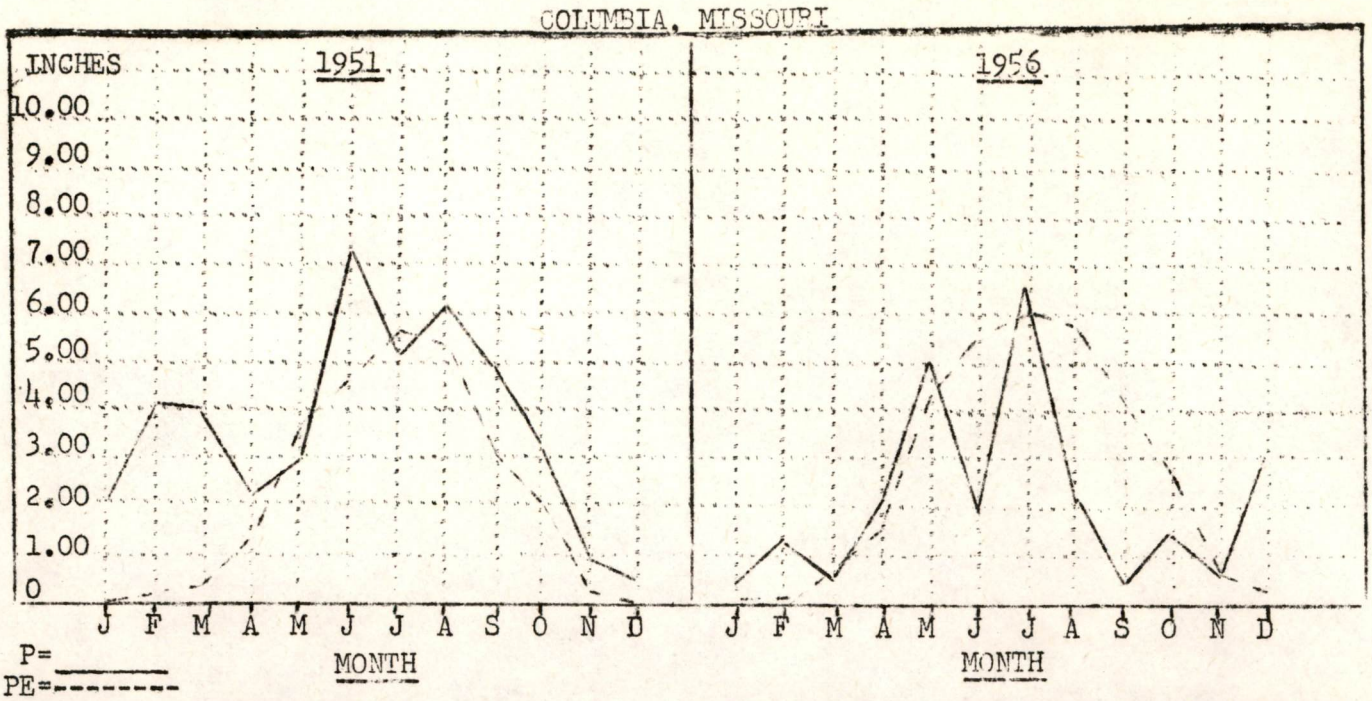
At times each of these "uses" of water become all-important, and we tend to overlook the others. During a flood, the runoff becomes the dominant factor. During the height of the crop growing season, the moisture condition of the topsoil is most important.

Several methods of estimating how the incoming precipitation is "used" have been developed. For this study we have chosen Thornethwaite's method. In very simple terms, his method enables one to use the observed temperatures and length of day to estimate the "potential evapotranspiration". This can be thought of in a way as the amount of water that would be lost back to the atmosphere by evaporation from the earth's surface and by transpiration from growing plant life, if water were continually available in the top layers of the soil. If the root zone and subsoil layers become dried out, the actual loss would be something less than the "potential" value. If all of the incoming precipitation can be "used" by evapotranspiration, none will be left over for the other "uses" described above.

A comparison of actual precipitation and potential evapotranspiration for each month over a long period of years should yield some useful patterns to help plan use of water in many fields of activity. One advantage of this approach over a comparison against long-term mean values of rainfall is that it takes into account the variation in "estimated need" for water. For example, in an extremely hot July in Missouri, the potential loss of water by evapotranspiration will greatly exceed the long-term average for rainfall for July. In fact, it would take unusually heavy rains to equal the potential loss by evapotranspiration.

The following illustration shows the comparison of monthly precipitation and potential evapotranspiration for Columbia, Missouri. (P.E. computed by Thornethwaite's method). 1951 was a year with abundant rainfall in nearly every

month. 1956 was a year with moisture deficiency in several months.



In winter months, the loss from evapotranspiration is at a minimum, so whatever precipitation falls has a better chance to go into the topsoil or into streams as the temperature goes above freezing.

The attached graphs are intended to show the seasonal patterns involved at representative stations in Missouri. The lines marked 5%, 25%, 50%, 75%, and 95% are taken from cumulative frequency distributions for each station. For example at Tarkio, Missouri in the month of July, 5% of the (P-PE) values were less than -5.80 inches, 25% were less than -3.75 inches, 50% were less than -2.75, 75% were less than -.80 and 95% were less than +3.80.

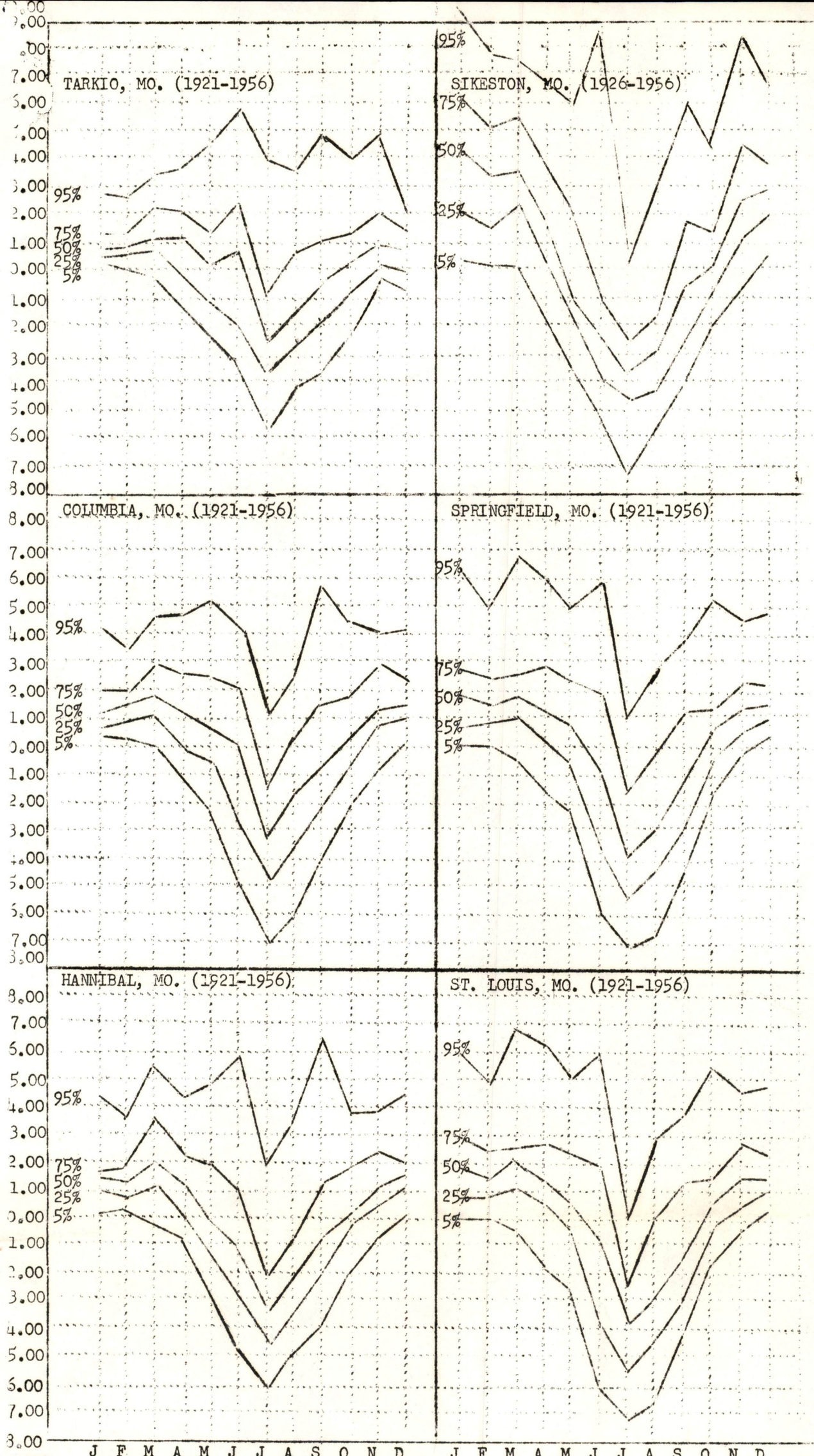
If you use an equation like the following to describe the hydrologic cycle, the graphs and tabulations presented in this study have more meaning.

$$P = E + T + RO + S$$

Where P = precipitation
E = evaporation
T = transpiration
RO = surface runoff
S = storage in the topsoil and as groundwater

In this study the P.E. (potential evapotranspiration) is an estimate of the maximum value of (E + T). If this value exceeds P for a given month, little if any of the precipitation received during that month will go into the (RO + S) portion, in fact, if any moisture is in storage from previous months, some of it will go into the (E + T) portion to make up some portion of the deficit. When P exceeds (E + T) then some of P will go into the (RO + S) phase of the hydrologic cycle.

The graphs, then, portray the times of year when it is most likely to build up moisture for storage and runoff, and those times when evaporation and transpiration take the lion's share of incoming precipitation.



CUMULATIVE FREQUENCY OF (P-PE)

CUMULATIVE FREQUENCY DISTRIBUTION
(P-PE) THORNETHWAITE'S METHOD

SIKESTON, MISSOURI
(1926-1956)

CUM. %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	.30	.30	.20	-1.35	-3.40	-5.25	-7.20	-5.85	-3.65	-1.70	-.40	.75
10	.70	.70	1.30	-.95	-2.90	-4.80	-6.45	-5.60	-3.30	-1.00	0.00	1.05
25	2.20	1.50	2.40	.40	-1.65	-3.75	-4.60	-4.30	-2.40	-.60	1.30	2.30
50	4.20	3.40	3.85	2.25	-1.00	-2.10	-3.75	-3.15	-.65	.05	2.60	3.10
75	6.00	5.20	5.50	3.40	2.20	-.75	-2.40	-1.75	1.80	1.40	4.60	3.95
90	9.10	6.70	7.15	5.50	4.20	4.00	-.20	0.00	3.50	3.25	6.30	6.00
95	9.70	7.80	7.80	6.70	6.00	9.00	.75	3.00	6.20	4.50	8.80	6.75

COLUMBIA, MISSOURI
(1921-1956)

CUM %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	.40	.40	0.00	-1.40	-2.50	-5.50	-7.20	-5.80	-3.40	-1.60	-.50	.30
10	.50	.50	.30	-.95	-1.80	-4.80	-6.50	-5.25	-2.80	-1.30	-.30	.60
25	.90	.95	1.05	-.15	-.60	-3.10	-4.90	-3.50	-1.85	-.50	.90	1.15
50	1.30	1.40	1.90	1.15	.50	-.20	-3.40	-1.30	-.50	.50	1.50	1.60
75	2.00	2.00	3.00	2.75	2.60	2.10	-1.50	.80	1.75	1.90	3.00	2.30
90	3.20	2.75	3.85	4.05	4.30	3.60	.30	2.20	4.10	2.85	3.90	3.60
95	4.15	3.50	4.70	4.75	5.30	4.30	1.00	2.75	5.85	4.30	4.20	4.30

ST. LOUIS, MISSOURI
(1921-1956)

CUM %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	.40	.40	.40	-.60	-3.70	-5.80	-6.10	-6.10	-4.10	-1.90	-.30	.50
10	.60	.60	.60	-.70	-2.90	-5.40	-5.60	-5.40	-3.60	-1.60	.30	.80
25	1.10	1.10	1.30	.20	-2.10	-3.80	-4.50	-4.60	-2.00	-.60	1.20	1.40
50	1.50	1.50	2.40	1.40	-.60	-2.60	-3.50	-3.30	-1.20	.40	1.70	1.90
75	2.30	2.50	4.00	3.20	1.70	-.50	-1.60	-1.80	0.00	1.80	2.80	2.70
90	4.30	3.40	5.20	4.80	4.80	1.90	1.70	1.70	1.80	3.10	3.80	4.00
95	6.00	3.70	6.20	5.60	6.50	2.50	2.30	2.70	3.20	4.00	4.40	4.60

SPRINGFIELD, MISSOURI
(1921-1956)

CUM. %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	0.00	.10	-.40	-1.70	-2.50	-5.95	-7.05	-6.60	-4.30	-1.45	-.20	.45
10	.20	.40	-.10	-.60	-1.85	-5.35	-6.60	-5.85	-3.90	-1.00	.05	.70
25	.80	.90	1.20	.60	-0.70	-3.60	-5.30	-4.30	-2.80	-.10	.65	1.10
50	1.80	1.40	1.90	1.50	.60	-1.00	-3.75	-2.90	-1.10	.90	1.60	1.60
75	2.80	2.40	2.60	2.80	2.40	2.00	-2.40	0.00	1.50	1.50	2.80	2.35
90	4.20	4.20	5.50	5.10	3.50	4.50	-.40	1.85	3.10	3.60	4.05	4.00
95	6.10	4.90	6.90	6.30	5.10	6.00	.10	3.00	3.85	5.50	4.60	4.75

TARKIO, MISSOURI
(1921-1956)

CUM. %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	.20	0.00	-.30	-1.30	-2.30	-3.70	-5.80	-4.20	-3.40	-2.10	-.40	-.60
10	.20	.10	0.00	-.90	-2.00	-2.90	-4.70	-3.70	-2.90	-1.50	-.20	-.50
25	.40	.50	.60	-.10	-1.20	-2.00	-3.70	-2.50	-1.70	-.50	.20	0.00
50	.60	.80	1.20	1.10	.20	.70	-2.80	-1.50	-.30	.40	.90	.80
75	1.10	1.30	2.40	2.10	1.40	2.60	-.90	.90	1.30	1.20	2.30	1.30
90	1.80	1.90	3.10	3.60	3.40	5.20	.30	3.00	4.20	2.60	4.30	1.90
95	2.70	2.60	3.60	3.80	4.60	5.90	3.90	3.60	5.20	4.00	4.80	2.20

(Continued next page)

CUMULATIVE FREQUENCY DISTRIBUTION (Continued)
(P-PE) THORNETHWAITE'S METHOD

HANNIBAL, MISSOURI
(1921-1956)

CUM. %	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
5	.10	.40	-.10	-.70	-2.90	-4.80	-6.10	-4.85	-3.80	-1.70	-.50	.15
10	.30	.50	.40	-.50	-2.50	-4.30	-5.40	-4.15	-3.20	-1.20	.10	.45
25	.90	.70	1.30	.20	-1.60	-2.90	-4.80	-3.45	-2.15	-.30	.65	1.20
50	1.40	1.30	2.00	1.30	-.30	-.70	-3.40	-2.35	-.80	.30	1.30	1.60
75	1.80	1.80	3.50	2.30	2.00	1.30	-2.20	-.75	1.50	1.85	2.50	2.05
90	3.90	2 .40	4.80	3.70	2.90	3.00	-.10	1.60	4.00	3.30	3.65	3.40
95	4.40	3.40	5.60	4.40	4.70	5.90	1.90	3.65	6.80	3.75	3.95	4.65

TARKIO, MISSOURI
P-PE (Thornethwaite's Method)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1921	.72	-.18	.05	1.46	1.29	M	-3.12	-2.56	1.65	2.17	-.26	.17
1922	.76	1.47	1.97	1.54	-.73	-3.52	.35	-2.24	-.29	.44	3.85	.30
1923	.12	.18	2.32	1.33	-.46	-1.44	-5.96	-.05	.10	.24	3.19	.44
1924	.24	1.26	3.18	-.59	-1.04	5.30	.09	-1.98	-.91	-2.11	.02	2.16
1925	.44	.86	.91	.67	-1.72	1.76	-2.79	-5.78	-.91	3.05	.09	.46
1926	.96	.75	1.19	-.42	-.73	1.33	-3.18	-1.62	9.98	.69	1.71	.90
1927	.24	1.20	1.86	3.63	-1.61	.03	-3.09	-.76	.06	1.55	-.30	.52
1928	0	2.88	-.15	1.92	-1.01	2.96	-.80	-.25	3.38	.35	4.19	.65
1929	1.81	1.28	.95	3.98	2.18	1.24	5.18	-3.45	.76	4.94	1.60	.37
1930	.71	.10	.57	-.01	1.21	.75	-6.08	-1.42	-1.01	-.29	2.58	.20
1931	.17	.35	1.52	1.52	-.72	.62	-3.94	-1.30	1.82	.56	4.76	1.85
1932	1.30	1.01	.53	.71	.84	-2.35	-3.03	.60	-1.06	-.33	1.36	1.22
1933	.15	.30	2.67	-.70	.36	-2.67	-3.63	1.23	.74	1.09	0	1.10
1934	.96	.80	.15	-1.40	-1.99	-3.68	M	-4.77	3.88	1.92	4.15	.46
1935	1.18	.86	.70	.43	6.36	4.52	M	-3.10	1.14	2.45	2.83	.35
1936	2.39	.46	-.85	1.76	1.16	-2.51	M	M	3.64	-.43	-.16	1.40
1937	2.64	.62	1.39	3.96	-2.72	-2.96	4.26	-3.56	-2.73	.43	.39	.98
1938	.39	.79	.91	.97	4.67	-1.66	-1.06	1.10	-1.52	-2.74	2.23	.54
1939	.89	1.13	2.79	1.80	-1.95	1.50	-5.08	-1.81	-3.65	-.68	.46	.35
1940	.96	1.44	2.90	2.29	-.79	-2.70	-.58	2.80	-2.95	-.72	2.28	1.11
1941	1.43	1.66	.72	.46	1.88	2.39	-4.32	-3.92	6.03	10.25	.92	2.51
1942	1.17	1.50	2.29	-.92	4.43	5.08	-4.31	.20	.90	.81	.92	2.38
1943	.50	.82	.61	-.76	.99	4.75	-2.78	-1.82	-.99	M	M	M
1944	M	M	M	M	M	-1.61	-3.69	.34	-1.66	1.37	.93	1.84
1945	.34	1.65	2.51	2.78	3.23	2.33	-2.77	.77	.19	-1.41	.30	1.04
1946	.95	-.06	5.85	-1.75	.53	.15	-2.83	-2.58	3.82	.62	1.08	.02
1947	.29	.11	.45	2.86	.85	7.51	-2.88	M	-3.16	-.99	1.19	1.83
1948	.27	1.47	3.80	.48	-1.47	-1.54	-3.17	-3.31	-1.29	1.41	2.09	1.16
1949	3.51	.65	1.54	.73	-.81	6.31	-2.63	-1.52	1.33	.68	.39	.59
1950	.62	.99	.57	.30	.98	-1.20	.14	2.72	-.74	.65	.62	.11
1951	M	2.45	3.31	3.52	2.06	3.70	-.88	2.23	-.72	-.34	1.40	.62
1952	.34	.33	2.85	3.10	.75	3.03	-1.97	3.68	-2.21	-1.51	5.31	1.17
1953	.25	.89	1.94	.75	.21	-3.50	-3.77	-1.62	-1.88	-1.98	.86	1.05
1954	.01	.71	.66	1.49	2.78	-.53	M	2.55	-3.28	1.47	-.64	.39
1955	1.70	2.96	.29	1.54	-2.57	1.73	M	-4.32	-1.15	-.38	.18	.27
1956	.53	.64	-.20	-.63	-1.36	-1.07	-1.56	-1.68	-2.18	-.91	2.44	M

HANNIBAL, MISSOURI
P-PE (Thornethwaite's Method)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1921	1.35	.11	1.89	2.44	-2.79	-2.58	-5.17	.35	3.76	.01	.59	1.40
1922	1.56	1.15	5.53	3.40	-1.90	-4.80	-3.54	-3.31	-.51	-.44	2.18	.38
1923	.55	.53	3.96	.63	-1.47	-.21	-5.48	1.90	.05	.97	.83	1.99
1924	1.10	1.35	2.33	-.23	1.26	1.26	-3.12	-3.08	-.89	.31	.04	3.36
1925	.39	2.37	1.44	-.68	-.43	-2.04	-2.04	-.58	2.09	3.05	1.85	1.54
1926	1.44	2.14	2.94	2.84	-1.71	.26	-4.35	.69	9.49	1.14	2.77	1.07
1927	1.56	1.17	5.98	2.03	2.73	.21	-3.29	-1.68	-1.44	2.44	2.01	2.05
1928	.41	1.86	.16	1.12	-.63	.80	-3.49	-4.61	1.39	1.51	2.77	1.82
1929	3.33	.84	3.97	1.62	1.70	-.12	0	-3.86	-.20	2.78	.78	.66
1930	3.45	1.27	.45	-.90	1.78	5.03	-6.14	-4.40	2.65	.41	2.22	.43
1931	.14	1.88	2.08	.21	2.14	-.38	-4.27	-2.59	-.50	.59	2.56	2.08
1932	1.40	.80	1.52	.06	-2.47	1.10	-3.07	4.81	-1.31	.16	.43	4.70
1933	1.56	.44	3.48	.29	3.13	-4.94	-5.30	-3.05	-2.37	-.58	-.90	1.46
1934	.79	.90	1.69	-.53	-2.93	-2.74	-4.26	-3.19	3.05	-.44	4.34	1.19
1935	1.73	1.93	2.02	1.44	7.96	1.77	-.60	-3.45	-.84	.44	3.65	.91
1936	1.18	1.95	-.18	-.40	-2.68	-4.72	-3.30	-3.37	2.96	0	1.23	2.03
1937	4.30	.59	.47	2.02	-.63	-3.43	2.77	-4.68	-2.72	-.74	.75	2.00
1938	4.09	1.66	1.43	1.99	2.14	-1.30	-3.32	-1.18	-2.96	-1.97	3.58	2.50
1939	1.82	1.96	2.81	2.91	-.64	2.03	-3.74	4.20	-4.03	-.51	.98	1.27
1940	1.70	.68	1.86	1.80	-1.84	-2.02	-6.15	-.33	-3.56	.56	1.76	1.78
1941	4.15	.56	.68	1.50	-3.02	-2.84	-2.05	-1.21	6.31	7.26	1.14	1.41
1942	.26	4.28	1.45	1.75	2.86	1.64	-1.08	-2.71	-.87	-.77	3.85	4.74
1943	.67	.73	1.15	.27	5.90	-2.85	-2.41	-1.88	-.13	2.22	.83	1.65
1944	.62	1.97	4.50	6.69	-.47	-4.33	-4.95	-.60	1.27	0	3.38	1.52
1945	1.43	1.23	4.73	3.50	.33	6.42	-5.18	-3.84	7.47	-.30	.50	1.67
1946	2.48	.67	1.74	.40	2.10	-1.97	-4.09	2.56	-1.99	3.85	3.46	1.28
1947	1.26	.14	2.61	4.12	1.34	8.41	-5.08	-3.63	-2.02	.87	1.23	2.43
1948	1.38	2.12	3.96	-.17	.49	-.11	.19	-1.41	-2.24	.86	1.09	1.28

HANNIBAL, MISSOURI (Cont'd)

EAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1949	5.37	1.60	2.12	-.38	-.21	2.83	-5.11	-3.92	1.82	3.16	-.73	5.32
1950	2.74	1.84	1.26	2.72	-1.73	-2.70	-.62	-1.77	-2.14	-2.47	.85	.30
1951	1.53	3.91	5.08	.72	-.68	.42	-3.29	-2.11	.62	.36	2.05	1.37
1952	.73	1.82	3.23	1.29	1.18	-3.10	-3.53	-2.05	-1.49	-.44	2.40	1.69
1953	1.03	.97	3.77	.58	-1.24	-4.28	-4.63	-4.67	-1.80	-.35	-.03	1.02
1954	1.02	.91	.47	4.06	-.12	-3.88	-2.40	-.02	-3.06	2.43	.69	1.55
1955	1.76	2.85	1.04	1.45	2.82	1.79	-5.79	-3.45	-1.65	3.84	.12	.23
1956	.31	.80	-.17	1.11	-1.53	-2.59	-2.58	-2.22	-3.78	-1.80	.27	M

ST. LOUIS, MISSOURI
P-PE (Thornethwaite's Method)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1921	.87	.68	4.56	4.80	.13	-3.94	-4.43	-2.96	1.01	-.67	3.74	2.66
1922	.74	1.39	4.07	5.15	-3.15	-5.40	-3.16	-4.29	-1.97	-.68	1.53	4.82
1923	1.81	1.50	3.85	1.38	2.46	-1.33	-4.09	.39	-.09	2.15	1.14	2.78
1924	1.15	1.12	2.92	-.35	3.47	1.58	-1.36	-1.95	-1.06	1.54	.77	4.63
1925	.50	1.86	.49	-.11	-1.81	-1.41	-3.84	-3.15	-.45	1.64	3.63	1.43
1926	1.59	2.26	3.63	3.16	-2.58	-3.31	-5.47	-4.30	3.43	1.87	2.41	1.12
1927	3.66	.13	6.74	4.22	5.72	-2.19	-2.53	-2.10	-1.82	2.19	4.80	2.31
1928	1.81	2.23	1.50	1.50	-1.65	3.05	.82	-.88	-1.66	-.18	1.27	1.99
1929	2.11	.88	4.19	4.74	6.94	-1.43	-2.91	-2.08	-1.85	3.02	1.05	2.87
1930	5.70	1.75	.34	-1.32	-2.28	-3.03	-6.32	-6.08	-.71	.03	1.04	.77
1931	.20	1.41	2.03	1.11	.41	-4.56	-2.25	-2.21	.67	.41	3.29	2.78
1932	2.23	1.23	1.05	.98	-2.03	-3.60	-.88	2.92	-1.53	2.43	1.75	2.30
1933	1.71	.86	4.26	1.98	4.62	-6.88	-1.42	-5.16	-2.48	1.12	1.01	1.44
1934	1.52	1.26	2.55	.32	-4.25	-4.02	-5.98	-3.12	2.67	-.30	1.70	1.92
1935	2.69	1.04	5.13	.98	4.35	-.46	-3.18	-4.12	-.66	.56	2.55	1.11
1936	1.32	1.97	.62	1.28	-3.94	-2.93	-6.65	-6.57	1.40	.79	1.74	1.85
1937	5.21	1.45	1.30	5.55	.57	1.89	-4.30	-4.65	-4.04	-.04	-.04	3.56
1938	1.28	3.11	7.98	1.17	2.29	-.92	-2.45	-5.44	-3.49	-1.63	3.28	1.93
1939	3.78	3.15	2.38	4.29	-1.72	-2.52	-3.85	4.58	-3.98	-1.69	1.83	1.20
1940	1.33	1.32	.93	2.08	-1.93	-3.10	-5.10	-1.79	-4.51	-1.36	2.73	2.95
1941	2.28	.61	.19	1.92	-2.74	-3.48	-4.37	-3.82	-.80	4.93	2.36	.81
1942	1.41	2.47	1.07	-.28	1.36	1.58	2.00	-1.97	-1.69	.15	3.54	4.56
1943	.74	.87	2.74	.01	6.76	.16	-4.91	-4.60	-.96	.22	.51	1.85
1944	.10	2.52	2.08	7.17	-.50	-5.06	-2.34	-3.39	.44	-1.49	.45	1.52
1945	1.02	3.44	6.65	3.32	1.36	2.78	-4.32	-1.42	6.24	-.89	1.05	1.64
1946	1.49	2.81	1.09	.25	2.38	-2.79	-4.47	15.48	-2.25	.92	6.77	2.62
1947	2.03	.41	2.01	4.23	-.96	2.22	-4.56	-5.87	-1.58	3.54	2.07	2.13
1948	.94	1.44	4.70	-.26	-.41	-1.73	1.64	-5.19	-1.76	.40	1.67	1.78
1949	7.43	2.43	1.89	-.91	-1.59	-3.75	4.64	-3.94	1.74	4.20	-.60	3.48
1950	7.92	3.14	3.07	2.73	-.26	-1.58	-3.83	2.89	-.77	-1.97	2.87	.79
1951	2.18	5.76	2.13	.41	-2.25	1.20	-2.24	-3.32	.38	.58	3.10	2.38
1952	1.04	1.90	3.23	1.77	-2.34	-5.27	-3.24	-2.85	-3.16	-1.27	1.98	1.66
1953	1.75	1.33	3.16	2.06	-.75	-5.11	-5.72	-5.42	-3.91	.32	-.02	.23
1954	1.44	.06	.57	.23	-.30	-3.79	-4.64	-2.33	-.04	1.64	.64	2.13
1955	1.45	3.03	1.51	-.13	-2.37	-2.33	-.83	-4.33	-.59	2.23	1.91	.03
1956	.73	3.34	.59	1.38	.47	-3.57	2.25	-4.03	-2.88	-2.16	1.97	3.69

COLUMBIA, MISSOURI
P-PE (Thornethwaite's Method)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1921	1.37	.05	1.79	3.81	.09	-2.39	-4.05	.30	5.87	.29	.75	1.28
1922	1.53	1.16	7.69	7.96	.37	-3.65	-2.31	-2.23	-.22	-.81	1.48	1.32
1923	1.14	1.00	3.25	2.33	-1.42	1.14	-2.44	-1.61	-.65	1.16	.66	2.21
1924	1.22	1.95	1.57	-.77	2.50	2.79	.65	1.67	2.08	-.36	.74	4.76
1925	.82	1.21	1.58	1.54	.37	3.12	-4.09	-.33	.34	3.65	2.70	1.88
1926	1.43	1.78	2.19	3.74	-1.29	-1.82	-2.00	-.41	6.28	1.87	2.08	1.60
1927	1.75	.24	6.72	2.90	3.15	1.48	-1.53	.55	-1.63	2.66	3.53	1.94
1928	.91	1.93	-.24	1.32	-2.18	10.76	2.43	2.21	.30	.40	4.05	2.09
1929	2.09	1.03	2.87	3.38	8.79	2.61	-4.76	-5.13	-.42	4.92	1.00	.78
1930	4.41	1.23	.42	-1.14	-.80	-1.93	-6.54	-3.81	-.58	.76	1.49	.42
1931	.15	2.79	2.71	-.59	3.35	-4.95	-4.46	3.56	1.98	.54	2.59	2.00
1932	1.66	.51	.96	-.32	-2.35	.72	-3.25	.68	-1.37	.55	1.01	4.81

COLUMBIA, MISSOURI (Cont'd)

EAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
933	1.40	.97	2.54	-.25	3.43	-4.02	-5.68	-2.48	-.66	1.12	.14	1.75
934	.80	1.06	2.55	-.95	-3.10	-3.22	-7.41	-1.52	5.04	.08	3.41	1.19
935	1.74	.65	1.54	.96	5.19	1.08	-2.95	-5.54	-1.00	1.84	6.28	.97
936	.93	1.40	1.06	-1.21	-1.72	-5.54	-7.11	-6.00	5.88	.16	1.08	2.18
937	4.03	.66	1.71	1.83	.60	-1.40	-3.62	-4.57	-2.01	-.25	1.94	1.78
938	3.34	2.14	3.93	2.55	3.41	3.29	-4.34	-4.78	-2.69	-2.39	3.81	3.09
939	1.36	2.45	1.73	2.68	.65	-2.44	-4.56	3.37	-4.13	-1.16	3.44	.90
940	1.62	1.05	1.26	1.19	-.07	.54	-4.44	1.12	-3.49	-.19	2.06	2.65
941	2.78	.31	.12	1.36	.70	-1.15	-1.62	-2.93	2.17	10.91	1.71	1.49
942	.38	3.62	1.71	-.13	1.21	1.86	-1.92	-1.61	.97	-.65	2.55	4.51
943	.88	.53	1.40	.11	9.86	2.31	-.33	-4.89	1.56	1.96	1.09	2.17
944	.34	2.61	3.36	7.91	-.48	-5.27	-4.17	3.09	1.90	-1.13	1.07	1.58
945	.94	2.44	4.42	4.26	2.85	4.96	-4.95	-3.01	9.53	-.33	-.46	1.44
946	2.40	1.78	.38	.33	3.10	-3.23	-2.00	.61	-2.24	3.24	4.26	1.13
947	.86	.23	3.73	4.48	-.05	1.90	-3.67	-6.19	-1.04	-.03	1.25	1.70
948	1.15	2.01	3.15	-2.02	.08	1.39	.10	-1.07	-1.53	1.34	3.48	1.27
949	6.29	1.85	1.42	.73	1.80	.17	.21	-3.04	3.46	3.00	-.43	3.29
950	2.08	1.28	1.29	2.09	1.33	-.25	-2.27	1.21	-2.03	-1.16	.86	.20
951	2.30	4.05	3.66	.79	-.85	2.70	-.66	.66	1.72	1.24	1.68	1.49
952	.76	1.79	2.94	.76	-.37	-2.25	-5.21	1.74	-1.66	-1.39	3.61	1.49
953	1.29	1.25	2.77	1.37	-1.11	-5.63	-3.82	-2.94	-1.46	-.15	-.37	.90
954	1.01	.76	.71	2.07	2.22	-3.58	-7.60	.42	-2.39	2.73	-.18	1.43
955	1.95	3.15	.80	-.81	.20	2.43	-4.27	-1.21	.08	3.40	.12	.19
956	.42	1.18	-.22	.55	.94	-3.62	.65	-3.56	-3.46	-1.13	-.04	2.84

SPRINGFIELD, MISSOURI
P-PE (Thornethwaite's Method)

EAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
921	1.09	.42	5.65	2.45	-.21	3.48	-6.78	1.88	-.64	.30	1.62	1.66
922	1.38	1.85	-5.56	2.56	-.48	-5.49	-.25	-3.56	-3.47	-.96	3.20	1.91
923	3.13	1.27	1.91	1.38	1.04	.53	-4.12	-5.02	.17	3.07	2.60	2.33
924	1.50	1.10	2.41	.84	3.23	2.43	.31	.12	1.04	-2.01	.87	4.21
925	1.55	.70	-.07	-.27	-.59	-2.32	-2.92	-4.16	2.76	1.67	1.51	.88
926	2.18	.85	2.15	-.32	.27	-1.07	-5.87	.50	4.36	2.04	2.63	1.89
927	3.47	.29	6.41	7.44	2.25	1.16	.70	3.94	-2.46	1.66	4.57	1.87
928	.62	.86	1.51	5.02	.03	7.96	-3.68	2.10	-3.40	-.87	1.38	2.44
929	2.53	1.55	1.63	1.56	6.55	-.26	-5.63	-2.51	-1.24	3.45	.70	1.38
930	5.27	.93	.04	-1.73	.32	-1.21	-6.91	-3.34	-.97	1.10	1.27	1.17
931	.39	2.66	2.13	1.55	.38	-5.65	-3.15	5.06	-4.03	-.14	2.61	1.03
932	3.49	-.06	2.20	.92	-1.00	4.07	-3.21	-2.62	-3.18	2.87	2.80	4.76
933	2.14	.99	1.63	4.57	2.71	-3.54	-2.77	-1.08	1.99	1.18	.31	.55
934	1.18	1.38	2.31	1.56	-2.68	-4.57	-7.28	-3.66	3.17	1.41	4.63	1.51
935	2.36	.73	7.71	.26	3.74	6.47	-5.61	-2.01	-1.42	1.74	1.96	.62
936	.17	1.01	-.47	.77	-2.38	-3.91	-7.06	-6.64	2.79	3.13	.84	2.34
937	6.94	1.08	1.31	3.24	1.01	3.82	-2.69	-4.94	-1.22	-.20	1.29	2.38
938	3.11	4.10	1.10	1.20	2.67	.23	-4.75	-6.13	-2.65	-.12	4.40	1.12
939	2.36	3.91	.69	1.95	2.27	-2.03	-4.01	-1.88	-4.25	-.34	2.10	1.40
940	.89	1.24	1.79	2.99	-1.35	-3.20	-2.97	-.54	-1.68	-.84	2.50	2.34
941	2.72	.93	.56	4.88	-2.52	-1.89	-3.52	-2.66	3.30	6.15	1.70	2.22
942	1.52	2.12	.07	2.59	-1.03	.49	-3.83	-2.66	.76	1.39	3.46	5.72
943	.07	.62	2.75	1.85	12.60	-1.31	-4.75	-4.35	2.33	1.85	-.06	2.63
944	.74	2.93	2.81	2.06	-1.74	-4.11	-.72	.80	-1.58	.75	1.03	.91
945	.88	4.15	7.12	9.94	1.12	2.60	-4.57	-3.99	5.65	.97	-.29	.51
946	2.85	2.84	-1.07	1.27	3.82	-3.85	-5.32	.82	-2.54	-1.49	7.17	2.66
947	.28	.35	2.41	5.30	.89	1.62	-.59	-6.54	.51	-.01	1.28	1.41
948	.44	1.77	3.30	-1.38	-.22	5.34	-1.42	-3.99	-1.49	.53	2.17	1.75
949	4.15	2.30	1.85	-.11	1.01	1.94	-2.98	-3.37	2.43	6.02	.07	4.10
950	6.53	1.83	1.63	1.43	2.68	-1.73	-3.62	1.03	-1.49	-.54	.21	.13
951	2.36	5.10	2.46	.82	-.58	3.82	-.30	-2.29	1.45	2.41	4.09	1.09
952	.77	3.15	2.80	1.01	-1.50	-6.93	-5.00	1.10	-3.94	-1.21	2.72	1.50
953	1.43	1.09	2.89	4.18	.32	-5.95	-7.05	-5.62	-4.09	-.24	.12	1.17
954	1.57	.80	.95	.98	2.95	-5.39	-5.33	-3.42	-.87	4.50	.18	5.12
955	.40	5.17	1.71	-2.26	1.17	-1.01	-3.36	-5.99	-2.15	.10	-.15	.14
956	1.00	1.65	-.31	.06	1.62	-1.60	-2.09	-4.81	-3.71	.74	1.60	2.50

SIKESTON, MISSOURI
P-PE (Thornethwaite's Method)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1926	M	M	M	1.82	-2.87	-3.21	1.91	6.66	-2.31	1.05	4.39	3.03
1927	9.89	.47	4.78	11.27	9.21	4.59	-2.09	-2.35	5.24	-.95	5.04	3.03
1928	2.09	2.21	M	4.89	M	12.67	-4.29	-1.30	.14	3.48	-.77	2.95
1929	6.73	4.58	1.94	1.82	4.98	-1.55	-3.22	-1.72	2.40	-.90	3.87	4.06
1930	10.91	1.84	2.23	-1.83	-1.51	-4.49	-7.30	5.68	-.57	-.02	1.58	2.20
1931	1.35	4.11	3.75	.94	.26	-2.49	-.34	-2.37	-3.58	-.78	4.05	2.86
1932	6.84	4.42	3.97	0	-3.06	-2.52	-4.45	-3.84	7.29	1.23	1.02	7.34
1933	3.55	3.85	5.73	3.01	3.64	-4.60	.57	-1.96	6.28	.92	.45	2.30
1934	1.19	1.11	3.44	.36	-3.43	-4.07	-6.11	-2.02	1.80	1.16	8.87	3.49
1935	4.56	1.37	12.87	1.97	3.07	3.09	-4.65	-4.20	-2.02	1.18	1.61	1.89
1936	.74	1.86	2.02	2.54	-1.45	-4.89	-2.83	-6.56	1.19	2.31	1.13	3.44
1937	14.28	1.24	1.35	2.54	.93	-.39	-4.67	-5.81	2.33	3.36	1.54	3.24
1938	4.18	3.17	7.59	-.73	-1.16	-1.62	.26	-5.96	-3.30	-1.42	3.84	1.61
1939	5.06	8.51	3.93	4.61	-.91	-2.81	-3.82	-2.22	-3.40	.14	1.30	1.93
1940	2.65	6.71	2.82	5.48	-.53	-1.36	-2.31	-2.87	-2.29	-2.15	4.93	3.49
1941	2.86	.59	-.16	-1.32	-1.88	-3.64	-4.53	-.86	-2.94	4.65	2.23	4.55
1942	4.01	3.86	3.44	2.09	-.73	-1.99	-6.96	.74	-3.04	.18	4.60	2.51
1943	.04	.76	4.35	1.82	1.56	1.08	-5.68	-4.02	2.57	-.59	.67	3.10
1944	.96	4.71	4.78	7.12	-1.94	-3.22	-5.42	-1.81	-1.99	-1.99	2.25	5.37
1945	2.43	5.72	7.65	6.00	3.41	11.14	-3.29	-1.96	1.94	.12	3.97	2.05
1946	5.33	5.64	.14	2.60	8.31	-4.90	-2.28	-1.84	-.75	.07	5.29	2.75
1947	2.66	.35	2.03	4.49	1.39	-1.08	-3.37	-5.72	-.20	1.25	5.07	2.28
1948	3.88	3.48	5.19	-.56	-1.78	-1.56	-2.03	-4.89	.66	-.53	7.06	4.08
1949	12.35	5.03	6.25	-1.08	-1.42	-.10	-4.34	-2.65	-1.27	5.60	-.17	5.57
1950	15.39	8.39	6.27	3.44	2.18	-3.23	-1.43	-1.68	.30	.03	3.82	2.39
1951	6.03	5.61	2.53	2.08	-3.58	6.69	-3.74	-4.44	1.72	-.46	9.49	6.21
1952	4.65	3.99	5.96	.70	-.22	-5.72	-4.59	-4.39	-.53	-.33	2.10	-.23
1953	4.22	1.65	5.20	2.65	-1.71	-5.43	-3.38	-5.38	-3.96	-.17	.37	3.23
1954	4.56	1.94	2.59	-.72	2.08	-.69	-7.34	-1.50	-2.36	1.44	-.02	6.80
1955	.36	2.84	4.68	2.89	1.52	-.95	-3.97	-4.15	-2.67	1.11	1.19	.66
1956	3.39	6.93	1.68	2.22	.45	-1.16	-4.05	-4.18	-.47	-.96	2.29	M

NOTE: 1921 through 1926 data are missing, for Sikeston, Missouri

McQuigg, James D. "Forecasting Corn Yields." Ms, nd

Antecedent
This is an experiment in using "API", or ~~Antecedent~~ Precipn Index, to see if correlated with corn yields. 3 Ia cties.

Took corn yield data 1895-1951. Abstracted secular trend. Also broke into hybrid and non-hybrid periods.

. Current method of detecting drought areas is with weekly, 3-weekly, or monthly cumulative precipn charts. McQuigg suggests API is better tool for this.

His correlations show good relations between API and corn yields.

"Phenology." Contraction from Phenomenology. Science of relations between weather or climate and periodic biological activity such as plant fruiting, bird migrations, etc. ad infinitum.

McQuigg's correlations based on arbitrary periods, e.g. mid-May to mid-August. Using phenological data (i.e. critical periods in life of plants) would help.

What is the Antecedent Precipitation Index? Is described in Linsley, Kohler, and Paulhus, APPLIED HYDROLOGY. It has been reproduced in tabular form by the Hydrologic Services Division. (of what?)

551.46 Engr. L655a. also 1958 Edn, Hydrology for Engrs. also in Revel.

Neither Meinzer nor ASCE Hydrology books describe API.

Consult Linsley, Kohler, and Paulhus. This API may be what I seek for an index to clustering of deficits. Because Kohler suggested to McQuigg that he use the minimum API each year, and M Quigg found that this minimum showed good correlation with corn yields.

One stat method is to take deviations from secular trend, to abstract from other effects of time; also could plot points on any other kind of scale, and take just deviations. McQuigg did this, with time. Now he also pulls another good stunt, the inverse of the first. He plots yields with API, then shows that years of yields lower than API trend are years of temperature extremes; and years of higher yields are years of normal temperatures.

In other words, having segregated out your errant data you can proceed to examine them, find reasons why they err. System and sifting, over and over, until you know something.

Drought and Water Surplus in Agricultural Soils of the Lower Mississippi Valley Area

Technical Bulletin No. 1209

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

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Drought and Water Surplus in Agricultural Soils of the Lower Mississippi Valley Area

By C. H. M. VAN BAVEL, *Soil and Water Conservation Research Division, Agricultural Research Service*

Natural resources used in agricultural production must be reviewed from time to time in the light of changing economic conditions and of continuing progress in technology. Water is one of these resources, and in the humid section of the country it is receiving closer attention than ever before in efforts to make agricultural production more efficient.

The increased emphasis on soil moisture can be attributed to several causes. Foremost is the fact that crop adaptation and improvement, pest control, adequate fertilization, and erosion control have removed many previous barriers to sustained high yields. This has made soil moisture in many cases a controlling factor in crop production.

Recent droughts and competition for water by agriculture, industry, and municipalities have also created a greater interest in water resources, resulting in surveys, investigations, and new legislation.

Finally, many farmers and farm leaders are becoming convinced that irrigation has a promising future in humid areas. This belief is based on the favorable results of many irrigation experiments and on experiences gained on a fast-growing number of irrigation farms. Consequently, construction of farm ponds and purchase of irrigation equipment has increased rapidly in recent years.

Not all developments are directed toward eliminating soil-water deficiencies. Drainage, as a means of making land more productive, is also receiving more attention.

The focal point of the problem is the lack of suitable soil-moisture conditions for plant growth that occurs from time to time. Occurrence of these undesirable conditions varies with geographical location, soil properties, cropping systems, and, in particular, weather conditions. In the latter category, distribution of rainfall and consumptive use of water by crops are of principal significance.

It would obviously be of value to know what soil-moisture conditions may be expected to occur in a given area, as determined by the factors listed above. Such information should be given in terms of probabilities, because of the extreme seasonal variability in rainfall distribution. The calculation and presentation of average values or conditions would have only limited value. Rather, one is interested in frequency distributions that show what the odds are for a given event or, conversely, what may be expected at given odds. In agricultural climatology this principle has been widely recognized in the description of frost hazards and in studies of excessive precipitation in relation to flood prevention and erosion control.

When a description of the incidence of soil-moisture deficits and excesses can be given, even if it is an approximation, much can be concluded in regard to the suitability for certain types of crop production in given areas and under given soil conditions. The needs for irrigation and drainage also become evident and certain design factors needed in the engineering of irrigation and drainage works may be uncovered.

Until recently, such information as described above has not been available to the agronomist, agricultural engineer, or economist. Currently, an effort is being made

to provide estimates of soil-moisture conditions in the eastern United States. Van Bavel and associates have published reports for Virginia, North Carolina, South Carolina, and Georgia (*16*, *17*, *15*, *14*),[1] and work is underway for Alabama and for the Minnesota–Dakotas region. A similar survey is being made by the Tennessee Valley Authority for its area. Studies are also being made in the Northeastern States by a regional group.

This report is concerned with the Lower Mississippi Valley area, that is, from the confluence of the Ohio and Mississippi Rivers southward. This important agricultural area comprises small segments of Missouri, Kentucky, and Tennessee, and major parts of Mississippi, Louisiana, and Arkansas. The latter three States were studied in their entirety, even though they are in part outside the Mississippi Valley area.

The work leading toward this report is a cooperative effort of the Agricultural Research Service of the U.S. Department of Agriculture, and the North Carolina Agricultural Experiment Station. Machine calculations and tabulations were performed under contract by the National Weather Records Center, U.S. Weather Bureau, Asheville, N.C.

PURPOSE AND SCOPE OF THE REPORT

Daily soil-water balances were computed for 25 years of record and for 81 locations in the Lower Mississippi Valley area. These balances were based on recorded amounts of daily precipitation and on estimated values of daily evaporation from a vegetated land surface. Furthermore, the soil was assumed capable of retaining certain maximum amounts of water available to plants. These amounts ranged from 1 to 5 inches.

From the computations it was determined: (1) On how many days in each month of record the available supply of soil moisture was exhausted; (2) how much rainfall fell in excess of the soil storage capacity for each month of record.

The data were then arranged to show: (1) The probability for the number of drought-days to exceed a given value in a season; (2) similar odds for each month of the year; (3) the amount of water required to overcome the deficiencies, also at given odds; and (4) the probability for the monthly water excess to be greater than a given value for each season of the year.

The above data are presented partly as graphs and charts and partly in the form of tables. For this purpose the entire area of study was broken up into a number of sections, each comprising from three to six stations.

The data as reported enable one to determine for a given section and time of year the probability for occurrence of deficits and excesses of soil moisture of given severity. In cases of deficits, the required amounts of irrigation water have also been estimated.

The data thus serve a several-fold purpose. One may ascertain the severity of drought incidence in a location for certain soil conditions. The recurrence value of a drought as it happened may be determined and related to the plant response in an irrigation or fertilizer trial. The demand for irrigation water may be anticipated for long-range planning or for the design of individual water-supply systems.

The excess of soil water and its relation to drainage and leaching of plant nutrients can be estimated

[1] Italic numbers in parentheses refer to Literature Cited, p. 12.

for specific areas and soil conditions.

The data in this report do not purport to be highly accurate. Such would be impossible within the limits of the current effort and, even more so, with the present meager supply of observational and experimental data on water use by crops. However, it is believed that this study may be the beginning of a better description of environmental conditions for crop production.

PROCEDURE

The idea of using daily soil-water balances, based on estimates of evapotranspiration, for characterizing soil-moisture conditions is by now an established principle.

Since it was suggested by Van Bavel (*12*) and by Allred and Chen (*1*) in 1953, similar procedures have been advocated by Krimgold (*5*), Baver (*2*), Mather (*6*), and McCloud (*7*). Although the methods suggested or used by these investigators vary considerably, the common objective is to obtain a reliable estimate of prevailing soil-moisture conditions for large areas in spite of the absence of direct observations of soil-moisture content for almost all areas and conditions.

Basic to this development has been the now generally accepted theory by soil physicists, climatologists, and others that when soil moisture is not limiting, the return of water to the atmosphere by any plant cover is primarily determined by physical and meteorological factors and, therefore, is subject to computation. The work of Thornthwaite (*11*), Penman (*8*, *9*), Blaney and Criddle (*3*), and others has been instrumental in bringing this to the fore.

More recently, large-scale application of the foregoing ideas has come about. Van Bavel and others (*14*, *15*, *16*, *17*) have published a series of reports describing the occurrence of agricultural drought in the southeastern part of the United States. A world survey of soil-moisture reserves has been published by Van Hylckama (*18*). Other studies are in progress.

Five steps make up the procedure for estimating soil-moisture conditions from climatological data. These are: (1) Procurement of rainfall data, (2) estimation of evapotranspiration, (3) estimation of the moisture-storage capacity of the soil, (4) computation of the daily soil-moisture balance, and (5) classification of the resulting data. These five steps are described in detail.

Procurement of Rainfall Data

Fortunately, data on daily precipitation are available for many stations and for long periods. The present study encompasses the States of Mississippi, Arkansas, Louisiana, and small parts of Tennessee, Missouri, and Kentucky, as shown in figure 1. A total of 81 locations were chosen for a study of the daily precipitation record. (See table 1 and fig. 1.)

Daily precipitation was obtained from official U.S. Weather Bureau records for every day of every year for the period 1930–54 or 1930–55, inclusive. (Previous studies (*12*) showed that satisfactory frequency distributions could be developed based on a record of about 25 years.) The data were entered on IBM punchcards, together with any available data on extreme values of daily temperature. The cards are stored at the National Weather Records Center, Asheville, N.C., and are available for use by others.

A few records do not have data for all 25 or 26 years due to missing observations in excess of an arbitrarily assumed limit of 10 in any 1 year.

In the first large study (*17*) that was made, a considerably denser network of stations was employed. It became evident later that the variation between stations did not warrant such a large number of stations, and in subsequent work (*14*, *15*, and *16*) a rule of about 25 stations per State was adopted. This rule was also applied to the present study.

Estimation of Evapotranspiration

Several methods have been advanced for deducing values for potential or maximum evapotranspiration from other climatological data. Even though all of these are still under considerable scrutiny and subject to modification and improvement, the method suggested by Penman (*8*, *9*) appears to be adapted to the greatest variety of conditions, and, therefore, seems preferable for use in the series of studies of which this report is one.

The Penman formula appears to evaluate properly the effect of solar radiation and other, secondary, elements in computing evapotranspiration. A disadvantage is that the data required for the Penman formula are available at only a few stations in the Lower Mississippi Valley. This objection may weigh even more heavily in remote and undeveloped areas of the world.

Another disadvantage of the Penman formula is that it is complicated and entails much calculation. This objection may be overcome at some loss of precision by using a nomograph prepared by Van Bavel (*13*). In the present work, however, the complete formula was used, including an empirical factor 0.7 to convert values for open water to values for vegetated surfaces.

Average monthly values for maximum evapotranspiration were computed for six stations in the Lower Mississippi Valley area as follows: Jackson and Vicksburg, Miss.; New Orleans and Shreveport, La.; Memphis, Tenn.; and Little Rock, Ark. The required data on sunshine duration, relative humidity and temperature of the air, and windspeed were obtained from official U.S. Weather Bureau records. Values for extraterrestrial radiation were computed from Angot's values as shown by Brunt (*4*). The latter values are also available from the Smithsonian Meteorological Tables (*10*) and for the latitudes of the United States in a report by Van Bavel (*13*).

The results are shown in table 2. To offset the paucity of data within the area itself, similar calculations were made for the following stations in adjacent areas: Birmingham, Montgomery, and Mobile, Ala.; Nashville, Tenn.; and Pensacola, Fla.

Based on these results, the area under study was divided into six regions within which the maximum evapotranspiration was regarded as independent of location. These six regions are shown in figure 1. Table 3 shows the rainfall stations in each region. Table 4 gives the values of average daily evapotranspiration assigned to each region.

The values in table 4 were used to compute the daily water balance for each year of record. Therefore, no accounting was made for the fact that actual values of evapotranspiration may vary from day to day within a given month or between months of different years. This procedure was adopted for the sake of practicality and is believed not to cause appreciable errors in the results. A more detailed discussion may be found in an earlier report (*17*).

It is of considerable interest to compare the average monthly totals of computed evapotranspiration with average monthly totals of precipitation, since the general

tendency of soil-moisture conditions in an area is readily apparent from such a comparison. For the six stations mentioned above, the yearly variation in total rainfall and evapotranspiration, by months, is shown in figures 2 and 3. With the exception of data for New Orleans, La., the graphs indicate shortages of soil moisture during the summer and excesses during the winter.

Estimation of the Moisture-Storage Capacity of the Soil

Computation of a water balance of the soil must involve an estimate of its moisture-storage capacity. The nature of the soil and of the root systems of plants that grow in it impose definite lower and upper limits on the amount of water that may be stored in a form available to plants.

The lower limit is determined by the physical nature of the soil (in particular the amount and nature of the clay) and by the depth of the root system and the degree to which it is ramified throughout the soil. Further factors are the ability of the plant to withstand high moisture stresses and to continue to grow as moisture becomes less available.

The upper limit also depends on the soil, primarily its pore-size distribution, content of clay and organic matter, and again on the depth of the root system.

Since any combination of the above factors may occur and be of practical interest within a given geographical area, it would be most unrealistic to compute water balances for only one arbitrarily selected value of the storage capacity of the soil. Therefore, soil-moisture-storage capacity is used as a parameter by assigning to it a range of values permitting interpolation for any given case.

At the same time, the controversial issue as to what constitutes plant-available water is avoided. For the present study, the values assumed for calculation purposes were 1, 2, 3, 4, and 5 inches. As will be seen later, deficits and excesses of soil moisture may still occur in the Lower Mississippi Valley area even though the moisture-storage capacity of the soil is as high as 5 inches. Actual instances where the root zone can store as much as 5 inches of water are not too common. For example, it would imply a root zone of 3 feet in which 14 percent of the volume could be occupied by water in plant-available form, not subject to rapid removal by the force of gravity. Not many soils used in crop production in the Lower Mississippi Valley are thus favorably constituted, although some may be, particularly forest soils.

Computation of the Daily Soil-Moisture Balance

The method used in this study is identical to the procedure described in previous reports (*14*, *15*, *16*, *17*), and therefore is reported only in brief.

At the beginning of the period of record, usually January 1, 1930, it is assumed that the full storage value applies, that is, 1.00 inch, 2.00 inches, as the case may be. Subsequently, on each day the recorded amount of rainfall is added, the estimated amount of evapotranspiration as furnished by table 4 is subtracted, and the result is carried over to the next day.

Sometimes the result is in excess of the assumed storage capacity or "basis" value. This excess amount is canceled when the total is transferred to the following day, indicating its eventual loss to the vegetation by percolation beyond the root zone. The excess amounts are recorded separately and totaled

by months, indicating for each month of record the excess of supply over demand.

On other occasions the result of the daily balance is zero or a negative amount. Negative amounts are also canceled when the balance for the following day is set up, indicating, of course, that plants cannot transpire water from soil in which no water is available to them. Incidence of zero or negative amounts marks the occurrence of a "drought-day" and, again, the total number of these drought-days is recorded for each month of record.

The method of calculation used is obviously a compromise of practicality with accuracy. No account is possible of surface runoff, and the dependence of evapotranspiration on soil-moisture content is more complicated than is assumed. The errors that are implied by the procedure are discussed in detail in an earlier report (*17*), and the conclusion is warranted that the purpose of the calculation is not jeopardized by the assumptions made.

The calculation as outlined was carried out with IBM equipment for each of the five basis amounts. The procedure involved the use of a single punchcard for each day, on which the daily rainfall, the pertinent value of evapotranspiration, and the results of the calculation for the five soil-storage values were all recorded.

Classification of the Data Obtained

Tabulations were prepared from the punchcards of the monthly moisture excess and the monthly total of drought-days for each month of record and for each station. Annual totals of each characteristic were also obtained.

From the machine tabulations, frequency distributions were computed of the total number of drought-days during March through November and the annual value of excess moisture for each of the 81 stations in the area.

These frequency curves were interpolated at probability levels of 1, 2, 3, and 5 out of 10 to yield the minimum number of drought-days for each station for each of the 5 basis amounts. The data were then plotted on maps, and lines of equal drought incidence were drawn. An identical procedure was followed in respect to the annual totals of excess precipitation, resulting in maps showing lines of equal amounts of annual excess.

Frequency curves were also prepared of the monthly totals of drought-days for each month for each basis amount. However, these were based on the aggregated data of several stations. For this purpose the entire area under study was divided into 20 sections, within which monthly drought probabilities were substantially equal.

The rainfall stations in each of the 20 sections used in the tabulation of monthly drought-day totals are listed in table 5. The sections are outlined in figure 4. A set of frequency curves was prepared for each section, and these were interpolated at probabilities of 1, 2, 3, and 5 out of 10. The values of the minimum number of drought-days per month thus obtained were tabulated by section, by month, and by odds.

A similar procedure was followed with respect to the monthly totals of surplus moisture. The stations were again subdivided—this time on the basis of precipitation pattern—into 18 sections. These sections are shown in table 6 and figure 5. The monthly totals were aggregated by sections and also by seasons of the year, since there appeared to be only small differences between months of any season. The frequency curves show,

therefore, the minimum monthly excess for 18 sections, 5 basis amounts, and 4 seasons. Again, these curves were interpolated at probabilities of 1, 2, 3, and 5 out of 10 and the results tabulated.

Finally, a computation was made of the deficits of precipitation in terms of inches of irrigation water required to prevent the occurrence of drought-days. The amount of the deficit was obtained by taking the expected minimum number of drought-days for each month and each section, as shown in table 5 and figure 4, at odds of 1 out of 10 and multiplying this amount by the estimated daily evapotranspiration, as given in table 4. Values thus obtained were tabulated. The resultant figures represent an amount of water that will exceed the demand in 9 out of 10 years and will be short of demand only in the remaining year. Irrigation requirements applying to odds of 7 out of 10 years and 5 out of 10 years were computed in a similar manner and are given in tables 10 and 11, respectively.

RESULTS AND DISCUSSION

Occurrence of Drought-Days

As stated previously, frequency distributions were prepared of the total number of drought-days in the period for each of the 81 stations within the Lower Mississippi Valley area. These relations are not all presented in this report; instead, 20 stations were selected, 1 for each of the 20 sections shown in figure 4. The frequency distributions are given in figures 6 through 25. On the abscissa these graphs show the minimum number of drought-days, and on the ordinate the associated value of the probability expressed in percent. The ordinate scale is based on the normal distribution (probability paper). When plotted in this way, straight lines can be fitted to the points without much difficulty. The lines drawn are fitted by eye. Separate lines are shown for each of the five basis amounts and are so designated.

In similar investigations pertaining to Georgia (*14*), it was found in some cases that the points could only be fitted to a straight line when the logarithm of the probability was plotted on the ordinate. This phenomenon was not observed for any of the 81 stations in the present study.

From the graphs (figs. 6 through 25) detailed information may be obtained for each of the 20 sections in the area under study. For example, central Mississippi (sec. 7) is typified by Poplarville, Miss. (fig. 12), which shows that there is a 50-percent chance that there will be 87 or more drought-days in the season from March through November if the storage capacity of the soil is 1 inch. If the storage capacity is 2 inches, the corresponding figure is 53 days, and so forth. For soil-storage figures that are not integral numbers of inches, one may interpolate between the data supplied by the graphs. For example, if the storage capacity is 3.5 inches, the number of drought-days that must be expected as a minimum in 1 out of 10 years is about 59.

The low percentage figures on the ordinate represent the situation in the driest years, which are unlikely events. On the other hand, the high percentage figures correspond with what one must expect frequently, as a rule, or even with practical certainty, depending on the odds selected. Figure 12 indicates that in central Mississippi on soils with low moisture-storage capacity (less than 2 inches), 40 to 60 drought-days must be expected just about every year. Every other year this figure goes up to between 60 and 100, and rarely it can go as

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high as 120, out of a total of 275 days.

The effect of the storage capacity of the soil on drought incidence is very clear from figures 6 through 25. In many cases an increase of 1 inch in storage capacity means a decrease of 50 percent in the chances for a similar drought occurrence. This is particularly true in dry years and points out the desirability of managing land in such a way that the soil reservoir for water will be at its maximum possible value. Often the incidence of disastrous drought may be eliminated by increasing the volume of soil on which plant roots can draw, as demonstrated by the frequency distributions shown.

The differences between stations and regions are also apparent from figures 6 through 25, but may be studied more conveniently from the area maps (figs. 26 through 45).

As related earlier, these maps are based on the frequency distributions for all 81 stations. A map is presented for each basis amount and for four probability levels, indicating the minimum number of drought-days for the period March through November.

These maps show that the expected number of drought-days typifying the area as a whole may range from about 140 to as few as 40, depending on the odds and the storage capacity of the soil. Although considerable geographical variation exists, it is an evident and important conclusion that, at a given level of odds, drought severity in the Lower Mississippi Valley area is dependent more on the soil-moisture storage value than on geographical location.

The driest section in the area is northwestern Louisiana. On shallow soils the minimum number of drought-days is as high as 100 during the March through November period every other year. The least dry section is also in Louisiana, around the mouth of the Mississippi river. Even there, 50 and 60 drought-days per year are not uncommon.

While the difference in drought incidence from southeast to northwest is rather large in Louisiana, there is much less contrast in Mississippi and hardly any in Arkansas. In Mississippi, drought incidence increases from the southeastern to the western part of the State. The sections surrounding the Lower Mississippi Valley to the north and the east show generally a lower incidence of soil-moisture deficiencies than the area itself.

The influence of the Mississippi River is rather pronounced, inasmuch as drought seems more severe in the immediate vicinity of the river. Figures 27 through 29 illustrate this point, which, however, is of minor significance in the total picture.

Figures 26 through 45 serve primarily as a handy and quick reference to the area situation, but more detailed and precise information can be obtained from the frequency graphs in the preceding figures.

The data as presented so far give no particulars about the seasonal distribution of drought-days, which is of direct practical interest in the growing of certain crops.

The method of obtaining monthly values for drought incidence was presented earlier (p. 6), and the data are shown in table 7. (In the interest of brevity, the pertaining frequency distributions are not shown.) Table 7, therefore, gives for the 20 sections illustrated in figure 4 and for each of 9 months the minimum number of drought-days at 4 levels of probability and for 5 basis amounts.

The table shows that drought occurrence is concentrated in the months of June, July, August, September, and October in most sec-

tions, although along the coast probabilities for drought are noticeably diminished in August and September. The seasonal variation is illustrated in figure 46, which shows for each section by months the minimum number of drought-days occurring in 5 out of 10 years for a basis amount of 2 inches.

Drought is all but absent in March and occurs in April only on the least favorable soils. Apparently the deficiencies that develop during the summer are always wiped out by the winter rains. This is also evident from the lowered drought incidence during October and is in agreement with the general data shown in figures 2 and 3.

Table 7 shows also that droughts are severe during the height of the summer under almost all soil conditions. In 1 out of 10 years, one must expect soil moisture to be unavailable during almost the entire month in June, July, or August. Even every other year, one must reckon with drought during at least half of each of these months. For the many crops that are grown during the summer, these are serious implications, emphasizing the need for irrigation.

For example, in section 10 (central Mississippi), soil moisture is inadequate every other year during at least 13 days in June, even if soil-moisture storage is 3 inches. In the worst year out of 10, this figure climbs to 24. July shows 14 and 28 days, respectively, and August 15 and 28.

For those unfamiliar with the rules of probability calculus, it may be useful to point out that the expected number of drought-days for periods composed of more than 1 month does not follow by mere addition. For example, if May shows a minimum number of 21 at a probability level of 1 out of 10 and June shows 18, the expected minimum number for May and June is not 39, but less. If drought-day occurrence were not correlated at all from one month to the next, a good approximation of the expected number in the May–June period at a probability level of 1 out of 10 could be obtained from the individual monthly values at the level of 3 out of 10. In the example cited, this would give a value of 27 days.

In reality, there is a strong correlation between months, which implies that the correct answer is between 27 and 39. The correlation is stronger as the basis amount becomes larger, since the carryover effect from month to month is larger. In absence of detailed studies, no exact procedure can be given. Merely adding monthly data results in "safe" values, that is, values that overestimate drought incidence.

In previous studies (*17*), this effect, which is particularly important at extreme probabilities, was not considered.

Excess of Soil Moisture

The method of handling the data on annual and monthly moisture excesses was described earlier (p. 6). From the data on the yearly total of the daily excess a series of maps was prepared. (See figs. 47 through 66.) These maps show the geographical distribution of the minimum excess for five basis amounts and four odds.

For example, northern Louisiana will have more than 30 inches of precipitation in excess of storage capacity in 2 out of 10 years when the soil can store 2 inches of water subject to removal by plants (fig. 52).

The effect of the basis amount on the annual excess is small, as may be observed from a comparison of figures 47 through 66. This is attributable to the fact that most of the annual excess occurs during the

winter when there is little loss of water by evaporation from the soil.

Generally, the annual excess is greatest in the vicinity of the Mississippi estuary, where values between 40 and 50 inches per year are not uncommon. Lowest values are in northern Arkansas, where the excess ranges from 15 to 25 inches annually. Since the excess occurs mostly in winter the distribution of the excess is a reflection of the winter precipitation climate. Also, the variation of the excess from year to year is greater than that observed from annual drought-day totals, and reflects the fact that annual precipitation is more variable than annual evapotranspiration.

Unless surface runoff is unusually significant, the quantities of water shown in figures 47 through 66 signify percolation through the root zone into the subsoil. Eventually this appears as streamflow (sometimes called runoff). The figures indicate the severity of the leaching process and demonstrate that the depth of rooting has some influence on leaching.

Monthly frequency curves of moisture excess were also prepared, but it was found best to group the months into four seasons. An example of seasonal frequency distribution for section 8 (northeast Mississippi) is given in figures 67, 68, 69, and 70. These graphs show the minimum monthly excess typical for each season. For example, figure 67 shows that chances are 3 out of 10 to experience an excess of 5.5 inches or more per month in any one of the months of December, January, or February when the soil has a storage capacity of 1 inch.

A comparison of figure 67 (for the winter season) with figures 68, 69, and 70 (for the other seasons) shows that the highest monthly excess values in section 8 occur in the winter. In winter there is very little difference among the five basis amounts; in fact, to avoid confusion the data for 2 and 4 inches have not been plotted.

In the spring (fig. 68), monthly excesses are much lower than in the winter, and there is almost no difference among the five basis amounts. Values for 3, 4, and 5 inches are identical with those for 2 inches and have not been plotted.

The lowest values occur in the summer (fig. 69), and there is an appreciable difference among the curves for 1, 2, 3, and 4 inches. The 5-inch values are so close to the 4-inch values that they have been omitted. It is apparent that low soil-moisture storage values increase the percolation losses during a period when moisture deficiencies are also very serious.

A similar situation prevails in the fall (fig. 70), except that the monthly excess values are higher.

The interesting part is that computation of daily soil-moisture balances demonstrates that excesses and deficiencies of soil moisture may occur within the same season, particularly when soils have a low storage capacity.

A set of graphs, such as shown in figures 67 through 70, was prepared for each of the 18 sections shown in figure 5. To economize on space, graphs were interpolated and are presented in tabular form in table 8. This table shows for each of the 18 sections the minimum monthly water excess at 10 probability levels for each season and for the 5 basis amounts of soil-moisture storage.

It is believed that the data in table 8 have significance for problems of land drainage, land preparation, and fertilizer application. In the design of drainage systems the information should probably be broken down to much shorter periods, say from 24 to 72 hours. This is being contemplated for future work.

Amount of Water Needed for Irrigation

The amount of water needed for irrigation depends not only on the anticipated consumptive use by the crop but also on equipment and design factors that determine the efficiency of irrigation.

However, the basis for calculating the demand for water is the crop's expected need. In deciding what these amounts are it is essential to consider the odds and the storage capacity of the soil, besides the obvious factors of geographical location and time of year.

The method of computation was described earlier (p. 7), and the results are given in table 9 for each of the 20 sections shown in figure 4. Table 9, therefore, shows the maximum irrigation requirement in 9 out of 10 years for each month and for the five basis amounts of soil-moisture storage.

During the summer these values are often as high as 5 inches per month, which implies a need for considerable quantities of irrigation water to eliminate drought.

The amounts given are sufficient to meet the demand in 9 out of 10 years and should, therefore, be looked on as safe estimates. However, they do not take into account the losses that occur in distributing and applying the water.

Similar figures for the irrigation requirements but for odds of 7 out of 10 and 5 out of 10 are given in tables 10 and 11, respectively.

A special problem arises in regard to the rice crop. In this case, evaporation takes place from an open water surface and the amount of water needed for irrigation would roughly be equal to the expected rainfall during the period of irrigation minus the average evaporation loss. To this there should be added any loss by seepage. It seems that this quantity has to be evaluated in each separate case.

Some pertinent information is provided in table 12, which gives the maximum amount of precipitation that can be expected at selected odds for areas in which rice is an actual or a potential crop. The amounts given are for the 4-month period of May through August. In section 18, for example, the maximum rainfall that can be expected during May through August in 1 out of 10 years is 9.6 inches. In that same period evaporation from open water can be estimated at 29 inches. Therefore, in 1 out of 10 years at least 19.4 inches (29–9.6) of supplemental water is needed, to which anticipated seepage losses must be added.

CONCLUSIONS

The primary purpose of this report is to make data on soil-moisture conditions available for application to other problems. However, the results allow some conclusions that are of interest by themselves.

1. Occurrence of appreciable soil-moisture deficits is restricted in the Lower Mississippi Valley area to the months of May through October.

2. Drought occurrence is at a minimum in southeastern Louisiana and at a maximum in northwestern Louisiana.

3. Drought occurrence depends markedly on the storage capacity of the soil for water.

4. Regardless of either geographical area or the nature of the soil, drought is a common and serious hazard from May through October. Under average conditions, many sections show a lack of available moisture half the time and very few less than one-third the time.

5. Consequently, irrigation appears indispensable to maximum

soil utilization in most sections of the area, and the required amounts of irrigation water are high. Under average conditions, the amount of additional water required approaches the average rainfall in most of the area during the summer and early fall.

6. Paradoxically, the amounts of excess precipitation are also considerable for the entire area, with maximum values in southeastern Louisiana and minimum values in northern Arkansas.

7. The moisture excess occurs primarily during the winter and early spring months and is only slightly influenced by moisture-storage capacity of the soil.

8. Under average conditions the annual loss as excess water varies from 15 to 30 inches, of which a large part is represented by percolation, indicating the severity of leaching. At a later stage this water becomes stream runoff.

9. Total annual rainfall would, by and large, meet the consumptive use of farm crops in the Lower Mississippi Valley if it were not for an unfavorable distribution of rainfall. As it is, the balance can be restored only by large-scale artificial changes in the hydrology, such as storage of excess water in aboveground and underground reservoirs and issuance of these reserves through irrigation during the period of demand.

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TABLE 1.—*Rainfall stations used in soil-moisture studies of the Lower Mississippi Valley area*

[Numbers refer to figs. 1, 4, and 5]

State	Station
Arkansas	1. Arkadelphia.
	2. Blytheville.
	3. Calico Rock.
	4. Camden.
	5. Corning.
	6. Dumas.
	7. El Dorado.
	8. Fayetteville.
	9. Gilbert.
	10. Grannis.
	11. Harrison.
	12. Little Rock.
	13. Marianna.
	14. Marked Tree.
	15. Morrilton.
	16. Newport.
	17. Ozark.
	18. Pine Bluff.
	19. Portland.
	20. Prescott.
	21. Searcy.
	22. Stuttgart.
	23. Texarkana.
Kentucky	1. Mayfield.
Louisiana	1. Alexandria.
	2. Baton Rouge.
	3. Covington.
	4. Crowley Expt. Sta.
	5. De Ridder.
	6. Donaldsonville.
	7. Franklinton.
	8. Houma.
	9. Lake Charles.
	10. Lake Providence.
	11. Logansport.
	12. Monroe.
	13. Morgan City.
	14. Natchitoches.
	15. New Orleans.
	16. Plain Dealing.
	17. Ruston.
Louisiana—Con.	18. St. Joseph Expt. Sta.
	19. Shreveport.
	20. Simmesport.
	21. Urania.
	22. Ville Platte.
	23. Winnsboro.
	24. Jeanerette.
Mississippi	1. Brookhaven.
	2. Clarksdale.
	3. Cleveland.
	4. Collins.
	5. Columbia.
	6. Corinth.
	7. Enterprise.
	8. Forest.
	9. Greenville.
	10. Grenada.
	11. Hernando.
	12. Holly Springs.
	13. Jackson.
	14. Leaksville.
	15. Louisville.
	16. Natchez.
	17. Poplarville.
	18. Port Gibson.
	19. State College.
	20. Tupelo.
	21. University.
	22. Vicksburg.
	23. Waynesboro.
	24. Yazoo City.
Missouri	1. Caruthersville.
	2. Fisk.
	3. Jackson.
	4. Sikeston.
Tennessee	1. Bolivar.
	2. Brownsville.
	3. Memphis.
	4. Milan.
	5. Union City.

TABLE 2.—*Average values of daily maximum evapotranspiration in inches for 6 stations in the Lower Mississippi Valley area, computed by months*

Month	Mississippi		Louisiana		Tennessee	Arkansas
	Jackson	Vicksburg	New Orleans	Shreveport	Memphis	Little Rock
January	0. 037	0. 037	0. 044	0. 035	0. 032	0. 025
February	. 064	. 064	. 069	. 065	. 055	. 054
March	. 085	. 084	. 090	. 085	. 080	. 075
April	. 125	. 122	. 127	. 128	. 126	. 114
May	. 143	. 149	. 155	. 153	. 150	. 141
June	. 182	. 180	. 172	. 196	. 183	. 176
July	. 177	. 170	. 158	. 195	. 179	. 177
August	. 163	. 161	. 147	. 180	. 157	. 158
September	. 132	. 135	. 132	. 142	. 126	. 121
October	. 086	. 085	. 098	. 088	. 076	. 071
November	. 052	. 049	. 056	. 050	. 045	. 041
December	. 037	. 033	. 038	. 033	. 038	. 025

TABLE 3.—*Rainfall stations used in soil-moisture studies of the Lower Mississippi Valley area, grouped into 6 regions of substantially equal evapotranspiration*

[Numbers refer to fig. 1]

State	Region and station
Mississippi	Region 1:
	1. Brookhaven.
	2. Clarksdale.
	3. Cleveland.
	4. Collins.
	5. Columbia.
	6. Corinth.
	7. Enterprise.
	8. Forest.
	9. Greenville.
	10. Grenada.
	11. Hernando.
	12. Holly Springs.
	13. Jackson.
	14. Leaksville.
	15. Louisville.
	16. Natchez.
	17. Poplarville.
	18. Port Gibson.
	19. State College.
	20. Tupelo.
	21. University.
	22. Vicksburg.
	23. Waynesboro.
	24. Yazoo City.
Louisiana	Region 2:
	13. Morgan City.
	8. Houma.
	15. New Orleans.
	Region 3:
	10. Lake Providence.
	17. Ruston.
	12. Monroe.
	23. Winnsboro.
	18. St. Joseph Expt. Sta.
	21. Urania.
	14. Natchitoches.
	1. Alexandria.
	20. Simmesport.
	7. Franklinton
	5. De Ridder.
	22. Ville Platte.
	3. Covington.
	9. Lake Charles
	4. Crowley Expt. Sta.
	6. Donaldsonville.
Louisiana—Con.	Region 3—Con.
	24. Jeanerette.
	2. Baton Rouge.
	Region 4:
	11. Logansport.
	16. Plain Dealing.
	19. Shreveport.
Arkansas	Region 5:
	8. Fayetteville.
	10. Grannis.
	17. Ozark.
	20. Prescott.
	23. Texarkana.
	Region 6:
	1. Arkadelphia.
	2. Blytheville.
	3. Calico Rock.
	4. Camden.
	5. Corning.
	6. Dumas.
	7. El Dorado.
	9. Gilbert.
	11. Harrison.
	12. Little Rock.
	13. Mariana.
	14. Marked Tree.
	15. Morrilton.
	16. Newport.
	18. Pine Bluff.
	19. Portland.
	21. Searcy.
	22. Stuttgart.
Missouri	Region 6:
	1. Caruthersille.
	2. Fisk.
	3. Jackson.
	4. Sikeston.
Kentucky	Region 6:
	1. Mayfield.
Tennessee	Region 6:
	1. Bolivar.
	2. Brownsville.
	3. Memphis.
	4. Milan.
	5. Union City.

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TABLE 4.—*Average values of daily maximum evapotranspiration in inches, 6 regions, the Lower Mississippi Valley area, by months*

[Numbers of regions refer to fig. 1]

Month	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6
January	0. 03	0. 04	0. 03	0. 04	0. 04	0. 03
February	. 06	. 07	. 06	. 06	. 07	. 06
March	. 08	. 09	. 08	. 08	. 09	. 08
April	. 12	. 13	. 12	. 13	. 13	. 12
May	. 14	. 16	. 14	. 15	. 16	. 14
June	. 18	. 17	. 18	. 20	. 17	. 18
July	. 18	. 16	. 18	. 20	. 16	. 18
August	. 16	. 15	. 16	. 18	. 15	. 16
September	. 13	. 13	. 13	. 14	. 13	. 13
October	. 08	. 10	. 08	. 09	. 10	. 08
November	. 05	. 06	. 05	. 05	. 06	. 06
December	. 03	. 04	. 03	. 03	. 04	. 03

TABLE 5.—*Rainfall stations used in soil-moisture studies of the Lower Mississippi Valley area, grouped into 20 sections for reporting drought incidence*

[Numbers refer to fig. 4]

State	Section and station
Louisiana	Section 1: 2. Baton Rouge. 3. Covington. 7. Franklinton. Section 2: 6. Donaldsonville. 8. Houma. 24. Jeanerette. 13. Morgan City. 15. New Orleans. Section 3: 4. Crowley Expt. Sta. 5. De Ridder 9. Lake Charles 20. Simmesport. 22. Ville Platte. Section 4: 1. Alexandria. 14. Natchitoches. 21. Urania. Section 5: 10. Lake Providence. 12. Monroe. 18. St. Joseph Expt. Sta. 23. Winnsboro.
Louisiana—Con.	Section 6: 11. Logansport. 16. Plain Dealing. 17. Ruston. 19. Shreveport.
Mississippi	Section 7: 5. Columbia. 14. Leaksville. 17. Poplarville. 24. Waynesboro. Section 8: 1. Brookhaven. 16. Natchez. 18. Port Gibson. Section 9: 4. Collins. 7. Enterprise. 8. Forest. 15. Louisville. Section 10: 9. Greenville. 13. Jackson. 22. Vicksburg. 23. Yazoo City. Section 11: 6. Corinth. 19. State College. 20. Tupelo.

TABLE 5.—*Rainfall stations used in soil-moisture studies of the Lower Mississippi Valley area, grouped into 20 sections for reporting drought incidence*—Continued

[Numbers refer to fig. 4]

State	Section and station	State	Section and station
Mississippi—Con.	Section 12: 2. Clarksdale. 3. Cleveland. 10. Grenada. 11. Hernando. 12. Holly Springs. 21. University.	Arkansas—Con.	Section 16: 3. Calico Rock. 12. Little Rock. 15. Morrilton. 16. Newport. 21. Searcy.
Tennessee	Section 13: 1. Bolivar. 2. Brownsville. 3. Memphis. 4. Milan. 5. Union City.		Section 17: 8. Fayetteville. 9. Gilbert. 11. Harrison. 17. Ozark.
Kentucky	Section 14: 1. Mayfield.		Section 18: 6. Dumas. 18. Pine Bluff. 22. Stuttgart.
Missouri	Section 14: 1. Caruthersville. 2. Fisk. 3. Jackson. 4. Sikeston.		Section 19: 1. Arkadelphia. 10. Grannis. 20. Prescott. 23. Texarkana.
Arkansas	Section 15: 2. Blytheville. 5. Corning. 13. Marianna. 14. Marked Tree.		Section 20: 4. Camden. 7. El Dorado. 19. Portland.

TABLE 6.—*Rainfall stations used in soil-moisture studies of the Lower Mississippi Valley area, grouped into 18 sections for reporting monthly moisture excess*

[Numbers refer to fig. 5]

State	Section and station
Louisiana	Section 1: 2. Baton Rouge. 3. Covington. 6. Donaldsonville. 7. Franklinton. 15. New Orleans.
	Section 2: 4. Crowley Expt. Sta. 8. Houma 24. Jeanerette. 13. Morgan City. 20. Simmesport. 22. Ville Platte.
	Section 3: 1. Alexandria. 5. De Ridder. 9. Lake Charles. 10. Lake Providence. 12. Monroe. 18. St. Joseph Expt. Sta. 21. Urania. 23. Winnsboro.
	Section 4: 11. Logansport. 14. Natchitoches. 16. Plain Dealing. 17. Ruston. 19. Shreveport.
Mississippi	Section 5: 5. Columbia. 14. Leaksville. 17. Poplarville.
	Section 6: 1. Brookhaven. 4. Collins. 7. Enterprise. 16. Natchez. 24. Waynesboro.
	Section 7: 8. Forest. 13. Jackson. 15. Louisville. 18. Port Gibson. 22. Vicksburg. 23. Yazoo City.
	Section 8: 6. Corinth. 12. Holly Springs. 19. State College. 20. Tupelo. 21. University.
Mississippi—Con.	Section 9: 2. Clarksdale. 3. Cleveland. 9. Greenville. 10. Grenada. 11. Hernando.
Tennessee	Section 10: 1. Bolivar. 2. Brownsville. 3. Memphis. 4. Milan. 5. Union City.
Kentucky	Section 11: 1. Mayfield.
Missouri	Section 11: 1. Caruthersville. 2. Fisk. 3. Jackson. 4. Sikeston.
Arkansas	Section 12: 2. Blytheville. 5. Corning. 14. Marked Tree. 16. Newport.
	Section 13: 12. Little Rock. 13. Marianna. 21. Searcy. 22. Stuttgart.
	Section 14: 3. Calico Rock. 9. Gilbert. 15. Morrilton.
	Section 15: 8. Fayetteville. 11. Harrison. 17. Ozark.
	Section 16: 10. Grannis.
	Section 17: 1. Arkadelphia. 4. Camden. 7. El Dorado 20. Prescott. 23. Texarkana.
	Section 18: 6. Dumas. 18. Pine Bluff. 19. Portland.

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*

[Section numbers refer to fig. 4]

Section 1

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	5	0	0	0	0
2 out of 10	2	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	8	0	0	0
2 out of 10	13	5	0	0	0
3 out of 10	11	4	0	0	0
5 out of 10	8	0	0	0	0
May:					
1 out of 10	22	18	12	5	0
2 out of 10	18	14	8	1	0
3 out of 10	17	11	5	0	0
5 out of 10	13	6	0	0	0
June:					
1 out of 10	24	21	18	14	10
2 out of 10	21	17	14	10	6
3 out of 10	19	14	11	6	3
5 out of 10	15	10	6	1	0
July:					
1 out of 10	19	17	15	13	11
2 out of 10	16	13	11	9	7
3 out of 10	14	10	8	6	3
5 out of 10	10	5	3	1	0
August:					
1 out of 10	18	12	10	6	5
2 out of 10	15	11	5	3	1
3 out of 10	13	6	3	0	0
5 out of 10	9	3	0	0	0
September:					
1 out of 10	22	18	15	10	8
2 out of 10	19	14	10	4	1
3 out of 10	16	10	6	0	0
5 out of 10	15	5	0	0	0
October:					
1 out of 10	28	27	23	19	14
2 out of 10	24	20	15	9	4
3 out of 10	21	15	9	2	0
5 out of 10	15	7	0	0	0
November:					
1 out of 10	11	9	7	6	5
2 out of 10	8	5	3	2	0
3 out of 10	5	2	0	0	0
5 out of 10	1	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 2

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	13	0	0	0	0
2 out of 10	10	0	0	0	0
3 out of 10	8	0	0	0	0
5 out of 10	6	0	0	0	0
April:					
1 out of 10	18	12	0	0	0
2 out of 10	15	8	0	0	0
3 out of 10	13	5	0	0	0
5 out of 10	10	0	0	0	0
May:					
1 out of 10	22	18	15	9	1
2 out of 10	20	16	11	5	0
3 out of 10	18	13	9	2	0
5 out of 10	14	9	4	0	0
June:					
1 out of 10	25	23	22	19	16
2 out of 10	22	18	16	14	10
3 out of 10	19	15	13	10	5
5 out of 10	15	10	7	3	0
July:					
1 out of 10	16	12	11	10	8
2 out of 10	13	9	8	6	5
3 out of 10	11	6	5	3	2
5 out of 10	8	3	1	0	0
August:					
1 out of 10	15	9	5	3	3
2 out of 10	12	6	2	0	0
3 out of 10	10	3	0	0	0
5 out of 10	5	0	0	0	0
September:					
1 out of 10	19	12	8	0	0
2 out of 10	15	8	3	0	0
3 out of 10	13	5	0	0	0
5 out of 10	9	1	0	0	0
October:					
1 out of 10	30	24	19	12	4
2 out of 10	25	19	11	3	0
3 out of 10	21	15	5	0	0
5 out of 10	15	8	0	0	0
November:					
1 out of 10	15	12	10	7	2
2 out of 10	11	9	6	2	0
3 out of 10	9	6	4	0	0
5 out of 10	4	2	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 3

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	10	0	0	0	0
2 out of 10	7	0	0	0	0
3 out of 10	5	0	0	0	0
5 out of 10	2	0	0	0	0
April:					
1 out of 10	20	13	1	0	0
2 out of 10	17	9	0	0	0
3 out of 10	14	6	0	0	0
5 out of 10	10	1	0	0	0
May:					
1 out of 10	22	18	14	7	1
2 out of 10	19	15	9	1	0
3 out of 10	17	12	5	0	0
5 out of 10	14	7	0	0	0
June:					
1 out of 10	28	25	24	23	18
2 out of 10	24	21	18	16	11
3 out of 10	22	18	15	11	5
5 out of 10	18	14	8	3	0
July:					
1 out of 10	22	21	20	19	18
2 out of 10	19	17	15	14	13
3 out of 10	17	14	12	11	9
5 out of 10	14	10	7	6	3
August:					
1 out of 10	22	19	18	17	16
2 out of 10	19	15	14	12	11
3 out of 10	17	13	11	8	4
5 out of 10	14	9	7	3	0
September:					
1 out of 10	22	21	20	18	16
2 out of 10	19	18	17	14	12
3 out of 10	17	15	14	11	8
5 out of 10	12	6	2	0	0
October:					
1 out of 10	30	27	27	26	24
2 out of 10	24	20	18	17	15
3 out of 10	20	15	11	10	8
5 out of 10	13	7	2	0	0
November:					
1 out of 10	11	8	7	7	6
2 out of 10	7	3	2	1	0
3 out of 10	5	0	0	0	0
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 4

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	8	0	0	0	0
2 out of 10	6	0	0	0	0
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	18	9	0	0	0
2 out of 10	15	6	0	0	0
3 out of 10	12	4	0	0	0
5 out of 10	9	1	0	0	0
May:					
1 out of 10	20	15	9	0	0
2 out of 10	18	12	6	0	0
3 out of 10	16	10	4	0	0
5 out of 10	13	6	1	0	0
June:					
1 out of 10	28	24	21	18	13
2 out of 10	25	21	18	14	8
3 out of 10	23	19	15	11	5
5 out of 10	18	14	10	6	1
July:					
1 out of 10	25	23	23	23	23
2 out of 10	22	20	19	19	19
3 out of 10	20	17	17	16	15
5 out of 10	16	13	12	10	8
August:					
1 out of 10	28	28	28	28	28
2 out of 10	25	23	23	23	23
3 out of 10	23	21	20	19	18
5 out of 10	19	16	14	11	10
September:					
1 out of 10	27	26	25	24	22
2 out of 10	23	21	20	19	18
3 out of 10	20	18	17	15	14
5 out of 10	16	13	11	10	8
October:					
1 out of 10	26	25	25	25	24
2 out of 10	23	22	22	21	20
3 out of 10	21	19	17	17	16
5 out of 10	16	12	9	7	5
November:					
1 out of 10	11	0	0	0	0
2 out of 10	0	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 5

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	8	0	0	0	0
2 out of 10	5	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	7	0	0	0
2 out of 10	13	3	0	0	0
3 out of 10	11	0	0	0	0
5 out of 10	8	0	0	0	0
May:					
1 out of 10	20	15	9	0	0
2 out of 10	18	12	5	0	0
3 out of 10	16	10	3	0	0
5 out of 10	13	6	0	0	0
June:					
1 out of 10	29	27	24	18	13
2 out of 10	25	23	20	14	9
3 out of 10	23	20	17	12	6
5 out of 10	19	15	12	7	2
July:					
1 out of 10	27	26	26	26	25
2 out of 10	24	23	22	21	20
3 out of 10	21	20	19	18	16
5 out of 10	18	15	14	12	10
August:					
1 out of 10	29	27	26	26	26
2 out of 10	26	24	24	24	24
3 out of 10	24	22	21	21	21
5 out of 10	20	18	17	15	15
September:					
1 out of 10	27	27	27	26	25
2 out of 10	24	23	23	22	21
3 out of 10	22	20	19	19	17
5 out of 10	19	16	14	13	12
October:					
1 out of 10	29	29	29	28	28
2 out of 10	27	25	24	23	23
3 out of 10	24	22	20	19	18
5 out of 10	18	14	10	9	7
November:					
1 out of 10	13	11	11	11	11
2 out of 10	8	5	5	5	5
3 out of 10	5	1	1	1	1
5 out of 10	0	0	0	0	0

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TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 6

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	11	0	0	0	0
2 out of 10	8	0	0	0	0
3 out of 10	5	0	0	0	0
5 out of 10	1	0	0	0	0
April:					
1 out of 10	18	11	3	0	0
2 out of 10	15	3	0	0	0
3 out of 10	12	0	0	0	0
5 out of 10	9	0	0	0	0
May:					
1 out of 10	22	18	14	10	0
2 out of 10	19	15	10	5	0
3 out of 10	17	12	6	2	0
5 out of 10	14	8	1	0	0
June:					
1 out of 10	30	28	26	23	20
2 out of 10	26	24	22	19	15
3 out of 10	24	22	19	15	12
5 out of 10	21	17	14	10	7
July:					
1 out of 10	28	28	28	28	28
2 out of 10	26	25	25	25	25
3 out of 10	24	23	23	23	22
5 out of 10	21	19	18	17	16
August:					
1 out of 10	30	29	29	29	28
2 out of 10	27	27	27	27	26
3 out of 10	25	25	24	24	24
5 out of 10	22	21	20	20	19
September:					
1 out of 10	29	29	29	29	29
2 out of 10	26	26	26	26	25
3 out of 10	24	23	22	22	21
5 out of 10	20	17	16	15	14
October:					
1 out of 10	30	30	30	28	28
2 out of 10	28	26	26	24	24
3 out of 10	23	22	22	20	20
5 out of 10	17	14	13	12	11
November:					
1 out of 10	9	7	7	7	7
2 out of 10	5	2	2	1	1
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 7

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	6	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	15	6	0	0	0
2 out of 10	11	2	0	0	0
3 out of 10	9	0	0	0	0
5 out of 10	5	0	0	0	0
May:					
1 out of 10	24	18	13	7	0
2 out of 10	21	14	9	3	0
3 out of 10	18	12	6	0	0
5 out of 10	14	7	1	0	0
June:					
1 out of 10	25	23	20	17	13
2 out of 10	22	19	16	13	8
3 out of 10	20	17	13	10	5
5 out of 10	16	12	8	5	0
July:					
1 out of 10	19	18	17	15	13
2 out of 10	16	15	14	12	9
3 out of 10	14	12	11	8	5
5 out of 10	11	7	4	0	0
August:					
1 out of 10	19	16	14	12	11
2 out of 10	16	12	9	7	6
3 out of 10	14	10	6	3	2
5 out of 10	11	5	1	0	0
September:					
1 out of 10	21	18	16	14	11
2 out of 10	18	13	10	8	5
3 out of 10	16	10	6	4	0
5 out of 10	12	4	0	0	0
October:					
1 out of 10	30	28	25	20	20
2 out of 10	25	21	17	10	5
3 out of 10	22	17	10	3	0
5 out of 10	16	9	0	0	0
November:					
1 out of 10	14	12	12	11	7
2 out of 10	10	8	7	6	1
3 out of 10	7	4	3	2	0
5 out of 10	2	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 8

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	7	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	6	0	0	0
2 out of 10	13	2	0	0	0
3 out of 10	10	0	0	0	0
5 out of 10	7	0	0	0	0
May:					
1 out of 10	22	15	11	0	0
2 out of 10	18	12	5	0	0
3 out of 10	16	10	5	0	0
5 out of 10	13	7	0	0	0
June:					
1 out of 10	29	23	20	15	9
2 out of 10	24	20	17	12	6
3 out of 10	21	18	15	9	5
5 out of 10	17	14	10	5	1
July:					
1 out of 10	24	24	24	24	23
2 out of 10	21	20	20	19	18
3 out of 10	19	17	16	15	13
5 out of 10	15	11	8	6	3
August:					
1 out of 10	23	23	22	21	20
2 out of 10	21	20	19	18	17
3 out of 10	19	17	16	14	13
5 out of 10	16	12	10	8	5
September:					
1 out of 10	28	26	26	22	21
2 out of 10	24	21	20	16	17
3 out of 10	21	18	17	14	13
5 out of 10	17	12	11	9	8
October:					
1 out of 10	30	28	28	28	27
2 out of 10	25	22	22	21	21
3 out of 10	22	18	17	16	16
5 out of 10	16	11	7	5	2
November:					
1 out of 10	13	12	12	11	11
2 out of 10	9	6	5	5	5
3 out of 10	6	1	0	0	0
5 out of 10	2	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 9

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	6	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	3	0	0	0	0
5 out of 10	1	0	0	0	0
April:					
1 out of 10	16	8	0	0	0
2 out of 10	13	4	0	0	0
3 out of 10	11	1	0	0	0
5 out of 10	8	0	0	0	0
May:					
1 out of 10	21	17	10	5	0
2 out of 10	18	14	9	3	0
3 out of 10	16	11	5	2	0
5 out of 10	13	7	1	0	0
June:					
1 out of 10	28	25	21	18	13
2 out of 10	24	20	17	13	9
3 out of 10	22	18	14	10	6
5 out of 10	18	13	10	5	1
July:					
1 out of 10	22	20	20	20	18
2 out of 10	19	17	16	16	14
3 out of 10	17	15	13	13	10
5 out of 10	13	11	8	5	4
August:					
1 out of 10	25	23	22	22	21
2 out of 10	22	19	18	17	15
3 out of 10	20	16	15	13	11
5 out of 10	16	12	9	5	4
September:					
1 out of 10	24	24	23	23	21
2 out of 10	21	20	20	19	16
3 out of 10	19	17	16	16	13
5 out of 10	16	11	10	8	5
October:					
1 out of 10	29	29	29	28	28
2 out of:*55*	25	23	22	20	20
3 out of 10	22	18	16	15	13
5 out of 10	16	11	7	6	3
November:					
1 out of 10	17	16	16	14	14
2 out of 10	12	10	10	9	8
3 out of 10	9	6	6	5	2
5 out of 10	4	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 10

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	7	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	2	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	7	0	0	0
2 out of 10	13	2	0	0	0
3 out of 10	10	0	0	0	0
5 out of 10	6	0	0	0	0
May:					
1 out of 10	23	18	13	5	0
2 out of 10	20	15	9	1	0
3 out of 10	17	12	6	0	0
5 out of 10	14	8	2	0	0
June:					
1 out of 10	28	28	24	20	17
2 out of 10	25	24	21	17	13
3 out of 10	23	20	18	14	9
5 out of 10	19	15	13	8	2
July:					
1 out of 13	29	29	28	28	26
2 out of 10	25	24	23	22	21
3 out of 10	23	21	19	18	17
5 out of 10	19	16	14	12	10
August:					
1 out of 10	28	28	28	28	28
2 out of 10	25	25	25	24	24
3 out of 10	23	21	21	20	20
5 out of 10	20	16	15	14	14
September:					
1 out of 10	27	27	27	27	25
2 out of 10	24	23	23	22	21
3 out of 10	22	20	20	19	17
5 out of 10	18	16	14	13	11
October:					
1 out of 10	30	29	29	29	29
2 out of 10	26	24	24	24	24
3 out of 10	23	21	21	20	20
5 out of 10	17	14	13	11	10
November:					
1 out of 10	13	12	10	10	10
2 out of 10	8	6	5	4	4
3 out of 10	4	2	1	0	0
5 out of 10	1	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 11

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	6	0	0	0	0
2 out of 10	3	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	14	6	0	0	0
2 out of 10	11	2	0	0	0
3 out of 10	10	0	0	0	0
5 out of 10	6	0	0	0	0
May:					
1 out of 10	23	20	12	5	0
2 out of 10	19	15	8	0	0
3 out of 10	16	12	5	0	0
5 out of 10	13	6	0	0	0
June:					
1 out of 10	28	28	25	22	18
2 out of 10	25	23	21	15	13
3 out of 10	23	20	17	14	9
5 out of 10	19	15	12	8	2
July:					
1 out of 10	25	24	24	24	23
2 out of 10	22	21	20	20	20
3 out of 10	20	18	17	17	16
5 out of 10	17	14	12	10	7
August:					
1 out of 10	27	26	26	25	25
2 out of 10	24	23	22	21	21
3 out of 10	21	20	19	17	17
5 out of 10	18	15	13	12	11
September:					
1 out of 10	25	24	23	22	22
2 out of 10	22	21	20	20	19
3 out of 10	20	19	18	17	17
5 out of 10	16	14	12	12	11
October:					
1 out of 10	29	28	28	28	28
2 out of 10	24	23	22	22	22
3 out of 10	20	18	17	17	17
5 out of 10	15	10	8	6	6
November:					
1 out of 10	8	7	7	7	7
2 out of 10	4	4	3	3	3
3 out of 10	1	1	0	0	0
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 12

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	6	0	0	0	0
2 out of 10	3	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	7	0	0	0
2 out of 10	12	3	0	0	0
3 out of 10	10	0	0	0	0
5 out of 10	5	0	0	0	0
May:					
1 out of 10	22	17	11	4	0
2 out of 10	18	13	6	0	0
3 out of 10	16	10	3	0	0
5 out of 10	12	5	0	0	0
June:					
1 out of 10	28	27	24	22	17
2 out of 10	25	23	21	17	12
3 out of 10	23	20	18	14	8
5 out of 10	19	16	13	7	1
July:					
1 out of 10	28	28	27	26	24
2 out of 10	25	24	22	21	19
3 out of 10	23	21	19	18	16
5 out of 10	19	15	14	12	10
August:					
1 out of 10	28	28	27	27	27
2 out of 10	25	25	24	24	23
3 out of 10	23	22	21	21	20
5 out of 10	19	17	16	15	14
September:					
1 out of 10	28	27	27	27	27
2 out of 10	24	23	23	23	22
3 out of 10	22	20	20	19	18
5 out of 10	16	15	13	12	11
October:					
1 out of 10	30	29	29	28	28
2 out of 10	25	23	23	23	23
3 out of 10	21	19	19	18	18
5 out of 10	15	11	6	5	5
November:					
1 out of 10	7	6	6	5	5
2 out of 10	5	4	3	3	3
3 out of 10	4	2	1	1	1
5 out of 10	2	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 13

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	5	0	0	0	0
2 out of 10	3	0	0	0	0
3 out of 10	1	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	14	7	0	0	0
2 out of 10	11	2	0	0	0
3 out of 10	9	0	0	0	0
5 out of 10	5	0	0	0	0
May:					
1 out of 10	22	17	12	5	0
2 out of 10	18	13	6	0	0
3 out of 10	16	10	3	0	0
5 out of 10	11	5	0	0	0
June:					
1 out of 10	29	29	25	22	18
2 out of 10	25	23	21	17	11
3 out of 10	23	20	18	13	7
5 out of 10	18	14	11	6	0
July:					
1 out of 10	29	29	29	29	27
2 out of 10	25	25	23	22	21
3 out of 10	23	21	19	17	16
5 out of 10	20	15	13	10	8
August:					
1 out of 10	29	29	29	28	26
2 out of 10	26	25	25	24	23
3 out of 10	24	22	21	20	20
5 out of 10	20	17	15	14	13
September:					
1 out of 10	27	26	26	26	26
2 out of 10	23	22	22	21	21
3 out of 10	20	19	19	18	18
5 out of 10	16	13	12	11	10
October:					
1 out of 10	25	24	22	22	22
2 out of 10	21	20	18	18	18
3 out of 10	17	16	14	14	14
5 out of 10	12	9	6	5	5
November:					
1 out of 10	8	6	5	5	5
2 out of 10	5	2	1	0	0
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0

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TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 14

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	9	2	0	0	0
2 out of 10	5	0	0	0	0
3 out of 10	3	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	15	7	0	0	0
2 out of 10	12	2	0	0	0
3 out of 10	10	0	0	0	0
5 out of 10	7	0	0	0	0
May:					
1 out of 10	20	17	12	6	0
2 out of 10	17	13	7	1	0
3 out of 10	15	10	4	0	0
5 out of 10	11	6	0	0	0
June:					
1 out of 10	28	26	25	21	17
2 out of 10	24	22	20	17	9
3 out of 10	22	18	17	13	8
5 out of 10	17	13	11	7	2
July:					
1 out of 10	28	27	26	26	25
2 out of 10	25	24	23	22	20
3 out of 10	23	21	20	18	16
5 out of 10	20	17	15	13	10
August:					
1 out of 10	29	28	28	27	26
2 out of 10	25	24	24	23	22
3 out of 10	23	21	21	20	19
5 out of 10	19	17	16	15	14
September:					
1 out of 10	26	25	25	25	25
2 out of 10	23	22	22	21	21
3 out of 10	20	19	18	17	17
5 out of 10	16	12	10	8	8
October:					
1 out of 10	22	22	22	22	22
2 out of 10	18	18	17	17	16
3 out of 10	14	13	13	12	11
5 out of 10	9	5	3	1	0
November:					
1 out of 10	10	6	5	5	5
2 out of 10	6	3	2	2	2
3 out of 10	3	2	1	1	1
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 15

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	8	3	0	0	0
2 out of 10	1	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	14	4	0	0	0
2 out of 10	11	0	0	0	0
3 out of 10	9	0	0	0	0
5 out of 10	6	0	0	0	0
May:					
1 out of 10	22	17	11	3	0
2 out of 10	18	13	6	0	0
3 out of 10	16	10	2	0	0
5 out of 10	12	4	0	0	0
June:					
1 out of 10	30	30	27	24	19
2 out of 10	27	25	22	18	13
3 out of 10	24	21	17	13	9
5 out of 10	20	15	11	6	1
July:					
1 out of 10	28	28	28	28	26
2 out of 10	26	26	26	24	22
3 out of 10	24	23	22	20	17
5 out of 10	20	17	15	13	10
August:					
1 out of 10	30	30	30	30	30
2 out of 10	27	27	27	26	25
3 out of 10	24	23	23	22	21
5 out of 10	20	18	16	15	14
September:					
1 out of 10	28	26	26	26	26
2 out of 10	25	22	21	21	21
3 out of 10	22	19	18	17	17
5 out of 10	18	14	12	11	11
October:					
1 out of 10	24	23	23	23	22
2 out of 10	20	19	19	18	17
3 out of 10	17	15	14	12	11
5 out of 10	12	6	2	1	0
November:					
1 out of 10	11	10	9	9	9
2 out of 10	8	6	5	5	4
3 out of 10	6	4	3	2	1
5 out of 10	2	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 16

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	8	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	15	7	1	0	0
2 out of 10	11	3	0	0	0
3 out of 10	9	1	0	0	0
5 out of 10	5	0	0	0	0
May:					
1 out of 10	18	13	8	2	0
2 out of 10	15	9	4	0	0
3 out of 10	13	6	1	0	0
5 out of 10	9	1	0	0	0
June:					
1 out of 10	30	27	21	16	13
2 out of 10	24	21	17	12	7
3 out of 10	20	17	14	9	3
5 out of 10	15	11	9	3	0
July:					
1 out of 10	30	30	28	27	26
2 out of 10	27	26	26	24	22
3 out of 10	25	23	23	21	19
5 out of 10	21	18	17	15	12
August:					
1 out of 10	29	29	29	29	29
2 out of 10	26	26	25	25	24
3 out of 10	23	22	22	21	21
5 out of 10	19	17	16	15	14
September:					
1 out of 10	27	27	26	26	26
2 out of 10	24	24	22	22	22
3 out of 10	21	21	19	19	19
5 out of 10	17	15	14	13	13
October:					
1 out of 10	22	22	21	21	21
2 out of 10	18	17	17	16	16
3 out of 10	15	13	12	11	11
5 out of 10	11	5	3	2	2
November:					
1 out of 10	12	9	8	8	8
2 out of 10	8	3	1	1	1
3 out of 10	5	0	0	0	0
5 out of 10	0	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 17

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	14	8	1	0	0
2 out of 10	11	4	0	0	0
3 out of 10	9	0	0	0	0
5 out of 10	5	0	0	0	0
April:					
1 out of 10	16	11	5	0	0
2 out of 10	14	6	1	0	0
3 out of 10	12	3	0	0	0
5 out of 10	9	0	0	0	0
May:					
1 out of 10	18	15	11	4	0
2 out of 10	16	11	5	0	0
3 out of 10	13	8	1	0	0
5 out of 10	10	3	0	0	0
June:					
1 out of 10	27	24	20	17	13
2 out of 10	23	19	16	12	7
3 out of 10	20	15	12	7	2
5 out of 10	15	9	3	0	0
July:					
1 out of 10	30	29	28	26	25
2 out of 10	26	25	24	23	22
3 out of 10	24	22	20	20	18
5 out of 10	20	17	15	13	9
August:					
1 out of 10	28	28	28	27	25
2 out of 10	25	24	24	23	22
3 out of 10	23	22	22	20	19
5 out of 10	19	17	16	14	12
September:					
1 out of 10	28	27	27	26	25
2 out of 10	24	23	22	21	20
3 out of 10	21	20	18	17	16
5 out of 10	17	14	12	11	10
October:					
1 out of 10	23	21	20	19	19
2 out of 10	19	16	15	14	13
3 out of 10	16	13	11	9	7
5 out of 10	11	5	1	0	0
November:					
1 out of 10	14	11	10	9	9
2 out of 10	10	7	6	5	4
3 out of 10	8	5	3	1	0
5 out of 10	3	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 18

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
March:	*Number*	*Number*	*Number*	*Number*	*Number*
1 out of 10	4	0	0	0	0
2 out of 10	0	0	0	0	0
3 out of 10	0	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	15	6	0	0	0
2 out of 10	11	1	0	0	0
3 out of 10	8	0	0	0	0
5 out of 10	4	0	0	0	0
May:					
1 out of 10	19	13	5	0	0
2 out of 10	16	9	0	0	0
3 out of 10	14	6	0	0	0
5 out of 10	10	1	0	0	0
June:					
1 out of 10	30	27	24	19	13
2 out of 10	26	23	19	14	8
3 out of 10	23	20	16	10	4
5 out of 10	19	15	10	5	0
July:					
1 out of 10	30	30	29	29	26
2 out of 10	27	26	25	25	23
3 out of 10	24	23	22	22	20
5 out of 10	20	17	15	14	12
August:					
1 out of 10	30	30	30	30	28
2 out of 10	27	26	26	26	24
3 out of 10	24	22	22	22	20
5 out of 10	20	17	15	14	12
September:					
1 out of 10	28	27	27	27	27
2 out of 10	24	23	23	22	22
3 out of 10	22	21	20	19	19
5 out of 10	18	16	15	13	12
October:					
1 out of 10	28	28	27	27	27
2 out of 10	23	20	18	18	18
3 out of 10	20	15	14	13	13
5 out of 10	14	9	7	7	6
November:					
1 out of 10	9	7	6	6	6
2 out of 10	7	4	4	3	3
3 out of 10	4	2	2	2	2
5 out of 10	1	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 19

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	11	0	0	0	0
2 out of 10	8	0	0	0	0
3 out of 10	6	0	0	0	0
5 out of 10	2	0	0	0	0
April:					
1 out of 10	16	10	3	0	0
2 out of 10	12	5	0	0	0
3 out of 10	10	2	0	0	0
5 out of 10	6	0	0	0	0
May:					
1 out of 10	19	15	9	4	0
2 out of 10	16	11	5	1	0
3 out of 10	14	8	2	0	0
5 out of 10	11	3	0	0	0
June:					
1 out of 10	28	26	21	17	13
2 out of 10	25	21	17	13	8
3 out of 10	22	18	14	10	4
5 out of 10	18	13	9	4	0
July:					
1 out of 10	27	25	25	24	23
2 out of 10	24	22	21	20	18
3 out of 10	21	19	18	17	14
5 out of 10	18	15	14	12	7
August:					
1 out of 10	30	30	30	30	30
2 out of 10	27	26	25	24	23
3 out of 10	24	23	20	19	18
5 out of 10	19	16	13	11	8
September:					
1 out of 10	28	27	27	26	26
2 out of 10	25	24	23	23	22
3 out of 10	22	21	20	20	18
5 out of 10	18	15	14	12	11
October:					
1 out of 10	30	29	28	28	28
2 out of 10	24	22	20	20	19
3 out of 10	20	17	15	14	11
5 out of 10	13	9	6	3	0
November:					
1 out of 10	12	10	8	6	4
2 out of 10	9	6	4	3	2
3 out of 10	7	3	2	2	1
5 out of 10	5	0	0	0	0

TABLE 7.—*Minimum number of drought-days in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 4 levels of probability, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section 20

Month and probability level	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
	Number	*Number*	*Number*	*Number*	*Number*
March:					
1 out of 10	8	0	0	0	0
2 out of 10	4	0	0	0	0
3 out of 10	2	0	0	0	0
5 out of 10	0	0	0	0	0
April:					
1 out of 10	16	7	0	0	0
2 out of 10	12	4	0	0	0
3 out of 10	10	1	0	0	0
5 out of 10	6	0	0	0	0
May:					
1 out of 10	22	19	12	3	0
2 out of 10	19	14	7	0	0
3 out of 10	16	11	3	0	0
5 out of 10	13	6	0	0	0
June:					
1 out of 10	29	26	24	20	15
2 out of 10	26	23	20	16	11
3 out of 10	24	20	17	13	8
5 out of 10	20	16	12	9	4
July:					
1 out of 10	26	25	24	23	23
2 out of 10	24	23	21	20	20
3 out of 10	22	20	19	18	18
5 out of 10	19	16	15	14	13
August:					
1 out of 10	31	31	31	31	31
2 out of 10	27	27	27	27	27
3 out of 10	25	24	23	23	23
5 out of 10	21	18	15	15	15
September:					
1 out of 10	27	26	26	26	26
2 out of 10	24	23	22	22	21
3 out of 10	22	20	19	19	18
5 out of 10	19	16	15	14	13
October:					
1 out of 10	30	30	28	27	26
2 out of 10	24	23	22	21	20
3 out of 10	20	19	18	17	16
5 out of 10	13	11	10	10	9
November:					
1 out of 10	9	7	7	7	7
2 out of 10	7	5	5	5	5
3 out of 10	5	3	3	3	3
5 out of 10	2	0	0	0	0

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*

[Section numbers refer to fig. 5]

Section 1

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.6	1.4	1.4	1.3	1.0
70	2.3	2.1	2.0	2.0	1.7
60	2.8	2.7	2.6	2.5	2.4
50	3.4	3.3	3.2	3.1	3.0
40	4.0	4.0	4.0	3.8	3.7
30	4.6	4.6	4.6	4.5	4.5
20	5.5	5.5	5.5	5.5	5.5
10	6.9	6.9	6.9	6.9	6.9
5	8.3	8.3	8.3	8.3	8.3
2	10.2	10.2	10.2	10.2	10.2
Spring:					
80	0	0	0	0	0
70	1.0	0	0	0	0
60	1.6	1.1	1.0	1.0	1.0
50	2.2	1.8	1.7	1.7	1.7
40	2.9	1.5	1.5	1.5	1.5
30	3.7	3.3	3.2	3.2	3.2
20	4.9	4.5	4.5	4.5	4.5
10	6.8	6.5	6.5	6.5	6.5
5	8.6	8.3	8.3	8.3	8.3
2	11.3	11.0	11.3	11.3	11.3
Summer:					
80	0	0	0	0	0
70	.5	0	0	0	0
60	1.1	0	0	0	0
50	1.6	.7	0	0	0
40	2.2	1.3	.7	0	0
30	2.8	2.0	1.3	.8	.5
20	3.6	2.9	2.2	1.8	1.5
10	5.0	4.3	3.7	3.4	3.2
5	6.3	5.6	5.2	4.9	4.8
2	8.0	7.4	7.1	6.8	6.7
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1.2	0	0	0	0
40	2.0	1.2	0	0	0
30	2.7	2.0	1.6	1.4	1.3
20	3.7	3.0	2.8	2.6	2.5
10	5.5	4.8	4.5	4.4	4.2
5	7.7	7.0	6.6	6.3	5.9
2	10.8	10.5	10.1	9.7	9.0

See footnote at end of table.

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TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 2

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.5	1.3	1.3	1.3	1.3
70	2.1	2.0	1.9	1.9	1.9
60	2.8	2.6	2.4	2.4	2.4
50	3.4	3.2	3.2	3.0	3.0
40	4.0	3.8	3.8	3.8	3.6
30	4.8	4.6	4.6	4.4	4.4
20	5.9	5.7	5.7	5.7	5.4
10	7.5	7.3	7.3	7.3	7.1
5	8.9	8.8	8.7	8.7	8.7
2	10.7	10.7	10.7	10.7	10.6
Spring:					
80	0	0	0	0	0
70	.5	0	0	0	0
60	1.2	.6	0	0	0
50	1.8	1.3	1.0	1.0	1.0
40	2.4	2.0	1.8	1.7	1.7
30	3.0	2.8	2.5	2.4	2.4
20	4.0	3.7	3.6	3.6	3.5
10	5.7	5.3	5.3	5.3	5.2
5	7.5	7.1	7.1	7.1	7.1
2	10.5	10.0	10.0	10.0	10.0
Summer:					
80	0	0	0	0	0
70	.6	0	0	0	0
60	1.2	0	0	0	0
50	1.8	.6	0	0	0
40	2.5	1.5	1.0	0	0
30	3.2	2.5	2.0	1.5	1.0
20	4.3	3.6	3.2	2.8	2.6
10	6.2	5.6	5.3	5.0	4.8
5	8.0	7.5	7.2	7.1	6.7
2	10.8	10.0	9.7	9.6	9.0
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1.2	0	0	0	0
40	1.9	1.2	0	0	0
30	2.8	2.2	1.7	1.4	1.2
20	4.0	3.5	3.1	2.8	2.6
10	6.4	5.6	5.3	5.0	4.8
5	8.5	7.7	7.4	7.0	6.8
2	11.2	10.2	9.9	9.2	9.0

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 3

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.7	1.7	1.6	1.6	1.3
70	2.4	2.2	2.2	2.2	2.0
60	3.0	3.0	2.8	2.8	2.7
50	3.7	3.7	3.6	3.6	3.4
40	4.5	4.5	4.4	4.4	4.2
30	5.5	5.5	5.5	5.3	5.2
20	6.8	6.6	6.6	6.6	6.5
10	8.7	8.7	8.6	8.6	8.5
5	10.5	10.4	10.4	9.8	9.8
2	12.5	12.4	12.4	12.4	12.2
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1.2	.9	.7	0	0
50	2.0	1.6	1.5	1.5	1.5
40	2.7	2.4	2.4	2.3	2.3
30	3.6	3.3	3.3	3.3	3.3
20	4.9	4.5	4.4	4.4	4.4
10	6.8	6.5	6.5	6.3	6.3
5	8.5	8.2	8.2	8.0	8.0
2	10.5	10.1	10.1	10.0	10.0
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1.6	0	0	0	0
20	2.6	1.7	1.0	0	0
10	4.1	3.4	2.6	2.2	2.0
5	5.8	5.0	4.3	4.2	4.0
2	8.7	7.6	7.1	6.9	6.5
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.2	0	0	0	0
30	2.0	1.2	0	0	0
20	3.0	2.3	1.6	1.0	0
10	4.7	4.0	3.3	3.0	2.5
5	6.4	5.8	5.0	4.7	4.3
2	8.6	8.1	7.3	6.9	6.3

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 4

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.6	1.5	1.3	1.3	1.2
70	2.1	2.1	2.1	2.0	1.8
60	2.7	2.7	2.5	2.5	2.3
50	3.3	3.3	3.1	3.1	2.9
40	4.0	4.0	3.7	3.7	3.5
30	4.8	4.6	4.6	4.4	4.4
20	6.0	6.0	5.8	5.8	5.7
10	8.0	8.0	7.9	7.9	7.8
5	9.7	9.7	9.6	9.6	9.5
2	11.8	11.8	11.7	11.7	11.7
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1.2	0	0	0	0
50	1.8	1.4	1.4	1.2	1.2
40	2.4	2.0	2.0	1.8	1.8
30	3.2	2.8	2.8	2.6	2.6
20	4.1	3.7	3.6	3.6	3.6
10	5.8	5.2	5.2	5.2	5.0
5	7.3	6.8	6.8	6.8	6.4
2	9.2	8.6	8.3	8.3	8.3
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	0	0	0	0	0
20	1.3	0	0	0	0
10	2.7	1.6	1.0	0	0
5	4.2	3.0	2.2	1.9	1.7
2	6.6	5.5	4.5	4.0	3.6
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.3	0	0	0	0
30	2.1	1.5	0	0	0
20	3.1	2.5	1.7	2.0	0
10	4.7	4.0	3.5	2.7	1.8
5	6.3	5.6	5.1	4.2	3.5
2	8.5	7.8	7.3	6.4	6.0

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 5

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.9	1.7	1.7	1.7	1.6
70	2.5	2.3	2.3	2.2	2.2
60	3.0	3.0	2.9	2.9	2.7
50	3.6	3.6	3.5	3.5	3.3
40	4.3	4.3	4.3	4.1	3.9
30	5.0	5.0	4.9	4.6	4.6
20	6.1	6.1	6.0	6.0	5.6
10	7.8	7.8	7.8	7.8	7.1
5	9.5	9.5	9.5	9.5	8.6
2	11.8	11.8	11.8	10.5	10.5
Spring:					
80	0	0	0	0	0
70	1.3	0	0	0	0
60	1.8	1.5	1.4	1.4	1.4
50	2.3	2.1	2.0	2.0	2.0
40	3.0	2.7	2.6	2.6	2.6
30	3.7	3.5	3.3	3.3	3.3
20	5.1	5.0	4.8	4.8	4.8
10	7.5	7.0	7.0	7.0	7.0
5	9.0	9.0	9.0	9.0	9.0
2	10.0	10.0	10.0	10.0	10.0
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1.3	0	0	0	0
40	1.9	0	0	0	0
30	2.5	1.4	0	0	0
20	3.4	2.4	1.9	1.3	1.1
10	4.8	4.0	3.5	3.2	3.0
5	6.2	5.5	5.0	4.7	4.5
2	8.0	7.5	6.8	6.3	6.0
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1.2	0	0	0	0
40	1.8	1.0	0	0	0
30	2.5	1.6	1.3	0	0
20	3.5	2.8	2.3	1.9	1.6
10	5.2	4.5	4.0	3.7	3.3
5	7.0	6.3	5.8	5.5	5.0
2	9.0	8.6	8.1	7.9	7.3

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 6

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	2.0	1.8	1.7	1.6	1.4
70	2.5	2.4	2.4	2.2	2.0
60	3.0	2.9	2.9	2.7	2.5
50	3.5	3.4	3.4	3.2	3.1
40	4.1	4.0	4.0	3.8	3.7
30	4.9	4.8	4.8	4.5	4.4
20	6.0	5.8	5.8	5.6	5.4
10	7.8	7.5	7.5	7.2	7.1
5	9.5	9.2	9.7	9.7	9.5
2	11.2	11.2	10.5	10.2	10.2
Spring:					
80	0	0	0	0	0
70	1.2	0	0	0	0
60	1.8	1.4	1.2	1.2	1.2
50	2.4	2.0	1.7	1.7	1.7
40	3.1	2.7	2.4	2.4	2.4
30	4.0	3.7	3.3	3.3	3.3
20	5.3	5.0	4.7	4.7	4.7
10	7.2	7.2	7.0	7.0	7.0
5	9.0	8.9	8.9	8.9	8.9
2	11.1	11.0	11.0	11.0	11.0
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.0	0	0	0	0
30	1.7	0	0	0	0
20	2.6	1.7	1.0	0	0
10	4.0	3.3	2.5	2.0	1.8
5	5.2	4.6	3.7	3.3	3.2
2	7.0	6.0	5.2	4.8	4.7
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.0	0	0	0	0
30	1.6	0	0	0	0
20	2.5	1.7	1.0	0	0
10	4.0	3.2	2.5	2.0	1.6
5	5.5	5.0	4.0	3.5	3.0
2	8.2	7.6	6.6	5.9	5.7

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 7

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.9	1.9	1.7	1.5	1.2
70	2.4	2.2	2.2	2.0	1.7
60	3.0	2.8	2.8	2.6	2.3
50	3.6	3.6	3.3	3.3	2.9
40	3.2	3.0	3.0	2.9	2.5
30	5.0	5.0	4.8	4.8	4.5
20	6.2	6.2	6.0	6.0	5.7
10	8.0	7.8	7.8	7.8	7.8
5	9.7	9.7	9.6	9.6	9.6
2	11.6	11.6	11.6	11.6	11.6
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1.3	[illegible]	0	0	0
50	1.8	1.6	1.4	1.4	1.4
40	2.5	2.2	2.2	2.1	2.1
30	3.2	3.0	2.9	2.9	2.9
20	4.2	4.1	4.0	4.0	4.0
10	5.9	5.8	5.8	5.8	5.5
5	7.6	7.3	7.3	7.3	7.0
2	[illegible]	9.1	8.7	8.7	8.7
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1.1	0	0	0	0
20	2.0	1.0	0	0	0
10	3.6	2.7	2.0	1.4	1.2
5	5.1	4.2	3.4	2.7	2.5
2	6.7	5.7	5.0	4.2	4.0
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1.3	0	0	0	0
20	2.4	1.7	0	0	0
10	3.9	3.3	2.7	2.0	1.2
5	5.5	5.0	4.5	3.6	3.0
2	7.7	6.7	6.4	5.5	5.0

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 8

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1. 7	1. 7	1. 5	1. 5	1. 2
70	2. 3	2. 3	2. 0	2. 0	1. 8
60	2. 8	2. 8	2. 5	2. 5	2. 3
50	3. 5	3. 2	3. 2	3. 0	3. 0
40	4. 3	4. 3	4. 0	4. 0	3. 8
30	5. 4	5. 4	5. 0	5. 0	4. 8
20	7. 0	7. 0	6. 5	6. 5	6. 3
10	9. 1	8. 7	8. 7	8. 7	8. 5
5	10. 8	10. 8	10. 0	10. 0	10. 0
2	12. 7	12. 7	12. 3	12. 3	12. 0
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1. 0	0	0	0	0
50	1. 6	1. 3	1. 3	1. 3	1. 3
40	2. 3	2. 0	2. 0	2. 0	2. 0
30	3. 0	2. 8	2. 8	2. 8	2. 8
20	4. 0	3. 6	3. 6	3. 6	3. 6
10	5. 0	4. 8	4. 8	4. 8	4. 8
5	6. 0	5. 8	5. 8	5. 8	5. 8
2	7. 0	6. 9	6. 9	6. 9	6. 9
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 0	0	0	0	0
20	1. 7	0	0	0	0
10	2. 7	2. 0	1. 2	0	0
5	4. 1	3. 3	2. 7	2. 0	2. 0
2	6. 0	4. 8	4. 2	3. 7	3. 7
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 4	0	0	0	0
30	2. 2	1. 4	0	0	0
20	3. 1	2. 4	1. 7	1. 0	0
10	4. 5	3. 8	3. 4	2. 8	2. 1
5	5. 6	5. 0	4. 8	4. 2	3. 5
2	6. 8	6. 2	6. 2	6. 8	5. 0

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 9

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1. 6	1. 6	1. 6	1. 4	1. 2
70	2. 3	2. 3	2. 3	1. 9	1. 8
60	2. 8	2. 8	2. 8	2. 5	2. 4
50	3. 5	3. 5	3. 5	3. 2	3. 1
40	4. 3	4. 3	4. 0	4. 0	4. 0
30	5. 4	5. 0	5. 0	5. 0	5. 0
20	7. 0	7. 0	7. 0	6. 7	6. 7
10	9. 0	9. 0	9. 0	9. 0	9. 0
5	10. 9	10. 9	10. 9	10. 9	10. 9
2	13. 0	13. 0	13. 0	13. 0	13. 0
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1. 1	0	0	0	0
50	1. 7	1. 4	1. 4	1. 4	1. 4
40	2. 4	2. 0	2. 0	2. 0	2. 0
30	3. 2	3. 2	2. 9	2. 9	2. 9
20	4. 2	4. 0	4. 0	4. 0	4. 0
10	5. 8	5. 7	5. 7	5. 7	5. 7
5	7. 2	7. 2	7. 2	7. 2	7. 2
2	9. 0	9. 0	9. 0	9. 0	9. 0
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 1	0	0	0	0
20	1. 9	0	0	0	0
10	3. 0	1. 9	1. 0	0	0
5	3. 9	2. 9	2. 1	1. 3	0
2	4. 9	4. 0	3. 3	2. 5	2. 0
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 2	0	0	0	0
30	1. 8	1. 2	0	0	0
20	2. 6	2. 0	1. 2	0	0
10	4. 0	3. 3	2. 7	2. 0	1. 5
5	5. 5	5. 0	4. 1	3. 3	3. 0
2	7. 8	7. 0	6. 0	5. 3	4. 8

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 10

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1. 2	1. 2	1. 1	0	0
70	1. 8	1. 8	1. 6	1. 5	1. 3
60	2. 4	2. 4	2. 2	2. 1	2. 0
50	3. 2	2. 9	2. 9	2. 8	2. 7
40	3. 9	3. 9	3. 7	3. 7	3. 5
30	5. 0	5. 0	5. 0	4. 7	4. 6
20	6. 6	6. 6	6. 6	6. 6	6. 6
10	9. 0	9. 0	9. 0	9. 0	9. 0
5	11. 3	11. 3	11. 3	11. 3	11. 3
2	14. 0	14. 0	14. 0	14. 0	14. 0
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1. 3	0	0	0	0
50	1. 9	1. 5	1. 5	1. 5	1. 5
40	2. 4	2. 1	2. 1	2. 1	2. 1
30	3. 1	2. 8	2. 8	2. 8	2. 8
20	3. 9	3. 8	3. 8	3. 8	3. 8
10	5. 1	5. 1	5. 1	5. 1	5. 1
5	6. 0	6. 0	6. 0	6. 0	6. 0
2	7. 2	7. 2	7. 2	7. 2	7. 2
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 1	0	0	0	0
20	2. 0	3. 0	0	0	0
10	3. 4	2. 5	1. 8	1. 3	1. 0
5	4. 6	3. 8	3. 2	2. 8	2. 7
2	6. 0	5. 2	4. 6	4. 3	4. 1
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 5	0	0	0	0
30	2. 1	1. 5	0	0	0
20	3. 0	2. 3	1. 8	1. 2	0
10	4. 3	3. 7	3. 1	2. 7	2. 1
5	5. 6	5. 0	4. 6	4. 1	3. 4
2	7. 3	6. 9	6. 6	6. 0	5. 2

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 11

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	0	0	0	0	0
70	1.2	1.2	1.1	0	0
60	1.7	1.7	1.7	1.5	1.2
50	2.2	2.2	2.0	2.0	1.8
40	2.8	2.8	2.5	2.5	3.1
30	3.4	3.4	3.4	3.2	3.1
20	4.4	4.4	4.2	4.2	4.0
10	6.1	6.0	6.0	6.0	5.9
5	8.2	8.0	8.0	8.0	8.0
2	13.3	13.3	13.3	13.3	13.3
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1.3	0	0	0	0
40	1.8	1.5	1.5	1.5	1.5
30	2.4	2.2	2.2	2.2	2.2
20	3.2	3.0	3.0	3.0	3.0
10	4.5	4.4	4.4	4.4	4.4
5	5.9	5.9	5.9	5.9	5.9
2	7.7	7.7	7.7	7.7	7.7
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	0	0	0	0	0
20	1.6	0	0	0	0
10	2.9	1.6	1.0	0	0
5	4.2	2.9	2.2	1.8	1.4
2	6.0	4.8	4.0	3.9	3.3
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.2	0	0	0	0
30	1.8	1.2	0	0	0
20	2.6	2.0	1.5	0	0
10	3.9	3.2	3.0	2.4	1.7
5	5.3	4.5	4.5	3.7	3.0
2	6.9	6.0	6.0	5.2	4.7

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 12

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	0	0	0	0	0
70	1. 5	1. 5	1. 3	1. 3	1. 0
60	2. 1	2. 1	1. 8	1. 8	1. 6
50	2. 8	2. 8	2. 4	2. 4	2. 1
40	3. 4	3. 4	3. 0	3. 0	2. 8
30	4. 2	4. 2	3. 8	3. 8	3. 6
20	5. 2	5. 2	5. 0	5. 0	4. 7
10	7. 0	7. 0	7. 0	7. 0	6. 7
5	9. 2	9. 2	9. 2	9. 2	9. 2
2	12. 0	12. 0	12. 0	12. 0	12. 0
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1. 4	1. 0	0	0	0
40	2. 0	1. 8	1. 8	1. 8	1. 8
30	2. 8	2. 6	2. 6	2. 6	2. 6
20	3. 8	3. 7	3. 7	3. 7	3. 7
10	5. 1	5. 1	5. 1	5. 1	5. 1
5	6. 3	6. 3	6. 3	6. 3	6. 3
2	7. 5	7. 5	7. 5	7. 5	7. 5
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 3	0	0	0	0
20	2. 1	0	0	0	0
10	3. 3	2. 0	1. 5	0	0
5	4. 5	3. 0	2. 7	2. 3	2. 0
2	6. 0	5. 0	4. 5	4. 2	3. 7
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 5	0	0	0	0
30	2. 1	1. 3	0	0	0
20	2. 9	2. 3	1. 6	1. 2	0
10	4. 3	3. 6	3. 1	2. 6	2. 0
5	5. 6	4. 8	4. 3	3. 7	3. 0
2	7. 1	6. 2	5. 6	5. 0	4. 2

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 13

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.0	0	0	0	0
70	1.6	1.6	1.6	1.3	1.1
60	2.1	2.1	2.1	1.8	1.7
50	2.7	2.7	2.7	2.4	2.3
40	3.5	3.5	3.5	3.0	2.9
30	4.4	4.4	4.4	3.9	3.9
20	6.1	6.1	6.1	5.4	5.4
10	9.0	9.0	9.0	9.0	9.0
5	10.9	10.9	10.9	10.9	10.9
2	12.6	12.6	12.6	12.6	12.6
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1.0	0	0	0	0
50	1.7	1.3	1.3	1.3	1.3
40	2.4	2.1	2.1	2.1	2.1
30	3.1	2.9	2.9	2.9	2.9
20	4.0	3.8	3.8	3.8	3.8
10	5.2	5.2	5.2	5.2	5.2
5	6.3	6.3	6.3	6.3	6.3
2	7.5	7.5	7.5	7.5	7.5
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	0	0	0	0	0
20	1.7	0	0	0	0
10	2.7	1.7	1.0	0	0
5	3.6	2.6	2.1	1.6	1.2
2	4.6	3.5	3.2	2.6	2.3
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.2	0	0	0	0
30	2.0	1.4	0	0	0
20	3.0	2.4	1.8	1.2	0
10	4.5	3.8	3.4	2.6	1.9
5	5.8	5.0	4.7	3.7	3.2
2	7.4	6.5	6.2	5.0	4.8

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 14

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	0	0	0	0	0
70	0	0	0	0	0
60	1. 6	1. 6	1. 6	1. 3	1. 3
50	2. 4	2. 4	2. 4	1. 9	1. 9
40	2. 9	2. 9	2. 9	2. 5	2. 5
30	3. 6	3. 6	3. 6	3. 2	3. 2
20	4. 5	4. 5	4. 5	4. 1	4. 1
10	5. 7	5. 7	5. 7	5. 4	5. 4
5	7. 1	7. 1	7. 1	7. 1	7. 1
2	8. 9	8. 9	8. 9	8. 9	8. 9
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1. 5	1. 0	0	0	0
40	2. 1	1. 6	1. 4	1. 4	1. 4
30	2. 8	2. 3	2. 2	2. 2	2. 2
20	3. 6	3. 2	3. 1	3. 1	3. 1
10	4. 9	4. 6	4. 6	4. 6	4. 6
5	6. 1	6. 0	6. 0	6. 0	6. 0
2	7. 9	7. 9	7. 9	7. 9	7. 9
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 0	0	0	0	0
20	1. 5	0	0	0	0
10	2. 3	1. 3	1. 0	0	0
5	3. 3	2. 3	2. 0	1. 7	1. 5
2	5. 0	4. 0	3. 8	3. 0	2. 5
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 5	0	0	0	0
30	2. 1	1. 1	0	0	0
20	3. 1	2. 2	1. 6	1. 0	0
10	4. 6	4. 0	3. 2	2. 5	1. 8
5	6. 0	5. 5	4. 6	4. 0	3. 0
2	7. 4	6. 9	6. 2	5. 9	4. 9

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 15

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1. 2	1. 0	0	0	0
40	1. 8	1. 6	1. 5	1. 3	1. 0
30	2. 4	2. 2	2. 2	2. 0	1. 8
20	3. 3	3. 2	3. 2	2. 9	2. 7
10	4. 6	4. 6	4. 5	4. 2	4. 0
5	6. 0	6. 0	5. 6	5. 6	5. 2
2	8. 0	8. 0	7. 0	7. 0	6. 6
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1. 1	0	0	0	0
40	1. 6	1. 1	0	0	0
30	2. 2	1. 7	1. 5	1. 5	1. 5
20	3. 0	2. 6	2. 4	2. 4	2. 4
10	4. 6	4. 3	4. 3	4. 1	4. 1
5	6. 4	6. 0	6. 0	6. 0	6. 0
2	8. 8	8. 0	8. 0	8. 0	8. 0
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1. 1	0	0	0	0
20	1. 8	1. 0	0	0	0
10	3. 1	2. 2	1. 6	1. 3	1. 1
5	4. 5	3. 6	3. 0	2. 6	2. 3
2	7. 0	5. 7	5. 2	4. 7	4. 3
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 2	0	0	0	0
30	1. 9	1. 0	0	0	0
20	2. 8	2. 0	1. 2	0	0
10	4. 4	3. 6	3. 0	2. 5	2. 2
5	6. 0	5. 5	4. 6	4. 0	3. 7
2	8. 1	7. 8	6. 6	5. 7	5. 1

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 16

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	0	0	0	0	0
70	1. 4	1. 4	1. 4	1. 1	0
60	2. 1	2. 1	2. 1	1. 9	1. 6
50	2. 8	2. 8	2. 8	2. 6	2. 4
40	3. 5	3. 5	3. 5	3. 4	3. 2
30	4. 4	4. 4	4. 4	4. 2	4. 0
20	5. 3	5. 3	5. 3	5. 2	5. 1
10	6. 9	6. 9	6. 9	6. 5	6. 5
5	8. 2	8. 2	8. 2	8. 2	8. 2
2	10. 0	10. 0	10. 0	10. 0	10. 0
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1. 4	1. 0	0	0	0
50	2. 0	1. 6	1. 4	1. 4	1. 4
40	2. 6	2. 2	2. 0	2. 0	2. 0
30	3. 3	2. 9	2. 2	2. 2	2. 2
20	4. 1	3. 9	3. 6	3. 6	3. 6
10	5. 8	5. 5	5. 4	5. 4	5. 4
5	7. 4	7. 0	7. 0	7. 0	7. 0
2	9. 5	9. 2	9. 2	9. 2	9. 2
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1. 2	0	0	0	0
30	2. 0	1. 1	0	0	0
20	3. 0	2. 0	1. 5	1. 1	0
10	4. 6	3. 6	3. 1	2. 7	2. 3
5	6. 3	5. 4	4. 6	4. 0	3. 6
2	9. 0	7. 4	6. 3	5. 5	5. 1
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	1. 5	0	0	0	0
40	2. 2	1. 5	1. 0	0	0
30	3. 0	2. 3	1. 7	1. 5	1. 2
20	4. 0	3. 3	2. 8	2. 8	2. 2
10	5. 7	4. 8	4. 3	4. 3	3. 6
5	8. 0	6. 3	6. 0	6. 0	5. 0
2	11. 2	8. 3	8. 0	7. 7	6. 8

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 17

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.3	1.3	1.2	1.2	0
70	1.9	1.9	1.8	1.7	1.4
60	2.4	2.4	2.3	2.2	2.0
50	3.0	3.0	2.8	2.7	2.5
50	3.7	3.7	3.4	3.2	3.1
30	4.6	4.6	4.1	4.1	4.0
20	6.0	6.0	5.5	5.5	5.5
10	8.3	8.3	8.0	8.0	8.0
5	10.0	10.0	10.0	10.0	10.0
2	11.9	11.9	11.9	11.9	11.9
Spring:					
80	0	0	0	0	0
70	1.1	0	0	0	0
60	1.5	1.0	1.0	1.0	1.0
50	2.0	1.6	1.6	1.6	1.6
40	2.5	2.2	2.2	2.2	2.2
30	3.1	2.9	2.9	2.9	2.9
20	4.0	3.8	3.8	3.8	3.8
10	5.4	5.2	5.2	5.2	5.2
5	7.0	6.5	6.5	6.5	6.5
2	9.0	8.3	8.3	8.3	8.3
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	1.3	0	0	0	0
20	2.0	1.0	0	0	0
10	3.4	2.4	1.6	1.1	0
5	4.9	3.7	2.9	2.4	1.9
2	7.0	5.4	4.8	4.1	3.9
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	4.4	0	0	0	0
30	2.2	1.6	0	0	0
20	3.2	2.6	2.0	1.5	0
10	5.1	4.6	4.0	3.2	2.6
5	6.7	6.0	5.5	4.8	4.0
2	7.9	7.1	6.7	6.0	5.3

See footnote at end of table.

TABLE 8.—*Minimum monthly excess moisture in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity and 10 levels of probability, by sections and seasons*—Continued

[Section numbers refer to fig. 5]

Section 18

Season and probability level (percent) [1]	1-inch basis	2-inch basis	3-inch basis	4-inch basis	5-inch basis
Winter:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
80	1.1	0	0	0	0
70	1.7	1.7	1.5	1.3	1.2
60	2.2	2.2	2.1	1.9	1.7
50	2.9	2.9	2.5	2.5	2.3
40	3.6	3.6	3.5	3.2	3.0
30	4.5	4.5	4.3	4.2	4.0
20	5.8	5.8	5.6	5.6	5.3
10	8.0	8.0	7.9	7.9	7.6
5	10.0	10.0	10.0	10.0	9.5
2	11.9	11.9	11.9	11.9	11.6
Spring:					
80	0	0	0	0	0
70	0	0	0	0	0
60	1.2	0	0	0	0
50	1.8	1.5	1.5	1.5	1.5
40	2.3	2.0	2.0	2.0	2.0
30	3.0	2.7	2.7	2.7	2.7
20	4.0	3.7	3.7	3.7	3.7
10	5.6	5.2	5.2	5.2	5.2
5	7.4	7.0	7.0	7.0	7.0
2	9.7	9.7	9.7	9.7	9.7
Summer:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	0	0	0	0	0
30	0	0	0	0	0
20	1.5	0	0	0	0
10	2.8	1.7	1.0	0	0
5	4.0	3.0	2.5	2.0	1.4
2	6.0	5.0	5.0	4.0	3.2
Fall:					
80	0	0	0	0	0
70	0	0	0	0	0
60	0	0	0	0	0
50	0	0	0	0	0
40	1.2	0	0	0	0
30	1.8	1.0	0	0	0
20	2.7	2.0	1.3	0	0
10	4.3	3.7	3.2	2.8	2.1
5	6.0	5.4	4.8	4.2	3.6
2	8.0	7.5	6.6	6.0	5.4

[1] Seasons are as follows: Winter=December, January, February; spring=March, April, May; summer=June, July, August; Fall=September, October, November.

TABLE 9.—*Maximum irrigation requirements in 9 out of 10 years in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity, by sections and months*

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 1:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0. 45	2. 08	3. 52	4. 08	3. 04	2. 70	2. 86	2. 80	0. 66
2	0	1. 04	2. 88	3. 57	2. 72	1. 80	2. 34	2. 70	. 54
3	0	0	1. 92	3. 06	2. 40	1. 50	1. 95	2. 30	. 42
4	0	0	. 80	2. 38	2. 08	. 90	1. 30	1. 90	. 36
5	0	0	0	1. 70	1. 76	. 75	1. 04	1. 40	. 30
Sec. 2:									
1	1. 17	2. 34	3. 52	4. 25	2. 56	2. 25	2. 47	3. 00	. 90
2	0	1. 56	2. 88	3. 91	1. 92	1. 35	1. 56	2. 40	. 72
3	0	0	2. 40	3. 74	1. 76	. 75	1. 04	1. 90	. 60
4	0	0	1. 44	3. 23	1. 60	. 45	0	1. 20	. 42
5	0	0	. 16	2. 72	1. 28	. 45	0	. 40	. 12
Sec. 3:									
1	. 90	2. 60	3. 52	4. 76	3. 52	3. 30	2. 86	3. 00	. 66
2	0	1. 69	2. 88	4. 25	3. 36	2. 85	2. 73	2. 70	. 48
3	0	. 13	2. 24	4. 08	3. 20	2. 70	2. 60	2. 70	. 42
4	0	0	1. 12	3. 91	3. 04	2. 55	2. 34	2. 60	. 42
5	0	0	. 16	3. 08	2. 88	2. 40	2. 08	2. 40	. 36
Sec. 4:									
1	. 64	2. 34	3. 00	5. 60	5. 00	5. 04	3. 78	2. 34	. 55
2	0	1. 17	2. 25	4. 80	4. 60	5. 04	3. 64	2. 25	0
3	0	0	1. 35	4. 20	4. 60	5. 04	3. 50	2. 25	0
4	0	0	0	3. 60	4. 60	5. 04	3. 36	2. 25	0
5	0	0	0	2. 60	4. 60	5. 04	3. 08	2. 16	0
Sec. 5:									
1	. 64	1. 92	2. 80	5. 22	4. 86	4. 64	3. 51	2. 32	. 65
2	0	. 84	2. 10	4. 86	4. 68	4. 32	3. 51	2. 32	. 55
3	0	0	1. 26	4. 32	4. 68	4. 16	3. 51	2. 32	. 55
4	0	0	0	3. 24	4. 68	4. 16	3. 38	2. 24	. 55
5	0	0	0	2. 34	4. 50	4. 16	3. 25	2. 24	. 55
Sec. 6:									
1	. 88	2. 34	3. 30	6. 00	5. 60	5. 40	4. 06	2. 70	. 45
2	0	1. 43	2. 70	5. 60	5. 60	5. 22	4. 06	2. 70	. 35
3	0	. 39	2. 10	5. 20	5. 60	5. 22	4. 06	2. 70	. 35
4	0	0	1. 50	4. 60	5. 60	5. 22	4. 06	2. 52	. 35
5	0	0	0	4. 00	5. 60	5. 22	4. 06	2. 52	. 35
Sec. 7:									
1	. 48	1. 80	3. 36	4. 50	3. 42	3. 04	2. 73	2. 40	. 70
2	0	. 72	2. 52	4. 14	3. 24	2. 56	2. 34	2. 24	. 60
3	0	0	1. 82	3. 60	3. 06	2. 24	2. 08	2. 00	. 60
4	0	0	. 98	3. 06	2. 70	1. 92	1. 82	1. 60	. 55
5	0	0	0	2. 34	2. 34	1. 76	1. 43	1. 60	. 35
Sec. 8:									
1	. 56	1. 92	3. 08	5. 22	4. 32	3. 68	3. 64	2. 40	. 65
2	0	. 72	2. 10	4. 14	4. 32	3. 68	3. 38	2. 24	. 60
3	0	0	1. 54	3. 60	4. 32	3. 52	3. 38	2. 24	. 60
4	0	0	0	2. 70	4. 32	3. 36	2. 86	2. 24	. 55
5	0	0	0	1. 62	4. 14	3. 20	2. 73	2. 16	. 55

TABLE 9.—*Maximum irrigation requirements in 9 out of 10 years in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 9:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0. 48	1. 92	2. 94	5. 04	3. 96	4. 00	3. 12	2. 32	0. 85
2	0	. 96	2. 38	4. 50	3. 60	3. 68	3. 12	2. 32	. 80
3	0	0	1. 40	3. 78	3. 60	3. 52	2. 99	2. 32	. 80
4	0	0	. 70	3. 24	3. 60	3. 52	2. 99	2. 24	. 70
5	0	0	0	2. 34	3. 24	3. 36	2. 73	2. 24	. 70
Sec. 10:									
1	. 56	1. 92	3. 22	5. 04	5. 22	4. 48	3. 51	2. 40	. 65
2	0	. 84	2. 52	5. 04	5. 22	4. 48	3. 51	2. 32	. 60
3	0	0	1. 82	4. 32	5. 04	4. 48	3. 51	2. 32	. 50
4	0	0	. 70	3. 60	5. 04	4. 48	3. 51	2. 32	. 50
5	0	0	0	3. 06	4. 68	4. 48	3. 25	2. 32	. 50
Sec. 11:									
1	. 48	1. 68	3. 22	5. 04	4. 50	4. 32	3. 25	2. 32	. 40
2	0	. 72	2. 80	5. 04	4. 32	4. 16	3. 12	2. 24	. 35
3	0	0	1. 68	4. 50	4. 32	4. 16	2. 99	2. 24	. 35
4	0	0	. 70	3. 96	4. 32	4. 00	2. 86	2. 24	. 35
5	0	0	0	3. 24	4. 14	4. 00	2. 86	2. 24	. 35
Sec. 12:									
1	. 48	1. 92	3. 08	5. 04	5. 04	4. 48	3. 64	2. 40	. 35
2	0	. 84	2. 38	4. 86	5. 04	4. 48	3. 51	2. 32	. 30
3	0	0	1. 54	4. 32	4. 86	4. 32	3. 51	2. 32	. 30
4	0	0	. 56	3. 96	4. 68	4. 32	3. 51	2. 24	. 25
5	0	0	0	3. 06	4. 32	4. 32	3. 51	2. 24	. 25
Sec. 13:									
1	. 40	1. 68	3. 08	5. 22	5. 22	4. 64	3. 51	2. 00	. 40
2	0	. 84	2. 38	5. 22	5. 22	4. 64	3. 38	1. 92	. 30
3	0	0	1. 68	4. 50	5. 22	4. 64	3. 38	1. 76	. 25
4	0	0	. 70	3. 96	5. 22	4. 48	3. 38	1. 76	. 25
5	0	0	0	3. 24	4. 86	4. 16	3. 38	1. 76	. 25
Sec. 14:									
1	. 72	1. 80	2. 80	5. 04	5. 04	4. 64	3. 38	1. 76	. 50
2	. 16	. 84	2. 38	4. 68	4. 86	4. 48	3. 25	1. 76	. 30
3	0	0	1. 68	4. 50	4. 68	4. 48	3. 25	1. 76	25
4	0	0	. 84	3. 78	4. 68	4. 32	3. 25	1. 76	. 25
5	0	0	0	3. 06	4. 50	4. 16	3. 25	1. 76	. 25
Sec. 15:									
1	. 64	1. 68	3. 08	5. 40	5. 04	4. 80	3. 64	1. 92	. 55
2	. 24	. 48	2. 38	5. 40	5. 04	4. 80	3. 38	1. 84	. 50
3	0	0	1. 54	4. 86	5. 04	4. 80	3. 38	1. 84	. 45
4	0	0	. 42	4. 32	5. 04	4. 80	3. 38	1. 84	. 45
5	0	0	0	3. 42	4. 68	4. 80	3. 38	1. 76	. 45
Sec. 16:									
1	. 64	1. 80	2. 52	5. 40	5. 40	4. 64	3. 51	1. 76	. 60
2	0	. 84	1. 82	4. 86	5. 40	4. 64	3. 51	1. 76	. 45
3	0	. 12	1. 12	3. 78	5. 04	4. 64	3. 38	1. 68	. 40
4	0	0	. 28	2. 88	4. 86	4. 64	3. 38	1. 68	. 40
5	0	0	0	2. 34	4. 68	4. 64	3. 38	1. 68	. 40

TABLE 9.—*Maximum irrigation requirements in 9 out of 10 years in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 17:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	1. 26	2. 08	2. 88	4. 59	4. 80	4. 20	3. 64	2. 30	0. 84
2	. 72	1. 43	2. 40	4. 08	4. 64	4. 20	3. 51	2. 10	. 66
3	. 09	. 65	1. 76	3. 40	4. 48	4. 20	3. 51	2. 00	. 60
4	0	0	. 64	2. 89	4. 16	4. 05	3. 38	1. 90	. 54
5	0	0	0	2. 21	4. 00	3. 75	3. 25	1. 90	. 54
Sec. 18:									
1	. 32	1. 80	2. 66	5. 40	5. 40	4. 80	3. 64	2. 24	. 45
2	0	. 72	1. 82	4. 86	5. 40	4. 80	3. 51	2. 24	. 35
3	0	0	. 70	4. 32	5. 22	4. 80	3. 51	2. 16	. 30
4	0	0	0	3. 42	5. 22	4. 80	3. 51	2. 16	. 30
5	0	0	0	2. 34	4. 68	4. 48	3. 51	2. 16	. 30
Sec. 19:									
1	. 99	2. 08	3. 04	4. 76	4. 32	4. 50	3. 64	3. 00	. 72
2	0	1. 30	2. 40	4. 42	4. 00	4. 50	3. 51	2. 90	. 60
3	0	. 39	1. 44	3. 57	4. 00	4. 50	3. 51	2. 80	. 48
4	0	0	. 64	2. 89	3. 84	4. 50	3. 38	2. 80	. 36
5	0	0	0	2. 21	3. 68	4. 50	3. 38	2. 80	. 24
Sec. 20:									
1	. 64	1. 92	3. 08	5. 22	4. 68	4. 96	3. 51	2. 40	. 45
2	0	. 84	2. 66	4. 68	4. 50	4. 96	3. 38	2. 40	. 35
3	0	0	1. 68	4. 32	4. 32	4. 96	3. 38	2. 24	. 35
4	0	0	. 42	3. 60	4. 14	4. 96	3. 38	2. 16	. 35
5	0	0	0	2. 70	4. 14	4. 96	3. 38	2. 08	. 35

TABLE 10.—*Maximum irrigation requirements in 7 out of 10 years in the Lower Mississippi Valley area for 5 basis amount of soil-moisture storage capacity, by sections and months*

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 1:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0	1. 32	2. 38	3. 42	2. 52	2. 08	2. 08	1. 68	0. 25
2	0	. 48	1. 54	2. 52	1. 80	. 96	1. 30	1. 20	. 10
3	0	0	. 70	1. 98	1. 44	. 48	. 78	. 72	0
4	0	0	0	1. 08	1. 08	0	0	. 16	0
5	0	0	0	. 54	. 54	0	0	0	0
Sec. 2:									
1	. 72	1. 69	2. 88	3. 23	1. 76	1. 50	1. 69	2. 10	. 54
2	0	. 65	2. 08	2. 55	. 96	. 45	. 65	1. 15	. 36
3	0	0	1. 44	2. 21	. 80	0	0	. 50	. 24
4	0	0	. 32	1. 70	. 48	0	0	0	0
5	0	0	0	. 85	. 32	0	0	0	0
Sec. 3:									
1	. 40	1. 68	2. 38	3. 96	3. 06	2. 72	2. 21	1. 60	. 25
2	0	. 72	1. 68	3. 24	2. 52	2. 08	1. 95	1. 20	0
3	0	0	. 70	2. 70	2. 16	1. 76	1. 82	. 88	0
4	0	0	0	1. 98	1. 98	1. 28	1. 43	. 80	0
5	0	0	0	. 90	1. 62	. 64	1. 04	. 64	0
Sec. 4:									
1	. 24	1. 44	2. 24	4. 14	3. 60	3. 68	2. 60	1. 68	0
2	0	. 48	1. 40	3. 42	3. 06	3. 36	2. 34	1. 52	0
3	0	0	. 56	2. 70	3. 06	3. 20	2. 21	1. 36	0
4	0	0	0	1. 98	2. 88	3. 04	1. 95	1. 36	0
5	0	0	0	. 90	2. 70	2. 88	1. 82	1. 28	0
Sec. 5:									
1	0	1. 32	2. 24	4. 14	3. 78	3. 84	2. 86	1. 92	. 25
2	0	0	1. 40	3. 60	3. 60	3. 52	2. 60	1. 76	. 05
3	0	0	. 42	3. 06	3. 42	3. 36	2. 47	1. 60	. 05
4	0	0	0	2. 16	3. 24	3. 36	2. 47	1. 52	. 05
5	0	0	0	1. 08	2. 88	3. 36	2. 21	1. 44	. 05
Sec. 6:									
1	. 40	1. 56	2. 55	4. 80	4. 80	4. 50	3. 36	2. 07	. 15
2	0	0	1. 80	4. 40	4. 60	4. 50	3. 22	1. 98	0
3	0	0	. 90	3. 80	4. 60	4. 32	3. 08	1. 98	0
4	0	0	. 30	3. 00	4. 60	4. 32	3. 08	1. 80	0
5	0	0	0	2. 40	4. 40	4. 32	2. 94	1. 80	0
Sec. 7:									
1	. 24	1. 08	2. 52	3. 60	2. 52	2. 24	2. 08	1. 76	. 35
2	0	0	1. 68	3. 06	2. 16	1. 60	1. 30	1. 36	. 20
3	0	0	. 84	2. 34	1. 98	. 96	. 78	. 80	. 15
4	0	0	0	1. 80	1. 44	. 48	. 52	. 24	. 10
5	0	0	0	. 90	. 90	. 32	0	0	0
Sec. 8:									
1	. 24	1. 20	2. 24	3. 78	3. 42	3. 04	2. 73	1. 76	. 35
2	0	0	1. 40	3. 24	3. 06	2. 72	2. 34	1. 44	. 05
3	0	0	. 70	2. 70	2. 88	2. 56	2. 21	1. 36	0
4	0	0	0	1. 62	2. 70	2. 24	1. 82	1. 28	0
5	0	0	0	. 90	2. 34	2. 08	1. 69	1. 28	0

TABLE 10.—*Maximum irrigation requirements in 7 out of 10 years in the Lower Mississippi Valley area for 5 basis amount of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 9:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0. 24	1. 32	2. 24	3. 96	3. 06	3. 20	2. 47	1. 76	0. 45
2	0	. 12	1. 54	3. 24	2. 70	2. 56	2. 21	1. 44	. 30
3	0	0	. 70	2. 52	2. 34	2. 40	2. 08	1. 28	. 30
4	0	0	. 28	1. 80	2. 34	2. 08	2. 08	1. 20	. 25
5	0	0	0	1. 08	1. 80	1. 76	1. 69	1. 04	. 10
Sec. 10:									
1	. 16	1. 20	2. 38	4. 14	4. 14	3. 68	2. 86	1. 84	. 20
2	0	0	1. 68	3. 60	3. 78	3. 36	2. 60	1. 68	. 10
3	0	0	. 84	3. 24	3. 42	3. 36	2. 60	1. 68	. 05
4	0	0	0	2. 52	3. 24	3. 20	2. 47	1. 60	0
5	0	0	0	1. 62	3. 06	3. 20	2. 21	1. 60	0
Sec. 11:									
1	0	1. 20	2. 24	4. 14	3. 60	3. 36	2. 60	1. 60	. 05
2	0	0	1. 68	3. 60	3. 24	3. 20	2. 47	1. 44	. 05
3	0	0	. 70	3. 06	3. 06	3. 04	2. 34	1. 36	0
4	0	0	0	2. 52	3. 06	2. 72	2. 21	1. 36	0
5	0	0	0	1. 62	2. 88	2. 72	2. 21	1. 36	0
Sec. 12:									
1	0	1. 20	2. 24	4. 14	4. 14	3. 68	2. 86	1. 68	. 20
2	0	0	1. 40	3. 60	3. 78	3. 52	2. 60	1. 52	. 10
3	0	0	. 42	3. 06	3. 42	3. 36	2. 60	1. 52	. 05
4	0	0	0	2. 52	3. 24	3. 36	2. 47	1. 44	. 05
5	0	0	0	1. 44	2. 88	3. 20	2. 34	1. 44	. 05
Sec. 13:									
1	. 08	1. 08	2. 24	4. 14	4. 14	3. 84	2. 60	1. 36	. 15
2	0	0	1. 40	3. 60	3. 78	3. 52	2. 47	1. 28	0
3	0	0	. 42	3. 24	3. 42	3. 36	2. 47	1. 12	0
4	0	0	0	2. 34	3. 06	3. 20	2. 34	1. 12	0
5	0	0	0	1. 26	2. 88	3. 20	2. 34	1. 12	0
Sec. 14:									
1	. 24	1. 20	2. 10	3. 96	4. 14	3. 68	2. 60	1. 12	. 15
2	0	0	1. 40	3. 24	3. 78	3. 36	2. 47	1. 04	. 10
3	0	0	. 56	3. 06	3. 60	3. 36	2. 34	1. 04	. 05
4	0	0	0	2. 34	3. 24	3. 20	2. 21	. 96	. 05
5	0	0	0	1. 44	2. 88	3. 04	2. 21	. 88	. 05
Sec. 15:									
1	0	1. 08	2. 24	4. 32	4. 32	3. 84	2. 86	1. 36	. 30
2	0	0	1. 40	3. 78	4. 14	3. 68	2. 47	1. 20	. 20
3	0	0	. 28	3. 06	3. 96	3. 68	2. 34	1. 12	. 15
4	0	0	0	2. 34	3. 60	3. 52	2. 21	. 96	. 10
5	0	0	0	1. 62	3. 06	3. 36	2. 21	. 88	. 05
Sec. 16:									
1	0	1. 08	1. 82	3. 60	4. 50	3. 68	2. 73	1. 20	. 25
2	0	. 12	. 84	3. 06	4. 14	3. 52	2. 73	1. 04	0
3	0	0	. 14	2. 52	4. 14	3. 52	2. 47	. 96	0
4	0	0	0	1. 62	3. 78	3. 36	2. 47	. 88	0
5	0	0	0	. 54	3. 42	3. 36	2. 47	. 88	0

TABLE 10.—*Maximum irrigation requirements in 7 out of 10 years in the Lower Mississippi Valley area for 5 basis amount of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
Sec. 17:									
1	0.72	1.44	1.82	3.60	4.32	3.68	2.73	1.28	0.40
2	0	.36	1.12	2.70	3.96	3.52	2.60	1.04	.25
3	0	0	.14	2.16	3.60	3.52	2.34	.88	.15
4	0	0	0	1.26	3.60	3.20	2.21	.72	.05
5	0	0	0	.36	3.24	3.04	2.08	.56	0
Sec. 18:									
1	0	0.96	1.96	4.14	4.32	3.84	2.86	1.60	.20
2	0	0	.84	3.60	4.14	3.52	2.73	1.20	.10
3	0	0	0	2.88	3.96	3.52	2.60	1.12	.10
4	0	0	0	1.80	3.96	3.52	2.47	1.04	.10
5	0	0	0	.72	3.60	3.20	2.47	1.04	.10
Sec. 19:									
1	.54	1.30	2.24	3.74	3.36	3.60	2.86	2.00	.42
2	0	.36	1.28	3.06	3.04	3.45	2.73	1.70	.18
3	0	0	.32	2.38	2.88	3.00	2.60	1.50	.12
4	0	0	0	1.70	2.72	2.85	2.60	1.40	.12
5	0	0	0	.68	2.24	2.70	2.34	1.10	.06
Sec. 20:									
1	.16	1.20	2.24	4.32	3.96	4.00	2.86	1.60	.25
2	0	.12	1.54	3.60	3.60	3.84	2.60	1.52	.15
3	0	0	.42	3.06	3.42	3.68	2.47	1.44	.15
4	0	0	0	2.34	3.24	3.68	2.47	1.36	.15
5	0	0	0	1.44	3.24	3.68	2.34	1.28	.15

TABLE 11.—*Maximum irrigation requirements in 5 out of 10 years in the Lower Mississippi Valley area for 5 basis amount of soil-moisture storage capacity, by sections and months*

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 1:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0	0. 96	1. 82	2. 70	1. 80	1. 44	1. 95	1. 20	0. 05
2	0	0	. 84	1. 80	. 90	. 48	. 65	. 56	0
3	0	0	0	1. 08	. 54	0	0	0	0
4	0	0	0	. 18	. 18	0	0	0	0
5	0	0	0	0	0	0	0	0	0
Sec. 2:									
1	. 54	1. 30	2. 24	2. 55	1. 28	. 75	1. 17	1. 20	. 24
2	0	0	1. 44	1. 70	. 48	0	. 13	. 64	. 12
3	0	0	. 64	1. 19	. 16	0	0	0	0
4	0	0	0	. 51	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
Sec. 3:									
1	. 16	1. 20	1. 96	3. 24	2. 52	2. 24	1. 56	1. 04	0
2	0	0	. 98	2. 52	1. 80	1. 44	. 78	. 56	0
3	0	0	0	1. 44	1. 26	1. 12	. 26	. 16	0
4	0	0	0	. 54	1. 08	. 48	0	0	0
5	0	0	0	0	. 54	0	0	0	0
Sec. 4:									
1	0	1. 08	1. 96	3. 24	2. 88	3. 04	2. 08	1. 28	0
2	0	. 12	. 84	2. 52	2. 34	2. 56	1. 69	. 96	0
3	0	0	. 14	1. 80	2. 16	2. 24	1. 43	. 72	0
4	0	0	0	1. 08	1. 80	1. 76	1. 30	. 56	0
5	0	0	0	. 18	1. 44	1. 60	1. 04	. 40	0
Sec. 5:									
1	0	0. 96	1. 96	3. 42	3. 24	3. 20	2. 47	1. 44	0
2	0	0	. 84	2. 70	2. 70	2. 88	2. 08	1. 12	0
3	0	0	0	2. 16	2. 52	2. 72	1. 82	. 80	0
4	0	0	0	1. 26	2. 16	2. 40	1. 69	. 72	0
5	0	0	0	. 36	1. 80	2. 40	1. 56	. 56	0
Sec. 6:									
1	. 08	1. 17	2. 10	4. 20	4. 20	3. 96	2. 80	1. 53	0
2	0	0	1. 20	3. 40	3. 80	3. 78	2. 38	1. 26	0
3	0	0	. 15	2. 80	3. 60	3. 60	2. 24	1. 17	0
4	0	0	0	2. 00	3. 40	3. 60	2. 10	1. 08	0
5	0	0	0	1. 40	3. 20	3. 42	1. 96	. 99	0
Sec. 7:									
1	0	. 60	1. 96	2. 88	1. 98	1. 76	1. 56	1. 28	. 10
2	0	0	. 98	2. 16	1. 26	. 80	. 52	. 72	0
3	0	0	. 14	1. 44	. 72	. 16	0	0	0
4	0	0	0	. 90	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
Sec. 8:									
1	0	. 84	1. 82	3. 06	2. 70	2. 56	2. 21	1. 28	. 10
2	0	0	. 98	2. 52	1. 98	1. 92	1. 56	. 88	0
3	0	0	0	1. 80	1. 44	1. 60	1. 43	. 56	0
4	0	0	0	. 90	1. 08	1. 28	1. 17	. 40	0
5	0	0	0	. 18	. 54	. 80	1. 04	. 16	0

TABLE 11.—*Maximum irrigation requirements in 5 out of 10 years in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers refer to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 9:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0 08	0. 96	1. 82	3. 24	2. 34	2. 56	2. 08	1. 28	0. 20
2	0	0	. 98	2. 34	1. 98	1. 92	1. 43	. 88	0
3	0	0	. 14	1. 80	1. 44	1. 44	1. 30	. 56	0
4	0	0	0	. 90	. 90	. 80	1. 04	. 48	0
5	0	0	0	. 18	. 72	. 64	. 65	. 24	9
Sec. 10:									
1	0	. 72	1. 96	3. 42	3. 42	3. 20	2. 34	1. 36	. 05
2	0	0	1. 12	2. 70	2. 88	2. 56	2. 08	1. 12	0
3	0	0	. 28	2. 34	2. 52	2. 40	1. 82	1. 04	0
4	0	0	0	1. 44	2. 16	2. 24	1. 69	. 88	0
5	0	0	0	. 36	1. 80	2. 24	1. 43	. 80	0
Sec. 11:									
1	0	. 72	1. 82	3. 42	3. 06	2. 88	2. 08	1. 20	0
2	0	0	. 84	2. 70	2. 52	2. 40	1. 82	. 80	0
3	0	0	0	2. 16	2. 16	2. 08	1. 56	. 64	0
4	0	0	0	1. 44	1. 80	1. 92	1. 56	. 48	0
5	0	0	0	. 36	1. 26	1. 76	1. 43	. 48	0
Sec. 12:									
1	0	. 60	1. 68	3. 42	3. 42	3. 04	2. 08	1. 20	. 10
2	0	0	. 70	2. 88	2. 70	2. 72	1. 95	. 88	0
3	0	0	0	2. 34	2. 52	2. 56	1. 69	. 48	0
4	0	0	0	1. 26	2. 16	2. 40	1. 56	. 40	0
5	0	0	0	. 18	1. 80	2. 24	1. 43	. 40	0
Sec. 13:									
1	0	. 60	1. 54	3. 24	3. 60	3. 20	2. 08	. 96	0
2	0	0	. 70	2. 52	2. 70	2. 72	1. 69	. 72	0
3	0	0	0	1. 98	2. 34	2. 40	1. 56	. 48	0
4	0	0	0	1. 08	1. 80	2. 24	1. 43	. 40	0
5	0	0	0	0	1. 44	2. 08	1. 30	. 40	0
Sec. 14:									
1	0	. 84	1. 54	3. 06	3. 60	3. 04	2. 08	. 72	0
2	0	0	. 84	2. 34	3. 06	2. 72	1. 56	. 40	0
3	0	0	0	1. 98	2. 70	2. 56	1. 30	. 24	0
4	0	0	0	1. 26	2. 34	2. 40	1. 04	. 08	0
5	0	0	0	. 36	1. 80	2. 24	1. 04	0	0
Sec. 15:									
1	0	. 72	1. 68	3. 60	3. 60	3. 20	2. 34	. 96	. 10
2	0	0	. 56	2. 70	3. 06	2. 88	1. 82	. 48	0
3	0	0	0	1. 98	2. 70	2. 56	1. 56	. 16	0
4	0	0	0	1. 08	2. 34	2. 40	1. 43	. 08	0
5	0	0	0	. 18	1. 80	2. 24	1. 43	0	0
Sec. 16:									
1	0	. 60	1. 26	2. 70	3. 78	3. 04	2. 21	. 88	0
2	0	0	. 14	1. 98	3. 24	2. 72	1. 95	. 40	0
3	0	0	0	1. 62	3. 06	2. 56	1. 82	. 24	0
4	0	0	0	. 54	2. 70	2. 40	1. 69	. 16	0
5	0	0	0	0	2. 16	2. 24	1. 69	. 16	0

TABLE 11.—*Maximum irrigation requirements in 5 out of 10 years in the Lower Mississippi Valley area for 5 basis amounts of soil-moisture storage capacity, by sections and months*—Continued

[Section numbers reder to fig. 4]

Section and basis amount (inches)	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Sec. 17:	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1	0. 40	1. 08	1. 40	2. 70	3. 60	3. 04	2. 21	0. 88	0. 15
2	0	0	. 42	1. 62	3. 06	2. 72	1. 82	. 40	0
3	0	0	0	. 54	2. 70	2. 56	1. 56	. 08	0
4	0	0	0	0	2. 34	2. 24	1. 43	0	0
5	0	0	0	0	1. 62	1. 92	1. 30	0	0
Sec. 18:									
1	0	48	1. 40	3. 42	3. 60	3. 20	2. 34	1. 12	. 05
2	0	0	. 14	2. 70	3. 06	2. 72	2. 08	. 72	0
3	0	0	0	1. 80	2. 70	2. 40	1. 95	. 56	0
4	0	0	0	. 90	2. 52	2. 24	1. 69	. 56	0
5	0	0	0	0	2. 16	1. 92	1. 56	. 48	0
Sec. 19:									
1	. 18	. 78	1. 76	3. 06	2. 88	2. 85	2. 34	1. 30	. 30
2	0	0	. 48	2. 21	2. 40	2. 40	1. 95	. 90	0
3	0	0	0	1. 53	2. 24	1. 95	1. 82	. 60	0
4	0	0	0	. 68	1. 92	1. 65	1. 56	. 30	0
5	0	0	0	0	1. 12	1. 20	1. 43	0	0
Sec. 20:									
1	0	. 72	1. 82	3. 60	3. 42	3. 36	2. 47	1. 04	. 10
2	0	0	. 84	2. 88	2. 88	2. 88	2. 08	. 88	0
3	0	0	0	2. 16	2. 70	2. 40	1. 95	. 80	0
4	0	0	0	1. 62	2. 52	2. 40	1. 82	. 80	0
5	0	0	0	. 72	2. 34	2. 40	1. 69	. 72	0

TABLE 12.—*Maximum rainfall, May through August, in selected sections of the Lower Mississippi Valley area, at various probability levels*

Section [1]	Maximum rainfall at a probability level of—		
	1 out of 10	3 out of 10	5 out of 10
	Inches	*Inches*	*Inches*
3	12. 2	17. 6	21. 0
5	9. 8	13. 6	16. 3
10	10. 0	13. 7	16. 3
12	10. 4	14. 0	16. 6
14	10. 2	12. 8	16. 2
15	9. 6	13. 7	16. 4
16	10. 9	14. 4	16. 8
18	9. 6	11. 9	15. 0
20	10. 6	13. 9	16. 2

[1] See fig. 4 for key to sections.

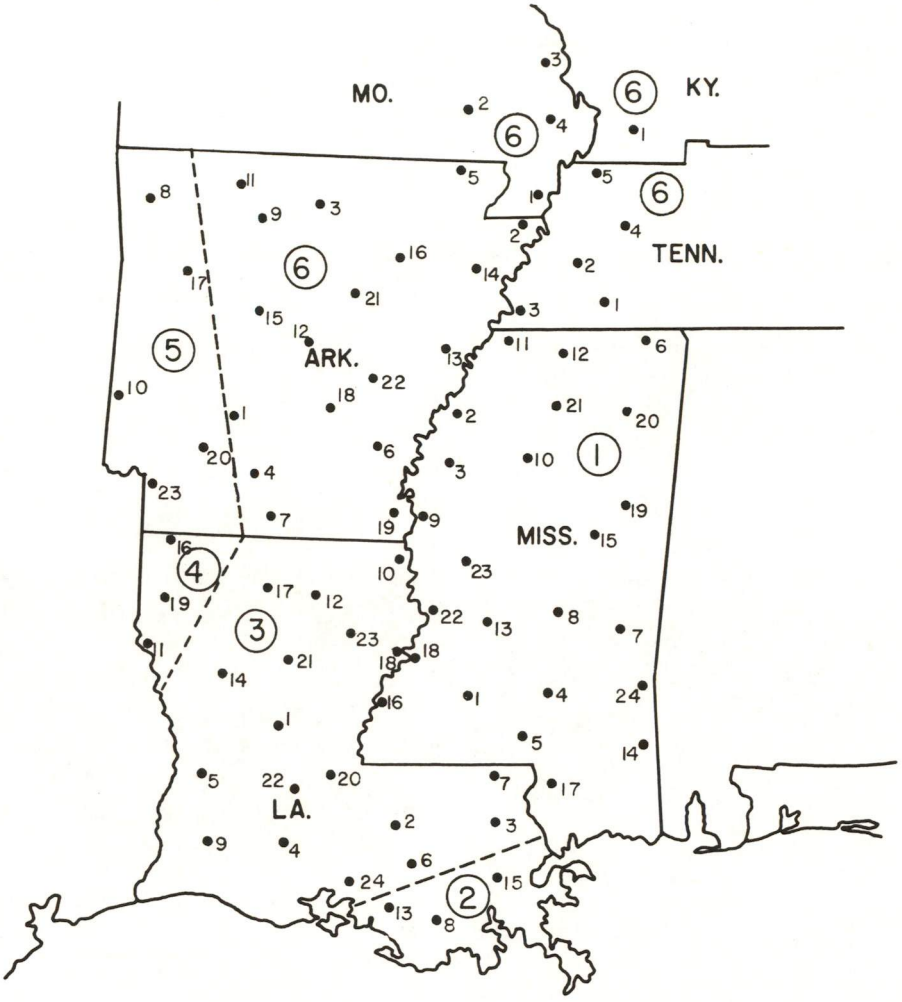


FIGURE 1.—*Lower Mississppi Valley area, showing the location of rainfall stations used in soil-moisture studies and the division of the area into six regions of approximately equal average evapotranspiration.*

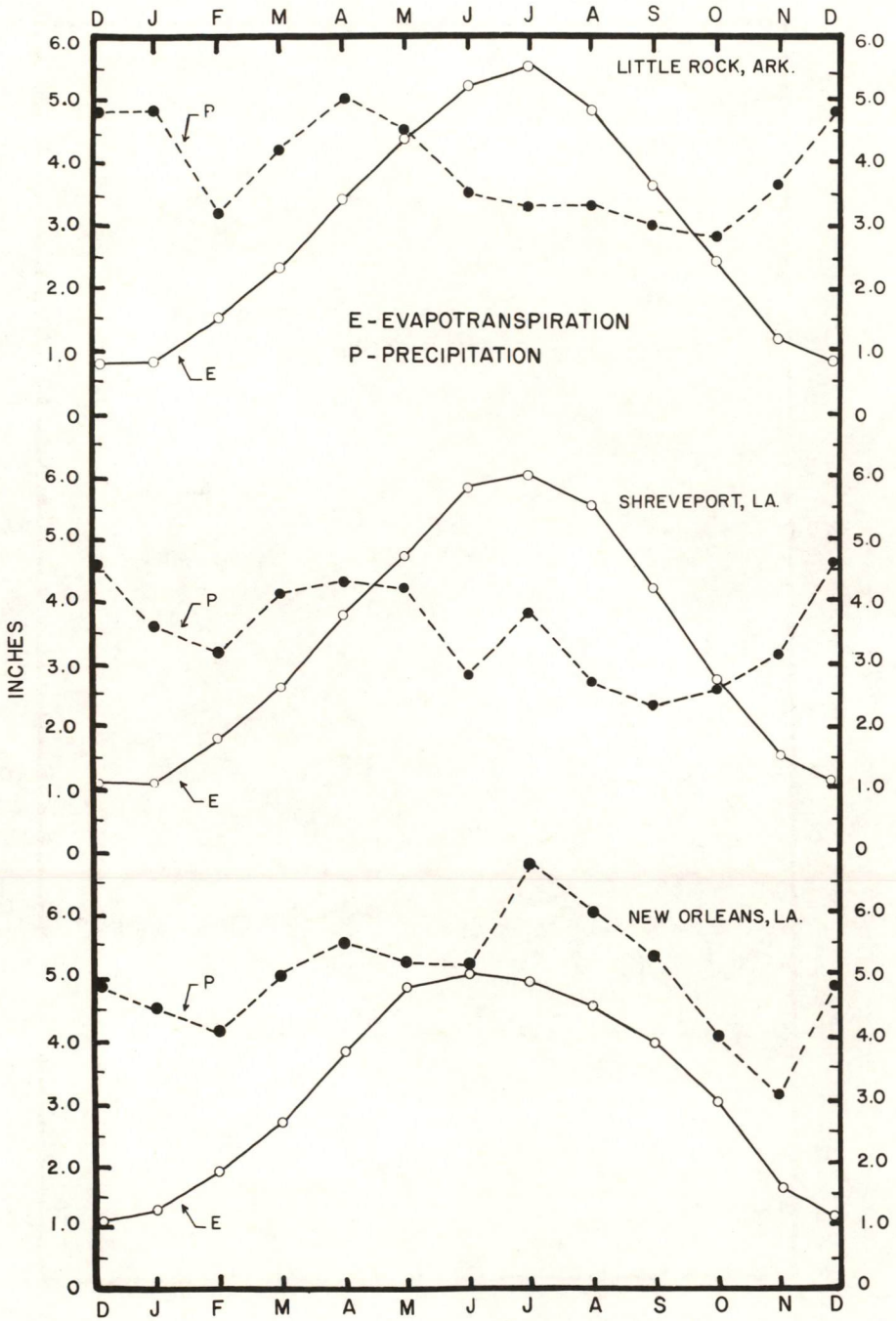


FIGURE 2.—*Monthly precipitation and monthly evapotranspiration at three stations (Little Rock, Ark., Shreveport, La., and New Orleans, La.) in the Lower Mississippi Valley area.*

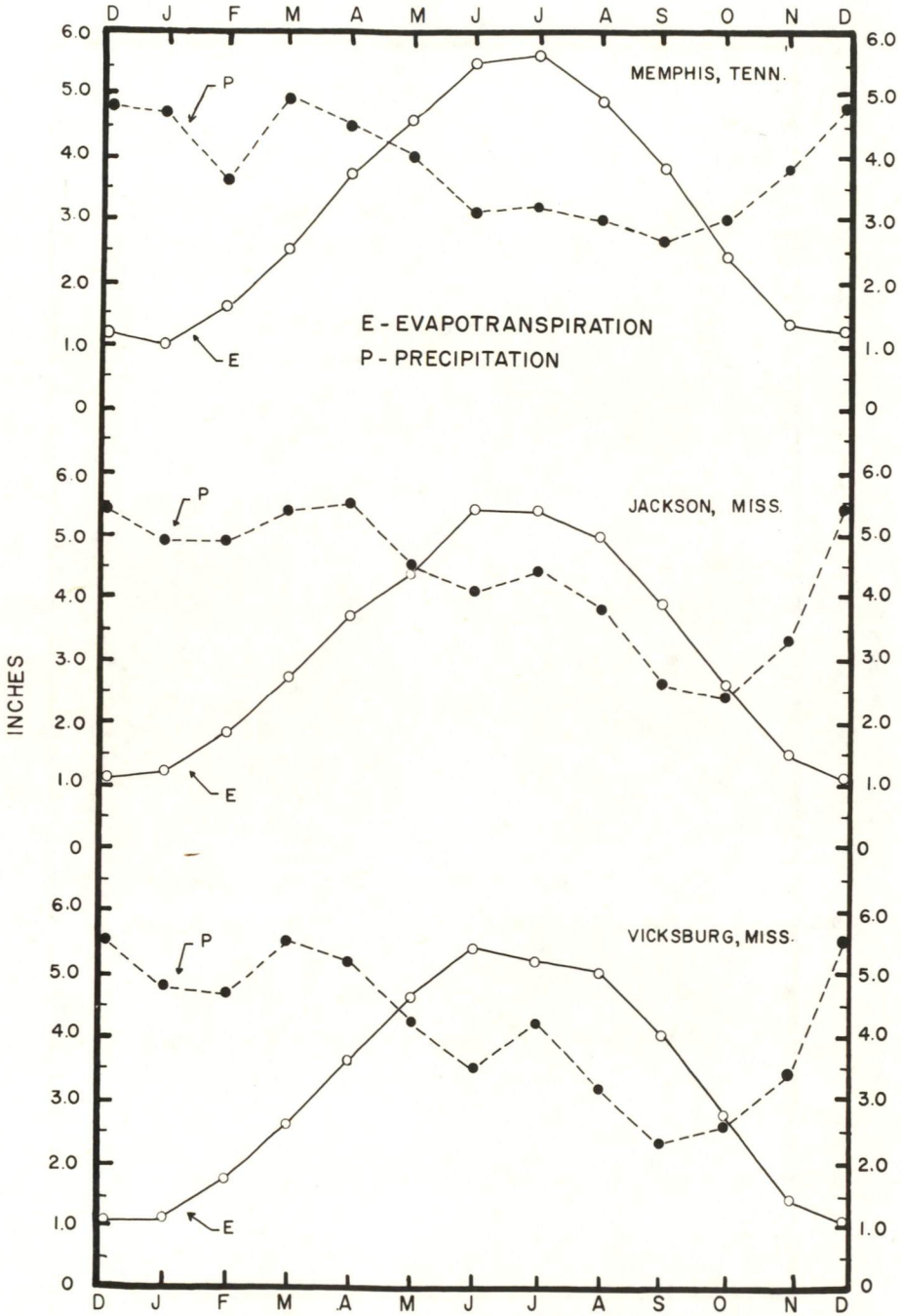


FIGURE 3.—*Monthly precipitation and monthly evapotranspiration at three stations (Memphis ,Tenn., Jackson, Miss., and Vicksburg, Miss.) in the Lower Mississippi Valley area.*

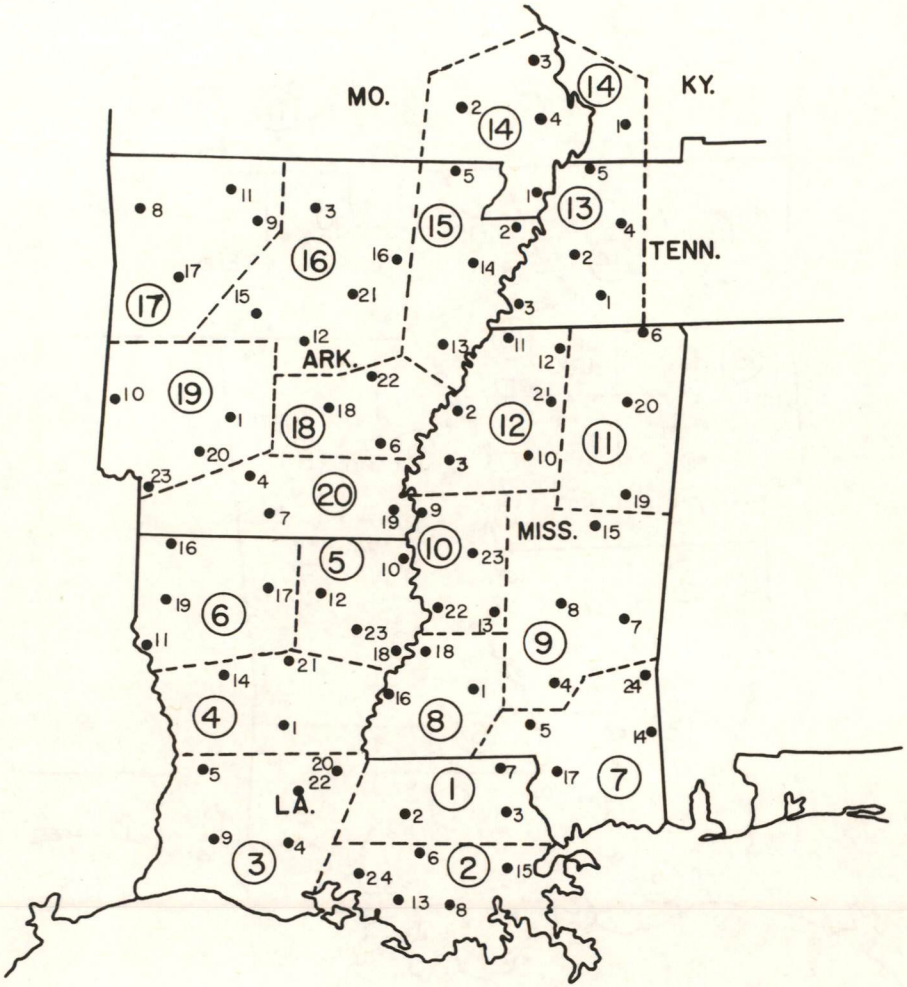


FIGURE 4.—*Location of 20 sections, and rainfall stations in each section, used for reporting monthly drought incidence in soil-moisture studies of the Lower Mississippi Valley area. (For key to numbers, see table 5.)*

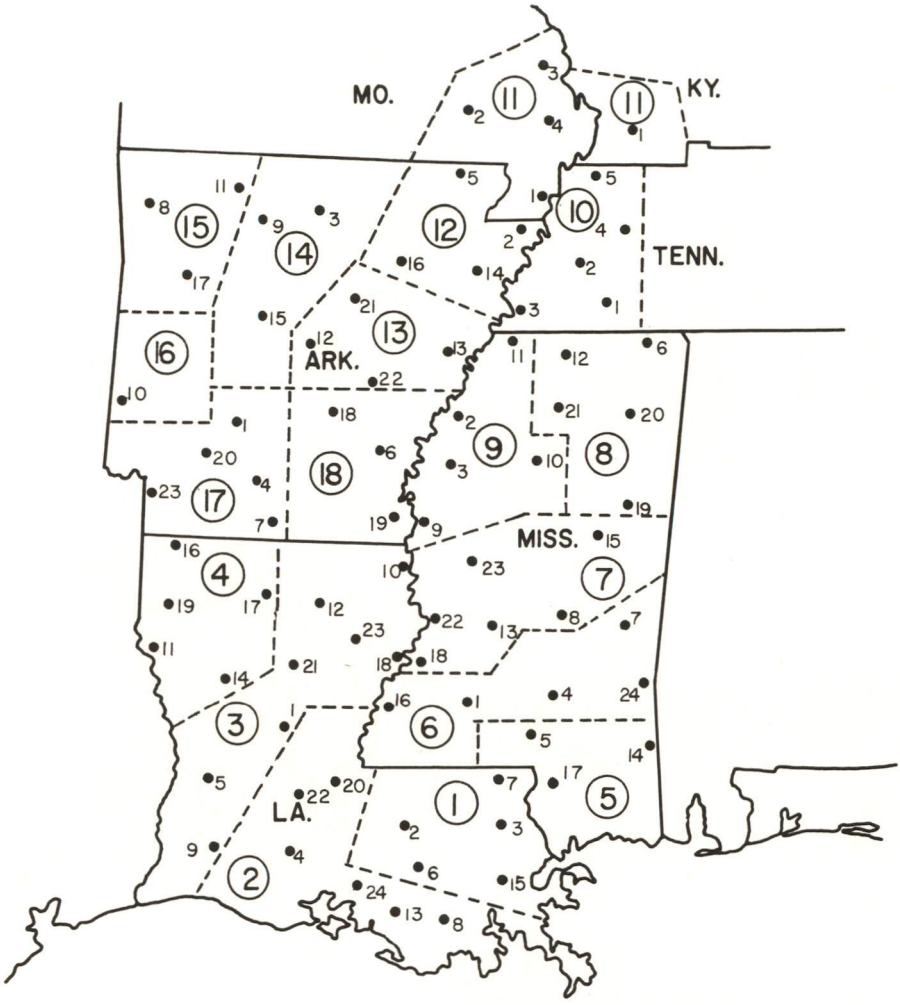


FIGURE 5.—*Location of 18 sections, and of rainfall stations in each section, used for reporting monthly excess moisture in soil-moisture studies of the Lower Mississippi Valley area. (For key to numbers, see table 6.)*

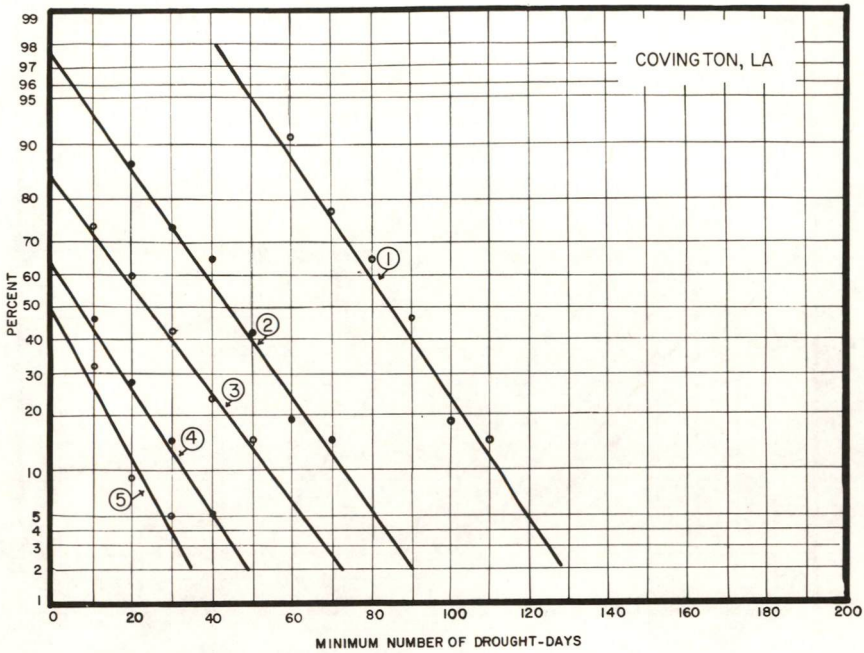


FIGURE 6.—*Probability for the minimum number of drought-days to occur at Covington, La. (sec. 1), during the period March through November for soil-moisture storage capacities 1, 2, 3, 4, and 5 inches.*

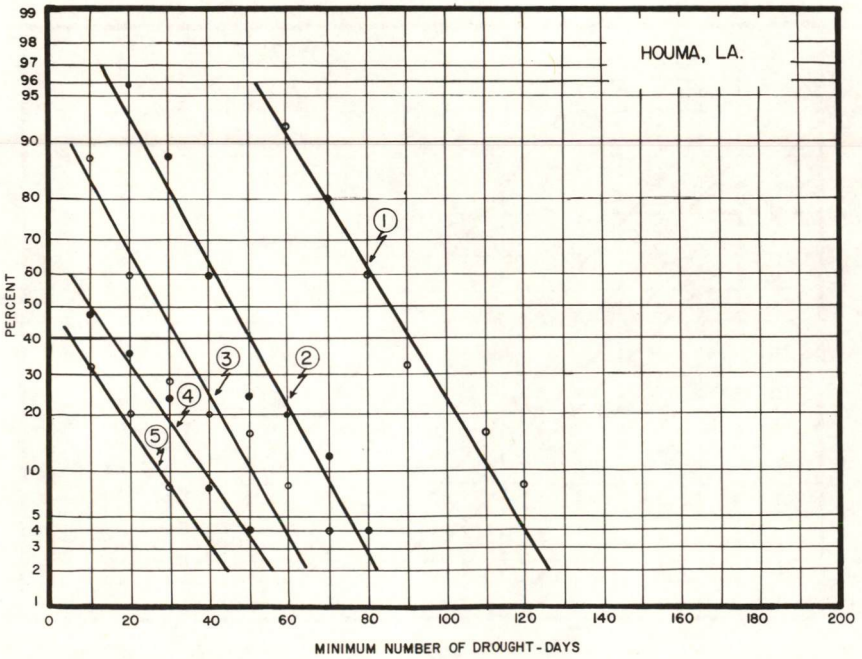


FIGURE 7.—*Probability for the minimum number of drought-days to occur at Houma, La. (sec. 2), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

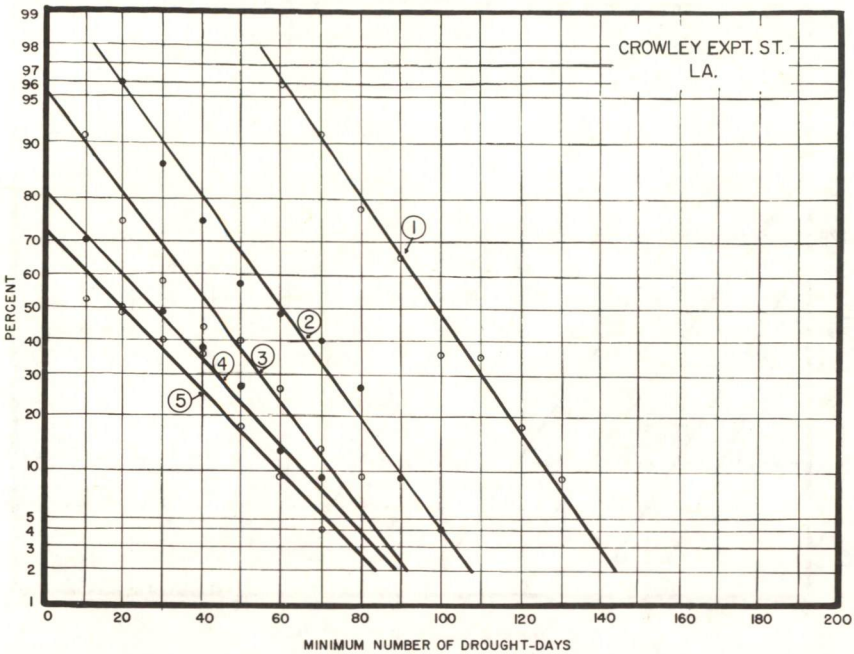


FIGURE 8.—*Probability for the minimum number of drought-days to occur at Crowley, Expt. Sta., La. (sec. 3), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

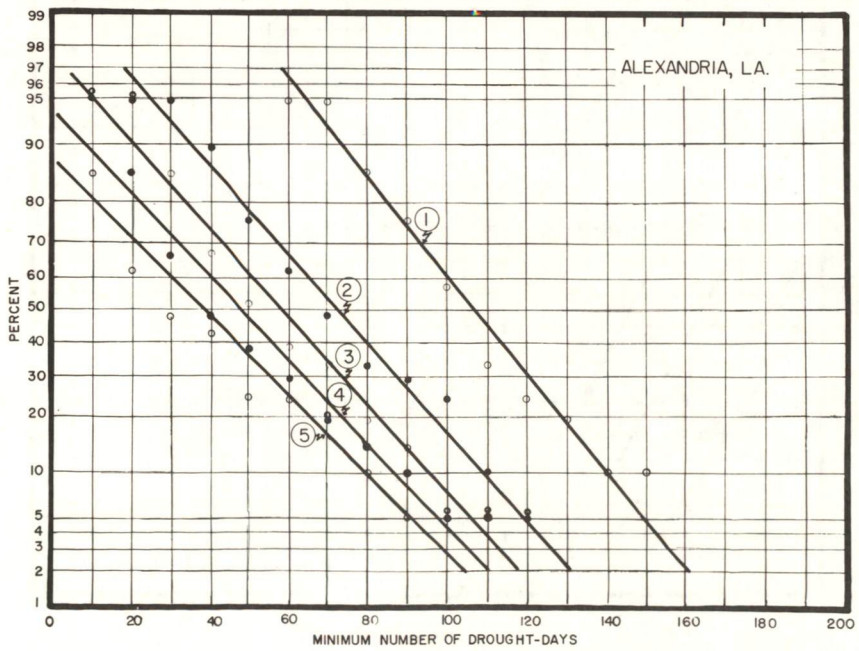


FIGURE 9.—*Probability for the minimum number of drought-days to occur at Alexandria, La. (sec. 4), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

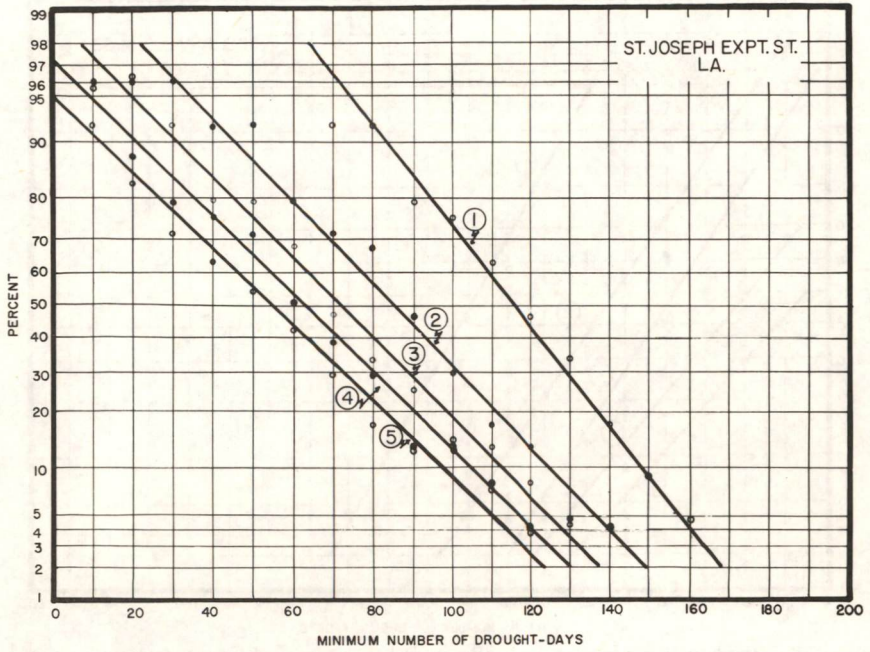


FIGURE 10.—*Probability for the minimum number of drought-days to occur at St. Joseph Expt. Sta., La. (sec. 5), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

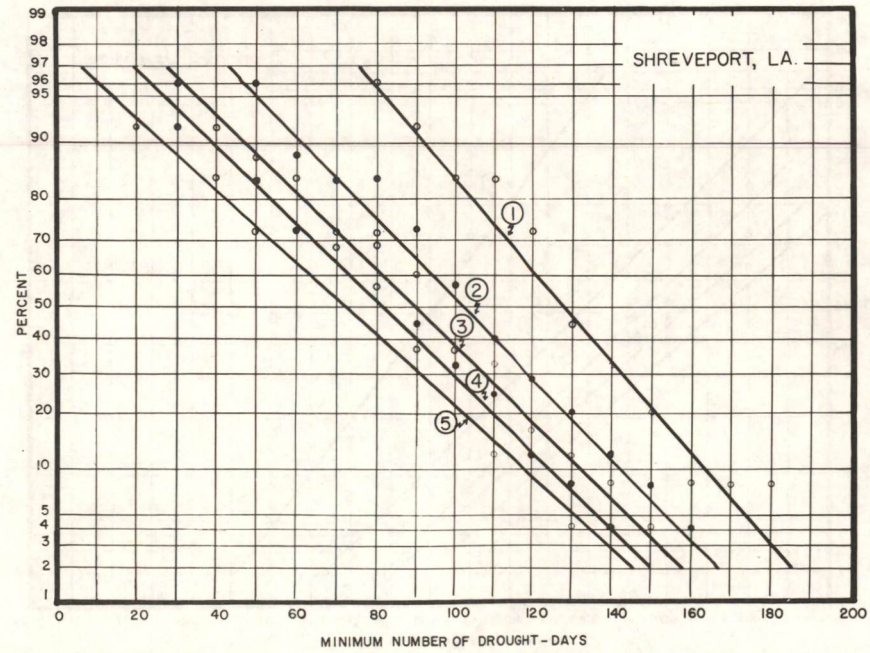


FIGURE 11.—*Probability for the minimum number of drought-days to occur at Shreveport, La. (sec. 6), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

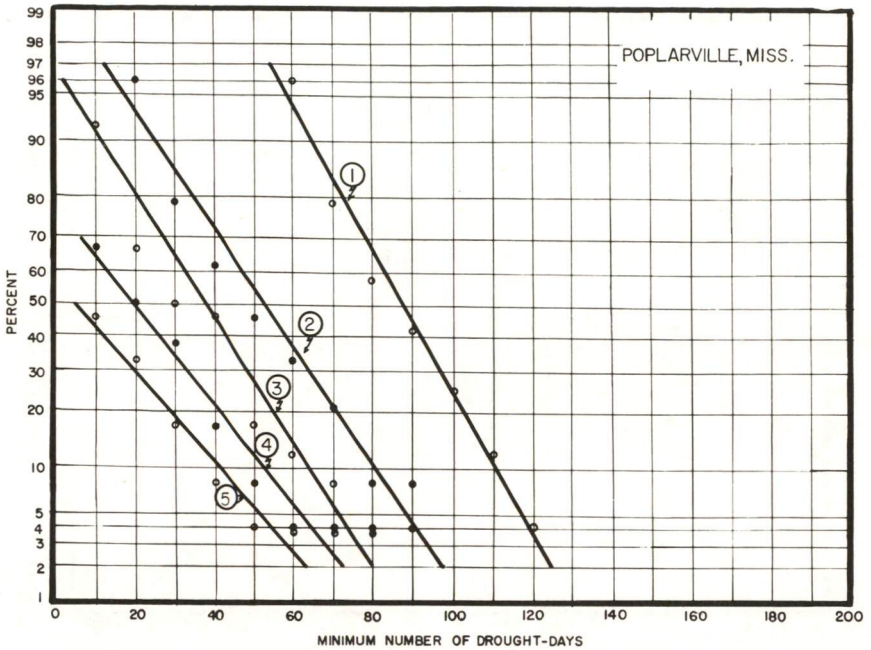


FIGURE 12.—*Probability for the minimum number of drought-days to occur at Poplarville, Miss. (sec. 7), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

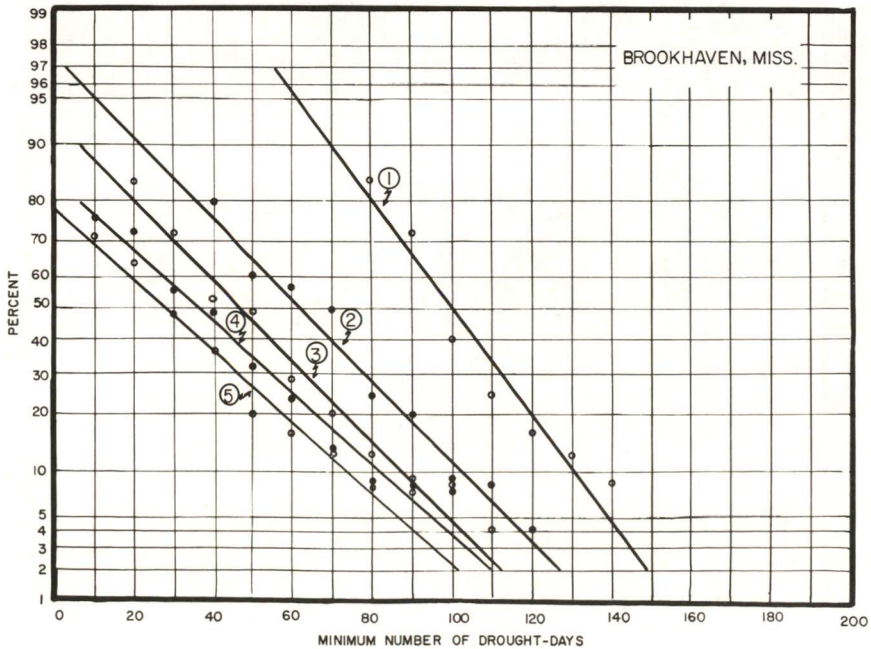


FIGURE 13.—*Probability for the minimum number of drought-days to occur at Brookhaven, Miss. (sec. 8), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

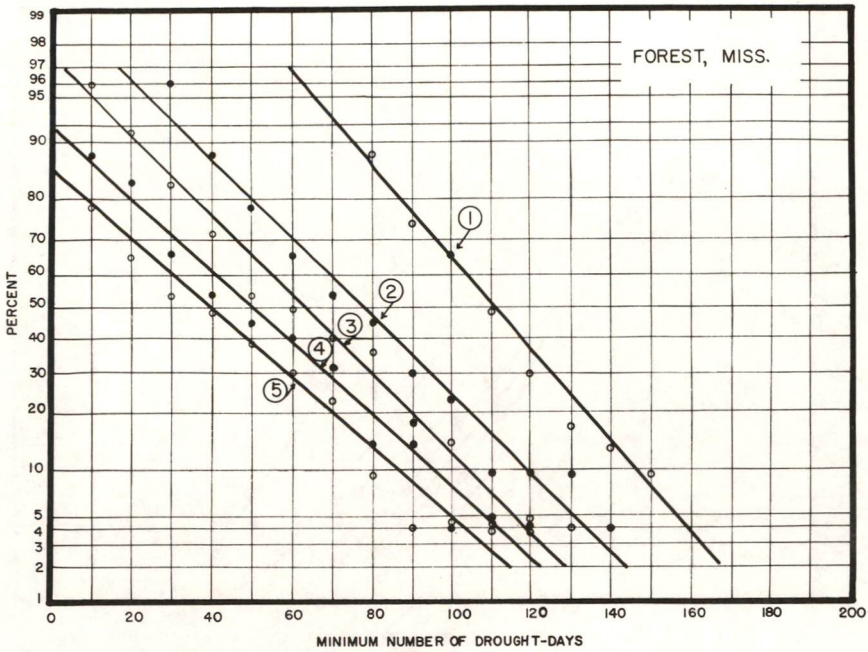


FIGURE 14.—*Probability for the minimum number of drought-days to occur at Forest, Miss. (sec. 9), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

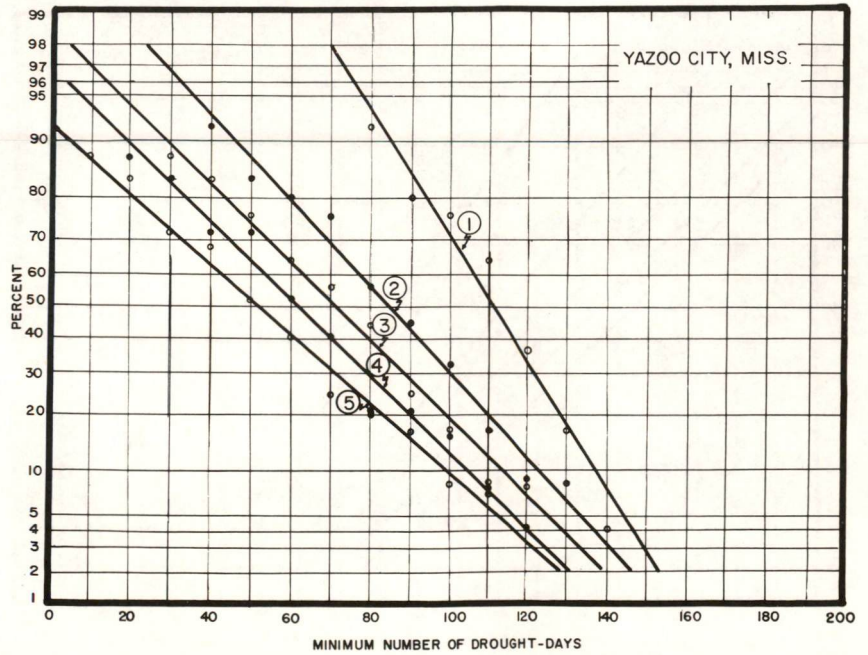


FIGURE 15.—*Probability for the minimum number of drought-days to occur at Yazoo City, Miss. (sec. 10), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

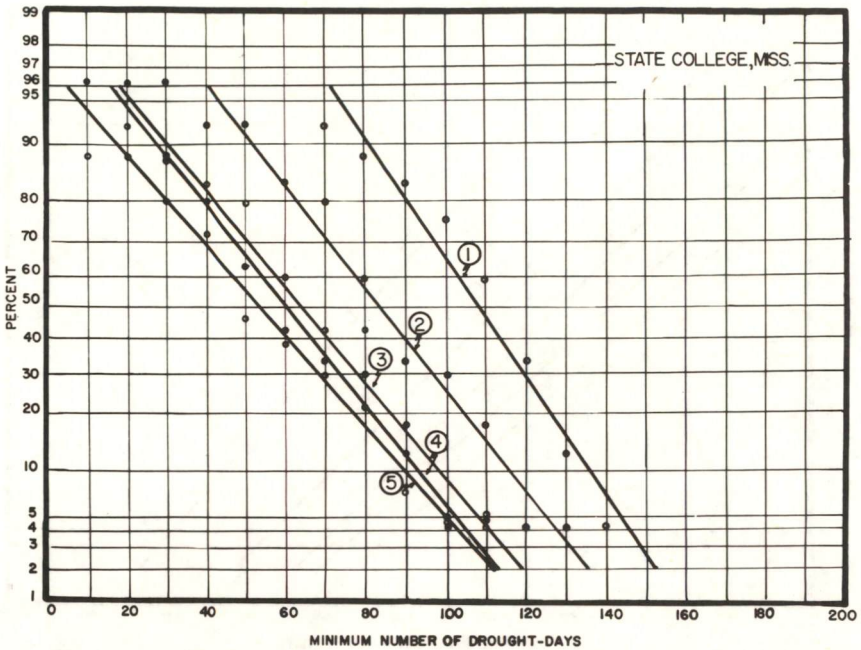


FIGURE 16.—*Probability for the minimum number of drought-days to occur at State College, Miss. (sec. 11), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

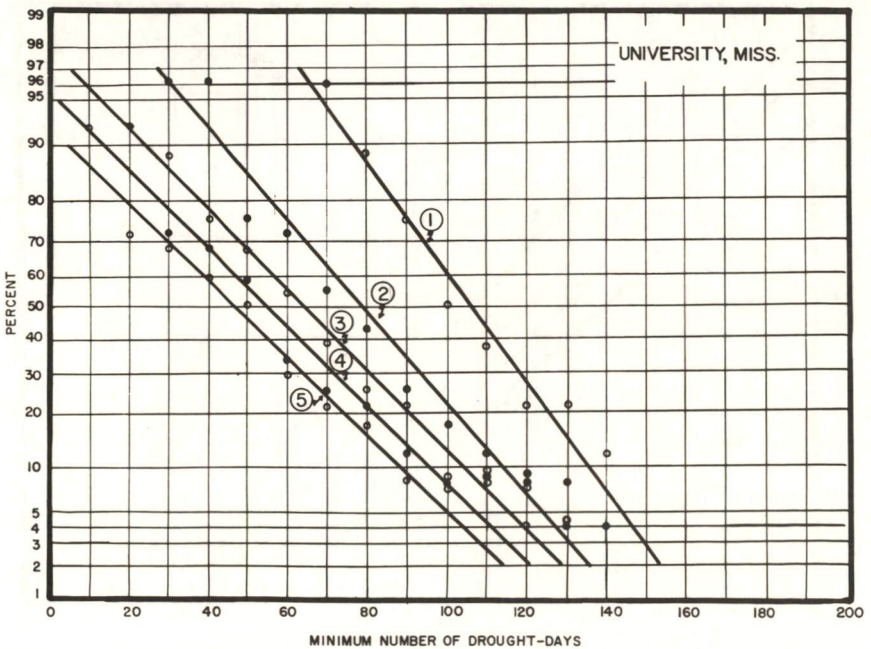


FIGURE 17.—*Probability for the minimum number of drought-days to occur at University, Miss. (sec. 12), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

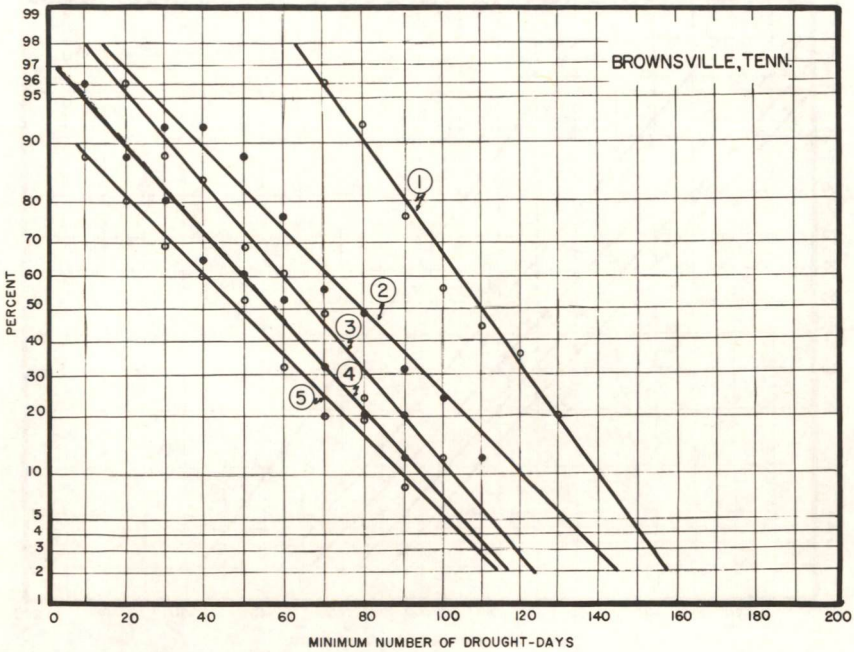


FIGURE 18.—*Probability for the minimum number of drought-days to occur at Brownsville, Tenn. (sec. 13), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

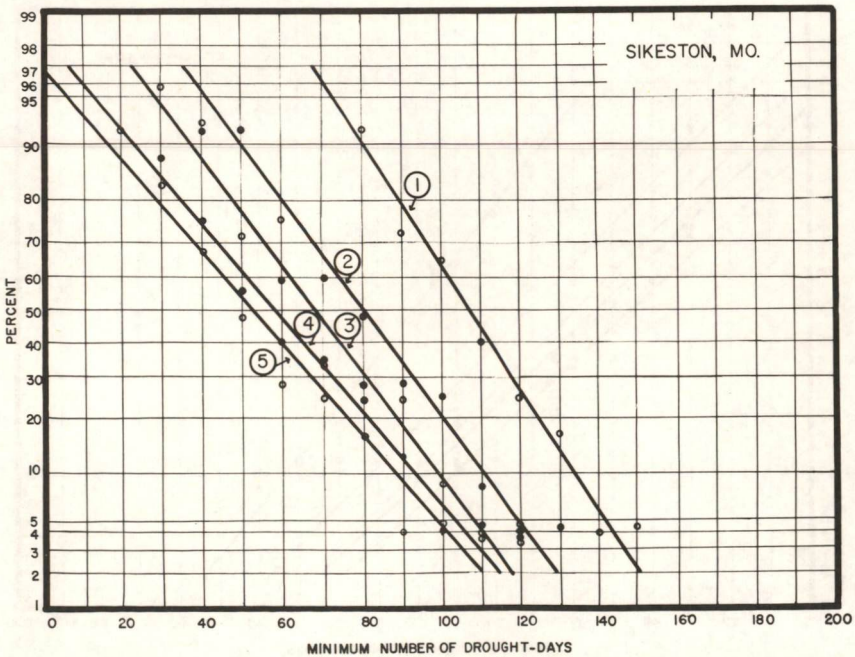


FIGURE 19.—*Probability for the minimum number of drought-days to occur in Sikeston, Mo. (sec. 14), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

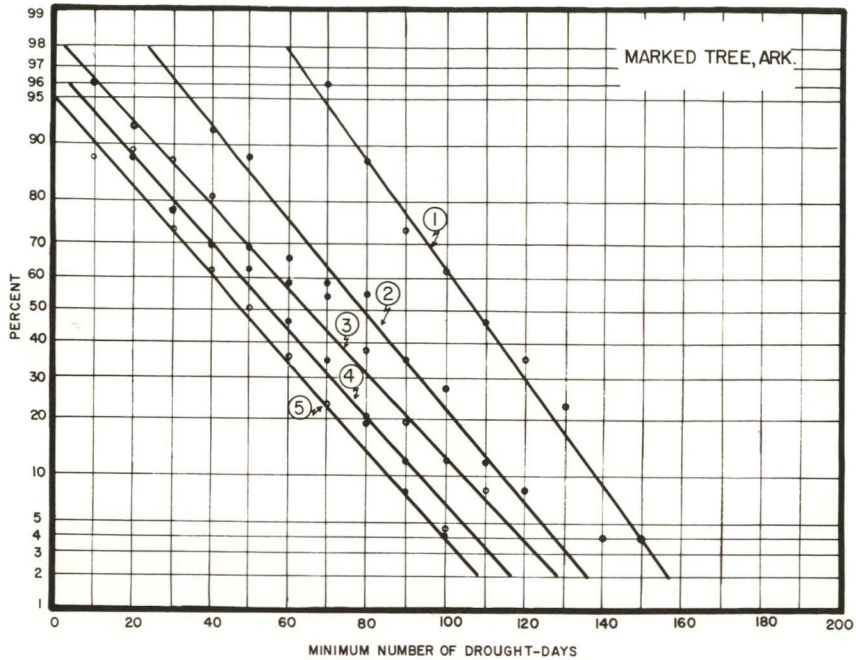


FIGURE 20.—*Probability for the minimum number of drought-days to occur at Marked Tree, Ark. (sec. 15), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

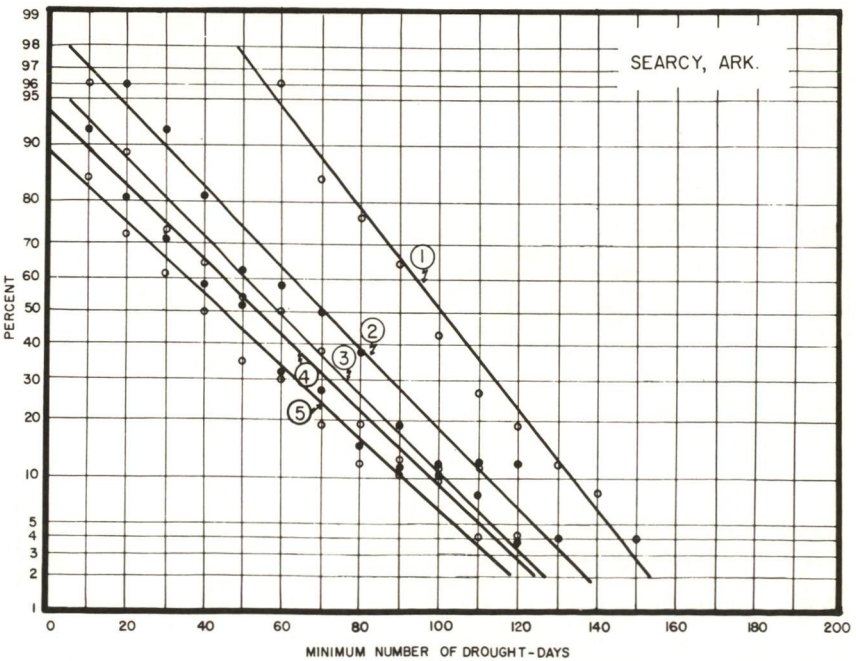


FIGURE 21.—*Probability for the minimum number of drought-days to occur at Searcy, Ark. (sec. 16), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

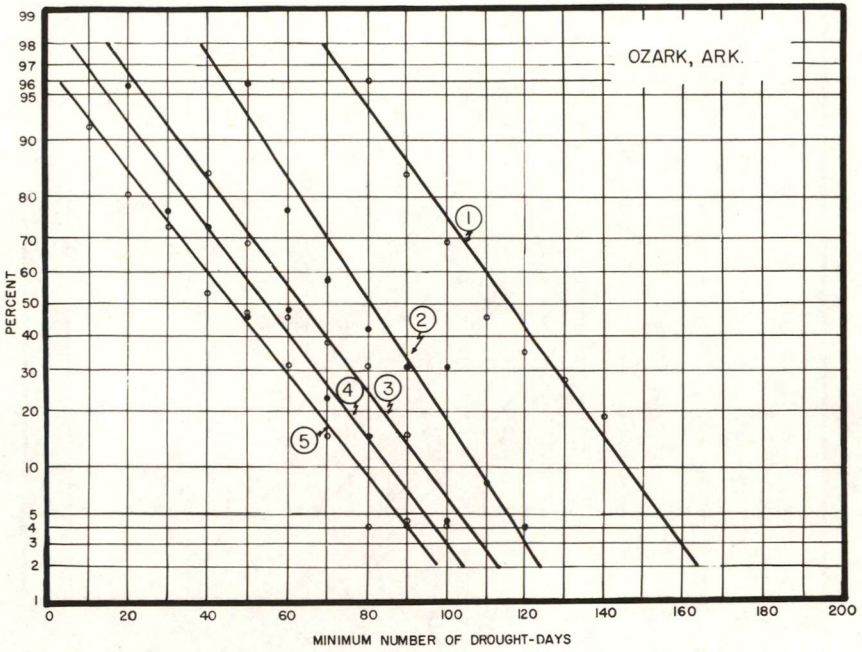


FIGURE 22.—*Probability for the minimum number of drought-days to occur at Ozark, Ark. (sec. 17), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

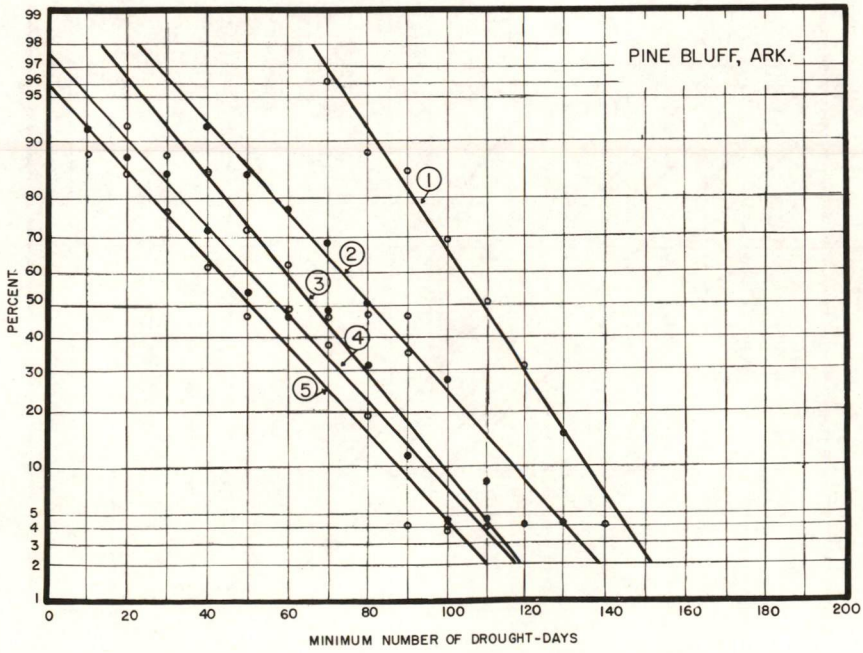


FIGURE 23.—*Probability for the minimum number of drought-days to occur at Pine Bluff, Ark. (sec. 18), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

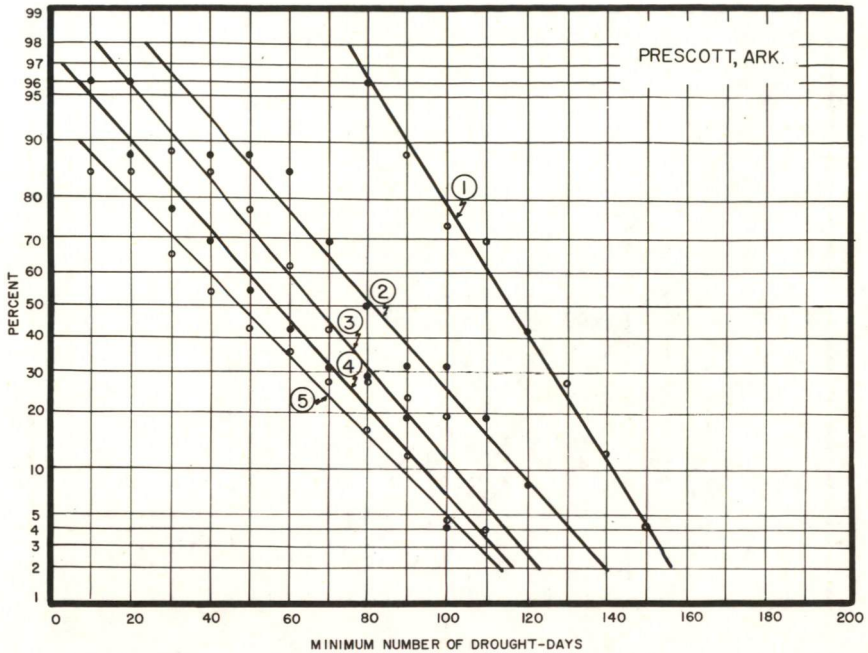


FIGURE 24.—*Probability for the minimum number of drought-days to occur at Prescott, Ark. (sec. 19), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

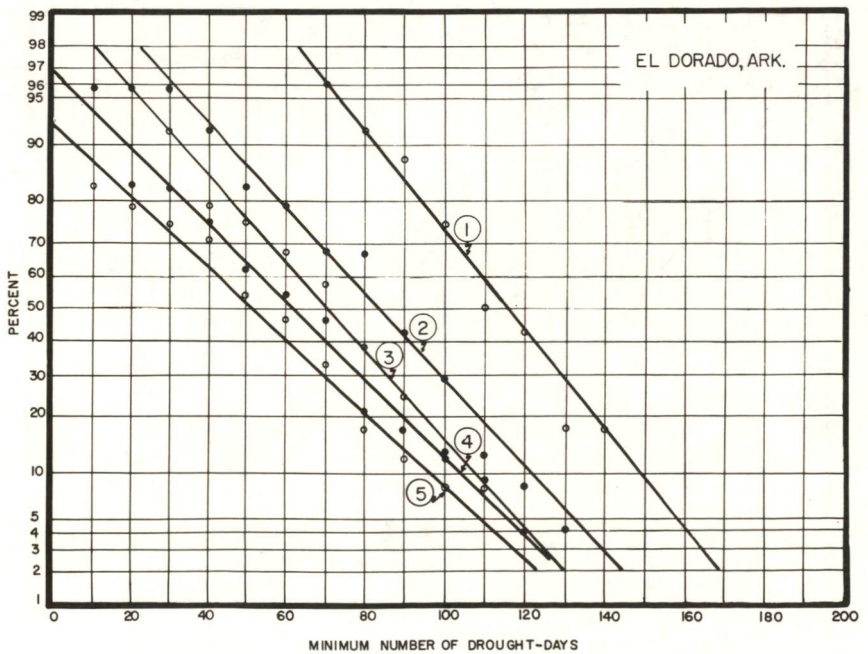


FIGURE 25.—*Probability for the minimum number of drought-days to occur at El Dorado, Ark. (sec. 20), during the period March through November for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches.*

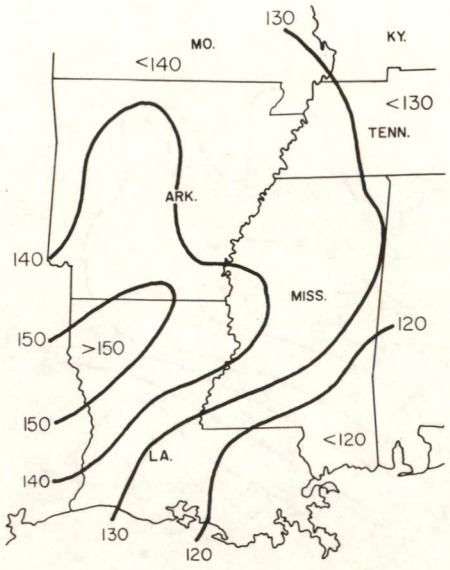


FIGURE 26.—*Minimum number of drought-days expected in the driest 1 out of 10 years during the period March through November for a soil-moisture storage capacity of 1 inch.*

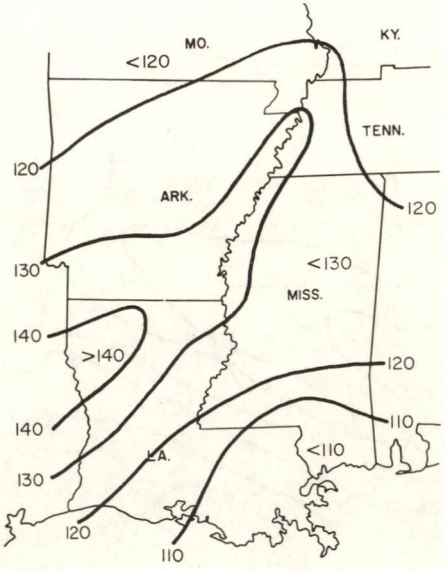


FIGURE 27.—*Minimum number of drought-days expected in the driest 2 out of 10 years during the period March through November for a soil-moisture storage capacity of 1 inch.*

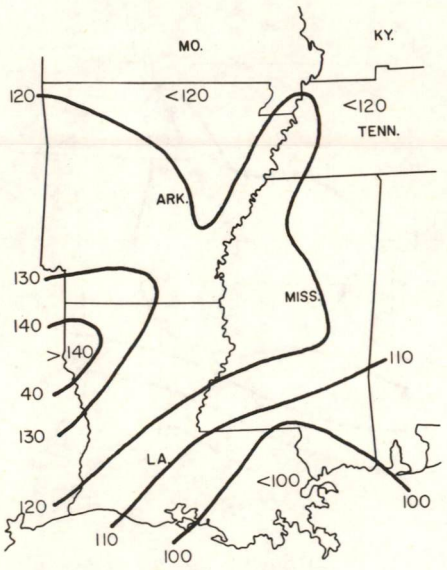


FIGURE 28.—*Minimum number of drought-days expected in the driest 3 out of 10 years during the period March through November for a soil-moisture storage capacity of 1 inch.*

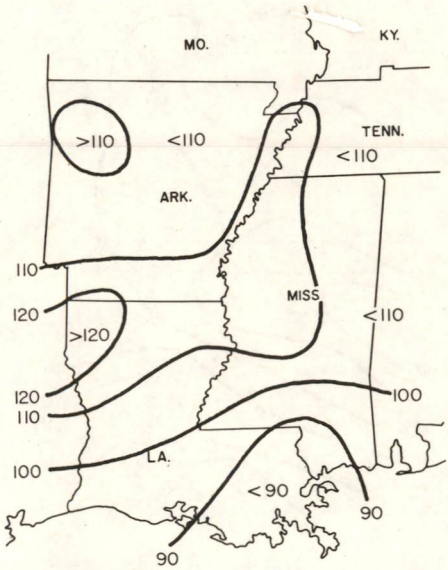


FIGURE 29.—*Minimum number of drought-days expected in the driest 5 out of 10 years during the period March through November for a soil-moisture storage capacity of 1 inch.*

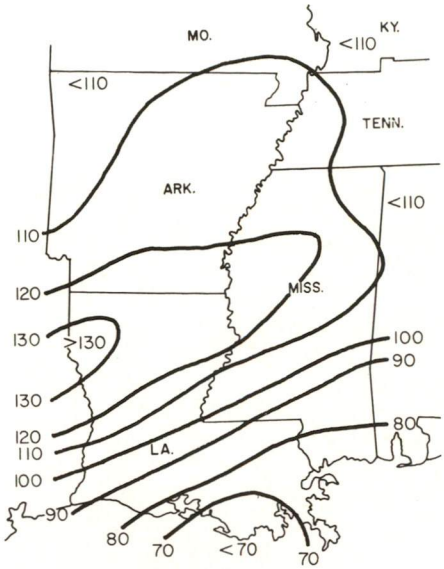


FIGURE 30.—*Minimum number of drought-days expected in the driest 1 out of 10 years during the period March through November for a soil-moisture storage capacity of 2 inches.*

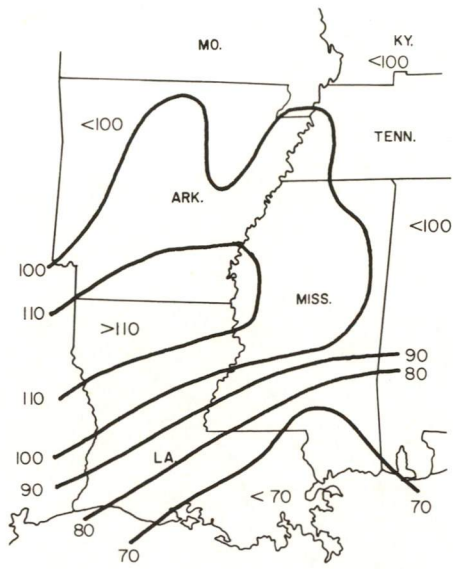


FIGURE 31.—*Minimum number of drought-days expected in the driest 2 out of 10 years during the period March through November for a soil-moisture storage capacity of 2 inches.*

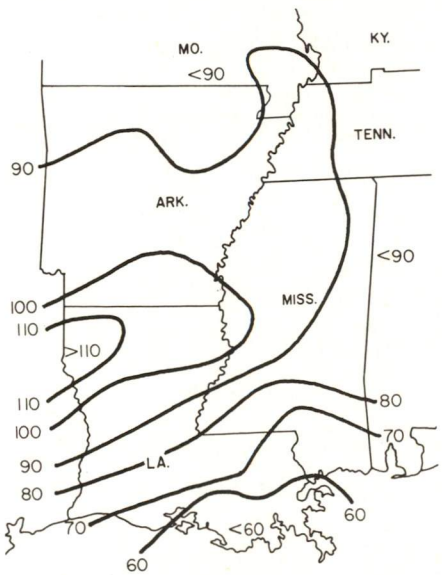


FIGURE 32.—*Minimum number of drought-days expected in the driest 3 out of 10 years during the period March through November for a soil-moisture storage capacity of 2 inches.*

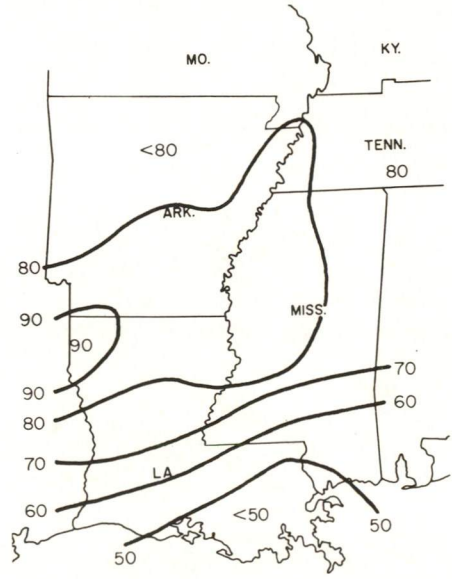


FIGURE 33.—*Minimum number of drought-days expected in the driest 5 out of 10 years during the period March through November for a soil-moisture storage capacity of 2 inches.*

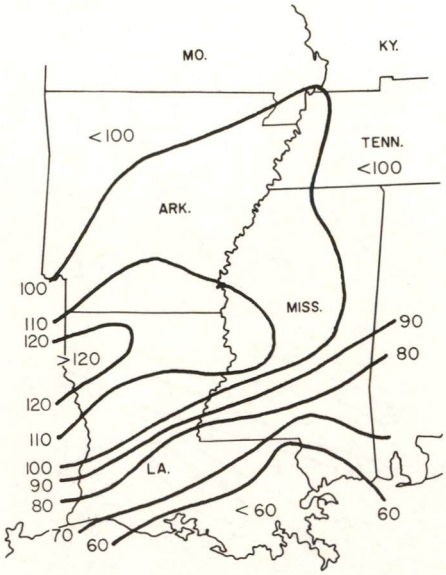


FIGURE 34.—*Minimum number of drought-days expected in the driest 1 out of 10 years during the period March through November for a soil-moisture storage capacity of 3 inches.*

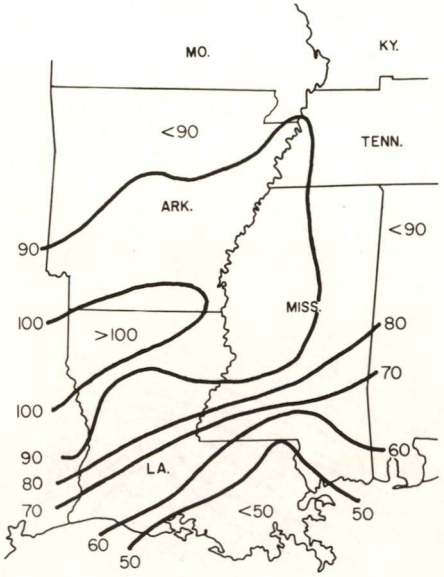


FIGURE 35.—*Minimum number of drought-days expected in the driest 2 out of 10 years during the period March through November for a soil-moisture storage capacity of 3 inches.*

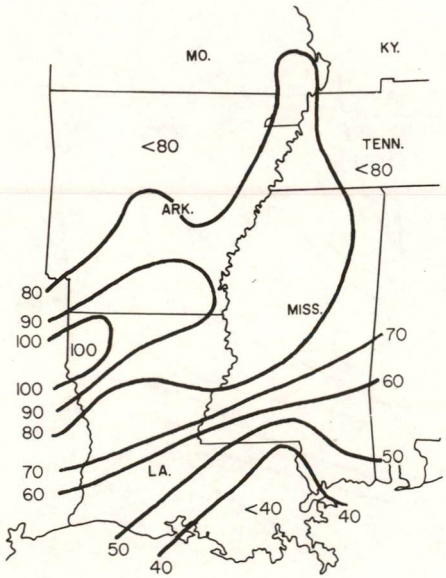


FIGURE 36.—*Minimum number of drought-days expected in the driest 3 out of 10 years during the period March through November for a soil-moisture storage capacity of 3 inches.*

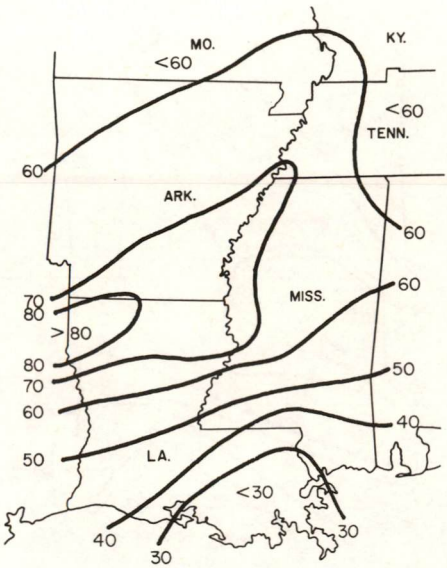


FIGURE 37.—*Minimum number of drought-days expected in the driest 5 out of 10 years during the period March through November for a soil-moisture storage capacity of 3 inches.*

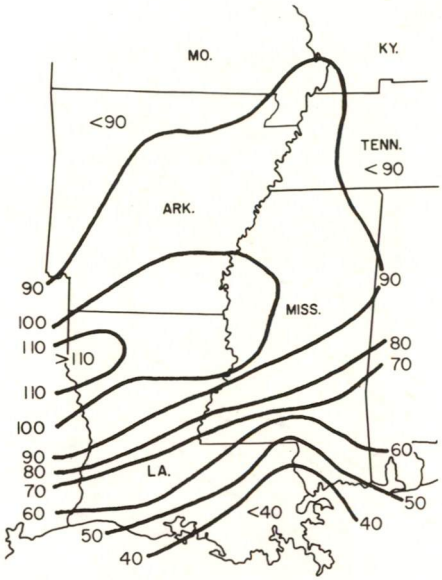


FIGURE 38.—*Minimum number of drought-days expected in the driest 1 out of 10 years during the period March through November for a soil-moisture storage capacity of 4 inches.*

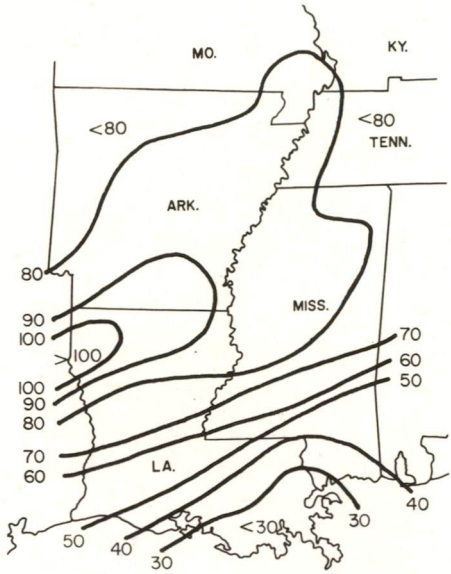


FIGURE 39.—*Minimum number of drought-days expected in the driest 2 out of 10 years during the period March through November for a soil-moisture storage capacity of 4 inches.*

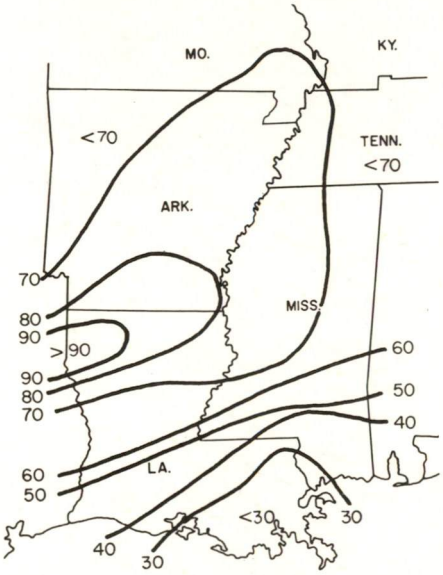


FIGURE 40.—*Minimum number of drought-days expected in the driest 3 out of 10 years during the period March through November for a soil-moisture storage capacity of 4 inches.*

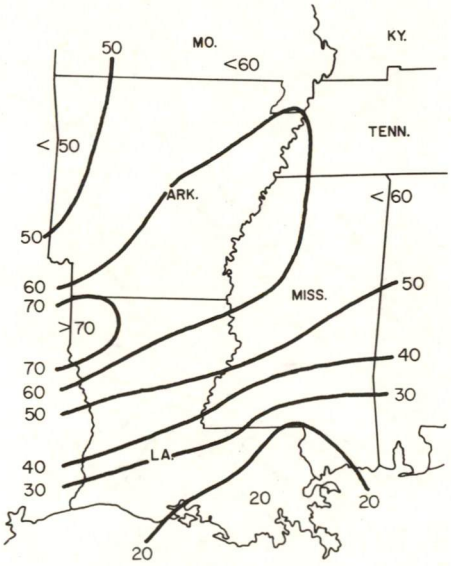


FIGURE 41.—*Minimum number of drought-days expected in the driest 5 out of 10 years during the period March through November for a soil-moisture storage capacity of 4 inches.*

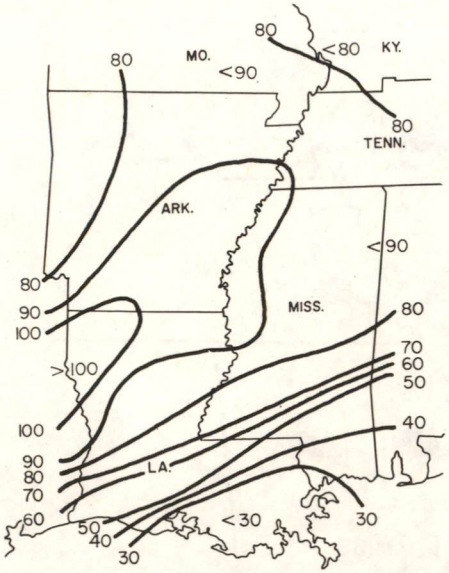


FIGURE 42.—*Minimum number of drought-days expected in the driest 1 out of 10 years during the period March through November for a soil-moisture storage capacity of 5 inches.*

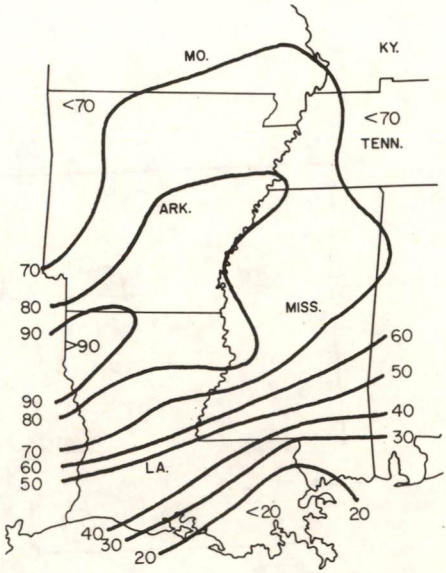


FIGURE 43.—*Minimum number of drought-days expected in the driest 2 out of 10 years during the period March through November for a soil-moisture storage capacity of 5 inches.*

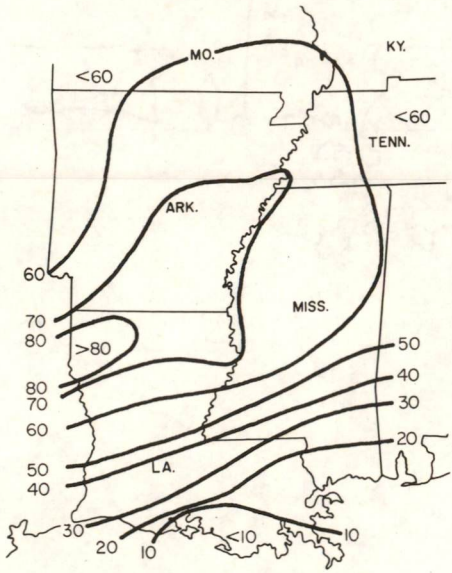


FIGURE 44.—*Minimum number of drought-days expected in the driest 3 out of 10 years during the period March through November for a soil-moisture storage capacity of 5 inches.*

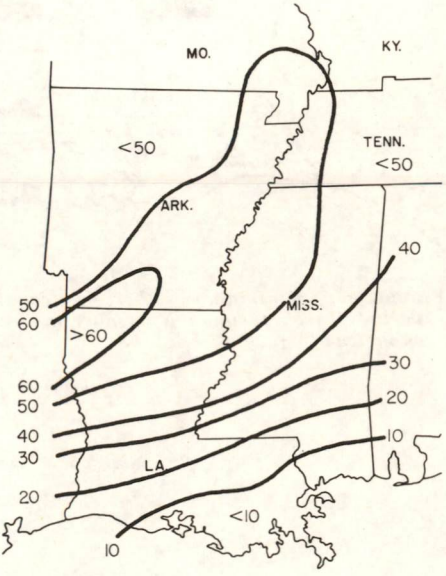


FIGURE 45.—*Minimum number of drought-days expected in the driest 5 out of 10 years during the period March through November for a soil-moisture storage capacity of 5 inches.*

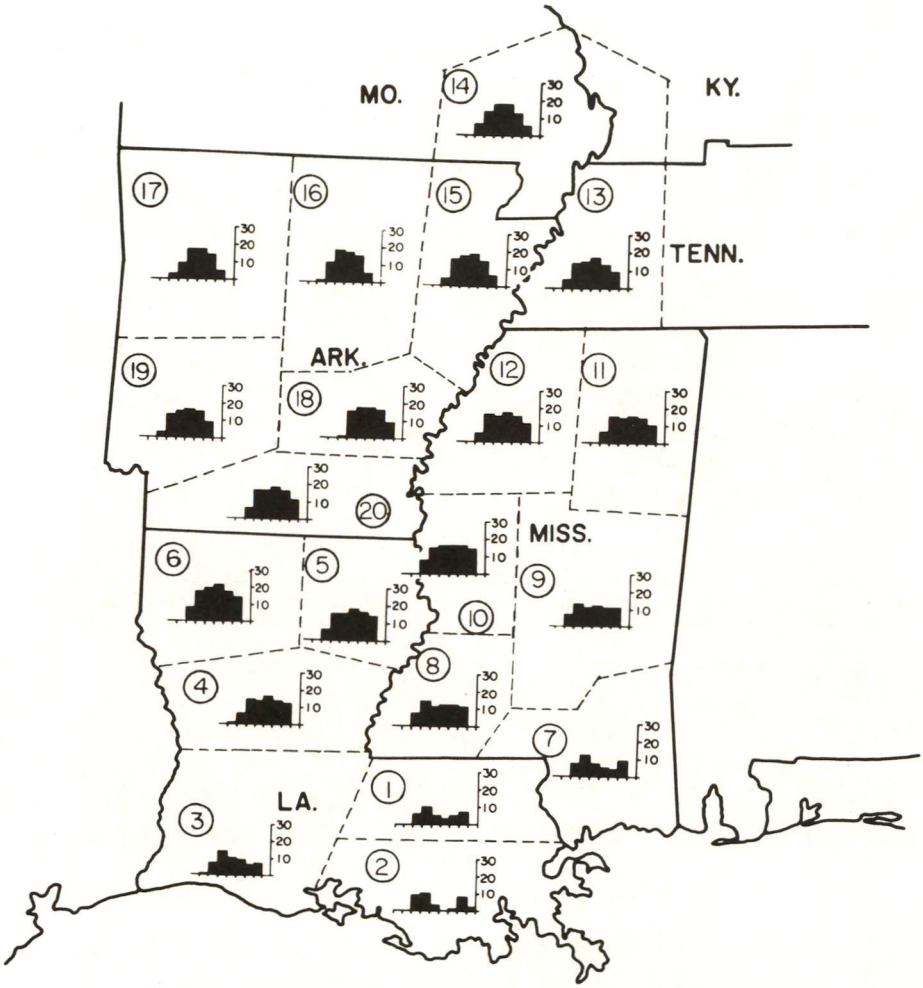


FIGURE 46.—*Minimum number of drought-days expected each month during the period March through November in 5 out of 10 years for a soil-moisture storage capacity of 2 inches.*

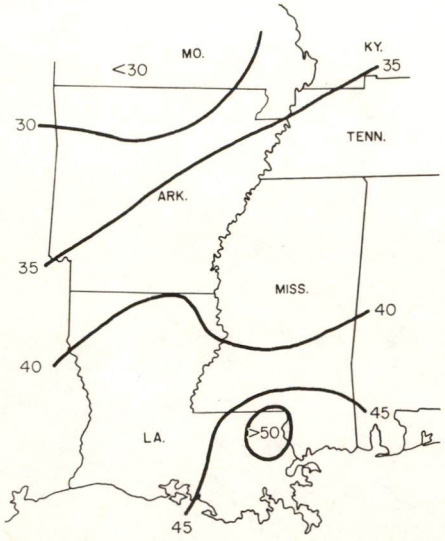


FIGURE 47.—*Minimum amount of excess moisture (inches) expected in 1 out of 10 years for a soil-moisture storage capacity of 1 inch.*

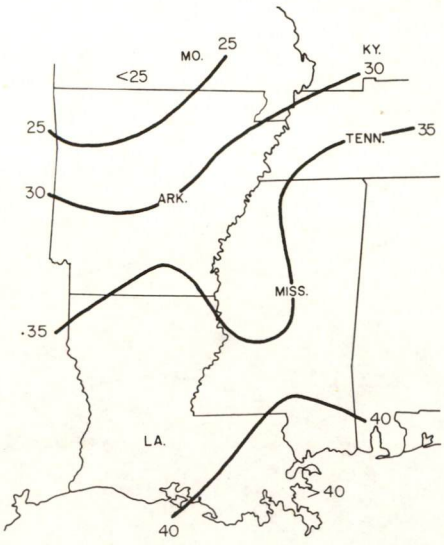


FIGURE 48.—*Minimum amount of excess moisture (inches) expected in 2 out of 10 years for a soil-moisture storage capacity of 1 inch.*

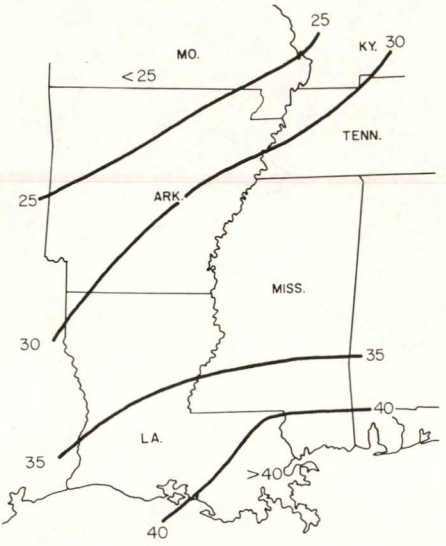


FIGURE 49.—*Minimum amount of excess moisture (inches) expected in 3 out of 10 years for a soil-moisture storage capacity of 1 inch.*

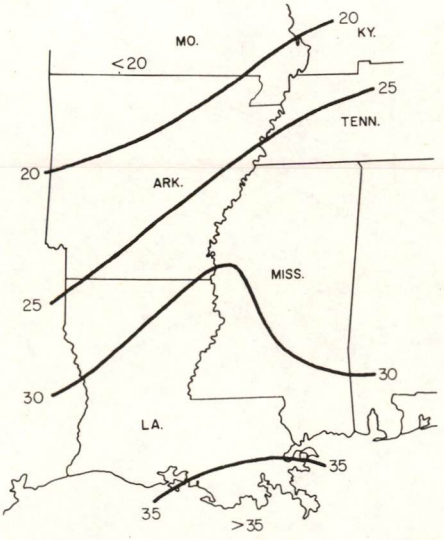


FIGURE 50.—*Minimum amount of excess moisture (inches) expected in 5 out of 10 years for a soil-moisture storage capacity of 1 inch.*

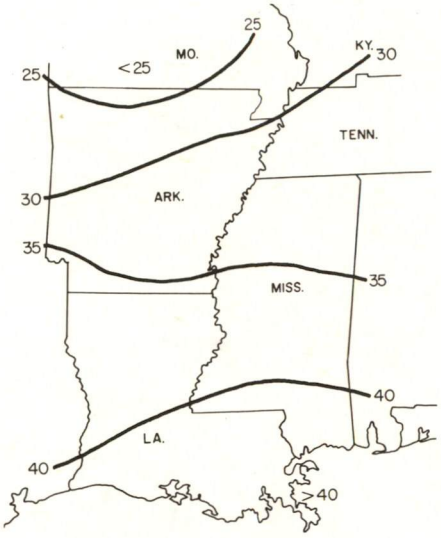


FIGURE 51.—*Minimum amount of excess moisture (inches) expected in 1 out of 10 years for a soil-moisture storage capacity of 2 inches.*

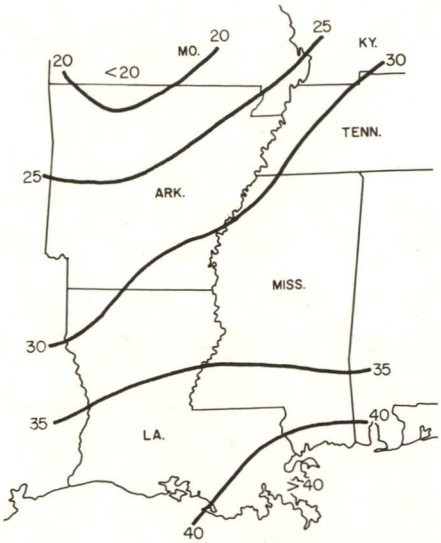


FIGURE 52.—*Minimum amount of excess moisture (inches) expected in 2 out of 10 years for a soil-moisture storage capacity of 2 inches.*

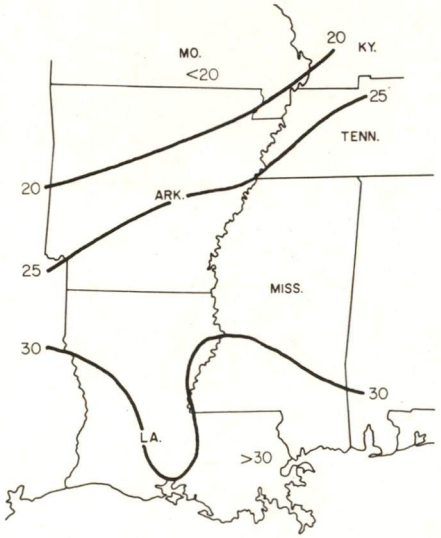


FIGURE 53.—*Minimum amount of excess moisture (inches) expected in 3 out of 10 years for a soil-moisture storage capacity of 2 inches.*

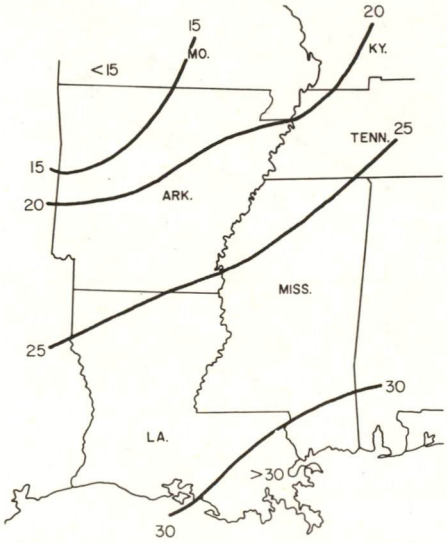


FIGURE 54.—*Minimum amount of excess moisture (inches) expected in 5 out of 10 years for a soil-moisture storage capacity of 2 inches.*

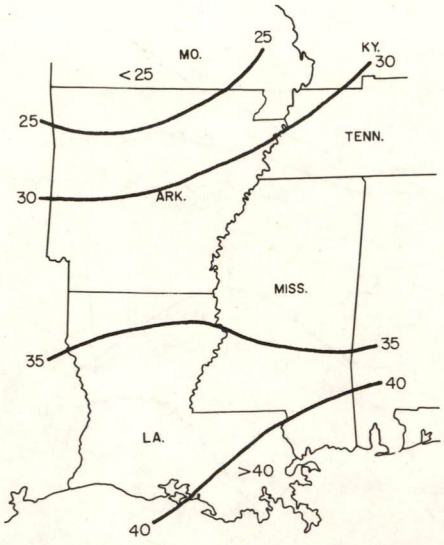


FIGURE 55.—*Minimum amount of excess moisture (inches) expected in 1 out of 10 years for a soil-moisture storage capacity of 3 inches.*

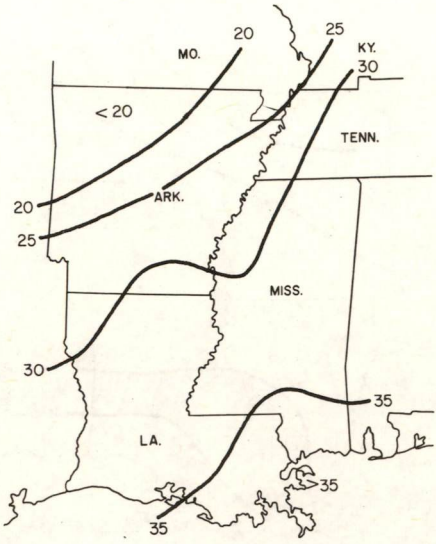


FIGURE 56.—*Minimum amount of excess moisture (inches) expected in 2 out of 10 years for a soil-moisture storage capacity of 3 inches.*

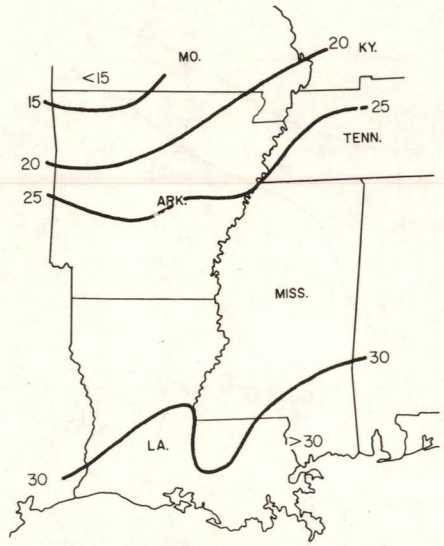


FIGURE 57.—*Minimum amount of excess moisture (inches) expected in 3 out of 10 years for a soil-moisture storage capacity of 3 inches.*

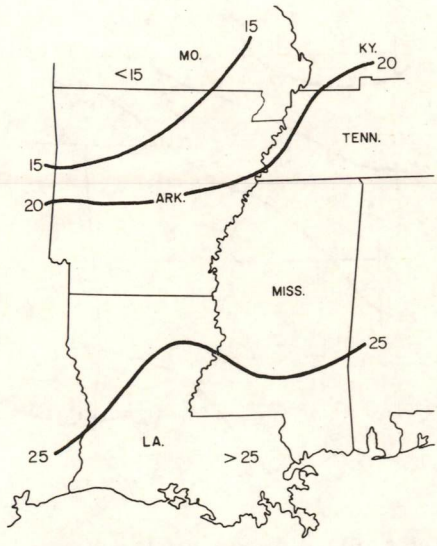


FIGURE 58.—*Minimum amount of excess moisture (inches) expected in 5 out of 10 years for a soil-moisture storage capacity of 3 inches.*

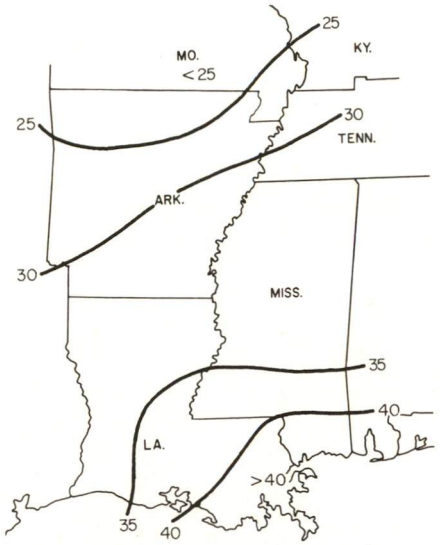


FIGURE 59.—*Minimum amount of excess moisture (inches) expected in 1 out of 10 years for a soil-moisture storage capacity of 4 inches.*

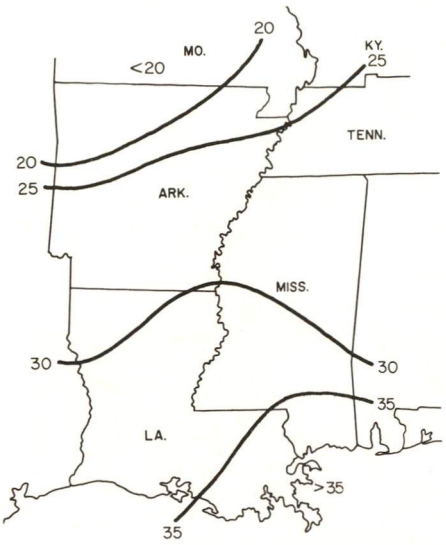


FIGURE 60.—*Minimum amount of excess moisture (inches) expected in 2 out of 10 years for a soil-moisture storage capacity of 4 inches.*

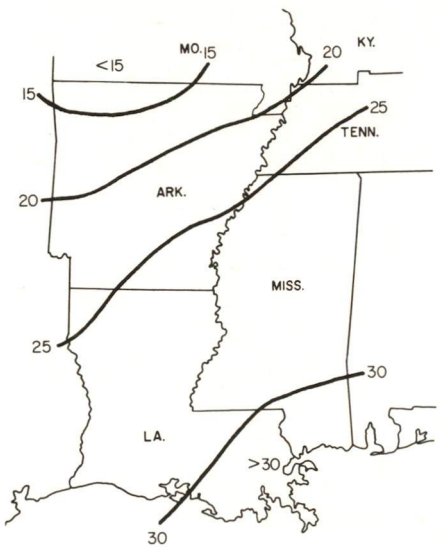


FIGURE 61.—*Minimum amount of excess moisture (inches) expected in 3 out of 10 years for a soil-moisture storage capacity of 4 inches.*

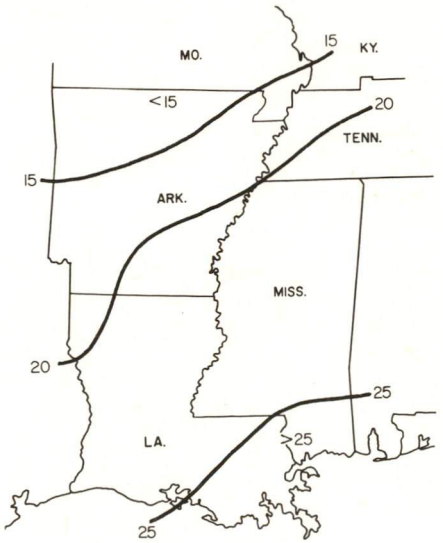


FIGURE 62.—*Minimum amount of excess moisture (inches) expected in 5 out of 10 years for a soil-moisture storage capacity of 4 inches.*

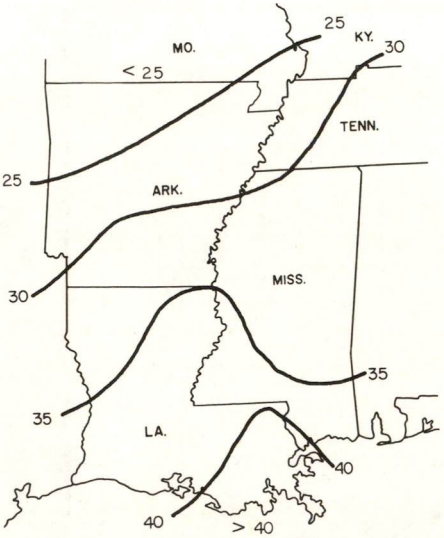


FIGURE 63.—*Minimum amount of excess moisture (inches) expected in 1 out of 10 years for a soil-moisture storage capacity of 5 inches.*

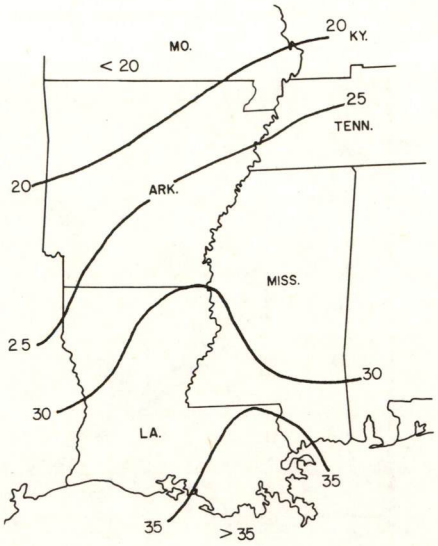


FIGURE 64.—*Minimum amount of excess moisture (inches) expected in 2 out of 10 years for a soil-moisture storage capacity of 5 inches.*

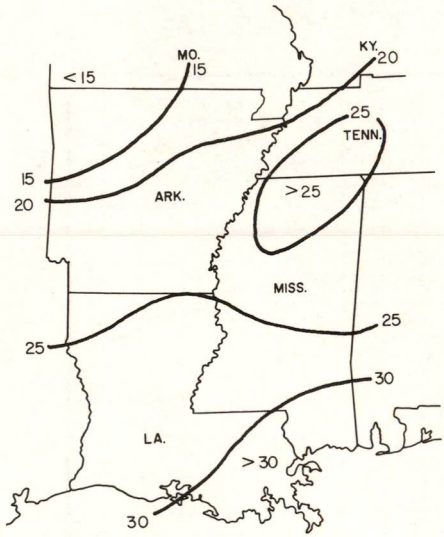


FIGURE 65.—*Minimum amount of excess moisture (inches) expected in 3 out of 10 years for a soil-moisture storage capacity of 5 inches.*

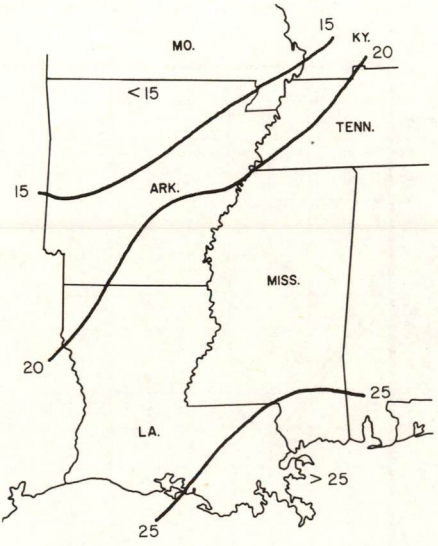


FIGURE 66.—*Minimum amount of excess moisture (inches) expected in 5 out of 10 years for a soil-moisture storage capacity of 5 inches.*

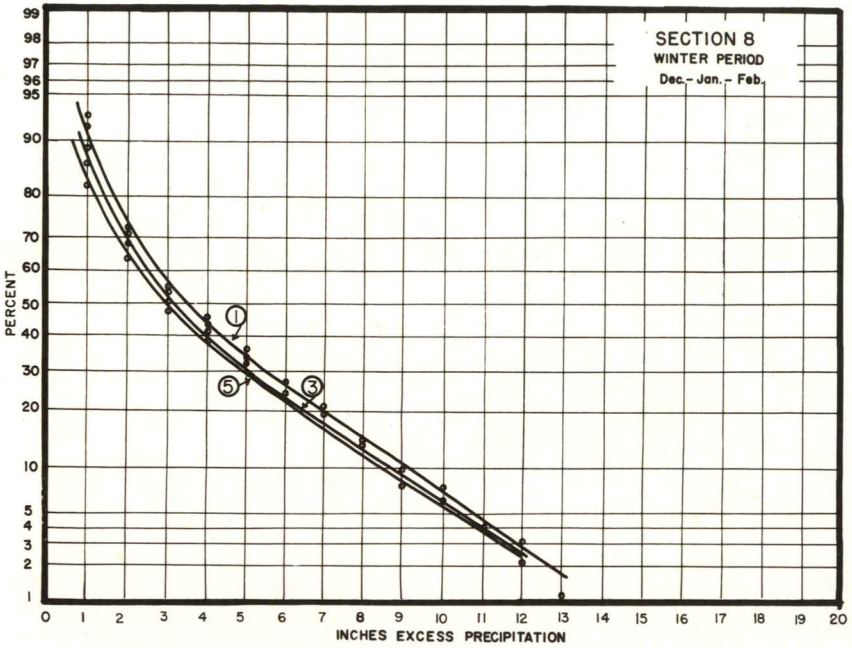


FIGURE 67.—*Minimum amount of excess moisture (inches) expected in section 8 during the winter for soil-moisture storage capacities of 1, 3, and 5 inches. (For location of section, see fig. 5.)*

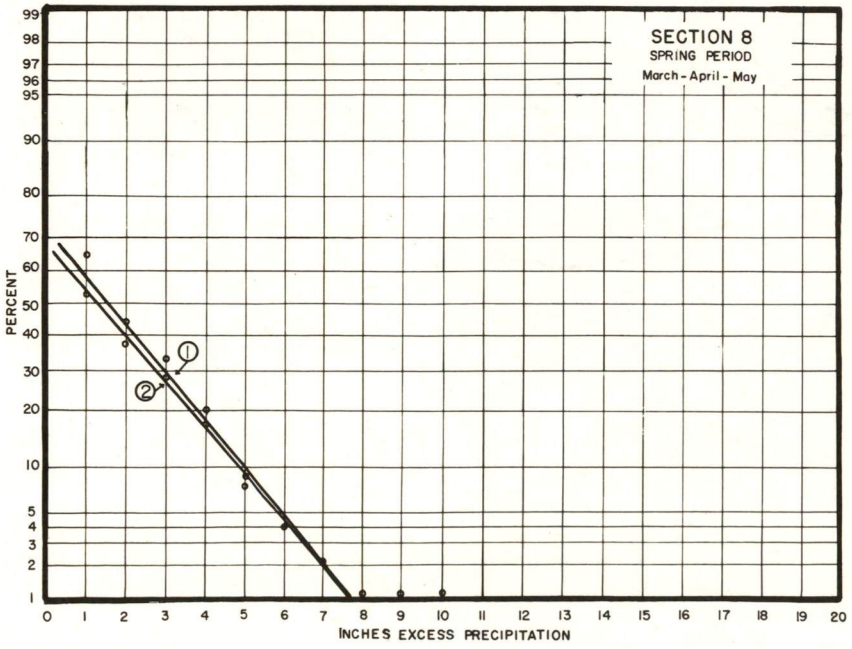


FIGURE 68.—*Minimum amount of excess moisture (inches) expected in section 8 during the spring for soil-moisture storage capacities of 1 and 2 inches. (For location of section, see fig. 5.)*

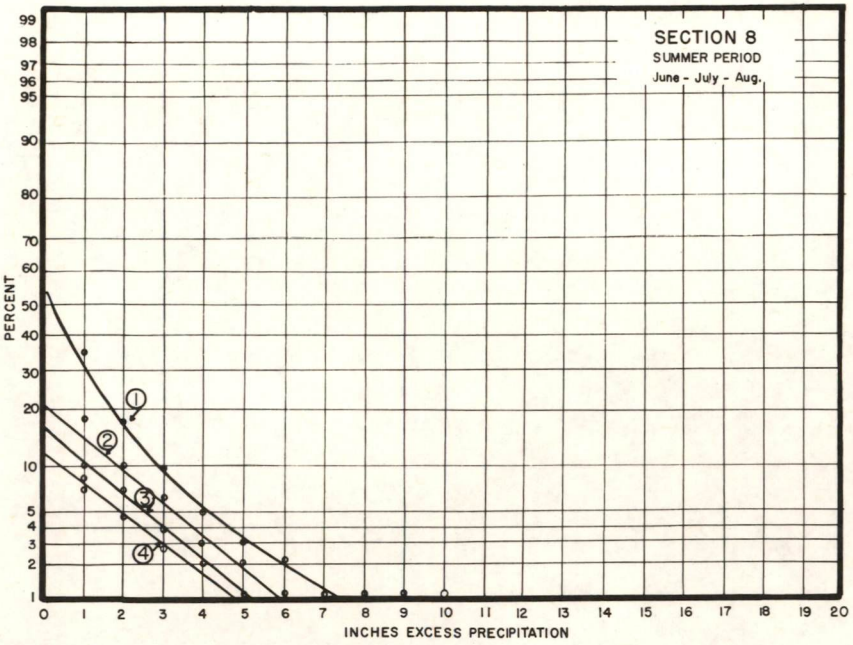


FIGURE 69.—*Minimum amount of excess moisture (inches) expected in section 8 during the summer for soil-moisture storage capacities of 1, 2, 3, and 4 inches. (For location of section, see fig. 5.)*

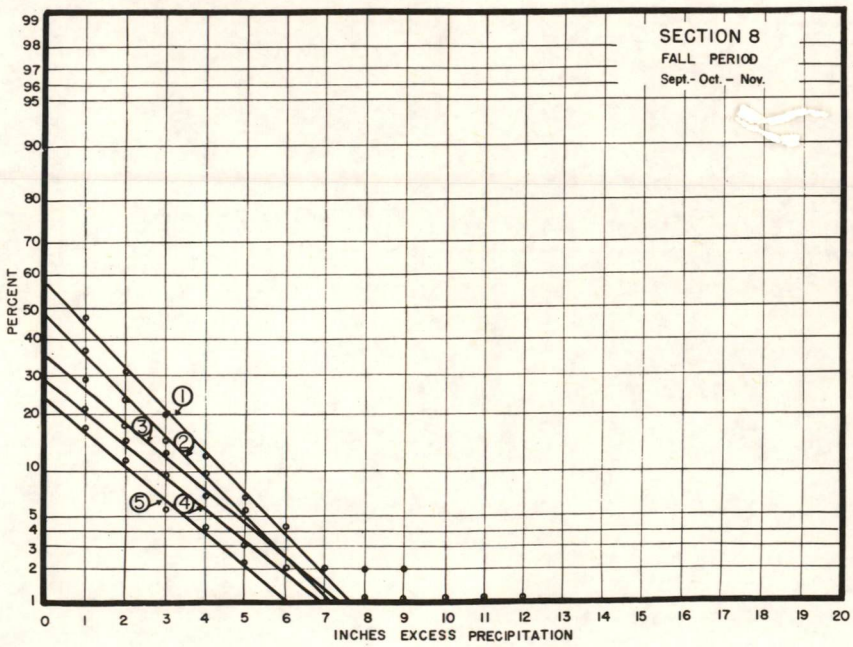


FIGURE 70.—*Minimum amount of excess moisture (inches) expected in section 8 during the fall for soil-moisture storage capacities of 1, 2, 3, 4, and 5 inches. (For location of section, see fig. 5.)*

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