

FIGURE 1—AVERAGE WATER CONTENT OF SNOW COVER ON MARCH 1  
BASED ON RECORDS FOR THE PERIOD 1941-65

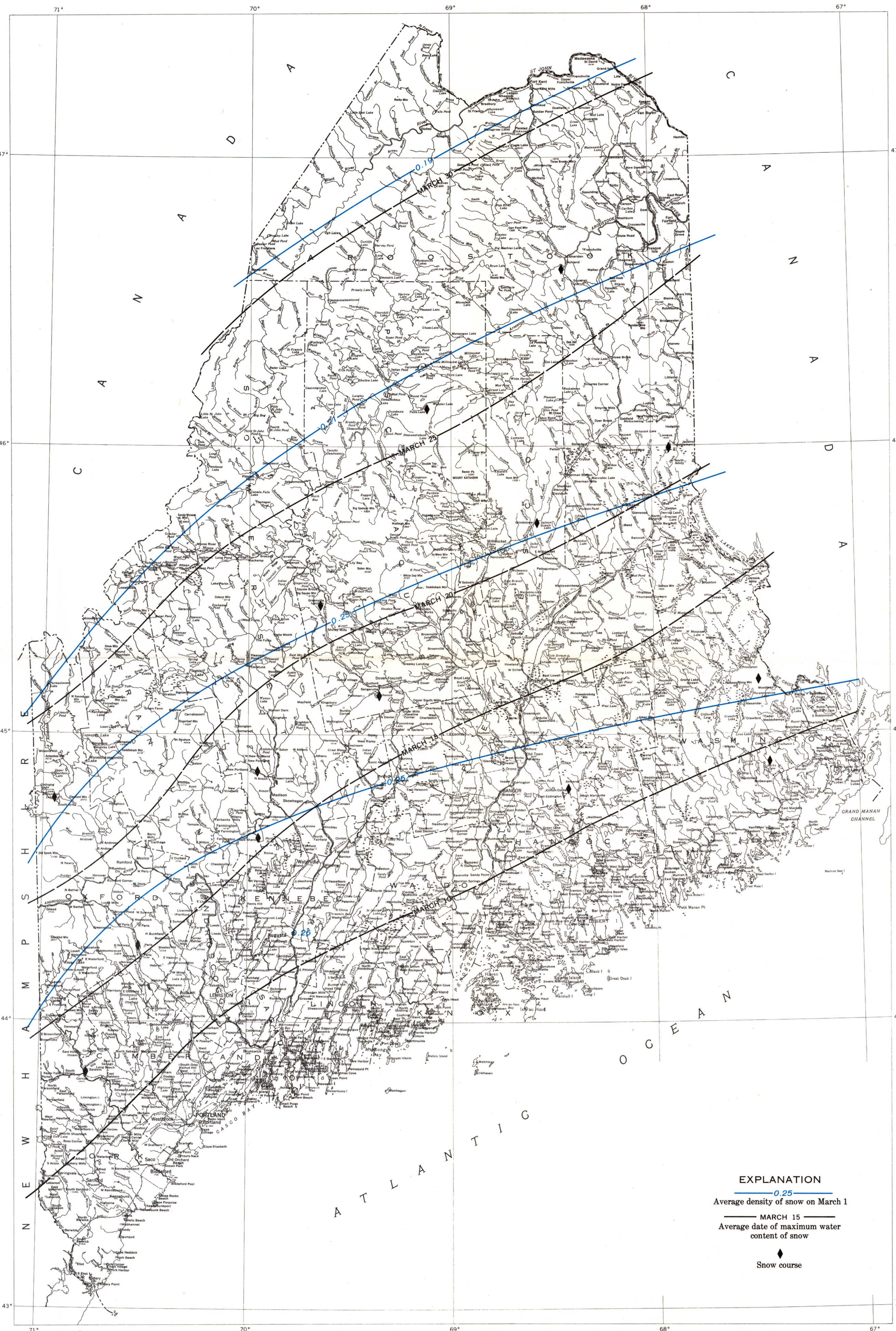
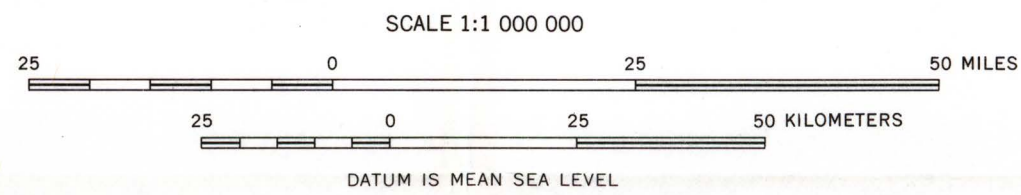


FIGURE 2—AVERAGE DENSITY OF SNOW ON MARCH 1 AND  
AVERAGE DATE OF MAXIMUM WATER CONTENT



#### AVERAGE WATER CONTENT OF SNOWPACK IN MAINE

Efficient management of the water resources of Maine requires a knowledge of the amount of water temporarily stored in the snow cover, which will augment the runoff from the March through May precipitation. The amount of water contained in the snow cover (water content or water equivalent of the snow) has been measured for more than 50 years at selected sites (snow courses) by operators of hydro-electric power systems and by the U.S. Geological Survey in cooperation with the Maine Public Utilities Commission. In 1941 the Maine District of the U.S. Geological Survey started the annual compilation of all snow-course data independently collected within the State and these data were used in preparing the annual map of Maine showing lines of equal water content on March 1. Maximum water content of the snow cover rarely occurs in Maine before March 1, and accretions of water content after that date for any given year can be estimated from weather records showing amounts of precipitation and temperatures after March 1.

No statewide data on the average water content of snow previously have been made available. However, several companies that operate reservoir systems have compiled average water content data for their particular drainage basins. The map of Maine showing lines of equal average water content of snow for March 1 (fig. 1) can be used to determine the average March 1 water content of snow at any point within the State. This map was developed from the annual maps for the 25-year period 1941-65. The water content was determined at all 15-minute intersections of latitude and longitude on each annual map, the 25-year average for each point was computed and plotted, and the lines of equal average water content were drawn. Little data on water content above the 2,000-foot elevation in the mountainous areas were available for compiling the annual maps and, because water content may have been greater than that shown for such areas, data from figure 1 at points above the 2,000-foot elevation should be used with caution.

Figure 2 is a map of Maine with lines of equal average snow density on March 1 (solid blue lines) and lines of equal average date of maximum accumulation of water content (dashed black lines) and may be used in conjunction with figure 1. Snow density is the ratio of the water content of snow, in inches, to the depth of snow, in inches. For example, snow 30 inches in depth that has a water content of 6.00 inches has a density of 0.20 ( $6.00 \text{ inches} \div 30 \text{ inches} = 0.20$ ). To compute average snow depth on March 1 the water content for the desired point as shown on figure 1 is divided by the density for the same point as interpolated from the solid lines on figure 2. At Augusta, for example, 4.2 inches of water content (fig. 1) divided by a density of 0.26 (extrapolated datum, fig. 2) makes an average March 1 snow depth of 16 inches. The date of average maximum accumulation of water content at any point may be interpolated from the dotted lines on figure 2; at Augusta it is March 11. Insufficient data are available to make an accurate computation of the average maximum accumulation of water content for all points in the State. However, an average maximum water content with accuracy satisfactory for many uses may be obtained as follows: At sites that have a date of maximum accumulation on or before March 15 (from fig. 2) add three-tenths of the average March precipitation at the site as obtained or interpolated from records of the U.S. Weather Bureau to the March 1 water content for the site (fig. 1). For those points at which the maximum water content occurs after March 15 add four-tenths of the average March precipitation to the March 1 water content; at Augusta the average maximum water content is  $3/10$  of 3.75 inches + 4.2 inches or 5.3 inches.

The curves in figure 3 show the average density with respect to time for two snow courses at Telos and Middle Dam. If snow depth is known or can be measured, the water content in inches may be estimated by multiplying the depth in inches by the density for the date as taken from one of the curves. The curve for Telos Dam must be used for points north of latitude  $45^{\circ}30'$  and the curve for Middle Dam must be used for points to the south.

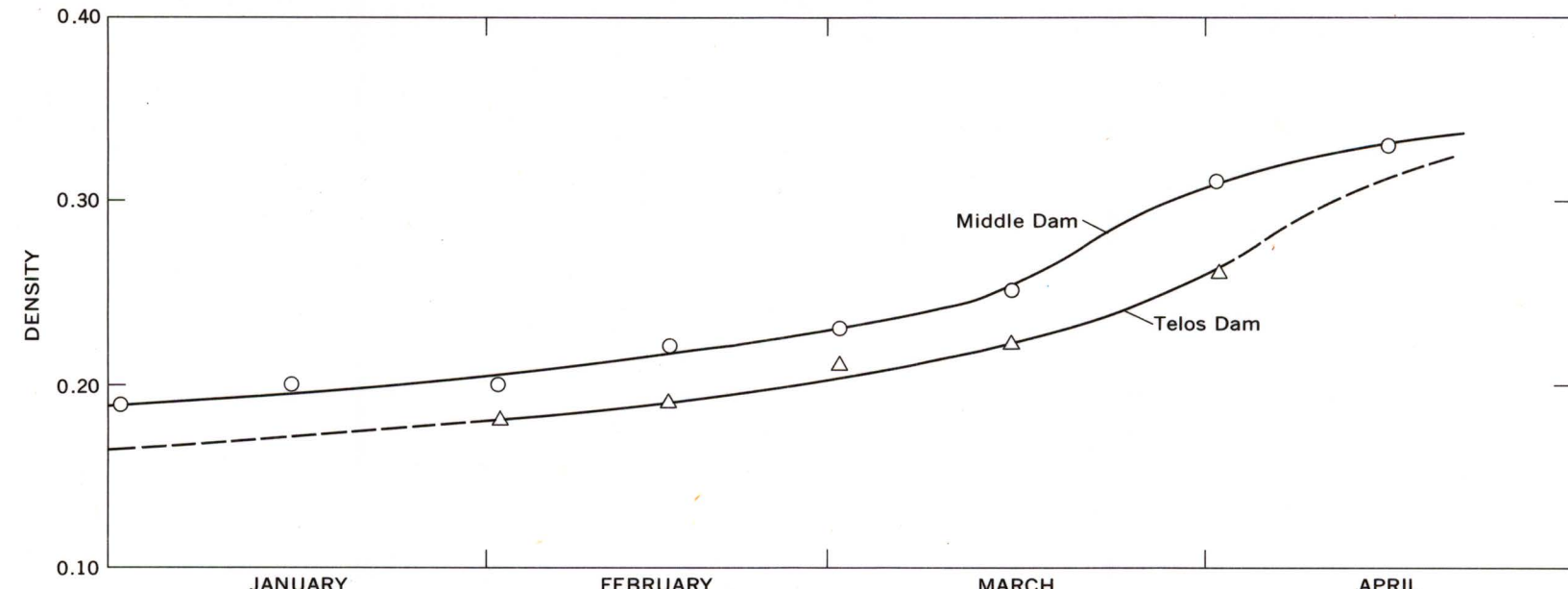


FIGURE 3—AVERAGE DENSITY OF SNOW AT MIDDLE DAM AND TELOS DAM

The curves in figure 4 show the average water content of snow during the winter months at the Middle Dam and Telos Dam snow courses. The dashed line is the cumulative average monthly precipitation for December through March at the Middle Dam course. The difference between the accumulated precipitation and the water content of the snow cover for any date is the measure of water lost to runoff, ground-water recharge, soil moisture, and evaporation. The water-content curves can be used as indicators of the average water content of snow at any date for any site in the northern two-thirds of the State. The amount as shown by the curves must be decreased for points in the southern third of the State with the greatest decrease for sites along the immediate coast where warmer temperatures cause greater losses of water from the snow cover.

#### Acknowledgments:

Some of the snow-course data for Maine used in preparing this report were collected by the Geological Survey in cooperation with the Maine Public Utilities Commission but much of the data were collected and made available by the following private organizations: Bangor Hydro-Electric Company, Great Northern Paper Company, Kennebec Water Power Company, Maine Public Service Company, and Union Water Power Company. Detailed data for nearly all snow-course measurements made during the 1941-65 period have been published by the U.S. Weather Bureau in the annual issues of "Snow Cover Surveys by the Eastern Snow Conference."

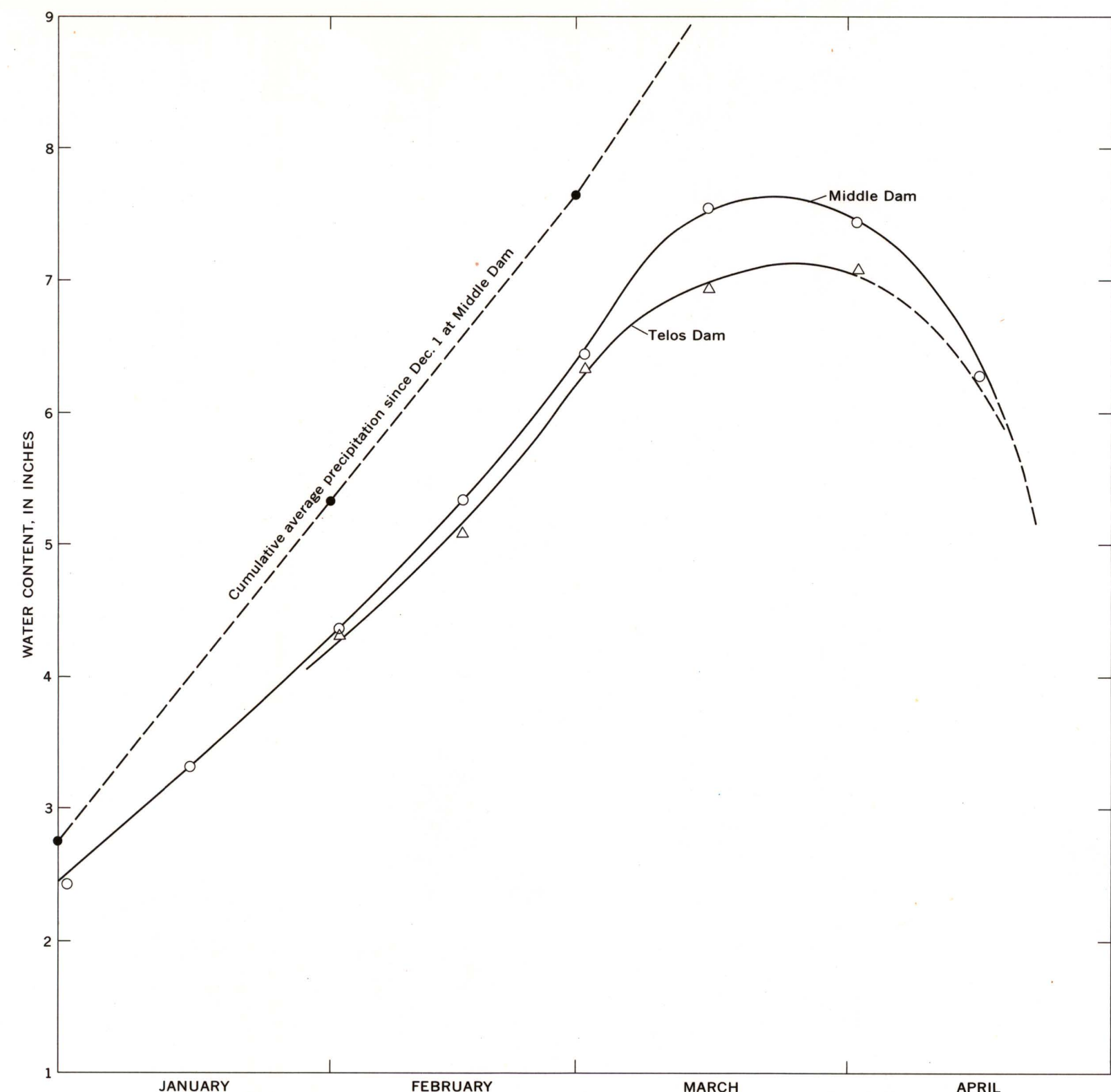


FIGURE 4—AVERAGE WATER CONTENT OF SNOW  
AT MIDDLE DAM AND TELOS DAM

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