Pacific Northwest Forest and Range Experiment Station

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CHARTS FOR DETERMINING SAMPLING RATE AND NUMBER IN SAMPLE

by

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ABSTRACT

Four charts are presented that show sampling rate and number in sample for different desired levels of accuracy when number in population and coefficient of variation can be estimated.

Sampling is replacing both complete enumeration and complete measurement in many phases of forestry work. Calculation of sampling rate or number in sample for a given level of sampling accuracy when number in entire population and coefficient of variation are known or can be estimated is a frequently recurring arithmetic exercise. This requires a preliminary estimate of number in sample to find an appropriate value of Student's "t" to use in the calculation. If this estimate is too far from calculated value when sample is small, the calculation should be repeated. However, the calculation can be avoided by use of charts like those presented in this note.

The following charts were prepared as an aid in sample scaling but are applicable to many other sampling problems. Each chart is for a different level of desired accuracy (E) from 1 to 4 percent. Accuracy is percentage difference between the sample estimated mean or

total and the population value. If sampling rate is based on figure 2, it can be stated that this difference or desired accuracy (E) will not exceed 2 percent. Statements like this have a 95-percent probability of being correct.

To use these charts for sample scaling, first select a level of desired accuracy (E) and estimate the total number of truckloads (N) in the sale and the coefficient of variation (CV) among truckload scales. For example: assume 2-percent desired accuracy, 2,000 truckloads, and 15-percent coefficient of variation. Use figure 2, find 2,000 on bottom scale and 15 percent on right margin. Follow 15-percent curve to left until it intersects vertical line 2,000. From this intersection, go horizontally to left margin and read n = 195 as required sample size, or read next higher diagonal line above the intersection to get a sampling rate of 1 in 10 loads.

Note: These charts solve the equation

$$n = \frac{1}{\frac{1}{N} + \frac{E^2}{C^2 t^2}}$$

where

n = number in sample

N = number in population

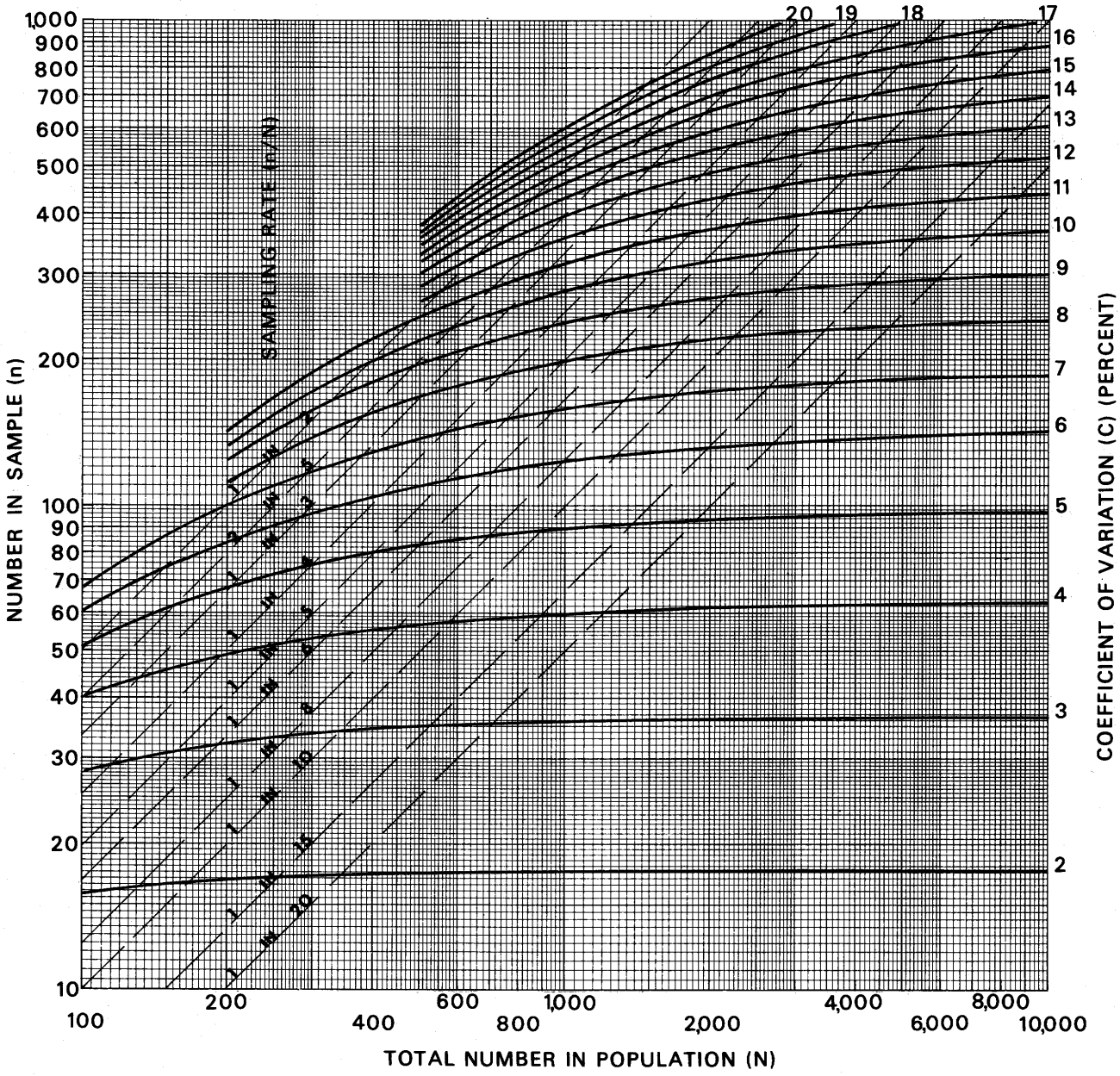
E = desired accuracy in percent

C = coefficient of variation of sample units in percent

t = tabular value of Student's "t" with (n-1) degrees of freedom

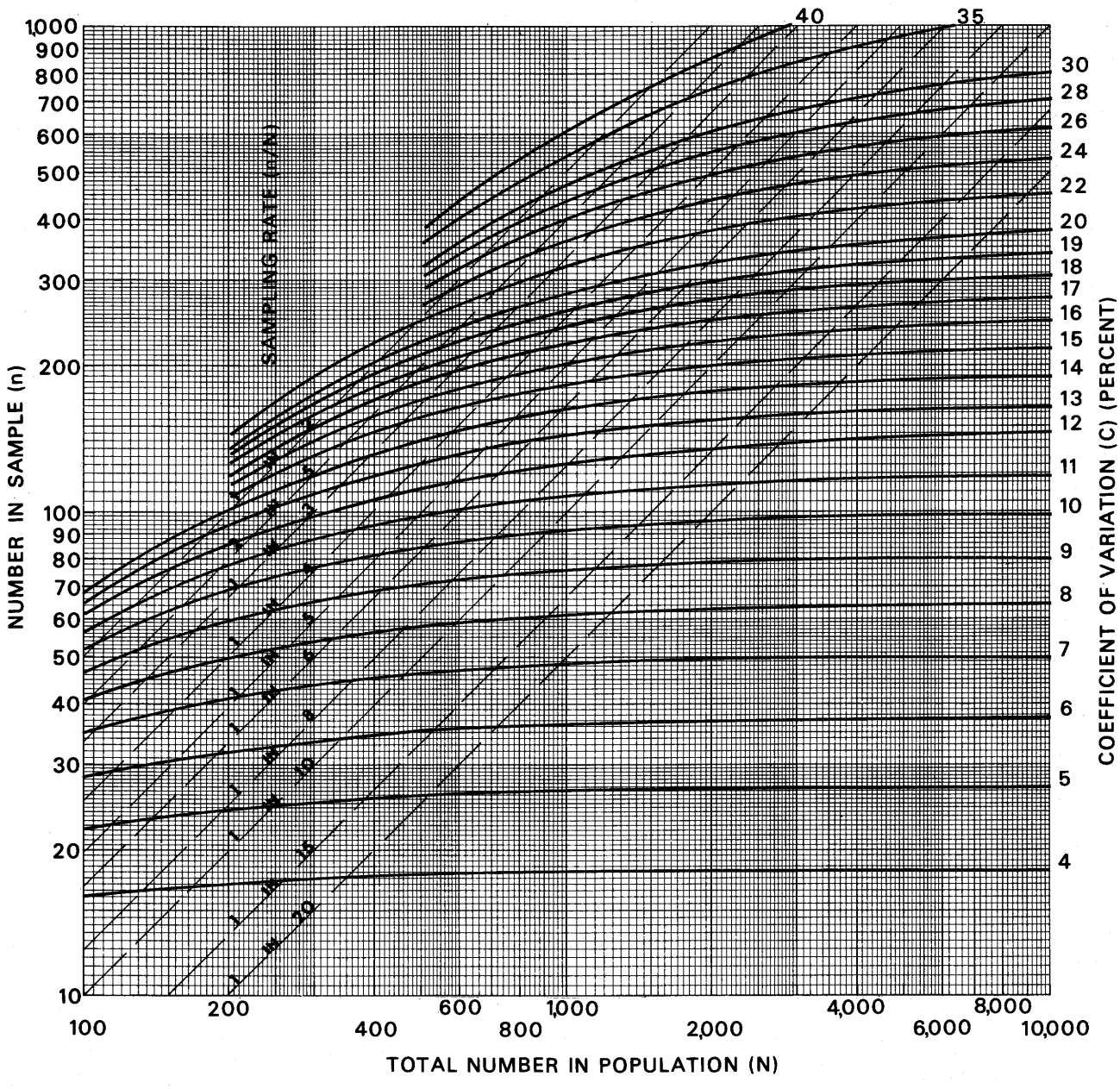
RATE OF SAMPLING

BASED ON DESIRED ACCURACY (E) OF 1-PERCENT AND 95-PERCENT PROBABILITY



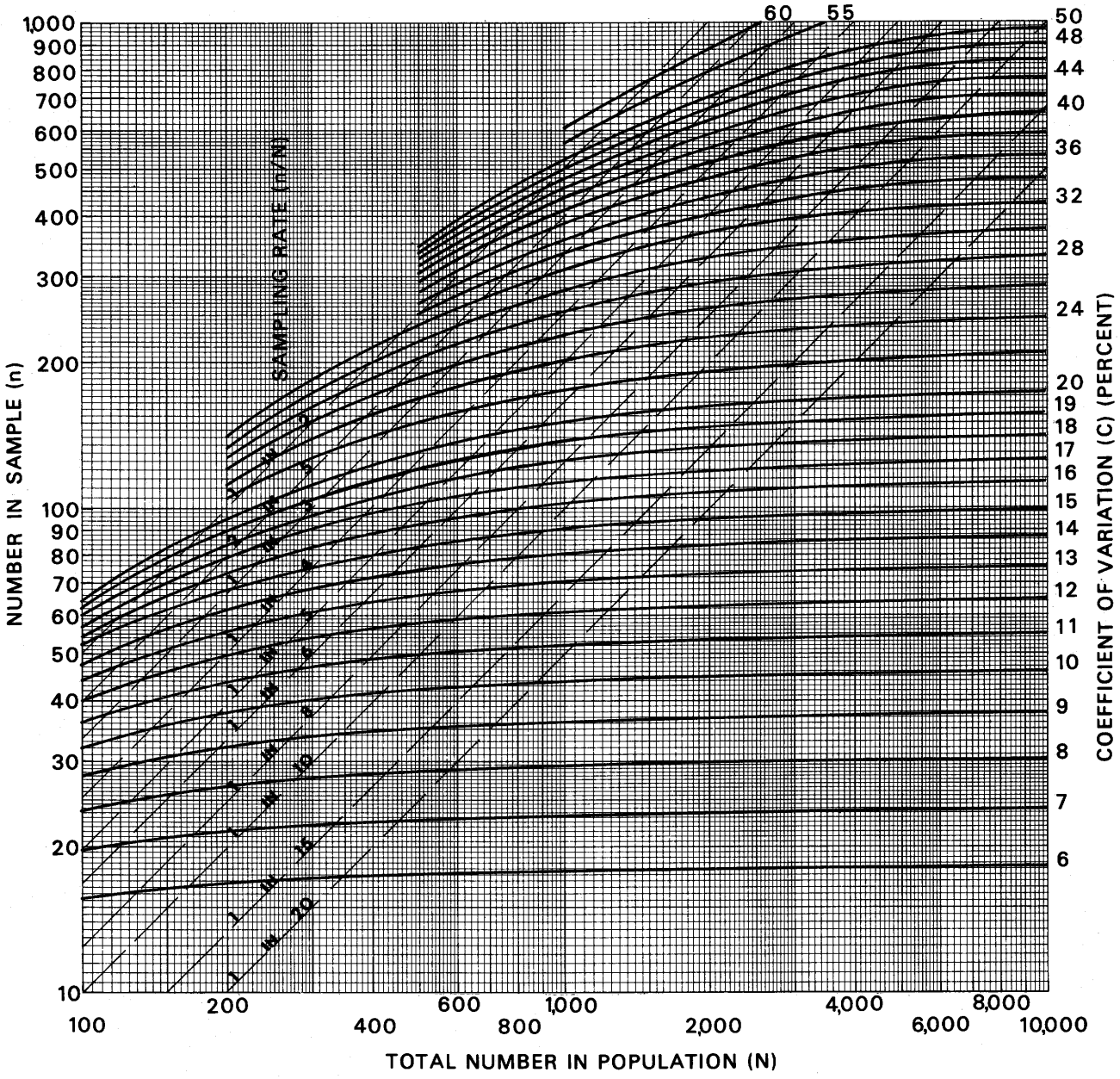
RATE OF SAMPLING

BASED ON DESIRED ACCURACY (E) OF 2-PERCENT AND 95-PERCENT PROBABILITY



RATE OF SAMPLING

BASED ON DESIRED ACCURACY (E) OF 3-PERCENT AND 95-PERCENT PROBABILITY



RATE OF SAMPLING

BASED ON DESIRED ACCURACY (E) OF4-PERCENT AND 95-PERCENT PROBABILITY