

GENERAL DISCUSSION

Precipitation for Census Years

The Census of 1940 completed a span of 50 years in which the Federal Census has gathered statistics on irrigation. Table 1 shows the eight individual years when irrigation enumerations were made and the mean annual precipitation and departures from normal for those years, as recorded by the United States Weather Bureau. The average monthly precipitation, by States, for the water year (October 1938 through September 1939), is given in table 2. These data, together with those for recorded rainfall and departures from normal for all years from 1888 to 1939, are presented graphically in charts I to VIII. An analysis of these figures indicates that in most States the annual precipitation was below normal in most of the census years. In many sections of the West the areas most affected by variations in the amount and distribution of precipitation are lands reported as irrigated pasture. This acreage seems to accord largely with the fluctuations in the amount of water available for pasture irrigation in the spring and

fall, before and after the requirements of other more valuable crops are satisfied, a relation and practice which should be taken into consideration in the use of irrigated pasture data. When a census year falls in, or at the end of, a drought or period of excessive precipitation, the available water supply, areas irrigated, and crop yields are correspondingly affected. Therefore, users of Census data should take into consideration, in their interpretation of Irrigation Census statistics, the precipitation factor for the years concerned.

Precipitation for the calendar year 1939 and the water year (October 1938 through September 1939) was below normal in the 19 western Irrigation States. Colorado, California, and Nebraska received the least rainfall during 1939, amounting to 65, 67, and 72 percent of normal, respectively. Idaho, Kansas, eastern Oregon, eastern Washington, and Wyoming received approximately 75 percent of their normal precipitation (see tables 1 and 2). Additional tabulations and discussions of precipitation and temperatures for the years 1938 and 1939 accompany each State report following this summary.

TABLE 1.—PRECIPITATION AND DEPARTURES FROM NORMAL: 1889, 1899, 1902, 1909, 1919, 1929, 1934, AND 1939  
(For the 17 western States and Arkansas, Louisiana, and Florida)

| STATE            | Normal for period | PRECIPITATION |                      |        |                      |        |                      |        |                      |        |                      |        |                      |        |                      |        |                      | Percent of normal |  |
|------------------|-------------------|---------------|----------------------|--------|----------------------|--------|----------------------|--------|----------------------|--------|----------------------|--------|----------------------|--------|----------------------|--------|----------------------|-------------------|--|
|                  |                   | 1889          |                      | 1899   |                      | 1902   |                      | 1909   |                      | 1919   |                      | 1929   |                      | 1934   |                      | 1939   |                      |                   |  |
|                  |                   | Amount        | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> | Amount | Depart. <sup>1</sup> |                   |  |
| Arizona          | Inches            | Inches        | Inches               | Inches | Inches               | Inches | Inches               | Inches | Inches               | Inches | Inches               | Inches | Inches               | Inches | Inches               | Inches | Inches               | Inches            |  |
| Arkansas         | 13.89             | 13.29         | -0.60                | 8.61   | -5.28                | 10.23  | -5.68                | 14.48  | +0.59                | 20.70  | -6.81                | 11.29  | -2.60                | 10.47  | -3.42                | 12.88  | -1.01                | 95                |  |
| California       | 48.25             | 45.61         | -2.64                | 41.49  | -6.76                | 51.70  | +5.45                | 44.08  | -4.20                | 54.52  | +6.27                | 46.10  | -2.15                | 42.47  | -5.78                | 50.16  | +1.91                | 104               |  |
| Colorado         | 23.72             | 33.25         | +9.53                | 22.47  | -1.25                | 24.22  | +0.50                | 42.15  | +18.41               | 21.29  | -2.43                | 15.00  | -8.72                | 18.01  | -5.71                | 15.80  | -7.92                | 67                |  |
| Idaho            | 16.38             | 13.75         | -2.63                | 14.67  | -1.71                | 13.88  | -2.50                | 20.98  | +4.58                | 17.14  | +0.76                | 18.16  | +1.78                | 10.69  | -5.49                | 10.68  | -5.70                | 65                |  |
| Kansas           | 17.96             | 14.76         | -3.20                | 18.96  | +1.00                | 16.98  | -1.00                | 22.83  | +4.87                | 15.97  | -1.99                | 13.94  | -4.02                | 16.10  | -1.86                | 13.73  | -4.23                | 76                |  |
| Louisiana        | 26.43             | 29.44         | +3.01                | 26.26  | -0.17                | 34.42  | +7.99                | 31.15  | +4.72                | 25.85  | -0.78                | 27.96  | +1.53                | 20.02  | -6.41                | 20.08  | -6.35                | 76                |  |
| Montana          | 55.45             | 41.21         | -14.24               | 42.19  | -13.26               | 46.89  | -8.56                | 55.25  | -2.20                | 69.25  | +13.78               | 63.65  | +8.20                | 59.23  | +3.78                | 51.51  | -3.94                | 93                |  |
| Nebraska         | 15.23             | 8.94          | -6.29                | 15.74  | +0.51                | 15.12  | -0.11                | 19.72  | +4.49                | 10.88  | -4.55                | 13.08  | -2.15                | 11.87  | -3.36                | 12.85  | -2.40                | 84                |  |
| Nevada           | 22.56             | 22.29         | -0.27                | 19.55  | -3.01                | 29.47  | +6.91                | 24.64  | +2.08                | 25.09  | +2.53                | 22.74  | +0.18                | 14.31  | -8.25                | 16.28  | -6.28                | 72                |  |
| New Mexico       | 9.22              | 12.41         | +3.19                | 9.12   | -0.10                | 7.25   | -1.97                | 11.03  | +1.81                | 7.08   | -2.14                | 5.85   | -3.39                | 7.12   | -2.10                | 8.48   | -0.74                | 92                |  |
| North Dakota     | 14.43             | 10.97         | -3.46                | 10.98  | -3.45                | 9.97   | -4.46                | 12.83  | -1.60                | 20.95  | +6.52                | 16.48  | +2.05                | 10.08  | -4.35                | 13.22  | -1.21                | 92                |  |
| Oklahoma         | 16.87             | 11.54         | -5.33                | 17.62  | +0.75                | 19.35  | +2.48                | 18.10  | +1.23                | 15.59  | -1.28                | 14.31  | -2.56                | 9.51   | -7.36                | 14.15  | -2.72                | 84                |  |
| Oregon           | 32.27             | 31.01         | -1.26                | 36.07  | +3.80                | 40.54  | +8.27                | 27.01  | -5.26                | 34.41  | +2.14                | 35.39  | +5.12                | 27.46  | -4.61                | 26.71  | -5.56                | 85                |  |
| Eastern Division | 26.10             | 29.79         | +3.69                | 31.06  | +4.96                | 29.88  | +5.78                | 32.85  | +6.75                | 26.21  | +0.11                | 19.33  | -6.77                | 25.87  | -0.23                | 20.77  | -5.33                | 80                |  |
| Western Division | 13.81             | 16.60         | +2.79                | 15.23  | +1.42                | 12.60  | -1.21                | 17.00  | +5.19                | 12.41  | -1.40                | 11.58  | -2.23                | 14.07  | +0.26                | 10.50  | -5.51                | 78                |  |
| South Dakota     | 55.83             | 30.38         | -25.45               | 66.70  | +12.87               | 68.76  | +14.93               | 69.31  | +15.48               | 57.28  | +3.45                | 38.66  | -15.17               | 53.53  | -0.30                | 43.90  | -9.93                | 82                |  |
| Texas            | 18.87             | 18.34         | -0.53                | 18.84  | -0.03                | 19.54  | +0.67                | 22.74  | +3.87                | 19.64  | +0.77                | 20.65  | +1.78                | 12.58  | -6.29                | 15.71  | -3.16                | 83                |  |
| Utah             | 30.63             | 38.06         | +7.43                | 28.70  | -1.93                | 33.92  | +3.29                | 23.45  | -7.18                | 45.64  | +15.01               | 31.17  | +0.54                | 26.78  | -3.85                | 24.69  | -5.94                | 81                |  |
| Washington       | 12.95             | 12.67         | -0.28                | 11.85  | -1.12                | 9.17   | -3.78                | 19.31  | +6.56                | 11.85  | -1.12                | 13.60  | +0.65                | 9.52   | -3.43                | 11.49  | -1.46                | 89                |  |
| Eastern Division | 24.75             | 31.85         | +7.10                | 45.07  | +10.32               | 40.24  | +5.49                | 35.87  | +1.12                | 31.00  | -3.75                | 23.74  | -11.01               | 38.27  | +3.52                | 32.00  | -2.75                | 92                |  |
| Western Division | 16.70             | 13.62         | -3.08                | 18.97  | +2.27                | 17.69  | +0.99                | 17.40  | +0.70                | 18.22  | +1.52                | 10.19  | -6.51                | 17.13  | +0.43                | 12.85  | -3.87                | 77                |  |
| Wyoming          | 57.33             | 36.02         | -21.31               | 67.87  | +10.54               | 62.98  | +5.65                | 58.75  | +1.42                | 52.08  | -5.25                | 44.01  | -13.32               | 69.97  | +12.64               | 59.74  | +2.41                | 104               |  |
| Florida          | 14.01             | 12.93         | -1.08                | 13.58  | -0.43                | 9.81   | -4.20                | 16.33  | +2.32                | 10.46  | -3.55                | 15.06  | +1.05                | 10.88  | -3.13                | 10.27  | -3.74                | 73                |  |

<sup>1</sup>Departure from normal.

TABLE 2.—MONTHLY AND ANNUAL PRECIPITATION WITH ANNUAL DEPARTURE FOR CALENDAR YEARS, 1938 AND 1939; AND MONTHLY AND TOTAL PRECIPITATION WITH DEPARTURE FOR PERIOD FOR WATER YEAR, OCTOBER 1938 THROUGH SEPTEMBER 1939  
(For the 17 western States, Arkansas, Louisiana, and Florida)

| STATE        | PRECIPITATION |           |            |        |        |        |                         |                                  |        |        |        |        |        |        |        |        | Water Year |                         |                                  |               | Annual                  |                                  |        |
|--------------|---------------|-----------|------------|--------|--------|--------|-------------------------|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------------------------|----------------------------------|---------------|-------------------------|----------------------------------|--------|
|              | 1938          |           |            |        |        |        |                         |                                  |        |        |        |        | 1939   |        |        |        | Water Year |                         | Annual                           |               |                         |                                  |        |
|              | Jan.-Mar.     | Apr.-June | July-Sept. | Oct.   | Nov.   | Dec.   | Pre-<br>cipi-<br>tation | De-<br>par-<br>ture <sup>1</sup> | Jan.   | Feb.   | Mar.   | Apr.   | May    | June   | July   | Aug.   | Sept.      | Pre-<br>cipi-<br>tation | De-<br>par-<br>ture <sup>1</sup> | Oct.-<br>Dec. | Pre-<br>cipi-<br>tation | De-<br>par-<br>ture <sup>1</sup> |        |
| Arizona      | Inches        | Inches    | Inches     | Inches | Inches | Inches | Inches                  | Inches                           | Inches | Inches | Inches | Inches | Inches | Inches | Inches | Inches | Inches     | Inches                  | Inches                           | Inches        | Inches                  | Inches                           | Inches |
| Arkansas     | 4.58          | 1.29      | 4.56       | 0.10   | 0.07   | 2.20   | 12.80                   | -1.09                            | 1.12   | 1.20   | 0.68   | 0.56   | 0.04   | 0.04   | 1.16   | 2.36   | 3.79       | 13.30                   | -0.59                            | 1.95          | 12.88                   | -1.01                            |        |
| California   | 18.58         | 12.99     | 7.55       | 0.94   | 5.26   | 2.93   | 48.25                   | 0.00                             | 6.21   | 8.56   | 3.71   | 7.13   | 4.85   | 4.50   | 3.34   | 2.53   | 1.77       | 51.73                   | +3.46                            | 7.56          | 50.16                   | +1.91                            |        |
| Colorado     | 21.31         | 2.59      | 0.60       | 1.61   | 1.17   | 2.78   | 30.06                   | +6.34                            | 3.23   | 2.25   | 2.90   | 0.52   | 0.97   | 0.12   | 0.08   | 0.07   | 1.70       | 17.40                   | -6.32                            | 3.96          | 15.80                   | -7.92                            |        |
| Idaho        | 3.98          | 6.23      | 6.45       | 0.97   | 0.93   | 0.89   | 19.35                   | +2.97                            | 1.30   | 1.09   | 1.14   | 0.91   | 1.03   | 0.82   | 0.90   | 1.08   | 1.10       | 12.06                   | -4.32                            | 1.31          | 10.68                   | -5.70                            |        |
| Kansas       | 7.02          | 4.40      | 2.19       | 2.58   | 1.91   | 1.46   | 19.56                   | +1.60                            | 1.69   | 2.01   | 1.29   | 0.68   | 0.81   | 1.29   | 0.89   | 0.16   | 0.97       | 15.54                   | -2.42                            | 4.14          | 13.73                   | -4.23                            |        |
| Louisiana    | 3.67          | 14.05     | 7.62       | 0.33   | 1.40   | 0.20   | 27.27                   | +0.84                            | 0.78   | 1.22   | 1.72   | 1.96   | 2.35   | 4.59   | 1.40   | 3.50   | 0.32       | 19.77                   | -6.66                            | 2.24          | 20.08                   | -6.35                            |        |
| Montana      | 11.99         | 14.16     | 15.23      | 1.32   | 4.03   | 3.53   | 50.26                   | -5.19                            | 5.62   | 5.89   | 2.89   | 2.40   | 6.72   | 4.42   | 5.97   | 4.86   | 3.23       | 50.68                   | -4.77                            | 9.71          | 51.51                   | -3.94                            |        |
| Nebraska     | 2.54          | 6.98      | 3.88       | 1.75   | 0.89   | 0.56   | 16.60                   | +1.37                            | 0.70   | 0.81   | 0.72   | 0.78   | 1.89   | 3.52   | 0.68   | 0.62   | 0.94       | 13.86                   | -1.37                            | 2.17          | 12.83                   | -2.40                            |        |
| Nevada       | 2.41          | 10.65     | 8.09       | 0.18   | 0.72   | 0.18   | 22.23                   | -0.33                            | 0.70   | 0.87   | 1.21   | 1.40   | 2.53   | 3.84   | 1.85   | 2.04   | 0.44       | 15.94                   | -8.62                            | 1.42          | 16.28                   | -6.28                            |        |
| New Mexico   | 4.67          | 3.42      | 1.34       | 1.32   | 0.52   | 0.42   | 11.79                   | +2.57                            | 0.96   | 0.78   | 0.95   | 0.79   | 0.73   | 0.19   | 0.60   | 0.34   | 1.34       | 8.94                    | -0.28                            | 1.80          | 8.48                    | -0.74                            |        |
| North Dakota | 2.38          | 3.58      | 6.63       | 1.10   | 0.27   | 0.76   | 14.62                   | +0.19                            | 1.39   | 0.61   | 0.76   | 0.88   | 0.72   | 0.64   | 2.45   | 1.76   | 1.83       | 13.17                   | -1.26                            | 2.18          | 13.22                   | -1.21                            |        |
| Oklahoma     | 1.75          | 6.37      | 5.47       | 0.55   | 0.87   | 0.32   | 15.33                   | -1.54                            | 0.47   | 0.63   | 0.59   | 0.87   | 1.55   | 4.59   | 1.81   | 2.10   | 0.68       | 14.85                   | -2.04                            | 1.06          | 14.15                   | -2.72                            |        |
| Oregon       | 10.15         | 13.20     | 6.51       | 0.52   | 2.21   | 0.62   | 33.21                   | +0.94                            | 2.79   | 1.67   | 1.82   | 2.44   | 3.76   | 5.35   | 1.65   | 2.66   | 3.33       | 25.82                   | -6.45                            | 4.24          | 26.71                   | -5.56                            |        |
| Eastern Div. | 13.53         | 5.60      | 1.49       | 2.06   | 3.35   | 2.48   | 28.31                   | +0.21                            | 2.90   | 3.53   | 2.23   | 0.44   | 1.07   | 1.05   | 0.49   | 0.35   | 0.64       | 20.59                   | -5.51                            | 8.07          | 20.77                   | -5.33                            |        |
| Western Div. | 6.70          | 2.87      | 1.30       | 1.29   | 1.71   | 1.02   | 14.89                   | +1.08                            | 1.09   | 1.58   | 1.22   | 0.22   | 0.76   | 0.61   | 0.35   | 0.12   | 0.55       | 10.62                   | -3.19                            | 3.90          | 10.50                   | -3.31                            |        |
| South Dakota | 2.35          | 8.25      | 1.93       | 3.80   | 7.04   | 5.76   | 51.83                   | -2.00                            | 6.97   | 7.70   | 4.51   | 0.93   | 1.75   | 2.03   | 0.79   | 0.88   | 0.86       | 43.02                   | -10.81                           | 17.48         | 43.90                   | -9.93                            |        |
| Texas        | 7.12          | 9.65      | 6.32       | 0.87   | 1.50   | 1.72   | 27.18                   | -3.45                            | 3.10   | 1.86   | 1.04   | 1.47   | 3.16   | 3.05   | 2.60   | 2.21   | 1.12       | 23.70                   | -6.93                            | 5.08          | 24.69                   | -5.94                            |        |
| Utah         | 5.24          | 3.60      | 2.52       | 1.70   | 1.16   | 0.97   | 15.19                   | +2.24                            | 1.87   | 1.29   | 1.29   | 0.94   | 0.78   | 0.86   | 0.85   | 0.54   | 0.66       | 2.61                    | 13.53                            | +0.58         | 1.79                    | 11.49                            | -1.46  |
| Washington   | 11.40         | 4.23      | 1.34       | 3.55   | 4.01   | 4.54   | 29.27                   | -5.48                            | 5.79   | 4.44   | 2.45   | 0.91   | 1.52   | 1.64   | 0.84   | 0.43   | 0.84       | 30.96                   | -3.79                            | 13.14         | 32.00                   | -2.75                            |        |
| Eastern Div. | 6.30          | 2.07      | 0.91       | 1.64   | 1.70   | 1.17   | 13.79                   | -2.91                            | 1.97   | 1.99   | 1.12   | 0.43   | 0.60   | 0.85   | 0.18   | 0.13   | 0.34       | 12.12                   | -4.58                            | 5.22          | 12.83                   | -3.67                            |        |
| Western Div. | 19.05         | 7.52      | 2.68       | 6.40   | 7.46   | 9.59   | 52.70                   | -4.63                            | 11.51  | 6.12   | 4.45   | 1.64   | 2.90   | 2.83   | 1.84   | 0.87   | 1.59       | 59.20                   | +1.87                            | 23.99         | 59.74                   | +2.41                            |        |
| Wyoming      | 2.61          | 5.75      | 4.04       | 1.17   | 1.01   | 0.68   | 15.26                   | +1.25                            | 0.78   | 0.85   | 0.68   | 0.96   | 1.57   | 1.70   | 0.81   | 0.78   | 0.92       | 11.91                   | -2.10                            | 1.22          | 10.27                   | -3.74                            |        |
| Florida      | 5.28          | 12.14     | 18.10      | 4.70   | 1.60   | 1.35   | 43.17                   | -9.56                            | 1.62   | 2.25   | 1.54   | 4.32   | 5.01   | 9.13   | 7.59   | 10.78  | 5.79       | 55.68                   | +2.95                            | 6.51          | 54.54                   | +1.81                            |        |

<sup>1</sup>Departure from normal.