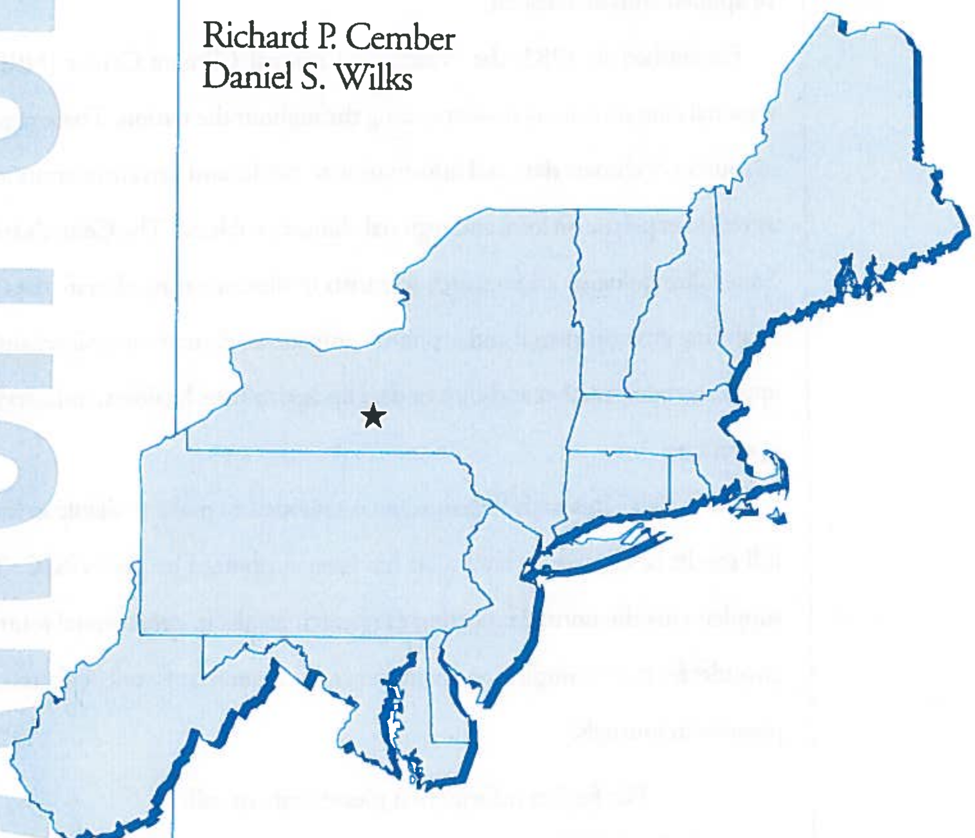
RESEARCH SERIES

NORTHEAST REGIONAL CLIMATE CENTER

Climatological Atlas of Snowfall and Snow Depth for the Northeastern United States and Southeastern Canada

Richard P. Cember
Daniel S. Wilks



Cornell University
Ithaca, New York
Publication No. RR 93-1
May 1993

The mission of the Northeast Regional Climate Center (NRCC) is to facilitate and enhance the collection, dissemination and use of climate data as well as to monitor and assess climatic conditions and impacts in the twelve-state, northeastern region of the United States. Implementing this mission involves three programmatic objectives: 1) the development and management of regional climate data bases, 2) the dissemination of information and educational services regarding climate and its impacts, and 3) the performance and support of applied climate research.

Established in 1983, the Northeast Regional Climate Center (NRCC) is one of six regional climate centers now operating throughout the nation. These regional centers serve as sources of climate data and information to public and private institutions and individuals as well as expertise on local and regional climate problems. The Center's staff cooperate with State Climatologists and research scientists in disseminating climate data and information, analyzing environmental and economic impacts of climate variability, and developing new applications of weather and climate data for agriculture, business, industry, and government operations.

The NRCC Research Report series is intended to make available to interested users the full results of climate research that has been supported by the NRCC. This report series supplements the normal reporting of research results in professional journals and provides an outlet for more complete and comprehensive accounts of work performed than is generally possible in journals.

For further information please write or call:

Northeast Regional Climate Center
1123 Bradfield Hall
Cornell University
Ithaca, New York 14853-1901
(607) 255-1751

The Northeast Regional Climate Center is supported by a Grant from the National Oceanic and Atmospheric Administration.

Climatological Atlas of Snowfall and Snow Depth for the Northeastern United States and Southeastern Canada

Richard P. Cember
Daniel S. Wilks
Department of Soil, Crop and
Atmospheric Sciences
Cornell University

Northeast Regional Climate Center
Research Series
Publication No. RR 93-1
May 1993

CONTENTS

Text

Maps

INTRODUCTION

Snowfall and snow cover are among the most important climatic elements of the cold season in the northeastern region of the United States. The presence and amount of snow affects a wide variety of enterprises. The Northeast Regional Climate Center (NRCC) receives large numbers of requests for information concerning snowfall and snow depth. Those requesting information represent a diverse group of professions: consulting engineers, law enforcement officials, transportation interests, attorneys, meteorological researchers, insurance companies, and others. In responding to these requests, it became apparent that a detailed and comprehensive presentation of the climatology of snowfall and snow depth for the Northeast would be helpful to a wide spectrum of users in government, industry and research.

Individuals wanting to manipulate electronically the data underlying the maps in this atlas can obtain raw data values and unsmoothed gridded values through the Internet computer network system. Contact the Northeast Regional Climate Center at (607) 255-1751 for further information.

HOW TO USE THIS ATLAS

Map displays

The snowfall and snow depth climatology of the Northeast for the recent past is depicted in maps of four kinds:

(1) Selected percentiles of monthly and seasonal total snowfall;
(2) Selected percentiles of seasonal maximum snow depth;
(3) For specified calendar periods, percentages of daily observations in which snowfall totals for the previous 24 hours equalled or exceeded selected threshold values (1 inch, 2 inches, 4 inches, 6 inches);
(4) For specified calendar periods, percentages of daily observations in which depth of snow on the ground equalled or exceeded selected threshold values (2 inches, 4 inches, 6 inches, 12 inches).

Maps of type (1) can be used to estimate probabilities for given monthly or winter total snowfalls. Maps of type (2) can be used in the same way, with respect to the single day during a given winter with the deepest snow cover. Maps of type (3) and (4) can be used to estimate probabilities for particular depths of snowfall and snow cover, respectively, on individual days throughout the winter.

All maps cover the same rectangular portion of North America (see map A). The core of this area is the twelve states designated as the Northeastern states for purposes of the Regional Climate Centers program of the National Oceanic and Atmospheric Administration. These states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia. Snowfall maps are drawn for the entire land area within the rectangle. Because snow depth data are sparse in Canada, contours for snow depth are drawn in the U.S. portions of the map only.

Interpretation and use of percentile values

Percentile values have been used to characterize the climatological distributions of the snow quantities in this atlas. Percentiles divide a set of data into hundredths according to their magnitudes. For example, the 10th percentile is the amount expected to be exceeded on average 90% of the time, or the amount that is greater than 10% of the data available. For Ithaca, New York, the 25th percentile of total January snowfall for the years 1955 to 1992 is 10.2 inches. That is to say, in 25% of the Januaries less than 10.2 inches of snow fell at Ithaca, while in 75% of the Januaries 10.2 inches or more fell. Percentiles are useful because they summarize the frequencies with which different events occur in the long run. That is, they serve as estimates for the probabilities of different snow events.

The percentile representation has a number of desirable features which more than make up for its relative unfamiliarity, and make it deserving of greater use in regard to precipitation data. Particularly for asymmetrically distributed data such as snow amounts, the American Association of State Climatologists have recommended the use of percentile values in order to compactly represent climatic variability (Kunkel and Court, 1990).

The first reason for using percentiles is that daily precipitation data contain occasional large values. These large values usually represent rare but real events, but occasionally they are due to errors in the data. Even if data are carefully screened for quality, large values that are plausible but erroneous can slip through. These can greatly alter a mean but have little effect on the median (the median is another name for the 50th percentile). Percentile summaries of the data are resistant to errors due to erroneous extreme values.

A second reason why percentiles are a desirable form of summary statistic for snowfall and snow depth is that they contain frequency information. For example, knowing that the mean January total snowfall at Ithaca is 17.6 inches tells nothing about how often one might expect to receive that much snow in January at Ithaca. However, knowing that the median is 12.6 inches says that an upcoming January in Ithaca has about an even chance of exceeding 12.6 inches of snowfall for the month. This type of information is useful for planning, especially if values are given for a range of percentiles, not just for the median.

Many users of climatological data will be accustomed to using the mean (arithmetic average) as a summary statistic to characterize a set of data. It is thus important to contrast this approach with the use of percentiles, and to motivate the choice of the latter as summary statistics. It is important also to distinguish the mean from the median. The mean and median, though often confused, are not generally interchangeable.

The mean is the sum of all the observations, divided by the number of observations. The median is the value that separates the largest 50% of the observations from the smallest 50%. If the observations obey the familiar "bell-shaped curve" (the Gaussian, or normal distribution), then the mean and the median will be approximately equal. However, precipitation data do not generally adhere to the bell-curve. With precipitation, it is typical to have many small events and a few large ones. Thus, an "average" (mean) rainfall or snowfall is usually larger than a "typical" (median) rainfall or snowfall, because the average is influenced much more strongly by the few large events. As a consequence, thinking of the mean as "normal" can be misleading (Church et al. 1941, Kunkel and Court 1990). For example, at Ithaca, for the years 1955 through 1992, the 50th percentile of January total snowfall is 12.6 inches, while the mean January total snowfall is 17.6 inches. It is therefore substantially more likely to receive less than the mean value of 17.6 inches of snow at Ithaca in January than it is to receive more than this amount.

Percentiles of monthly and seasonal total snowfall (maps 1-52)

Seven percentiles of monthly and annual total snowfall are depicted on separate maps. These are the 5th, 10th, 25th, 50th (median), 75th, 90th and 95th percentiles, for each of the seven months of October through April. Seasonal total snowfall refers to the "snow season" of October through April. Solid contours are drawn at equal intervals of snowfall, e.g., every inch, every two inches, or every four inches.

On many of the maps one or two dashed contours are also plotted. The minimum quantity of monthly total snowfall that can be recorded by the methods in use in the U.S. observation network is 0.1 inch. The dashed contour labeled "0.1" shows the boundary of areas of negligible snowfall at the given percentile.

Many of the maps also show a dashed contour labeled "1". When no solid contour with the value of 1 inch appears in a map (i.e. when the contour interval is 2 inches or greater), the 1-inch contour is dashed in. This helps delineate regions of small but non-negligible snowfall at the given percentile.

Percentiles of seasonal maximum snow depth (maps 53-59)

The seasonal maximum snow depth at a given location for a given snow season is defined as the largest snow depth (existing snow cover plus new snow) recorded during that season. Separate maps of percentiles of the seasonal maximum snow depth are similar to the monthly and seasonal total snowfall maps: again the 5th, 10th, 25th, 50th (median), 75th, 90th, and 95th percentiles are represented.

The minimum quantitative (i.e., neither zero nor trace) snow depth that is recorded by the U.S. observation network is 1 inch. Thus, on maps where no solid contour is associated with the value of 1 inch (i.e. maps for which the contour interval is 2 inches or more), a dashed line is used to represent the 1-inch contour. This delineates the boundary of the region with little or no snow on the ground at the given percentile.

Daily snowfall totals equalling or exceeding selected threshold values (maps 60-117)

These maps answer the question "How frequently during calendar period X (for example, the second half of November), did a snowfall of N inches or more occur in the 24-hour period prior to the daily observation?". Here, N is one, two, four or six inches. The "specified calendar period" varies according to how quickly the snow climatology statistics are changing at different times of the year. Since time stratification changes from map to map, expressing the event frequencies as percent of days, rather than as average numbers of days, allows better comparability across different maps.

All of January has been lumped together, as the likelihoods of the specified snowfall events do not change much during January. However, lumping all of April together would produce a set of maps that would be misleading for most of the month, understating the frequency of significant snowfalls in the early part of the month and overstating them at the end of the month. December and February are represented in halves, i.e., by two maps each. November is represented in three maps: one map for each of the first two quarters of November, and one map for the second half. (A quarter of a month is seven or eight days, as convenient.) March also is represented as three maps: one map for the first half, and one map each for the third and fourth quarters. October and April are represented in 4 quarter-monthly maps each.

Readers will notice that some maps for early and late in the snow season are omitted. An example is a map for the percentage of daily observations in the last quarter of October having a snowfall of 4 inches or more; note that there is no such map after the 2-inch snowfall map for late October. Maps are omitted when an event is so rare over the region for the given calendar period that there is little or nothing to map.

Maps of the frequencies of specified snowfall events have solid contours at equal intervals. Where the contour interval is 2% or larger, there is a dashed contour for the 1% probability value. Some maps also have a dashed contour with a value of a fraction of 1% (0.5%, 0.2%, or 0.1%). This contour defines the approximate boundaries of regions where the specified event did not occur during the period of record.

Note that these values may seem deceptively small. Even though a large snow event has a small probability of occurring on any one day, the probability of an event of specified magnitude some time during the month will be much higher. Unfortunately, estimating the probability of a snowfall event during some period cannot be done by simply multiplying the mapped values by the number of days in the period. For many users, these maps will be most useful if the contoured probabilities are used in a relative sense, to compare different locations at a given time of year, or to investigate seasonal changes at one location.

Daily snow depths on the ground equalling or exceeding selected threshold values (maps 118-193)

These maps are conceptually very similar to the maps of frequency of specified 24-hour snowfall events in the preceding section. Here the mapped events are the relative frequencies of daily snow depths of at least two inches, four inches, six inches or twelve inches. Again, the winter is divided into periods of unequal length representing approximately constant snow depth climatologies in the region. There are four quarter-monthly maps for each of the months October, November, December, and April. January and February are represented by two half-monthly maps each. March is represented by one set of maps for the first half, and two quarter-monthly maps for the second half.

METHODOLOGY

Sources of data

The atlas is based on observations from four different observing networks: the United States National Weather Service cooperative observer network, the United States National Weather Service meteorologists stationed at airports and other locations throughout the Northeast, the cooperative observer network of the Atmospheric Environment Service of Canada, and the meteorologists of the Atmospheric Environment Service of Canada and other Canadian government agencies stationed at various locations in Canada. All the data used are available in the archives of the Northeast Regional Climate Center (Ithaca, New York), the United States National Climatic Data Center (Asheville, North Carolina), and the Canadian Climate Centre (Downsview, Ontario).

The U.S. and Canadian cooperative networks are comprised of volunteer observers who make and report daily observations of meteorological and hydrological quantities. The instruments and measurement protocols of the two networks are generally similar. The major differences between the Canadian and U.S. systems are: (1) Canadian observers may take their measurements once or twice daily, and may make certain measurements once daily and others twice daily, while U.S. cooperative observers make measurements once daily; and (2) Canadian observers report their observations in metric units (degrees Celsius and centimeters), while U.S. data is reported in degrees Fahrenheit and inches. Neither difference causes any difficulty here. Canadian data received from the Canadian Climate Centre is already reduced to equivalent once-daily observations, while metric units are easily converted to English units.

Some users, especially Canadian users and U.S. users from the research community, may object that the maps should have been produced in metric rather than in English units. English units were chosen because we expect that the majority of the intended audience for this atlas will find the information most useful in this form.

Length and completeness of records

A study of United States cooperative observer handbooks issued since the organization of the U.S. Weather Bureau in 1890 shows that present methods of snowfall and snow depth observation were standardized in the United states in the mid-1890's. For most U.S. stations, daily observations before 1948 are still on paper records only, awaiting keyed entry into the national digital data set, and are thus not accessible to an automated procedure. Most National Weather Service stations have been in their present locations since the 1950's, when they moved from downtown offices to airports. However, these are a small minority of stations.

The observers who operate the cooperative stations are primarily volunteers. When observers retire, new observers are not always found immediately, nor do the new observers necessarily live close enough to the previous observer's location to be considered as the same station. Observers can become ill, and can miss a week or a month or a year of observations. The net result of these and other unhappy realities is that the further back into the past that a complete record of observations is sought, the fewer stations there are that meet this criterion.

For possible periods of record beginning after 1948, it is necessary to balance the desire for high geographic station density against those for a complete record and a uniform period of record. After a review of the relationship between station density and length of record, a subjective judgment was made concerning requirements for uniformity of period of record, length of record and degree of completeness of record. The period of record was chosen as October 1955 to April 1992 in the twelve Northeastern states, and October 1955 to April 1991 for the included portions of Canada, Ohio, Kentucky, Virginia and Michigan. The minimum criterion for use of a station's data in the atlas is that a station must have 19 or more winters in the period of record that are 95% complete or better, where "complete" means non-missing snowfall and snow depth data (in Canada, snowfall only) that have passed quality control screening.

Quality control of data

All data used in this atlas have been subjected to an automated quality-control procedure devised by Prof. David Robinson of Rutgers University (Robinson, 1993). Each day's observation of snowfall and snow depth must be reasonable in the sense that the values for snowfall and snow depth are consistent with the 24-hour minimum temperature, maximum temperature and precipitation; according to a specified set of criteria. Technical details of the quality-control criteria are given in the last section of this document.

Techniques of snow measurement

The technique for snowfall measurement is simple and straightforward, but good results depend on the care with which the observer carries out the standardized methods of observation and reporting. For the data sets from which this atlas is derived, snowfall is measured by inserting a measuring stick into the newly fallen snow until it reaches a solid surface known to lie beneath the newly fallen snow. If drifting has occurred, observers are instructed to make measurements at several representative points and average the measurements. The measurement of snowfall is made to the nearest tenth of an inch in the United States and to the nearest two millimeters in Canada. Snowfalls of less than a tenth of an inch (two millimeters, in Canada) are recorded non-quantitatively as a "trace". For this atlas, trace values were set to zero.

For details of official techniques for snowfall and snow depth measurement, see *Cooperative Station Observations* (National Weather Service, 1989) and *Manual of Climatological Observations* (Weather Services Directorate, 1992). For a more complete discussion of techniques and problems of snow measurement, see Goodison et al. (1981).

Spatial resolution of the maps

Over most of the Northeast the typical inter-station distance is about twenty miles. Some areas, such as northern New Jersey, have better data coverage; while other areas, such as most of Maine, are very sparsely covered (see map A). The mapping resolution overall is roughly at county scale — small counties where the data is dense, large counties where it is sparse. In general, the station density in the local area of interest to the user (map A) is the best guide to the effective map resolution in that area.

Temporal trends in the data

Many of the users of this atlas will employ it as a planning tool. This amounts, in effect, to assuming that the future will be like the past. In most cases, the frequencies of occurrence of various monthly or annual total snowfalls, annual maximum snow depths, daily snowfall totals and daily snow depths in the recent past are probably the best available estimates of their probabilities of occurrence in the near future.

However, it is important for some users to realize that the 20th-century snow record available for the Northeast contains at least one important trend which could be interpreted as some kind of climate change. In regions influenced by the Great Lakes' "lake-effect" snowfalls, the period from the 1920's to the present has exhibited a fairly well-established long-term increase (superimposed on the large year-to-year variations) in total annual snowfall. In some places where snowfall is heavily influenced by the Great Lakes there has been roughly a doubling of ten-year average annual total snowfalls between the 1920's and 1980's. The physical basis of this trend is poorly understood, but interested users may refer to Namias (1960), Eichenlaub (1970), and Leathers et al. (1993) for further discussion of the trend and some possible causes. It is unknown whether the trend of increasing Great Lakes snowfall will continue into the future. No major sustained trends elsewhere in the region have come to the attention of climatological observers, but such trends cannot be identified with confidence until they have been underway for several decades.

A note concerning certain stations in Canada

In the northeast corner of the map rectangle there is a region where the St. Lawrence River intersects the northern map boundary, in which the contour density and the presence of the map boundary does not generally permit unambiguous labeling of contours. An example where the information for this region is ambiguous is map 19. Map A, the map of stations used for the atlas, shows that the St. Lawrence River near the map boundary is straddled by two stations, the names of which are La Malbaie (on the west side) and Barrage Lac Morin (on the east side). These stations differ considerably in their snowfall statistics, with Barrage Lac Morin being by far the snowier site. Thus, where unlabeled contours similar to those of map 19 appear, the interpretation is that the local extremum on the west side (La Malbaie) is a local minimum, while the local extremum on the east side (Barrage Lac Morin) is a local maximum. However, it should be borne in mind that station coverage is poor in this region, and that the high ground on neither side of the river has been adequately sampled.

ADDITIONAL TECHNICAL CONSIDERATIONS

Quality control of data

The quality control criteria used in regard to U.S. cooperative observer stations and all Canadian stations were checks on each day's data for internal consistency, and consistency with the data of the previous day. No attempt was made to compare stations to their neighbors. The internal consistency criteria used were screening criteria developed by Prof. David Robinson of Rutgers University (Robinson, 1993).

Data for any day where either snowfall or snow depth data did not pass the internal consistency checks were eliminated from further consideration. When 24-hour temperature extremes or precipitation data failed the internal consistency checks, but snowfall and snow depth data passed them, the snow data were used. When one or more checks could not be performed on a snowfall or snow depth observation because accompanying non-snow data were missing, the snow observation was accepted. No attempt was made to estimate correct values in the cases of eliminated data.

Snowfall data for a particular date are considered to be internally inconsistent when any of the following conditions occurs (the units here are inches and degrees Fahrenheit):

(a) Non-zero snowfall but minimum temperature of 40° or greater.
(b) Snowfall greater than a prescribed state or province ceiling value.
(c) Snowfall greater than 0.4 but precipitation zero.
(d) Snowfall greater than 1.0 and less than 3.0, and snowfall greater than 50 times precipitation depth.
(e) Snowfall greater than or equal to 3.0 and less than or equal to 6.0, and snowfall greater than 40 times precipitation depth, and maximum temperature of 25° or higher.
(f) Snowfall greater than 6.0, with snowfall greater than 20 times precipitation depth, and maximum temperature of 25° or higher.
(g) Snowfall greater than 6.0, with snowfall greater than 30 times the precipitation depth, and maximum temperature of 24° or lower.

The highest prescribed state snowfall value in the quality control system was that for New York, at 45.0 inches, with lower values for the other states in the region. The system did not explicitly include Canadian provinces. For all Canadian stations the prescribed ceiling value for snowfall was set to the highest value among the fifty U.S. states, 75.8 inches (California).

Snow depth data for a particular date (referred to below as "today") were considered internally inconsistent when any of the following occurred:

(a) Today's snow depth exceeds a prescribed ceiling value.
(b) Today's snow depth exceeds yesterday's snow depth, but today's snowfall is zero.
(c) Yesterday's snow depth is greater than or equal to today's snow depth, today's snowfall is greater than 2.0, and today's maximum temperature is 29° or less.
(d) Yesterday's snow depth exceeds today's snow depth by 4 or more, and today's maximum temperature is 39° or less.
(e) Yesterday's snow depth exceeds today's snow depth by 7 or more, and today's maximum temperature is 44° or less.
(f) Yesterday's snow depth exceeds today's snow depth by 10 or more, and today's maximum temperature is 45° or greater.
(g) Yesterday's snow depth exceeds today's snow depth by 7 or more, but today's maximum temperature is missing.

The quality control system, though requiring prescribed snow depth ceiling values, did not specify them. The snow depth ceiling value for all states and provinces represented in the map was set to 99 inches, a few inches more than historical maximum for the twelve states of the Northeast (94 inches, recorded at Barnes Corners, New York, on February 4, 1977). This value was selected so as to catch keypunch errors in snow depth in the digital data set giving apparent values of 100 or more.

A slightly modified quality control system was used in regard to snow depth for data from U.S. National Weather Service or Federal Aviation Administration stations. This was necessary, at least in principle, because the snow depth measurement reported for a given day is taken at 0700 local time, while the 24-hour snowfall, precipitation, temperature maximum and temperature minimum values reported for the same day are for the 24-hour period ending at 2400 local time. In practice, it was found that very few of the NWS and FAA data failed the tests. We thus forego a detailed description of the modified snow depth quality control scheme used to screen them.

Effect of measurement times on observations

Cooperative observers have considerable freedom in choosing their observation times. Cooperative observer data are reported for the date of observation, not the date of presumed occurrence. Thus, except for stations reading at midnight, precipitation and snowfall data recorded for the preceding 24 hours at most stations frequently include some contribution from the previous day. Overlap of the measurement period with the previous day is not an important issue for snow depth, as snow depth is an instantaneous rather than a cumulative measurement, but the measured value may be affected by time of observation in that afternoon and evening observations of snow depth will reflect the extra, typically warmer, hours which occur after morning stations have made their measurements.

From the standpoint of this atlas, the effects of differing measurement times on 24-hour temperature extremes and precipitation are not of concern, as these are used in the atlas only for quality control of daily data, and the internal consistency of the cooperative observer data are not affected by the hour of measurement. Note, however, that the fixed observation schedule of a particular observer is arbitrary with respect to the timing of snowfall events. Thus, some long snowfall events are actually reported as having occurred on two or more days. Therefore, the daily snowfall statistics reported here will be lower on average than would have been obtained if snowfall were reported on an "event" basis.

Monthly snowfall totals are slightly affected by observation time. For stations reading in the morning, a portion of the recorded snowfall for the first and last dates of the period of interest would have in fact occurred before or after the period. For example, January monthly total snowfall for a morning station will actually include a contribution from December 31, and will not include a small amount from January 31 which is observed on February 1. The effects of this problem have been neglected as insignificant compared to other potential sources of error.

Calculation and interpolation of percentiles

The Pth percentile value V(P,X) of an ordered vector X of N observations

$$X = (x_1, x_2, \ldots, x_N) \;;\; x_N \geq x_{N-1} \geq \ldots \geq x_2 \geq x_1$$

was defined as follows:

- When there exists an element x_j such that $P = 100 * (j / (N+1))$, then $V(P,X) = x_j$.

- When there is no jth element such that $j/(N+1)$ is exactly equal to $P/100$, but there are jth and (j-1)th elements such that

  $$j/(N+1) > P/100 > (j-1)/(N+1),$$

  linear interpolation is performed to estimate the Pth percentile V(P,X) as

  $$V(P,X) = x_{j-1} + s\,\Delta,$$

  where

  $$\Delta = (P/100) - (j-1)/(N+1) \quad \text{and} \quad s = (x_j - x_{j-1})(N+1) \;.$$

Calculation and interpretation of percent of daily observations of snowfall and snow depth equalling or exceeding threshold values

For an ordered vector of N observations of snowfall or snow depth

$$X = (x_1, x_2, \ldots, x_N);\; x_N \geq x_{N-1} \geq \ldots \geq x_2 \geq x_1 \,,$$

the percent of observations equal to or greater than a threshold value T_k is defined as follows:

- When there is one or more $x_j \geq T_k$, this percentage is estimated as

  $$P_{ge}(T_k, X) = 100 * [N-(j-1)] / (N+1) \;,$$

  where the lowest value of j such that $x_j \geq T_k$ is used.

- When there is no $x_j \geq T_k$, the percentage of observations less than the threshold is estimated using

  $$P_{lt}(T_k, X) = 100/(N+1) \;.$$

Strictly speaking, $P_{lt}(T_k, X)$ is not correct (the equal sign should be a "<" sign), but this equality was selected to facilitate plotting of the dashed contour of the value of approximately 100/(N+1), below which the event did not occur in the period of record.

Map projection

The map is a projection onto a Cartesian plane with (x,y) = (longitude, latitude), tangent to the earth at the latitude of Ithaca, New York (ϕ_0 = 42.45°). Thus, the ratio of the statute length on the map of one degree of longitude to that of one degree of latitude is cos(42.45°) = 0.738. The map area is bounded by 66.6° W, 83.0° W, 36.9° N, and 47.7° N.

Method of interpolation and gridding

The choice of an interpolation method has been a perennial problem in mapping of precipitation. Three factors in particular cause this difficulty: (1) In any localized area of significant topographic relief, point precipitation is usually at least partly a function of altitude; (2) In many parts of the Northeast, the horizontal length scale of topographic variation is smaller than the typical distance between stations; and, (3) In areas of rough topography, the mean elevation of stations may be less than the mean elevation of the land surface, because people preferentially live and work in valleys rather than on hilltops.

Some recent research has suggested that for small areas, the techniques of geostatistics, both with and without explicit use of topography, offer improvements over simpler interpolation methods (Dingman et al. 1988; Hevesi et al. 1992a, b; Phillips et al. 1992; Tabios and Salas 1985). Unfortunately, as discussed by Phillips et al. (1992), the application of these promising techniques to areas as large as the domain of this atlas is not as straightforward as merely scaling up. Large areas lack the topographic and meteorological homogeneity that the kriging techniques in the current state of the art require, or that would be required by any interpolation method that depends on a single well-defined relationship between elevation and precipitation.

Despite their known deficiencies, methods older and simpler than geostatistical ones must be applied here, for lack of better alternatives. We have chosen a method in which stations near the interpolation point are weighted as a function of distance. The details of our method follow.

Station values for the calculated fields were cast into an 82 x 54 -cell rectilinear grid, with points spaced at 0.2° intervals. This grid is confined to the map area, but stations outside the map were also used for gridding; these influenced the gridpoints near the map edges. On the north, east and west boundaries of the map, stations located up to 1° from the map boundary were used. For, the southern boundary, stations located as far south as the southern boundaries of Virginia and Kentucky were used.

For a particular map, station values (percentiles or percentages) z_i for station locations (x_i, y_i) were used to calculate the gridpoint values $z_g(x_g, y_g)$ as

$$z_g(x_g,y_g) = \sum_i w(x_g,y_g,x_i,y_i)\, z_i(x_i,y_i) \;/\; \sum_i w(x_g,y_g,x_i,y_i)$$

where w is a weighting function designed by McLain (1974):

$$w(d_i^2) = \exp(-d_i^2/d_{scal}^2) \;/\; (f + d_i^2/d_{scal}^2) \; .$$

Here,

$$d_i^2 = (x_g-x_i)^2\cos^2\phi_0 + (y_g-y_i)^2 \;,\; \phi_0 = 42.45 \; .$$

Distances d_i and d_{scal} are expressed as great circle degrees and are calculated along rhumb lines. The parameter f is a small constant (here, $f=10^{-6}$) used to prevent division by zero. The scale distance d_{scal} = 1.2°.

The special virtue of the McLain weighting function is that for $d_i/d_{scal} < \sim 0.5$, its behavior is dominated by the inverse-square denominator, while for $d_i/d_{scal} > \sim 1$, its behavior is dominated by the exponential numerator. Thus it can be used to assign reasonable relative weights both at grid points with neighbor stations nearby and at gridpoints for which all neighbor stations are at some distance. (Note that the use of the McLain weighting function in this computation is different from the use of the same function as described by McLain [1974].)

The gridding algorithm finds the smallest circle around each gridpoint enclosing at least two stations, where the circle radius is an integer multiple of 0.2 great circle degrees. If the circle has a radius of 1.4 great circle degrees or less, the grid point is assigned a weighted average of the station values enclosed in the circle as described above. If the circle exceeds 1.4° in radius, the grid point is assigned a value that codes for missing data.

Smoothing, plotting and contouring

The gridded fields were smoothed using a moving average in a 3 x 3-box window, i.e. by an unweighted averaging of each grid point with its 8 nearest neighbors. No smoothing was performed on gridpoints adjacent to the edges of the map.

The gridded and smoothed data were contoured and plotted using the software package "NCAR Graphics", version 3.00 (Clare and Kennison, 1989).

An informative comparison of two mapped fields

To evaluate the success of the snow mapping technique used here, a scalar field which is very well-known at high resolution was used as a substitute for the statistics of snowfall and snow depth. This field is the land elevation itself.

Map B is an elevation map of the region made exclusively from the elevations of stations used in the snow maps (Table 1). These elevations were gridded, smoothed and contoured by the same methods used to map the snow data. Map C shows the topography of the region as plotted using a version of the United States Geological Survey's fine-scale (1 arc-sec x 1 arc-sec) digital topographic data for the region (National Operational Hydrologic Remote Sensing Center, 1991), smoothed and contoured using the same methods. The USGS-derived elevations are much denser than the map grid, so no interpolation was required. These two maps are of interest because they compare a smoothed contour field based on extremely high-resolution data with one interpolated from lower resolution, irregularly sampled data points. The latter sampling of the topographic field mimics the fashion in which the stationwise statistics for snow sample the unknown true field of the snow statistics.

After smoothing, the USGS data (Map C) give, as they should, quite good representations of the major topographic features of the region, and of the typical elevations and slopes, roughly at the county scale. The map constructed solely from the station elevations (Map B) shows some anomalies but is, on the whole, a good representation of the overall topography of the region when compared to Map C. The main flaw of Map B is that in areas of large topographic relief, Map B underestimates the altitudes relative to Map C. This underestimation effect is evidently due to the tendency of stations to be located in valleys, rather than on hilltops. In any case, the maximum underestimation at the appropriate horizontal scale generally does not exceed about 500 feet.

Note that both Map B and Map C contain elevation contours which intersect the Great Lakes shores. In the case of Map C, this is an artifact of smoothing; in the case of Map B, it is due to smoothing, to the coarse scale of station coverage, and to the fact there are no actual lake-surface elevations in the data set, since there are no stations located in the lakes.

These two maps suggest that the station distribution is adequate to draw the main features of the topographic field at roughly county-scale resolution (i.e. on the order of a few tens of miles) over most of the Northeast. By implication, it also suggests that the station distribution is adequate to draw the main features of the snow fields over most of the region. In areas of large topographic relief, especially where data coverage is uneven, there is probably a tendency for the maps to represent the snow fields occurring at elevations somewhat below that of the local mean elevation of the land surface in those areas, but this difference in elevation generally does not exceed 500 feet. For users in these mountainous regions whose need for data is largely confined to populated areas, this underestimation may in fact be desirable.

ACKNOWLEDGMENTS

We thank Prof. David Robinson of Rutgers University for assistance with quality control of the data; Keith Eggleston and Bill Noon of the Northeast Regional Climate Center (NRCC) for useful subroutines and assistance in data management; Warren Knapp, Director of NRCC, for creating an environment in which a large project of unpredictable proportions could be carried in patient peace and quiet to its conclusion; and the reviewers of an early draft of this atlas, whose suggestions have materially improved the presentation. We also thank the cooperative observers of the United States and Canada, without whom no atlas of this kind would be possible. This project was supported by the National Oceanic and Atmospheric Administration under grants NA16CP-0220-01 and NA16CP-0220-02.

REFERENCES

Church, P.E., E.L. Wells, and H.P. Boardman, Report of the committee on median versus arithmetical average. *Transactions of the American Geophysical Union,* 22, 102-103, 1941.

Clare, F., and D. Kennison, *NCAR Graphics Guide to New Utilities Version 3.00,* National Center for Atmospheric Research, Boulder, Colorado, 1989.

Dingman, S.L., D.M. Seely-Reynolds and R.C. Reynolds III, Application of kriging to estimating mean annual precipitation in a region of orographic influence, *Water Resources Bulletin,* 24, 329-339, 1988.

Eichenlaub, V. L., Lake effect snowfall to the lee of the Great Lakes: its role in Michigan, *Bulletin of the American Meteorological Society,* 51, 403-412, 1970.

Goodison, B. E., H. L. Ferguson and G. A. McKay, Measurement and data analysis, in Gray, D. M., and D. H. Male, eds., *Handbook of Snow: Principles, Processes, Management and Use,* Pergamon Press, Toronto, 1981.

Hevesi, J.A., J.D. Istok and A.L. Flint, Precipitation estimation in mountainous terrain using multivariate geostatistics. Part I: Structural Analysis, *Journal of Applied Meteorology,* 31, 661-676, 1992a.

Hevesi, J.A., A.L. Flint and J.D. Istok, Precipitation estimation in mountainous terrain using multivariate geostatistics. Part II: Isohyetal Maps, *Journal of Applied Meteorology*, 31, 677-688, 1992b.

Kunkel, K.E., and A. Court, Climatic means and normals—a statement of the American Association of State Climatologists. *Bulletin of the American Meteorological Society*, 71, 201-204, 1990.

Leathers, D. J., T.L. Mote, K.C. Kuivinen, S. McFeeters, and D. R. Kluck. Temporal characteristics of United States snowfall 1945-1946 through to 1984-1985, *International Journal of Climatology*, 13, 16-76, 1993.

McLain, D. H., Drawing contours from arbitrary data points, *Computer Journal*, 17, 318-324, 1974.

Namias, J., Snowfall over eastern United States: factors leading to its monthly and seasonal variations, *Weatherwise*, 13, 238-247, 1960.

National Operational Hydrologic Remote Sensing Center, *1991 Airborne and Satellite Snow Data* (compact optical disk for read-only memory), National Oceanic and Atmospheric Administration, Minneapolis, 1991.

National Weather Service, *Observing Handbook No. 2: Cooperative Station Observations*, National Oceanic and Atmospheric Administration, Silver Spring, Maryland, 1989.

Phillips, D. L., J. Dolph, and D. Marks, A comparison of geostatistical procedures for spatial analysis of precipitation in mountainous terrain, *Agricultural and Forest Meteorology*, 58, 119-141, 1992.

Robinson, D.A. Historical daily climatic data for the United States, *Preprints, Eighth Conference on Applied Climatology*, American Meteorological Society, 264-269, 1993.

Tabios, G. Q., and J. D. Salas, A comparative analysis of techniques for spatial interpolation of precipitation, *Water Resources Bulletin*, 21, 365-380, 1985.

Weather Services Directorate, *Manual of Climatological Observations*, Third Edition, Atmospheric Environment Service, Downsview, Ontario, 1992.

TABLE 1. LIST OF STATIONS USED

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
CONNECTICUT				
060806	BRIDGEPORT WSO AP	41.17	73.13	10
060918	BROOKLYN	41.78	71.95	240
061762	DANBURY	41.38	73.47	510
063207	GROTON	41.35	72.05	40
063451	HARTFORD BRAINARD FLD	41.73	72.65	20
063456	HARTFORD WSO AP	41.93	72.68	160
064488	MANSFIELD HOLLOW LAKE	41.75	72.18	250
064767	MIDDLETOWN 4 W	41.55	72.72	370
065077	MOUNT CARMEL	41.40	72.90	180
065445	NORFOLK 2 SW	41.97	73.22	1340
069067	WESTBROOK	41.30	72.43	40
069775	WOODBURY	41.55	73.23	650
DELAWARE				
071330	BRIDGEVILLE 1 NW	38.75	75.62	50
072730	DOVER	39.15	75.52	30
073570	GEORGETOWN 5 SW	38.63	75.45	50
075320	LEWES	38.77	75.13	20
075915	MILFORD 2 WSW	38.90	75.47	30
076410	NEWARK UNIV FARM	39.67	75.73	90
079595	WILMINGTON WSO AP	39.67	75.60	80
079605	WILMINGTON PORTER RESVR	39.77	75.53	270
KENTUCKY				
152791	FARMERS 2 S	38.12	83.55	680
156136	PAINTSVILLE 1 E	37.82	82.78	630
MAINE				
170275	AUGUSTA FAA AP	44.32	69.80	350
170355	BANGOR FAA AP	44.80	68.82	160
171175	CARIBOU WSO AP	46.87	68.02	620
171628	CORINNA	44.92	69.27	220
172426	EASTPORT	44.92	67.00	90
172765	FARMINGTON	44.68	70.15	420
172878	FORT KENT	47.25	68.58	520
173892	HOULTON FAA AP	46.12	67.78	500
173897	HOULTON	46.13	67.83	410
174183	JONESBORO	44.65	67.65	190
174878	MACHIAS	44.72	67.47	40
175675	NEWCASTLE	44.05	69.53	190
176905	PORTLAND WSMO AP	43.65	70.32	60
177250	ROCKLAND	44.10	69.12	40
177325	RUMFORD 1 SSE	44.53	70.53	630
178353	SPRINGFIELD	45.40	68.17	440
178398	SQUA PAN DAM	46.55	68.33	610
178974	VANCEBORO 2	45.57	67.43	390
179151	WATERVILLE PUMP STN	44.55	69.65	90
179314	WEST BUXTON 2 NNW	43.70	70.62	150
MARYLAND				
180465	BALTIMORE WSO AP	39.18	76.67	200
180700	BELTSVILLE	39.03	76.88	120
180705	BELTSVILLE PLANT STN 5	39.02	76.95	100
180732	BENSON POLICE BARRACKS	39.50	76.38	370
181032	BOYDS 2 NW	39.22	77.33	580
181385	CAMBRIDGE WTR TRMT PLT	38.57	76.07	10
181530	CATOCTIN MOUNTAIN PARK	39.65	77.48	1610
181627	CENTREVILLE	39.05	76.07	60
181750	CHESTERTOWN	39.22	76.07	40
181862	CLARKSVILLE 3 NNE	39.25	76.93	370
181995	COLLEGE PARK	38.98	76.95	90
182060	CONOWINGO DAM	39.65	76.17	40
182523	DENTON 2 E	38.88	75.80	50
182860	ELKTON	39.62	75.83	40
182906	EMMITSBURG 2 SE	39.68	77.30	420
183230	FORT GEORGE G MEADE	39.10	76.75	140
183348	FREDERICK POLICE BRKS	39.42	77.43	380
183675	GLENN DALE BELL STN	38.97	76.80	150
183975	HAGERSTOWN	39.65	77.73	660
184030	HANCOCK FRUIT LAB	39.70	78.18	430
185080	LA PLATA 1 W	38.53	77.00	140
185832	MC HENRY 2 NW	39.58	79.37	2680
185985	MILLINGTON 2 WNW	39.27	75.87	30
186620	OAKLAND 1 SE	39.40	79.40	2420
186770	OWINGS FERRY LANDING	38.68	76.67	160
186844	PARKTON 2 SW	39.63	76.70	600
187310	PRESTON 1 S	38.70	75.92	50
187705	ROCKVILLE 1 NE	39.10	77.10	440
187806	ROYAL OAK 2 SSW	38.72	76.18	10
188000	SALISBURY	38.37	75.58	10
188005	SALISBURY FAA AP	38.33	75.52	50
188065	SAVAGE RIVER DAM	39.52	79.13	1500
188380	SNOW HILL 4 N	38.23	75.38	30
189070	UPPER MARLBORO 3 NNW	38.87	76.78	100
189140	VIENNA	38.48	75.83	10
MARYLAND (continued)				
189195	WALDORF POLICE BARRACKS	38.65	76.88	210
189750	WOODSTOCK	39.33	76.87	460
MASSACHUSETTS				
190049	ADAMS	42.65	73.10	750
190120	AMHERST	42.38	72.53	150
190190	ASHBURNHAM	42.65	71.88	1190
190408	BARRE FALLS DAM	42.43	72.03	910
190535	BEDFORD	42.48	71.28	160
190666	BIRCH HILL DAM	42.63	72.12	860
190736	BLUE HILL WSO	42.22	71.12	630
190770	BOSTON WSO AP	42.37	71.03	20
190998	BUFFUMVILLE LAKE	42.12	71.90	500
192107	EAST BRIMFIELD LAKE	42.12	72.13	680
192451	EAST WAREHAM	41.77	70.67	20
192642	FALL RIVER	41.72	71.13	190
193505	HAVERHILL	42.77	71.07	20
193624	HINGHAM	42.23	70.92	30
193702	HOLYOKE	42.20	72.60	100
193985	KNIGHTVILLE DAM	42.28	72.87	630
194744	MIDDLETON	42.60	71.02	90
195524	NORTHBRIDGE 2	42.12	71.68	320
196245	PEABODY	42.53	70.98	170
196486	PLYMOUTH	41.95	70.67	90
196783	READING	42.52	71.13	90
196977	ROCKPORT 1 ESE	42.65	70.60	80
197627	SOUTHBRIDGE 3 SW	42.05	72.08	720
198367	TAUNTON	41.90	71.07	20
198573	TULLY LAKE	42.63	72.22	690
198757	WALPOLE 2	42.17	71.25	150
199316	WEST MEDWAY	42.13	71.43	210
199923	WORCESTER WSO AP	42.27	71.87	990
MICHIGAN				
200230	ANN ARBOR UNIV OF MICH	42.30	83.72	900
200417	BAD AXE	43.82	83.00	710
201299	CARO REGIONAL CENTER	43.45	83.40	670
202015	DEARBORN	42.32	83.23	610
202846	FLINT WSO AP	42.97	83.75	770
203477	GROSSE POINTE FARMS	42.38	82.90	610
203529	HALE LOUD DAM	44.47	83.72	820
203585	HARBOR BEACH 1 SSE	43.83	82.63	600
203947	HOWELL WWTP	42.60	83.93	920
204655	LAPEER	43.05	83.35	870
205488	MILLINGTON 3 SW	43.23	83.57	760
205650	MOUNT CLEMENS ANG BASE	42.60	82.83	580
206658	PONTIAC STATE HOSPITAL	42.65	83.30	980
206680	PORT HURON SEWAGE PLANT	42.98	82.42	590
207350	SANDUSKY	43.42	82.83	770
207820	STANDISH 5 SW	43.95	84.03	650
209014	WILLIS 5 SSW	42.08	83.58	660
209188	YALE	43.15	82.80	820
NEW HAMPSHIRE				
270681	BENTON 5 SW	44.03	71.93	1200
270690	BERLIN	44.45	71.18	930
270703	BETHLEHEM	44.28	71.68	1380
270741	BLACKWATER DAM	43.32	71.72	550
270910	BRADFORD	43.25	71.97	970
271647	COLEBROOK 2 E	44.90	71.48	1040
271683	CONCORD WSO AP	43.20	71.50	350
272174	DURHAM	43.15	70.95	70
272999	FIRST CONN LAKE	45.08	71.28	1660
273182	FRANKLIN FALLS DAM	43.47	71.65	430
273850	HANOVER	43.70	72.28	600
274399	KEENE	42.92	72.27	480
274475	LAKEPORT	43.55	71.47	560
274556	LANCASTER	44.48	71.58	910
274656	LEBANON FAA AIRPORT	43.63	72.32	560
275013	MACDOWELL DAM	42.90	71.98	970
275150	MARLOW	43.12	72.20	1170
275400	MILAN 7 NNW	44.67	71.22	1180
275412	MILFORD	42.82	71.65	300
275868	NEWPORT	43.37	72.18	780
276550	OTTER BROOK LAKE	42.95	72.23	680
276697	PETERBORO 2 S	42.85	71.95	1020
276818	PINKHAM NOTCH	44.27	71.25	2010
278539	SURRY MOUNTAIN LAKE	43.00	72.32	550
278855	WALPOLE 2	43.05	72.45	300
279940	WOODSTOCK	43.98	71.68	720
NEW JERSEY				
280311	ATLANTIC CITY WSO AP	39.45	74.57	140
280346	AUDUBON	39.88	75.08	40
280729	BELVIDERE	40.83	75.08	280

TABLE 1. LIST OF STATIONS USED (continued)

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
WEST VIRGINIA (continued)				
468662	SUTTON LAKE	38.65	80.68	840
468777	TERRA ALTA 1	39.45	79.55	2630
468807	THOMAS	39.15	79.50	3070
469011	UNION 3 SSE	37.55	80.53	2110
469086	VALLEY HEAD	38.55	80.03	2430
469281	WARDENSVILLE R M FARM	39.10	78.58	960
469333	WEBSTER SPRINGS 1 E	38.48	80.42	1540
469345	WEIRTON	40.40	80.60	1040
469368	WELLSBURG WTR TRTMT PL	40.28	80.62	660
469436	WESTON	39.03	80.47	1030
469683	WINFIELD LOCKS	38.53	81.92	570
ONTARIO				
6150100	ALBION	43.93	79.83	900
6150135	ALDERSHOT	43.32	79.87	475
6100345	ARNPRIOR GRANDON	45.42	76.37	350
6140348	ARTHUR	43.82	80.57	1483
6110605	BEATRICE	45.13	79.38	950
6100720	BELLROCK	44.48	76.77	480
6060773	BISCOTASING	47.30	82.10	1335
6150815	BLOOMFIELD	43.98	77.22	300
6120819	BLYTH	43.72	81.38	1150
6150830	BOWMANVILLE MOSTERT	43.92	78.67	325
6140954	BRANTFORD MOE	43.13	80.23	643
6100969	BROCKVILLE	44.60	75.70	300
6100971	BROCKVILLE PCC	44.60	75.67	300
6121025	BRUCEFIELD	43.55	81.55	850
6151042	BURKETON MCLAUGHLIN	44.03	78.80	1025
6151064	BURLINGTON TS	43.33	79.83	325
6141095	CAMBRIDGE GALT MOE	43.33	80.32	880
6151137	CAMPBELLFORD	44.30	77.80	480
6101265	CATARAQUI TS	44.37	76.62	475
6101335	CHALK RIVER AEC	46.05	77.37	400
6101440	CHATS FALLS	45.47	76.23	308
6111467	CHATSWORTH	44.40	80.90	1000
6101494	CHENAUX	45.58	76.68	276
6151545	CLAREMONT	43.95	79.07	575
6101555	CLAYBANK	45.42	76.40	350
6151689	COBOURG STP	43.97	78.18	260
6151750	COLD CREEK	43.92	79.70	823
6101820	COMBERMERE	45.37	77.62	940
6061847	CONISTON	46.47	80.82	779
6101874	CORNWALL	45.02	74.75	210
6101901	CORNWALL ONT HYDRO	45.03	74.80	250
6081928	CRYSTAL FALLS	46.45	79.87	745
6101955	DALHOUSIE L HIGH FALLS	44.97	76.62	525
6101958	DALHOUSIE MILLS	45.32	74.47	225
6131982	DELHI CDA	42.87	80.55	760
6101986	DELTA	44.62	76.13	320
6102009	DES JOACHIMS	46.18	77.70	425
6132090	DRESDEN	42.58	82.18	600
6132148	DUNNVILLE PUMPING STN	42.83	79.62	575
6112171	DURHAM	44.18	80.82	1260
6072325	ENGLEHART	47.82	79.90	825
6152335	ERINDALE	43.57	79.65	460
6112340	ESSA ONT HYDRO	44.37	79.80	710
6122370	EXETER	43.35	81.48	860
6142400	FERGUS SHAND DAM	43.73	80.33	1370
6142402	FERGUS MOE	43.70	80.38	1300
6142420	FOLDENS	43.02	80.78	1076
6152555	FRANKFORD MOE	44.23	77.60	375
6152605	FRENCHMANS BAY	43.82	79.08	250
6082612	FRENCH R CHAUDIERE DAM	46.13	80.02	650
6152695	GEORGETOWN WWTP	43.63	79.88	725
6142798	GLANWORTH CFPL	42.88	81.20	919
6142803	GLEN ALLAN	43.68	80.72	1325
6152833	GLEN HAFFY MONO MILLS	43.93	79.95	1425
6092915	GORE BAY	45.92	82.47	625
6153020	GREENWOOD MTRCA	43.90	79.07	420
6133047	GRIMSBY	43.20	79.57	298
6133120	HAGERSVILLE	42.97	80.07	725
6133121	HAGERSVILLE 2	42.93	80.08	700
6163156	HALIBURTON A	45.00	78.58	1050
6153298	HAMILTON PSYCH HOSPITAL	43.23	79.90	650
6153300	HAMILTON RBG	43.28	79.88	335
6133360	HARROW CDA	42.03	82.90	625
6153410	HEART LAKE	43.73	79.78	850
6104025	KEMPTVILLE	45.00	75.63	326
6104175	KINGSTON PUMPING STATION	44.23	76.48	251
6134190	KINGSVILLE MOE	42.05	82.68	650
6074209	KIRKLAND LAKE	48.15	80.02	1041
6144232	KITCHENER	43.43	80.50	1125
6084278	LA CAVE	46.37	78.73	565
6134390	LEAMINGTON	42.05	82.63	700
6144500	LONDON SHARON DRIVE	43.03	81.28	900
ONTARIO (continued)				
6124700	LUCKNOW	43.95	81.50	950
6084770	MADAWASKA	45.50	77.98	1038
6104880	MALLORYTOWN GRAHAM LAKE	44.57	75.88	400
6065043	MCVITTIES	46.28	80.85	700
6115099	MIDHURST	44.45	79.77	740
6115127	MIDLAND	44.75	79.90	593
6155183	MILLGROVE	43.32	79.97	837
6165195	MINDEN	44.93	78.72	900
6065250	MONETVILLE	46.15	80.30	725
6145267	MONTICELLO	43.97	80.40	1580
6105460	MORRISBURG	44.92	75.18	268
6135583	NEW GLASGOW	42.52	81.63	650
6135638	NIAGARA FALLS	43.13	79.08	600
6085682	NORTH BAY	46.32	79.47	660
6155790	ORANGEVILLE MOE	43.92	80.08	1350
6115820	ORILLIA TS	44.62	79.42	720
6155854	ORONO	43.97	78.62	485
6106052	OTTAWA LEMIEUX ISLAND	45.42	75.73	200
6106090	OTTAWA NRC	45.45	75.62	320
6126210	PAISLEY	44.27	81.37	801
6116254	PARRY SOUND	45.33	80.00	635
6136335	PELEE ISLAND	41.75	82.68	575
6166428	PETERBOROUGH DOBBIN TS	44.32	78.40	800
6166450	PETERBOROUGH STP	44.28	78.32	630
6126499	PETROLIA TOWN	42.88	82.17	660
6156515	PICKERING AUDLEY	43.90	79.05	360
6156533	PICTON	44.02	77.13	250
6156545	PINE GROVE	43.80	79.58	600
6076572	PORCUPINE ONT HYDRO	48.47	81.27	980
6136606	PORT COLBORNE	42.88	79.25	575
6136626	PORT DALHOUSIE	43.18	79.27	300
6136643	PORT DOVER	42.78	80.22	610
6156670	PORT HOPE	43.95	78.28	265
6136694	PORT STANLEY	42.67	81.22	600
6146711	PRESTON	43.40	80.42	955
6106779	PURDY	45.32	77.72	1610
6146939	REDICKVILLE	44.23	80.22	1725
6157012	RICHMOND HILL	43.88	79.45	764
6137147	RIDGETOWN	42.45	81.88	675
6137285	ST CATHARINES	43.20	79.25	300
6137306	ST CATHARINES POWER GLEN	43.12	79.25	400
6137361	ST THOMAS	42.78	81.17	775
6137399	ST WILLIAMS	42.70	80.45	700
6157685	SHARON	44.10	79.43	861
6127887	SOUTHAMPTON	44.50	81.37	610
6097915	SOUTH BAYMOUTH	45.58	82.02	596
6107955	SOUTH MOUNTAIN	44.97	75.48	278
6148105	STRATFORD MOE	43.37	81.00	1160
6148120	STRATHROY	42.95	81.65	750
6158255	THORNHILL GRANDVIEW	43.80	79.42	654
6138270	TILLSONBURG MOE	42.85	80.72	700
6158370	TORONTO ASHBRIDGES BAY	43.67	79.32	243
6158386	TORONTO BEVERLEY HILLS	43.73	79.50	475
6158520	TORONTO ELLESMERE	43.77	79.27	538
6158665	TORONTO ISLAND A	43.63	79.40	251
6158762	TORONTO NORTHCLIFFE	43.68	79.45	550
6158779	TORONTO SUNNYBROOK	43.72	79.38	515
6158885	TRENTON ONT HYDRO	44.13	77.60	290
6068980	TURBINE	46.38	81.57	675
6159124	UXBRIDGE 2	44.12	79.10	886
6139143	VINELAND RITTENHOUSE	43.17	79.42	310
6139145	VINELAND STATION	43.18	79.40	260
6139265	WALLACEBURG	42.58	82.40	580
6149386	WATERLOO WPCP	43.48	80.52	1075
6139445	WELLAND	43.00	79.27	575
6149455	WESTMINSTER TWP WPCP	42.92	81.22	850
6159575	WOODBRIDGE	43.80	79.60	540
6139600	WOODSLEE CDA	42.22	82.73	600
6129660	WROXETER	43.87	81.15	1100
QUEBEC				
7020040	ABERCORN	45.03	72.67	490
7060320	ARVIDA	48.43	71.17	335
7070451	BGE C LAC CHATEAUVERT	47.77	73.90	1255
7080452	BARRAGE DES QUINZE	47.55	79.23	870
7070454	BARRAGE GOUIN	48.35	74.10	1325
7050455	BARRAGE LAC MORIN	47.65	69.52	650
7070456	BARRAGE MATTAWIN	46.85	73.65	1200
7080468	BARRAGE TEMISCAMINGUE	46.72	79.10	595
7020560	BEAUCEVILLE	46.20	70.77	525
7080600	BELLETERRE	47.38	78.70	1055
7010720	BERTHIERVILLE	46.05	73.18	40
7020800	BISHOPTON	45.58	71.57	700
7020860	BROMPTONVILLE	45.50	71.97	425
7051200	CAUSAPSCAL	48.37	67.23	551

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
PENNSYLVANIA (continued)				
369655	WHITESBURG	40.73	79.40	1320
369702	WILKES-BARRE	41.23	75.88	660
369705	W BARRE SCRANT WSO AP	41.33	75.73	930
369714	WILLIAMSBURG	40.45	78.20	880
369728	WILLIAMSPORT WSO	41.25	76.92	520
369933	YORK 3 SSW PUMP	39.92	76.75	390
369950	YORK HAVEN	40.12	76.72	310
369995	ZIONSVILLE 3 SE	40.47	75.45	680
RHODE ISLAND				
370896	BLOCK ISLAND WSO AP	41.17	71.58	110
374266	KINGSTON	41.48	71.53	100
376698	PROVIDENCE WSO AP	41.73	71.43	50
379423	WOONSOCKET	41.98	71.50	120
VERMONT				
430499	BELLOWS FALLS	43.13	72.45	300
430661	BETHEL 4 N	43.88	72.63	660
431081	BURLINGTON WSO AP	44.47	73.15	330
431243	CAVENDISH	43.38	72.60	800
431360	CHELSEA	43.98	72.45	800
431433	CHITTENDEN	43.70	72.95	1080
434052	HUNTINGTON CENTER	44.28	72.97	700
435278	MONTPELIER FAA AP	44.20	72.57	1130
435542	NEWPORT	44.93	72.20	770
436335	PERU	43.25	72.90	1670
436761	READSBORO 1 SE	42.75	72.93	1120
436893	ROCHESTER	43.85	72.80	830
436995	RUTLAND	43.60	72.97	620
437054	SAINT JOHNSBURY	44.42	72.02	700
437607	SOUTH HERO	44.63	73.30	1100
438556	UNION VILLAGE DAM	43.80	72.27	460
438600	VERNON	42.77	72.52	230
438644	WAITSFIELD 2 WSW	44.18	72.85	820
438815	WATERBURY 2 SSE	44.32	72.75	760
439099	WEST BURKE	44.65	71.98	900
VIRGINIA				
440021	ABINGDON 3 S	36.67	81.97	1920
440166	ALTAVISTA	37.10	79.30	510
440193	AMISSVILLE	38.68	78.02	550
440243	APPOMATTOX	37.37	78.83	910
440327	ASHLAND	37.75	77.48	220
440385	BACK BAY WILDLIFE RFG	36.67	75.92	10
440551	BEDFORD	37.35	79.52	980
440670	BERRYVILLE	39.15	77.98	600
440720	BIG MEADOWS	38.52	78.43	3540
440766	BLACKSBURG 3 SE	37.18	80.42	2000
440792	BLAND	37.10	81.10	2000
441082	BROOKNEAL	37.03	78.95	520
441136	BUCKINGHAM	37.55	78.55	460
441159	BUENA VISTA	37.73	79.35	840
441209	BURKES GARDEN	37.08	81.33	3300
441585	CHARLOTTE COURT H 3 W	37.07	78.70	590
441593	CHARLOTTESVILLE 2 W	38.03	78.52	870
441606	CHASE CITY	36.83	78.47	510
441614	CHATHAM	36.82	79.40	640
441929	COLUMBIA 2 SSE	37.73	78.15	300
441955	CONCORD 5 S	37.28	78.97	650
441999	COPPER HILL 1 NNE	37.10	80.13	2720
442009	CORBIN	38.20	77.37	220
442041	COVINGTON	37.80	80.00	1250
442044	COVINGTON FILT PLANT	37.80	80.00	1230
442155	CULPEPER	38.47	78.00	420
442208	DALE ENTERPRISE	38.45	78.93	1400
442245	DANVILLE (BRIDGE ST)	36.58	79.38	410
442729	ELKWOOD 6 SE	38.45	77.77	330
442790	EMPORIA 1 WNW	36.68	77.55	100
442941	FARMVILLE 2 N	37.33	78.38	450
443192	FREDERICKSBURG NAT PK	38.32	77.45	90
443375	GLASGOW 1 SE	37.62	79.43	740
443466	GORDONSVILLE 3 S	38.08	78.18	460
443991	HILLSVILLE 1 S	36.73	80.73	2590
444044	HOLLAND 1 E	36.68	76.78	80
444101	HOPEWELL	37.30	77.30	40
444128	HOT SPRINGS	38.00	79.83	2240
444565	KERRS CREEK 6 WNW	37.85	79.58	1500
444676	LAFAYETTE 1 NE	37.23	80.22	1380
444720	LANGLEY AIR FORCE BASE	37.08	76.35	10
444768	LAWRENCEVILLE 5 W	36.77	77.93	300
444876	LEXINGTON	37.78	79.43	1600
444909	LINCOLN	39.12	77.72	500
445050	LOUISA	38.03	78.00	420
445096	LURAY 5 E	38.67	78.38	1200
445120	LYNCHBURG WSO AP	37.33	79.20	920

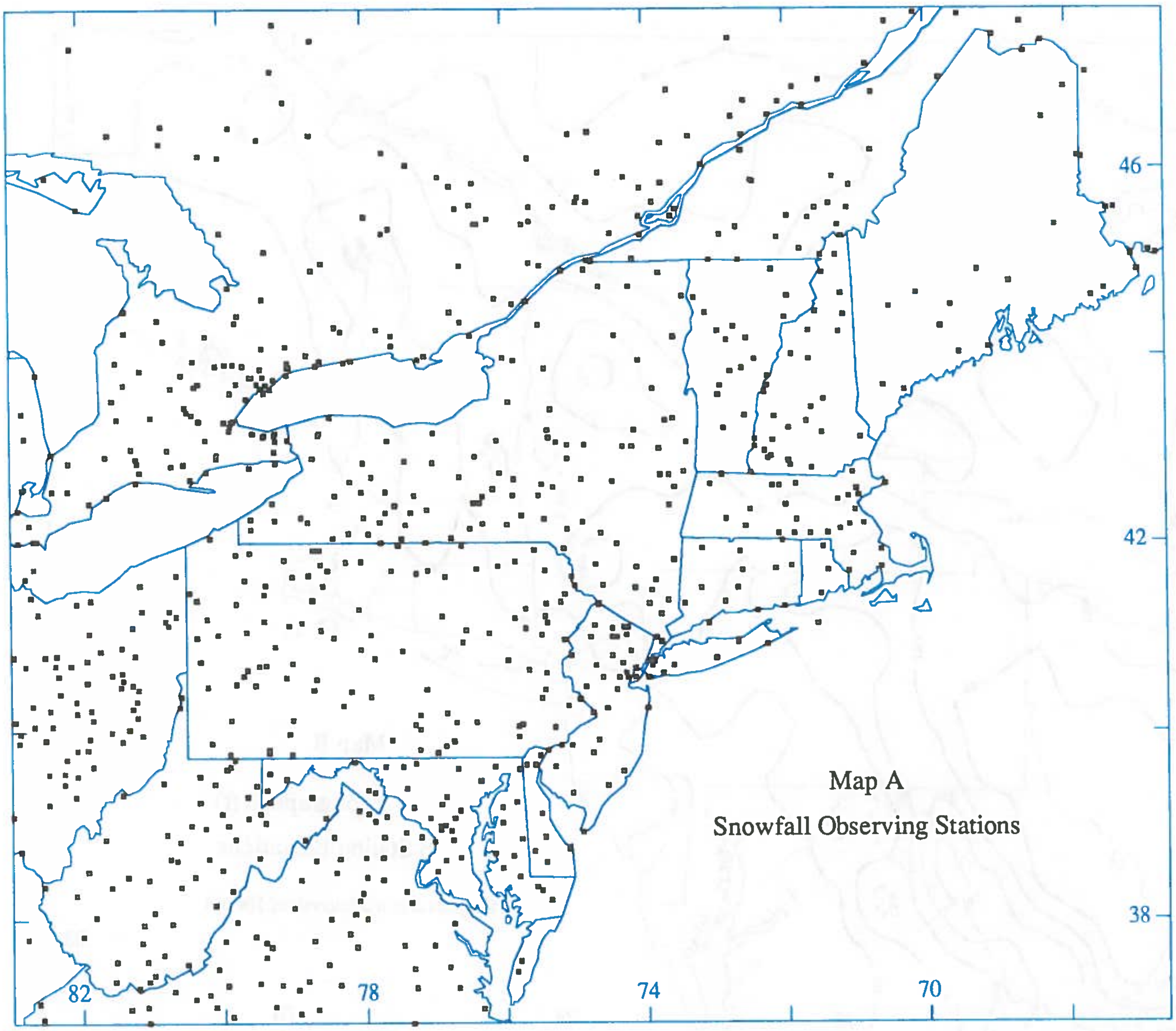
Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
VIRGINIA (continued)				
445213	MANASSAS 3 NW	38.78	77.50	330
445501	MENDOTA	36.70	82.32	1350
445851	MOUNT WEATHER	39.07	77.88	1720
445931	NASSAWADOX	37.47	75.87	40
446012	NEW CASTLE	37.50	80.10	1310
446139	NORFOLK WSO AP	36.90	76.20	20
446173	NORTH FORK LAKE	37.13	82.63	1680
446475	PAINTER 2 W	37.58	75.82	30
446491	PALMYRA 1 E	37.87	78.25	410
446626	PENNINGTON GAP	36.75	83.05	1510
446692	PHILPOTT DAM 2	36.78	80.03	1120
446712	PIEDMONT RESEARCH STN	38.22	78.12	520
447033	RAPIDAN	38.30	78.07	300
447201	RICHMOND WSO AP	37.50	77.33	160
447285	ROANOKE WSO AP	37.32	79.97	1150
447312	ROCKFISH	37.80	78.75	490
447338	ROCKY MOUNT	37.00	79.90	1230
448022	STAFFORDSVILLE 3 ENE	37.27	80.72	1950
448062	STAUNTON SEWAGE PLANT	38.15	79.03	1390
448129	STONY CREEK 3 ESE	36.92	77.35	70
448192	SUFFOLK LAKE KILBY	36.73	76.60	20
448396	THE PLAINS 2 NNE	38.90	77.75	530
448448	TIMBERVILLE 3 E	38.65	78.72	1000
448547	TROUT DALE	36.67	81.40	2820
448737	VIENNA DUNN LORING	38.90	77.22	420
448829	WALKERTON 2 NW	37.75	77.05	50
448888	WARRENTON 3 SE	38.68	77.77	500
448894	WARSAW 2 NW	37.98	76.77	140
448903	WASH DULLES WSO AP	38.95	77.45	290
448906	WASH NATL WSCMO AP	38.85	77.03	70
449025	WEST POINT 2 SW	37.52	76.83	20
449151	WILLIAMSBURG 2 N	37.30	76.70	70
449186	WINCHESTER 3 ESE	39.18	78.12	680
449215	WISE 1 SE	36.97	82.57	2570
449263	WOODSTOCK 2 NE	38.90	78.47	660
449301	WYTHEVILLE 1 S	36.93	81.08	2450
WEST VIRGINIA				
460355	ATHENS CONCORD COLLEGE	37.43	81.00	2550
460527	BAYARD	39.27	79.37	2380
460580	BECKLEY V A HOSPITAL	37.78	81.18	2330
460633	BELINGTON	39.03	79.95	1720
460921	BLUEFIELD FAA AIRPORT	37.30	81.22	2870
460939	BLUESTONE LAKE	37.65	80.88	1390
461215	BUCKEYE 1 SE	38.17	80.13	2100
461220	BUCKHANNON 2 W	39.00	80.27	1450
461282	BURNSVILLE LAKE	38.85	80.63	790
461363	CAMDEN ON GAULEY	38.37	80.62	2030
461393	CANAAN VALLEY	39.05	79.43	3250
461570	CHARLESTON WSFO AP	38.37	81.60	1020
461677	CLARKSBURG 1	39.27	80.35	950
461696	CLAY 1 SW	38.45	81.08	720
461723	CLENDENIN 1 SW	38.48	81.37	620
462718	ELKINS WSO AP	38.88	79.85	1990
462920	FAIRMONT	39.47	80.13	1300
463072	FLAT TOP	37.58	81.10	3340
463353	GARY	37.37	81.55	1430
463361	GASSAWAY	38.67	80.77	840
463544	GLENVILLE 1 ENE	38.93	80.82	720
463846	HAMLIN	38.28	82.10	640
464128	HICO 1 SE	38.10	81.00	2350
464393	HUNTINGTON WSO AP	38.37	82.55	830
464763	KEARNEYVILLE WSO	39.38	77.88	550
465002	LAKE LYNN	39.72	79.85	900
465353	LOGAN	37.85	82.00	720
465563	MADISON	38.05	81.82	680
465621	MANNINGTON 1 N	39.55	80.35	980
465707	MARTINSBURG FAA AP	39.40	77.98	530
465739	MATHIAS	38.87	78.87	1630
465871	MC ROSS	37.98	80.75	2450
465963	MIDDLEBOURNE 2 ESE	39.48	80.87	750
466202	MORGANTOWN FAA AP	39.65	79.92	1240
466212	MORGANTOWN LOCK AND DAM	39.62	79.97	830
466591	OAK HILL	37.97	81.15	2040
466849	PARKERSBURG FAA AP	39.35	81.43	830
466867	PARSONS 1 SE	39.10	79.67	1680
466982	PHILIPPI	39.15	80.03	1280
466991	PICKENS 1	38.67	80.22	2770
467029	PINEVILLE	37.58	81.53	1280
467207	PRINCETON	37.37	81.08	2410
467552	RIPLEY 4 NNE	38.88	81.68	610
467730	ROMNEY 1 SW	39.33	78.77	670
467785	ROWLESBURG 1	39.33	79.68	1460
468051	SENECA STATE FOREST	38.33	79.90	2500
468433	SPRUCE KNOB	38.68	79.52	3050

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
PENNSYLVANIA (continued)				
369655	WHITESBURG	40.73	79.40	1320
369702	WILKES-BARRE	41.23	75.88	660
369705	W BARRE SCRANT WSO AP	41.33	75.73	930
369714	WILLIAMSBURG	40.45	78.20	880
369728	WILLIAMSPORT WSO	41.25	76.92	520
369933	YORK 3 SSW PUMP	39.92	76.75	390
369950	YORK HAVEN	40.12	76.72	310
369995	ZIONSVILLE 3 SE	40.47	75.45	680
RHODE ISLAND				
370896	BLOCK ISLAND WSO AP	41.17	71.58	110
374266	KINGSTON	41.48	71.53	100
376698	PROVIDENCE WSO AP	41.73	71.43	50
379423	WOONSOCKET	41.98	71.50	120
VERMONT				
430499	BELLOWS FALLS	43.13	72.45	300
430661	BETHEL 4 N	43.88	72.63	660
431081	BURLINGTON WSO AP	44.47	73.15	330
431243	CAVENDISH	43.38	72.60	800
431360	CHELSEA	43.98	72.45	800
431433	CHITTENDEN	43.70	72.95	1080
434052	HUNTINGTON CENTER	44.28	72.97	700
435278	MONTPELIER FAA AP	44.20	72.57	1130
435542	NEWPORT	44.93	72.20	770
436335	PERU	43.25	72.90	1670
436761	READSBORO 1 SE	42.75	72.93	1120
436893	ROCHESTER	43.85	72.80	830
436995	RUTLAND	43.60	72.97	620
437054	SAINT JOHNSBURY	44.42	72.02	700
437607	SOUTH HERO	44.63	73.30	1100
438556	UNION VILLAGE DAM	43.80	72.27	460
438600	VERNON	42.77	72.52	230
438644	WAITSFIELD 2 WSW	44.18	72.85	820
438815	WATERBURY 2 SSE	44.32	72.75	760
439099	WEST BURKE	44.65	71.98	900
VIRGINIA				
440021	ABINGDON 3 S	36.67	81.97	1920
440166	ALTAVISTA	37.10	79.30	510
440193	AMISSVILLE	38.68	78.02	550
440243	APPOMATTOX	37.37	78.83	910
440327	ASHLAND	37.75	77.48	220
440385	BACK BAY WILDLIFE RFG	36.67	75.92	10
440551	BEDFORD	37.35	79.52	980
440670	BERRYVILLE	39.15	77.98	600
440720	BIG MEADOWS	38.52	78.43	3540
440766	BLACKSBURG 3 SE	37.18	80.42	2000
440792	BLAND	37.10	81.10	2000
441082	BROOKNEAL	37.03	78.95	520
441136	BUCKINGHAM	37.55	78.55	460
441159	BUENA VISTA	37.73	79.35	840
441209	BURKES GARDEN	37.08	81.33	3300
441585	CHARLOTTE COURT H 3 W	37.07	78.70	590
441593	CHARLOTTESVILLE 2 W	38.03	78.52	870
441606	CHASE CITY	36.83	78.47	510
441614	CHATHAM	36.82	79.40	640
441929	COLUMBIA 2 SSE	37.73	78.15	300
441955	CONCORD 5 S	37.28	78.97	650
441999	COPPER HILL 1 NNE	37.10	80.13	2720
442009	CORBIN	38.20	77.37	220
442041	COVINGTON	37.80	80.00	1250
442044	COVINGTON FILT PLANT	37.80	80.00	1230
442155	CULPEPER	38.47	78.00	420
442208	DALE ENTERPRISE	38.45	78.93	1400
442245	DANVILLE (BRIDGE ST)	36.58	79.38	410
442729	ELKWOOD 6 SE	38.45	77.77	330
442790	EMPORIA 1 WNW	36.68	77.55	100
442941	FARMVILLE 2 N	37.33	78.38	450
443192	FREDERICKSBURG NAT PK	38.32	77.45	90
443375	GLASGOW 1 SE	37.62	79.43	740
443466	GORDONSVILLE 3 S	38.08	78.18	460
443991	HILLSVILLE 1 S	36.73	80.73	2590
444044	HOLLAND 1 E	36.68	76.78	80
444101	HOPEWELL	37.30	77.30	40
444128	HOT SPRINGS	38.00	79.83	2240
444565	KERRS CREEK 6 WNW	37.85	79.58	1500
444676	LAFAYETTE 1 NE	37.23	80.22	1380
444720	LANGLEY AIR FORCE BASE	37.08	76.35	10
444768	LAWRENCEVILLE 5 W	36.77	77.93	300
444876	LEXINGTON	37.78	79.43	1600
444909	LINCOLN	39.12	77.72	500
445050	LOUISA	38.03	78.00	420
445096	LURAY 5 E	38.67	78.38	1200
445120	LYNCHBURG WSO AP	37.33	79.20	920
VIRGINIA (continued)				
445213	MANASSAS 3 NW	38.78	77.50	330
445501	MENDOTA	36.70	82.32	1350
445851	MOUNT WEATHER	39.07	77.88	1720
445931	NASSAWADOX	37.47	75.87	40
446012	NEW CASTLE	37.50	80.10	1310
446139	NORFOLK WSO AP	36.90	76.20	20
446173	NORTH FORK LAKE	37.13	82.63	1680
446475	PAINTER 2 W	37.58	75.82	30
446491	PALMYRA 1 E	37.87	78.25	410
446626	PENNINGTON GAP	36.75	83.05	1510
446692	PHILPOTT DAM 2	36.78	80.03	1120
446712	PIEDMONT RESEARCH STN	38.22	78.12	520
447033	RAPIDAN	38.30	78.07	300
447201	RICHMOND WSO AP	37.50	77.33	160
447285	ROANOKE WSO AP	37.32	79.97	1150
447312	ROCKFISH	37.80	78.75	490
447338	ROCKY MOUNT	37.00	79.90	1230
448022	STAFFORDSVILLE 3 ENE	37.27	80.72	1950
448062	STAUNTON SEWAGE PLANT	38.15	79.03	1390
448129	STONY CREEK 3 ESE	36.92	77.35	70
448192	SUFFOLK LAKE KILBY	36.73	76.60	20
448396	THE PLAINS 2 NNE	38.90	77.75	530
448448	TIMBERVILLE 3 E	38.65	78.72	1000
448547	TROUT DALE	36.67	81.40	2820
448737	VIENNA DUNN LORING	38.90	77.22	420
448829	WALKERTON 2 NW	37.75	77.05	50
448888	WARRENTON 3 SE	38.68	77.77	500
448894	WARSAW 2 NW	37.98	76.77	140
448903	WASH DULLES WSO AP	38.95	77.45	290
448906	WASH NATL WSCMO AP	38.85	77.03	70
449025	WEST POINT 2 SW	37.52	76.83	20
449151	WILLIAMSBURG 2 N	37.30	76.70	70
449186	WINCHESTER 3 ESE	39.18	78.12	680
449215	WISE 1 SE	36.97	82.57	2570
449263	WOODSTOCK 2 NE	38.90	78.47	660
449301	WYTHEVILLE 1 S	36.93	81.08	2450
WEST VIRGINIA				
460355	ATHENS CONCORD COLLEGE	37.43	81.00	2550
460527	BAYARD	39.27	79.37	2380
460580	BECKLEY V A HOSPITAL	37.78	81.18	2330
460633	BELINGTON	39.03	79.95	1720
460921	BLUEFIELD FAA AIRPORT	37.30	81.22	2870
460939	BLUESTONE LAKE	37.65	80.88	1390
461215	BUCKEYE 1 SE	38.17	80.13	2100
461220	BUCKHANNON 2 W	39.00	80.27	1450
461282	BURNSVILLE LAKE	38.85	80.63	790
461363	CAMDEN ON GAULEY	38.37	80.62	2030
461393	CANAAN VALLEY	39.05	79.43	3250
461570	CHARLESTON WSFO AP	38.37	81.60	1020
461677	CLARKSBURG 1	39.27	80.35	950
461696	CLAY 1 SW	38.45	81.08	720
461723	CLENDENIN 1 SW	38.48	81.37	620
462718	ELKINS WSO AP	38.88	79.85	1990
462920	FAIRMONT	39.47	80.13	1300
463072	FLAT TOP	37.58	81.10	3340
463353	GARY	37.37	81.55	1430
463361	GASSAWAY	38.67	80.77	840
463544	GLENVILLE 1 ENE	38.93	80.82	720
463846	HAMLIN	38.28	82.10	640
464128	HICO 1 SE	38.10	81.00	2350
464393	HUNTINGTON WSO AP	38.37	82.55	830
464763	KEARNEYVILLE WSO	39.38	77.88	550
465002	LAKE LYNN	39.72	79.85	900
465353	LOGAN	37.85	82.00	720
465563	MADISON	38.05	81.82	680
465621	MANNINGTON 1 N	39.55	80.35	980
465707	MARTINSBURG FAA AP	39.40	77.98	530
465739	MATHIAS	38.87	78.87	1630
465871	MC ROSS	37.98	80.75	2450
465963	MIDDLEBOURNE 2 ESE	39.48	80.87	750
466202	MORGANTOWN FAA AP	39.65	79.92	1240
466212	MORGANTOWN LOCK AND DAM	39.62	79.97	830
466591	OAK HILL	37.97	81.15	2040
466849	PARKERSBURG FAA AP	39.35	81.43	830
466867	PARSONS 1 SE	39.10	79.67	1680
466982	PHILIPPI	39.15	80.03	1280
466991	PICKENS 1	38.67	80.22	2770
467029	PINEVILLE	37.58	81.53	1280
467207	PRINCETON	37.37	81.08	2410
467552	RIPLEY 4 NNE	38.88	81.68	610
467730	ROMNEY 1 SW	39.33	78.77	670
467785	ROWLESBURG 1	39.33	79.68	1460
468051	SENECA STATE FOREST	38.33	79.90	2500
468433	SPRUCE KNOB	38.68	79.52	3050

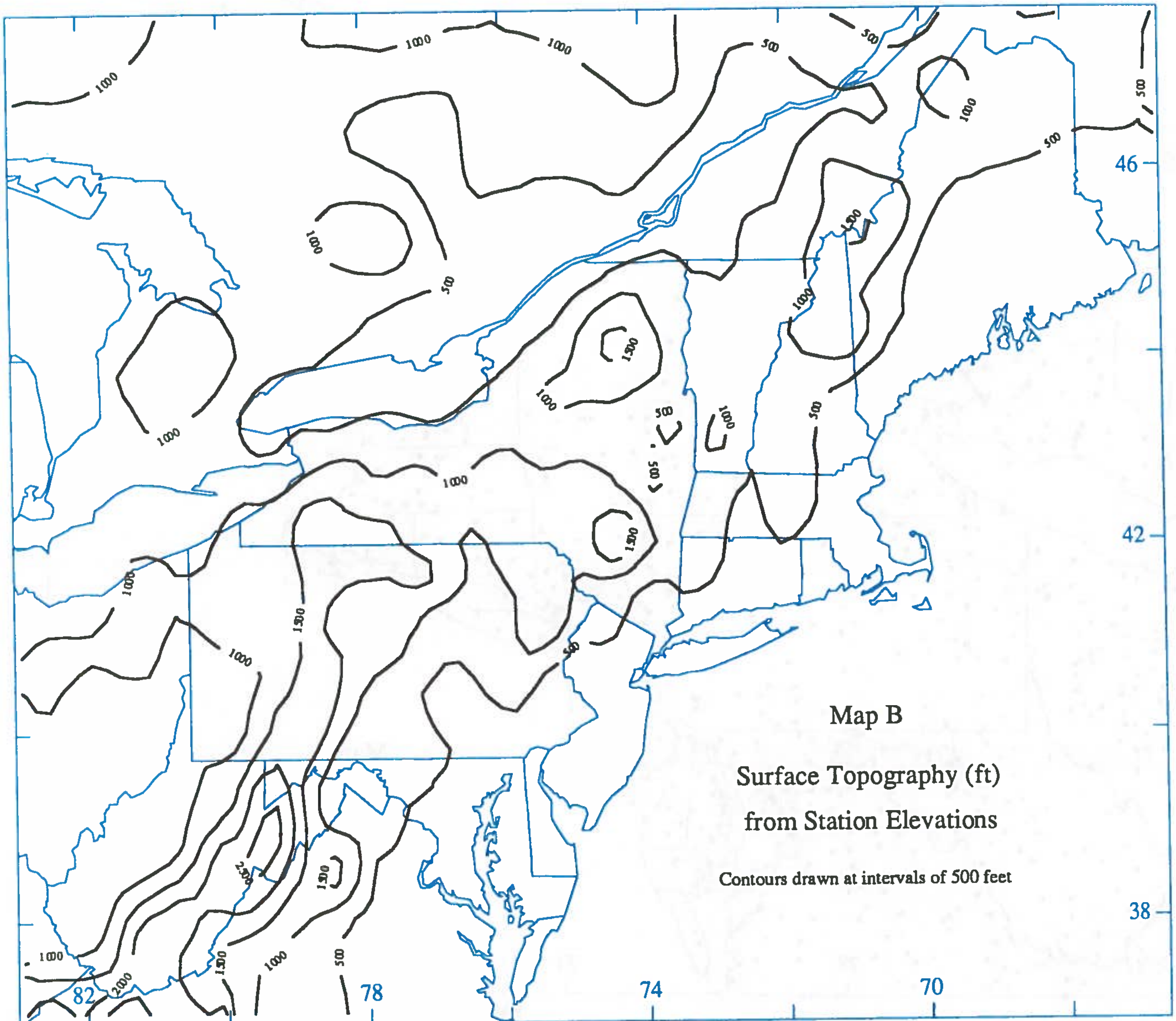
TABLE 1. LIST OF STATIONS USED (continued)

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
WEST VIRGINIA (continued)				
468662	SUTTON LAKE	38.65	80.68	840
468777	TERRA ALTA 1	39.45	79.55	2630
468807	THOMAS	39.15	79.50	3070
469011	UNION 3 SSE	37.55	80.53	2110
469086	VALLEY HEAD	38.55	80.03	2430
469281	WARDENSVILLE R M FARM	39.10	78.58	960
469333	WEBSTER SPRINGS 1 E	38.48	80.42	1540
469345	WEIRTON	40.40	80.60	1040
469368	WELLSBURG WTR TRTMT PL	40.28	80.62	660
469436	WESTON	39.03	80.47	1030
469683	WINFIELD LOCKS	38.53	81.92	570
ONTARIO				
6150100	ALBION	43.93	79.83	900
6150135	ALDERSHOT	43.32	79.87	475
6100345	ARNPRIOR GRANDON	45.42	76.37	350
6140348	ARTHUR	43.82	80.57	1483
6110605	BEATRICE	45.13	79.38	950
6100720	BELLROCK	44.48	76.77	480
6060773	BISCOTASING	47.30	82.10	1335
6150815	BLOOMFIELD	43.98	77.22	300
6120819	BLYTH	43.72	81.38	1150
6150830	BOWMANVILLE MOSTERT	43.92	78.67	325
6140954	BRANTFORD MOE	43.13	80.23	643
6100969	BROCKVILLE	44.60	75.70	300
6100971	BROCKVILLE PCC	44.60	75.67	300
6121025	BRUCEFIELD	43.55	81.55	850
6151042	BURKETON MCLAUGHLIN	44.03	78.80	1025
6151064	BURLINGTON TS	43.33	79.83	325
6141095	CAMBRIDGE GALT MOE	43.33	80.32	880
6151137	CAMPBELLFORD	44.30	77.80	480
6101265	CATARAQUI TS	44.37	76.62	475
6101335	CHALK RIVER AEC	46.05	77.37	400
6101440	CHATS FALLS	45.47	76.23	308
6111467	CHATSWORTH	44.40	80.90	1000
6101494	CHENAUX	45.58	76.68	276
6151545	CLAREMONT	43.95	79.07	575
6101555	CLAYBANK	45.42	76.40	350
6151689	COBOURG STP	43.97	78.18	260
6151750	COLD CREEK	43.92	79.70	823
6101820	COMBERMERE	45.37	77.62	940
6061847	CONISTON	46.47	80.82	779
6101874	CORNWALL	45.02	74.75	210
6101901	CORNWALL ONT HYDRO	45.03	74.80	250
6081928	CRYSTAL FALLS	46.45	79.87	745
6101955	DALHOUSIE L HIGH FALLS	44.97	76.62	525
6101958	DALHOUSIE MILLS	45.32	74.47	225
6131982	DELHI CDA	42.87	80.55	760
6101986	DELTA	44.62	76.13	320
6102009	DES JOACHIMS	46.18	77.70	425
6132090	DRESDEN	42.58	82.18	600
6132148	DUNNVILLE PUMPING STN	42.83	79.62	575
6112171	DURHAM	44.18	80.82	1260
6072325	ENGLEHART	47.82	79.90	825
6152335	ERINDALE	43.57	79.65	460
6112340	ESSA ONT HYDRO	44.37	79.80	710
6122370	EXETER	43.35	81.48	860
6142400	FERGUS SHAND DAM	43.73	80.33	1370
6142402	FERGUS MOE	43.70	80.38	1300
6142420	FOLDENS	43.02	80.78	1076
6152555	FRANKFORD MOE	44.23	77.60	375
6152605	FRENCHMANS BAY	43.82	79.08	250
6082612	FRENCH R CHAUDIERE DAM	46.13	80.02	650
6152695	GEORGETOWN WWTP	43.63	79.88	725
6142798	GLANWORTH CFPL	42.88	81.20	919
6142803	GLEN ALLAN	43.68	80.72	1325
6152833	GLEN HAFFY MONO MILLS	43.93	79.95	1425
6092915	GORE BAY	45.92	82.47	625
6153020	GREENWOOD MTRCA	43.90	79.07	420
6133047	GRIMSBY	43.20	79.57	298
6133120	HAGERSVILLE	42.97	80.07	725
6133121	HAGERSVILLE 2	42.93	80.08	700
6163156	HALIBURTON A	45.00	78.58	1050
6153298	HAMILTON PSYCH HOSPITAL	43.23	79.90	650
6153300	HAMILTON RBG	43.28	79.88	335
6133360	HARROW CDA	42.03	82.90	625
6153410	HEART LAKE	43.73	79.78	850
6104025	KEMPTVILLE	45.00	75.63	326
6104175	KINGSTON PUMPING STATION	44.23	76.48	251
6134190	KINGSVILLE MOE	42.05	82.68	650
6074209	KIRKLAND LAKE	48.15	80.02	1041
6144232	KITCHENER	43.43	80.50	1125
6084278	LA CAVE	46.37	78.73	565
6134390	LEAMINGTON	42.05	82.63	700
6144500	LONDON SHARON DRIVE	43.03	81.28	900
ONTARIO (continued)				
6124700	LUCKNOW	43.95	81.50	950
6084770	MADAWASKA	45.50	77.98	1038
6104880	MALLORYTOWN GRAHAM LAKE	44.57	75.88	400
6065043	MCVITTIES	46.28	80.85	700
6115099	MIDHURST	44.45	79.77	740
6115127	MIDLAND	44.75	79.90	593
6155183	MILLGROVE	43.32	79.97	837
6165195	MINDEN	44.93	78.72	900
6065250	MONETVILLE	46.15	80.30	725
6145267	MONTICELLO	43.97	80.40	1580
6105460	MORRISBURG	44.92	75.18	268
6135583	NEW GLASGOW	42.52	81.63	650
6135638	NIAGARA FALLS	43.13	79.08	600
6085682	NORTH BAY	46.32	79.47	660
6155790	ORANGEVILLE MOE	43.92	80.08	1350
6115820	ORILLIA TS	44.62	79.42	720
6155854	ORONO	43.97	78.62	485
6106052	OTTAWA LEMIEUX ISLAND	45.42	75.73	200
6106090	OTTAWA NRC	45.45	75.62	320
6126210	PAISLEY	44.27	81.37	801
6116254	PARRY SOUND	45.33	80.00	635
6136335	PELEE ISLAND	41.75	82.68	575
6166428	PETERBOROUGH DOBBIN TS	44.32	78.40	800
6166450	PETERBOROUGH STP	44.28	78.32	630
6126499	PETROLIA TOWN	42.88	82.17	660
6156515	PICKERING AUDLEY	43.90	79.05	360
6156533	PICTON	44.02	77.13	250
6156545	PINE GROVE	43.80	79.58	600
6076572	PORCUPINE ONT HYDRO	48.47	81.27	980
6136606	PORT COLBORNE	42.88	79.25	575
6136626	PORT DALHOUSIE	43.18	79.27	300
6136643	PORT DOVER	42.78	80.22	610
6156670	PORT HOPE	43.95	78.28	265
6136694	PORT STANLEY	42.67	81.22	600
6146711	PRESTON	43.40	80.42	955
6106779	PURDY	45.32	77.72	1610
6146939	REDICKVILLE	44.23	80.22	1725
6157012	RICHMOND HILL	43.88	79.45	764
6137147	RIDGETOWN	42.45	81.88	675
6137285	ST CATHARINES	43.20	79.25	300
6137306	ST CATHARINES POWER GLEN	43.12	79.25	400
6137361	ST THOMAS	42.78	81.17	775
6137399	ST WILLIAMS	42.70	80.45	700
6157685	SHARON	44.10	79.43	861
6127887	SOUTHAMPTON	44.50	81.37	610
6097915	SOUTH BAYMOUTH	45.58	82.02	596
6107955	SOUTH MOUNTAIN	44.97	75.48	278
6148105	STRATFORD MOE	43.37	81.00	1160
6148120	STRATHROY	42.95	81.65	750
6158255	THORNHILL GRANDVIEW	43.80	79.42	654
6138270	TILLSONBURG MOE	42.85	80.72	700
6158370	TORONTO ASHBRIDGES BAY	43.67	79.32	243
6158386	TORONTO BEVERLEY HILLS	43.73	79.50	475
6158520	TORONTO ELLESMERE	43.77	79.27	538
6158665	TORONTO ISLAND A	43.63	79.40	251
6158762	TORONTO NORTHCLIFFE	43.68	79.45	550
6158779	TORONTO SUNNYBROOK	43.72	79.38	515
6158885	TRENTON ONT HYDRO	44.13	77.60	290
6068980	TURBINE	46.38	81.57	675
6159124	UXBRIDGE 2	44.12	79.10	886
6139143	VINELAND RITTENHOUSE	43.17	79.42	310
6139145	VINELAND STATION	43.18	79.40	260
6139265	WALLACEBURG	42.58	82.40	580
6149386	WATERLOO WPCP	43.48	80.52	1075
6139445	WELLAND	43.00	79.27	575
6149455	WESTMINSTER TWP WPCP	42.92	81.22	850
6159575	WOODBRIDGE	43.80	79.60	540
6139600	WOODSLEE CDA	42.22	82.73	600
6129660	WROXETER	43.87	81.15	1100
QUEBEC				
7020040	ABERCORN	45.03	72.67	490
7060320	ARVIDA	48.43	71.17	335
7070451	BGE C LAC CHATEAUVERT	47.77	73.90	1255
7080452	BARRAGE DES QUINZE	47.55	79.23	870
7070454	BARRAGE GOUIN	48.35	74.10	1325
7050455	BARRAGE LAC MORIN	47.65	69.52	650
7070456	BARRAGE MATTAWIN	46.85	73.65	1200
7080468	BARRAGE TEMISCAMINGUE	46.72	79.10	595
7020560	BEAUCEVILLE	46.20	70.77	525
7080600	BELLETERRE	47.38	78.70	1055
7010720	BERTHIERVILLE	46.05	73.18	40
7020800	BISHOPTON	45.58	71.57	700
7020860	BROMPTONVILLE	45.50	71.97	425
7051200	CAUSAPSCAL	48.37	67.23	551

Station number	Station name	Latitude (degrees)	Longitude (degrees)	Elevation (feet)
QUEBEC (continued)				
7021320	CHARTIERVILLE	45.28	71.20	1700
7061440	CHICOUTIMI	48.42	71.08	50
7021580	CHUTE HEMMINGS	45.87	72.45	285
7011600	CHUTE PANET	46.87	71.87	500
7021840	COATICOOK	45.15	71.80	850
7022000	DISRAELI	45.92	71.32	1148
7012071	DONNACONA 2	46.68	71.73	150
7022160	DRUMMONDVILLE	45.88	72.48	270
7022280	EAST ANGUS	45.48	71.67	620
7022300	EAST HEREFORD	45.08	71.50	1175
7022320	FARNHAM	45.30	72.93	225
7032440	FORT COULONGE	45.82	76.75	350
7022800	GRANBY	45.38	72.70	550
7042840	GRANDES BERGERONNES	48.25	69.52	200
7082880	GRAND LAC VICTORIA	47.83	77.37	1080
7033160	HUBERDEAU	45.97	74.63	700
7023240	HUNTINGDON	45.05	74.17	161
7083480	KIPAWA LANIEL	47.05	79.27	920
7063560	LAC BOUCHETTE	48.27	72.18	1050
7033940	LA MACAZA A	46.40	74.78	804
7043960	LA MALBAIE	47.67	70.15	75
7024000	LAMBTON	45.83	71.08	1200
7024080	LA PATRIE	45.40	71.25	1250
7074240	LA TUQUE	47.40	72.78	499
7014290	LES CEDRES	45.30	74.05	155
7024320	LINGWICK	45.63	71.37	875
7024440	MAGOG	45.27	72.12	899
7084560	MANNEVILLE	48.55	78.48	1021
7024920	MILAN	45.58	71.12	1580
7035110	MONTEBELLO (SEDBERGH)	45.70	74.93	645
7035112	MONTEBELLO SEIGNIORY	45.65	74.95	172
7025257	MONTREAL JAR BOT	45.57	73.55	150
7025260	MONTREAL JEAN BREBEUF	45.50	73.62	435
7035360	MORIN HEIGHTS	45.92	74.27	950
7025440	NICOLET	46.20	72.62	100
7035520	NOMININGUE	46.38	75.05	1001
7035680	NOTRE DAME DU LAUS	46.12	75.63	700
7015730	OKA	45.50	74.07	300
7035760	OTTER LAKE	45.85	76.43	700
7036000	PERKINS	45.60	75.62	500
7026040	PHILIPSBURG	45.03	73.08	175
7036063	POINTE AU CHENE	45.65	74.80	150
7066080	PORTAGE DES ROCHES	48.30	71.22	540
7056240	PRICE	48.60	68.13	240
7076360	RAPIDE BLANC	47.80	72.97	909
7056600	RIVIERE BLEUE	47.43	69.03	699
7016800	ST ALBAN	46.72	72.08	250
7066820	ST AMBROISE	48.57	71.33	400
7016840	STE ANNE DE LA PERADE	46.58	72.23	52
7016960	ST CHARLES DE MANDEVILLE	46.35	73.35	550
7017080	ST COME	46.28	73.75	801
7047250	ST FEREOL	47.12	70.83	750
7037400	ST JEROME	45.80	74.05	556
7017480	ST LIN DES LAURENTIDES	45.85	73.75	210
7057600	ST PAMPHILE	46.97	69.78	1273
7057680	ST RAPHAEL	46.82	70.75	350
7057720	STE ROSE DU DEGELIS	47.57	68.63	495
7017755	STE THERESE OUEST	45.65	73.88	200
7017760	ST TITE	46.73	72.57	465
7047770	ST URBAIN	47.57	70.55	300
7018000	SHAWINIGAN	46.57	72.75	400
7038040	SHAWVILLE	45.62	76.47	550
7068160	SHIPSHAW	48.45	71.22	75
7048320	TADOUSSAC	48.15	69.70	230
7038500	THURSO	45.60	75.27	180
7058520	TRINITE DES MONTS	48.13	68.47	850
7058560	TROIS PISTOLES	48.15	69.13	150
7018564	TROIS RIVIERES	46.37	72.60	175
7018577	VALCARTIER FES	46.95	71.50	605
7038880	WALTHAM	45.92	76.92	369
NEW BRUNSWICK				
8101200	DOAKTOWN	46.55	66.15	125
8101301	EDMUNDSTON FRASER CO	47.37	68.33	500
8101904	GRAND FALLS DRUMMOND	47.03	67.70	750
8102600	MCADAM	45.58	67.33	459
8102800	MCGIVNEY	46.37	66.57	580
8103000	MINTO	46.03	66.03	75
8103400	MUSQUASH	45.20	66.33	50
8103500	NEPISIGUIT FALLS	47.40	65.78	348
8103800	OROMOCTO	45.83	66.47	150
8103845	PENNFIELD	45.10	66.73	75
8104600	ST ANDREWS	45.08	67.08	50
8104700	ST GEORGE	45.13	66.83	110



NRCC-Cornell Atlas of Snowfall and Snow Depth

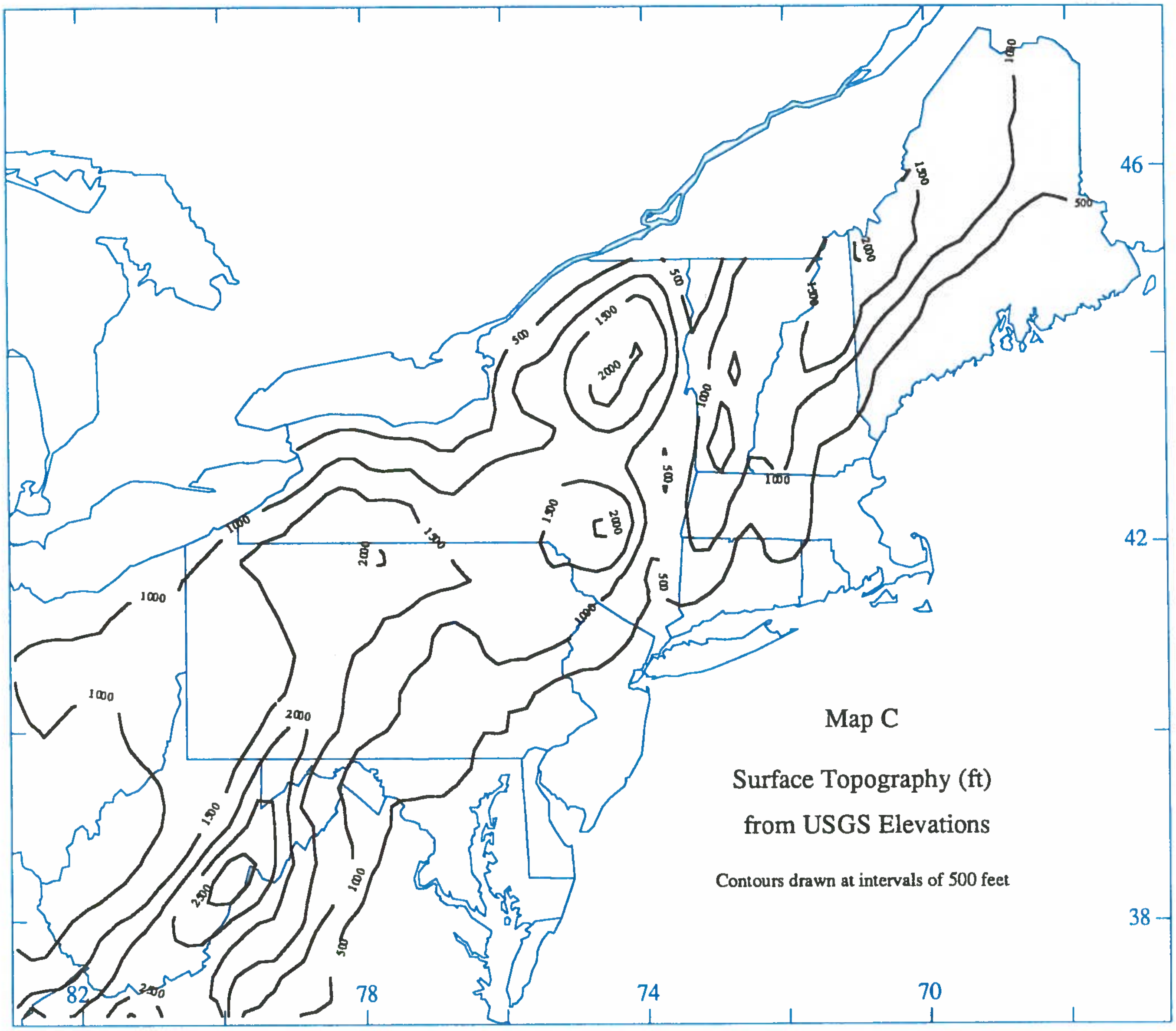


Map B

Surface Topography (ft)
from Station Elevations

Contours drawn at intervals of 500 feet

NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

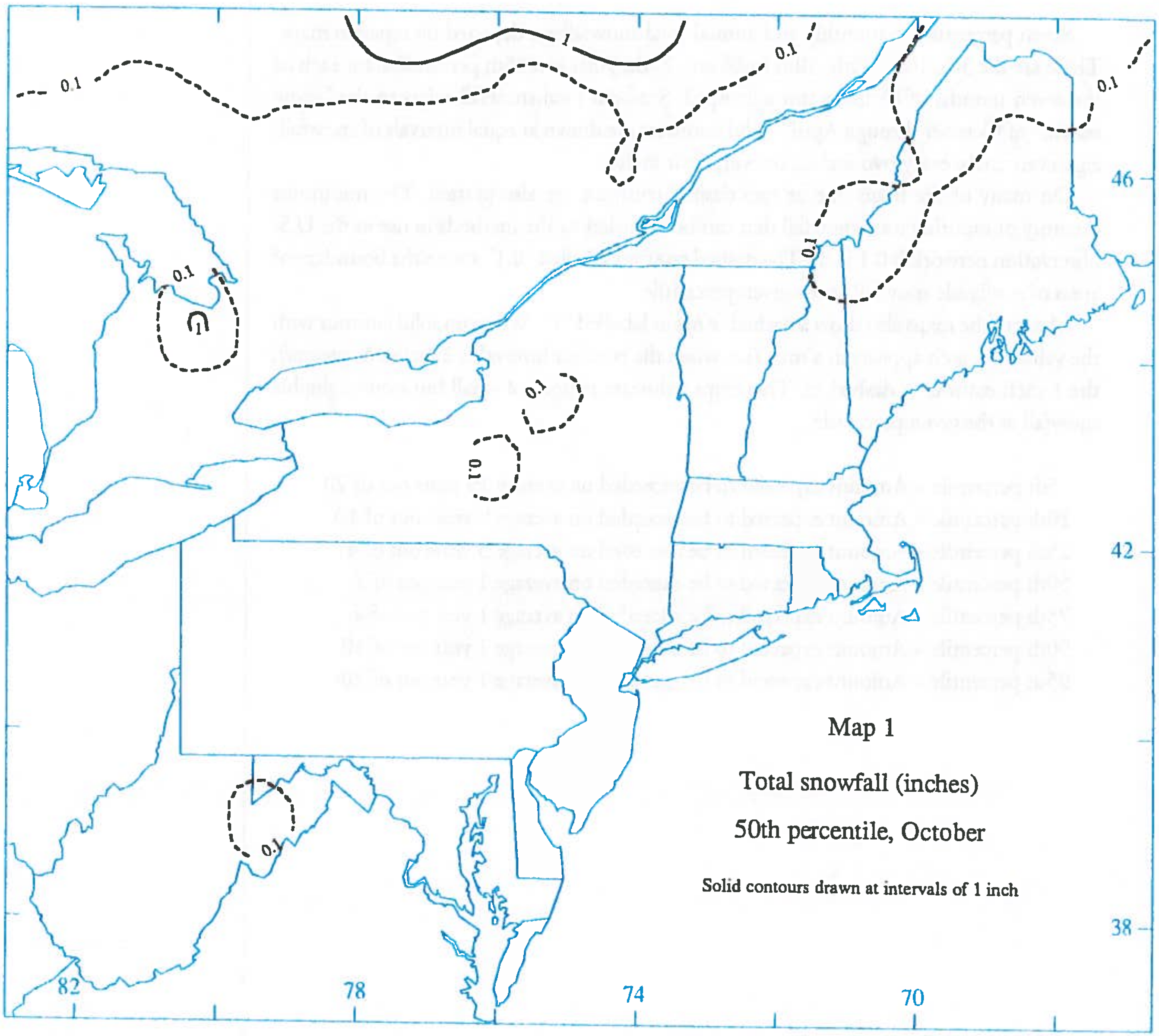
PERCENTILES OF MONTHLY AND SEASONAL TOTAL SNOWFALL

Seven percentiles of monthly and annual total snowfall are depicted on separate maps. These are the 5th, 10th, 25th, 50th (median), 75th, 90th and 95th percentiles, for each of the seven months of October through April. Seasonal total snowfall refers to the "snow season" of October through April. Solid contours are drawn at equal intervals of snowfall, e.g., every inch, every two inches, or every four inches.

On many of the maps one or two dashed contours are also plotted. The minimum quantity of monthly total snowfall that can be recorded by the methods in use in the U.S. observation network is 0.1 inch. The dashed contour labelled "0.1" shows the boundary of areas of negligible snowfall at the given percentile.

Many of the maps also show a dashed contour labelled "1". When no solid contour with the value of 1 inch appears in a map (i.e. when the contour interval is 2 inches or greater), the 1-inch contour is dashed in. This helps delineate regions of small but non-negligible snowfall at the given percentile.

5th percentile = Amount expected to be exceeded on average 19 years out of 20
10th percentile = Amount expected to be exceeded on average 9 years out of 10
25th percentile = Amount expected to be exceeded on average 3 years out of 4
50th percentile = Amount expected to be exceeded on average 1 year out of 2
75th percentile = Amount expected to be exceeded on average 1 year out of 4
90th percentile = Amount expected to be exceeded on average 1 year out of 10
95th percentile = Amount expected to be exceeded on average 1 year out of 20

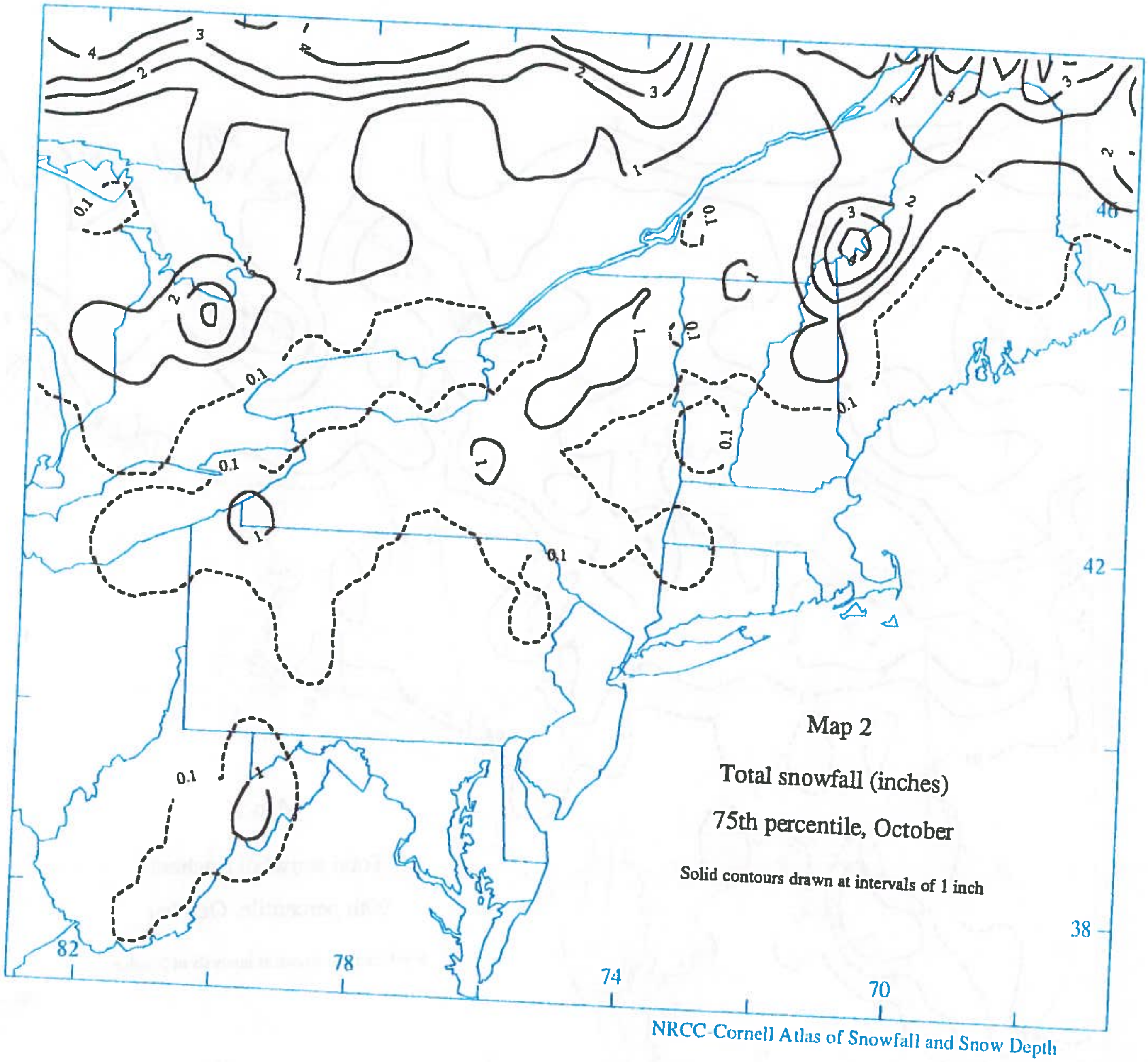


Map 1

Total snowfall (inches)

50th percentile, October

Solid contours drawn at intervals of 1 inch

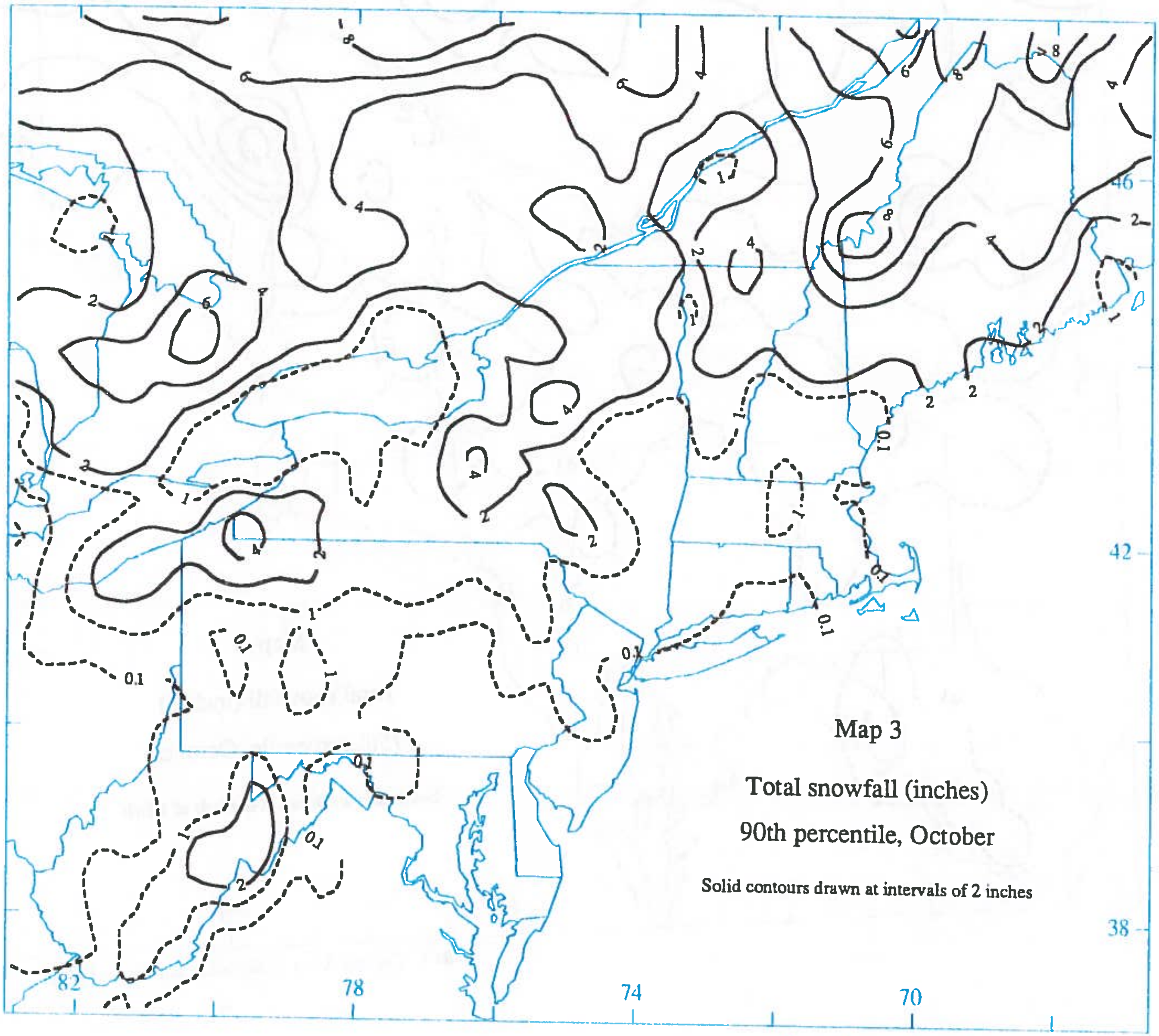


Map 2

Total snowfall (inches)

75th percentile, October

Solid contours drawn at intervals of 1 inch



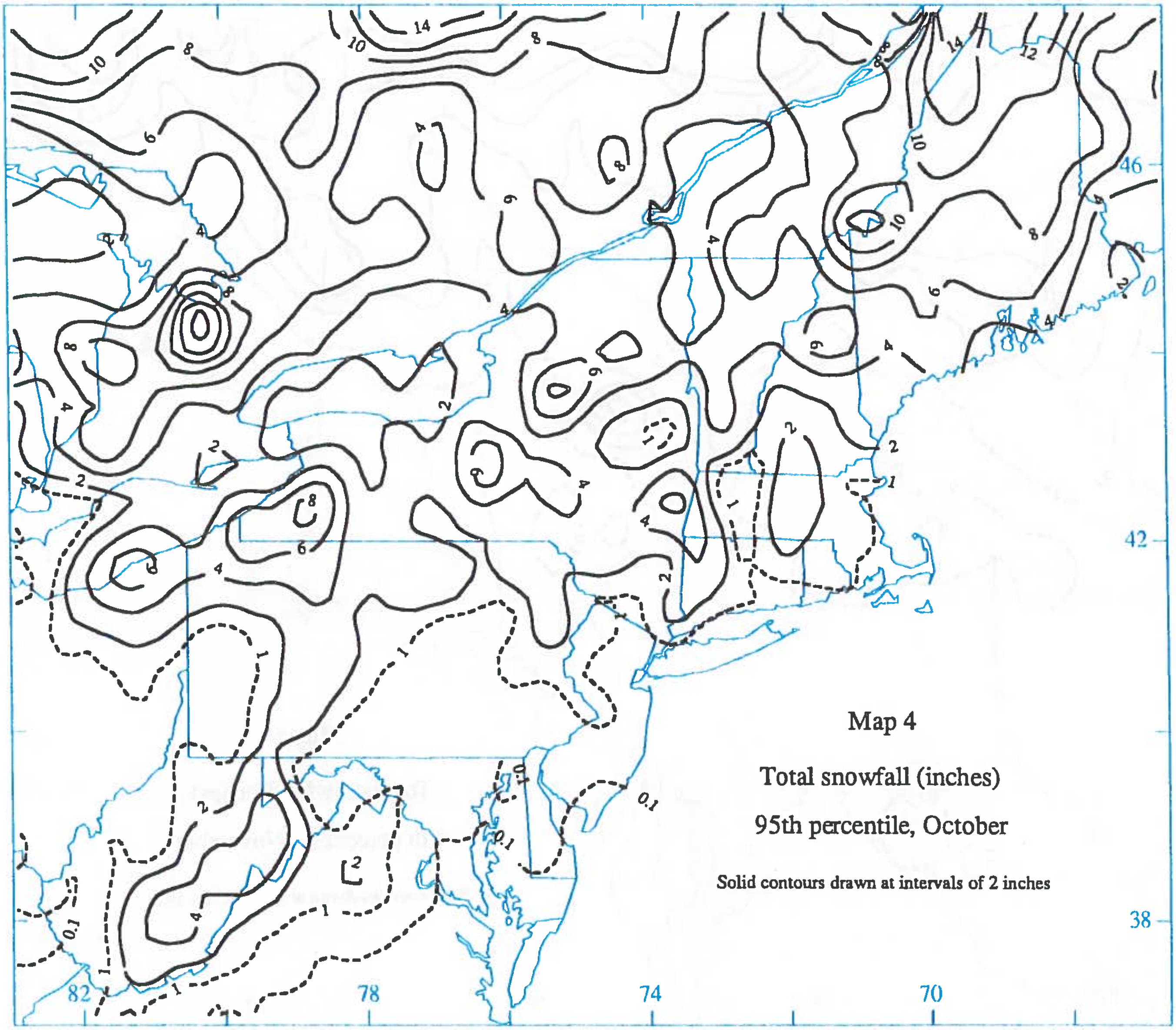
Map 3

Total snowfall (inches)

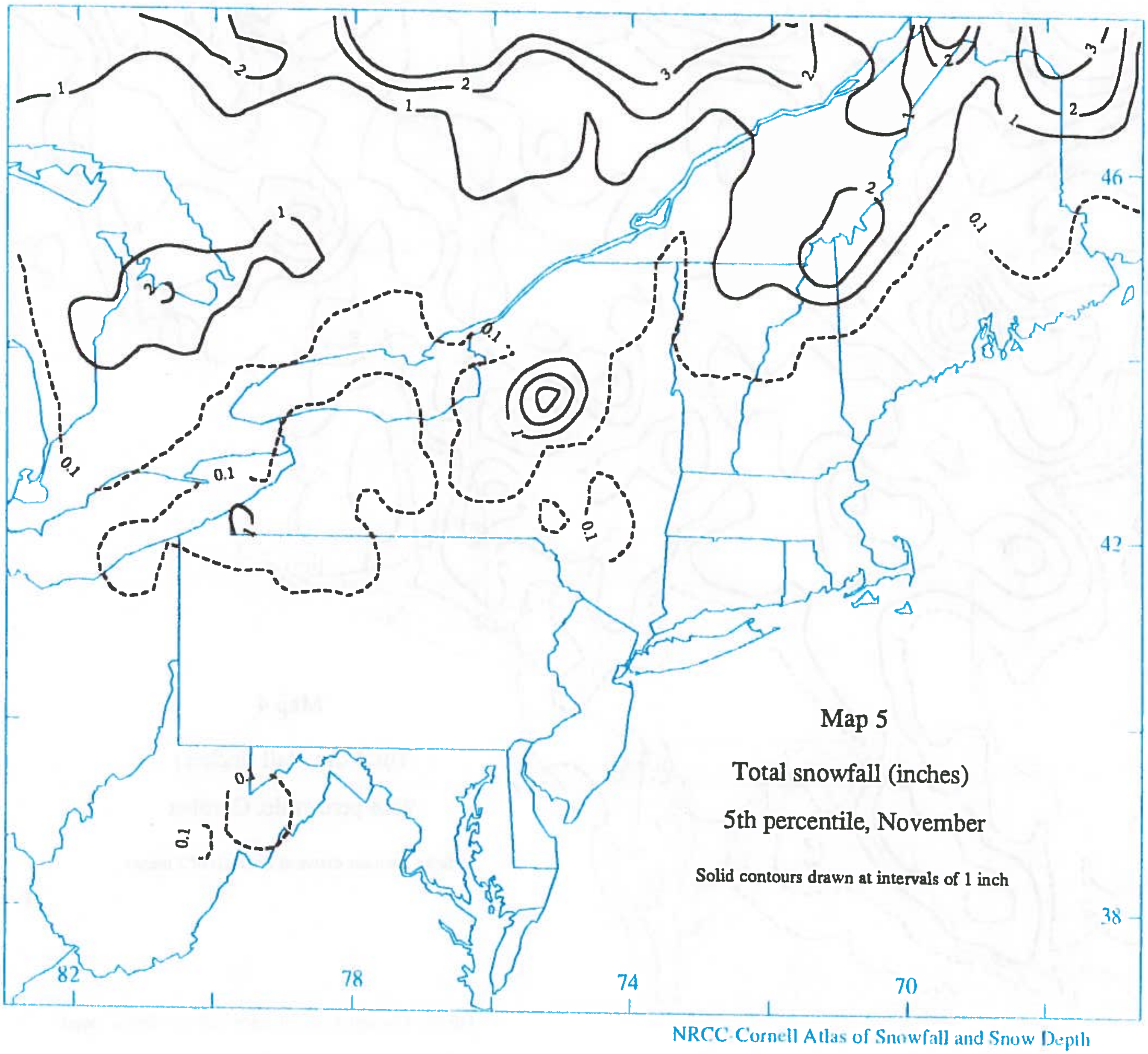
90th percentile, October

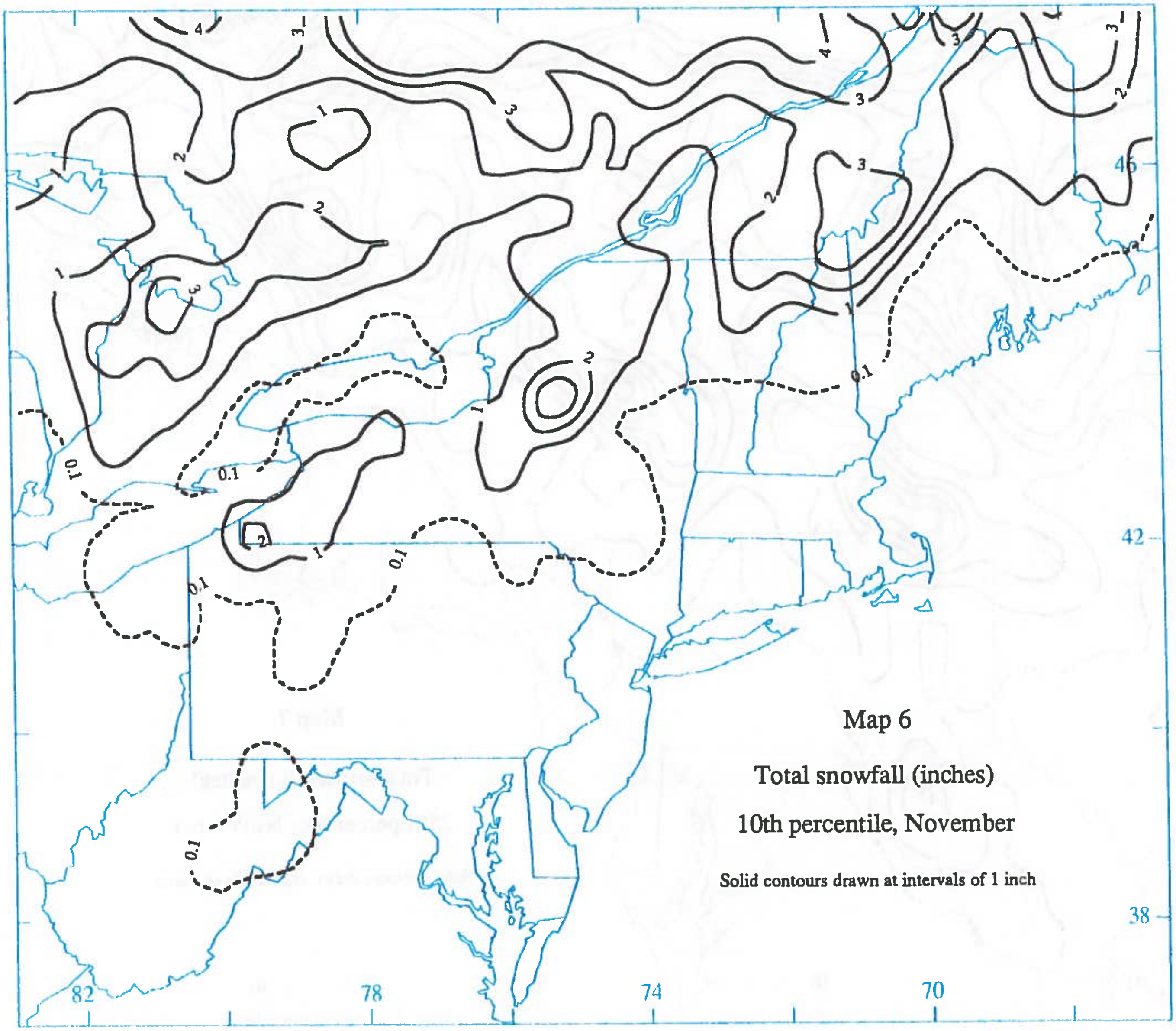
Solid contours drawn at intervals of 2 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth

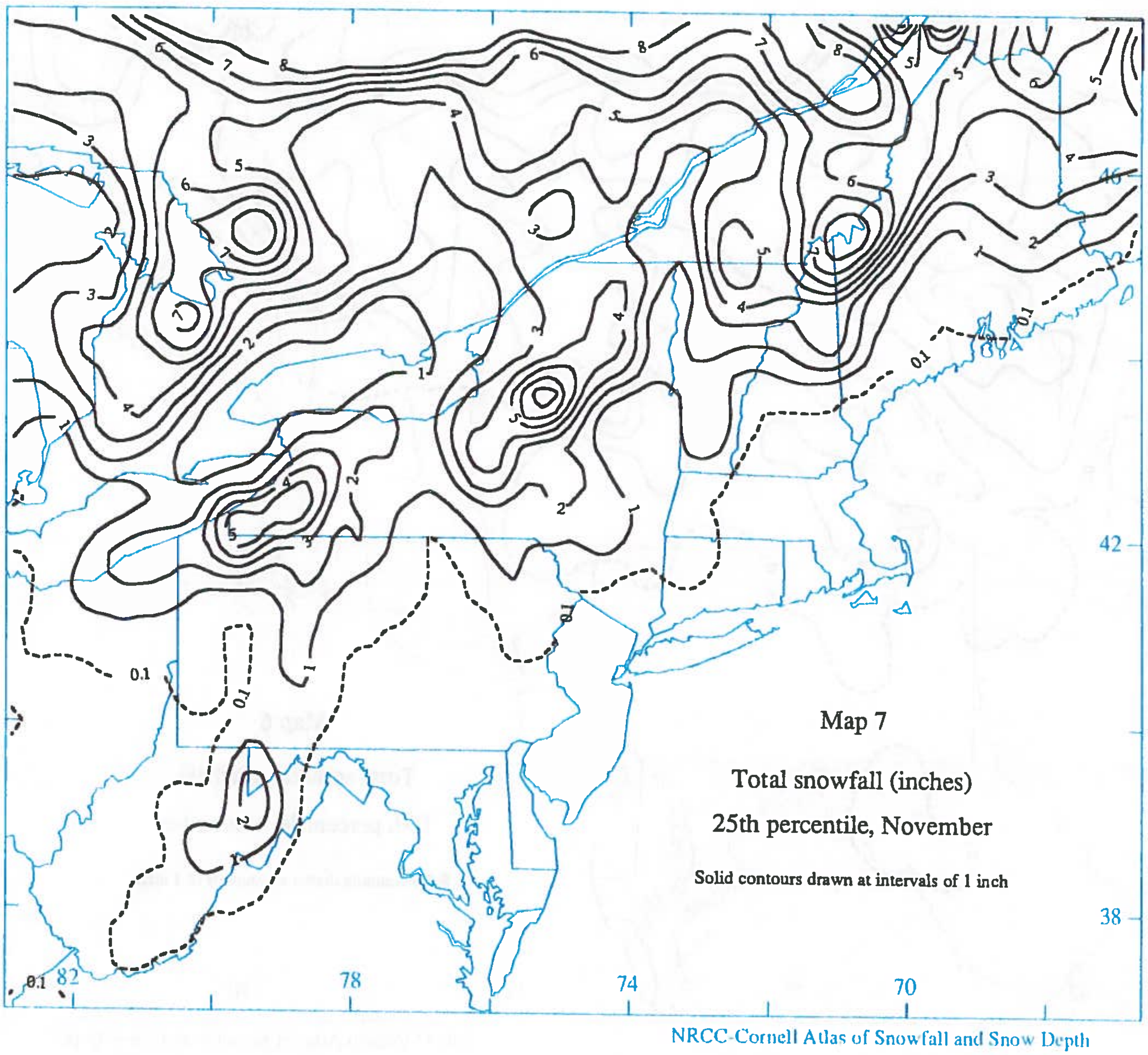


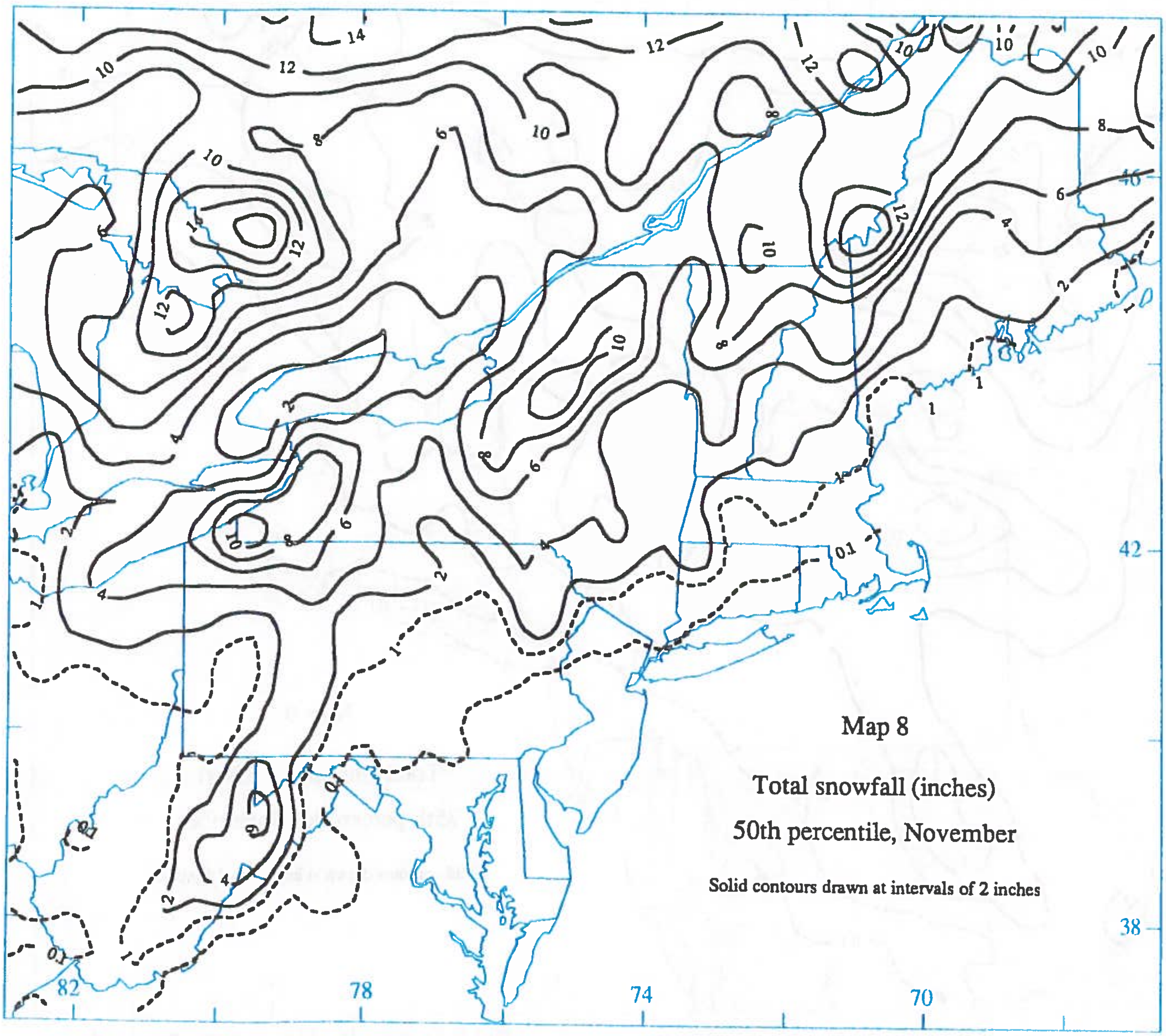
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 5
Total snowfall (inches)
5th percentile, November
Solid contours drawn at intervals of 1 inch
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 7
Total snowfall (inches)
25th percentile, November
Solid contours drawn at intervals of 1 inch
82
78
74
70
46
42
38
NRCC-Cornell Atlas of Snowfall and Snow Depth



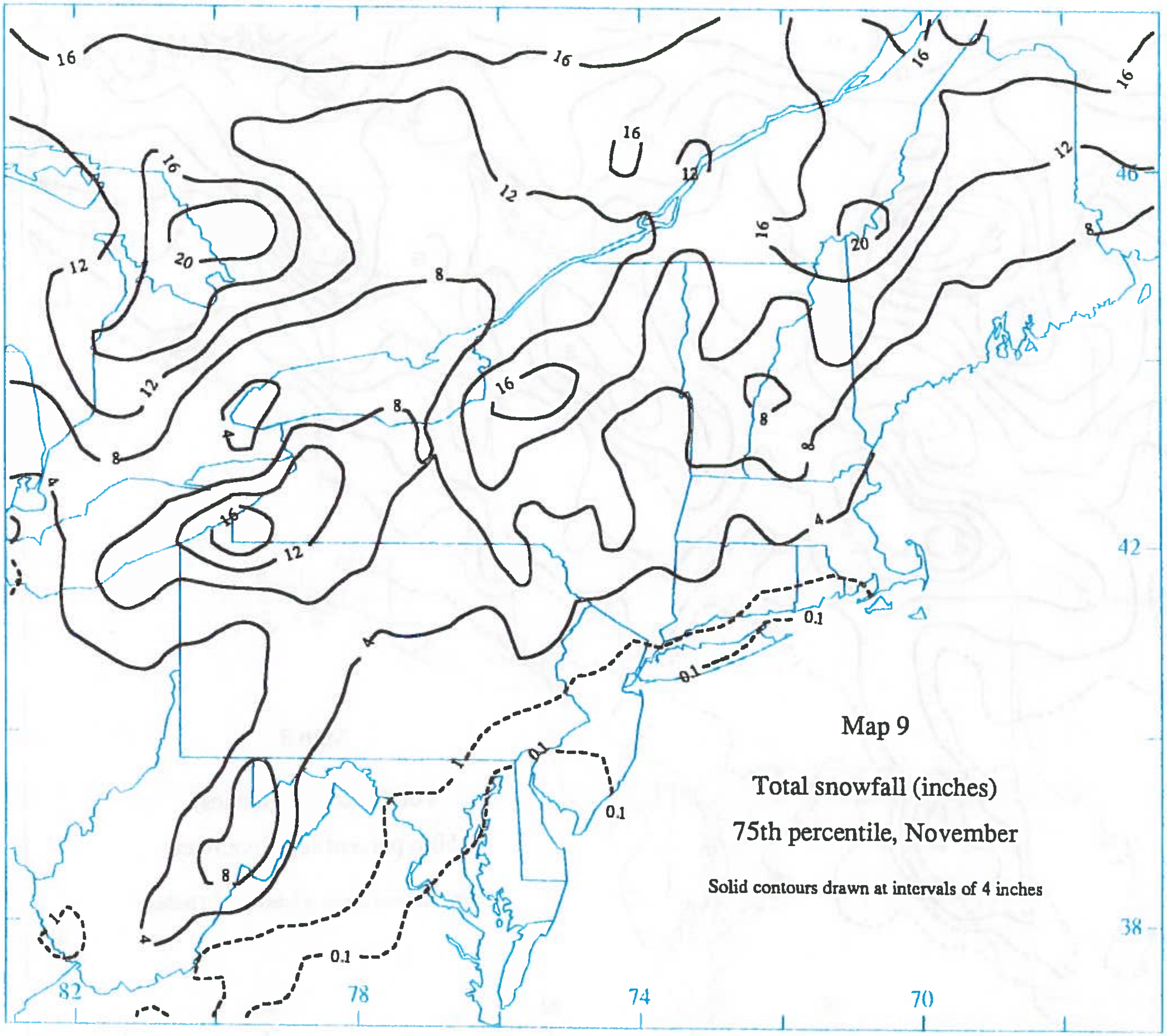
Map 8

Total snowfall (inches)

50th percentile, November

Solid contours drawn at intervals of 2 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



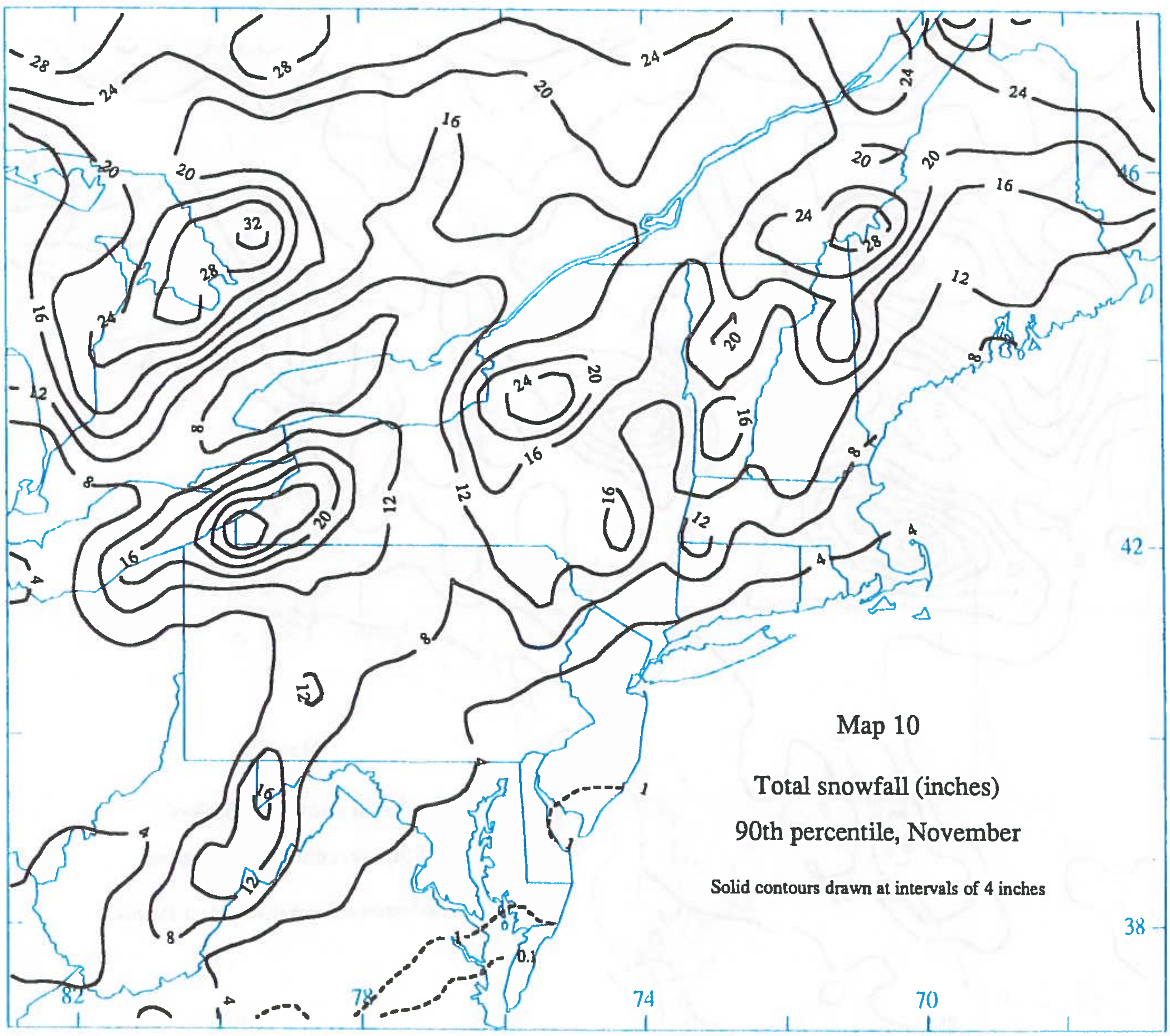
Map 9

Total snowfall (inches)

75th percentile, November

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



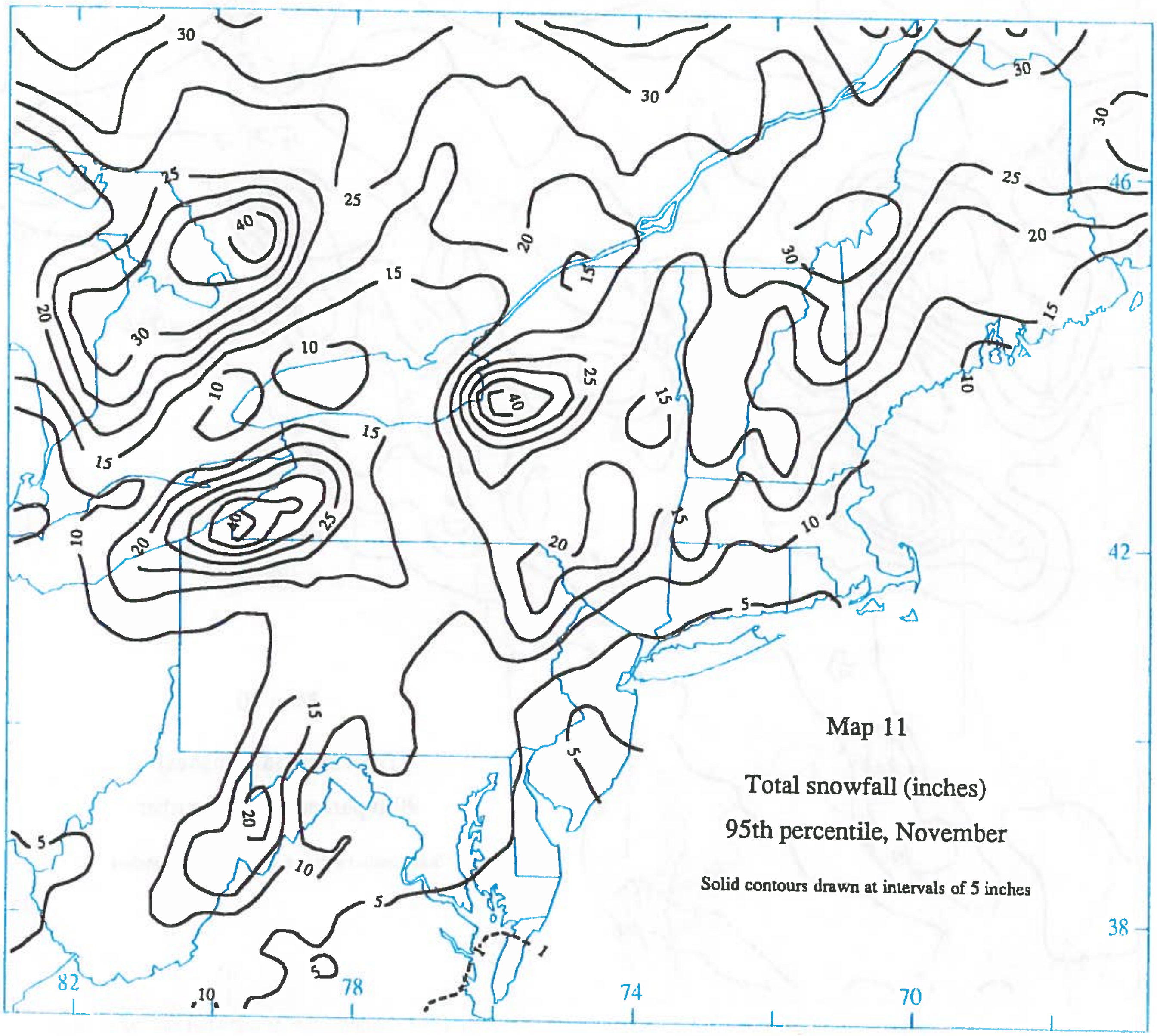
Map 10

Total snowfall (inches)

90th percentile, November

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



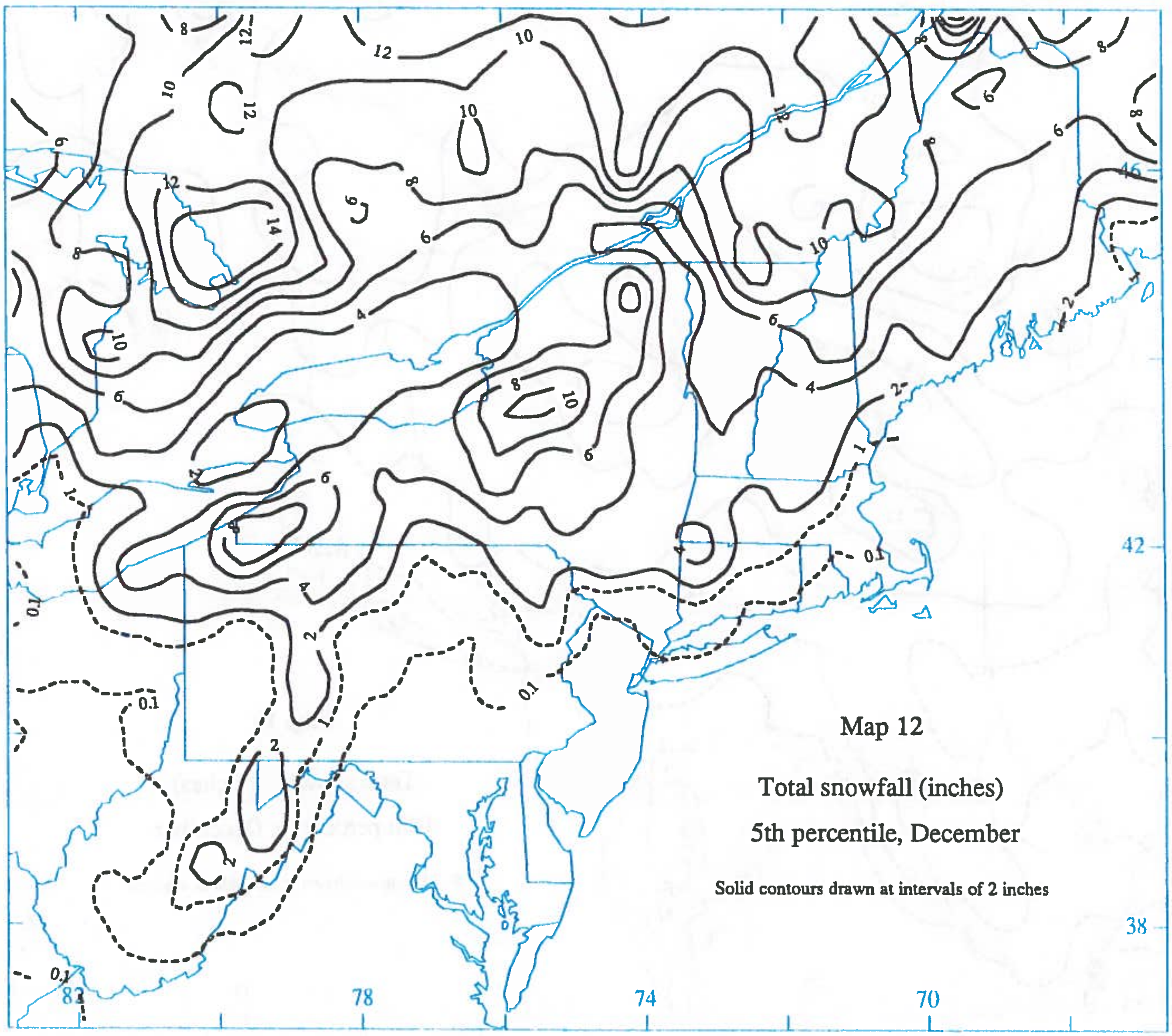
Map 11

Total snowfall (inches)

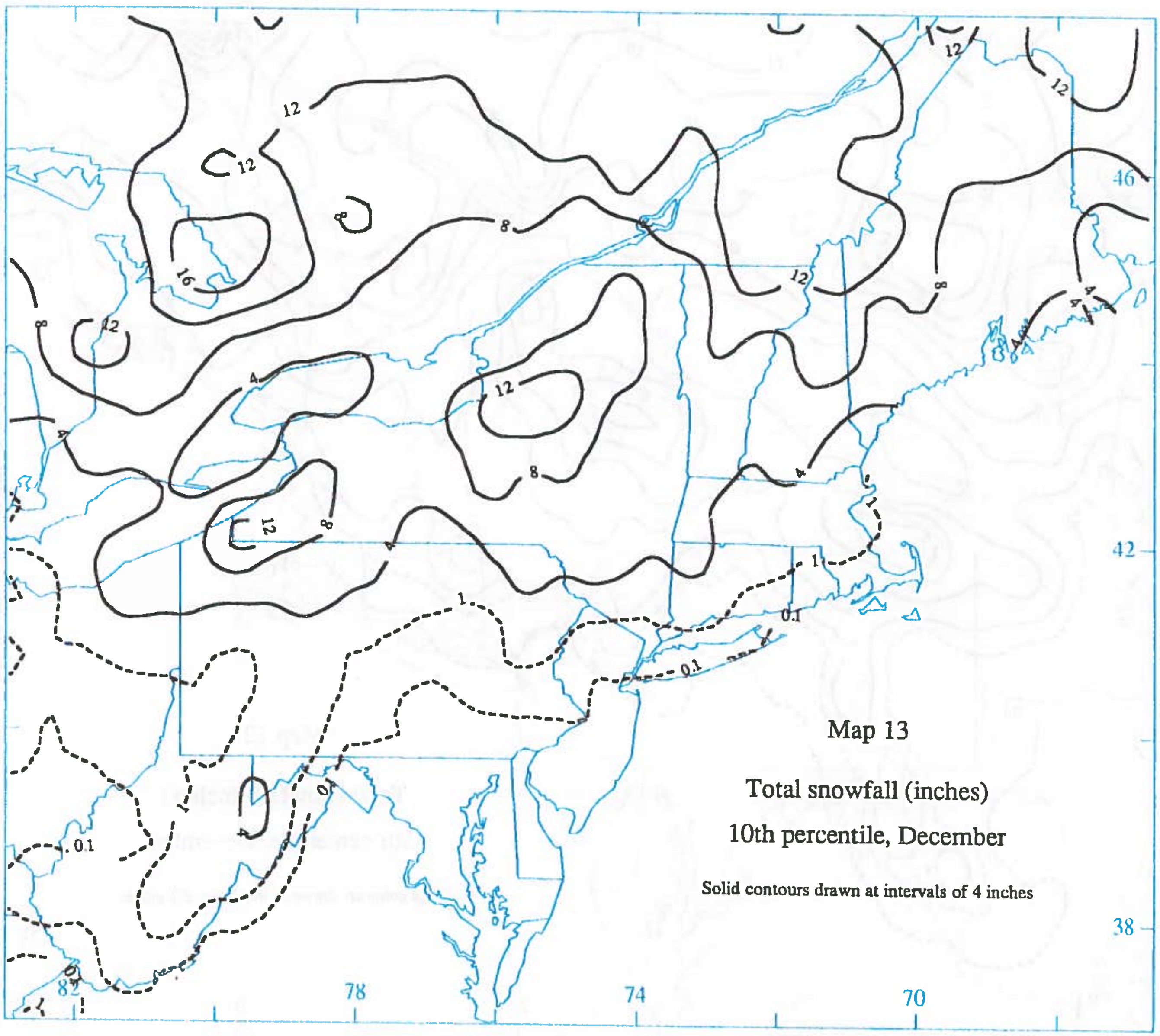
95th percentile, November

Solid contours drawn at intervals of 5 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

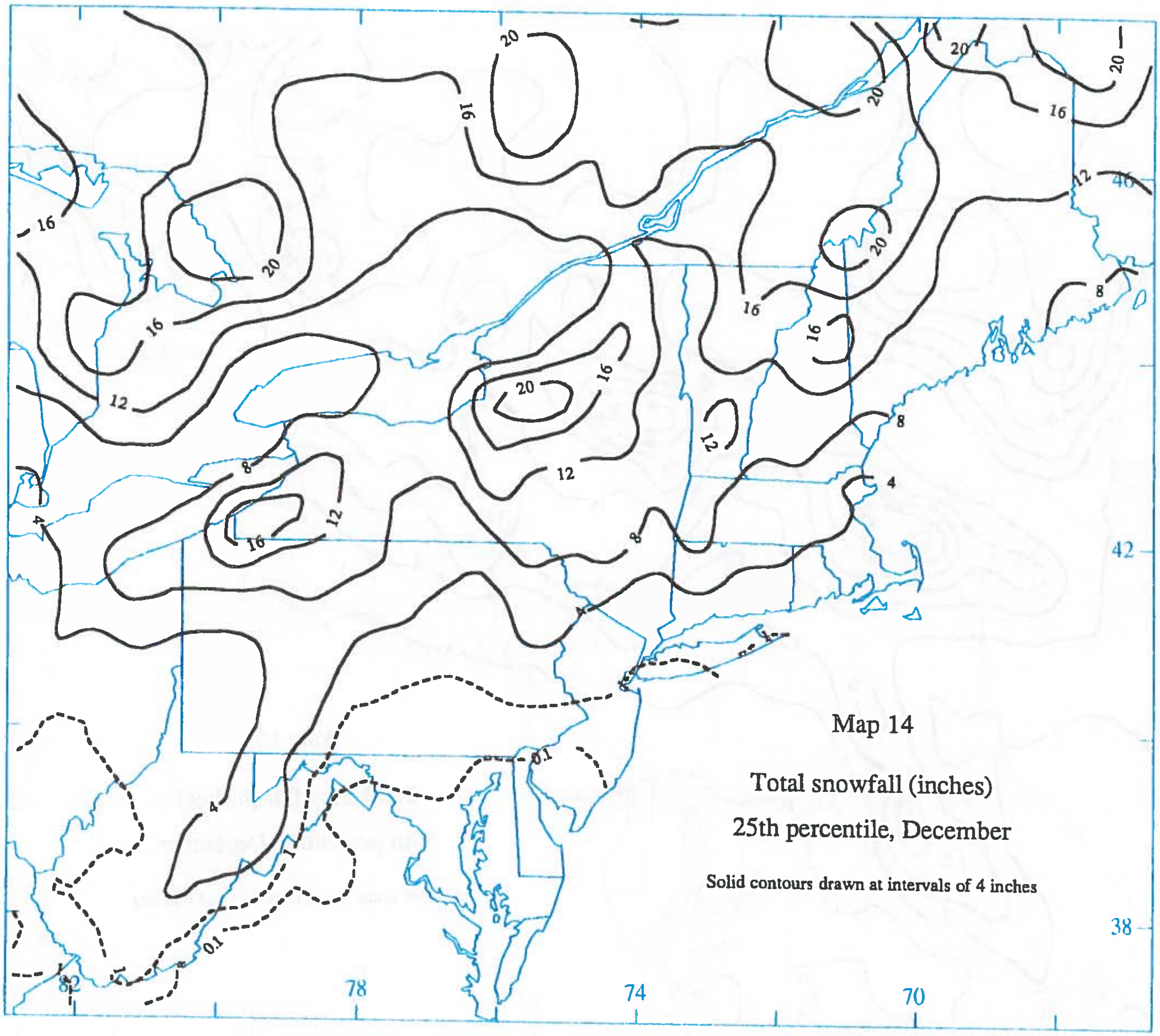


Map 13

Total snowfall (inches)

10th percentile, December

Solid contours drawn at intervals of 4 inches



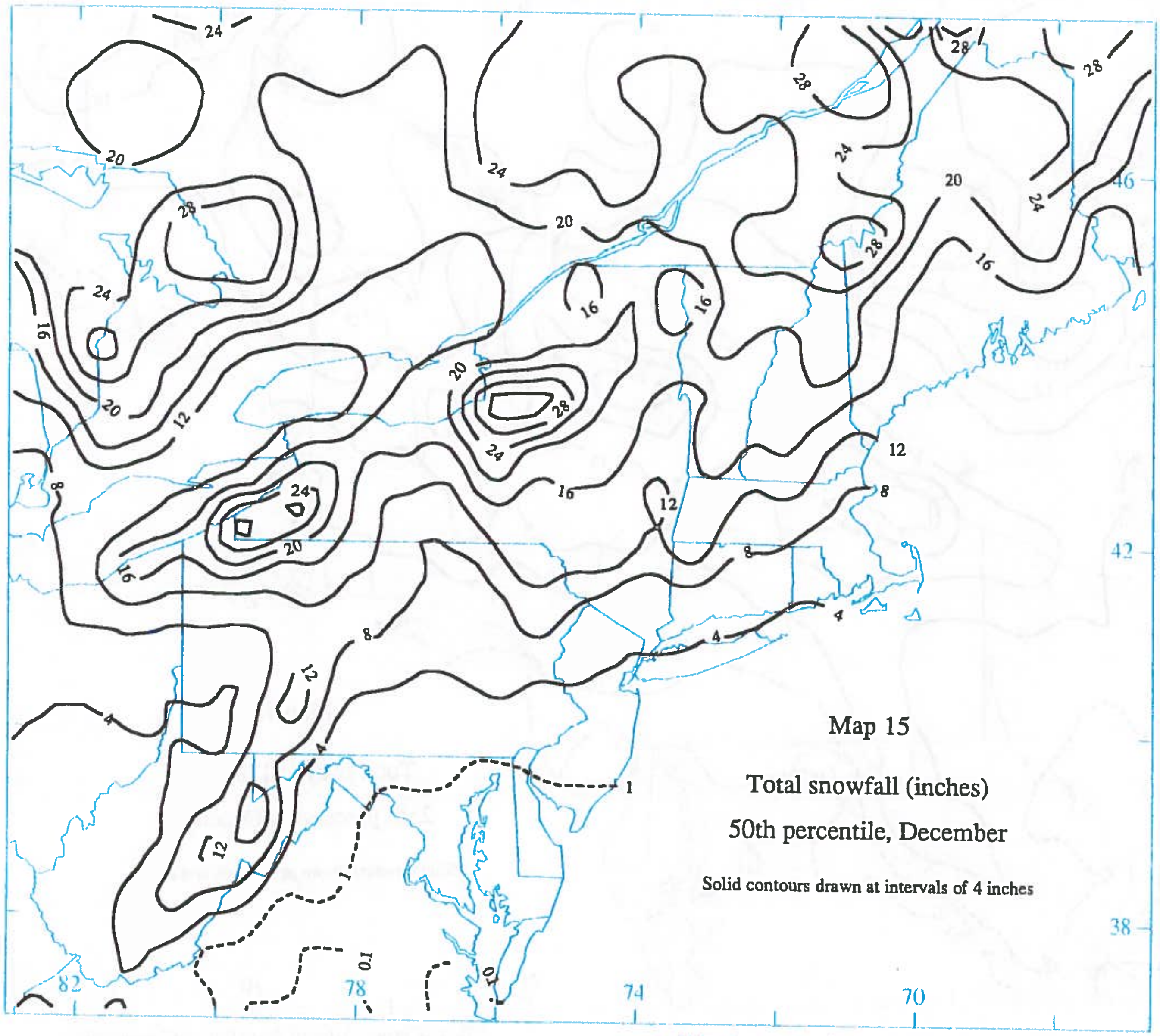
Map 14

Total snowfall (inches)

25th percentile, December

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



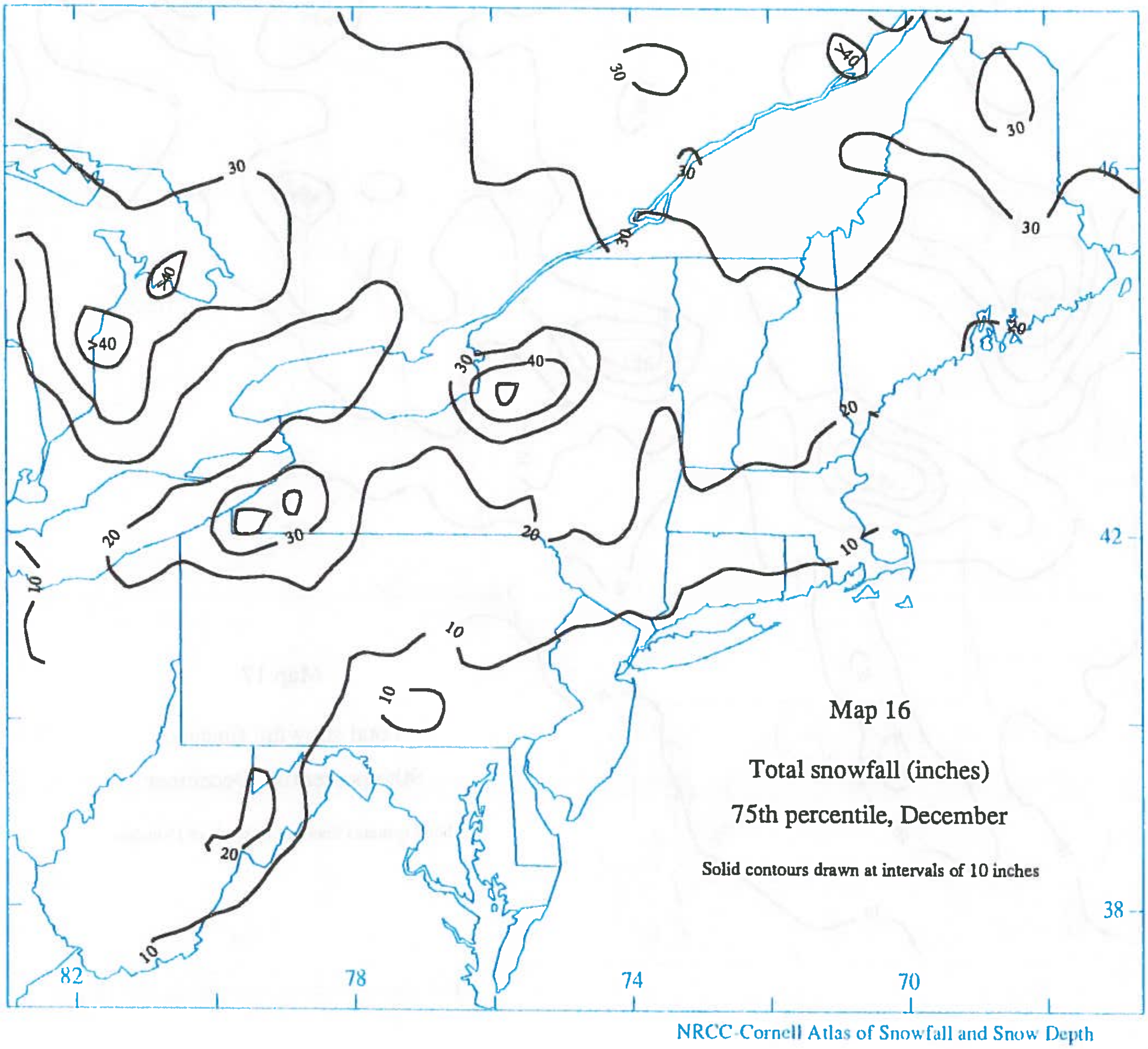
Map 15

Total snowfall (inches)

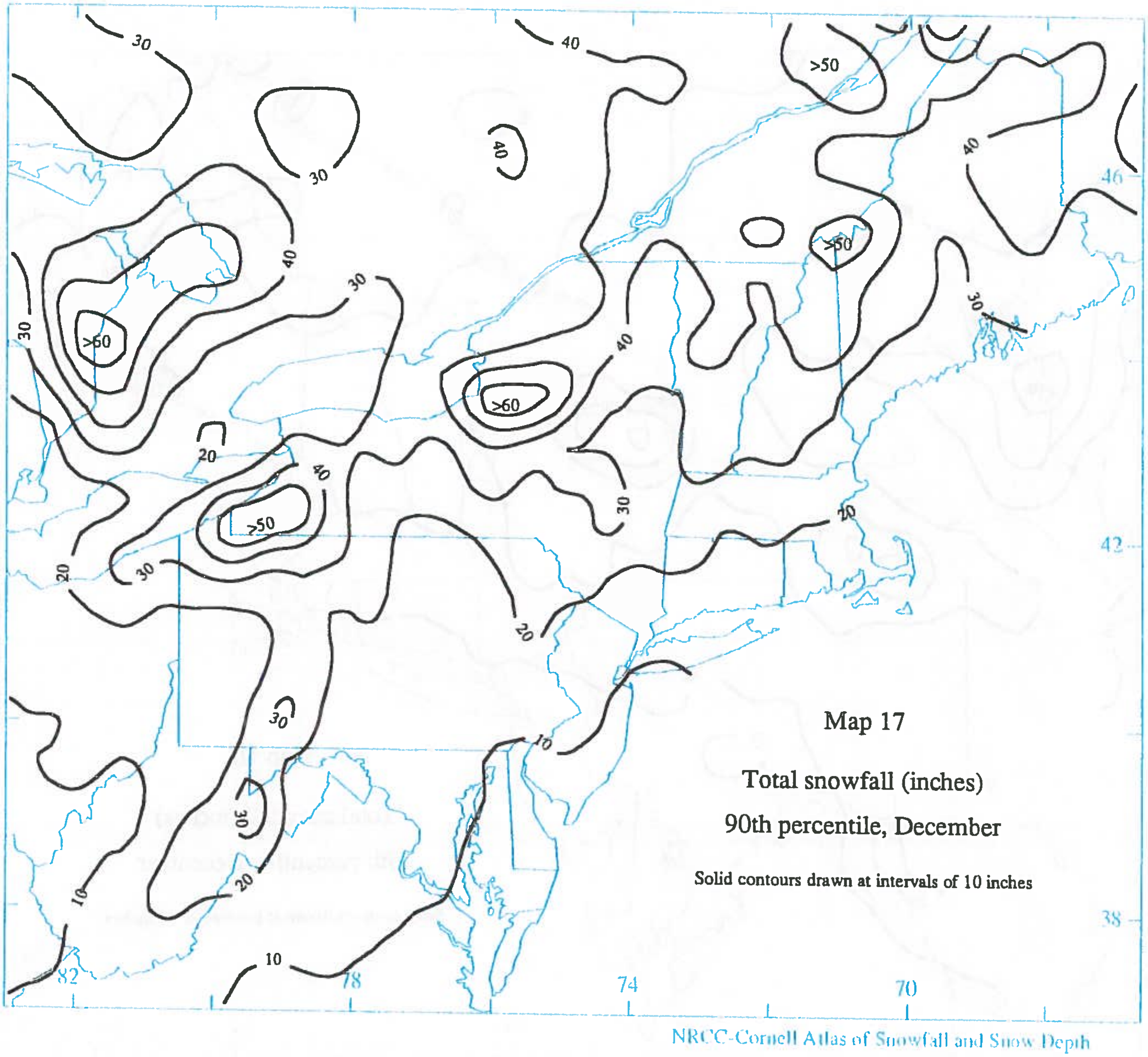
50th percentile, December

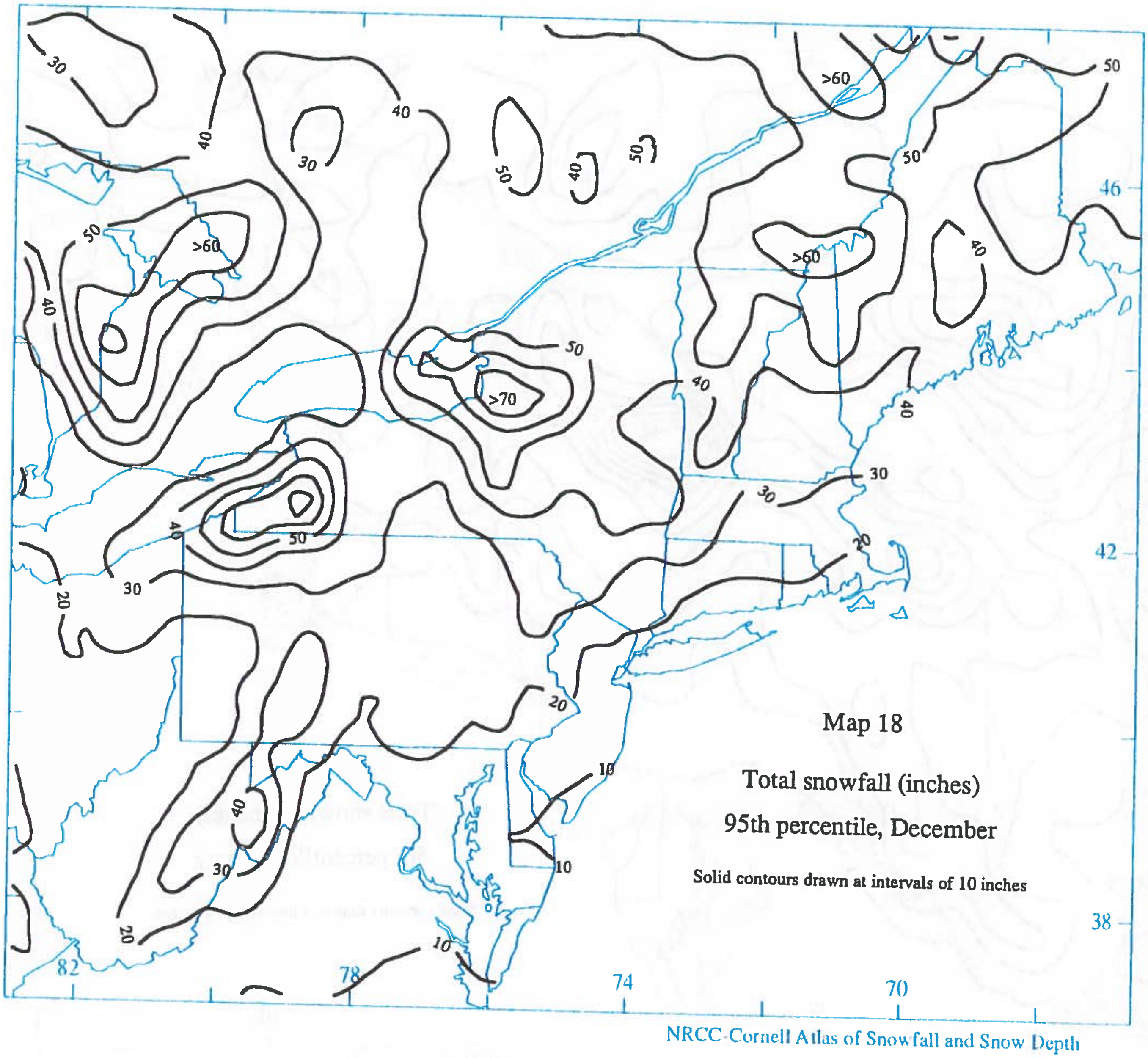
Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth

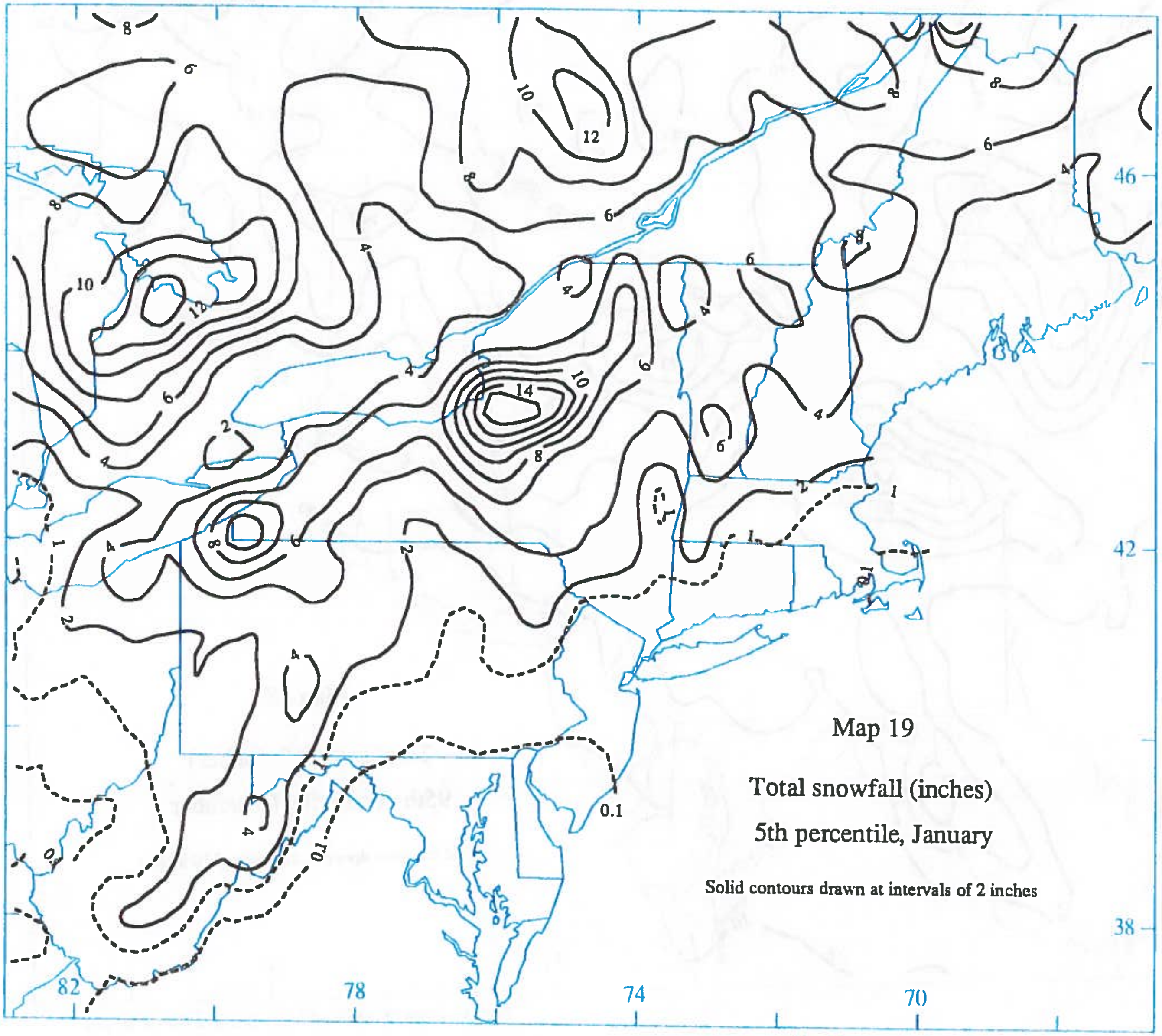


Map 16
Total snowfall (inches)
75th percentile, December
Solid contours drawn at intervals of 10 inches
46
42
38
82
78
74
70
30
>40
40
20
10
NRCC-Cornell Atlas of Snowfall and Snow Depth

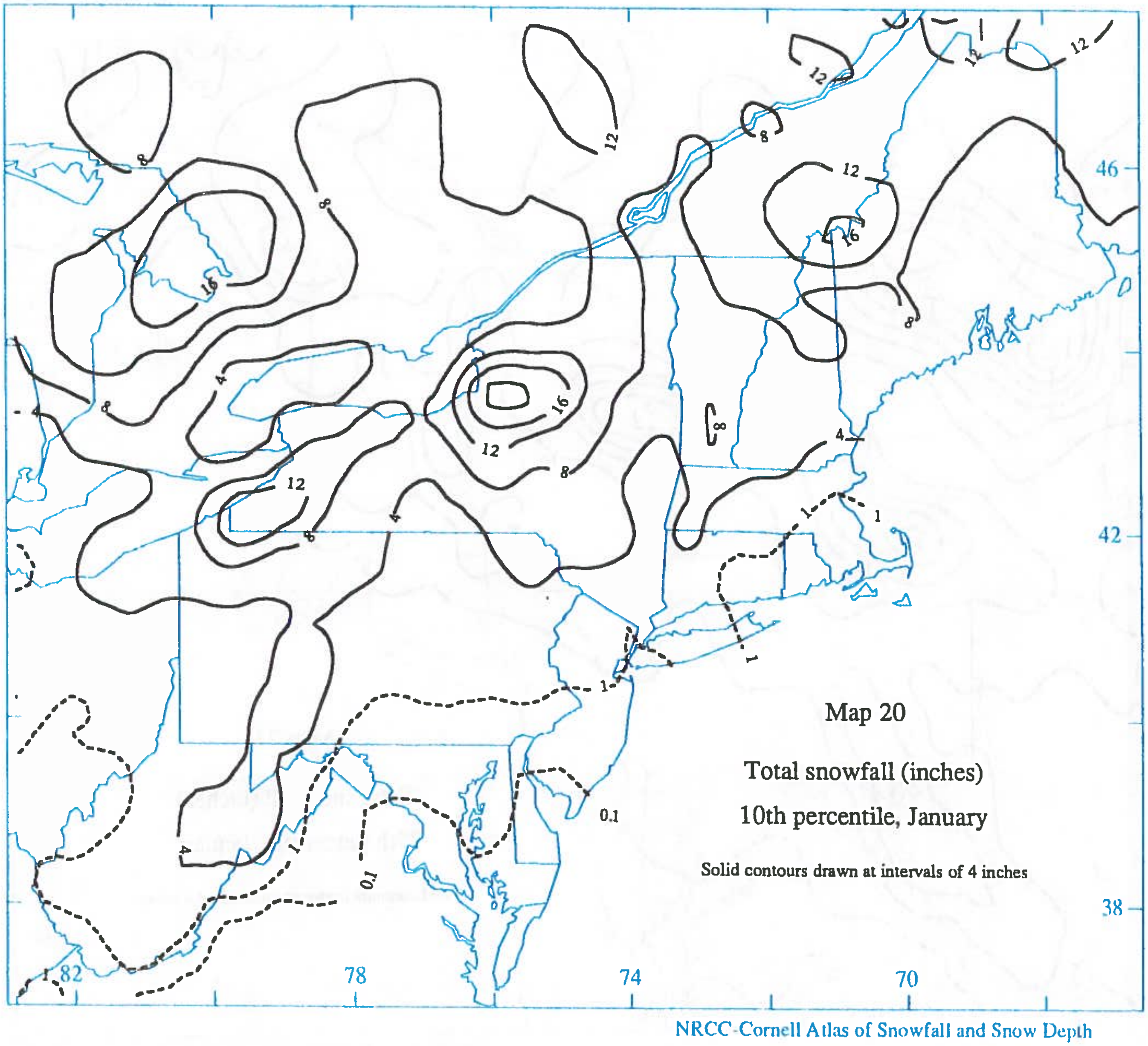

30
40
>50
40
30
>50
>60
30
40
30
40
>60
40
20
40
>50
30
30
20
20
20
30
10
30
20
10
10
82
78
74
70
46
42
38
Map 17
Total snowfall (inches)
90th percentile, December
Solid contours drawn at intervals of 10 inches
NRCC-Cornell Atlas of Snowfall and Snow Depth



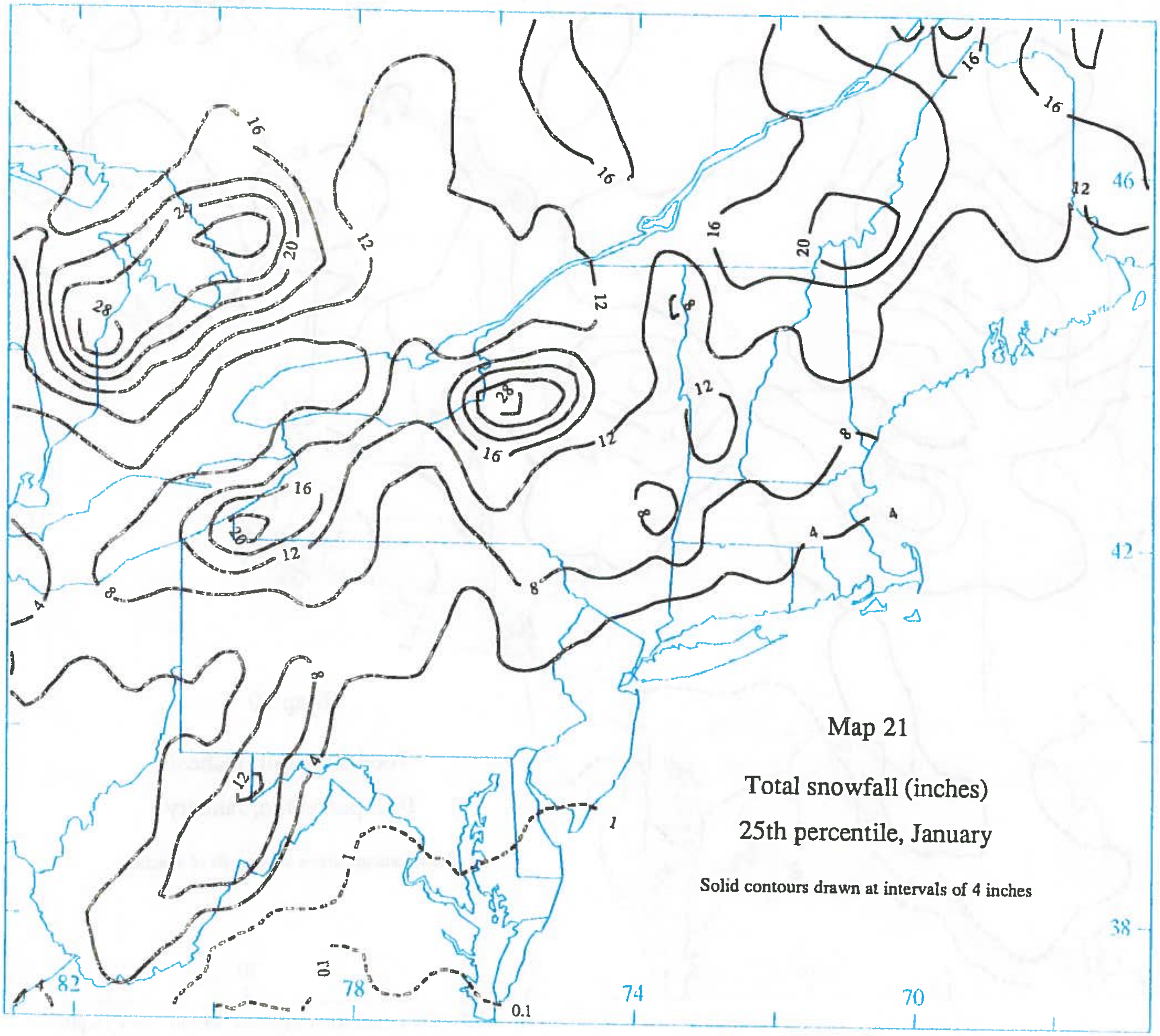
Map 18
Total snowfall (inches)
95th percentile, December
Solid contours drawn at intervals of 10 inches
>60
>70
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 20
Total snowfall (inches)
10th percentile, January
Solid contours drawn at intervals of 4 inches
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



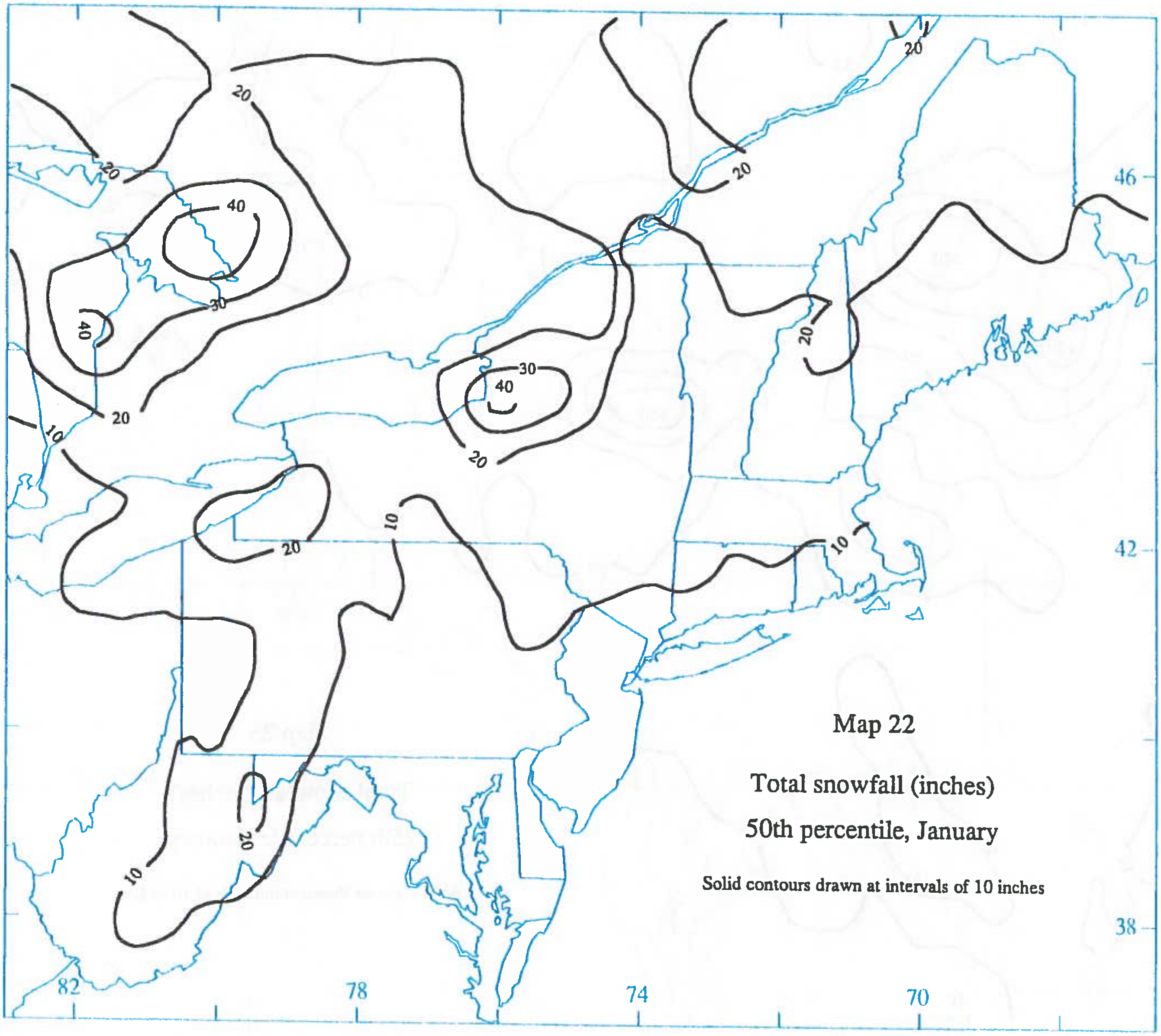
Map 21

Total snowfall (inches)

25th percentile, January

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



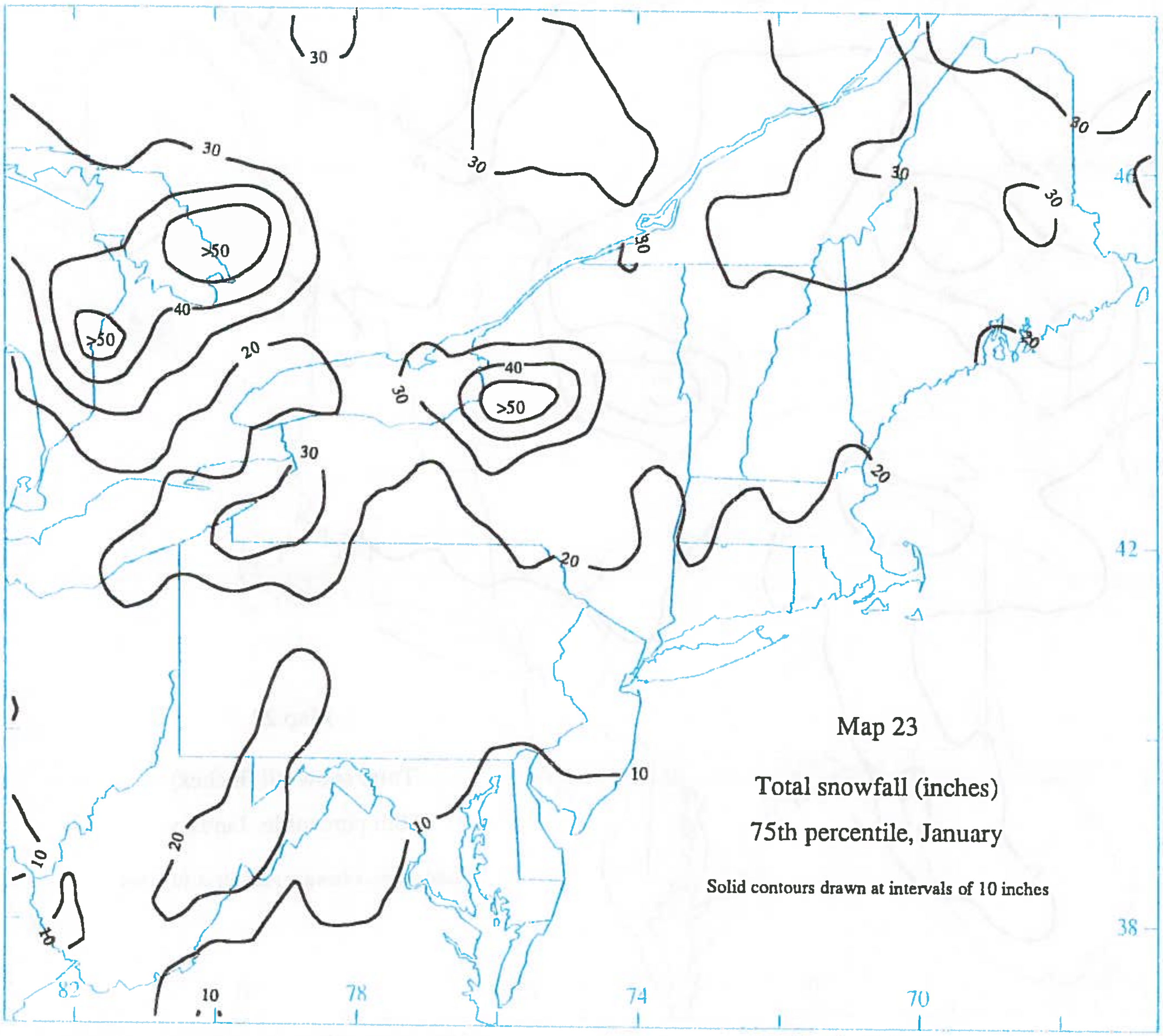
Map 22

Total snowfall (inches)

50th percentile, January

Solid contours drawn at intervals of 10 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



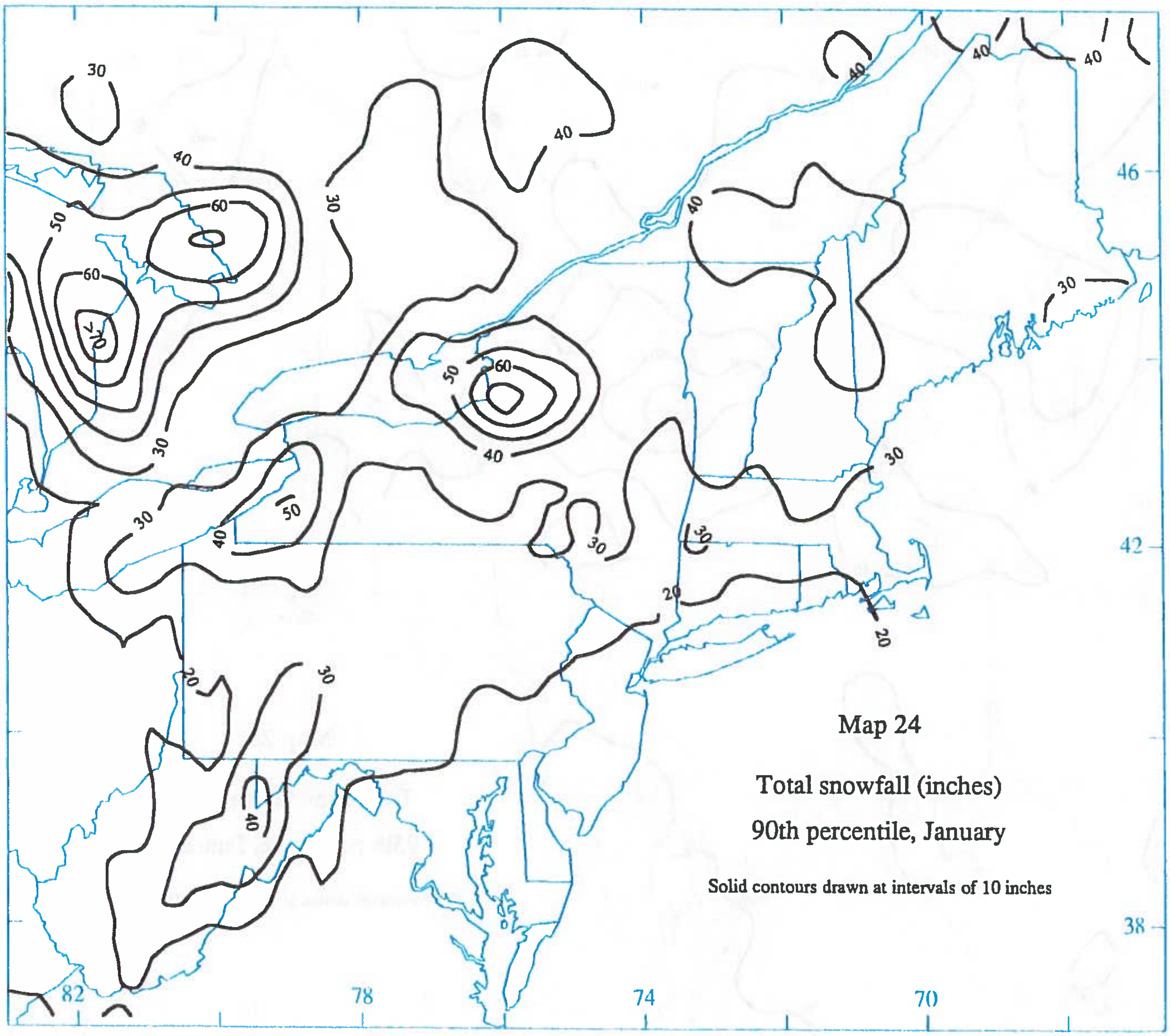
Map 23

Total snowfall (inches)

75th percentile, January

Solid contours drawn at intervals of 10 inches

NRCC Cornell Atlas of Snowfall and Snow Depth



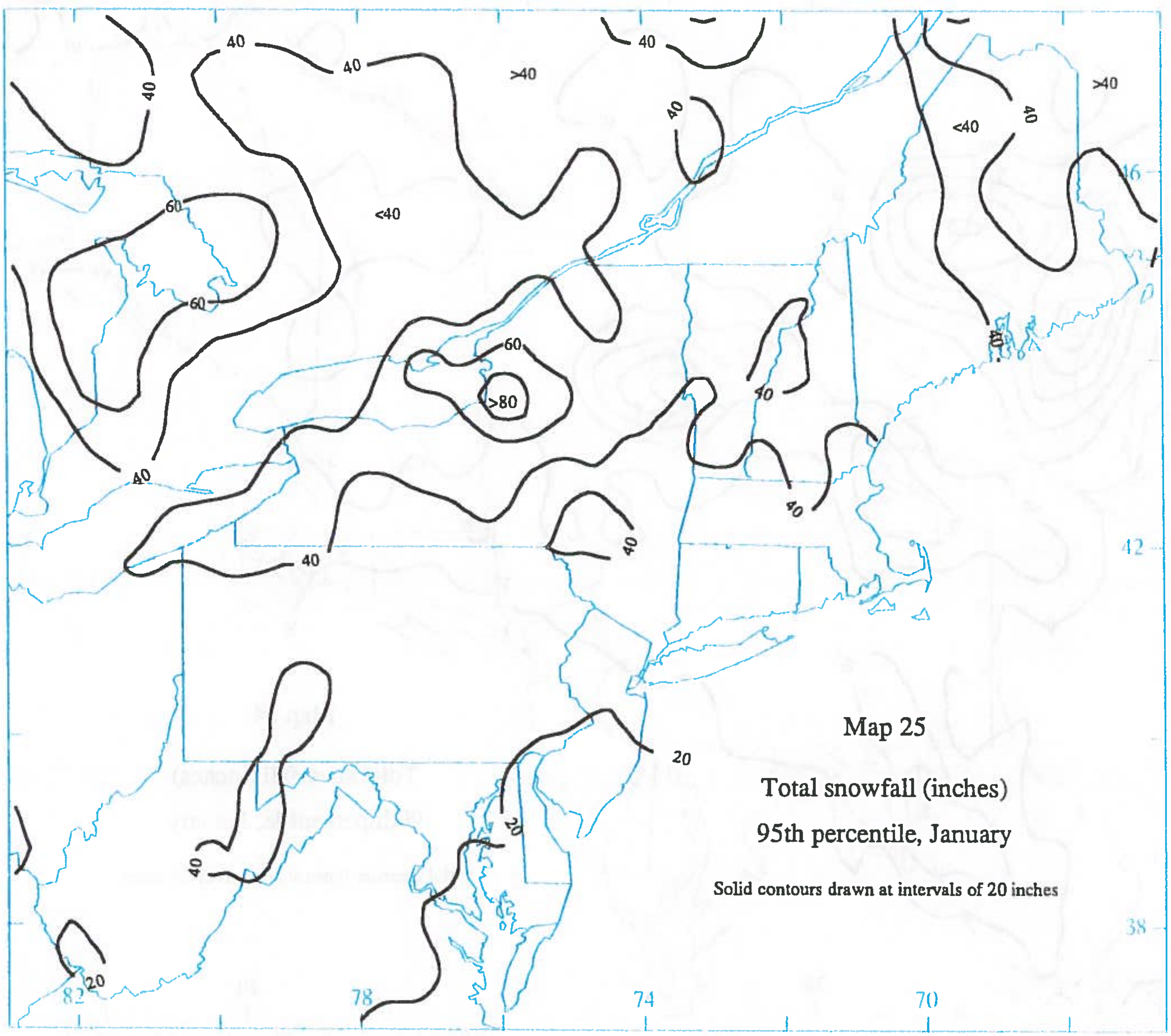
Map 24

Total snowfall (inches)

90th percentile, January

Solid contours drawn at intervals of 10 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



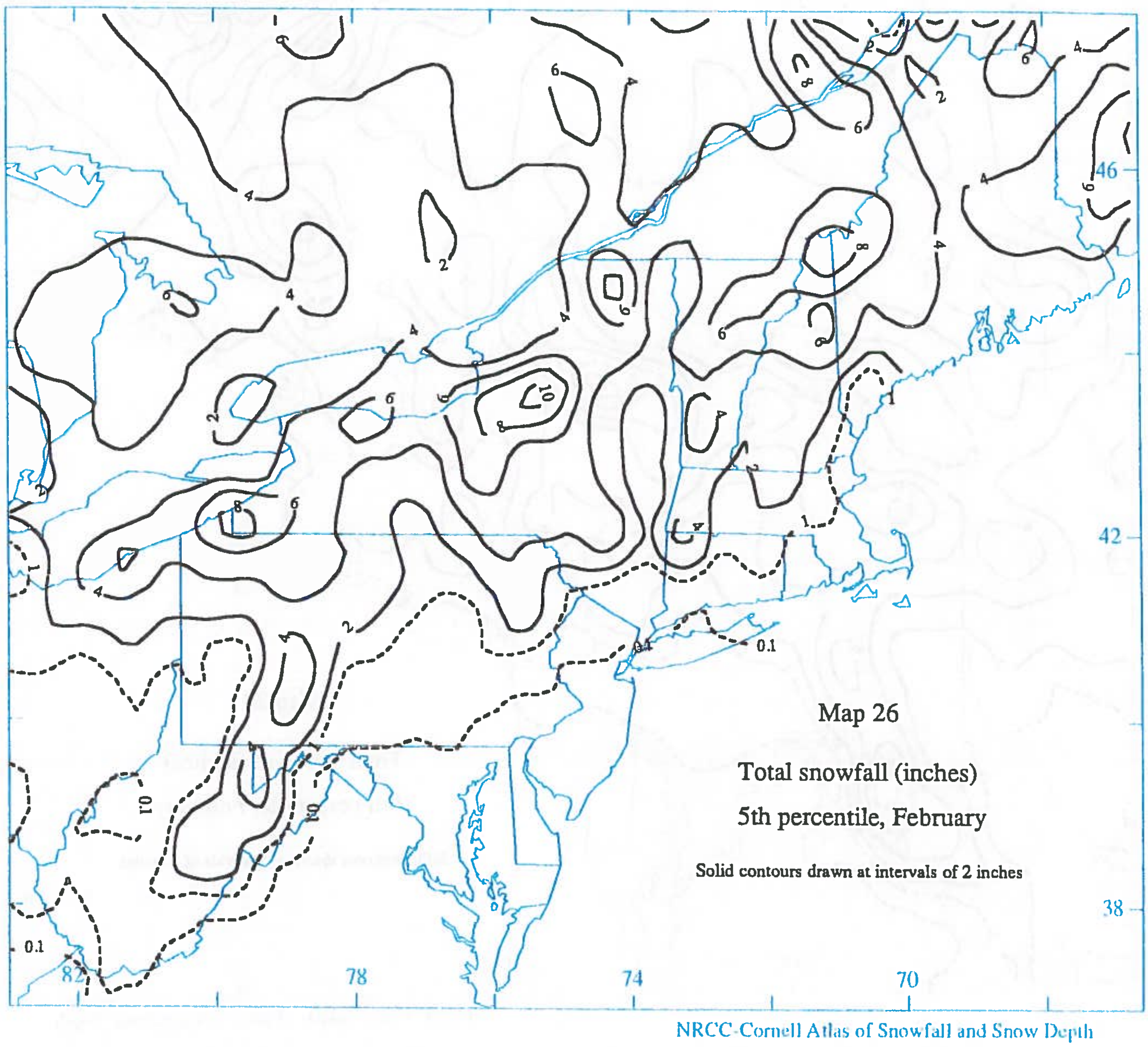
Map 25

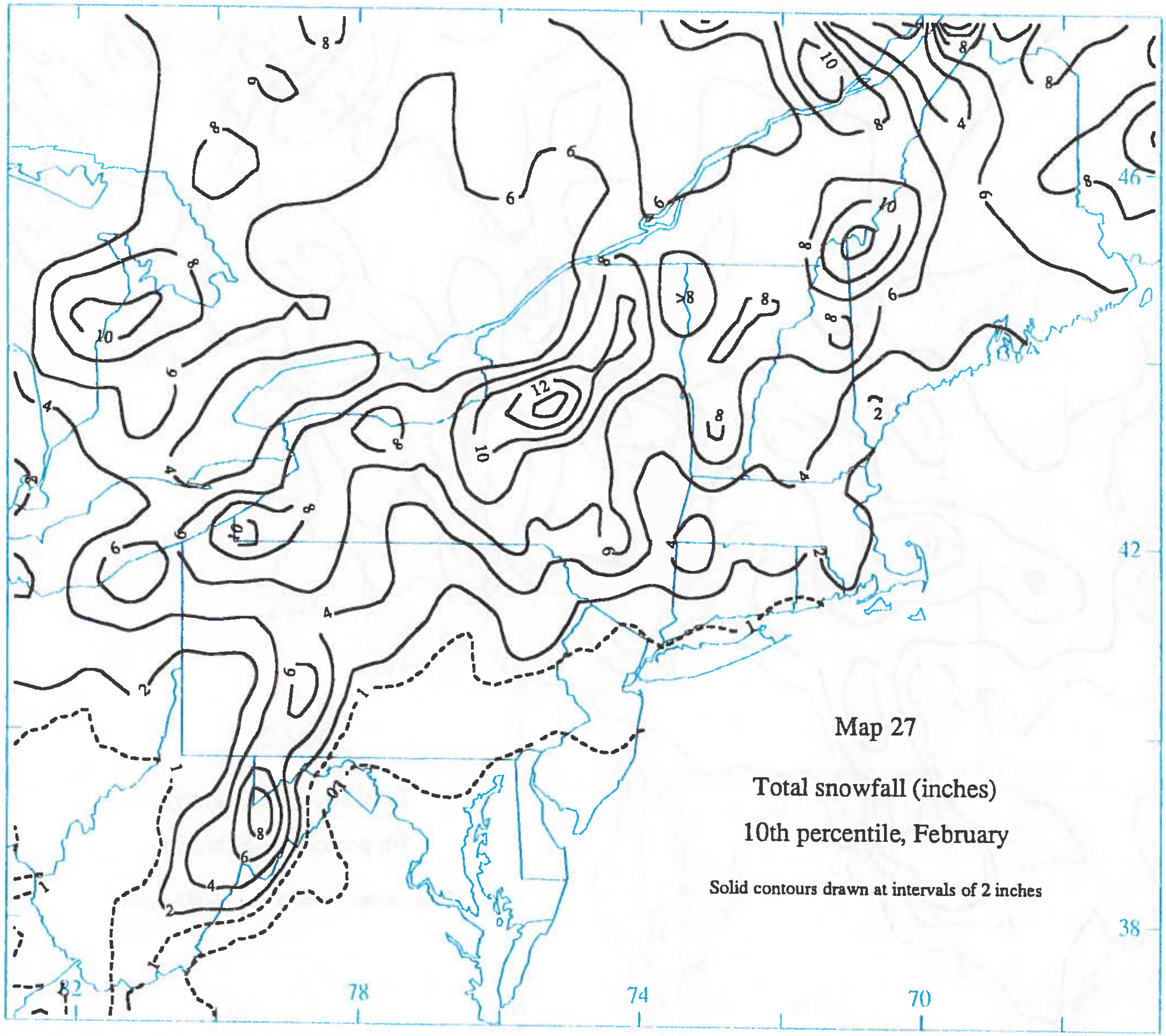
Total snowfall (inches)

95th percentile, January

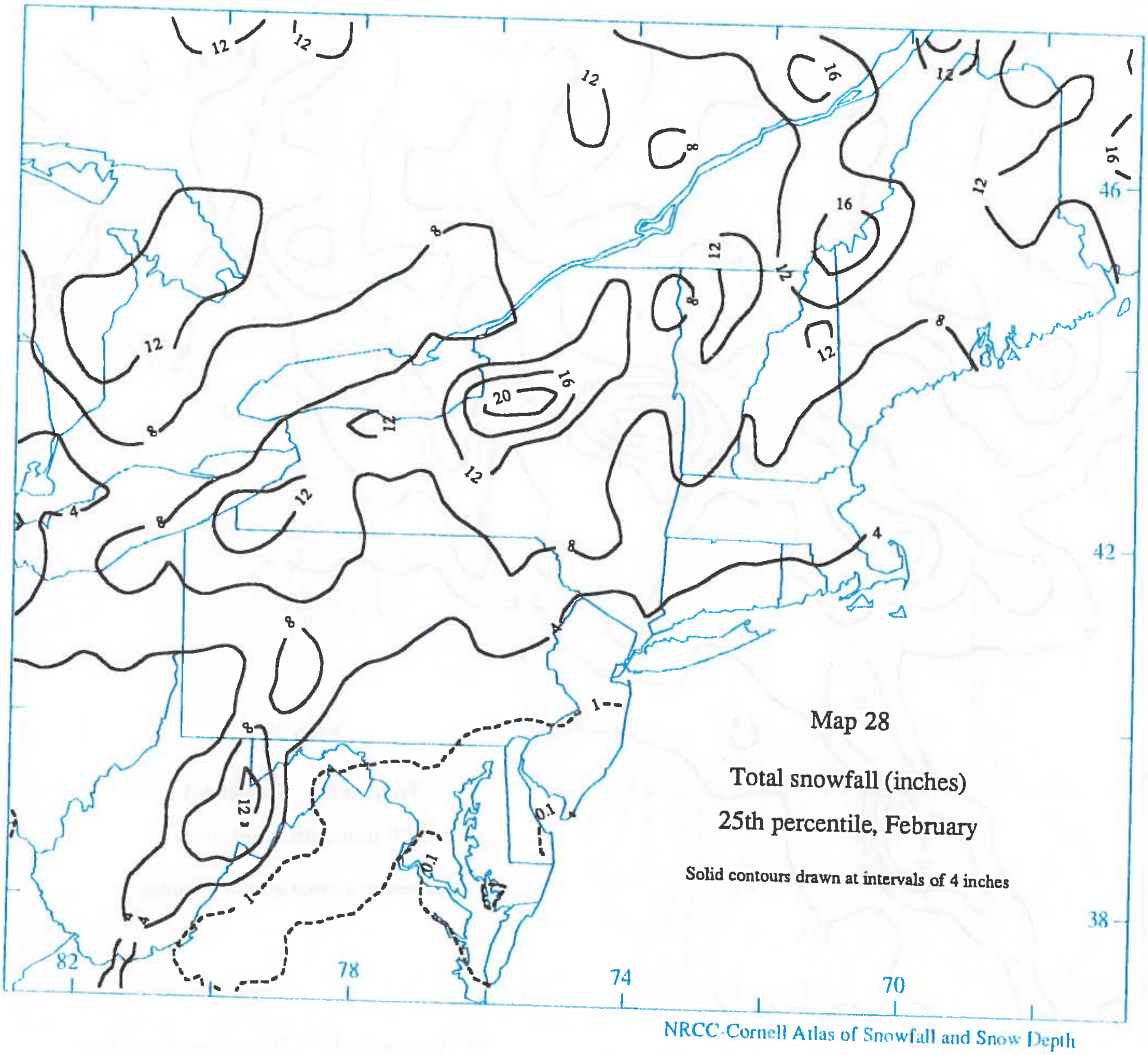
Solid contours drawn at intervals of 20 inches

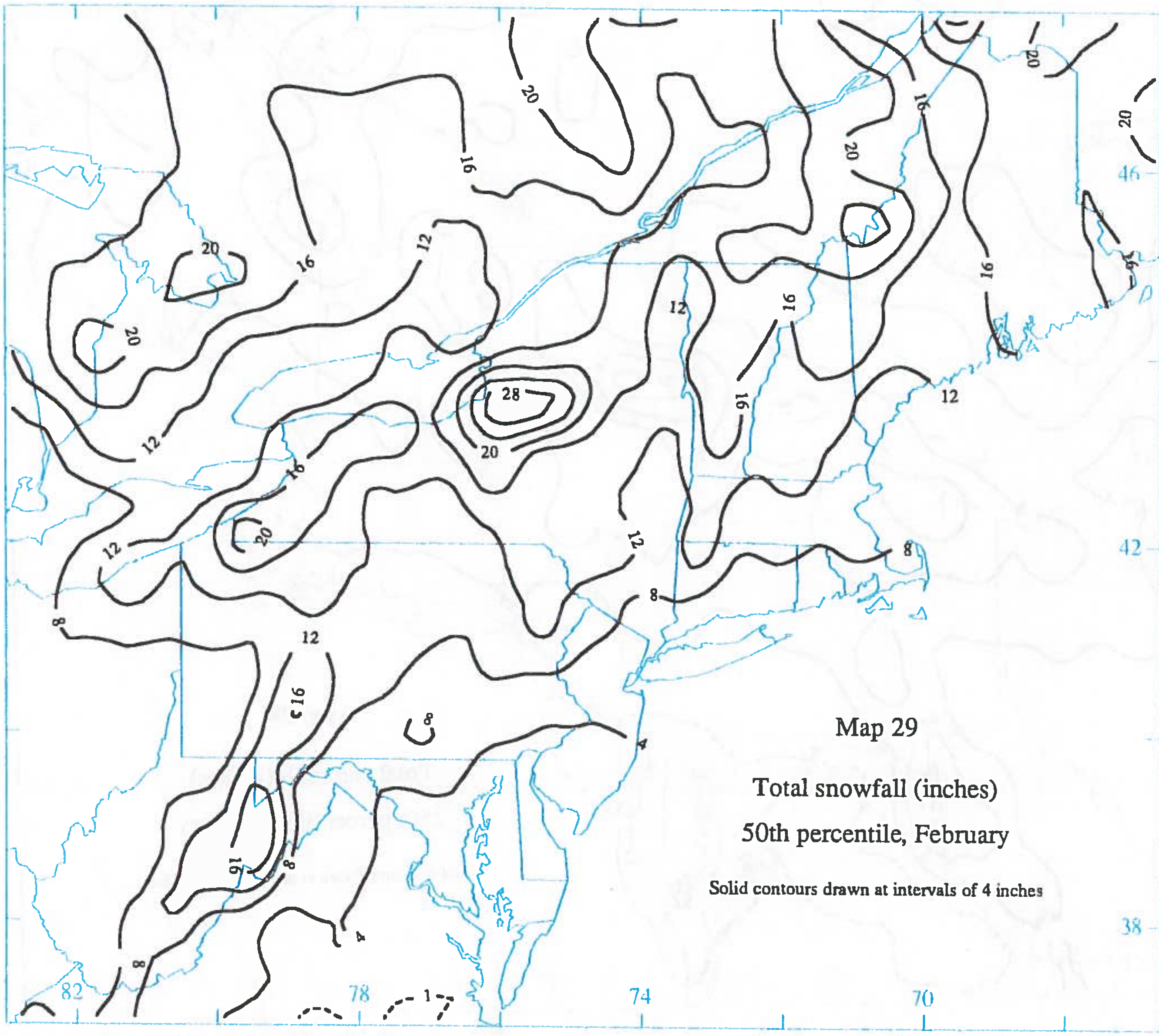
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 26
Total snowfall (inches)
5th percentile, February
Solid contours drawn at intervals of 2 inches
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

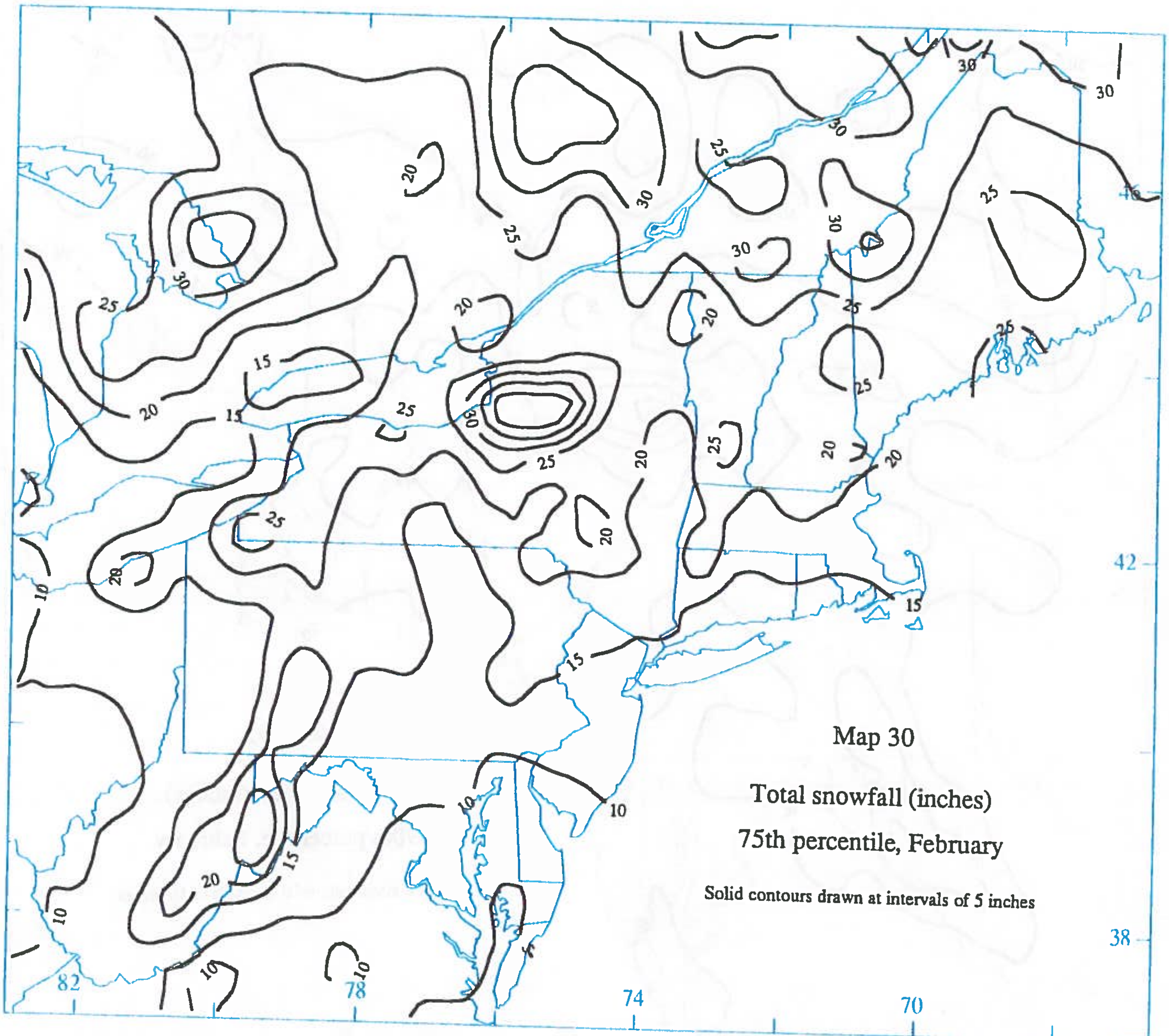


NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 28
Total snowfall (inches)
25th percentile, February
Solid contours drawn at intervals of 4 inches
82
78
74
70
46
42
38
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



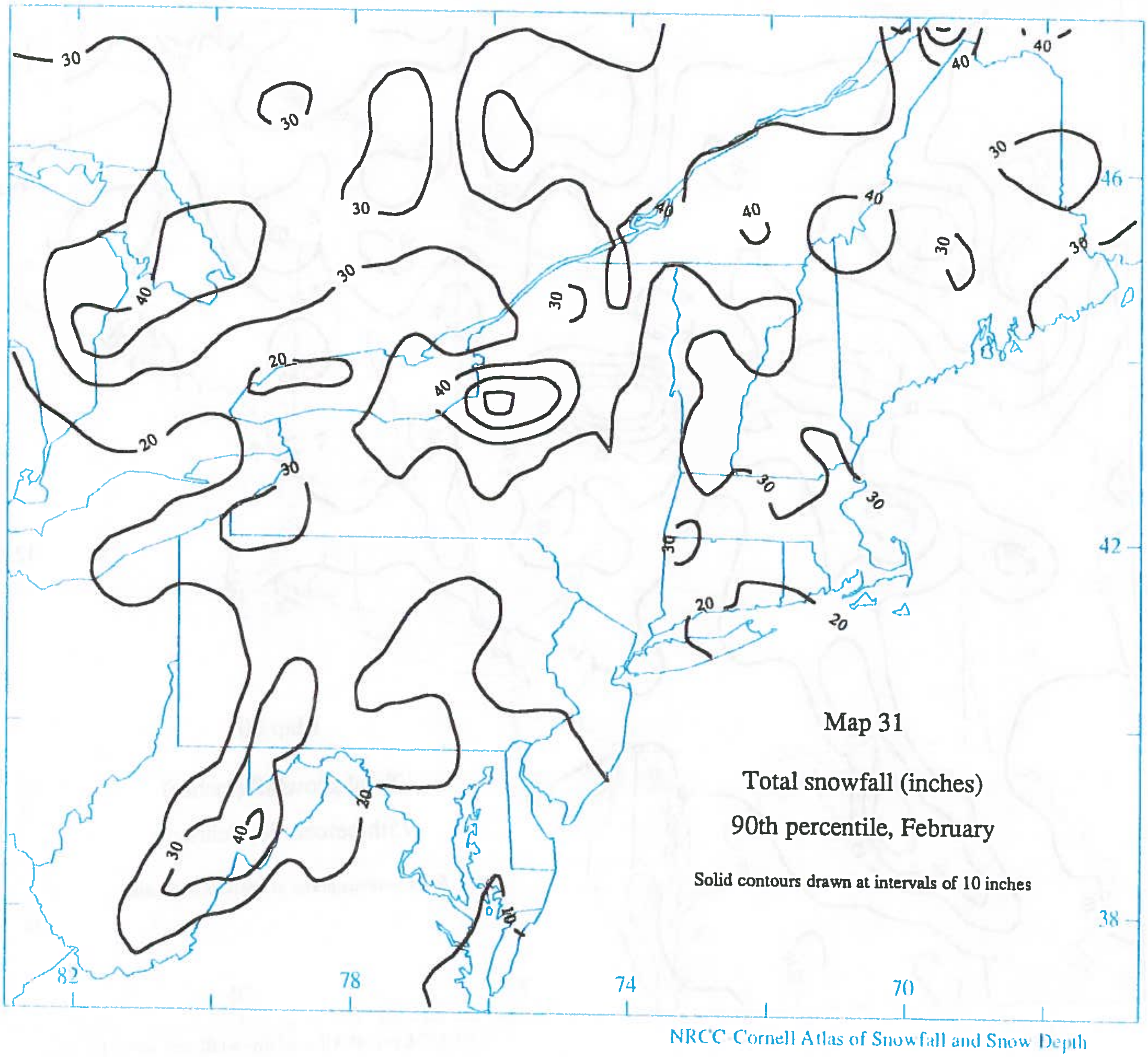
Map 30

Total snowfall (inches)

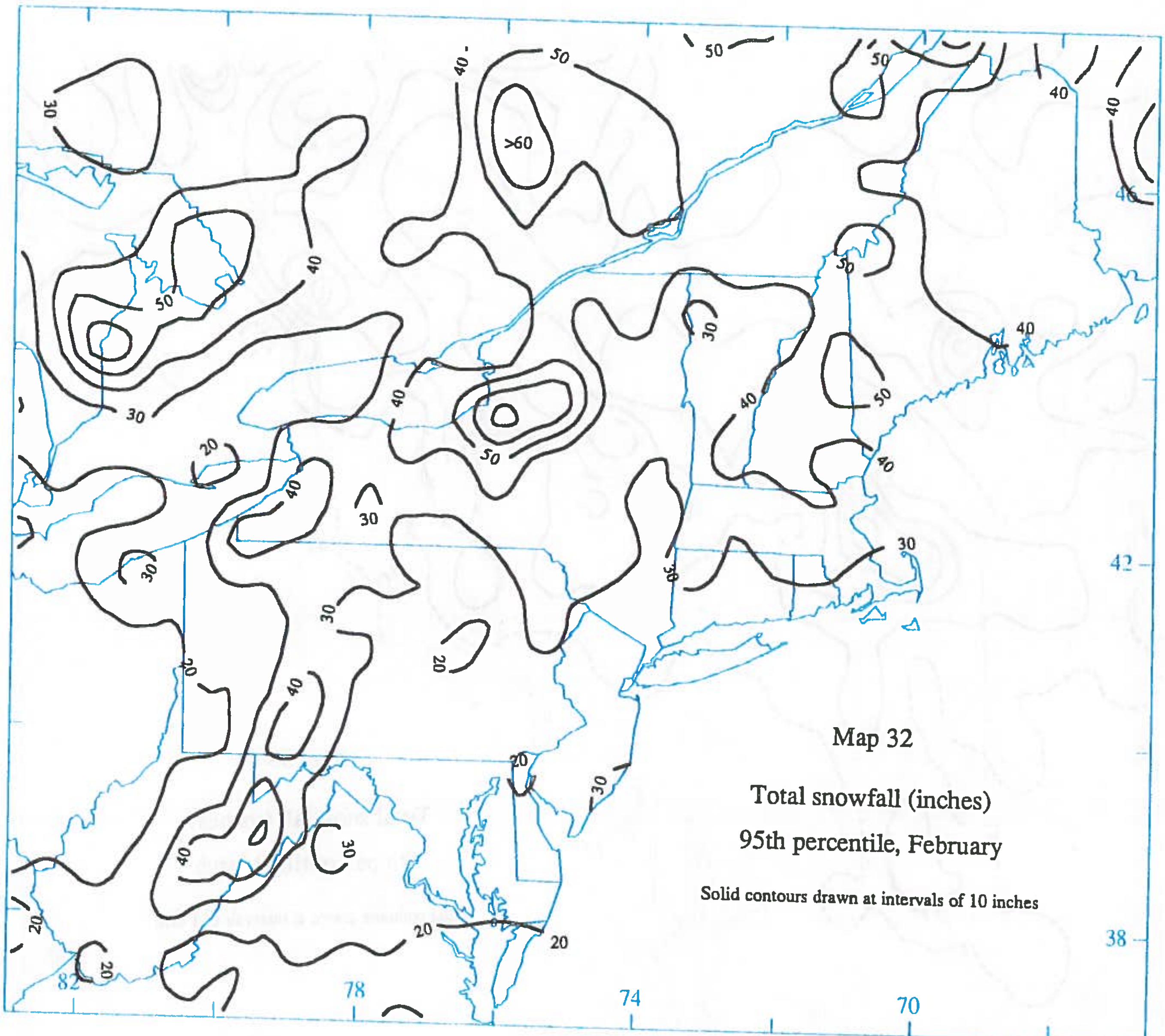
75th percentile, February

Solid contours drawn at intervals of 5 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 31
Total snowfall (inches)
90th percentile, February
Solid contours drawn at intervals of 10 inches
82
78
74
70
46
42
38
NRCC Cornell Atlas of Snowfall and Snow Depth



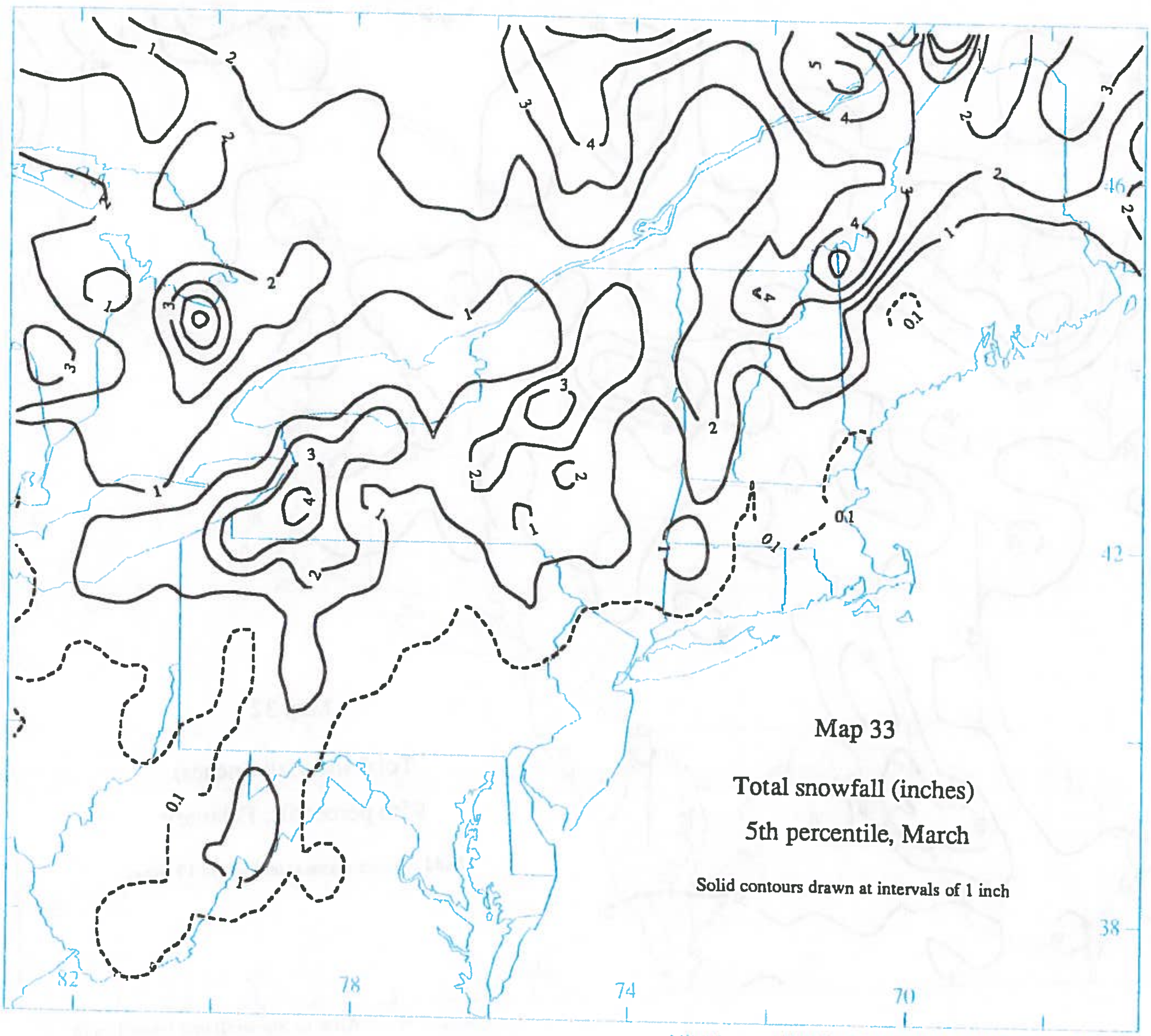
Map 32

Total snowfall (inches)

95th percentile, February

Solid contours drawn at intervals of 10 inches

NRCC Cornell Atlas of Snowfall and Snow Depth



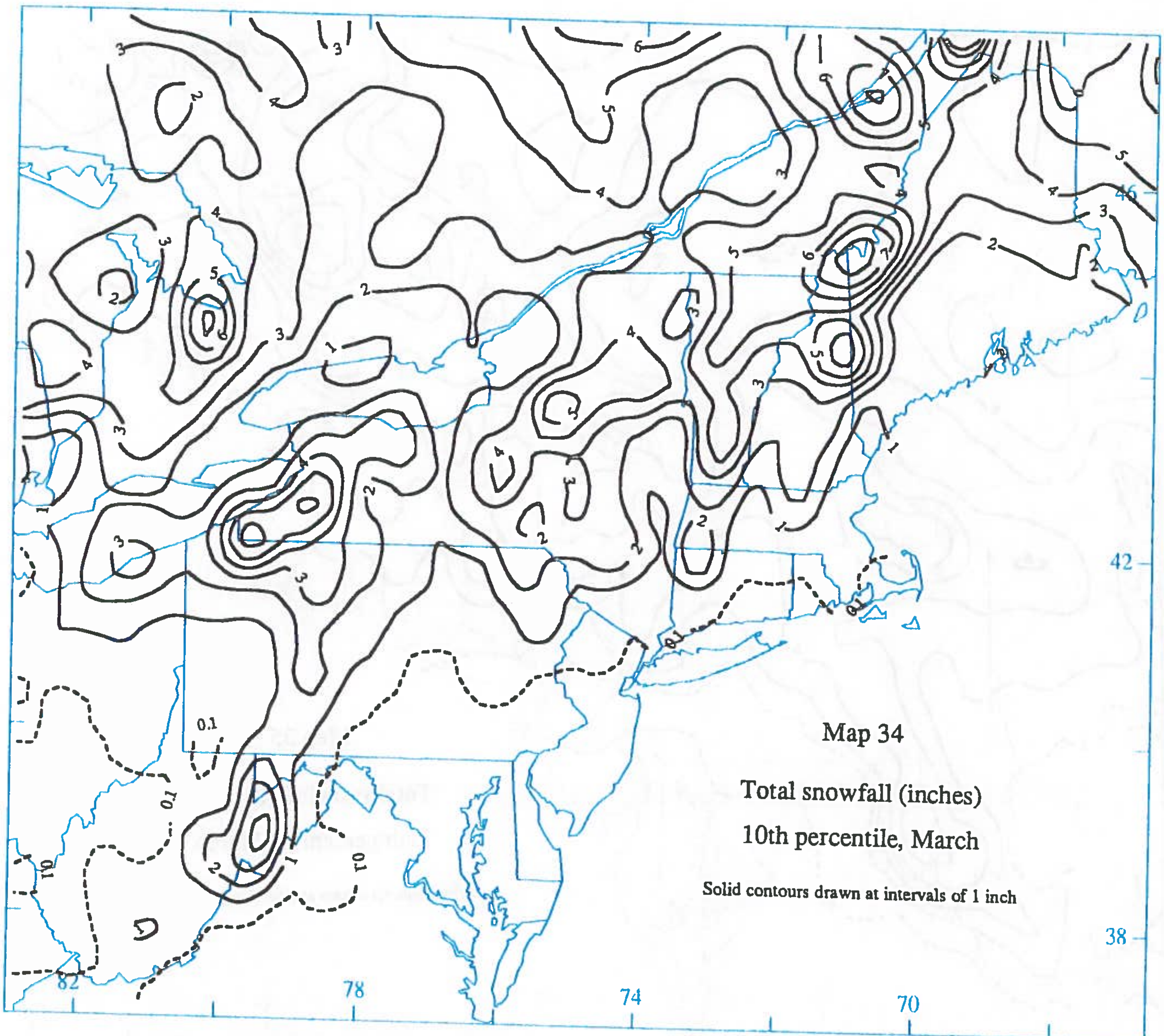
Map 33

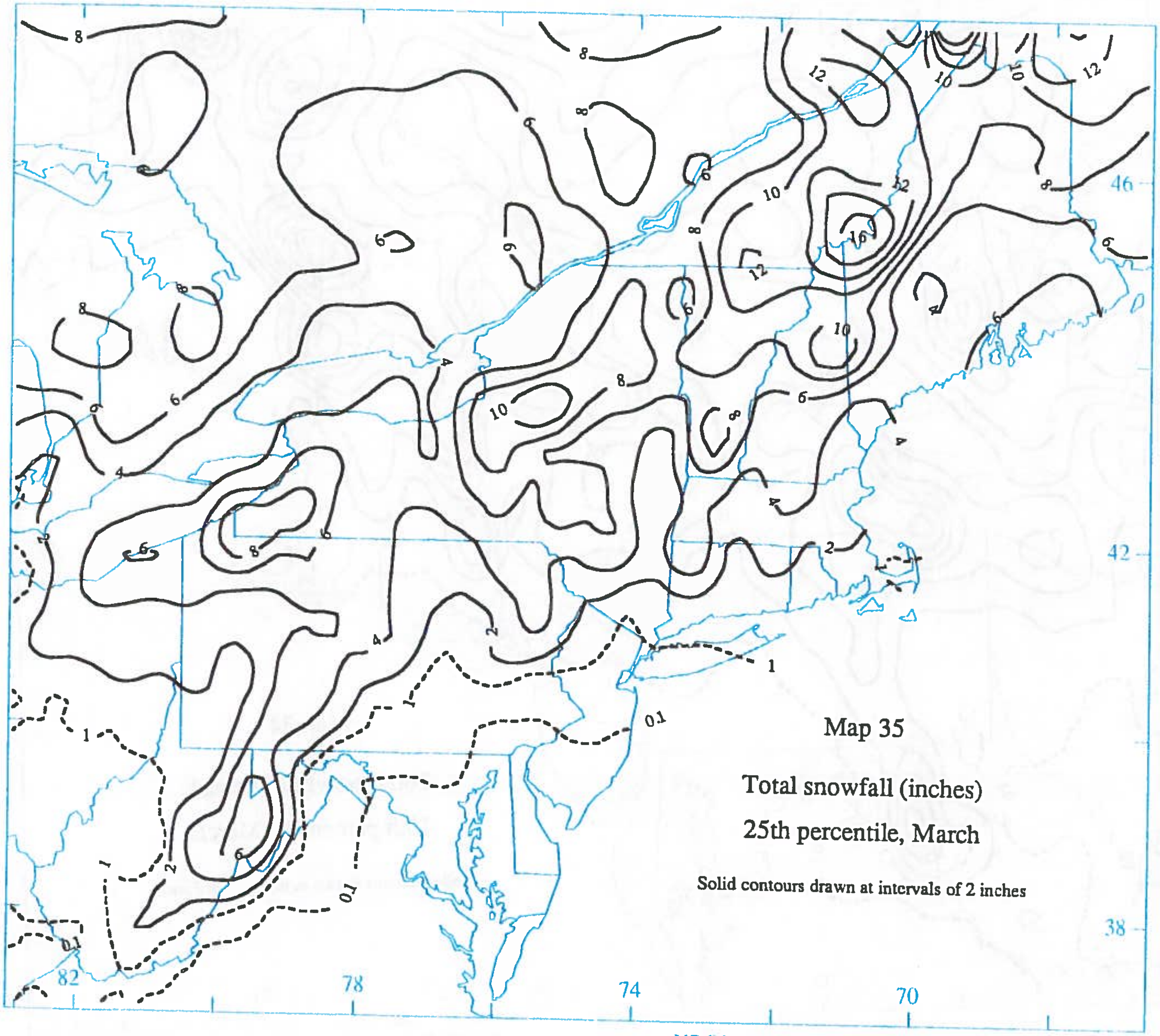
Total snowfall (inches)

5th percentile, March

Solid contours drawn at intervals of 1 inch

NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 34
Total snowfall (inches)
10th percentile, March
Solid contours drawn at intervals of 1 inch
46
42
38
82
78
74
70



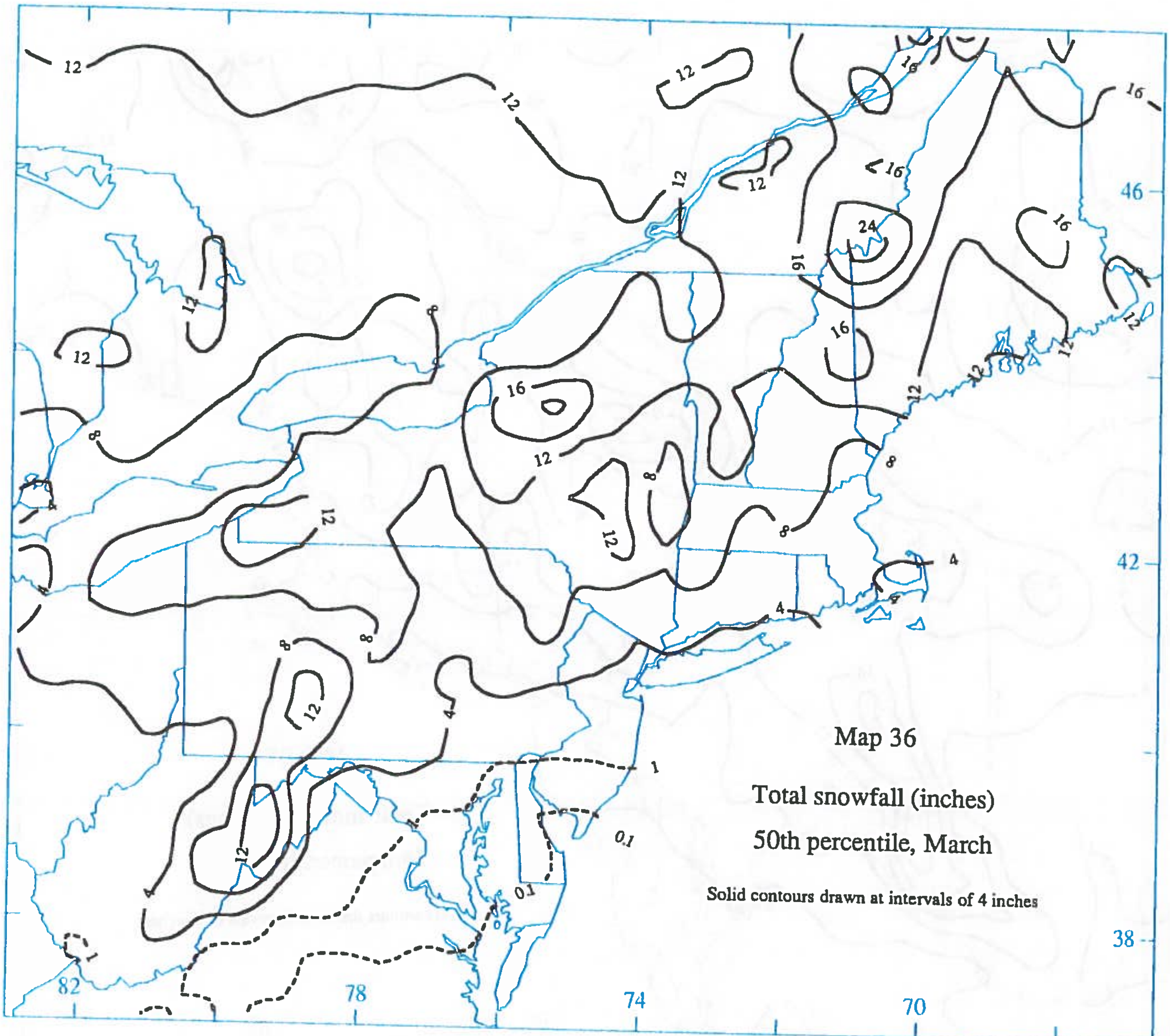
Map 35

Total snowfall (inches)

25th percentile, March

Solid contours drawn at intervals of 2 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



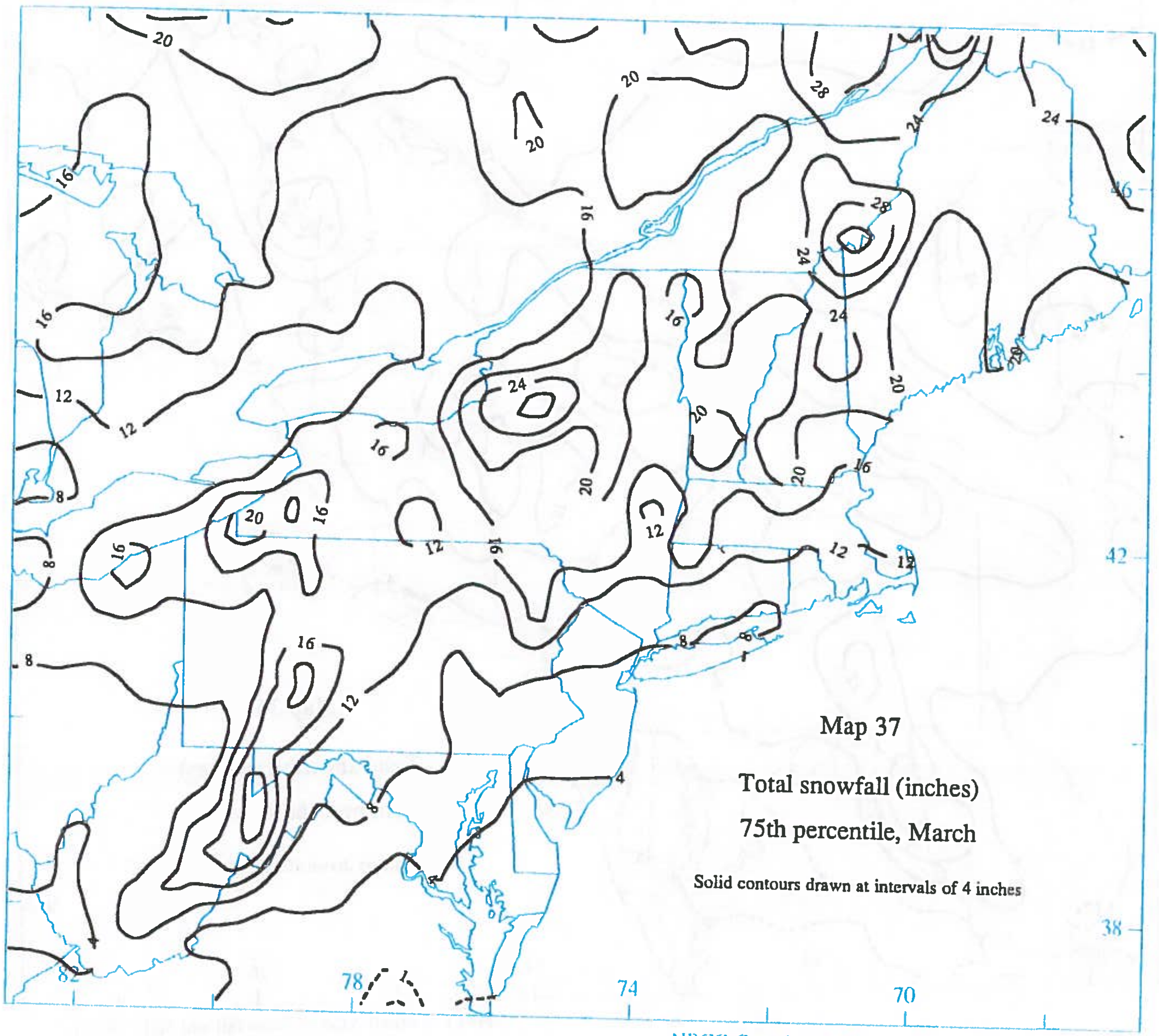
Map 36

Total snowfall (inches)

50th percentile, March

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



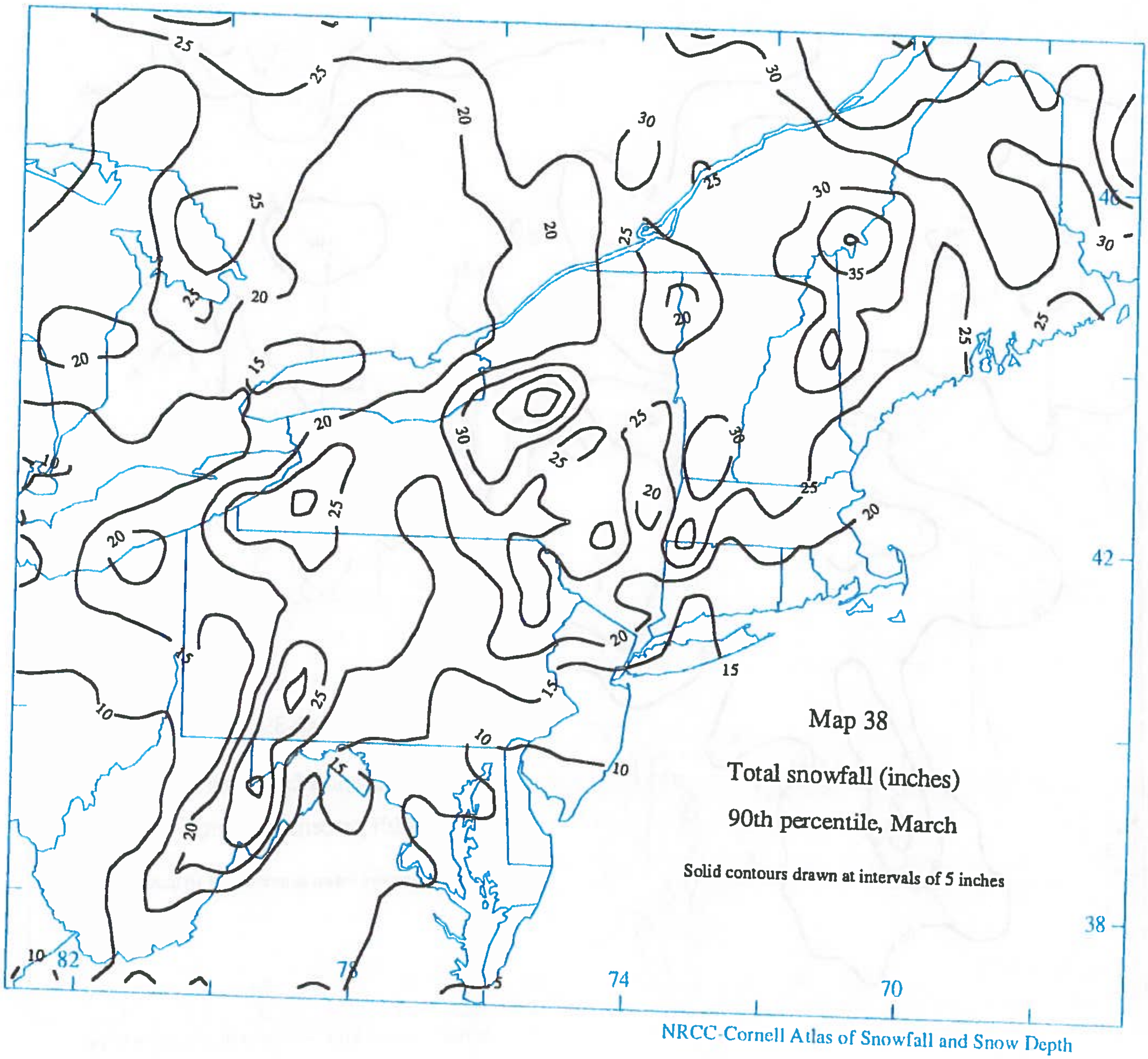
Map 37

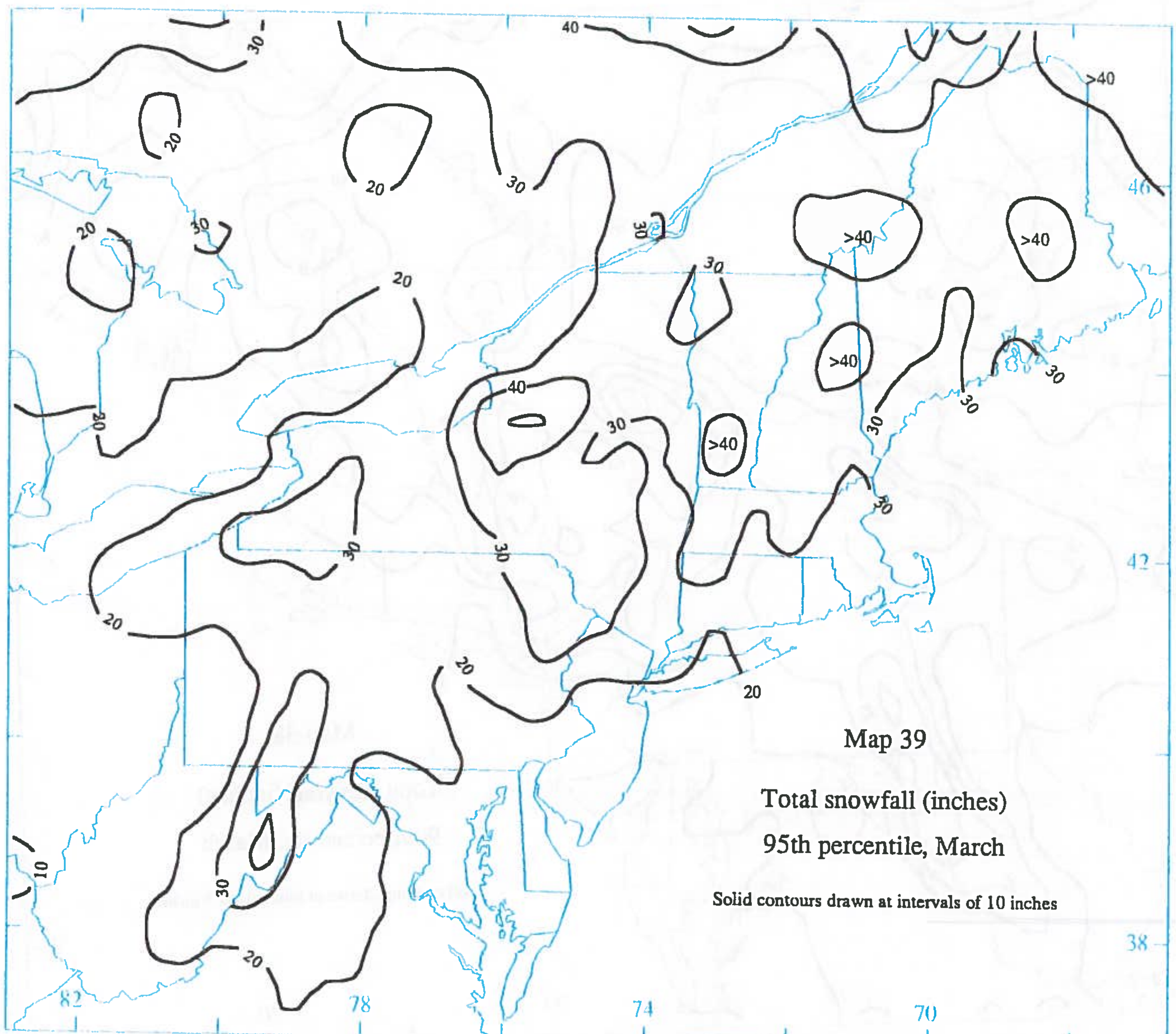
Total snowfall (inches)

75th percentile, March

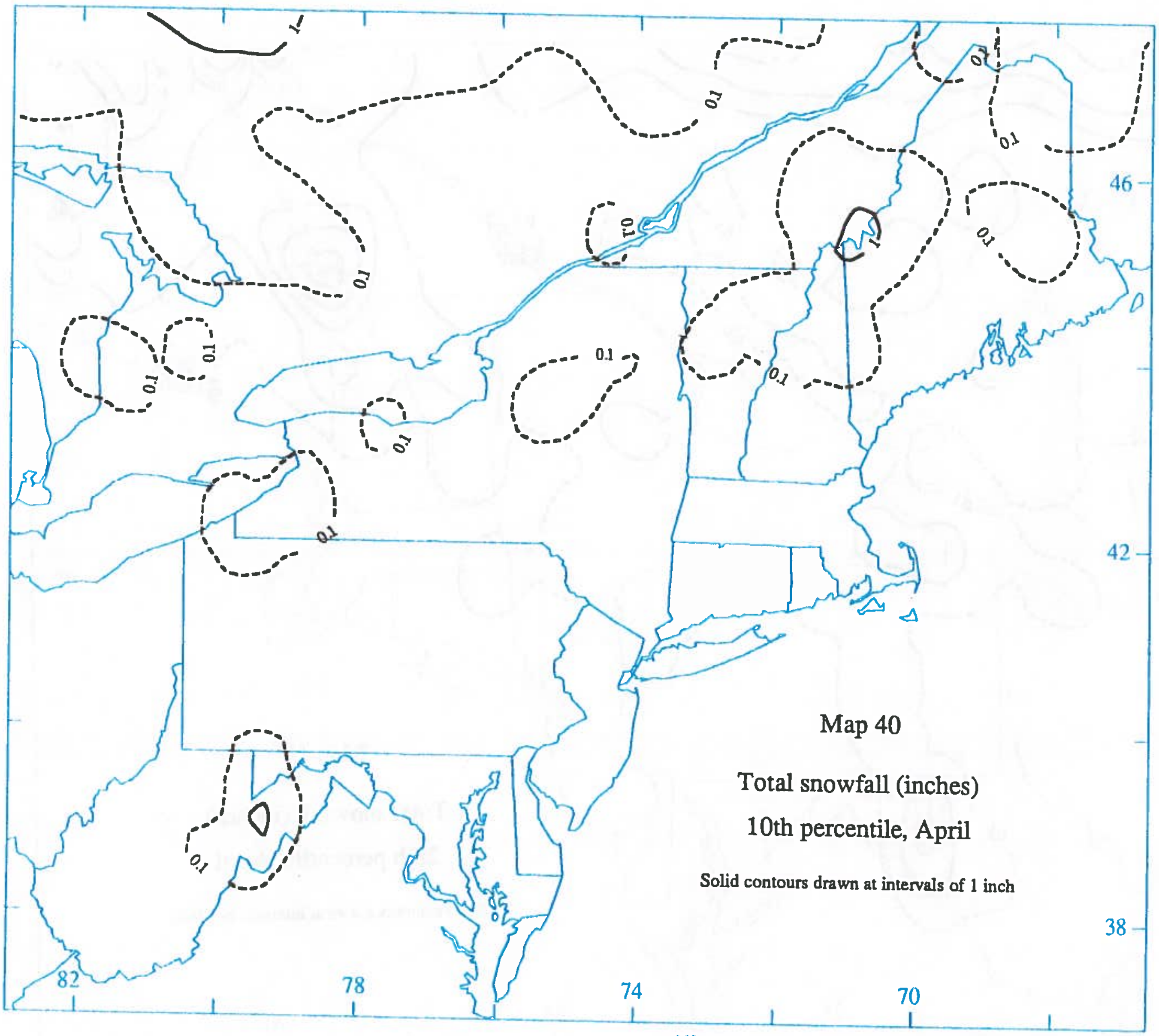
Solid contours drawn at intervals of 4 inches

NRCC Cornell Atlas of Snowfall and Snow Depth


Map 38
Total snowfall (inches)
90th percentile, March
Solid contours drawn at intervals of 5 inches
82
78
74
70
42
38
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC Cornell Atlas of Snowfall and Snow Depth

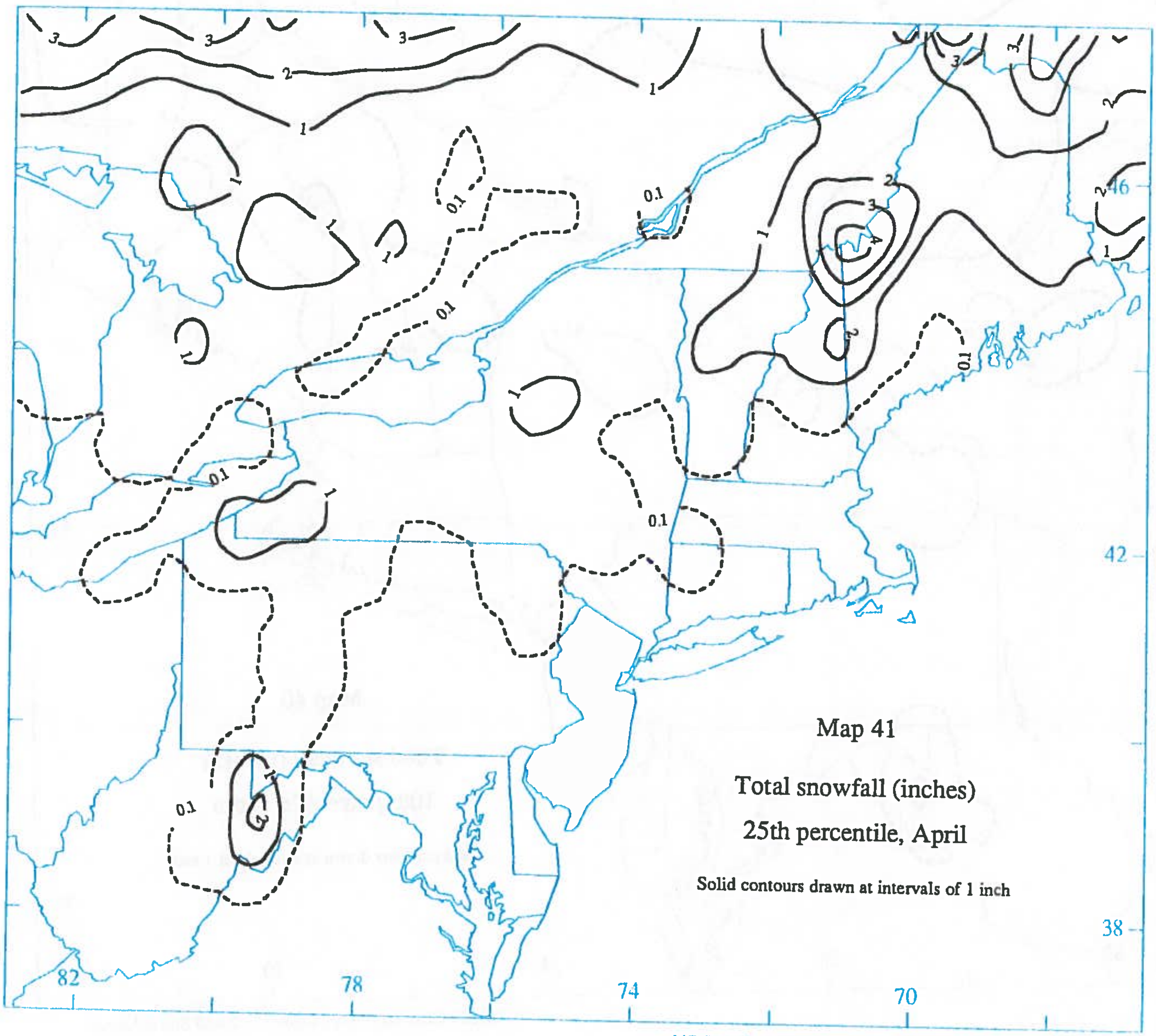


Map 40

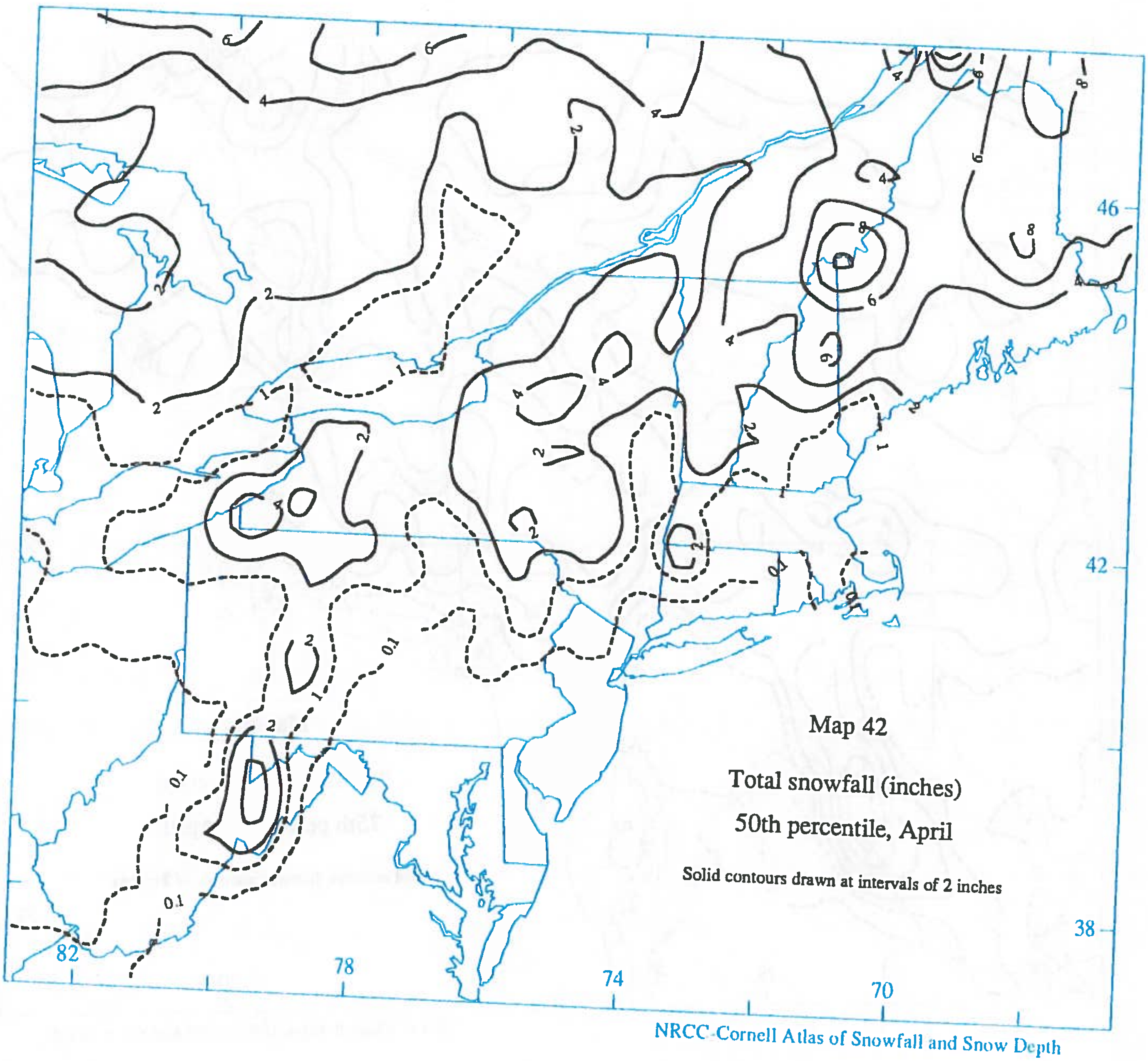
Total snowfall (inches)

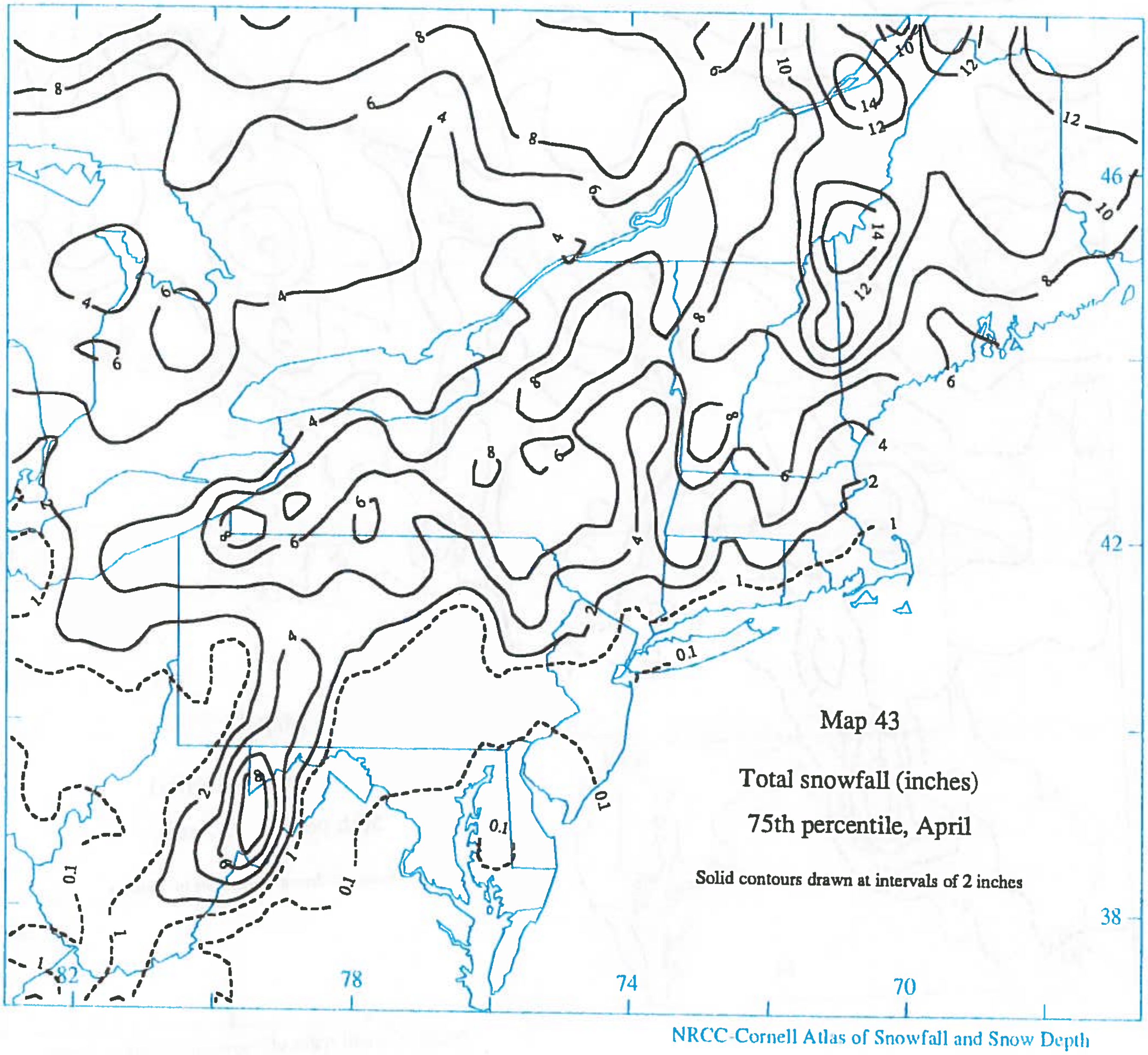
10th percentile, April

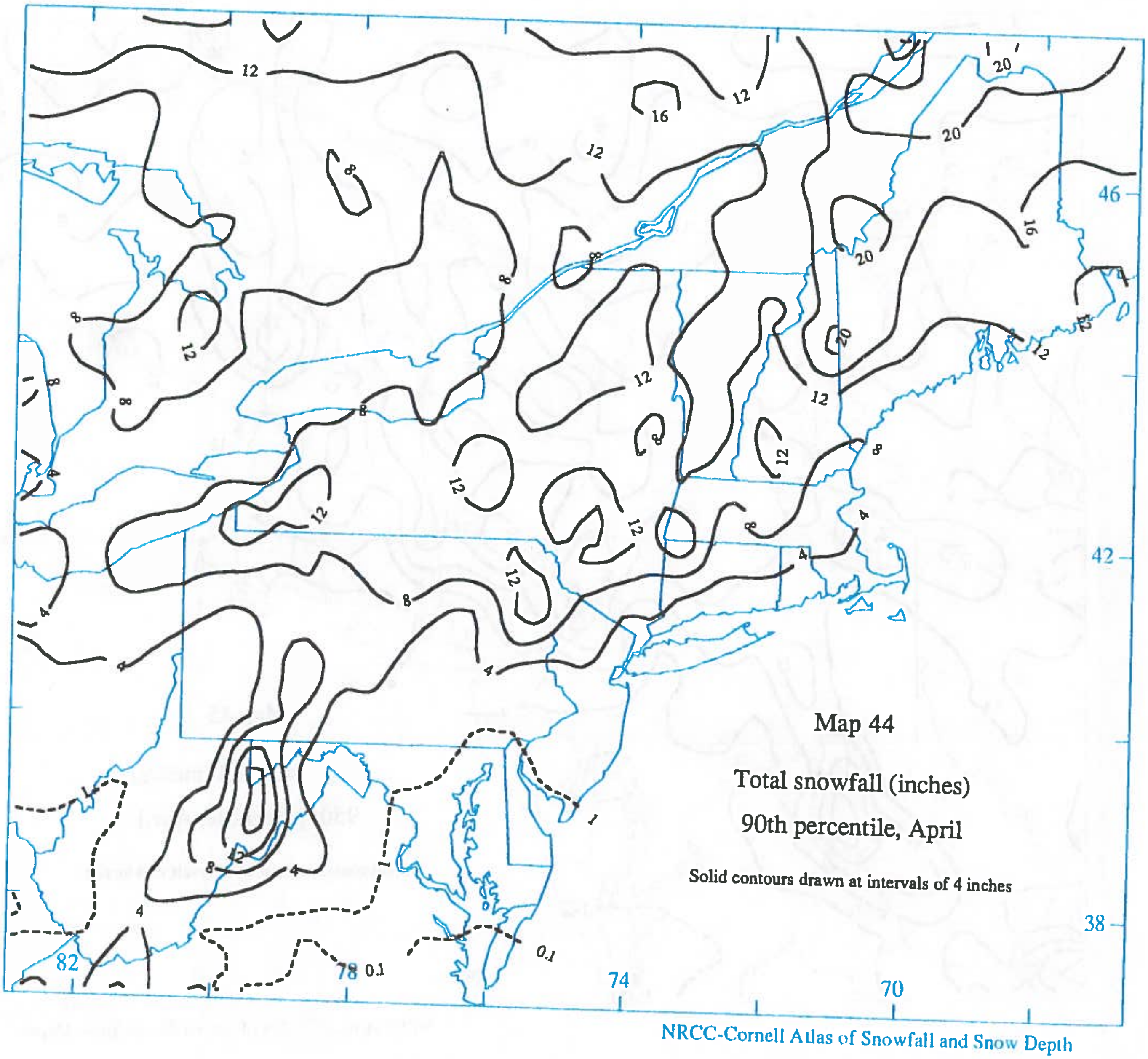
Solid contours drawn at intervals of 1 inch

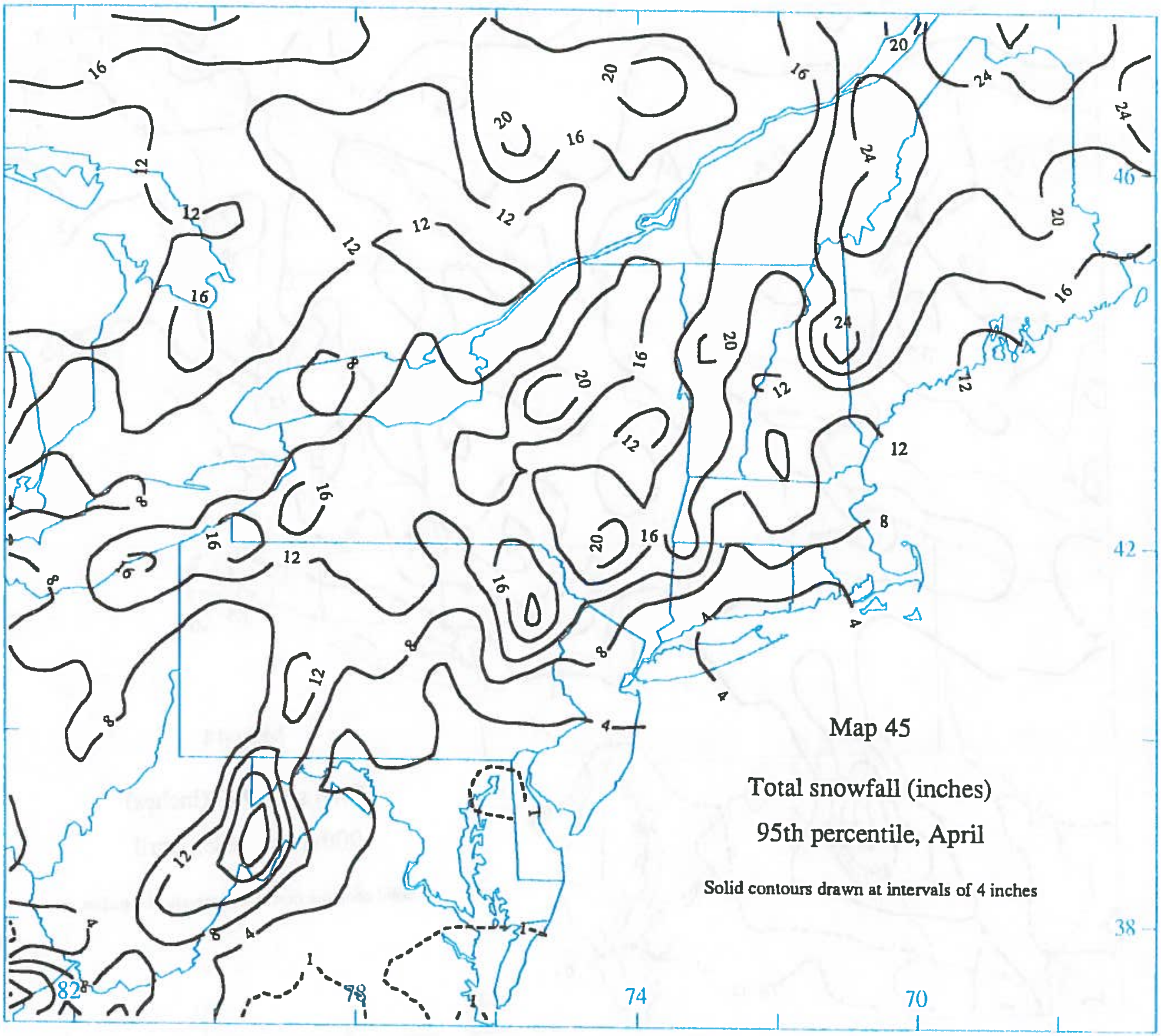


NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 42
Total snowfall (inches)
50th percentile, April
Solid contours drawn at intervals of 2 inches
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth


46
42
38
82
78
74
70
Map 43
Total snowfall (inches)
75th percentile, April
Solid contours drawn at intervals of 2 inches
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 44
Total snowfall (inches)
90th percentile, April
Solid contours drawn at intervals of 4 inches
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



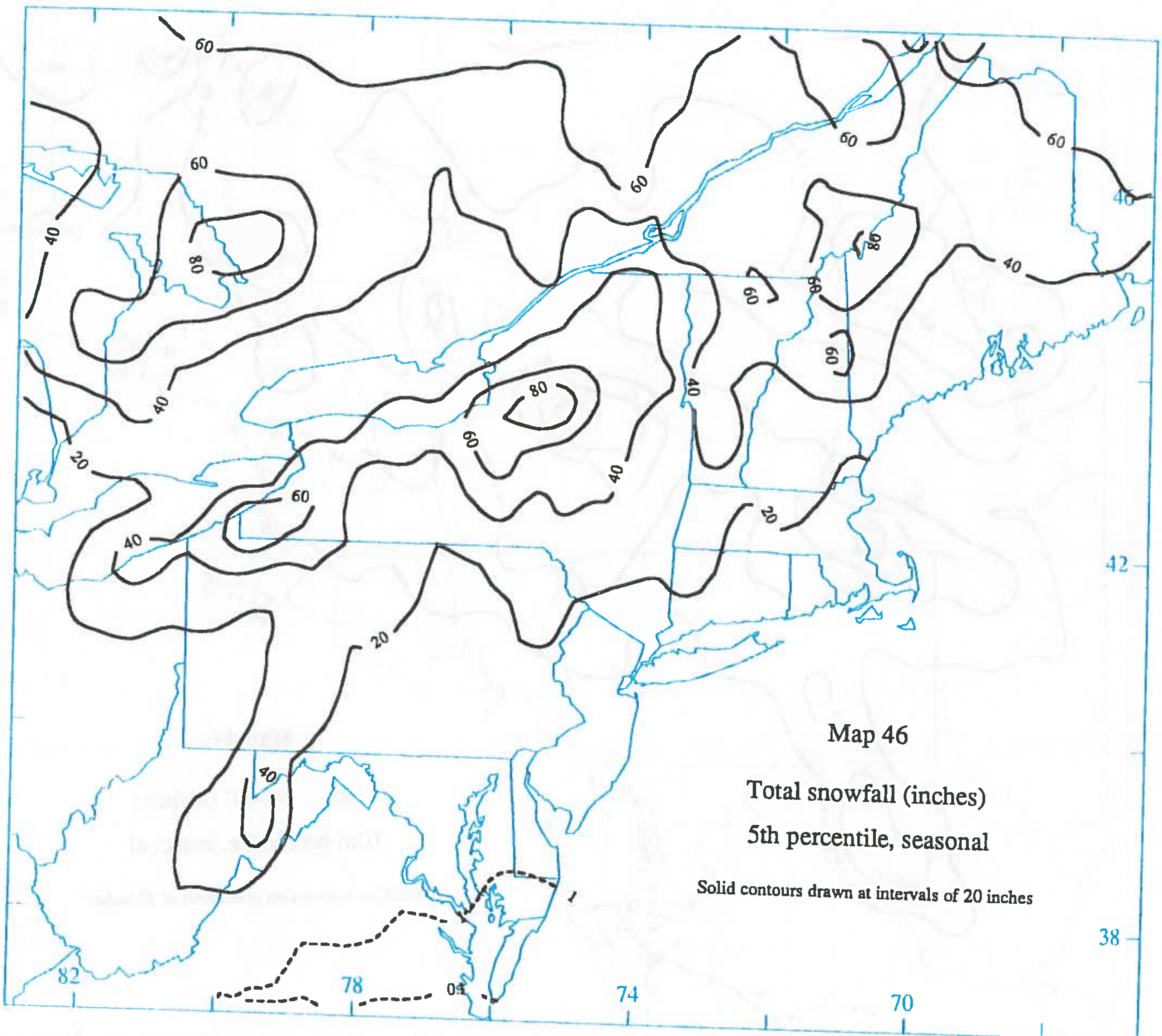
Map 45

Total snowfall (inches)

95th percentile, April

Solid contours drawn at intervals of 4 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



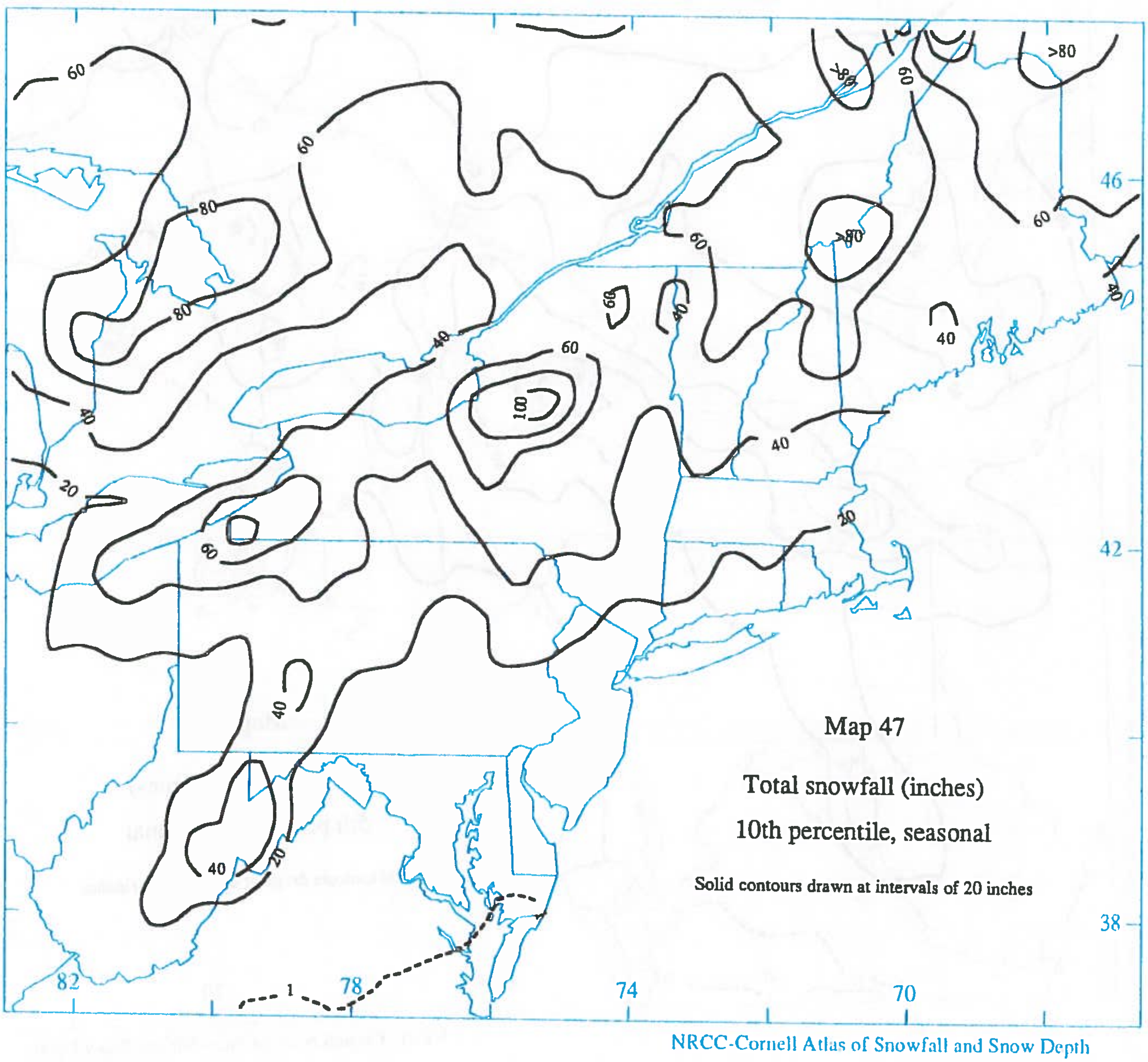
Map 46

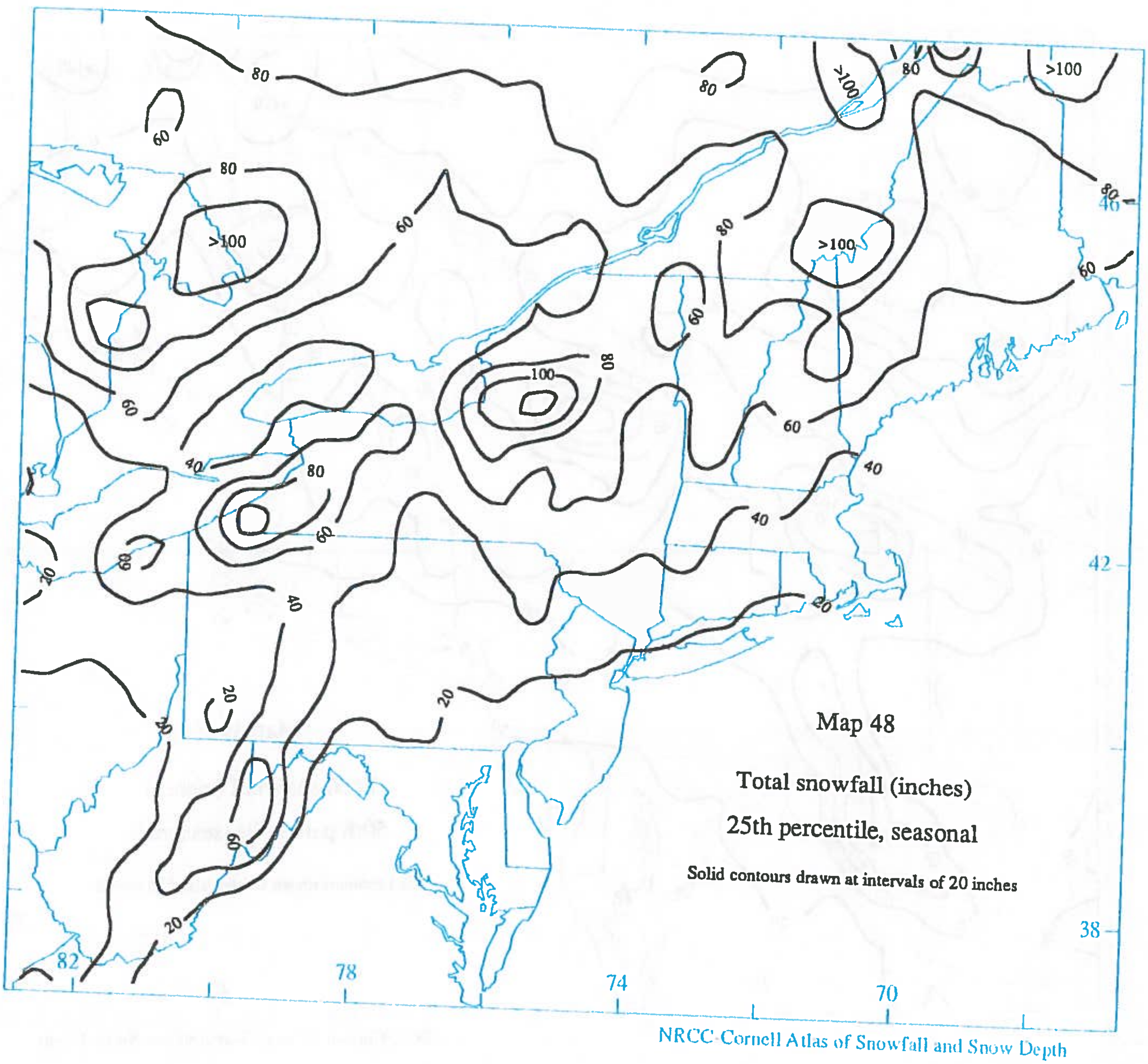
Total snowfall (inches)

5th percentile, seasonal

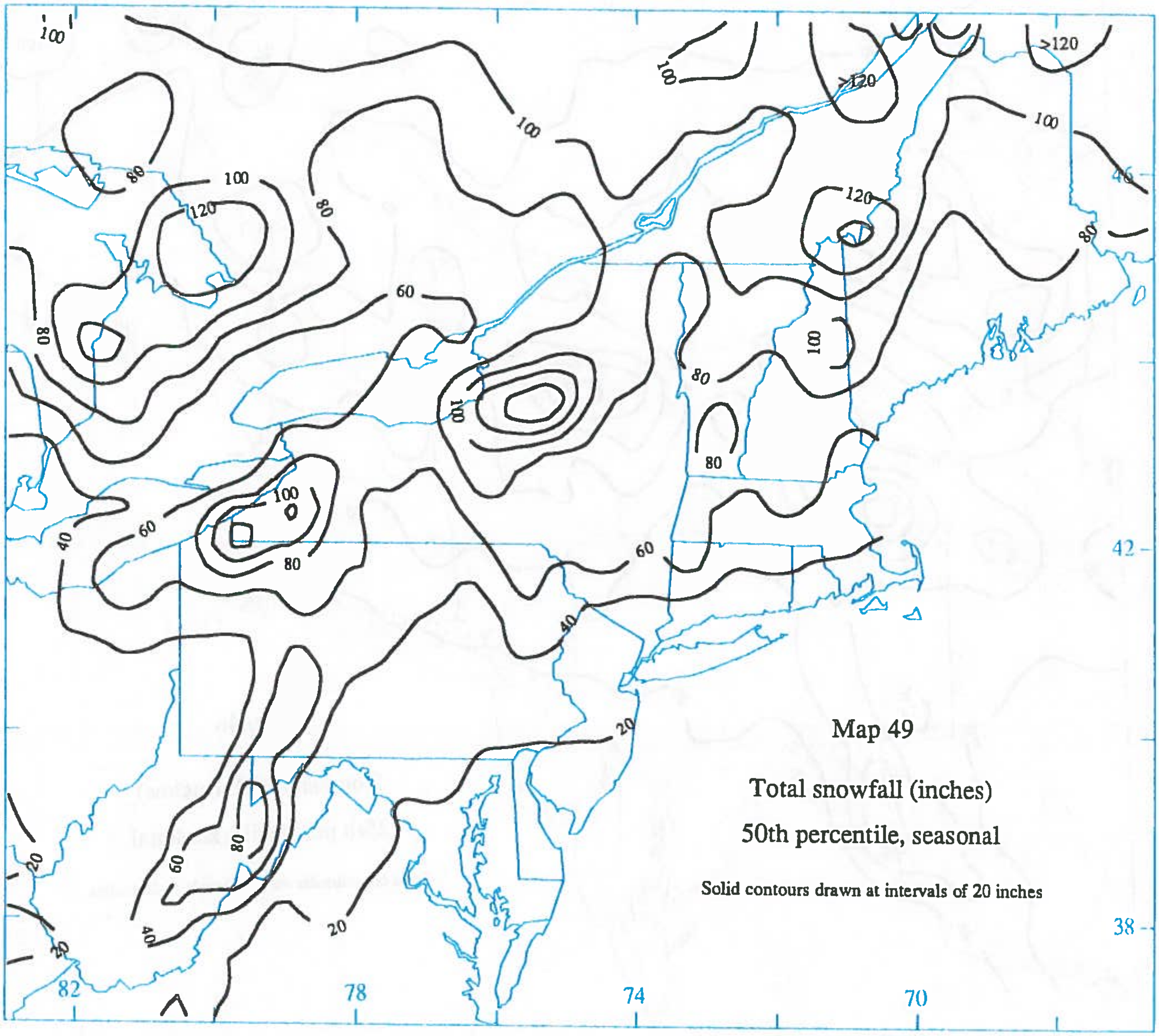
Solid contours drawn at intervals of 20 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 47
Total snowfall (inches)
10th percentile, seasonal
Solid contours drawn at intervals of 20 inches
>80
60
80
40
20
100
1
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 48
Total snowfall (inches)
25th percentile, seasonal
Solid contours drawn at intervals of 20 inches
NRCC Cornell Atlas of Snowfall and Snow Depth



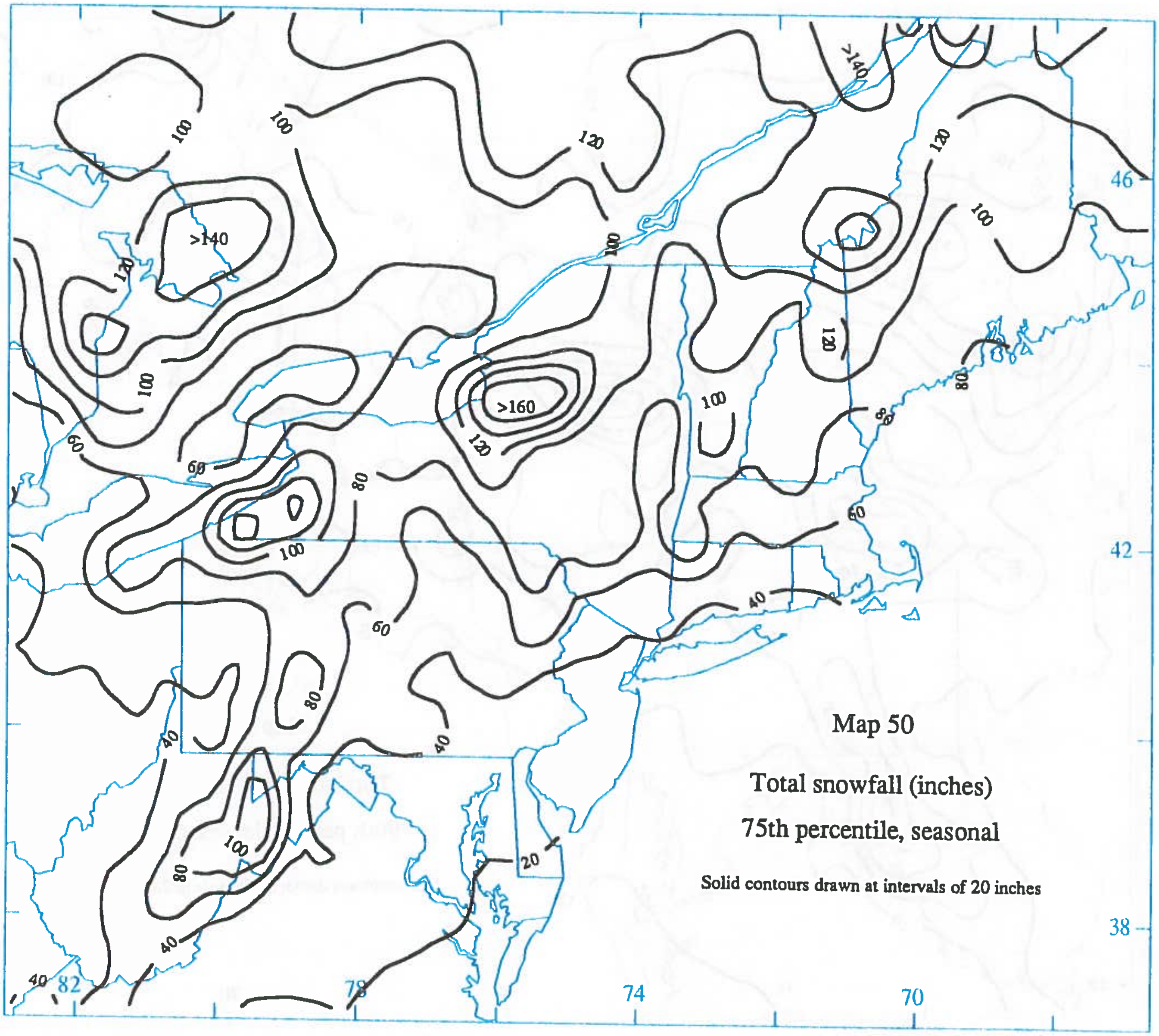
Map 49

Total snowfall (inches)

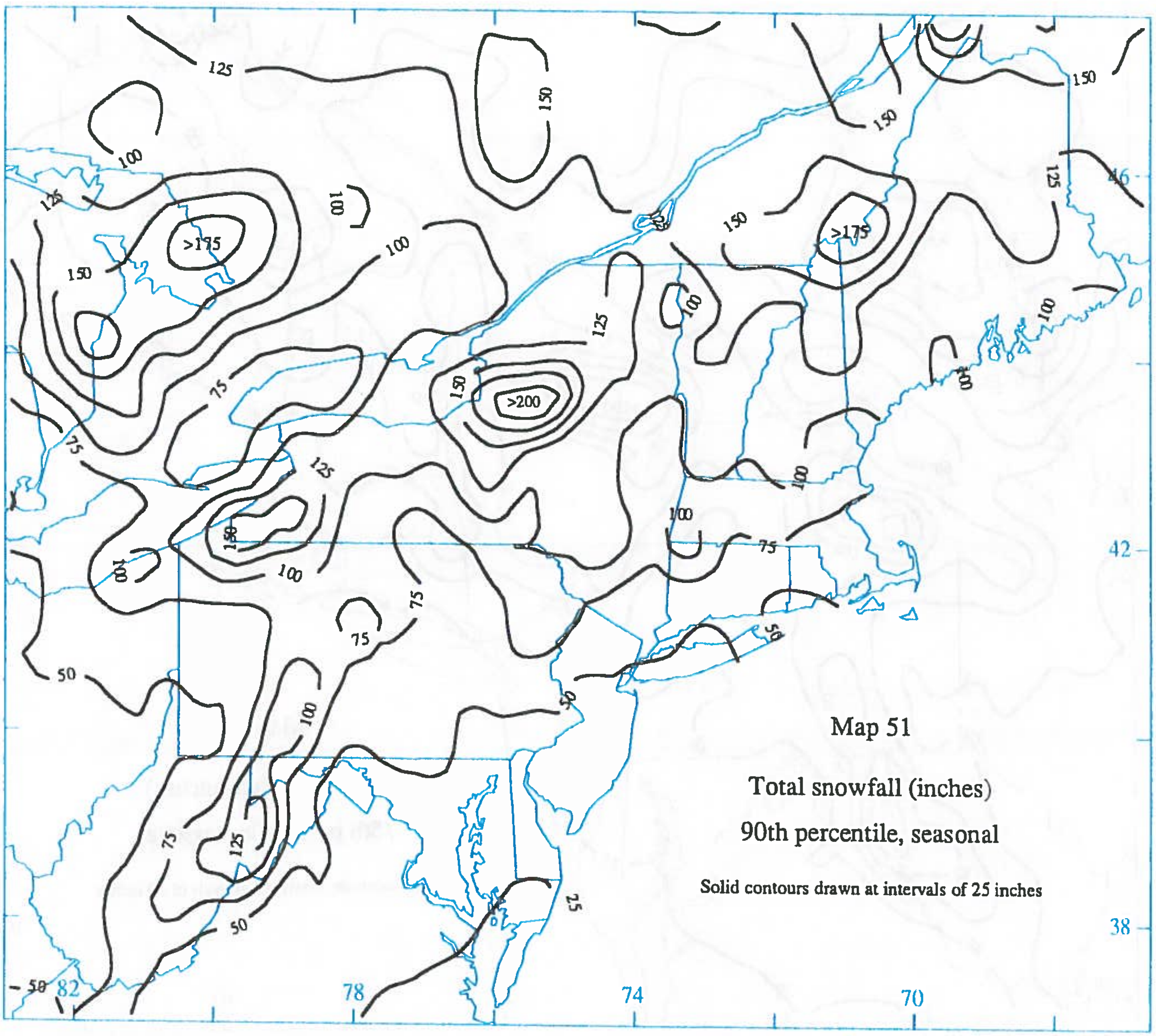
50th percentile, seasonal

Solid contours drawn at intervals of 20 inches

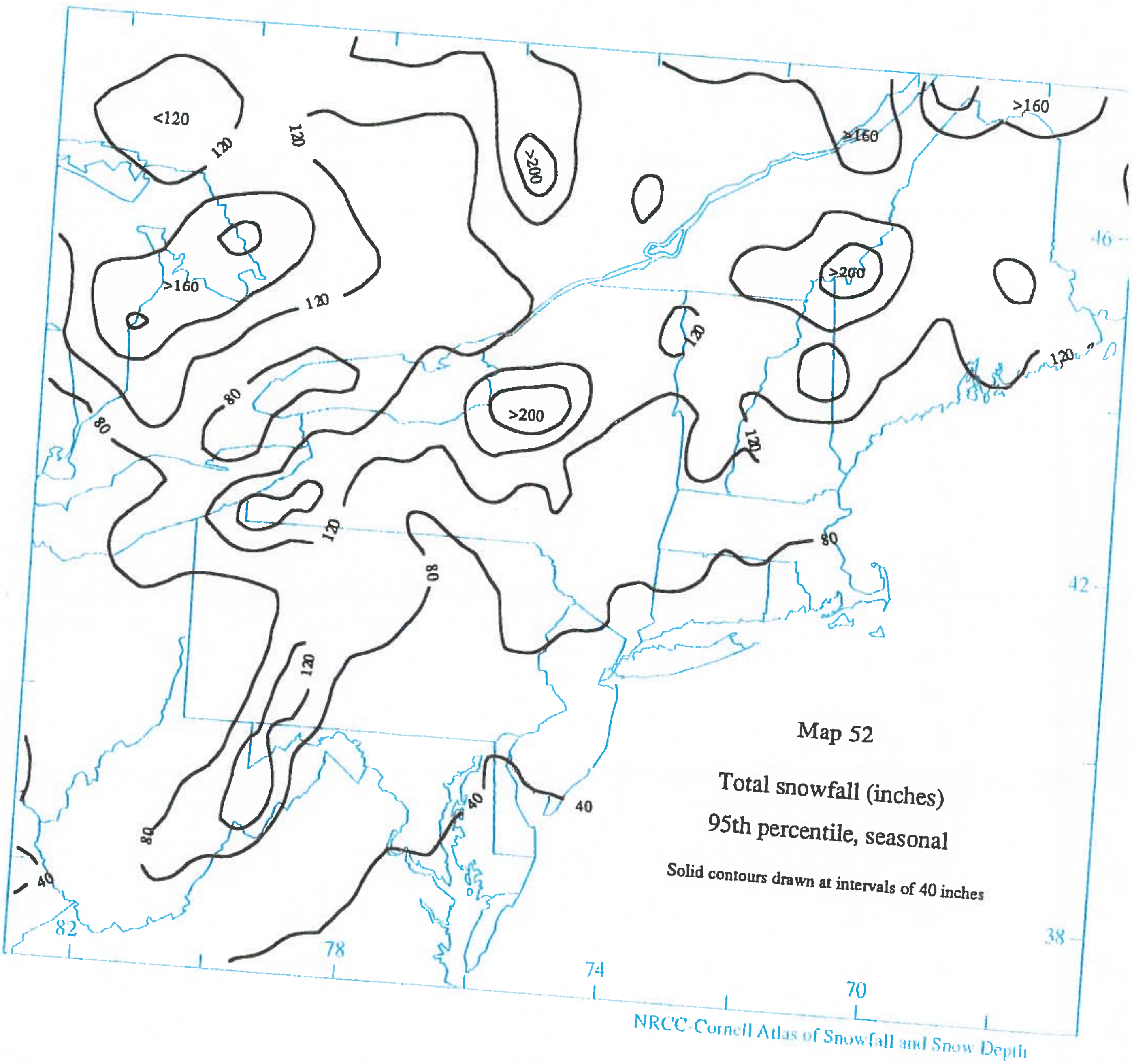
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



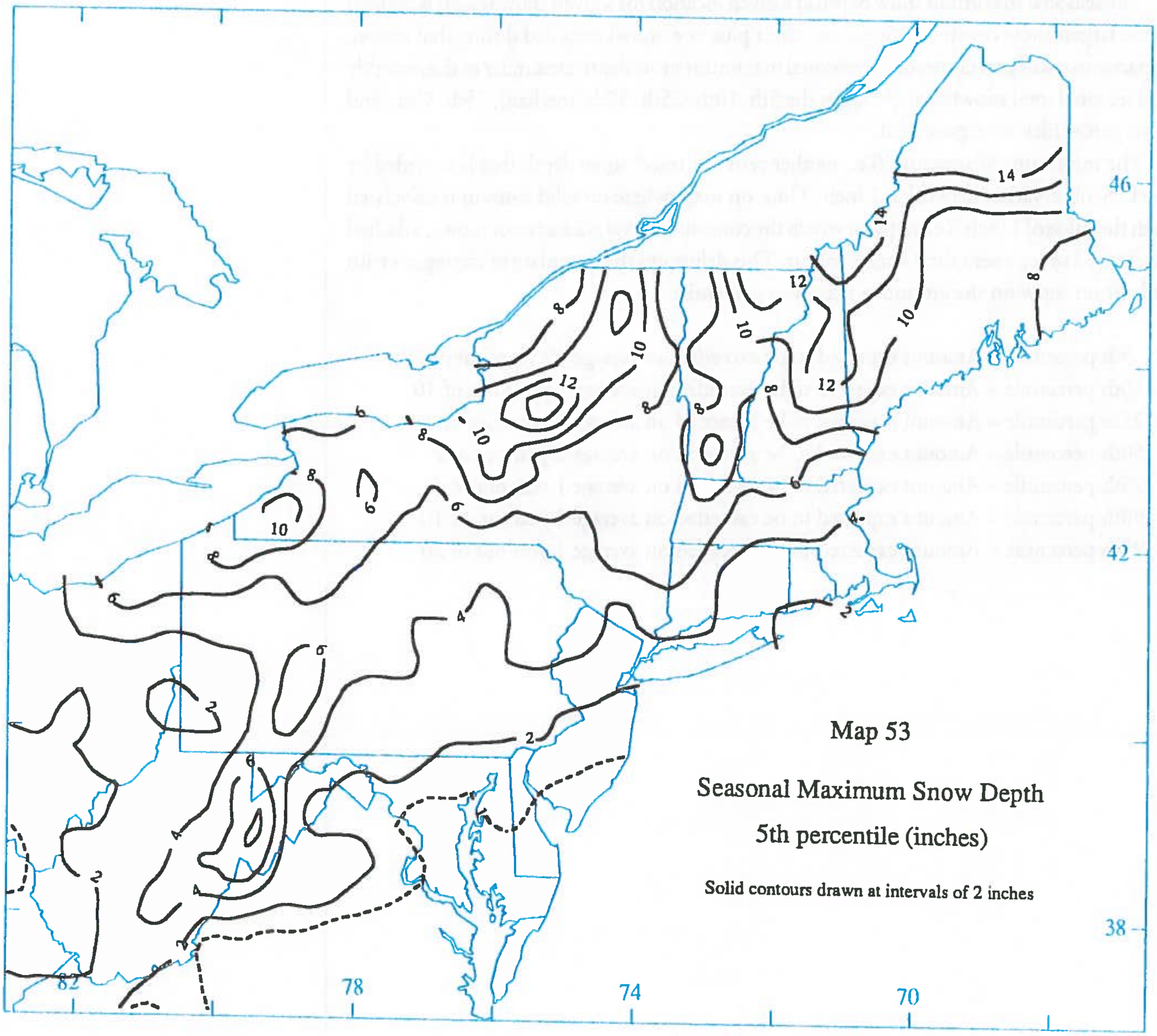
<120
120
>200
>160
>160
>200
>200
80
40
46
42
38
82
78
74
70
Map 52
Total snowfall (inches)
95th percentile, seasonal
Solid contours drawn at intervals of 40 inches
NRCC-Cornell Atlas of Snowfall and Snow Depth

PERCENTILES OF SEASONAL MAXIMUM SNOW DEPTH

The seasonal maximum snow depth at a given location for a given snow season is defined as the largest snow depth (existing snow cover plus new snow) recorded during that season. Separate maps of percentiles of the seasonal maximum snow depth are similar to the monthly and seasonal total snowfall maps: again the 5th, 10th, 25th, 50th (median), 75th, 90th, and 95th percentiles are represented.

The minimum quantitative (i.e., neither zero nor trace) snow depth that is recorded by the U.S. observation network is 1 inch. Thus, on maps where no solid contour is associated with the value of 1 inch (i.e. maps for which the contour interval is 2 inches or more), a dashed line is used to represent the 1-inch contour. This delineates the boundary of the region with little or no snow on the ground at the given percentile.

5th percentile = Amount expected to be exceeded on average 19 years out of 20
10th percentile = Amount expected to be exceeded on average 9 years out of 10
25th percentile = Amount expected to be exceeded on average 3 years out of 4
50th percentile = Amount expected to be exceeded on average 1 year out of 2
75th percentile = Amount expected to be exceeded on average 1 year out of 4
90th percentile = Amount expected to be exceeded on average 1 year out of 10
95th percentile = Amount expected to be exceeded on average 1 year out of 20



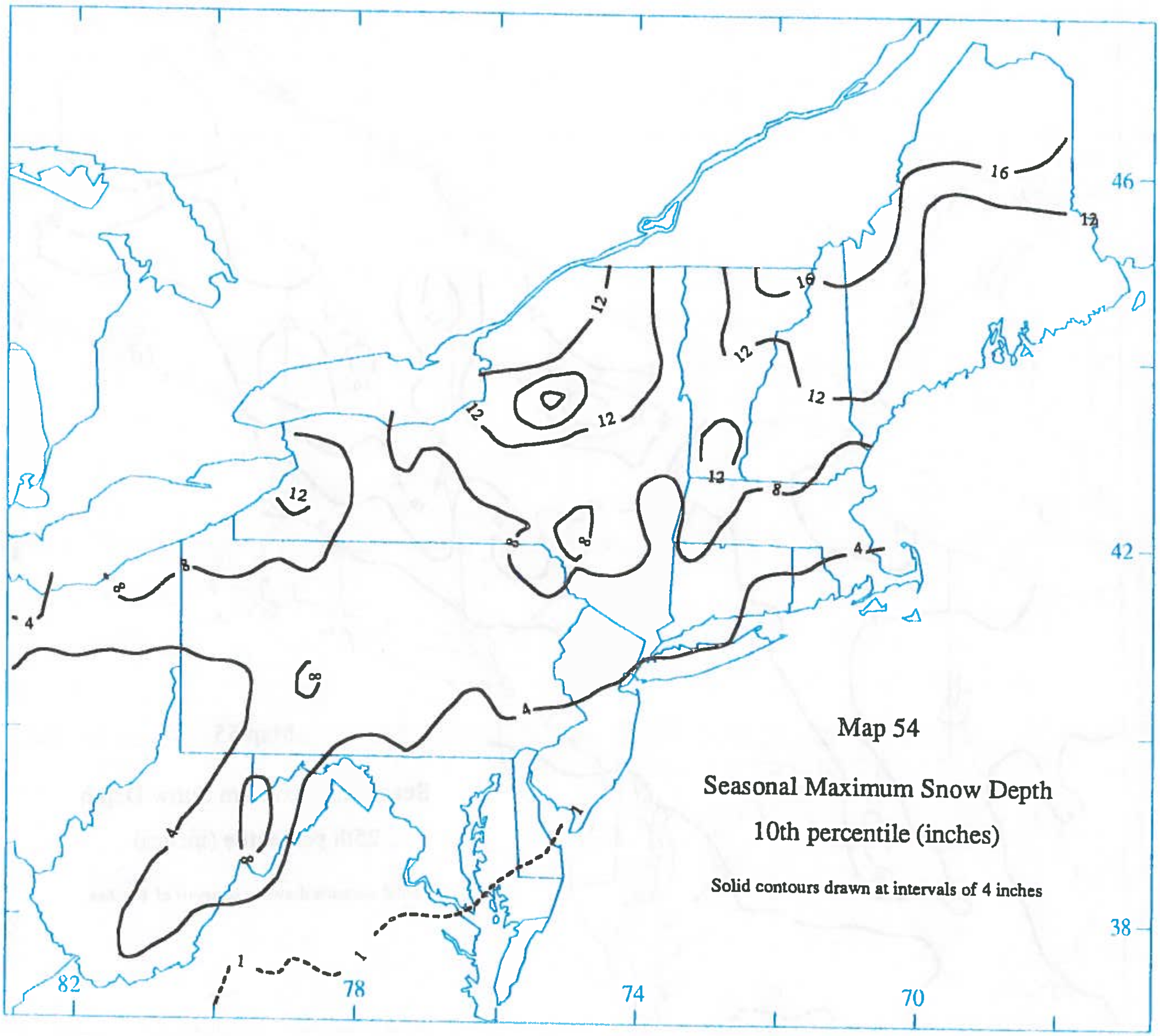
Map 53

Seasonal Maximum Snow Depth

5th percentile (inches)

Solid contours drawn at intervals of 2 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth



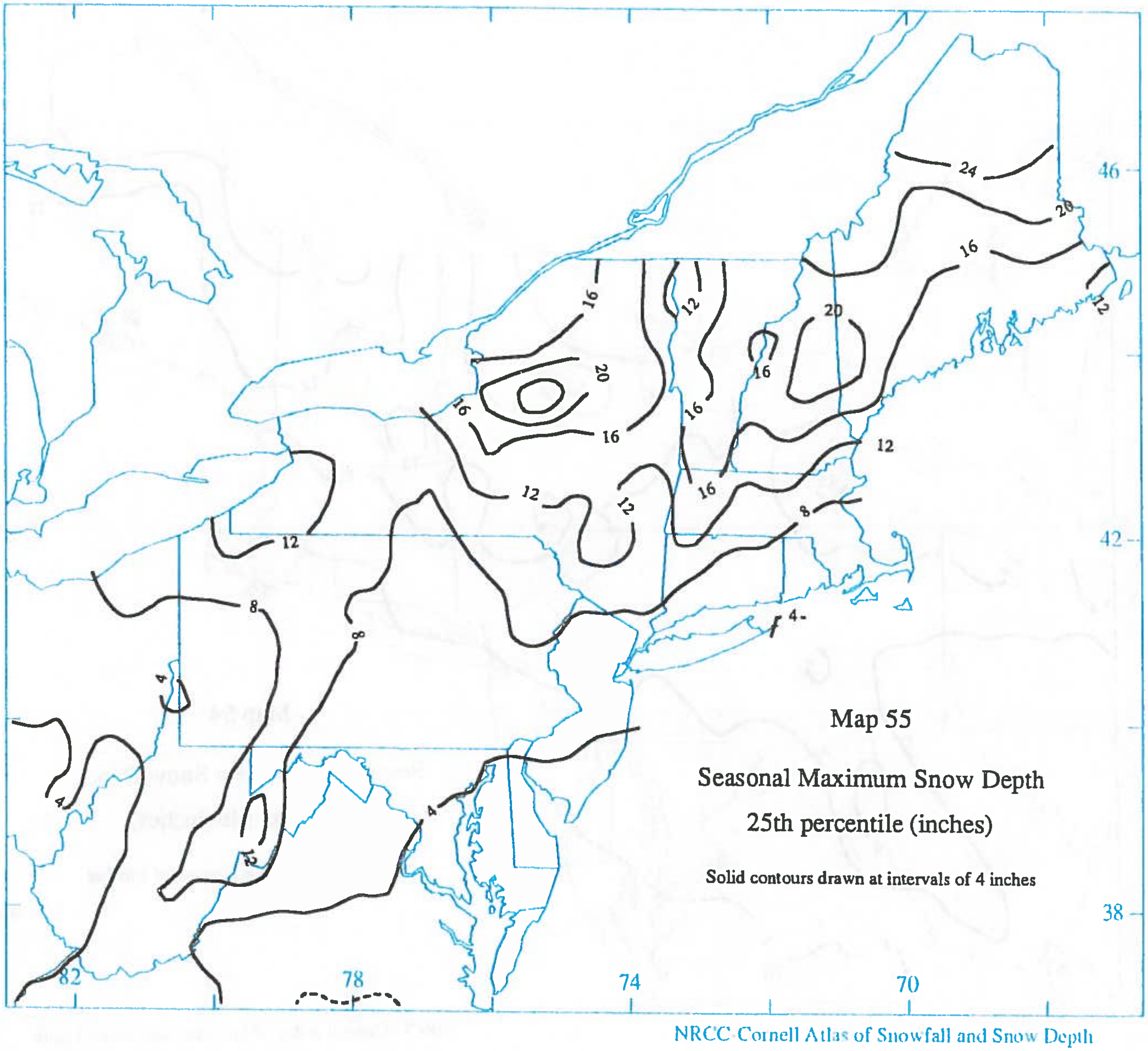
Map 54

Seasonal Maximum Snow Depth

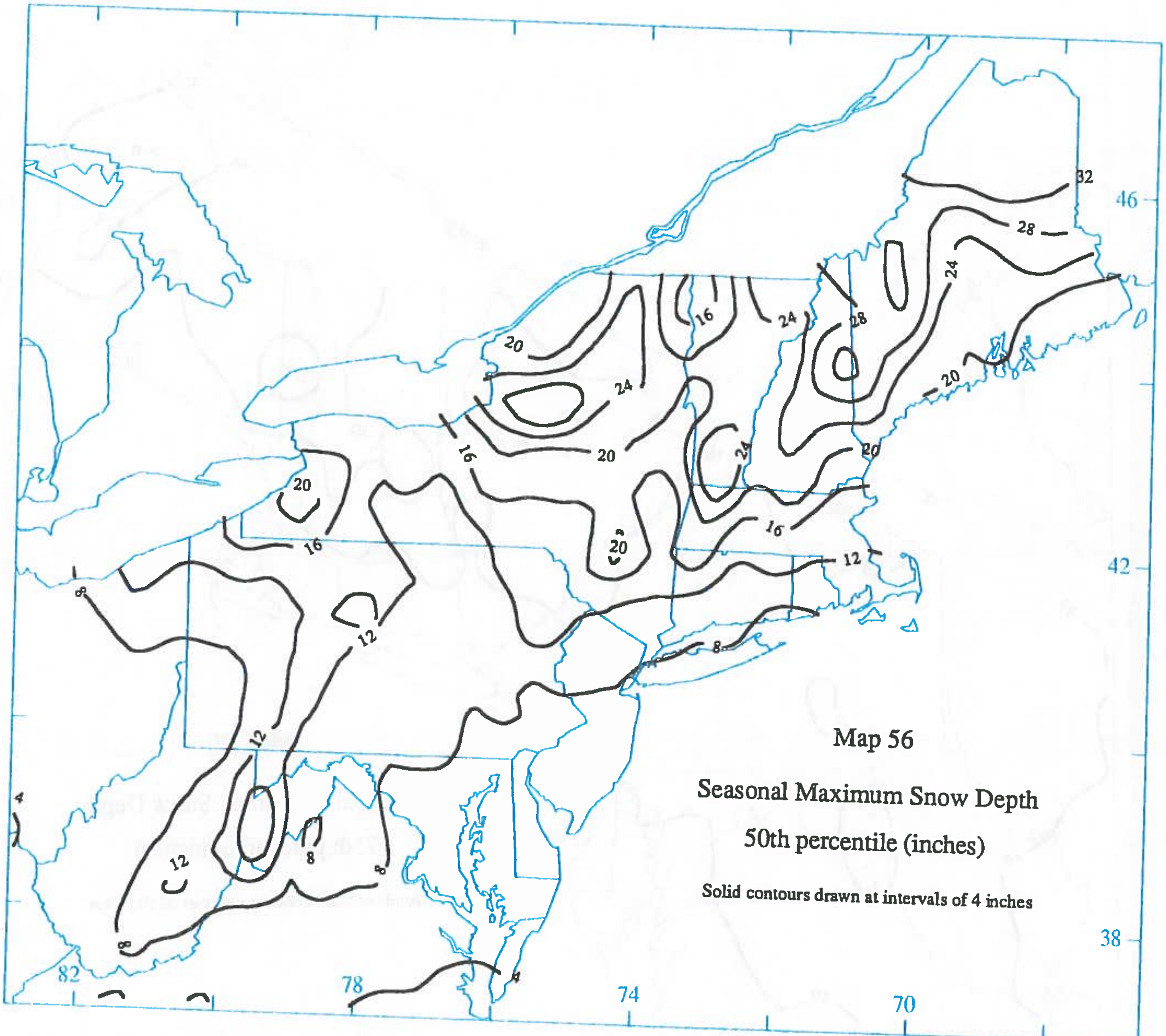
10th percentile (inches)

Solid contours drawn at intervals of 4 inches

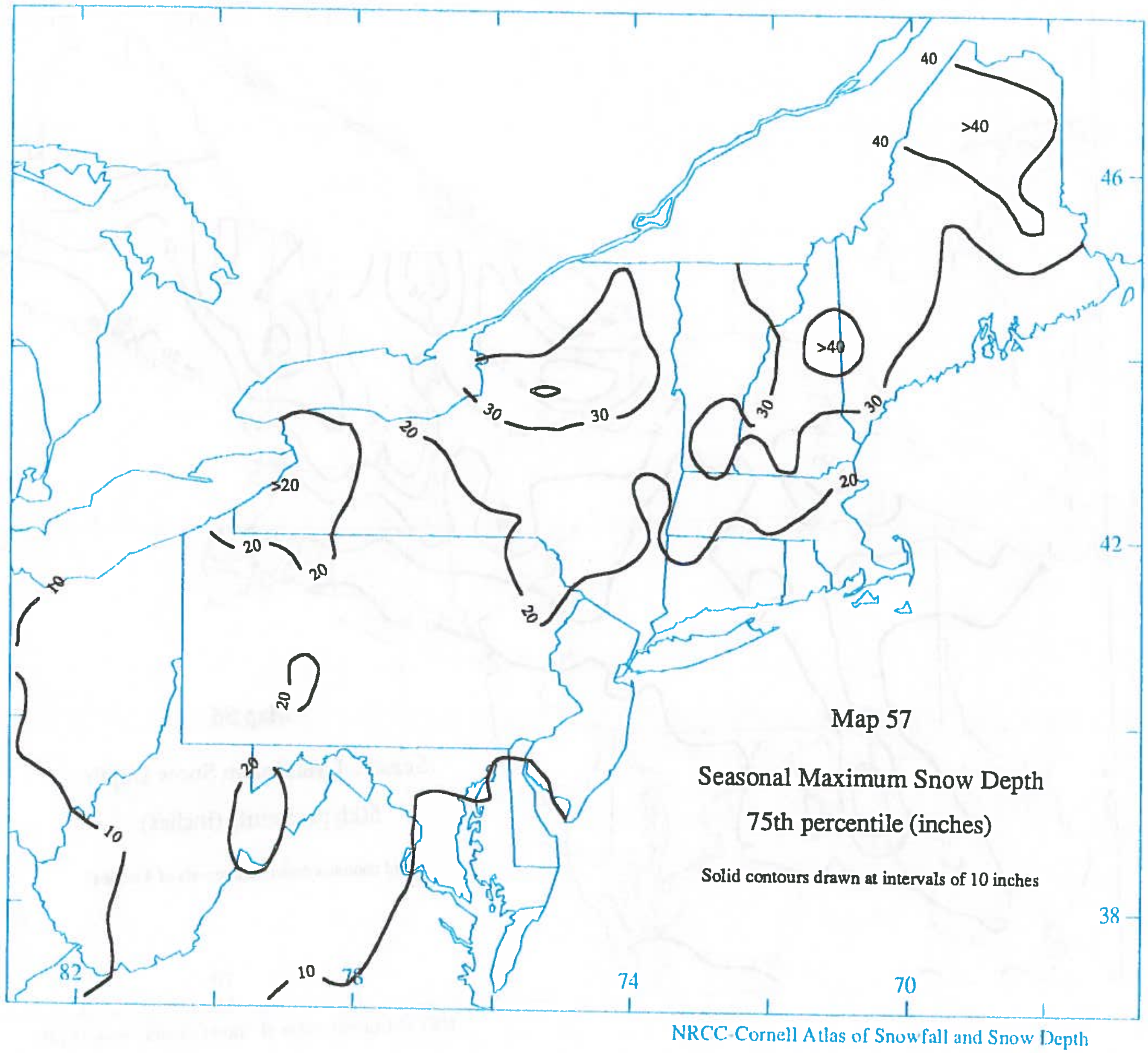
NRCC-Cornell Atlas of Snowfall and Snow Depth



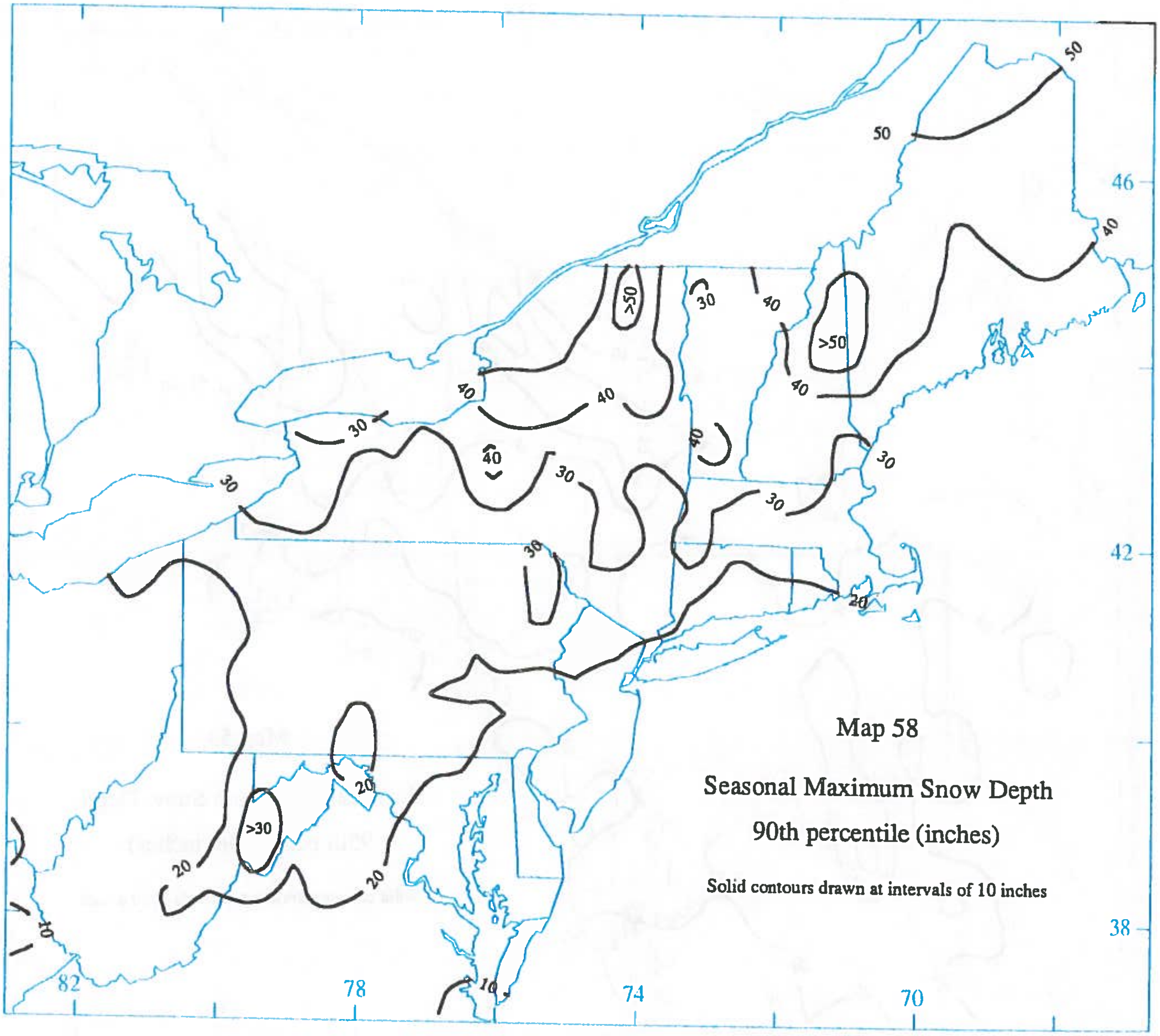
Map 55
Seasonal Maximum Snow Depth
25th percentile (inches)
Solid contours drawn at intervals of 4 inches
46
42
38
82
78
74
70
24
20
16
12
8
4
NRCC Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 57
Seasonal Maximum Snow Depth
75th percentile (inches)
Solid contours drawn at intervals of 10 inches
40
>40
40
>40
30
30
30
30
20
>20
20
20
20
20
20
20
10
10
10
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

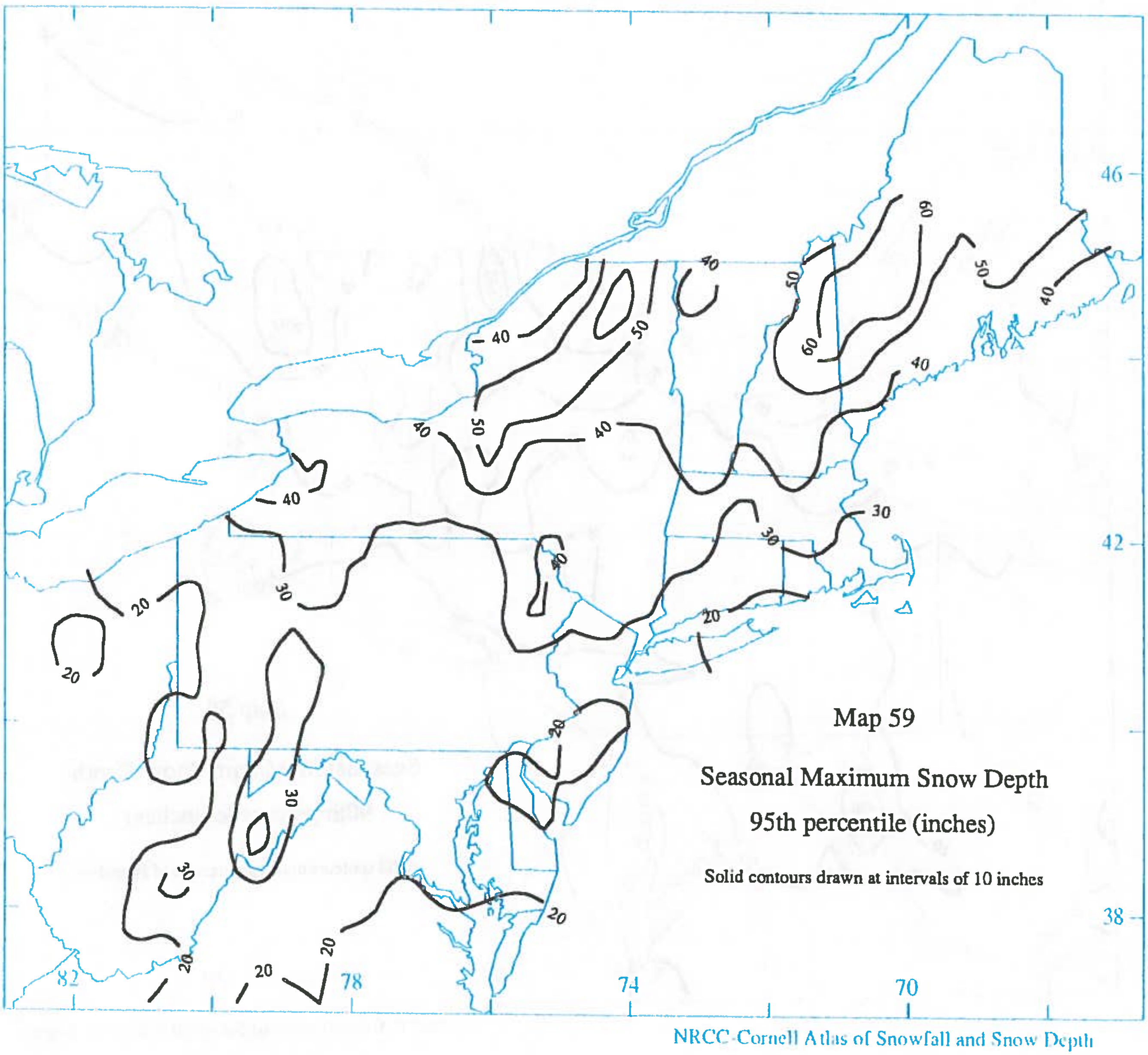


Map 58

Seasonal Maximum Snow Depth
90th percentile (inches)

Solid contours drawn at intervals of 10 inches

NRCC-Cornell Atlas of Snowfall and Snow Depth

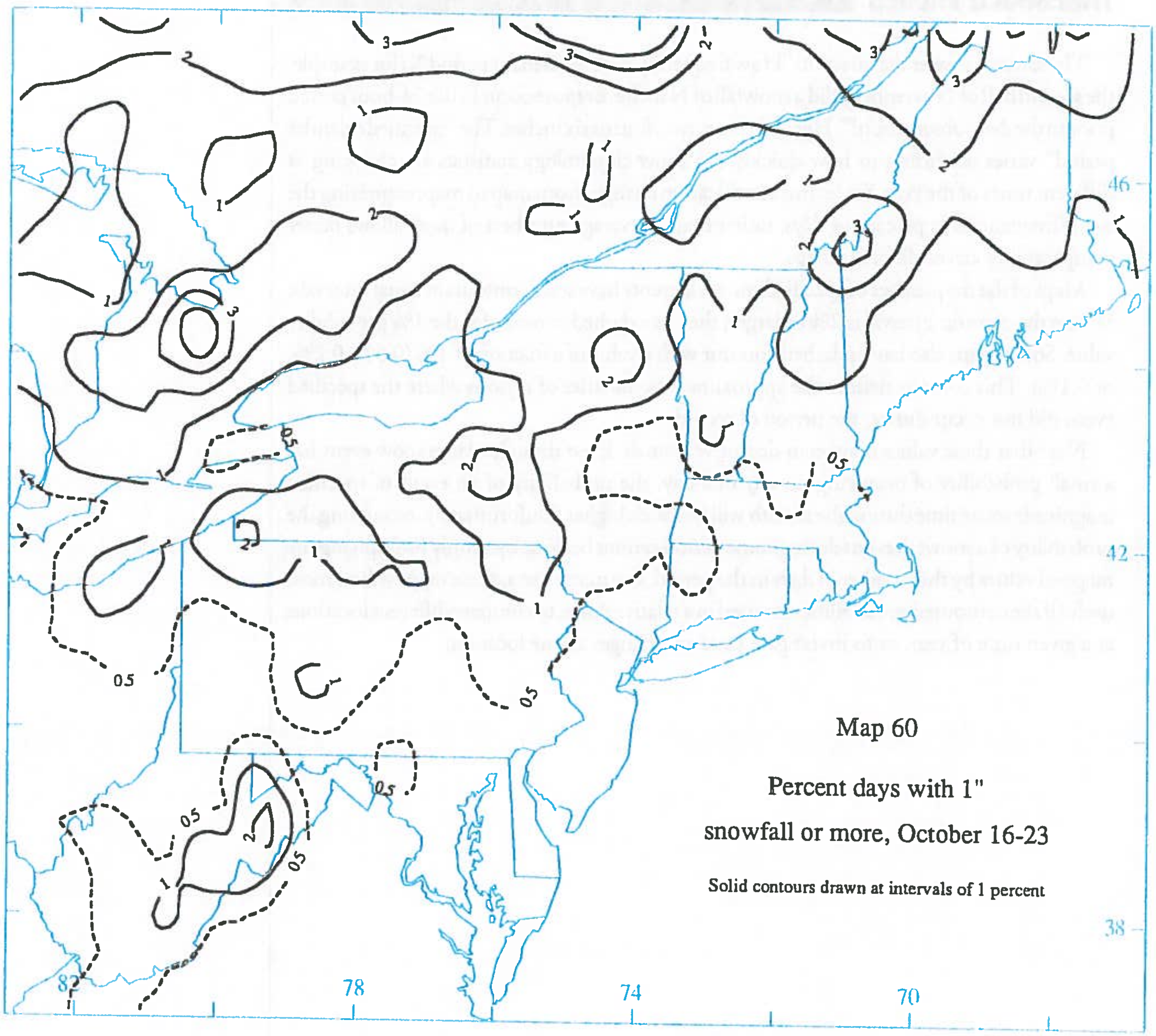

Map 59
Seasonal Maximum Snow Depth
95th percentile (inches)
Solid contours drawn at intervals of 10 inches
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

DAILY SNOWFALL TOTALS EQUALLING OR EXCEEDING SELECTED THRESHOLD VALUES

These maps answer the question "How frequently during calendar period X (for example, the second half of November), did a snowfall of N inches or more occur in the 24-hour period prior to the daily observation?". Here, N is one, two, four or six inches. The "specified calendar period" varies according to how quickly the snow climatology statistics are changing at different times of the year. Since time stratification changes from map to map, expressing the event frequencies as percent of days, rather than as average numbers of days, allows better comparability across different maps.

Maps of the frequencies of specified snowfall events have solid contours at equal intervals. Where the contour interval is 2% or larger, there is a dashed contour for the 1% probability value. Some maps also have a dashed contour with a value of a fraction of 1% (0.5%, 0.2%, or 0.1%). This contour defines the approximate boundaries of regions where the specified event did not occur during the period of record.

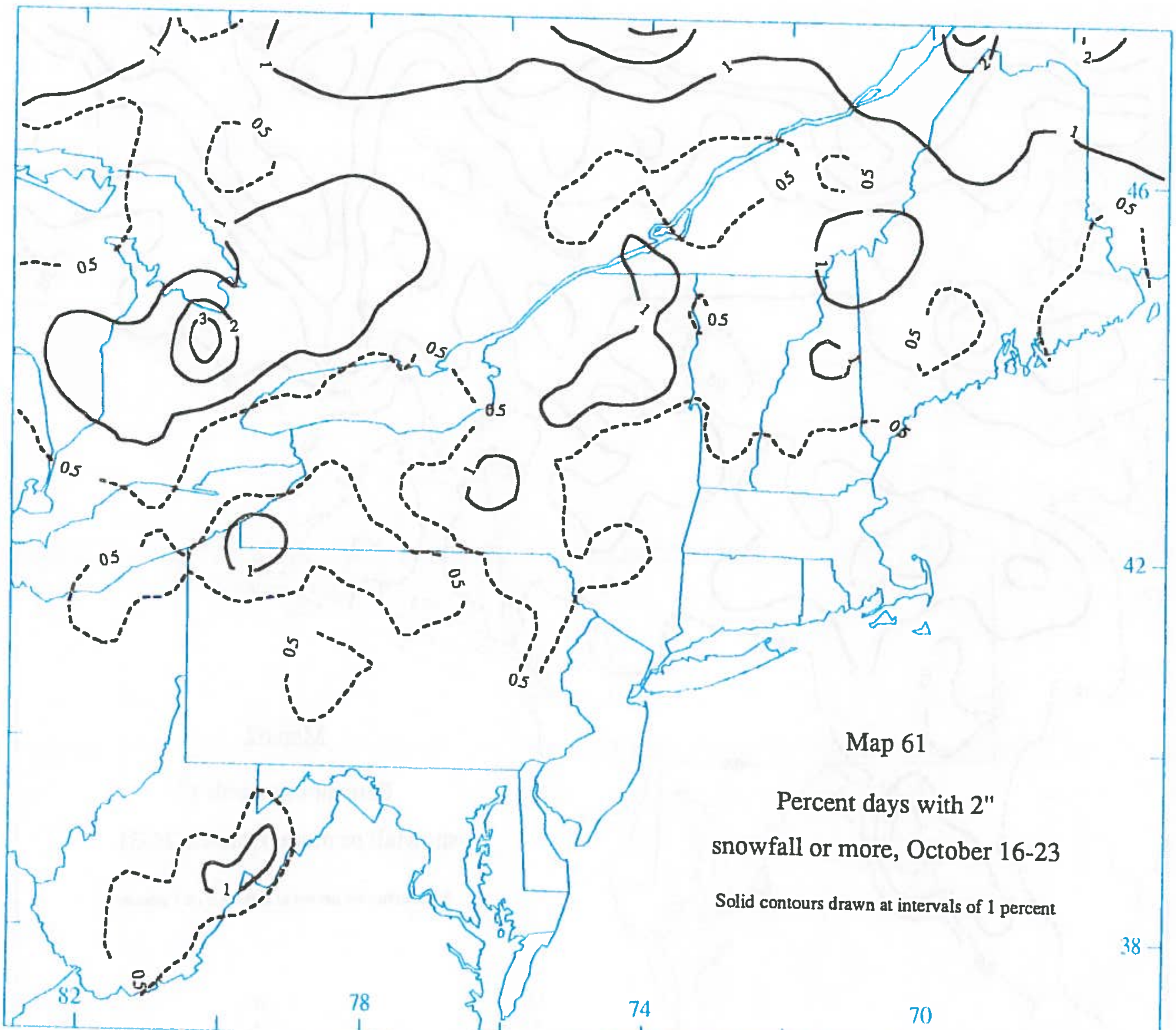
Note that these values may seem deceptively small. Even though a large snow event has a small probability of occurring on any one day, the probability of an event of specified magnitude some time during the month will be much higher. Unfortunately, estimating the probability of a snowfall event during some period cannot be done by simply multiplying the mapped values by the number of days in the period. For many users, these maps will be most useful if the contoured probabilities are used in a relative sense, to compare different locations at a given time of year, or to investigate seasonal changes at one location.



Map 60

Percent days with 1" snowfall or more, October 16-23

Solid contours drawn at intervals of 1 percent

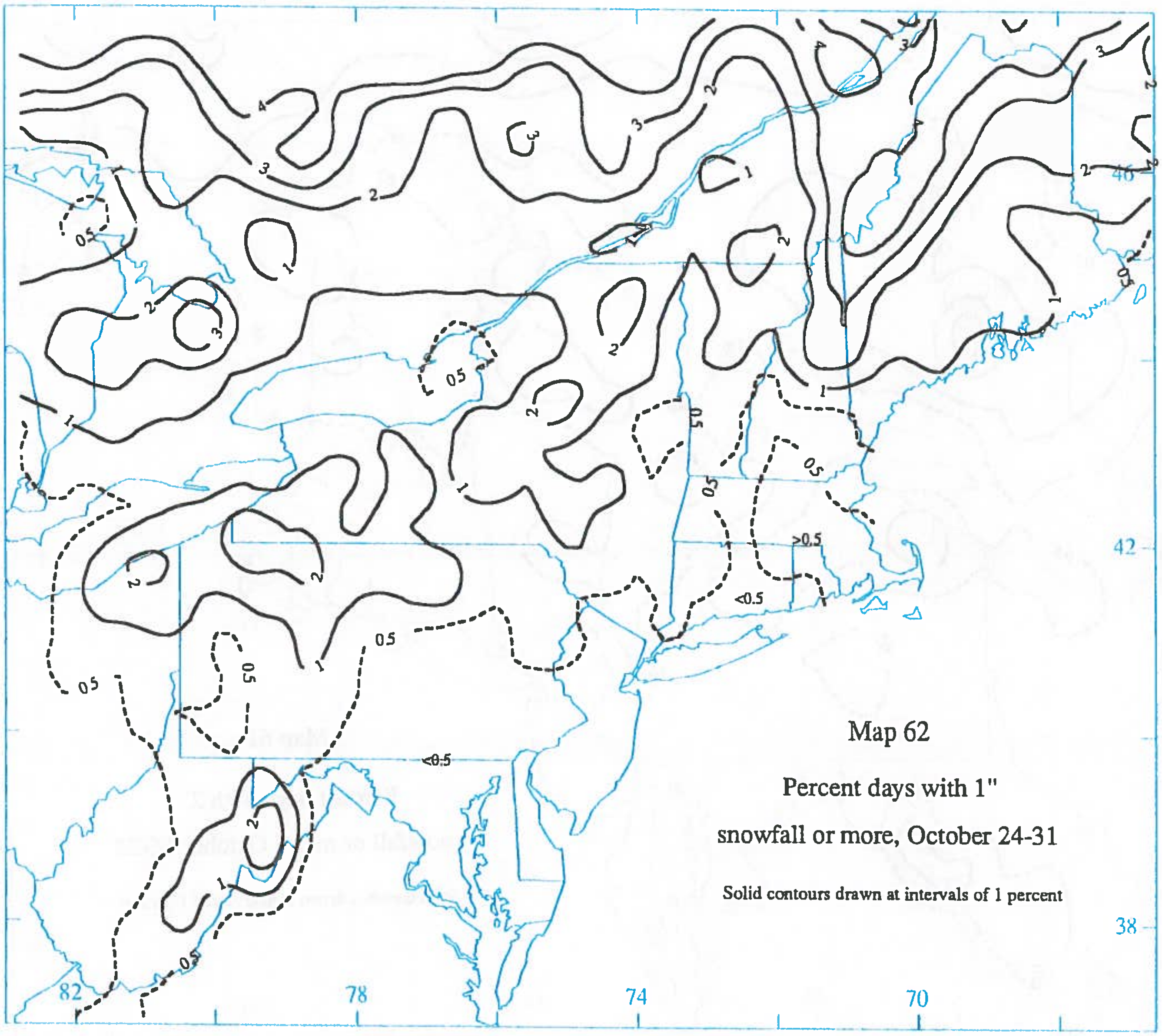


Map 61

Percent days with 2" snowfall or more, October 16-23

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

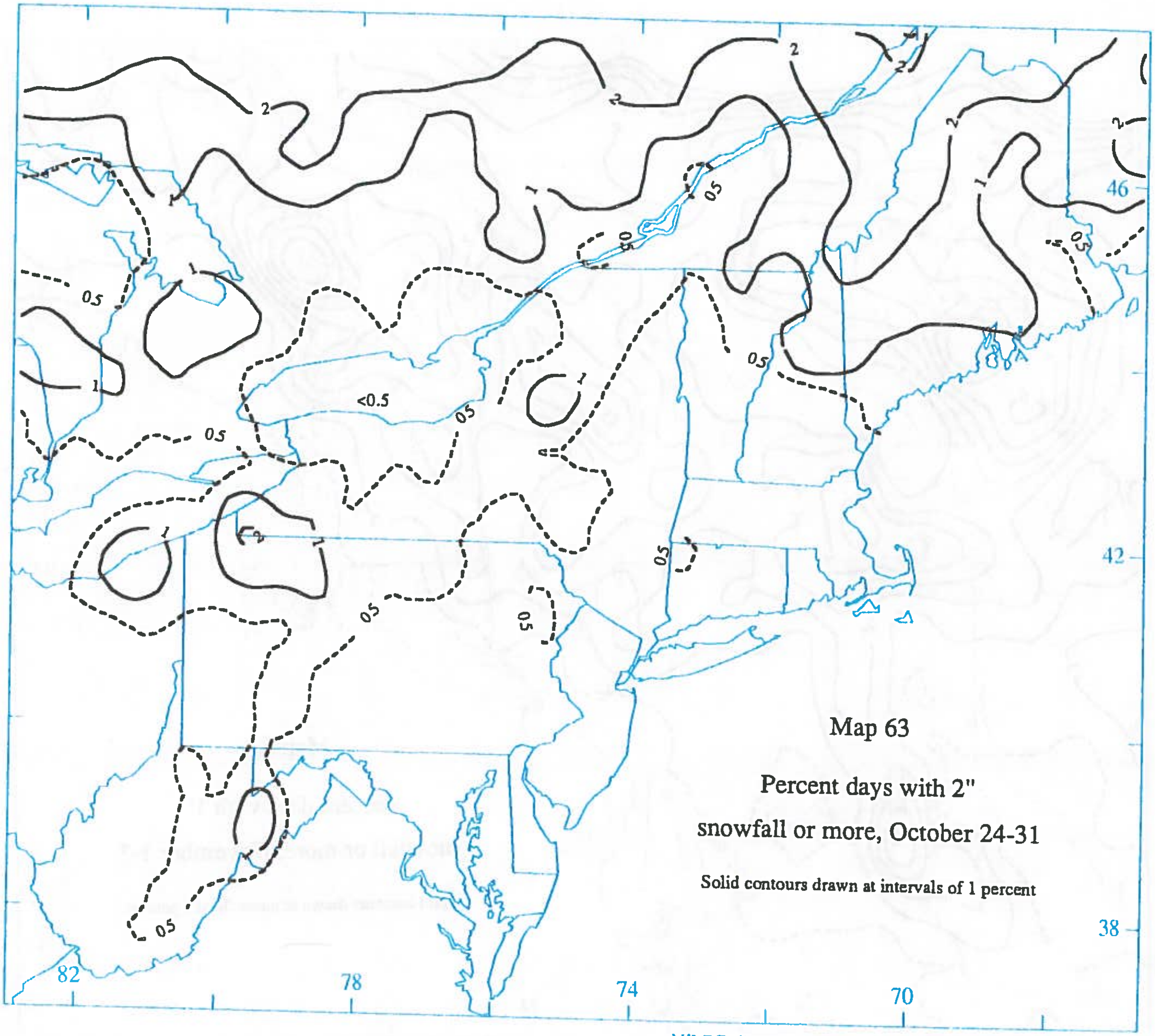


Map 62

Percent days with 1" snowfall or more, October 24-31

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

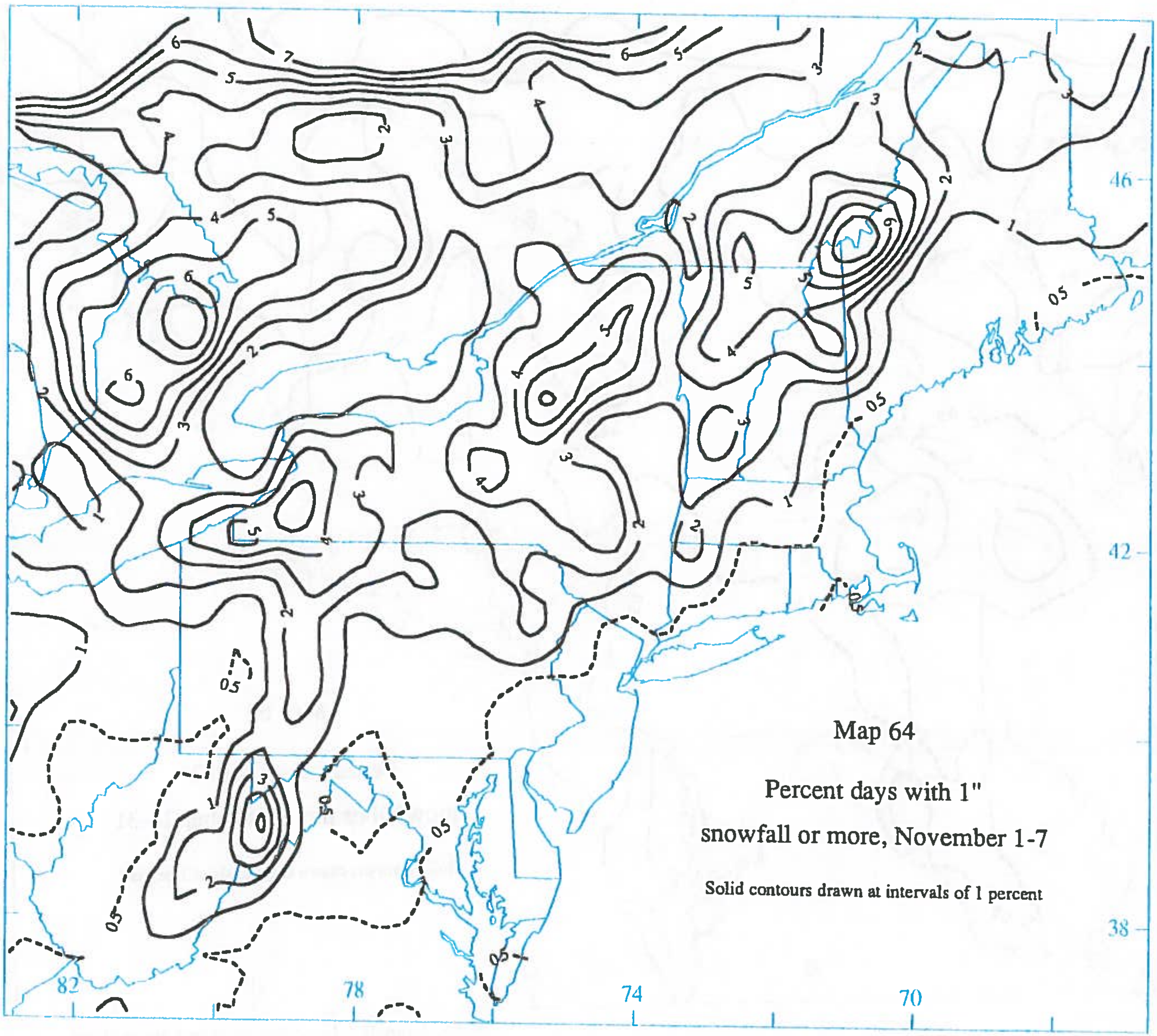


Map 63

Percent days with 2" snowfall or more, October 24-31

Solid contours drawn at intervals of 1 percent

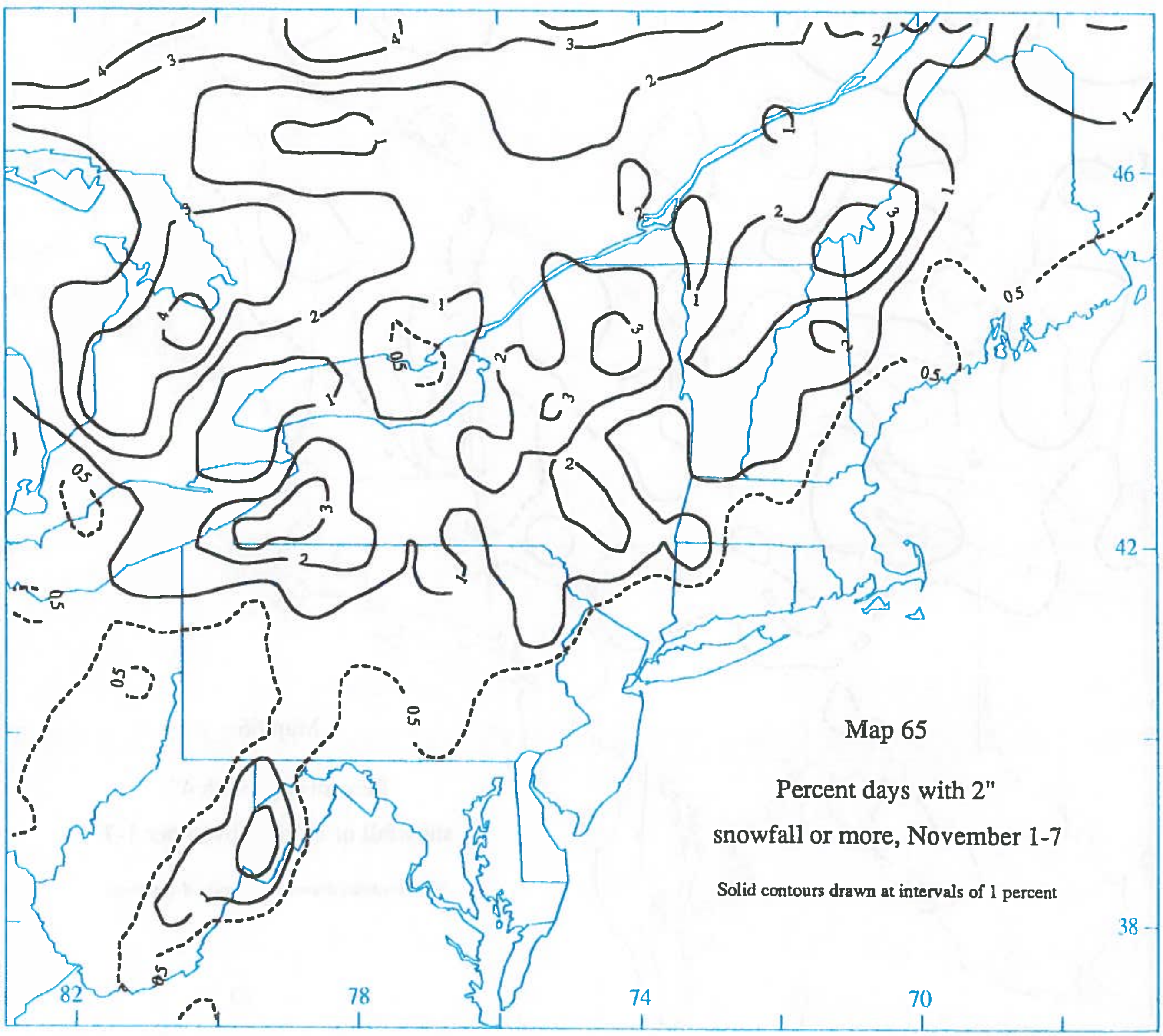
NRCC-Cornell Atlas of Snowfall and Snow Depth



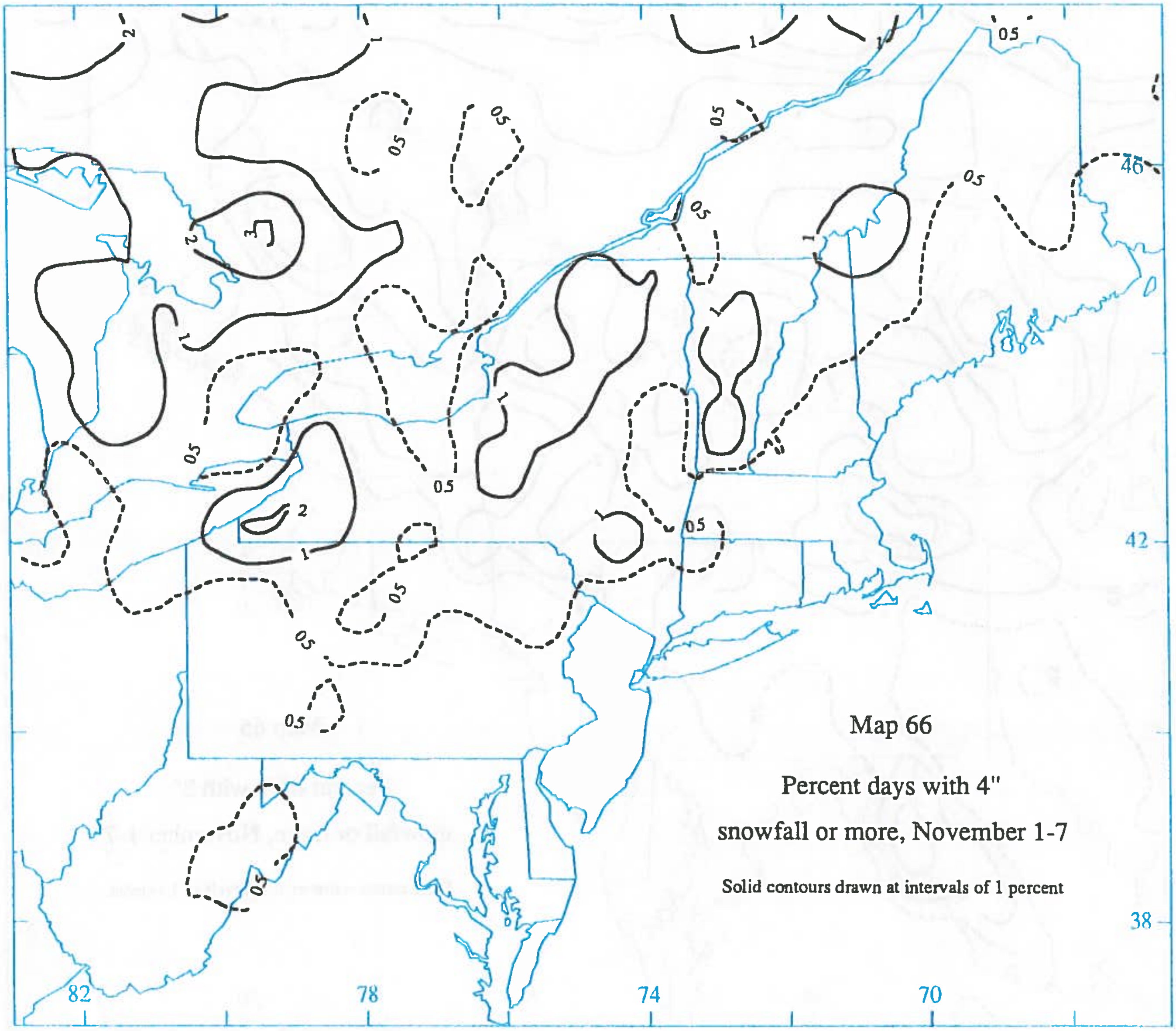
Map 64

Percent days with 1" snowfall or more, November 1-7

Solid contours drawn at intervals of 1 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

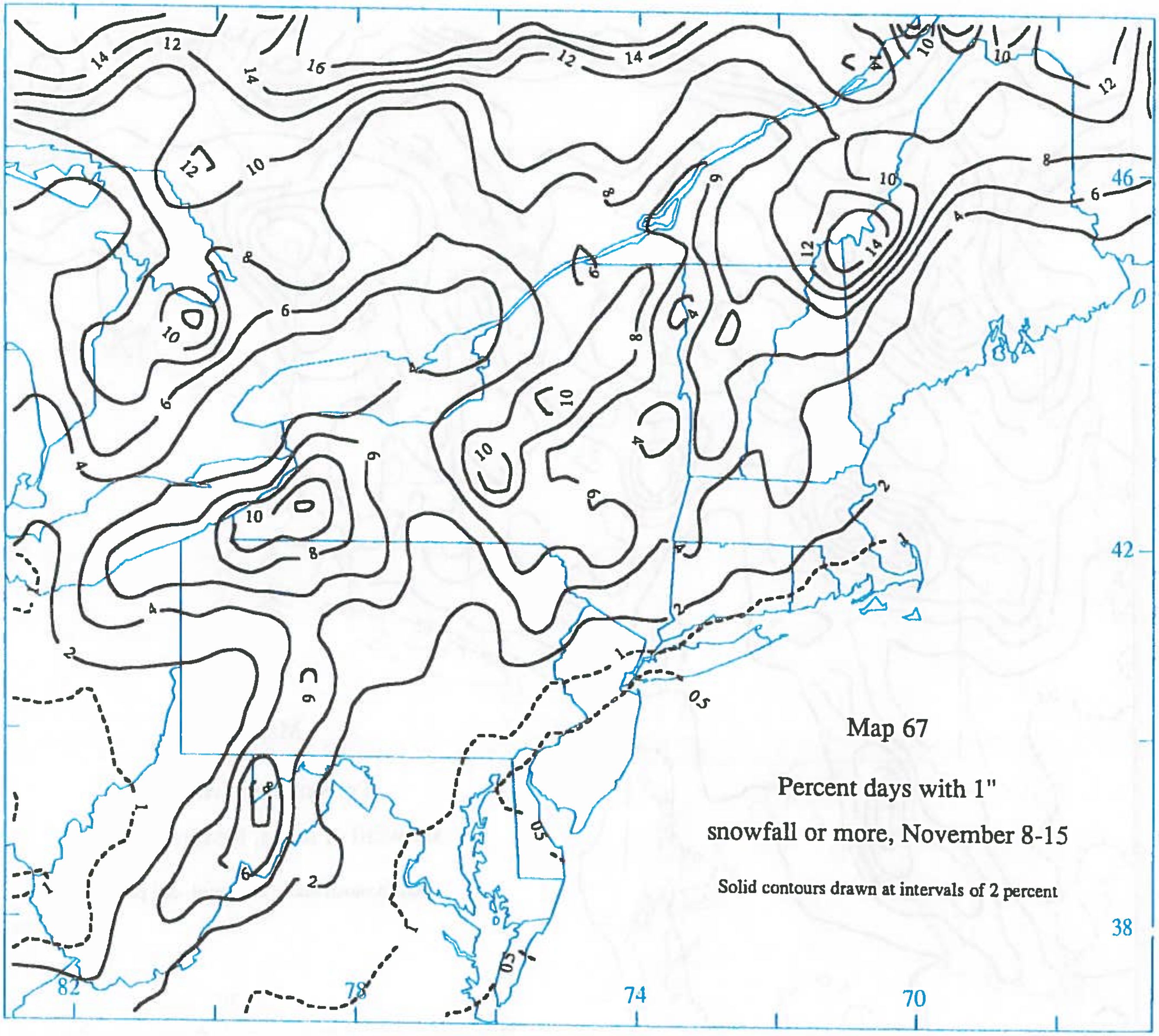


Map 66

Percent days with 4" snowfall or more, November 1-7

Solid contours drawn at intervals of 1 percent

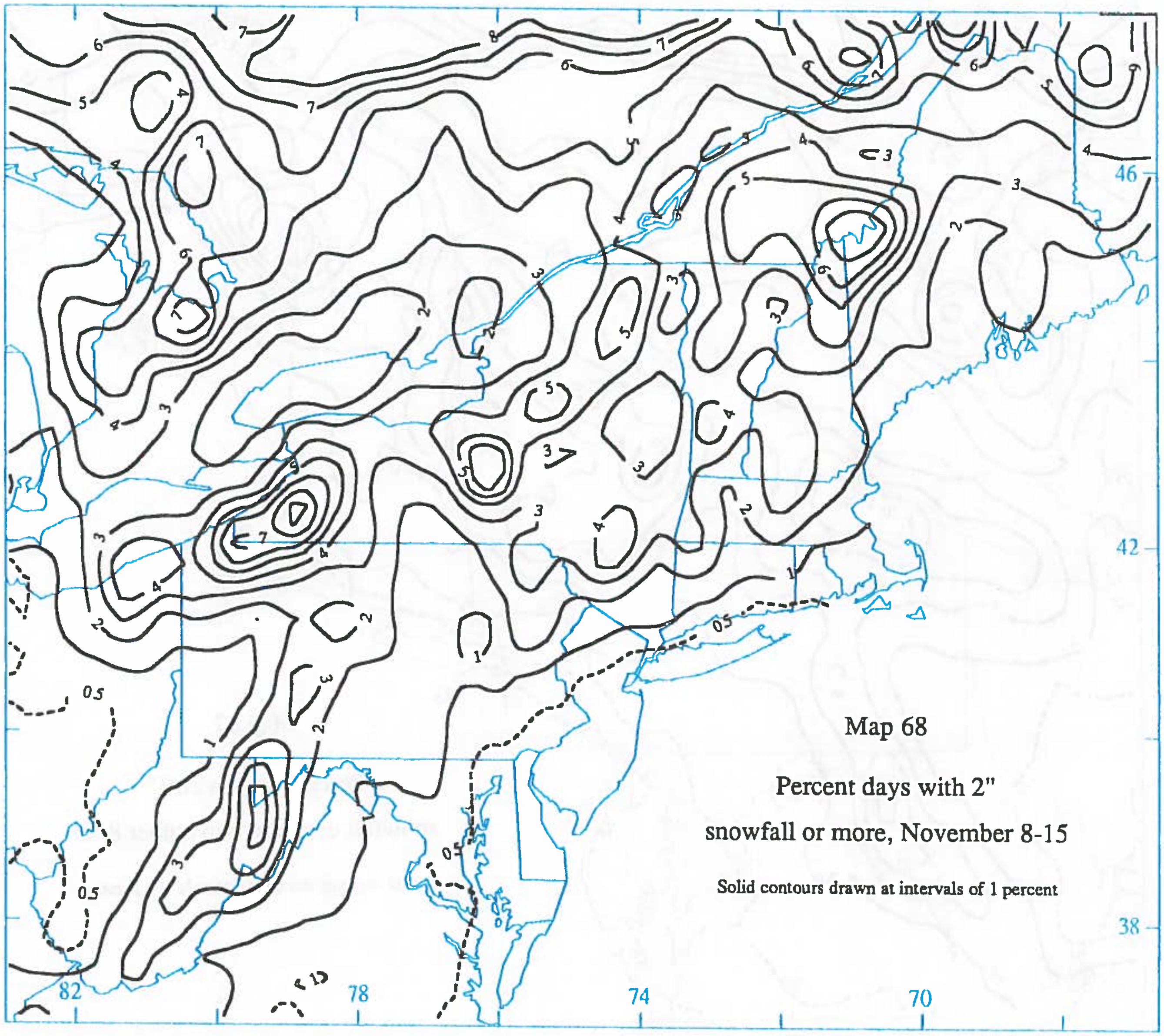
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 67

Percent days with 1" snowfall or more, November 8-15

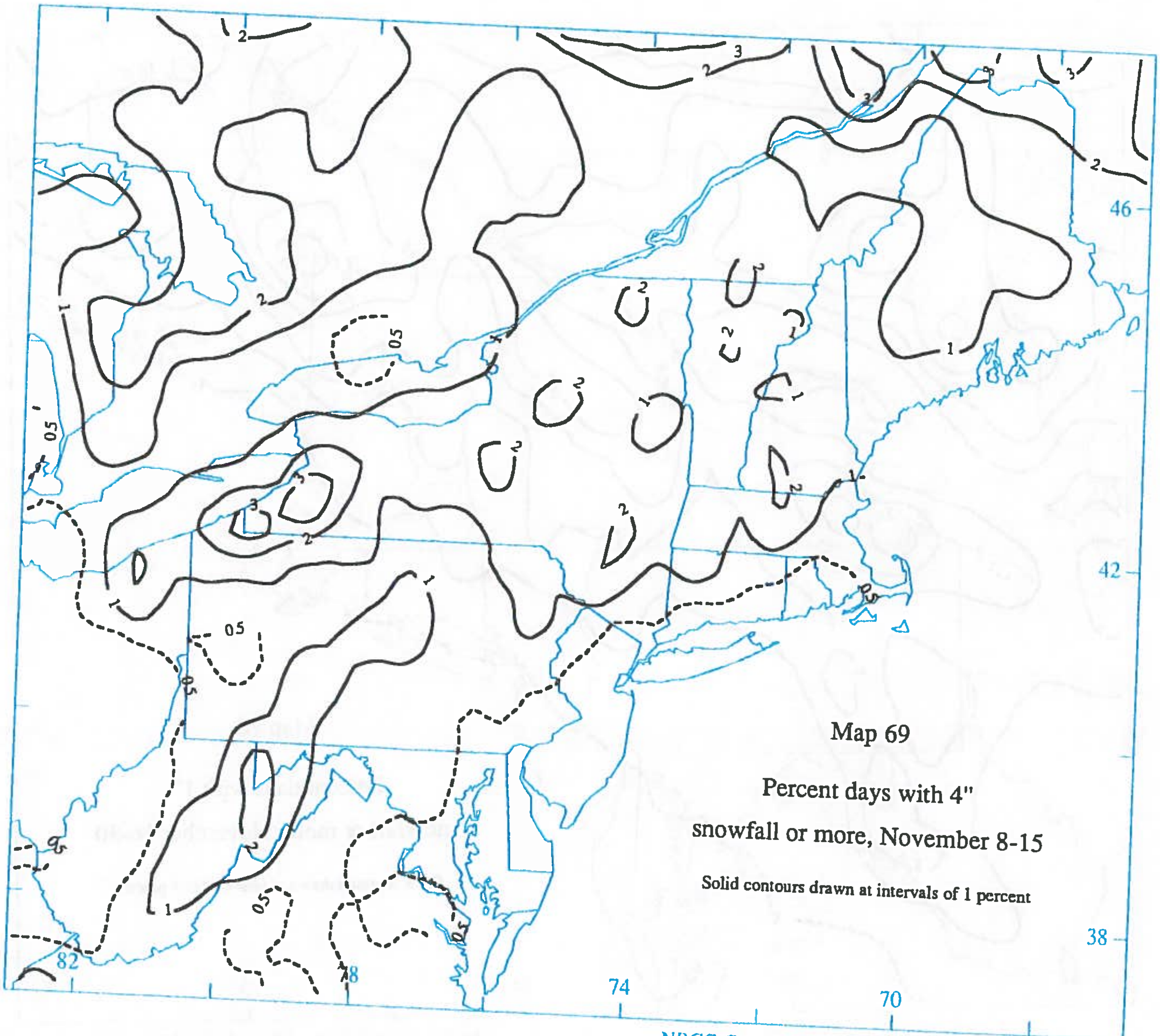
Solid contours drawn at intervals of 2 percent



Map 68

Percent days with 2" snowfall or more, November 8-15

Solid contours drawn at intervals of 1 percent

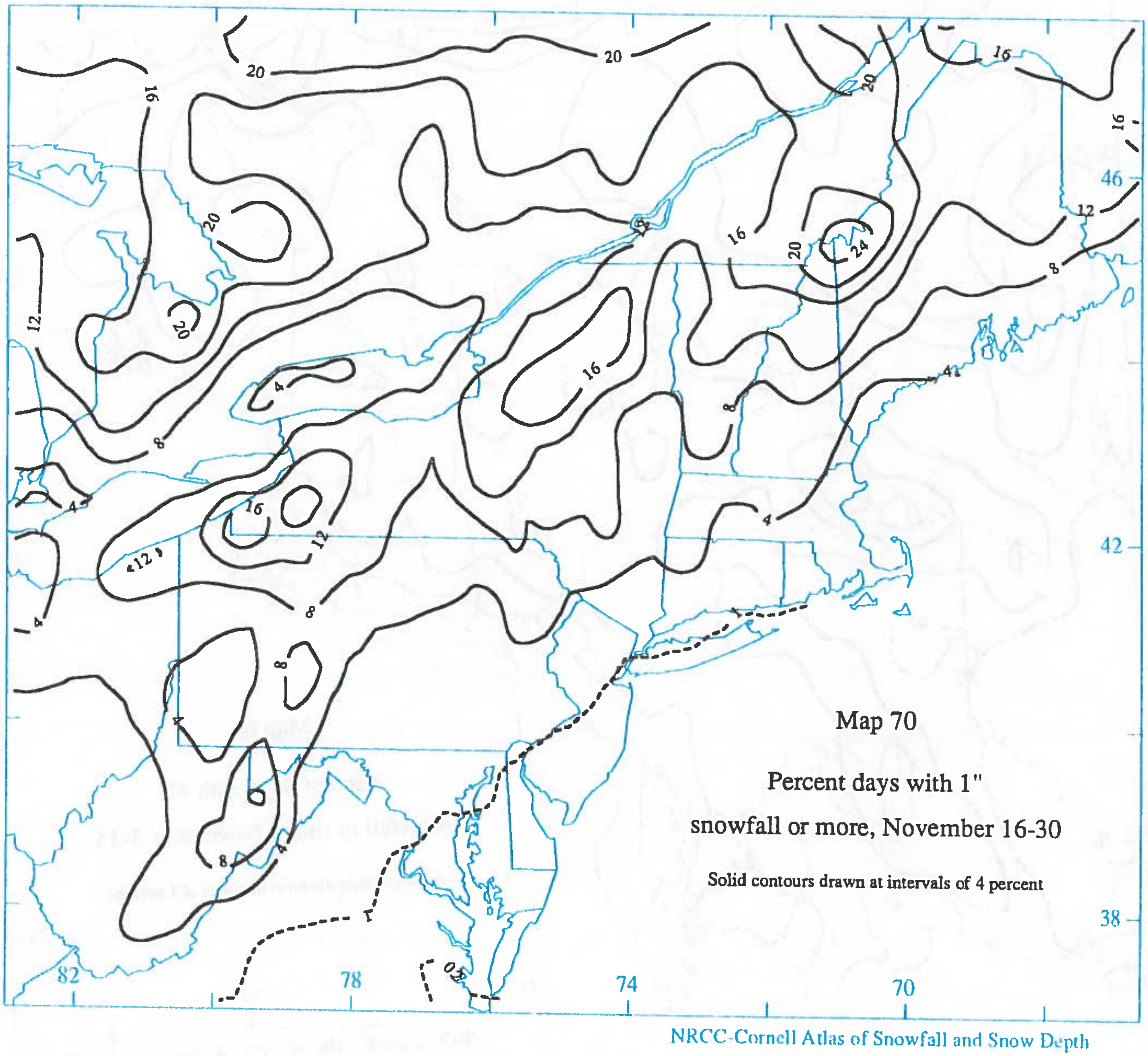


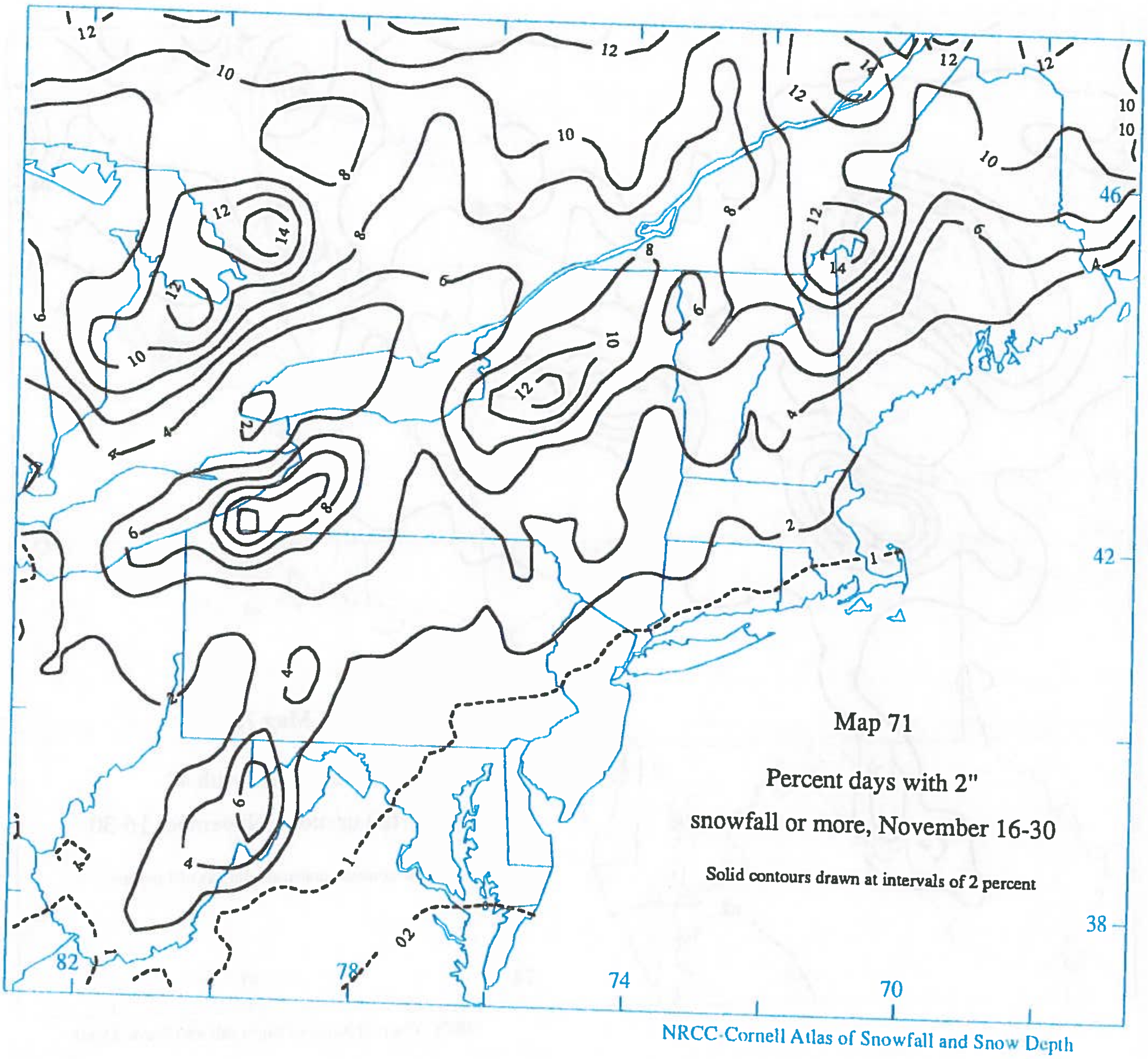
Map 69

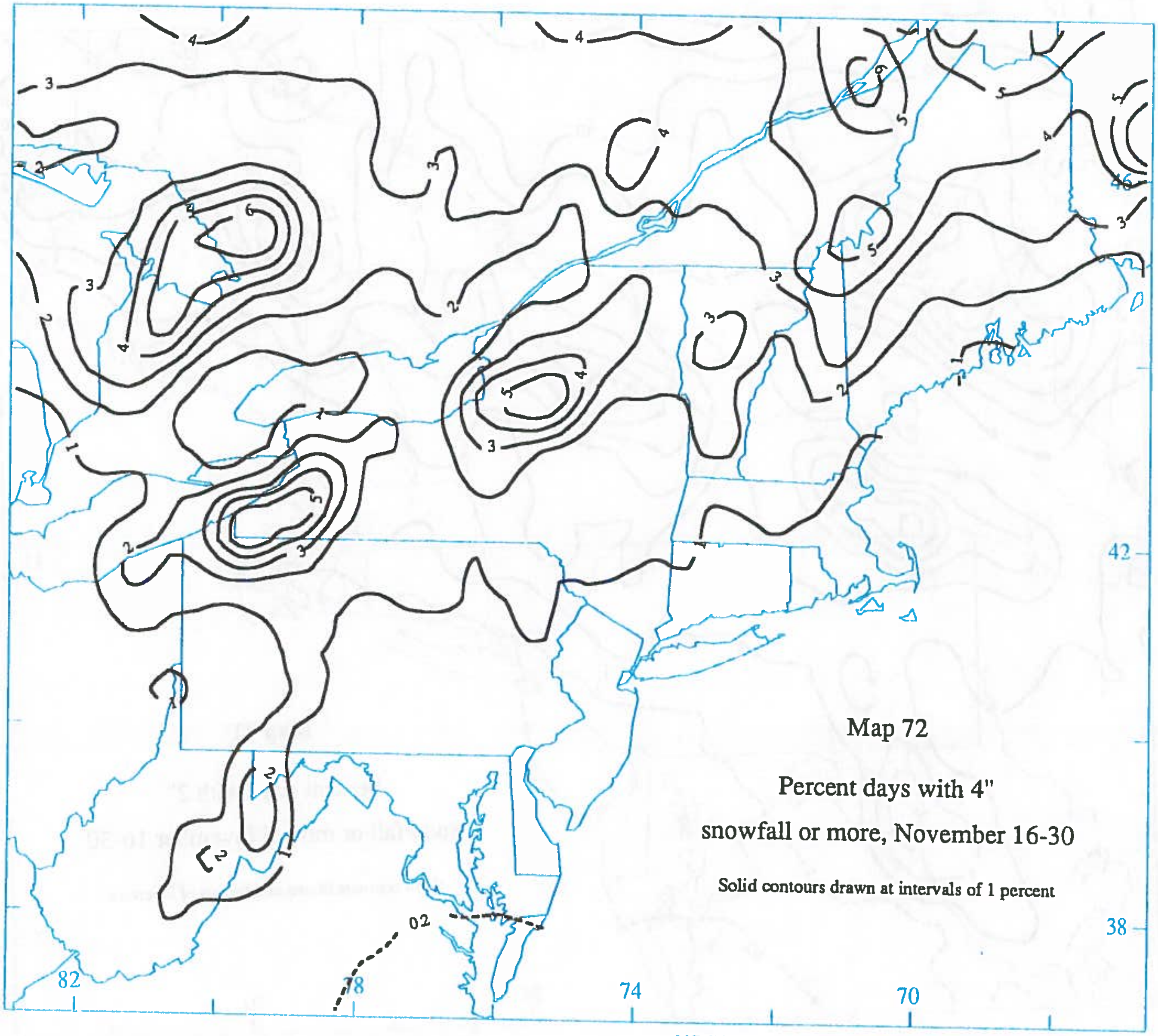
Percent days with 4" snowfall or more, November 8-15

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 70
Percent days with 1"
snowfall or more, November 16-30
Solid contours drawn at intervals of 4 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 71
Percent days with 2"
snowfall or more, November 16-30
Solid contours drawn at intervals of 2 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

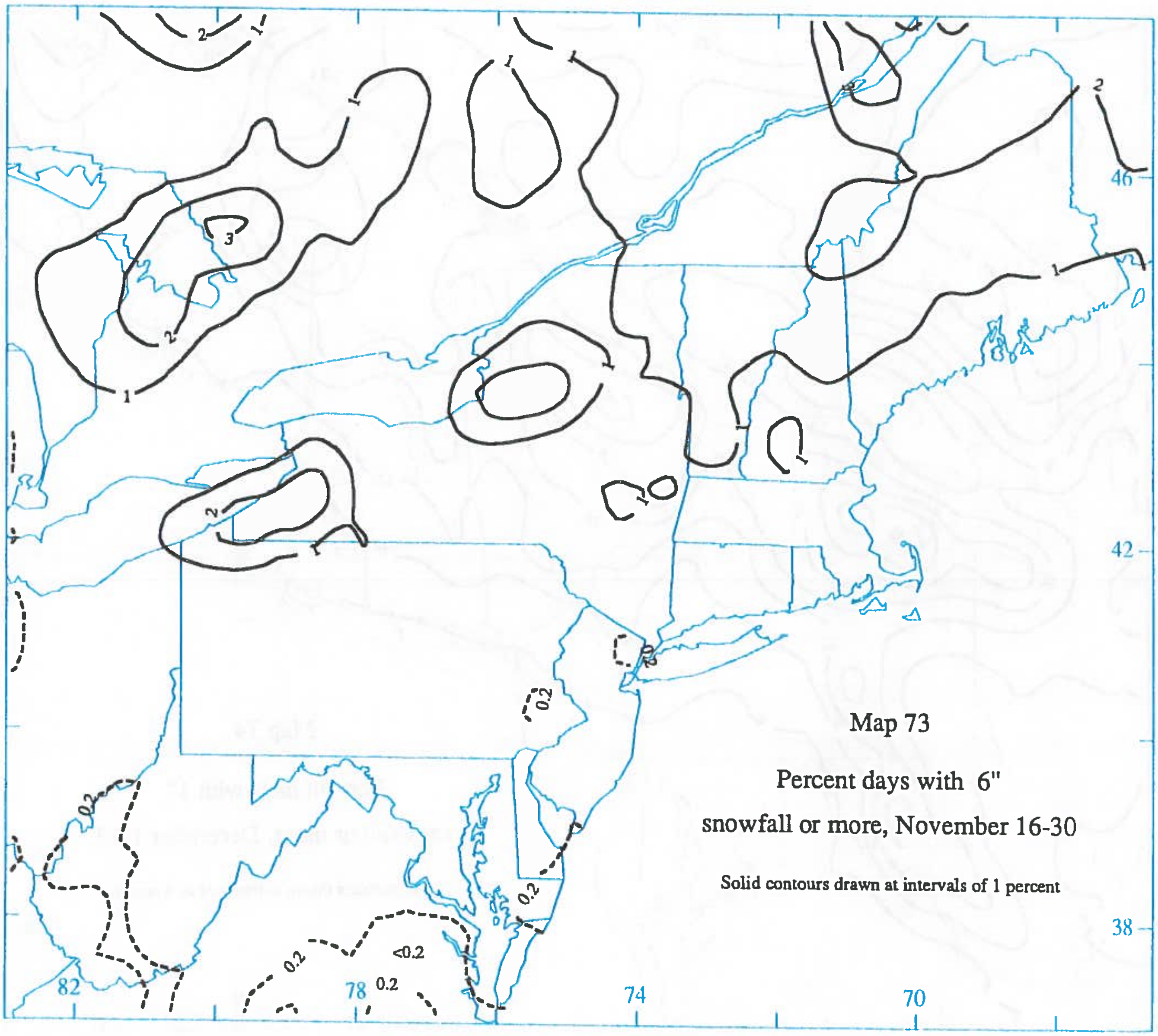


Map 72

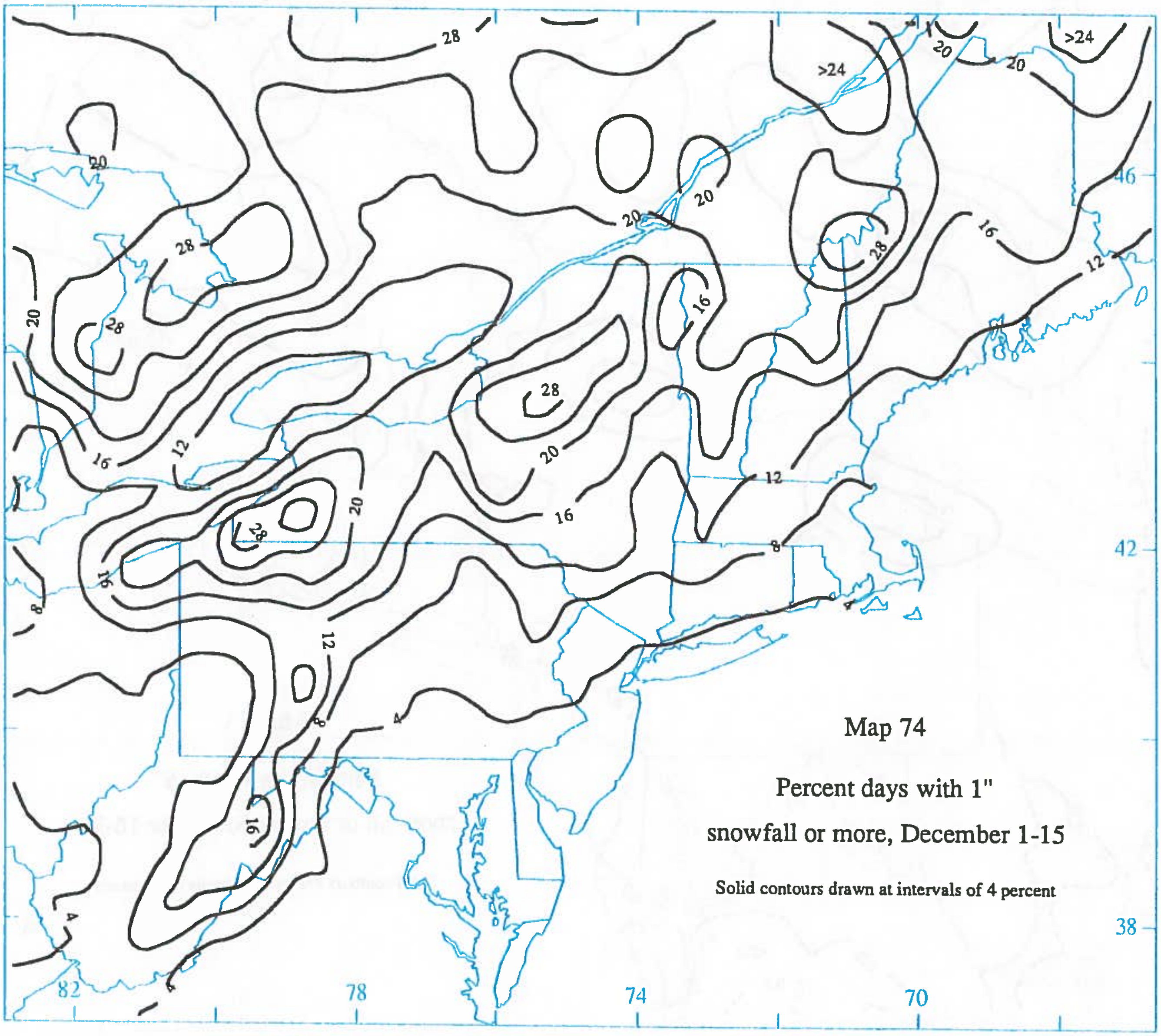
Percent days with 4" snowfall or more, November 16-30

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

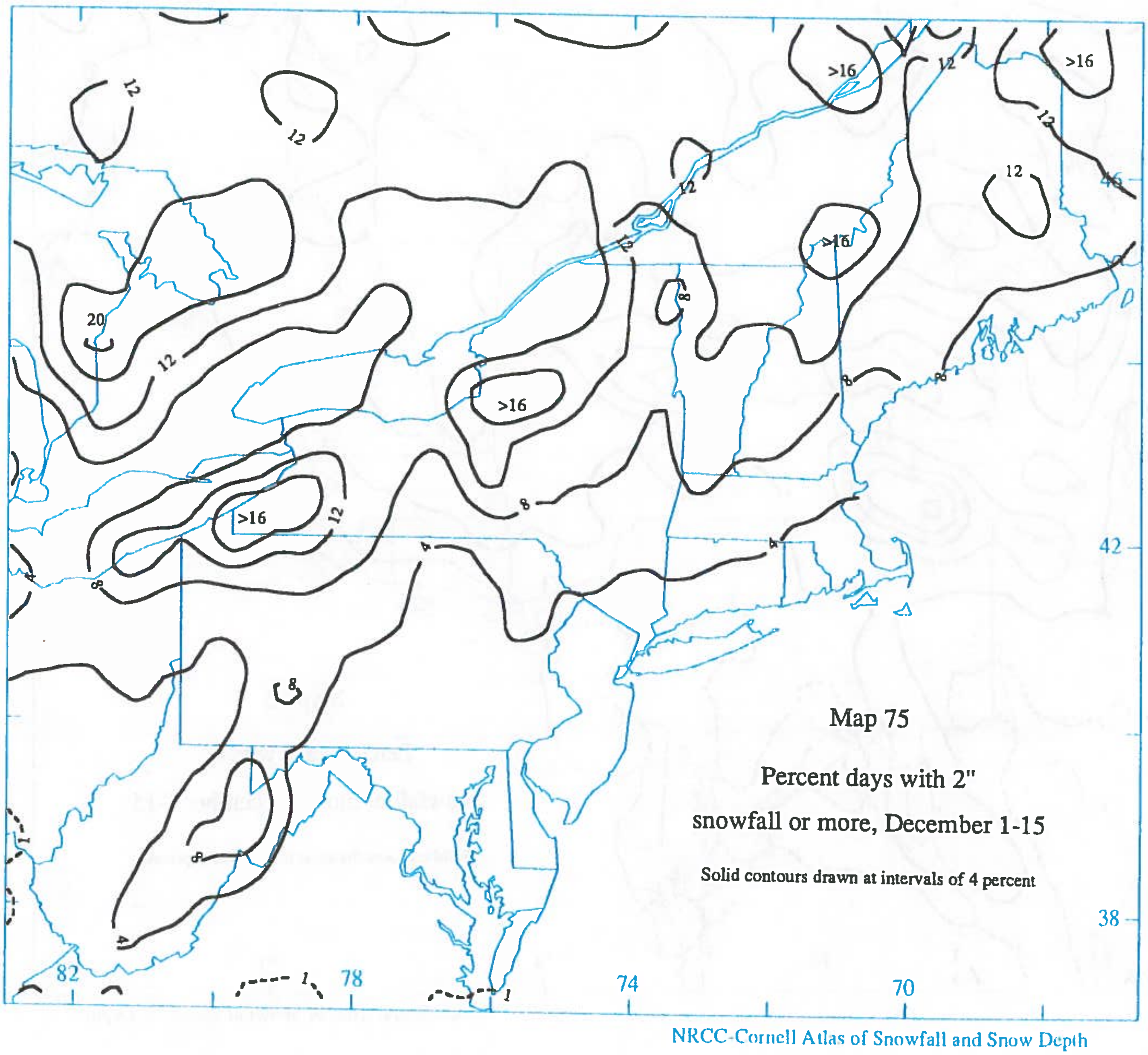


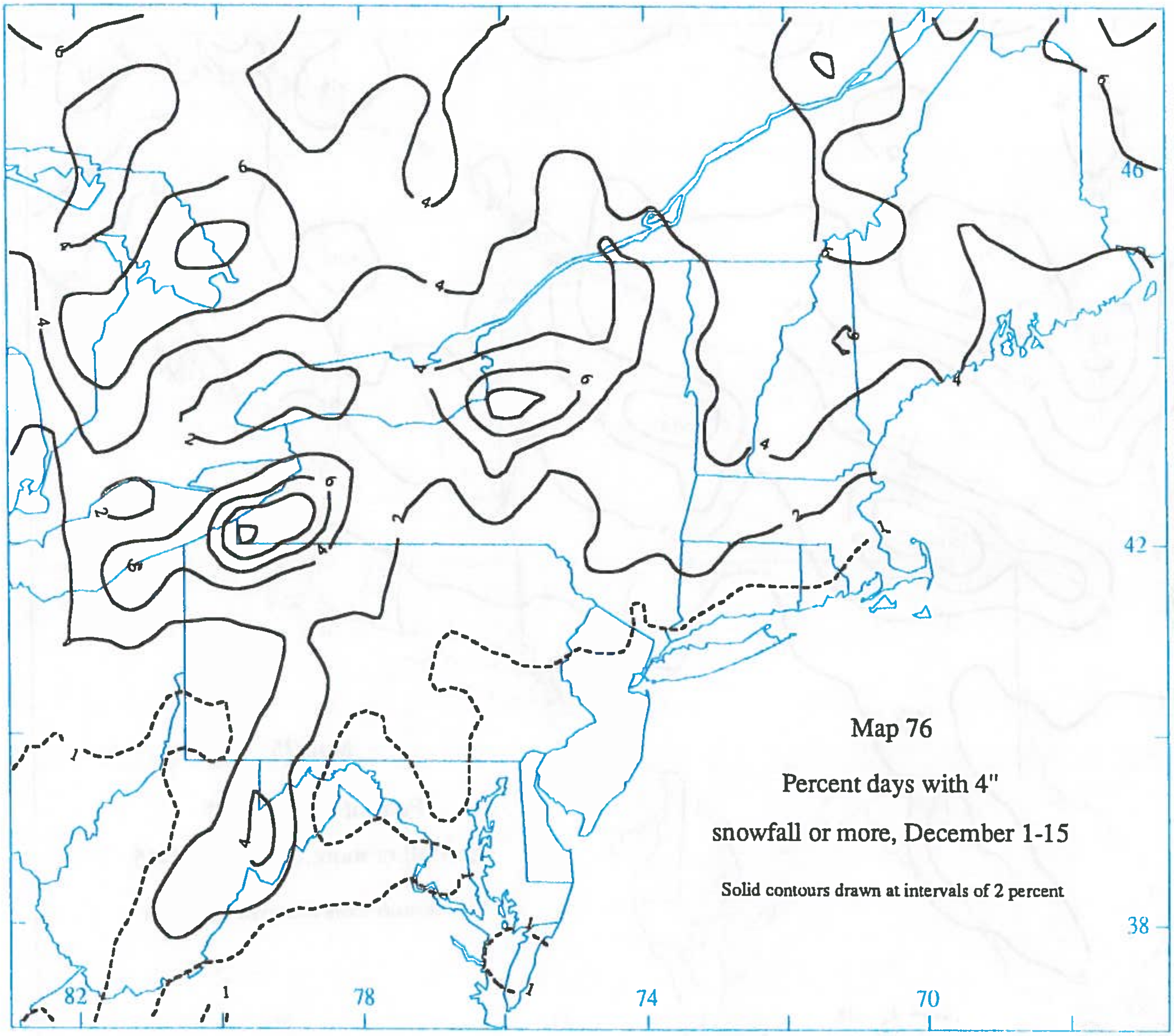
Map 74

Percent days with 1" snowfall or more, December 1-15

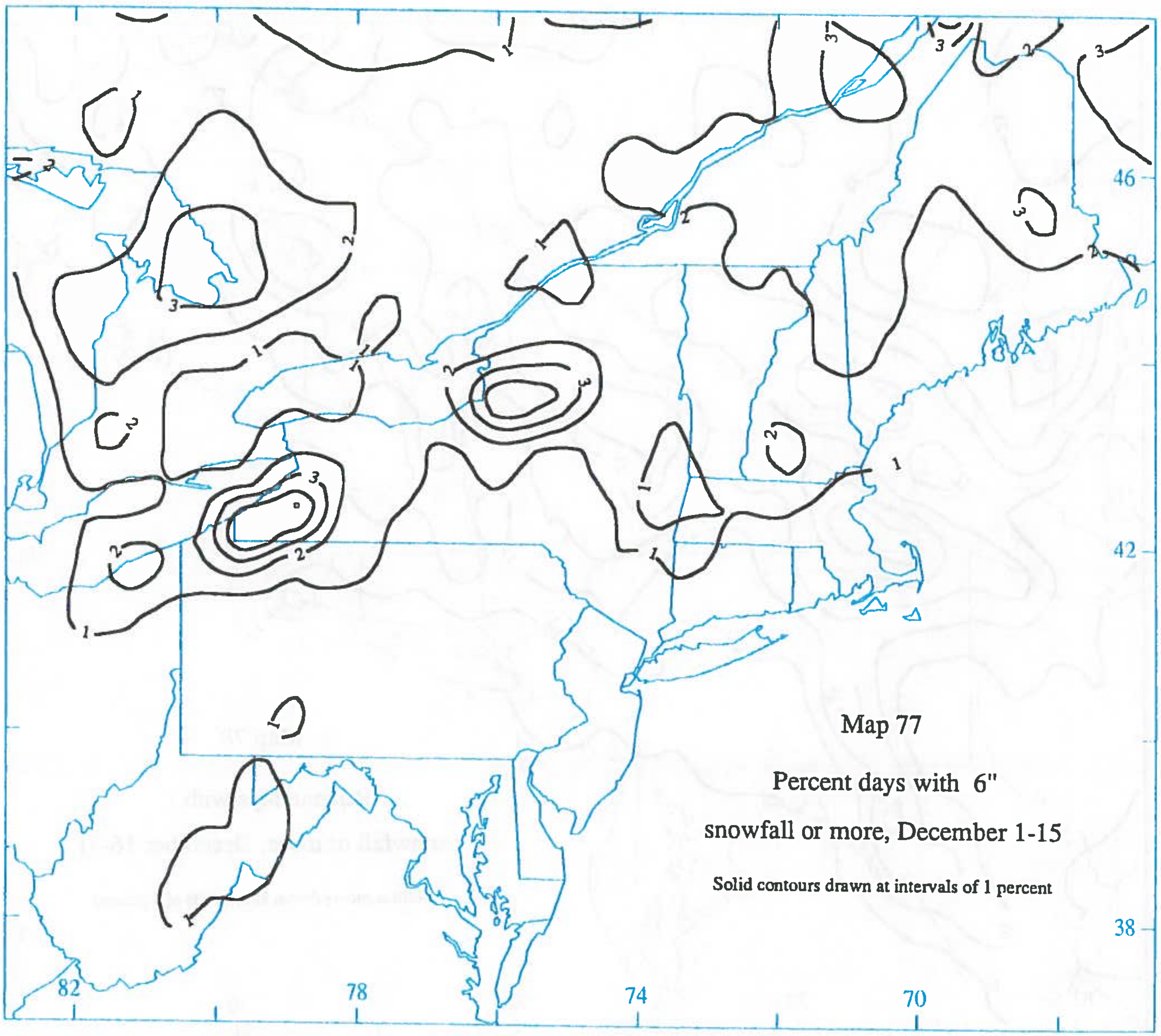
Solid contours drawn at intervals of 4 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 75
Percent days with 2"
snowfall or more, December 1-15
Solid contours drawn at intervals of 4 percent
>16
12
20
8
4
1
82
78
74
70
46
42
38
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



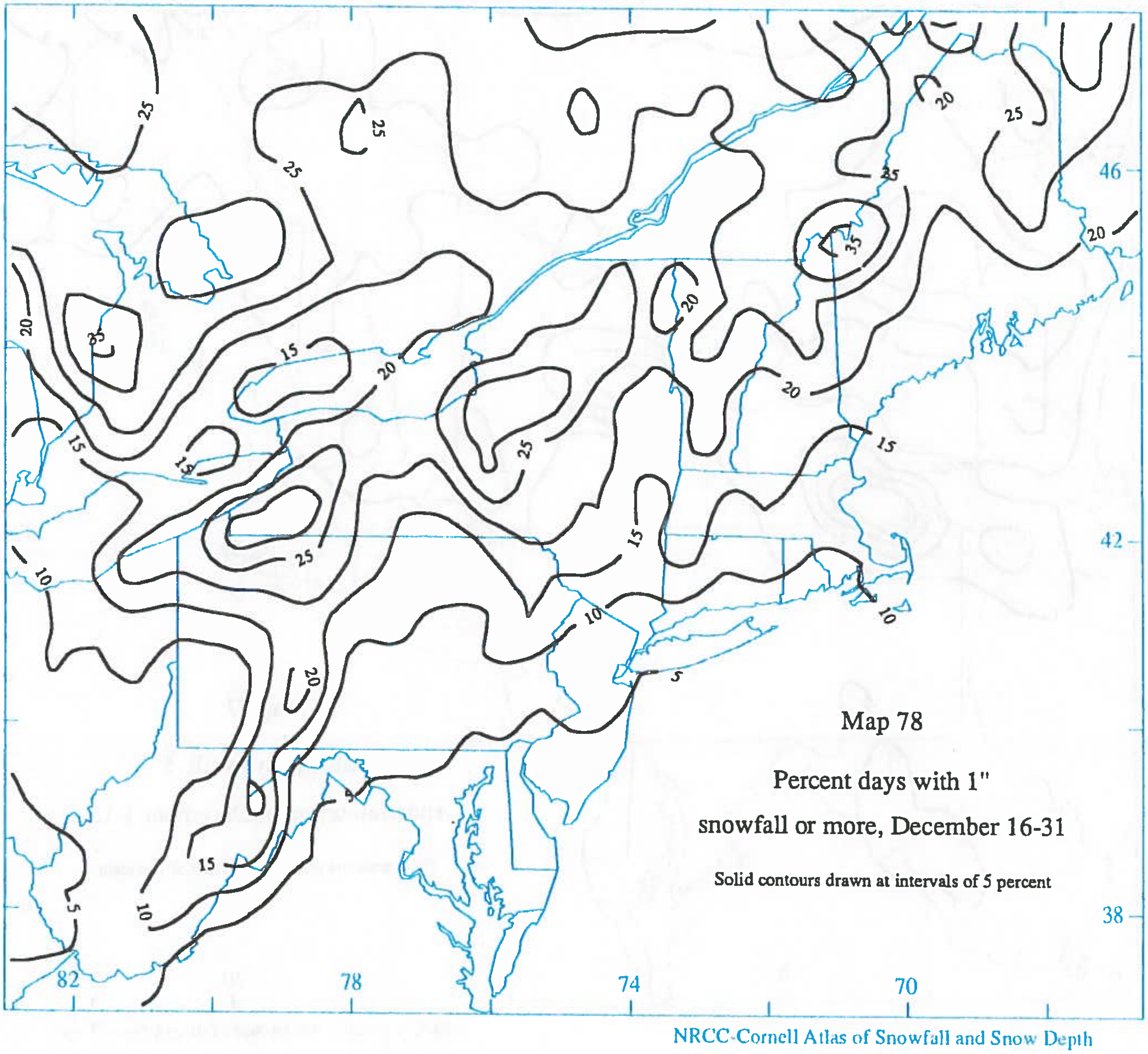
Map 77

Percent days with 6"

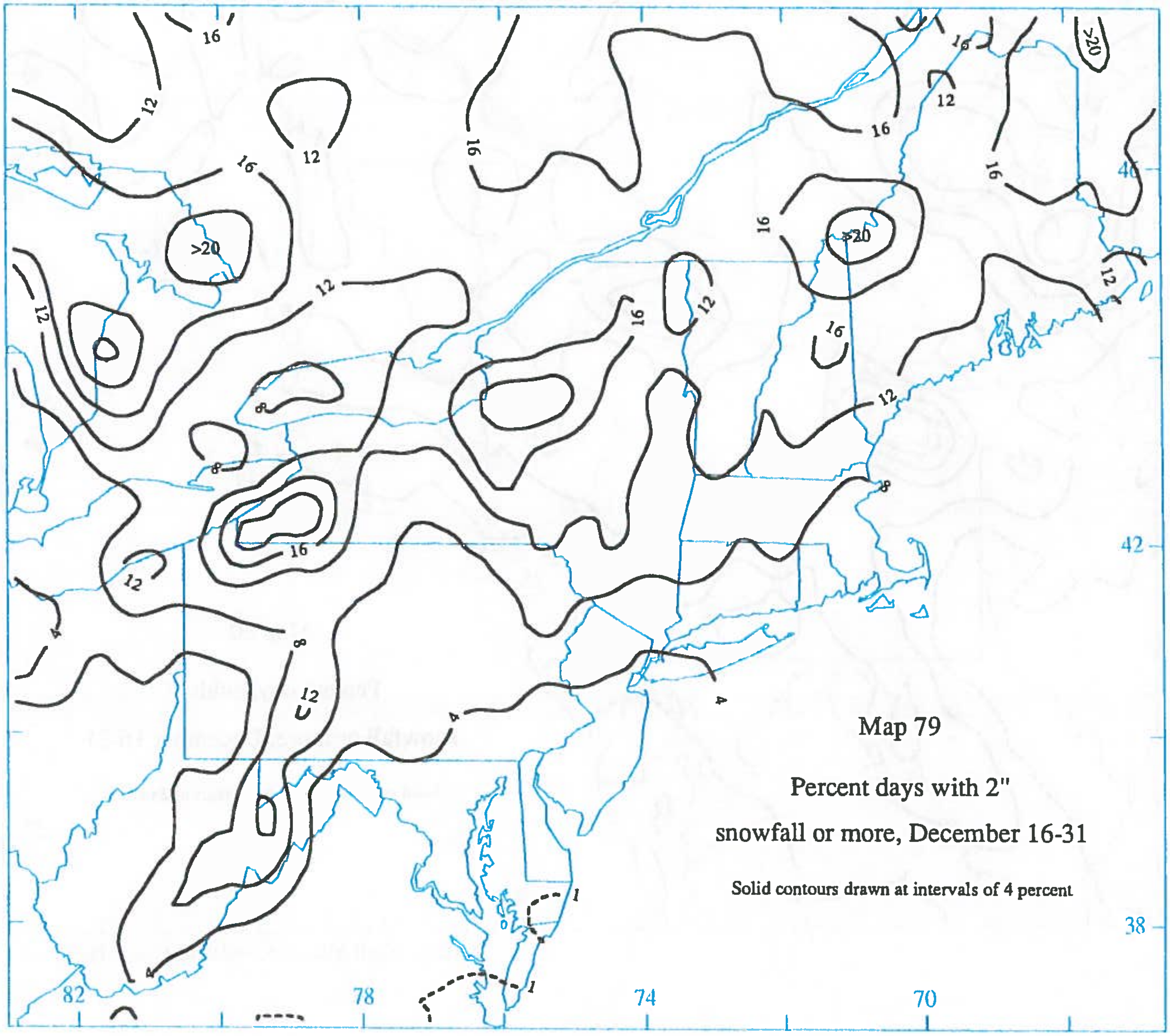
snowfall or more, December 1-15

Solid contours drawn at intervals of 1 percent

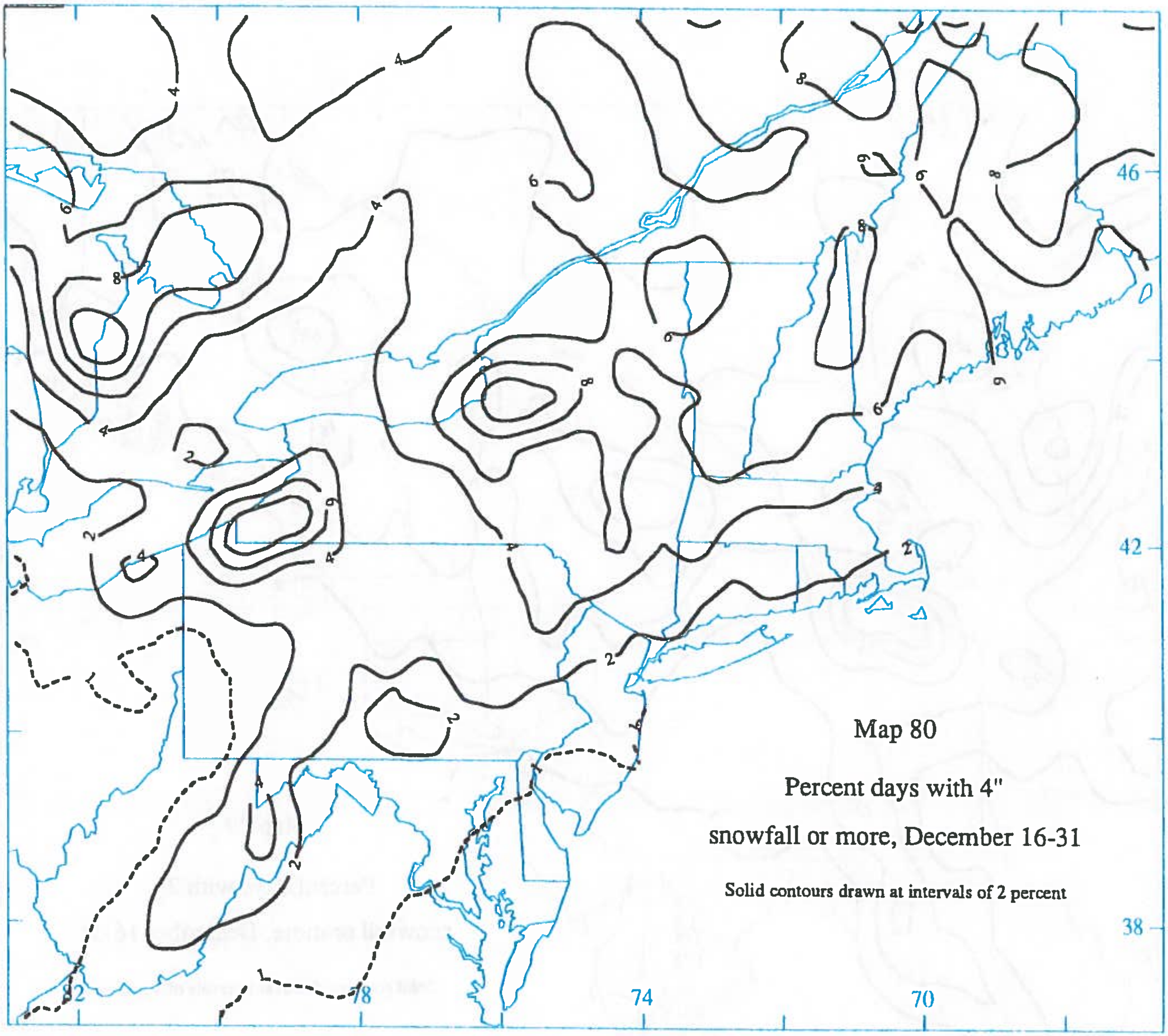
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 78
Percent days with 1" snowfall or more, December 16-31
Solid contours drawn at intervals of 5 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

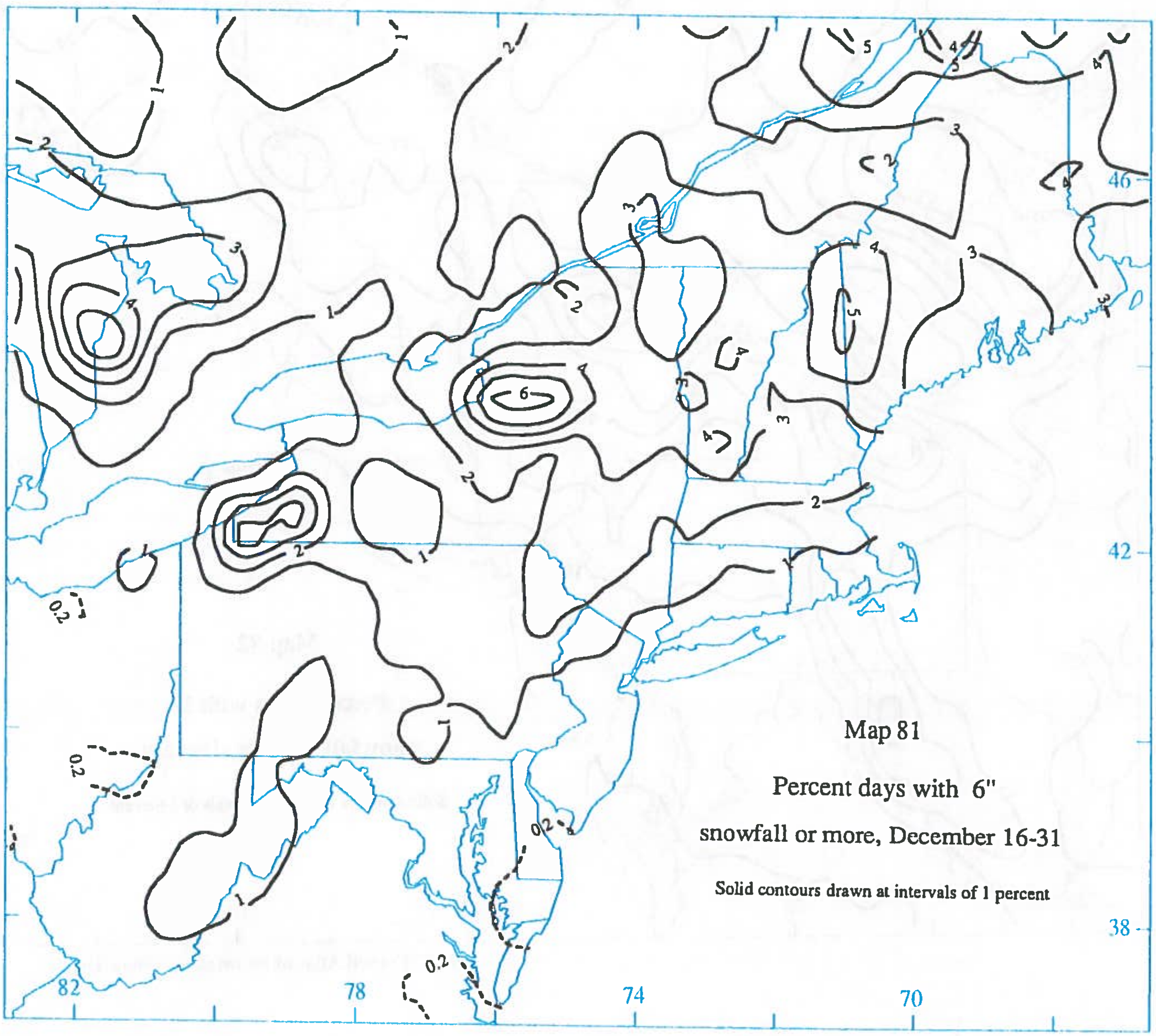


Map 80

Percent days with 4" snowfall or more, December 16-31

Solid contours drawn at intervals of 2 percent

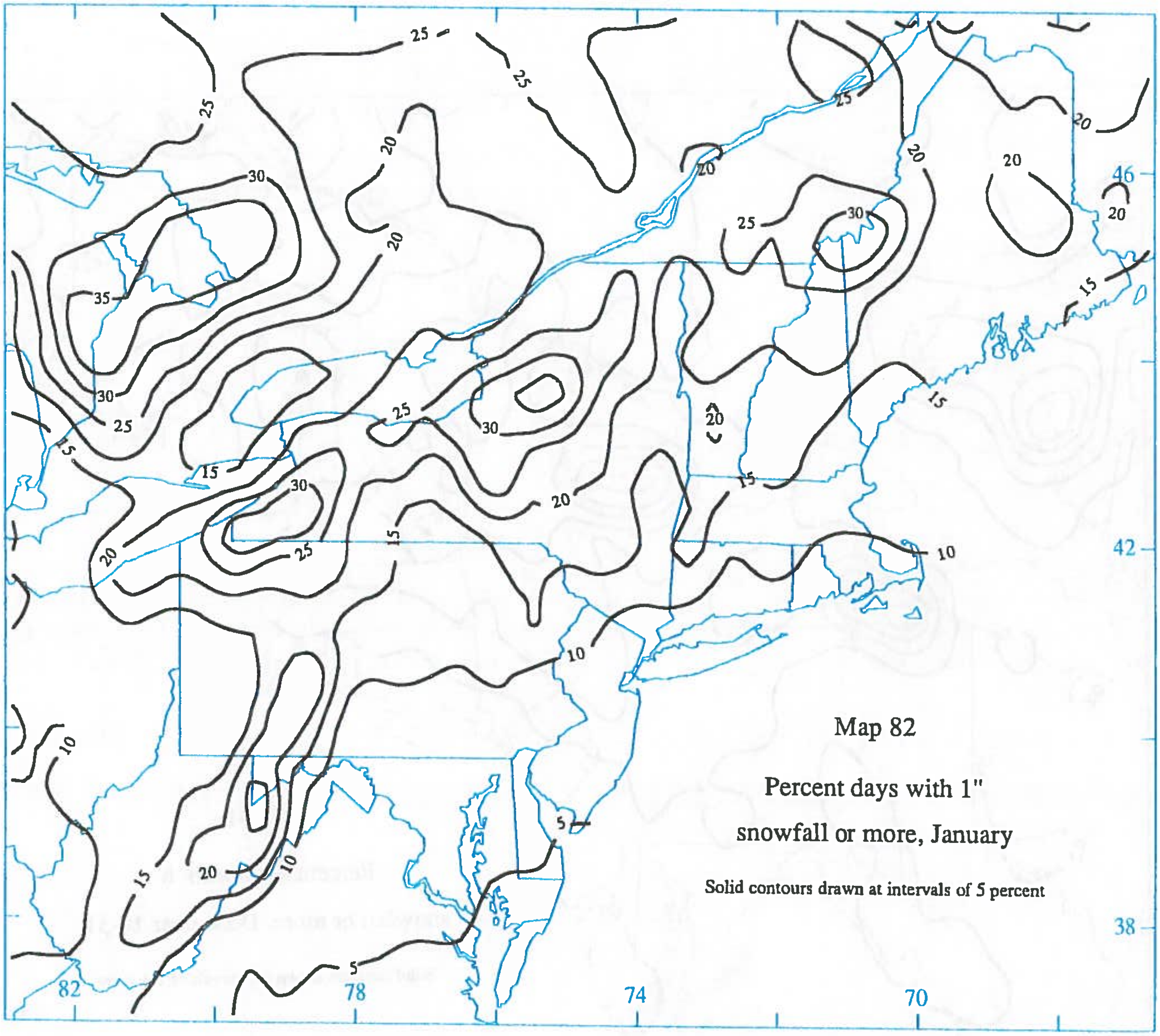
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 81

Percent days with 6" snowfall or more, December 16-31

Solid contours drawn at intervals of 1 percent

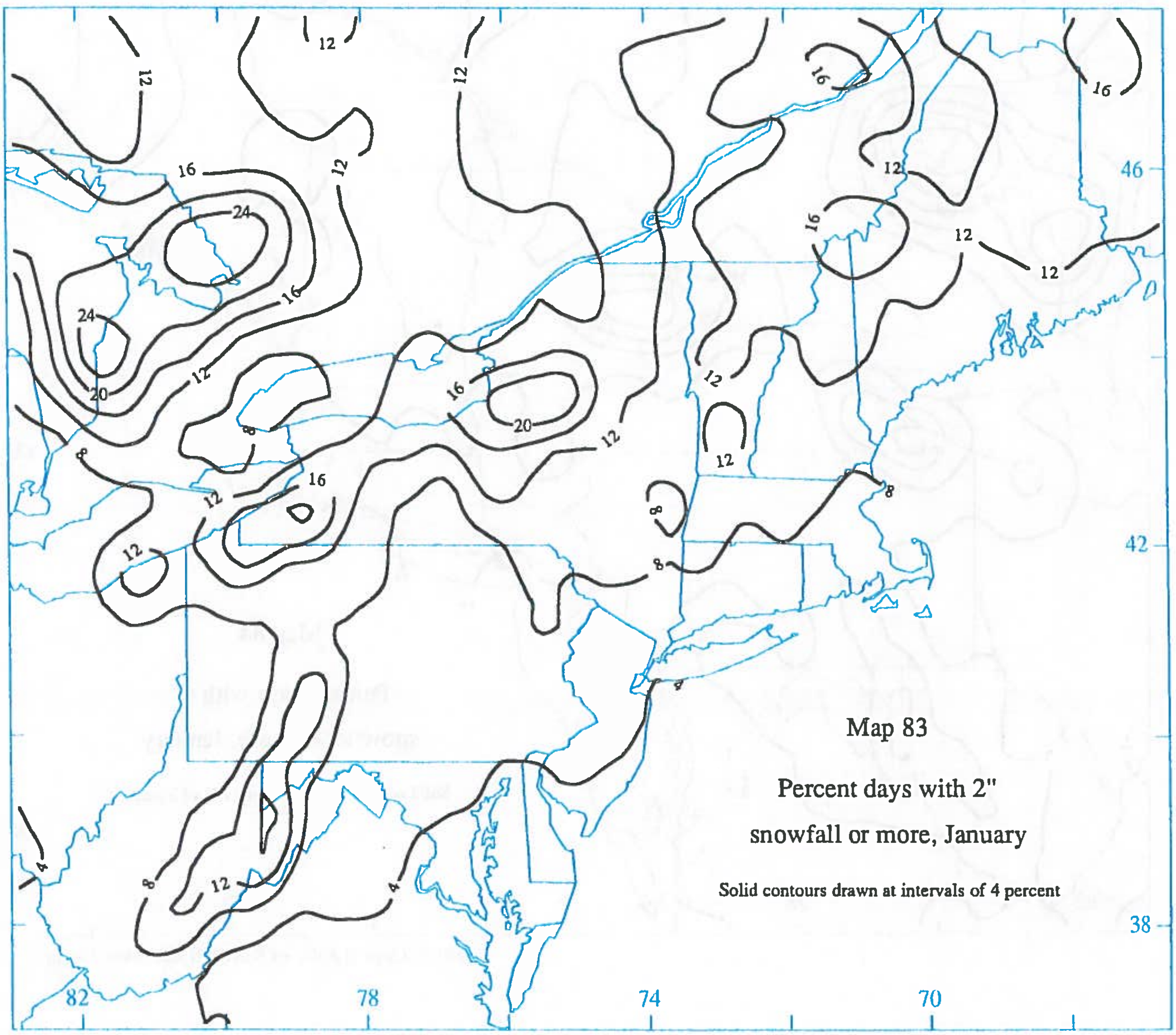


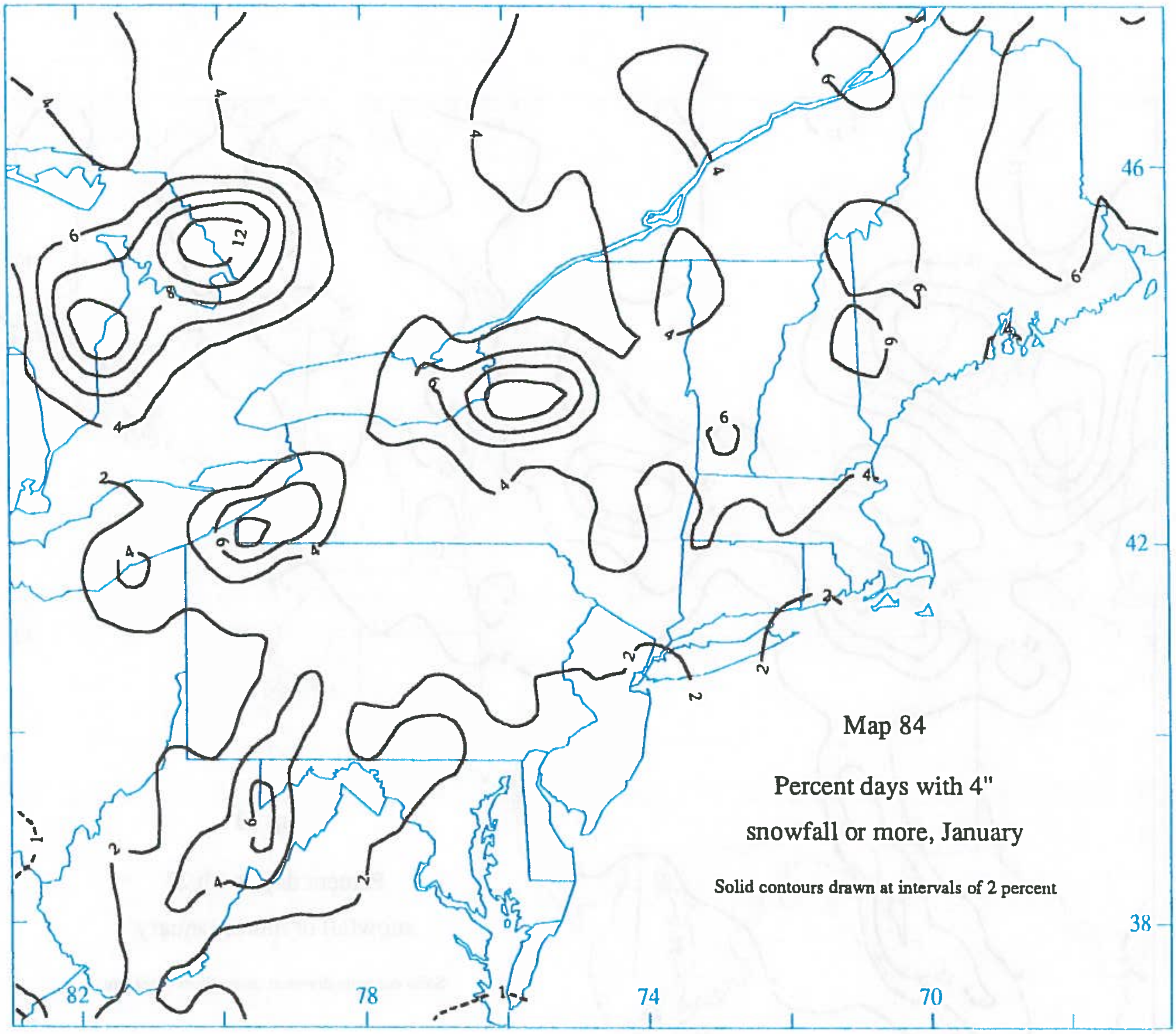
Map 82

Percent days with 1" snowfall or more, January

Solid contours drawn at intervals of 5 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

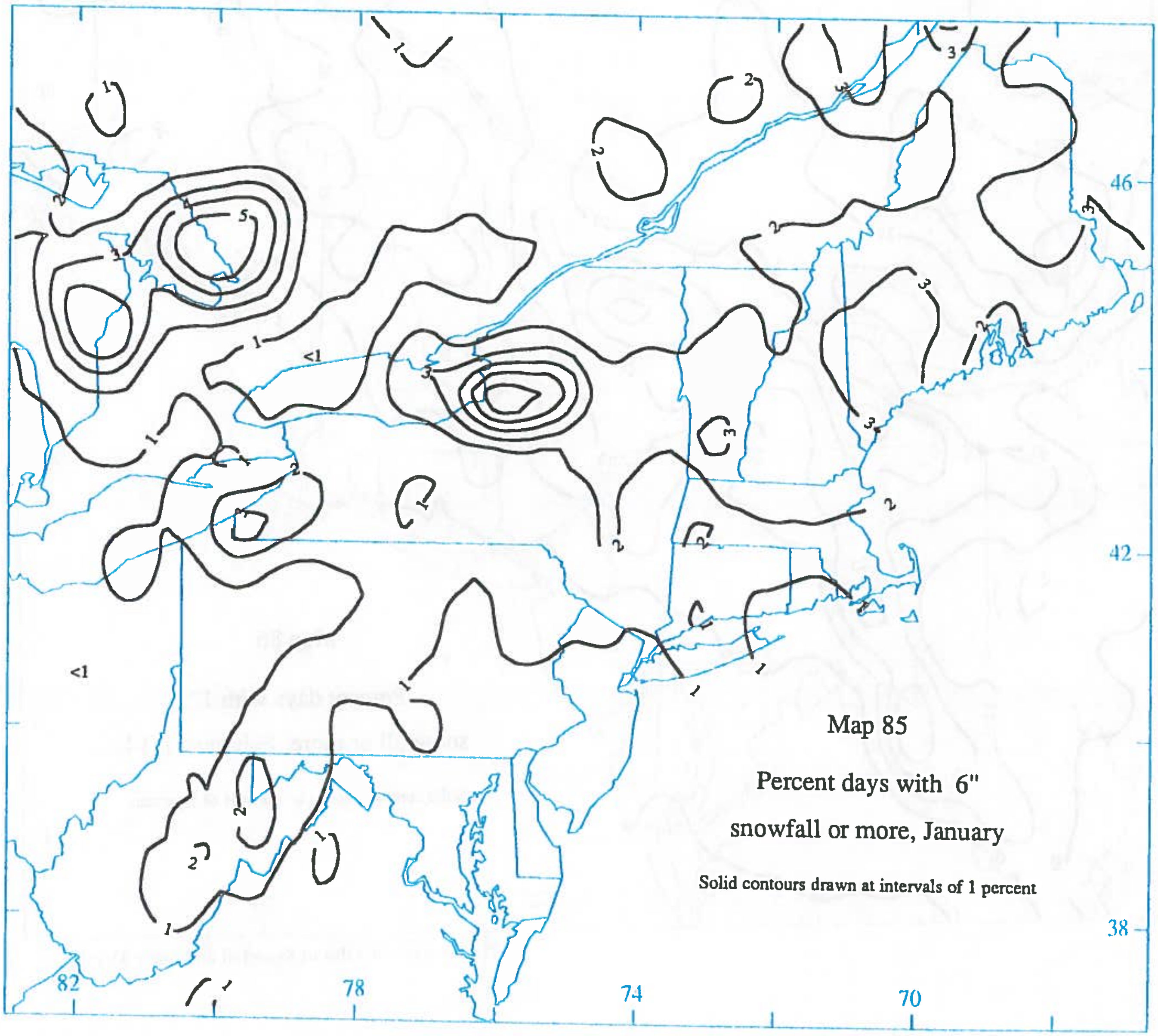

Map 83
Percent days with 2"
snowfall or more, January
Solid contours drawn at intervals of 4 percent
46
42
38
82
78
74
70



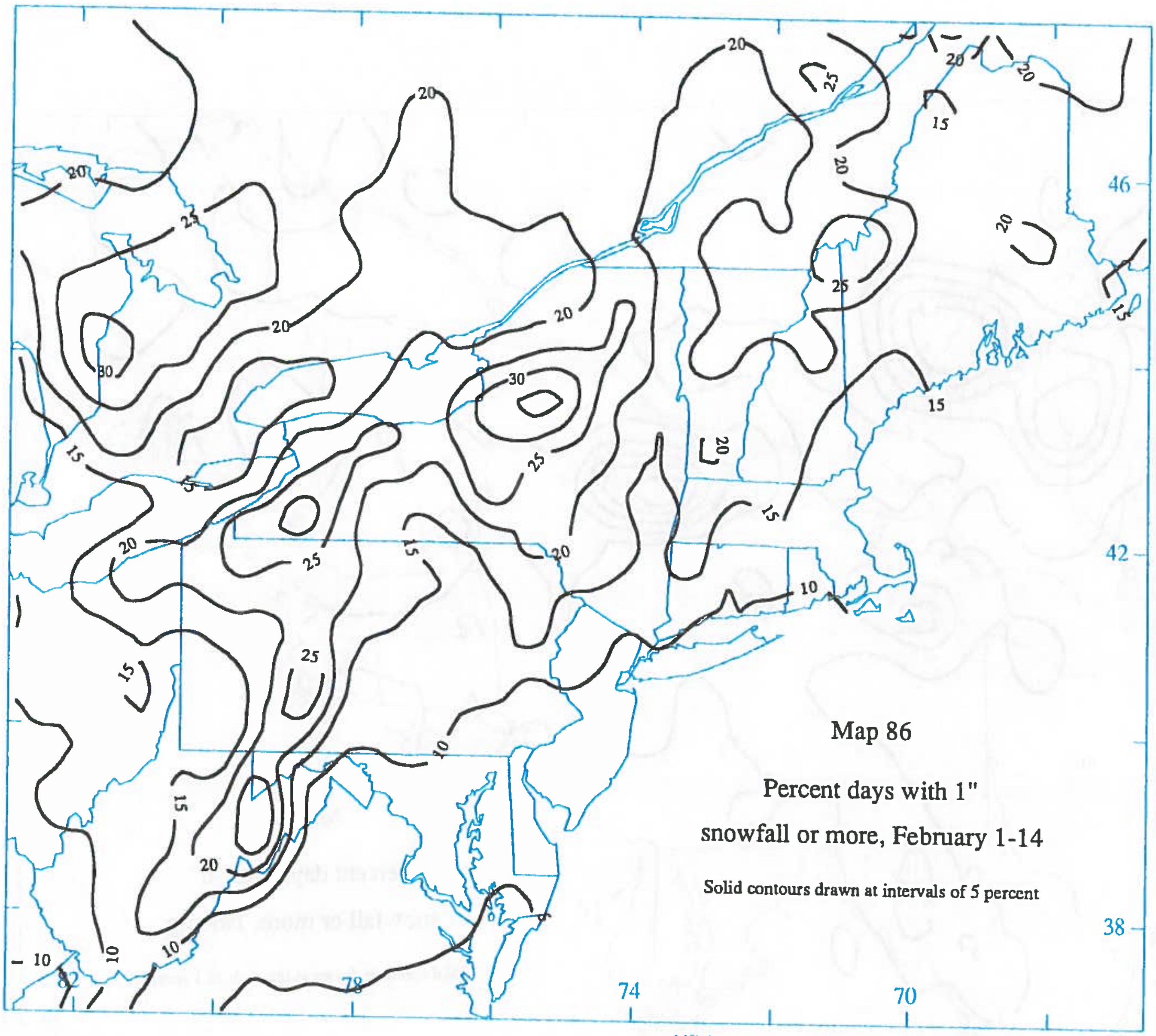
Map 84

Percent days with 4" snowfall or more, January

Solid contours drawn at intervals of 2 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

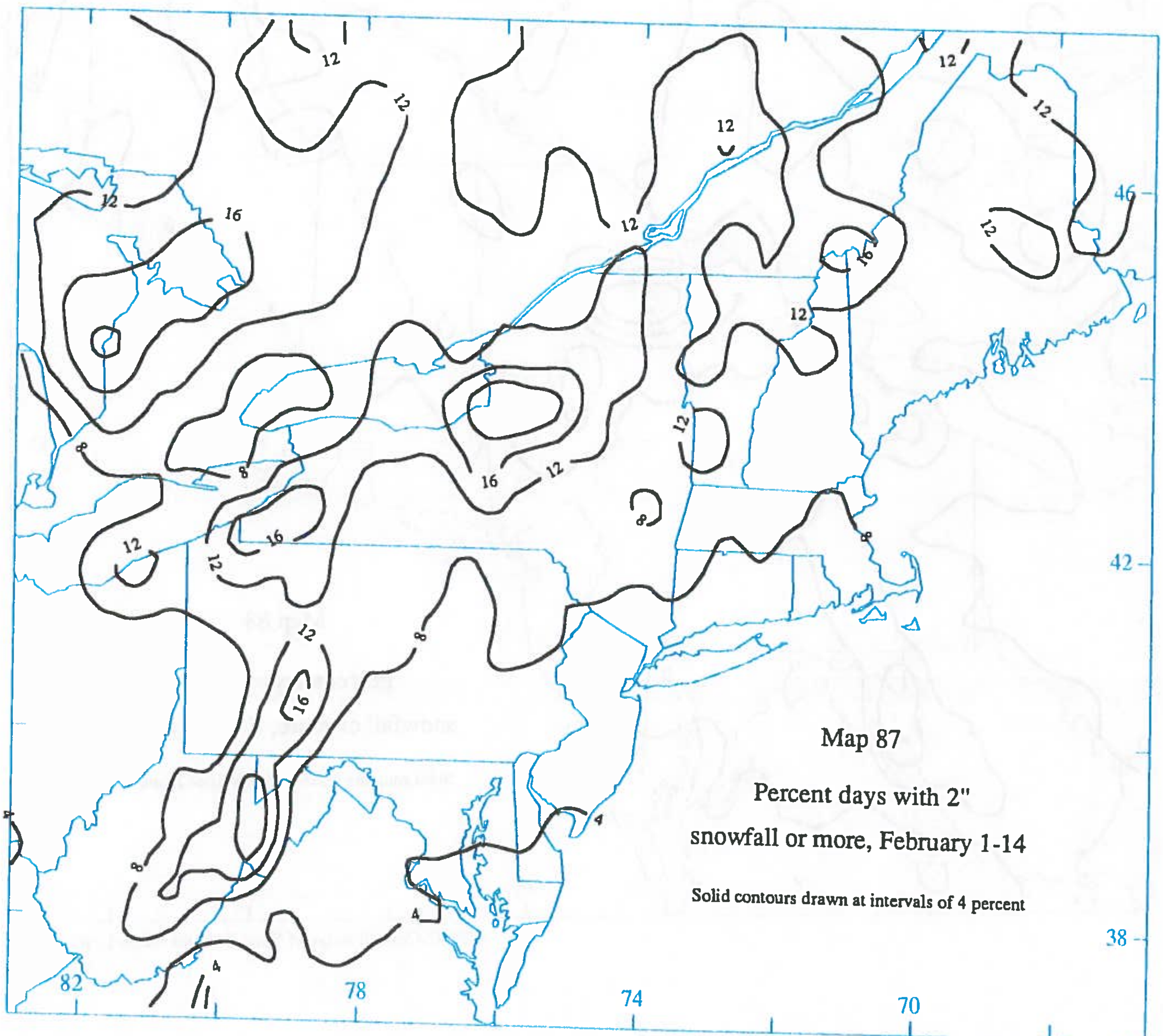


Map 86

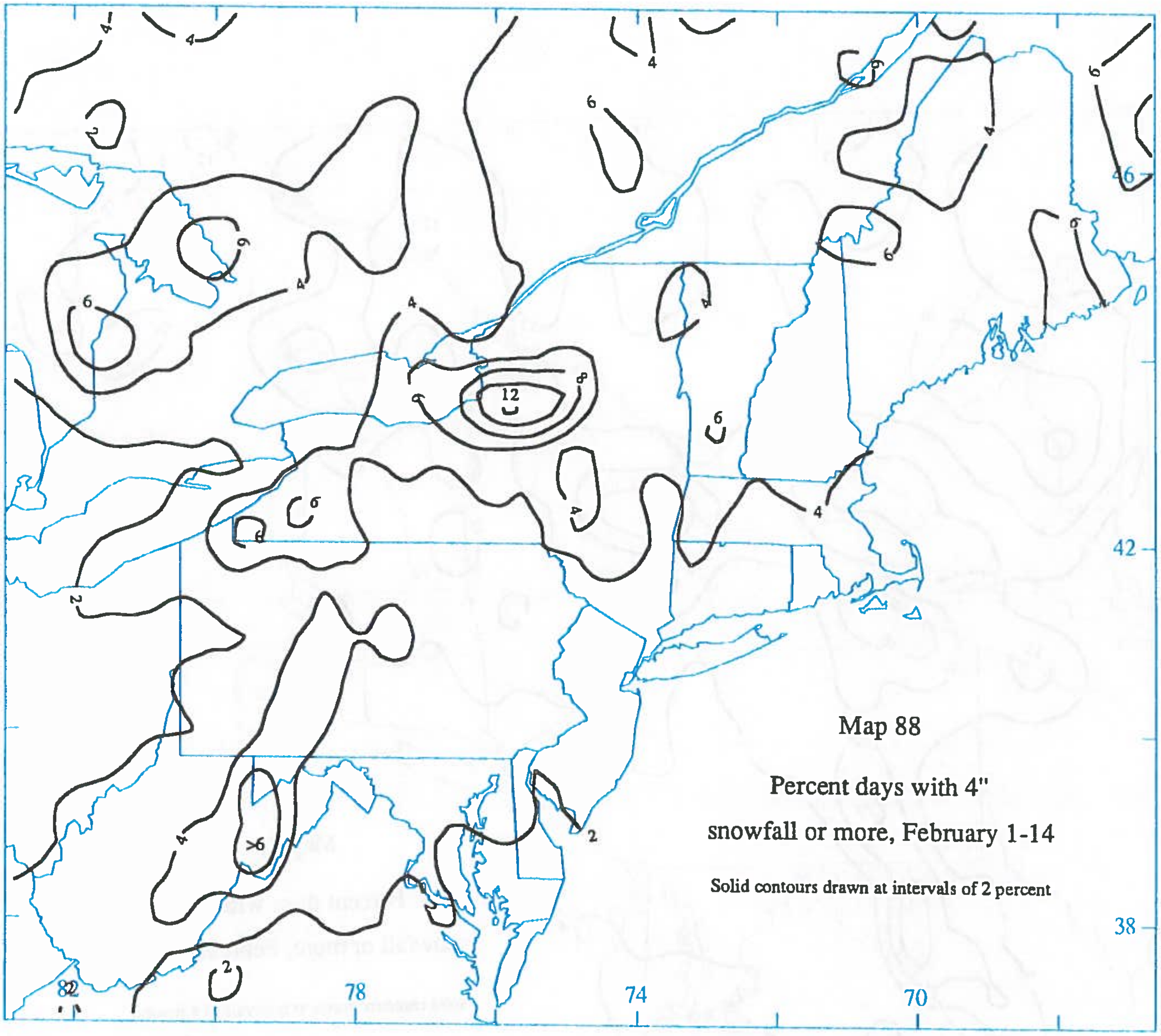
Percent days with 1" snowfall or more, February 1-14

Solid contours drawn at intervals of 5 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

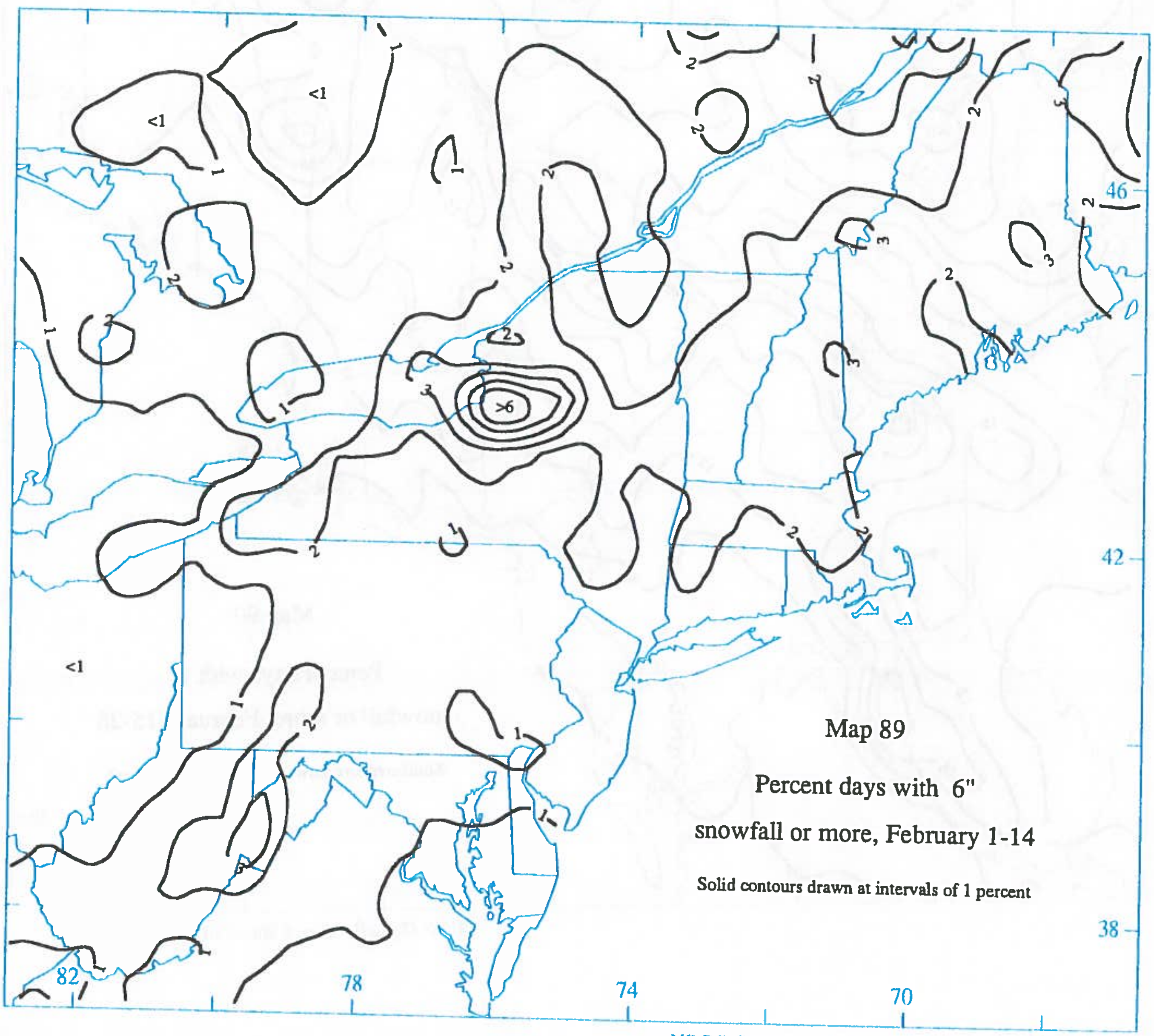


Map 88

Percent days with 4" snowfall or more, February 1-14

Solid contours drawn at intervals of 2 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

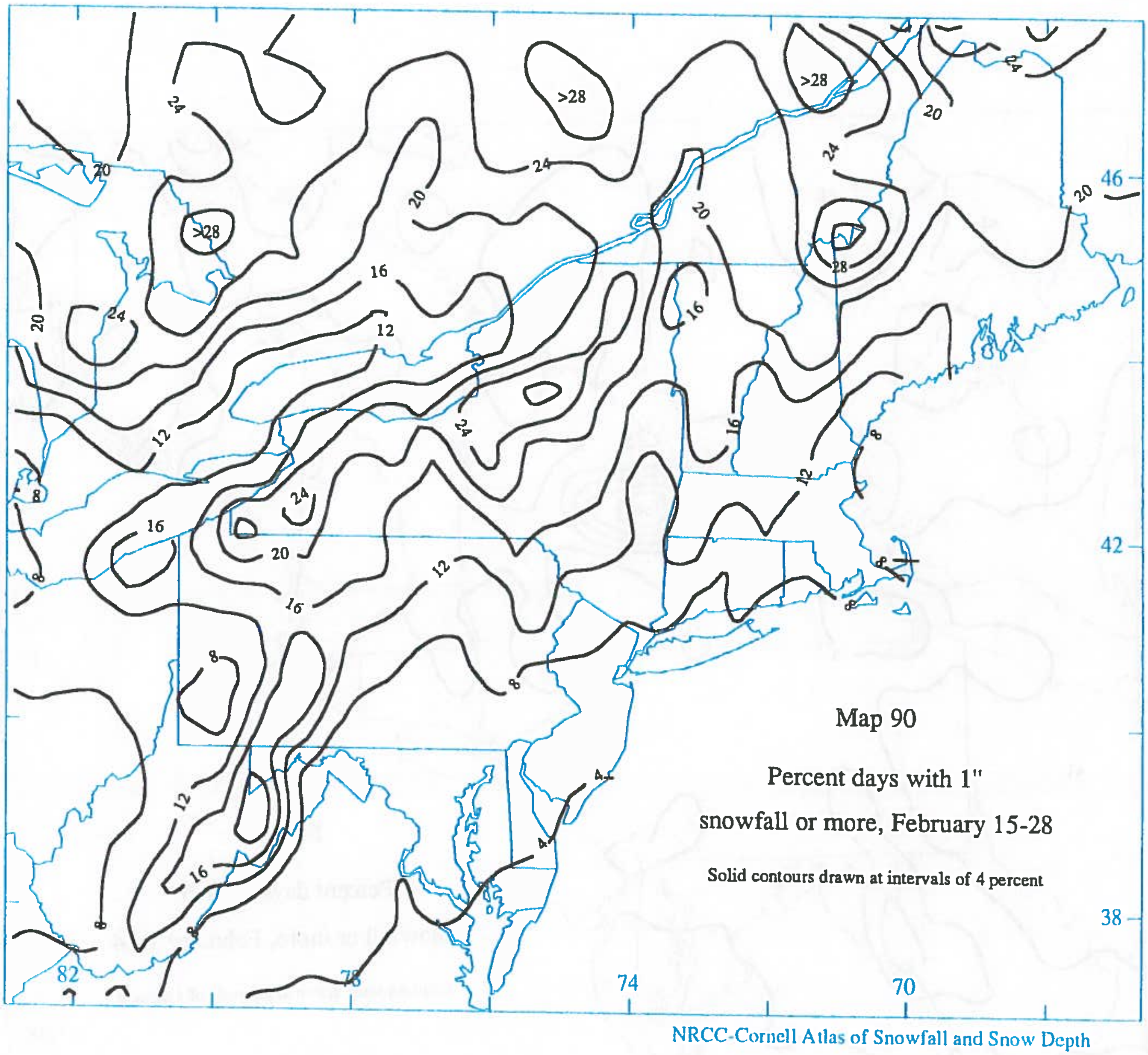


Map 89

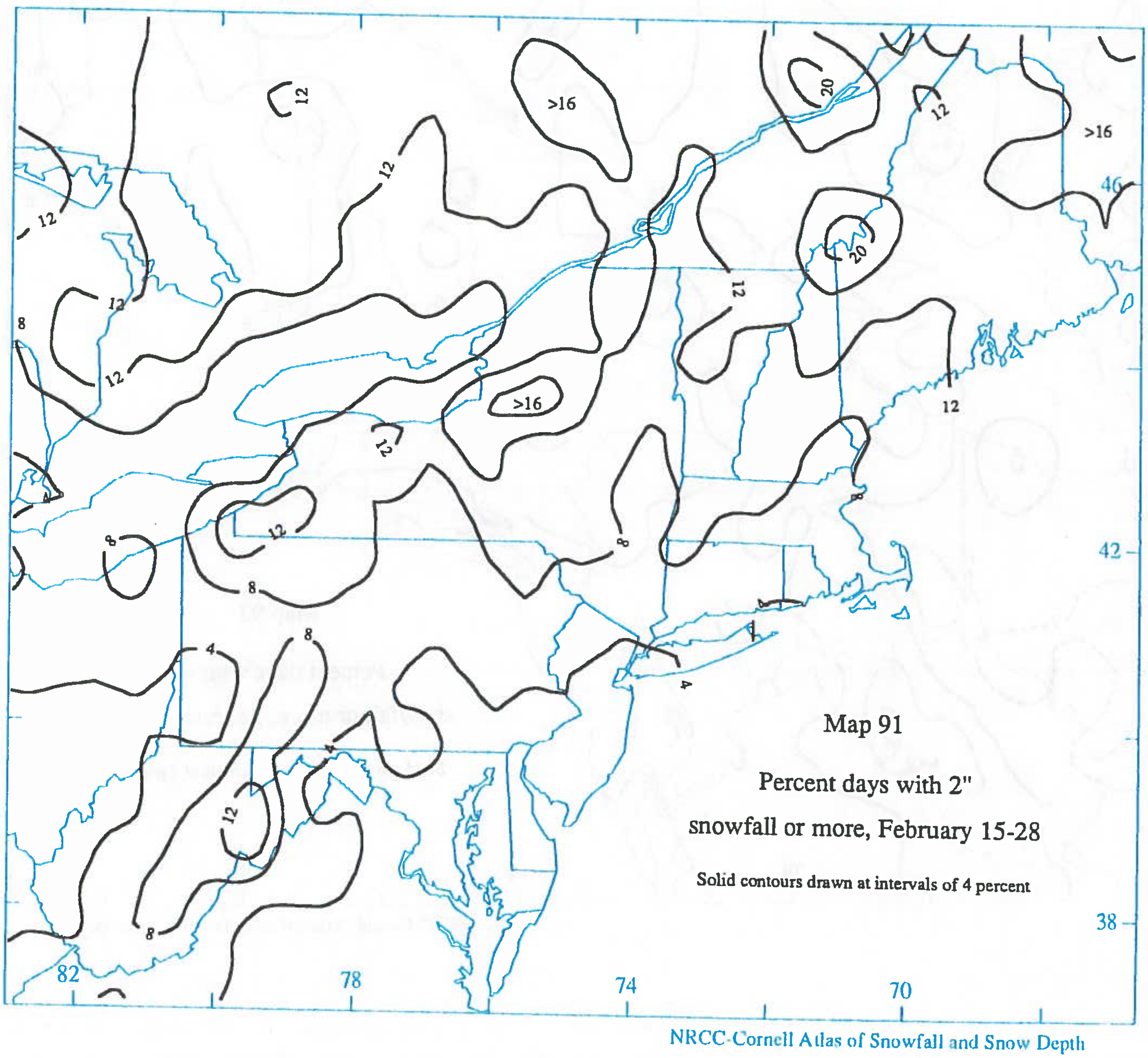
Percent days with 6" snowfall or more, February 1-14

Solid contours drawn at intervals of 1 percent

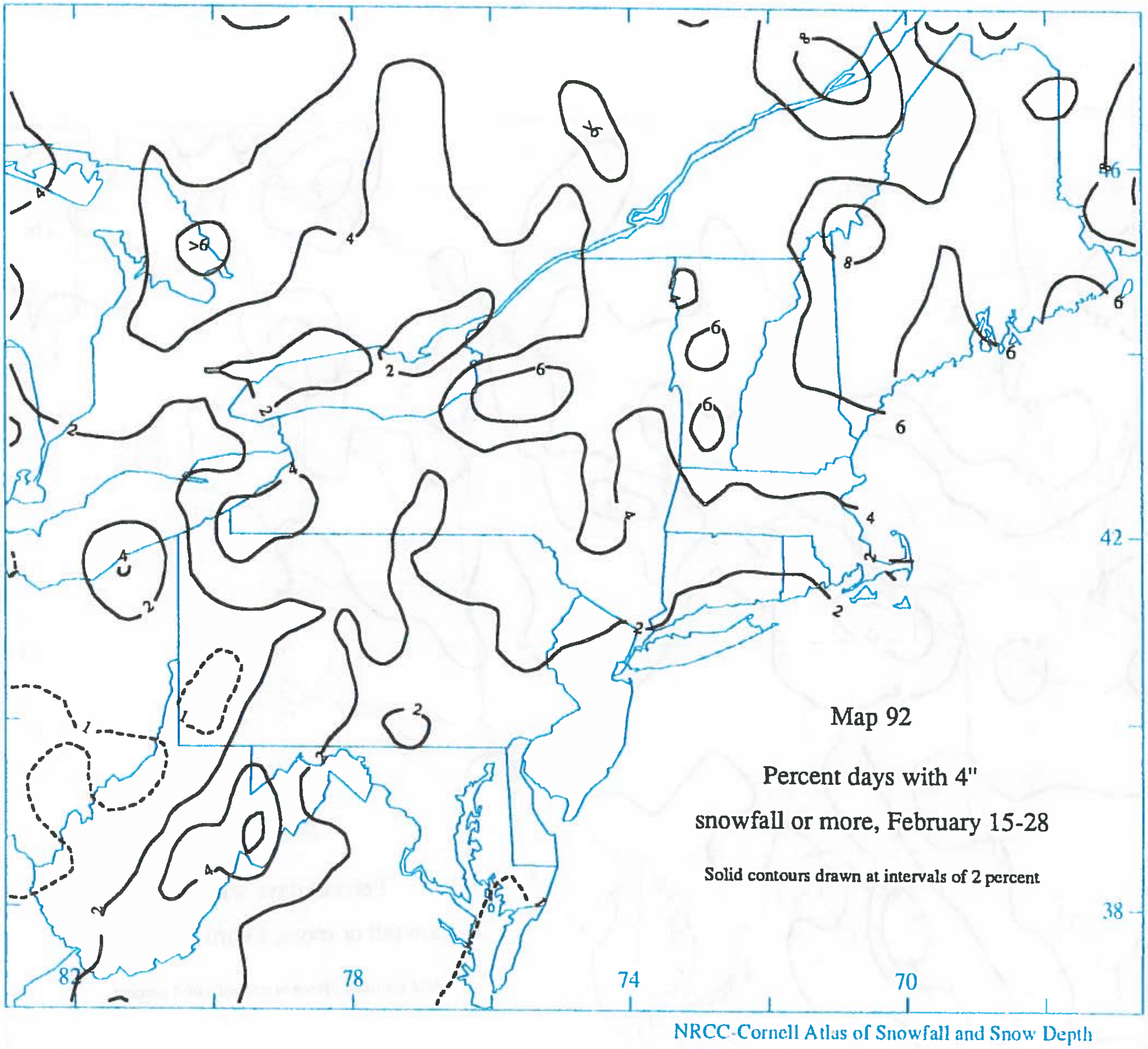
NRCC-Cornell Atlas of Snowfall and Snow Depth

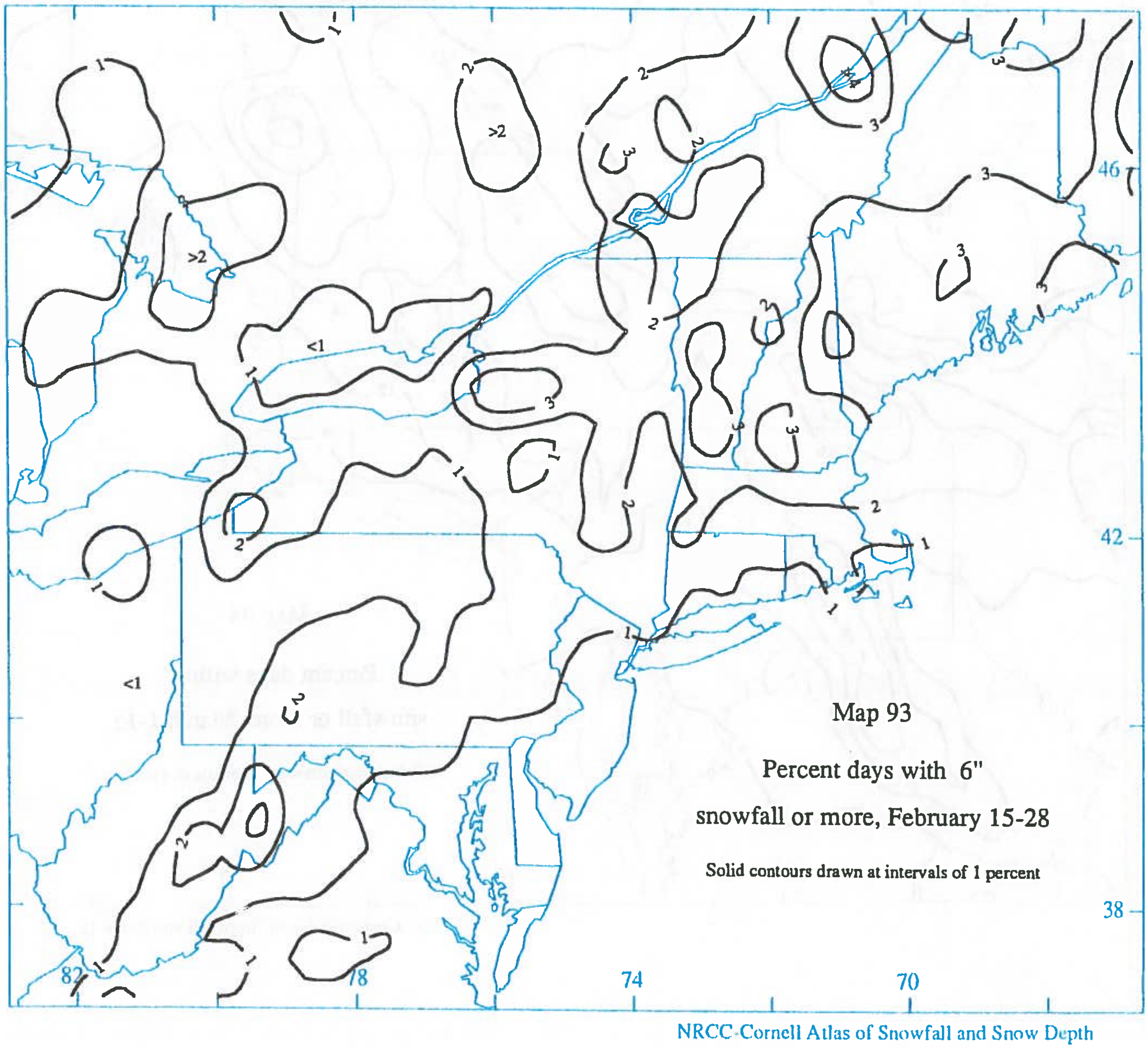


Map 90
Percent days with 1"
snowfall or more, February 15-28
Solid contours drawn at intervals of 4 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

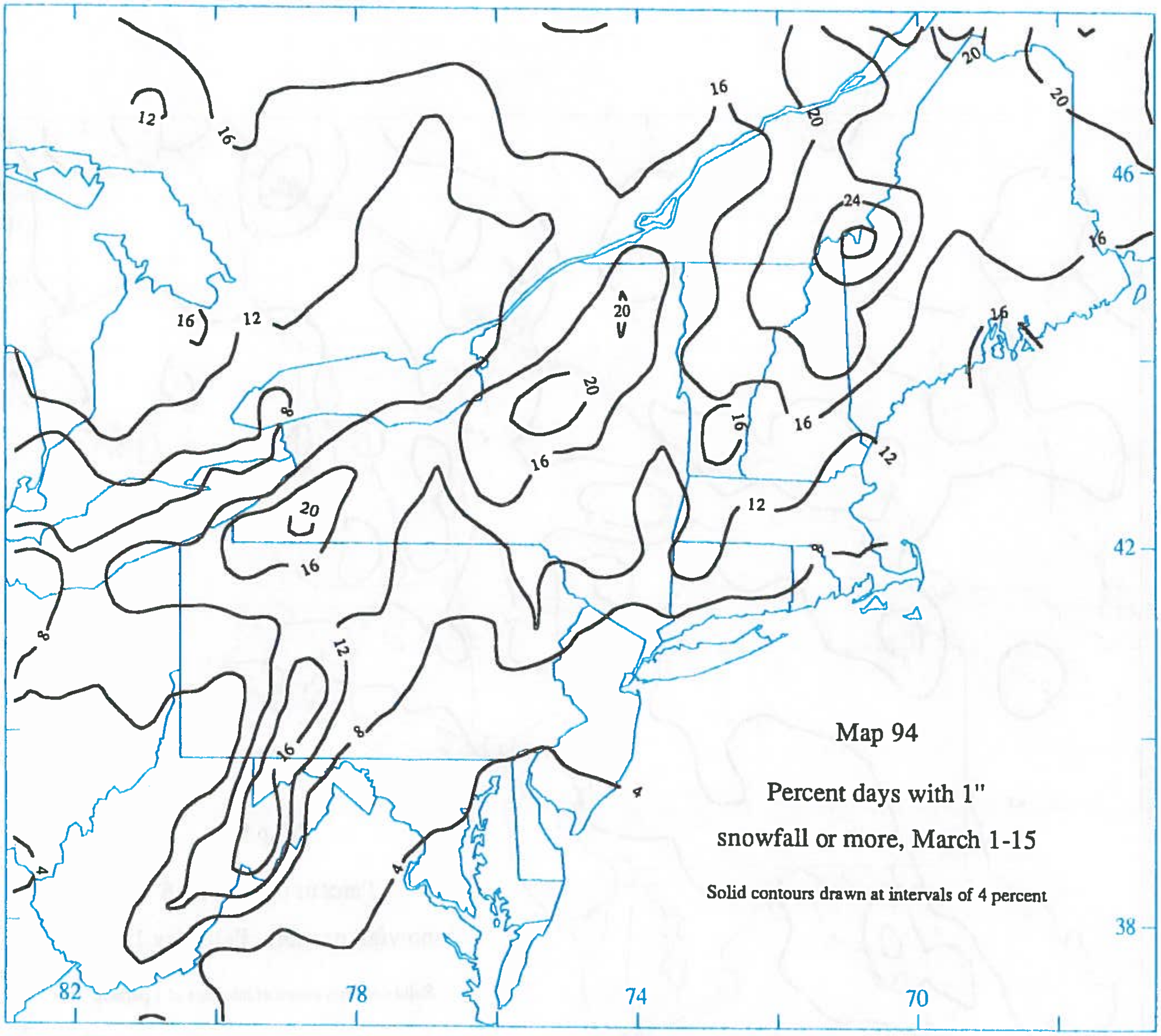


Map 91
Percent days with 2"
snowfall or more, February 15-28
Solid contours drawn at intervals of 4 percent
>16
20
12
8
4
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

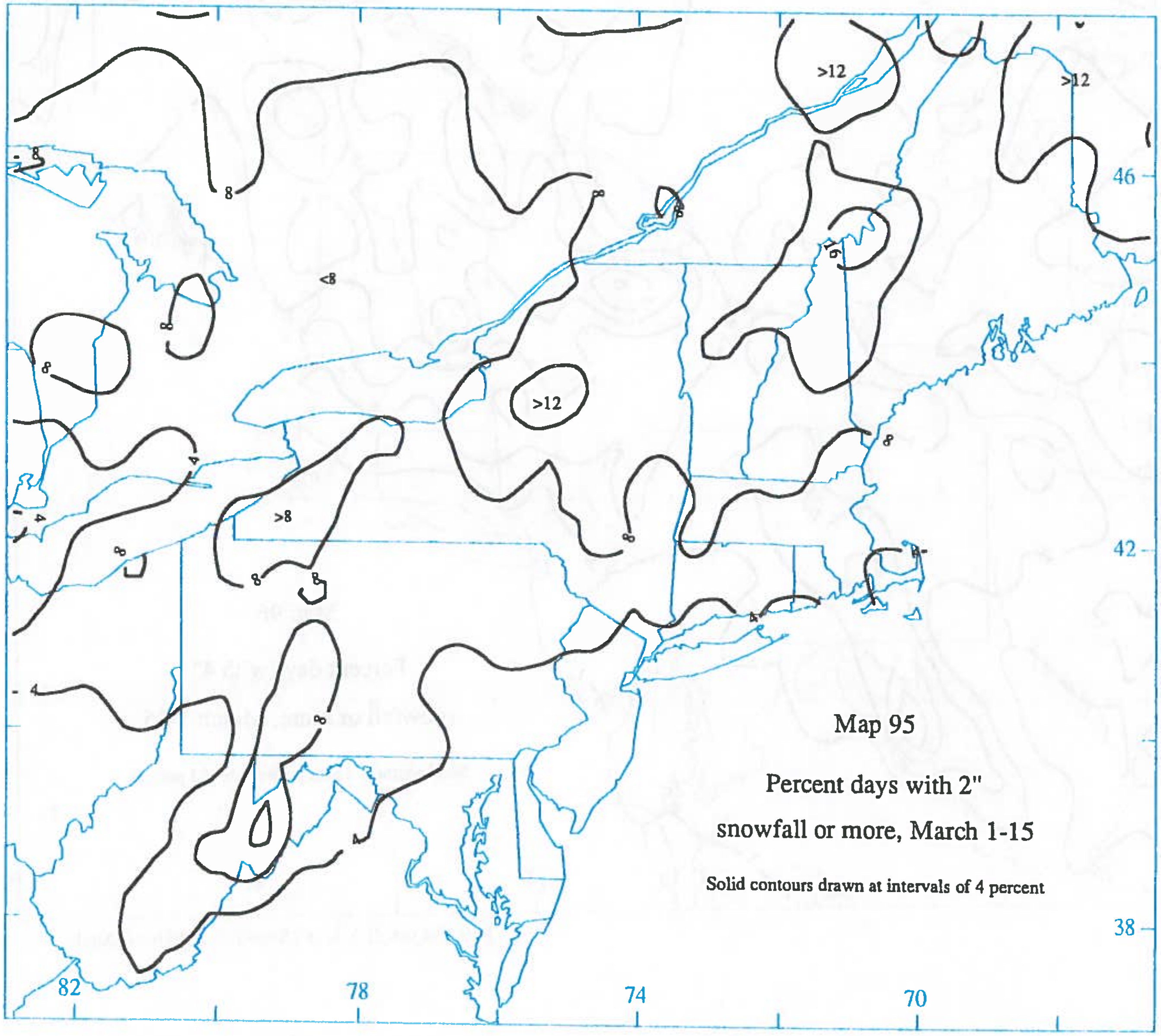

Map 92
Percent days with 4"
snowfall or more, February 15-28
Solid contours drawn at intervals of 2 percent
82
78
74
70
42
38
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 93
Percent days with 6"
snowfall or more, February 15-28
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



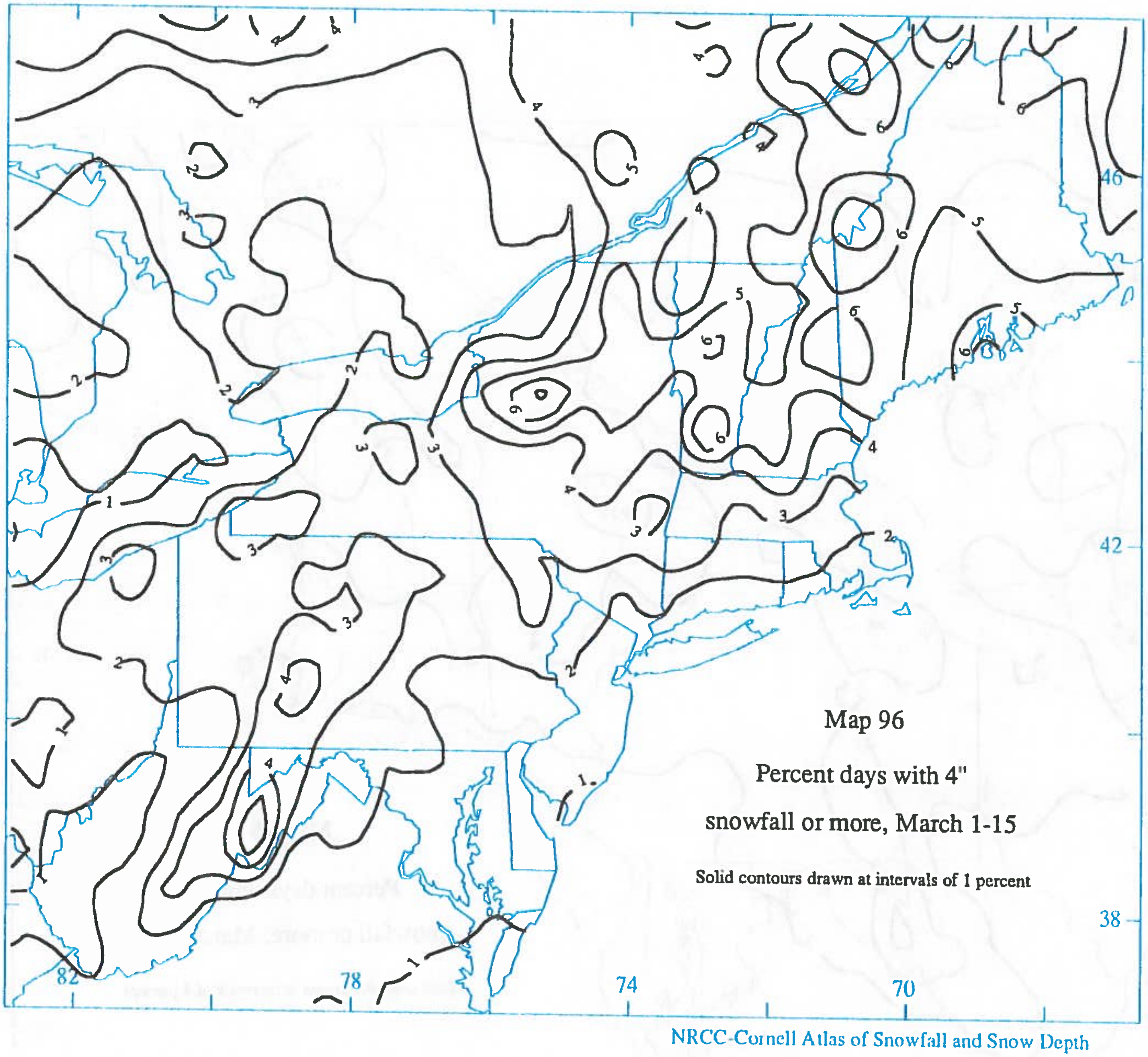
NRCC-Cornell Atlas of Snowfall and Snow Depth

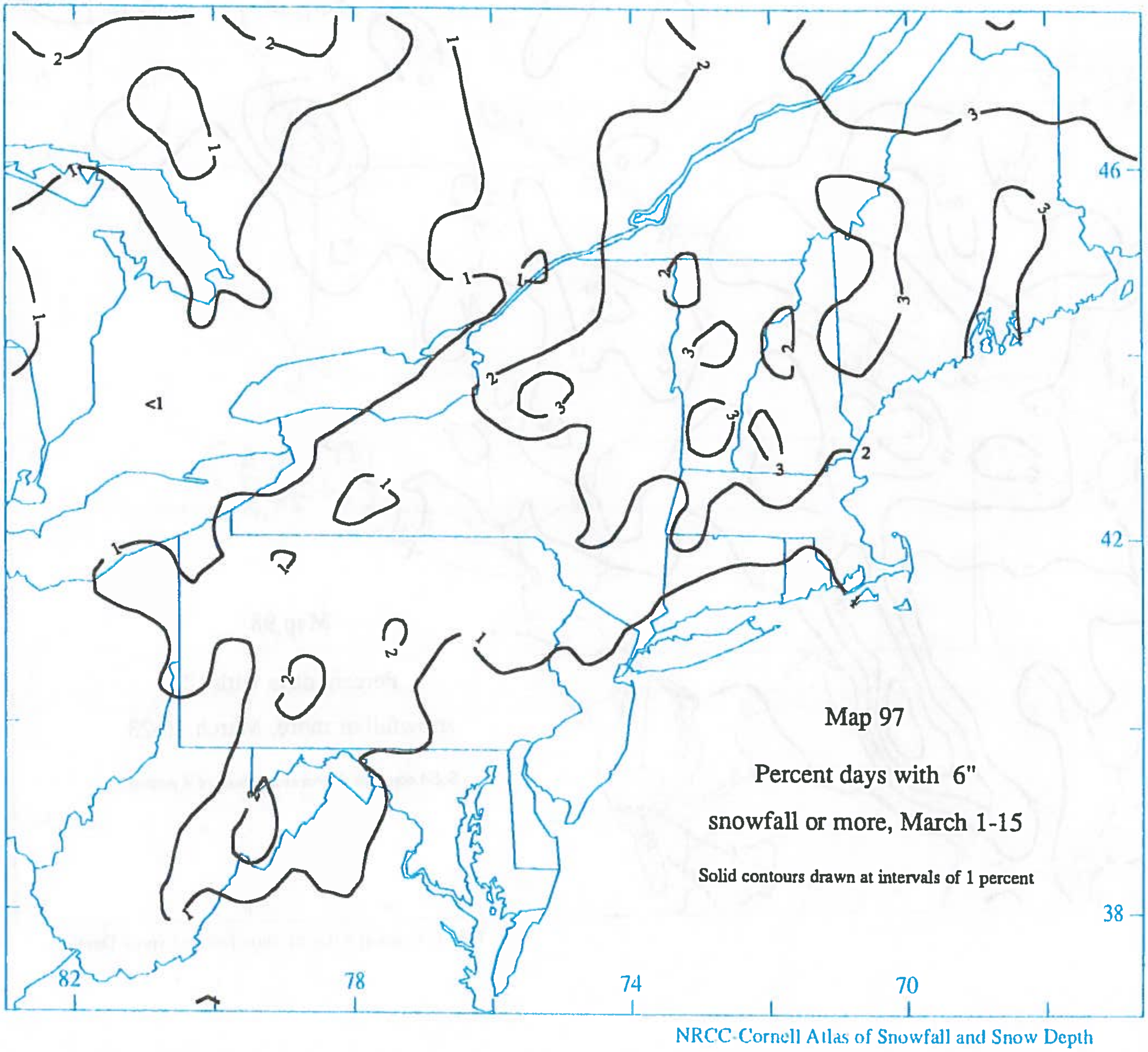


Map 95

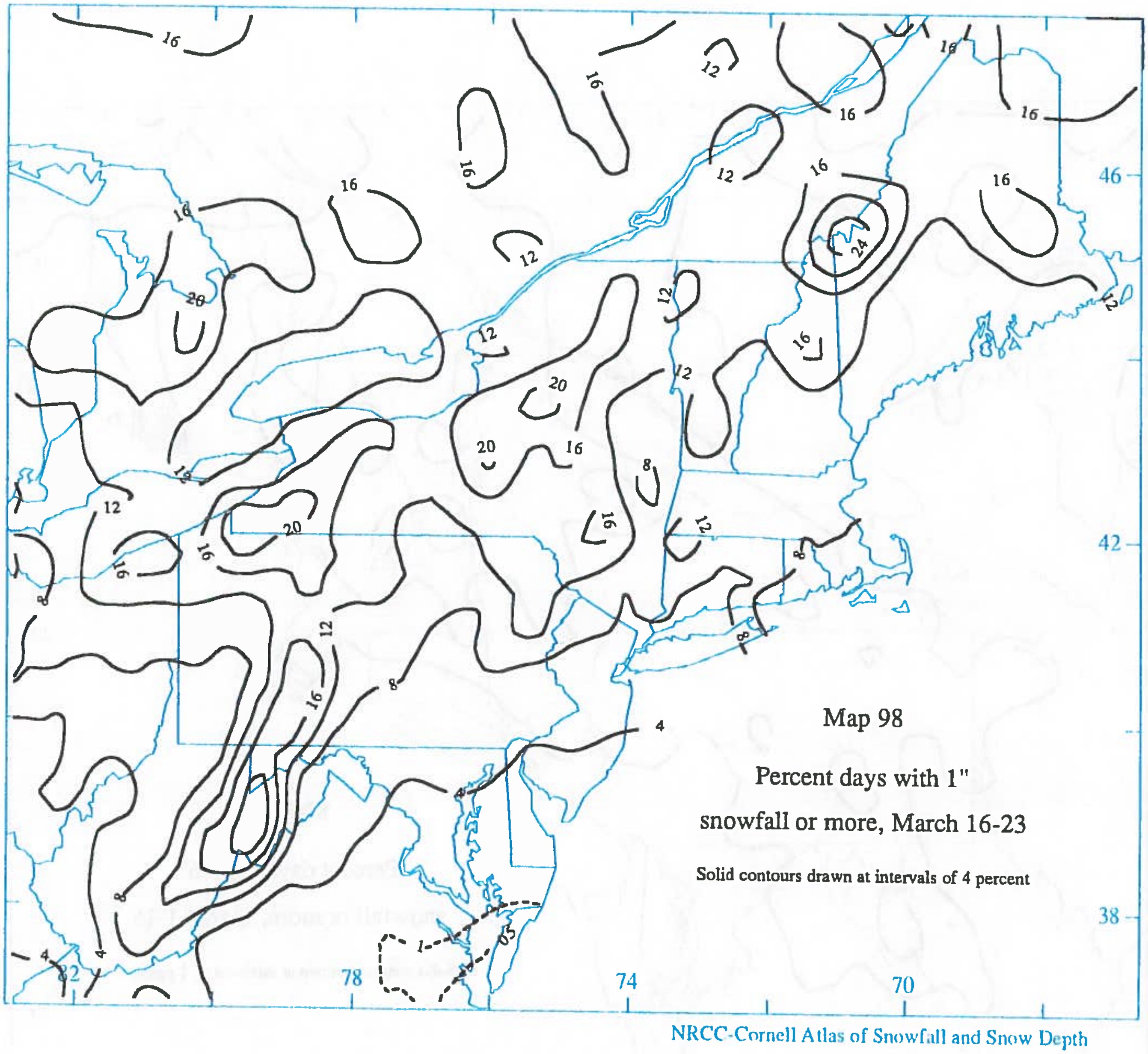
Percent days with 2" snowfall or more, March 1-15

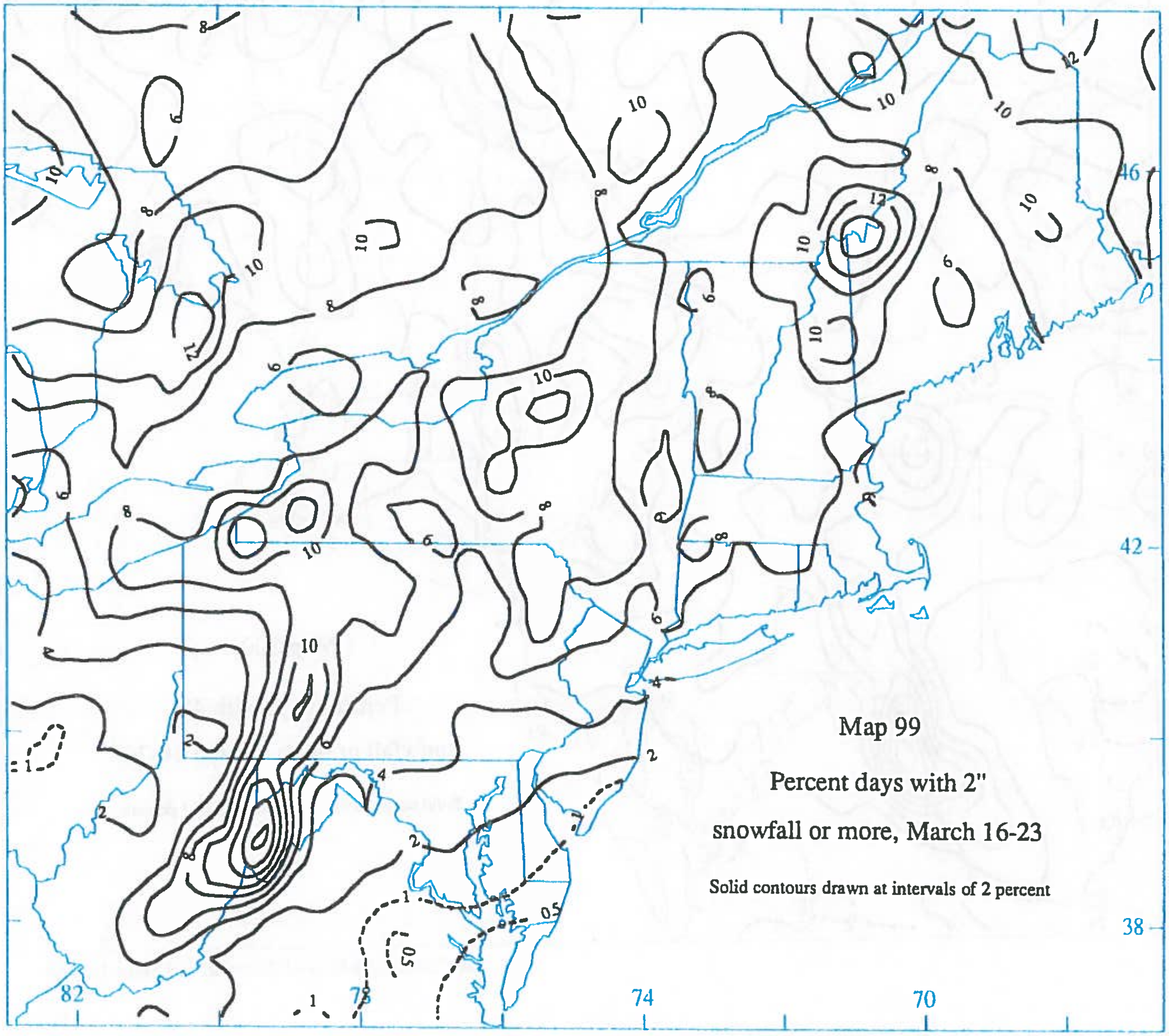
Solid contours drawn at intervals of 4 percent


Map 96
Percent days with 4"
snowfall or more, March 1-15
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 97
Percent days with 6"
snowfall or more, March 1-15
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
<1
1
2
3
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 98
Percent days with 1"
snowfall or more, March 16-23
Solid contours drawn at intervals of 4 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

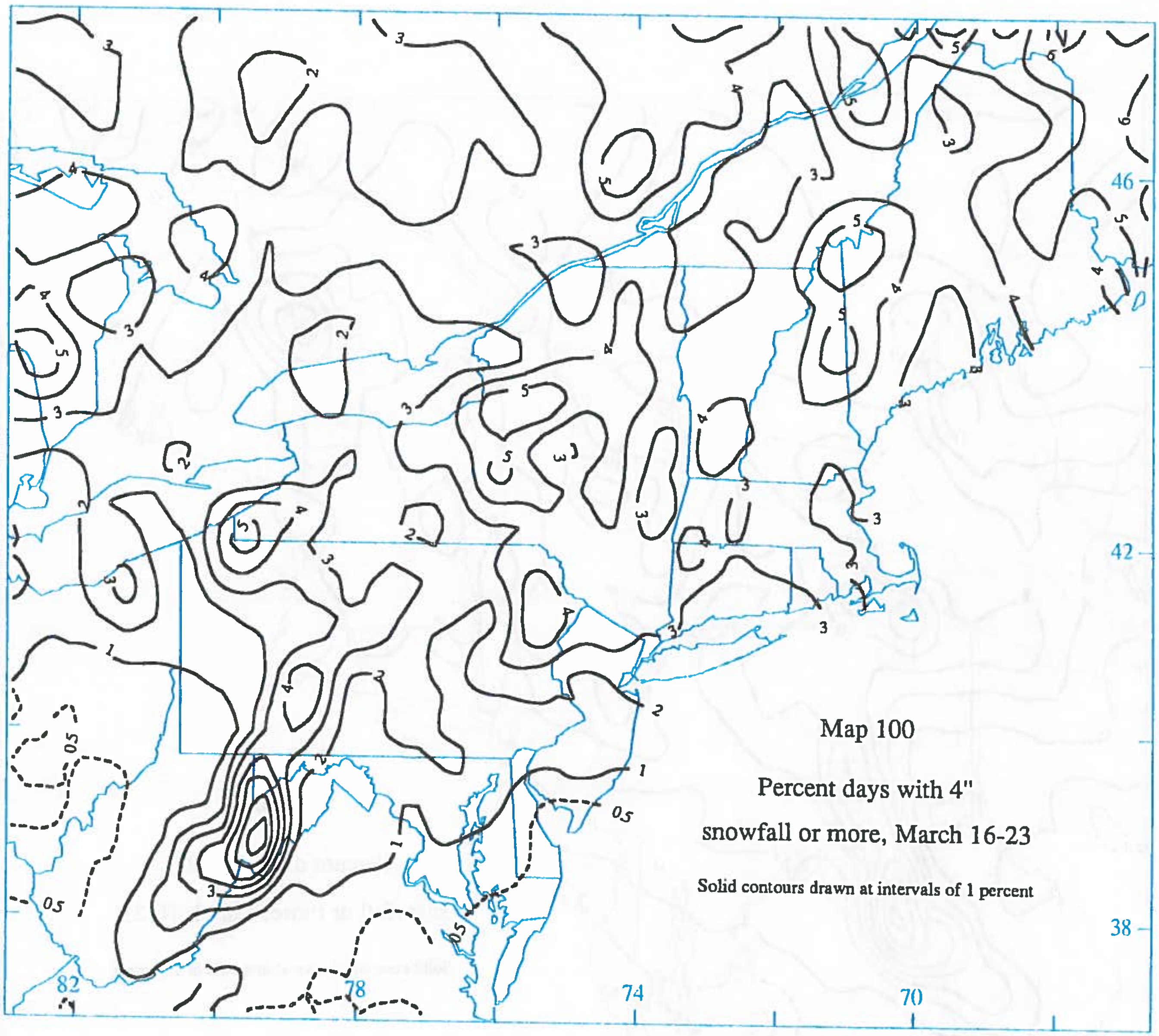


Map 99

Percent days with 2" snowfall or more, March 16-23

Solid contours drawn at intervals of 2 percent

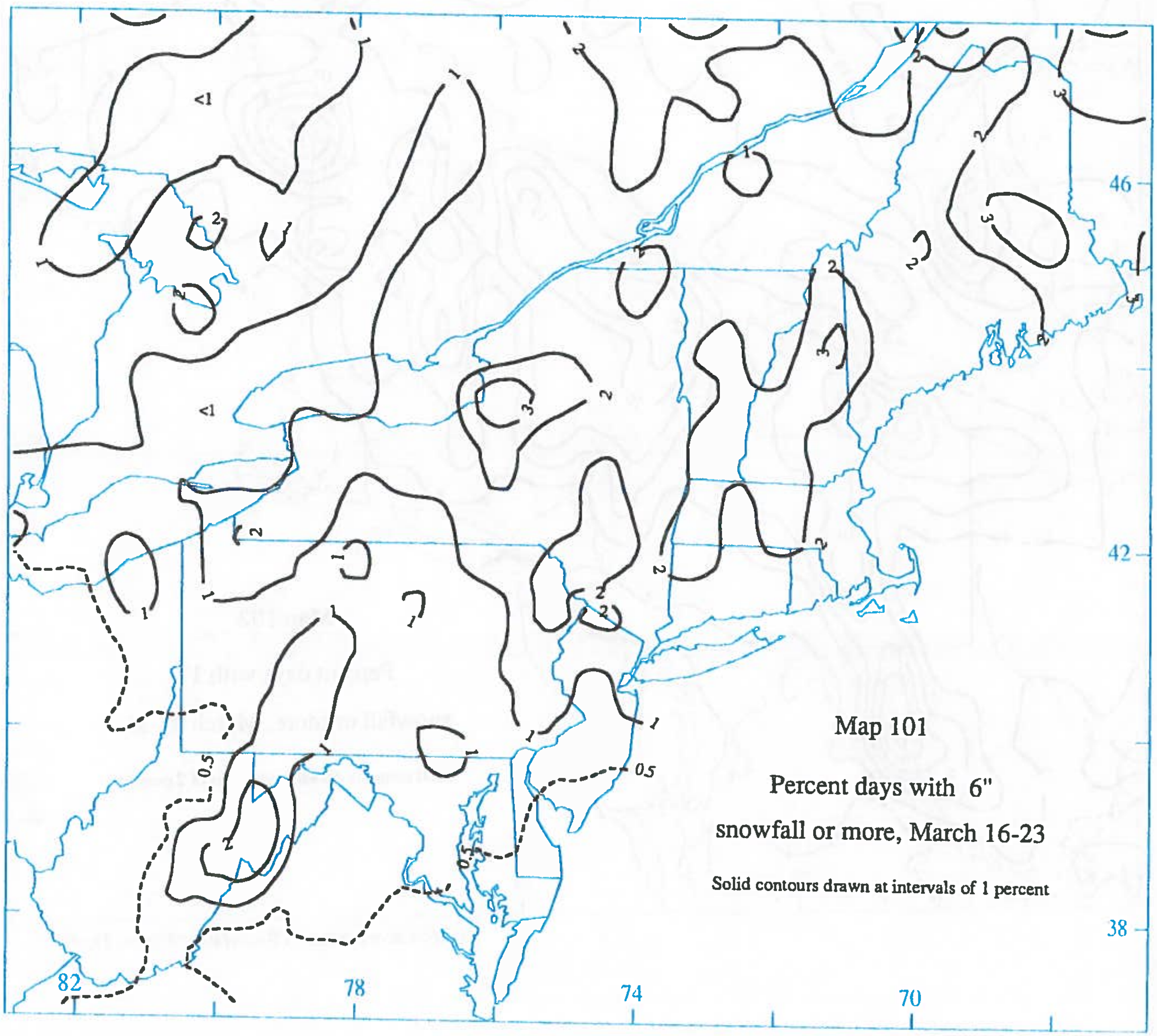
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 100

Percent days with 4" snowfall or more, March 16-23

Solid contours drawn at intervals of 1 percent

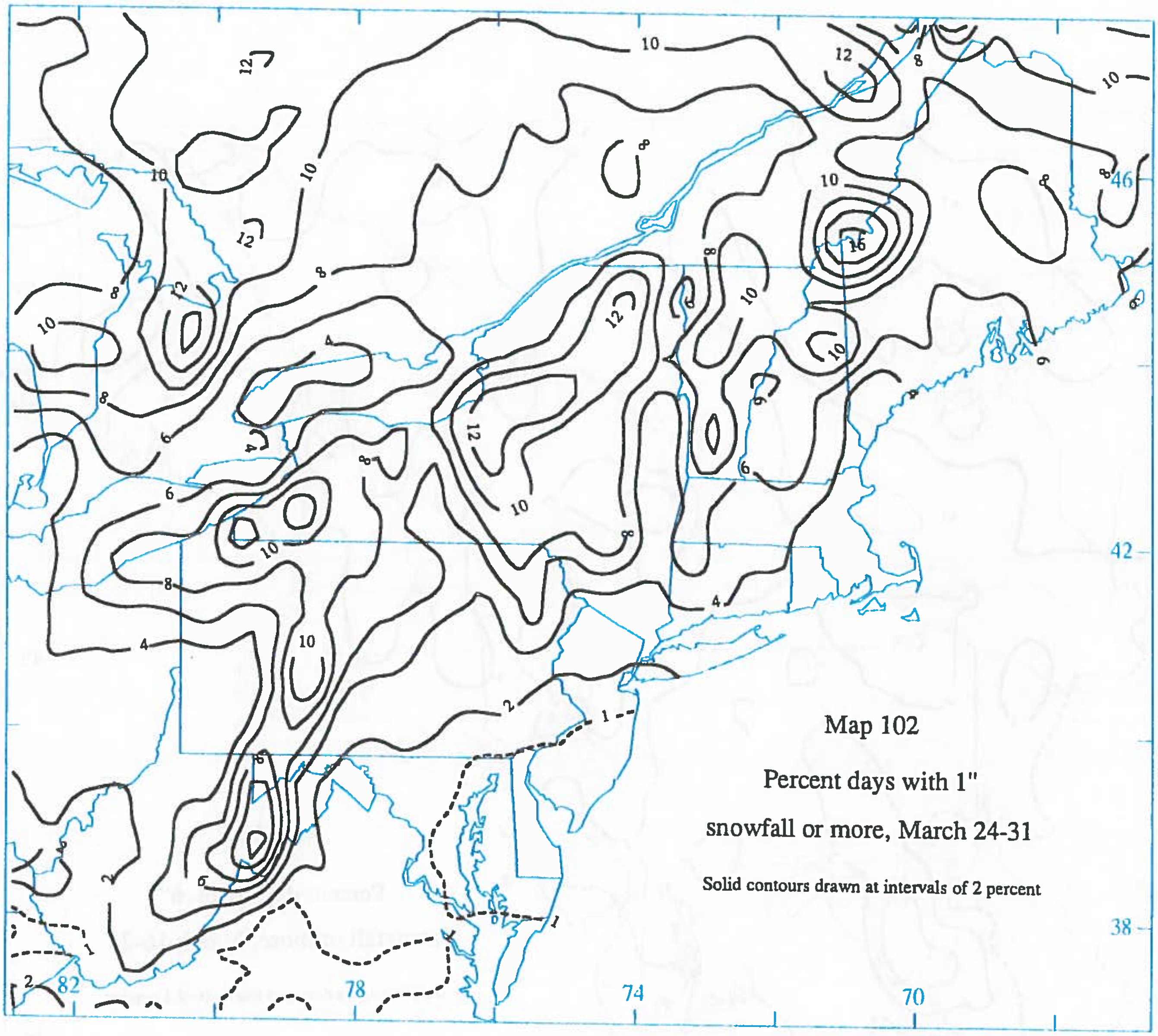


Map 101

Percent days with 6" snowfall or more, March 16-23

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

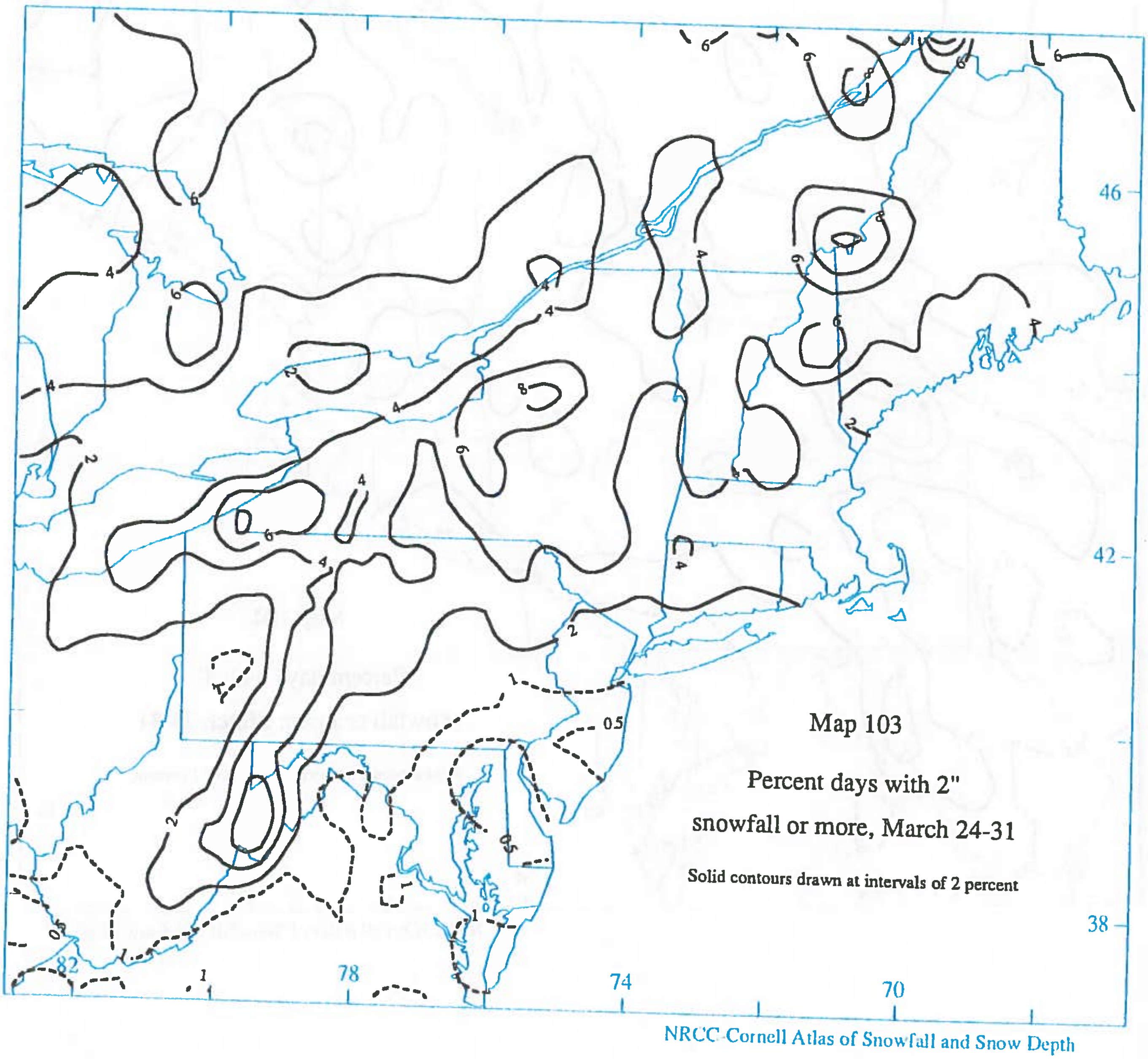


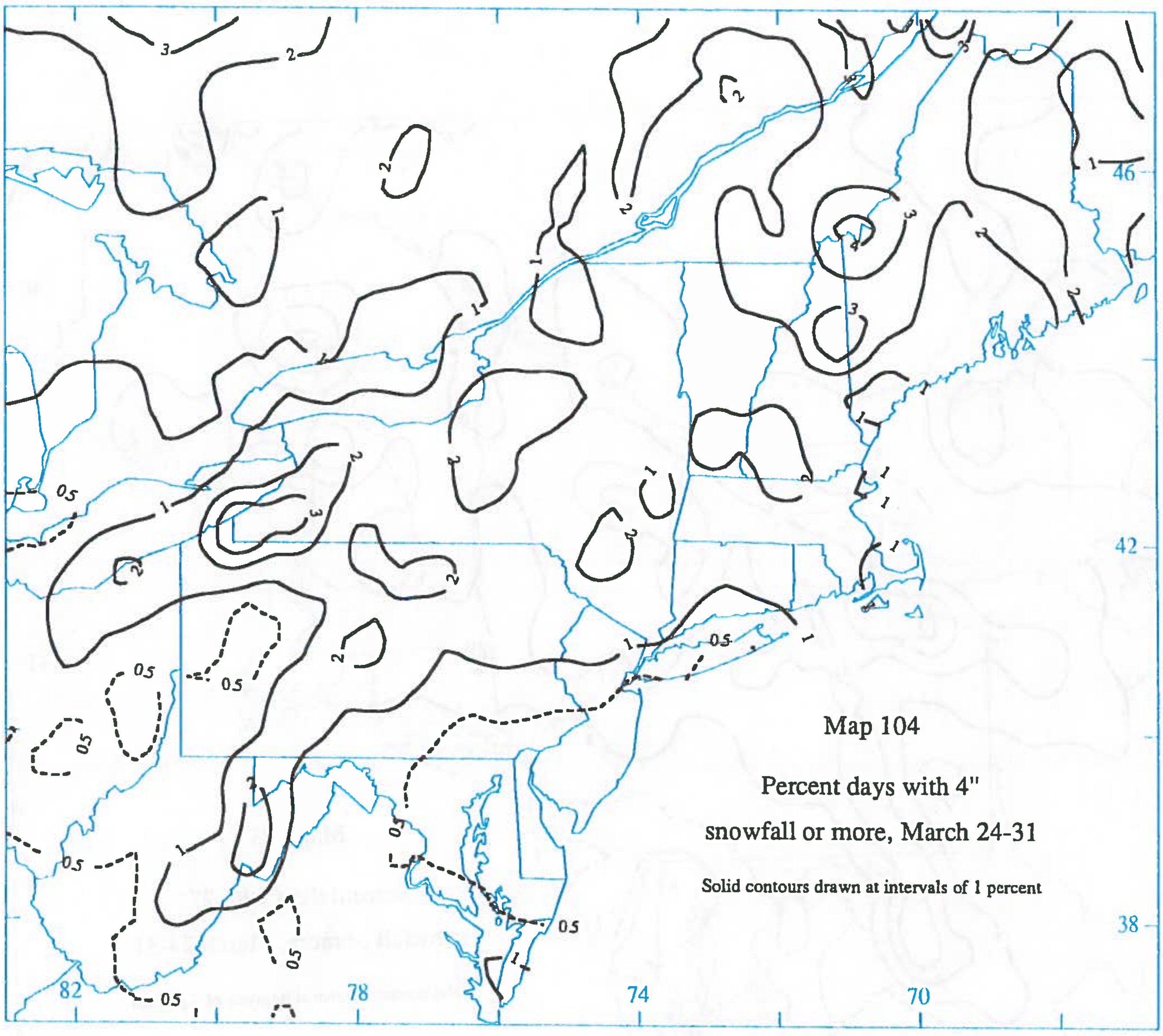
Map 102

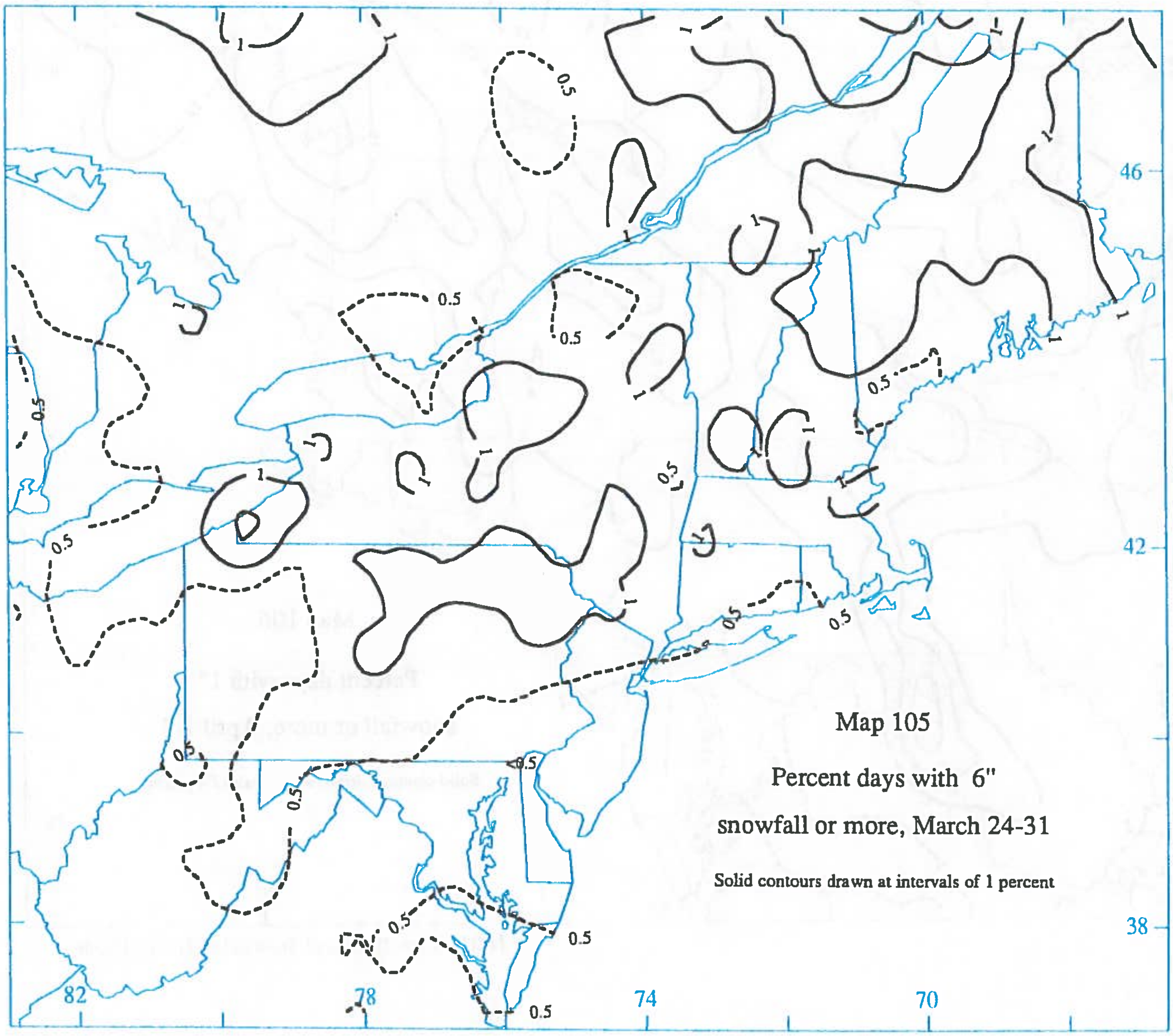
Percent days with 1" snowfall or more, March 24-31

Solid contours drawn at intervals of 2 percent

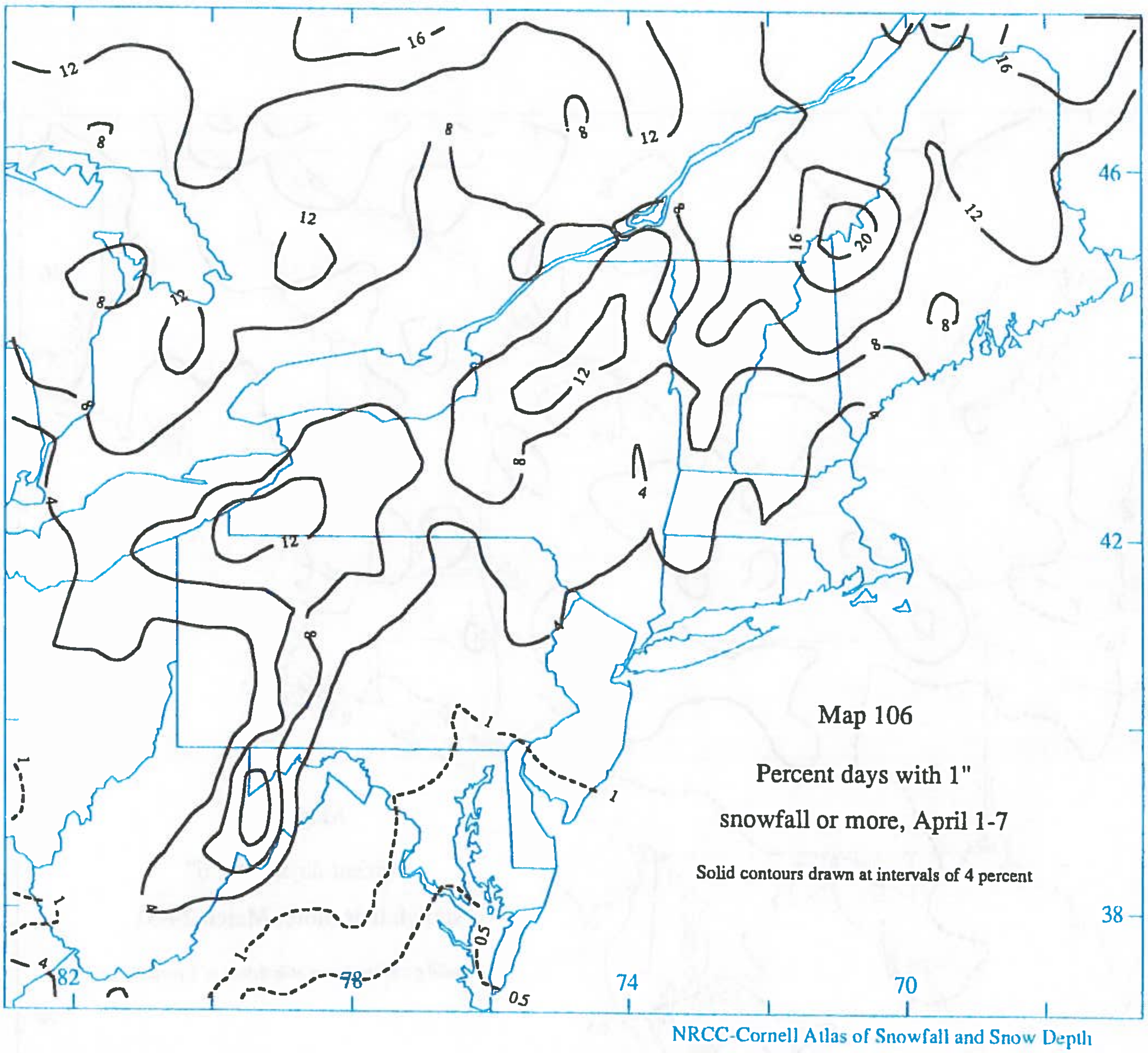
NRCC-Cornell Atlas of Snowfall and Snow Depth

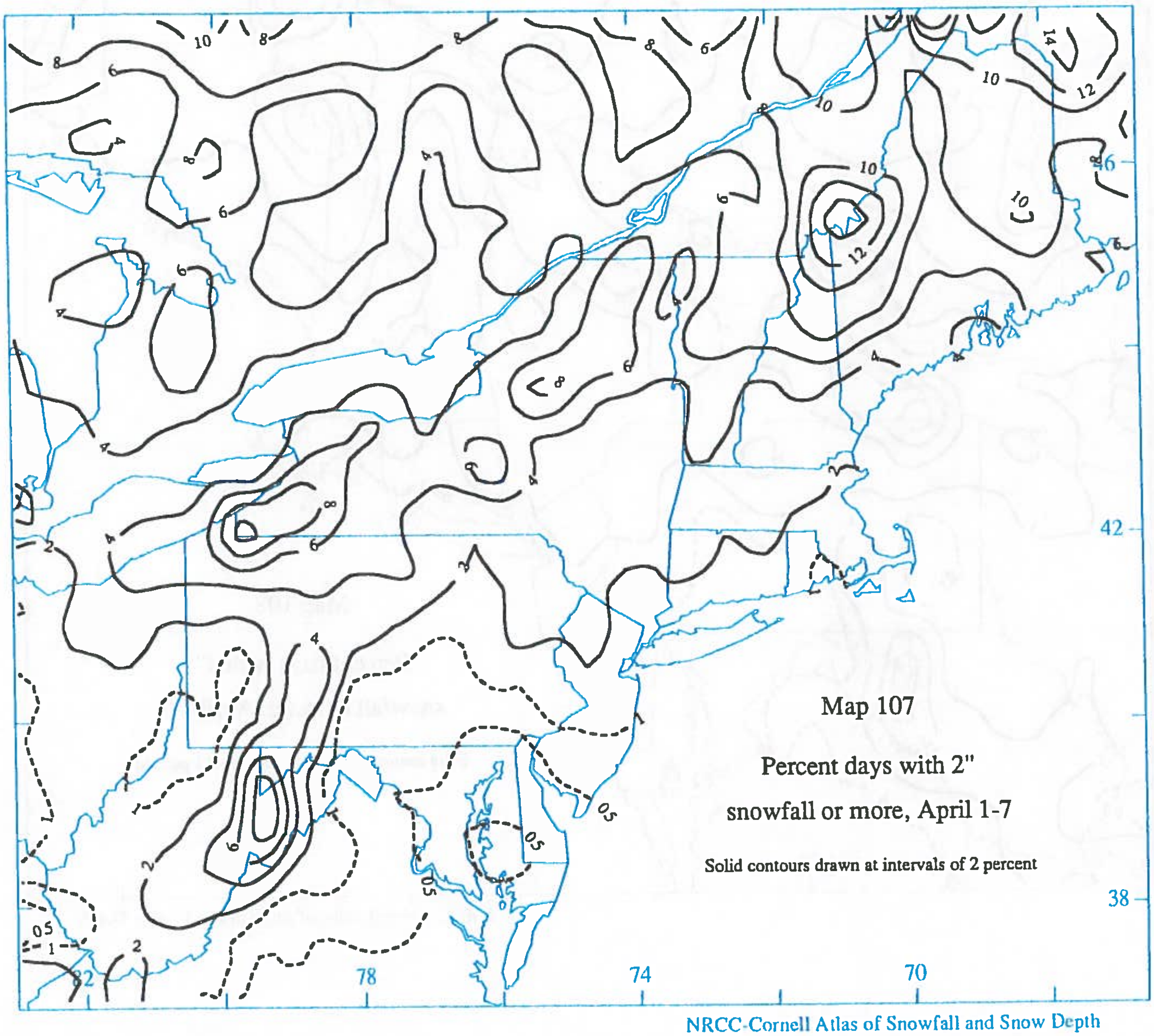

46
42
38
82
78
74
70
Map 103
Percent days with 2"
snowfall or more, March 24-31
Solid contours drawn at intervals of 2 percent
NRCC-Cornell Atlas of Snowfall and Snow Depth

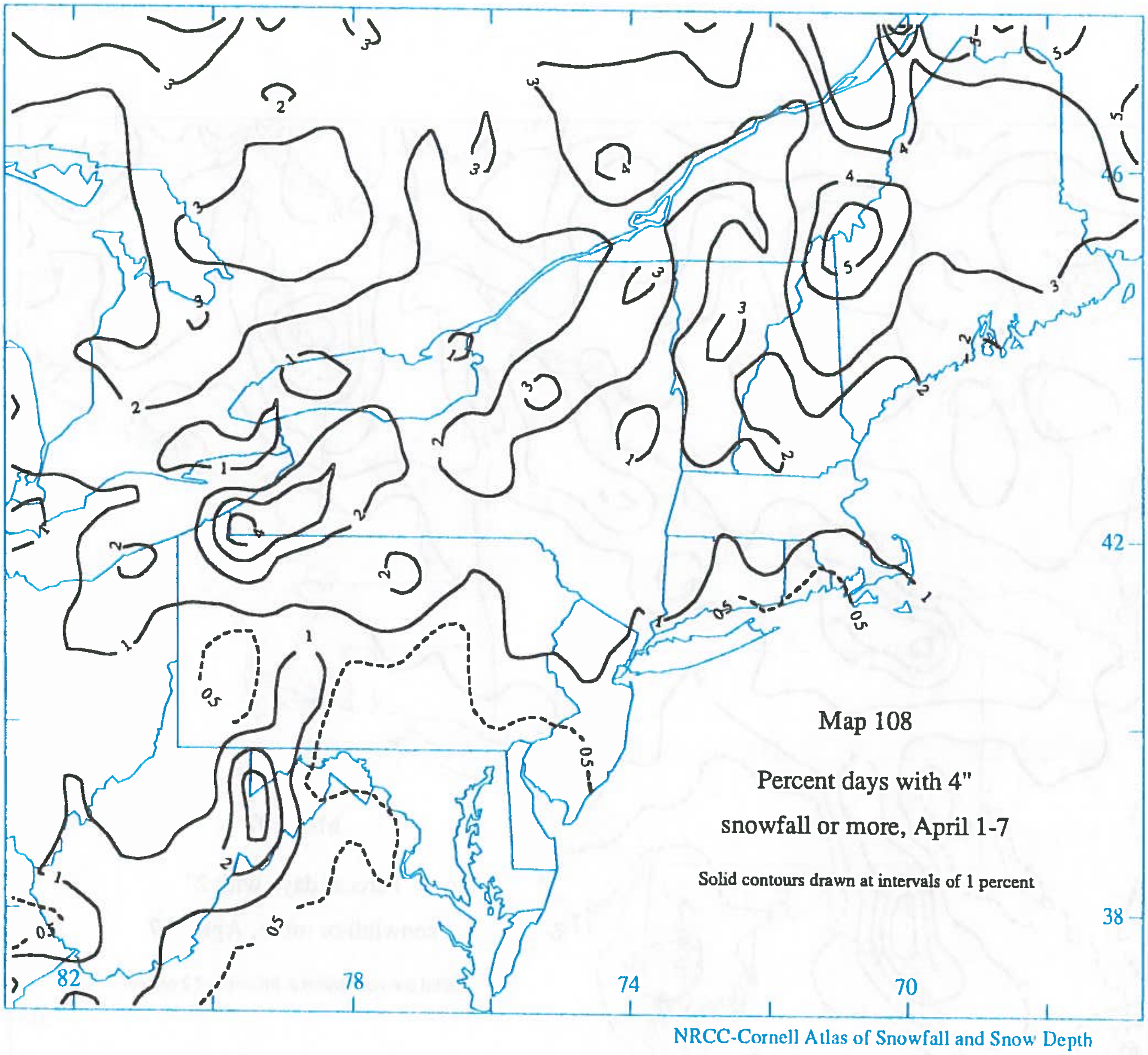

Map 104
Percent days with 4"
snowfall or more, March 24-31
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



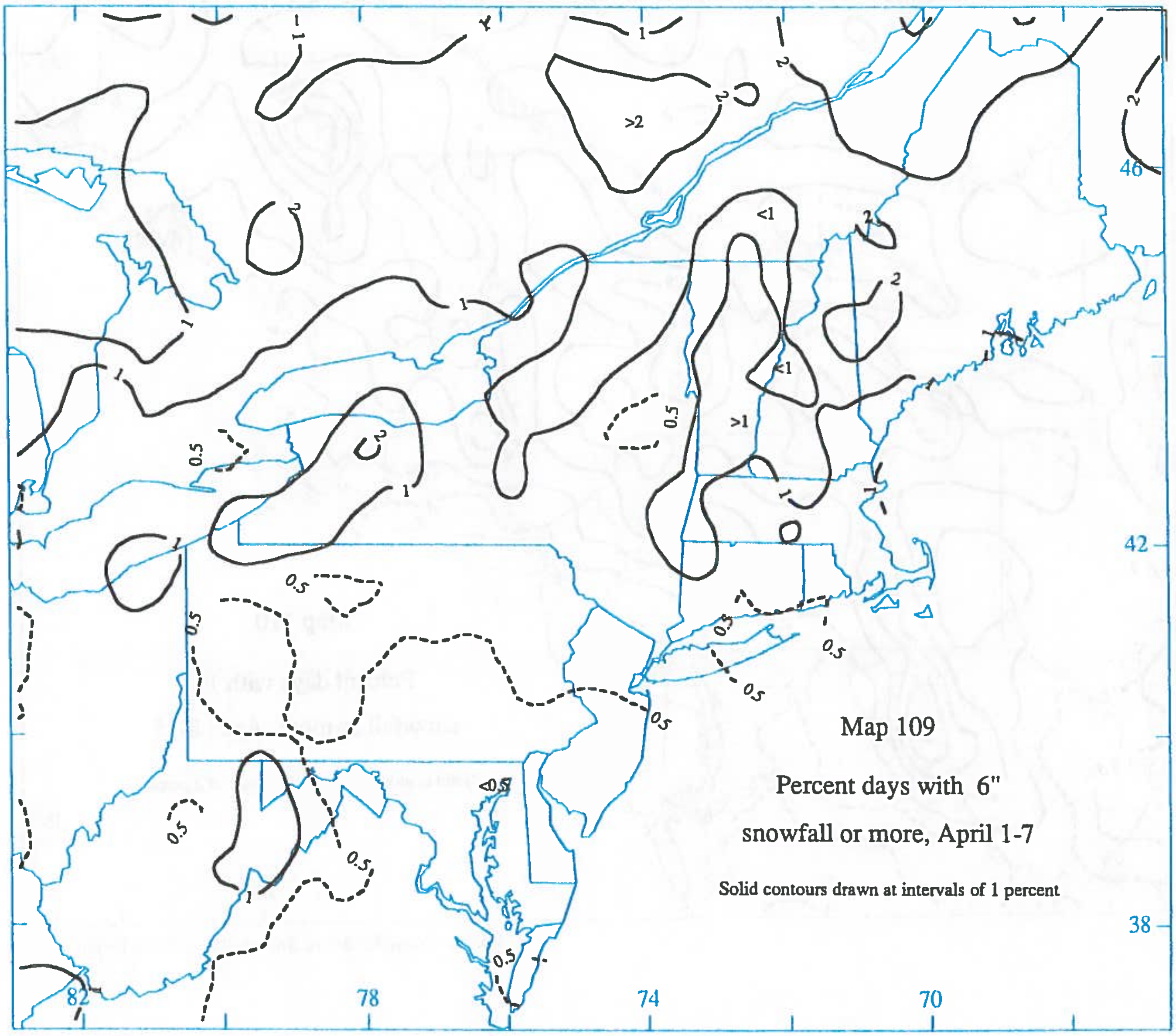
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 106
Percent days with 1"
snowfall or more, April 1-7
Solid contours drawn at intervals of 4 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

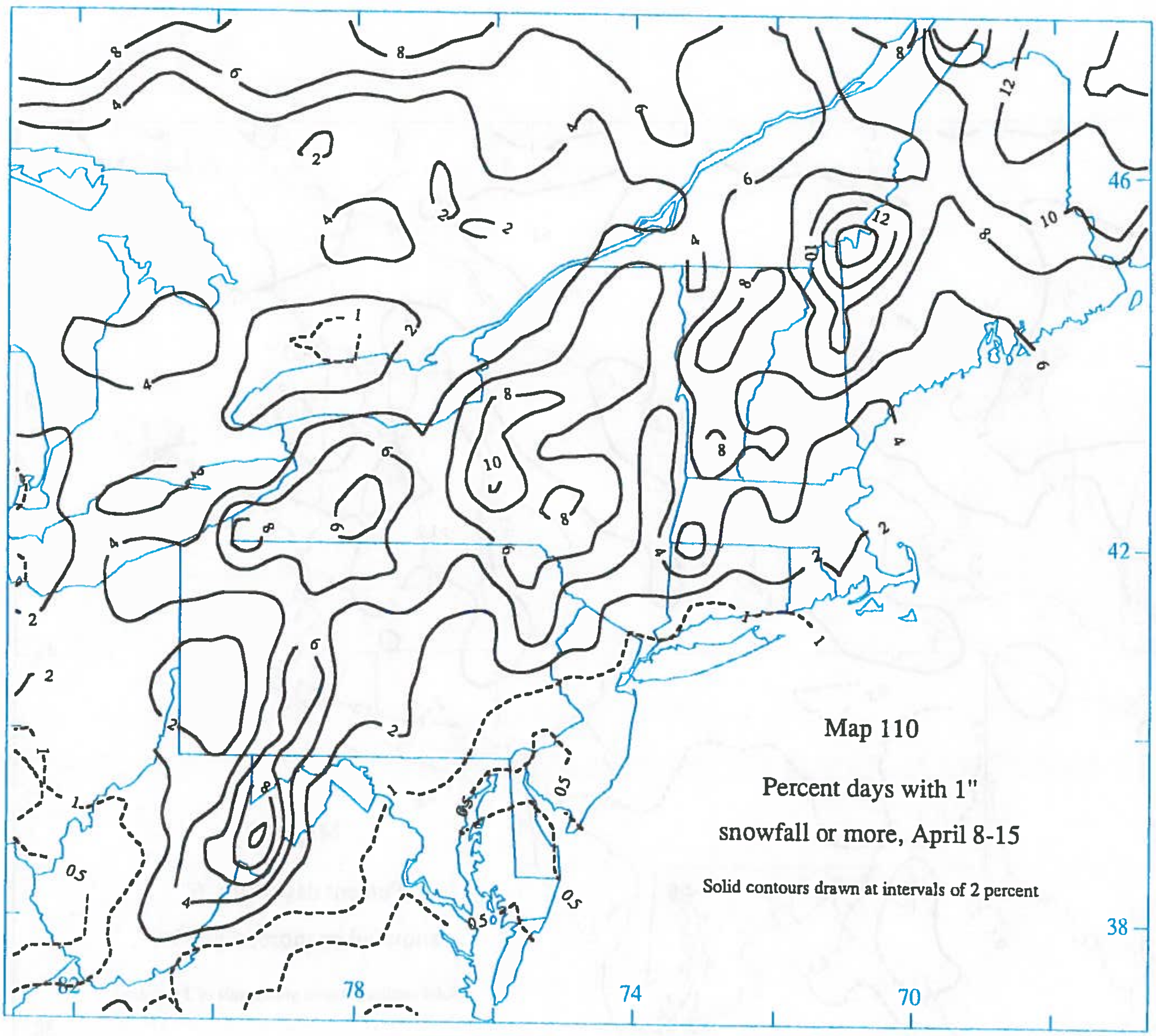

Map 107
Percent days with 2"
snowfall or more, April 1-7
Solid contours drawn at intervals of 2 percent
42
38
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 108
Percent days with 4"
snowfall or more, April 1-7
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

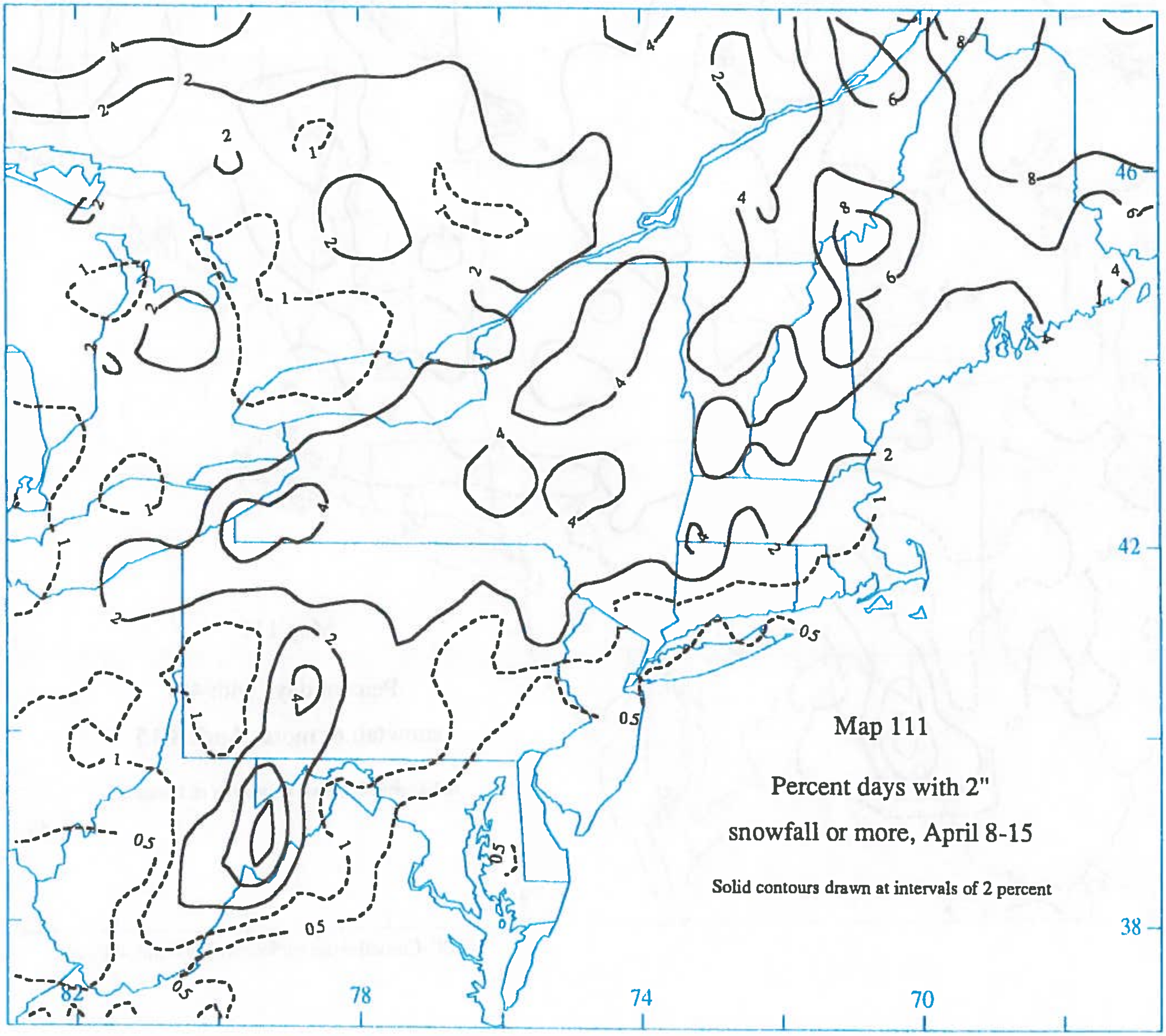


Map 110

Percent days with 1" snowfall or more, April 8-15

Solid contours drawn at intervals of 2 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

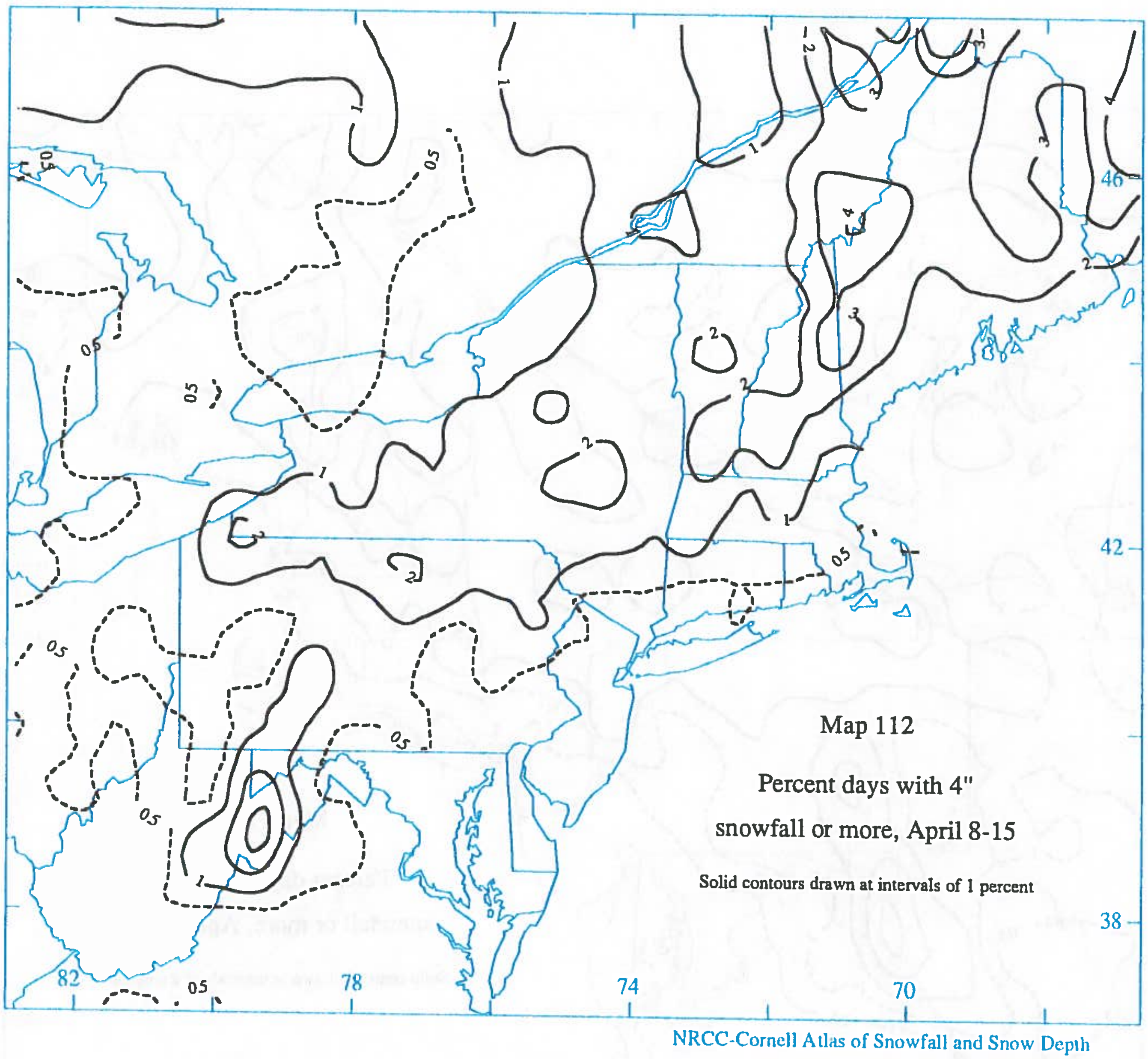


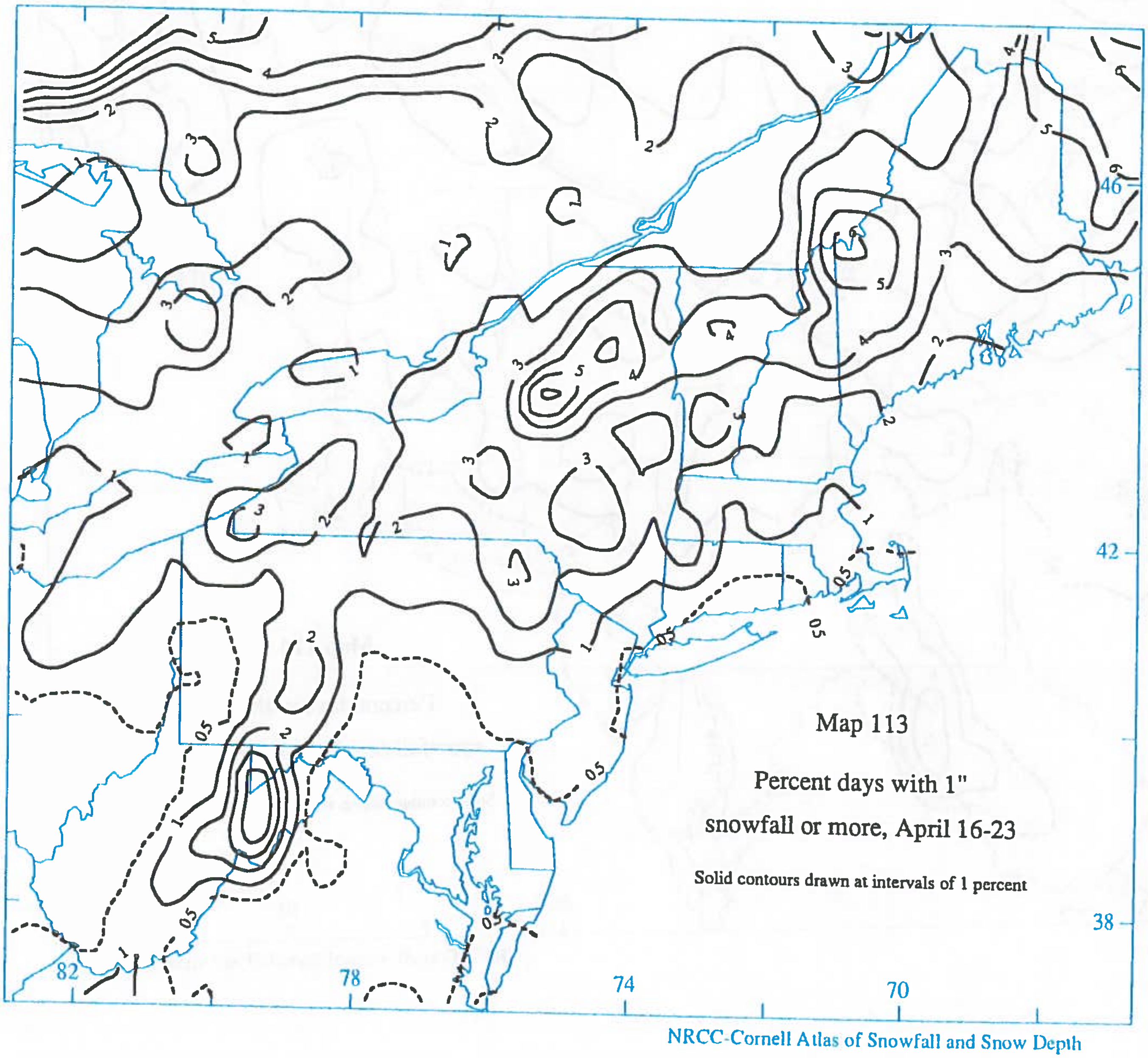
Map 111

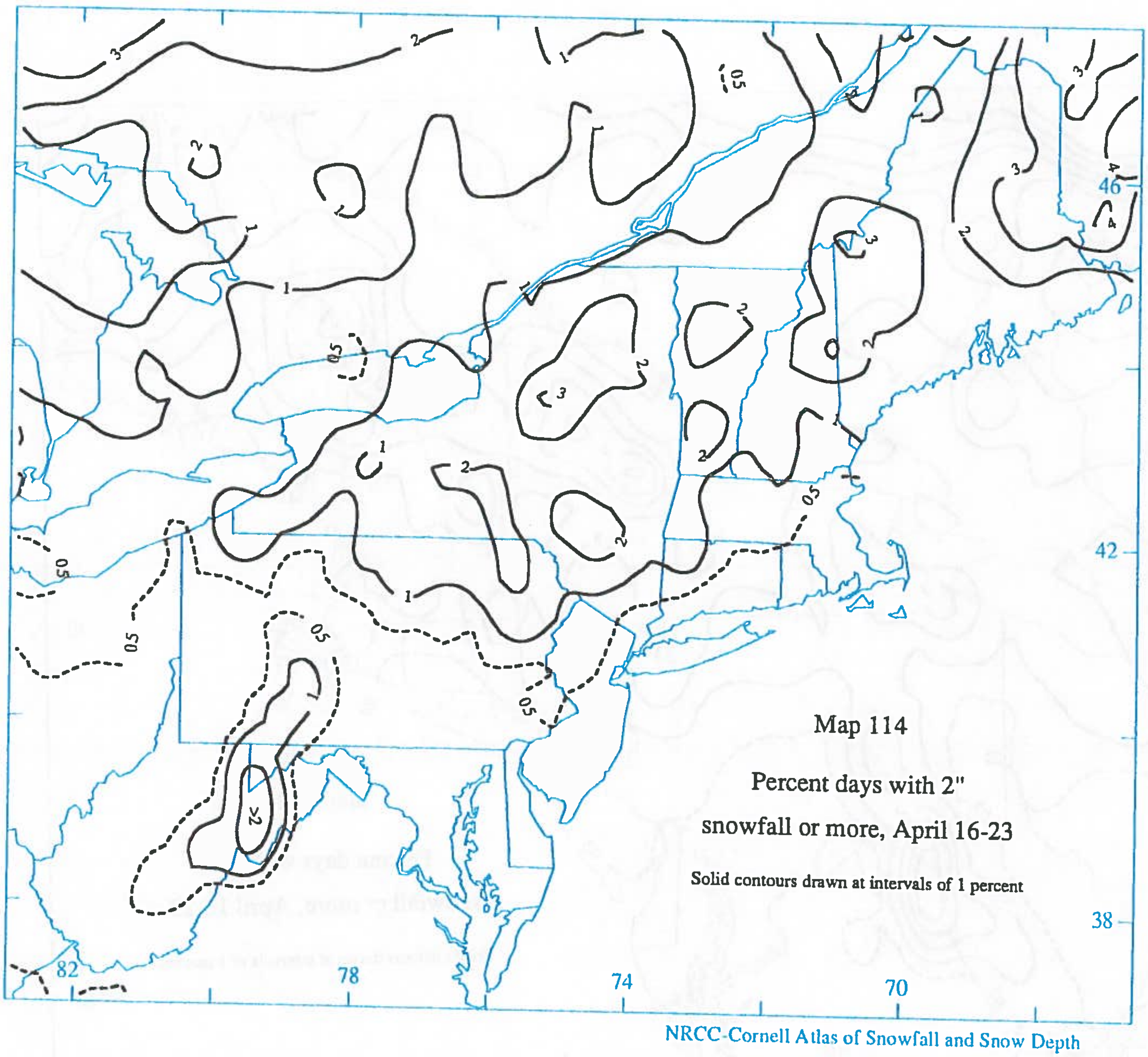
Percent days with 2" snowfall or more, April 8-15

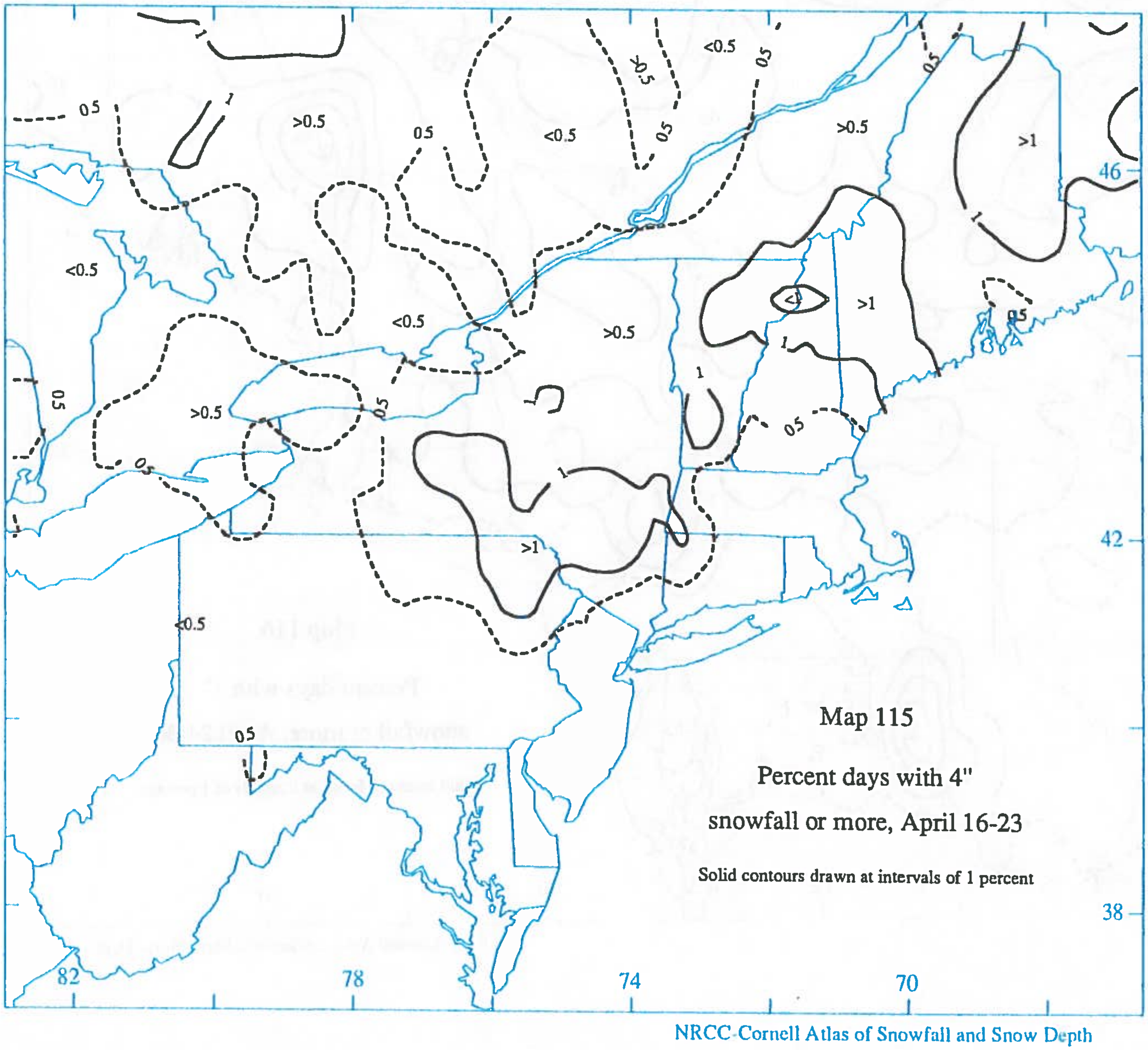
Solid contours drawn at intervals of 2 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

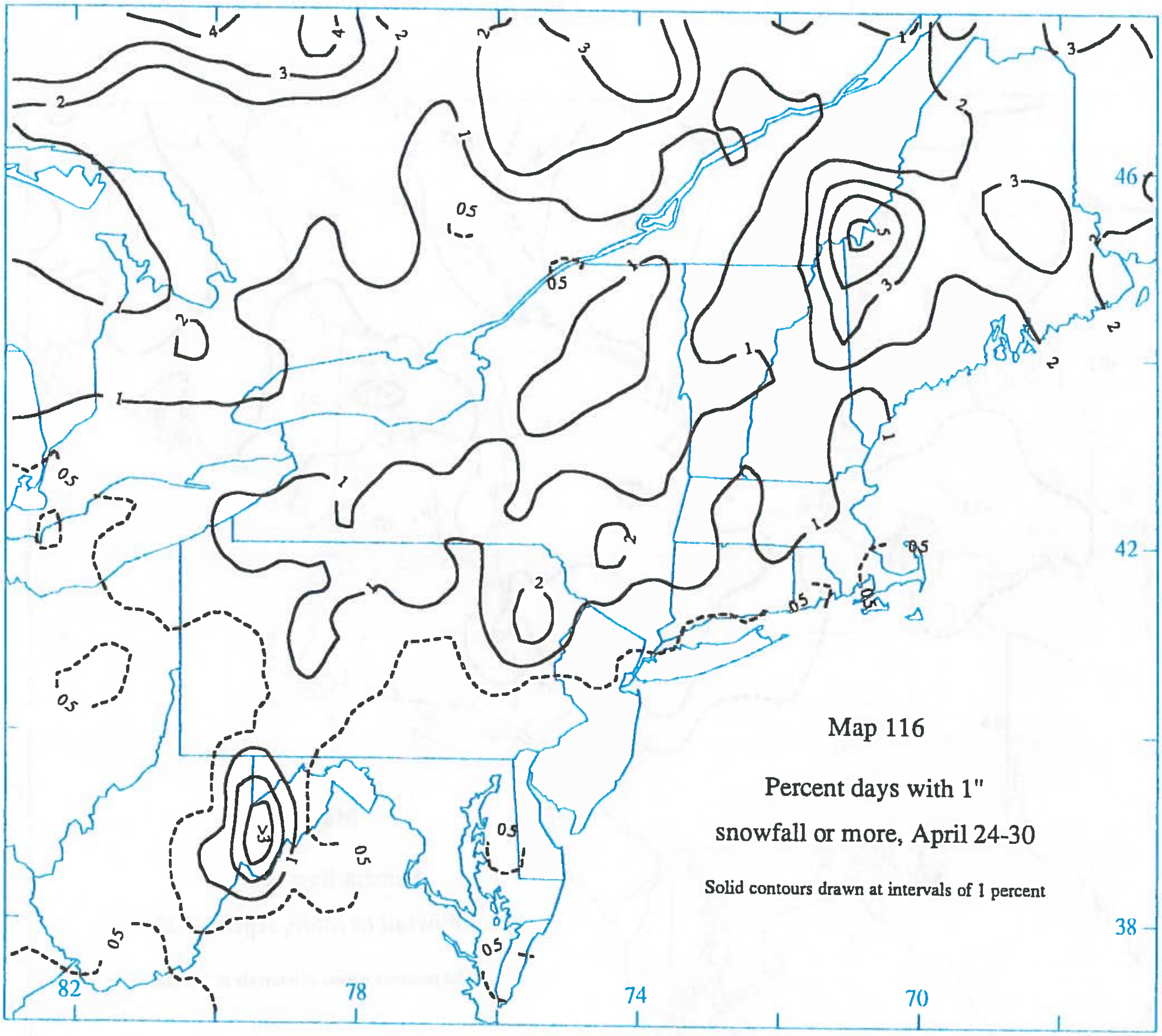

Map 112
Percent days with 4"
snowfall or more, April 8-15
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 113
Percent days with 1"
snowfall or more, April 16-23
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth


46
42
38
82
78
74
70
Map 114
Percent days with 2"
snowfall or more, April 16-23
Solid contours drawn at intervals of 1 percent
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 115
Percent days with 4"
snowfall or more, April 16-23
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

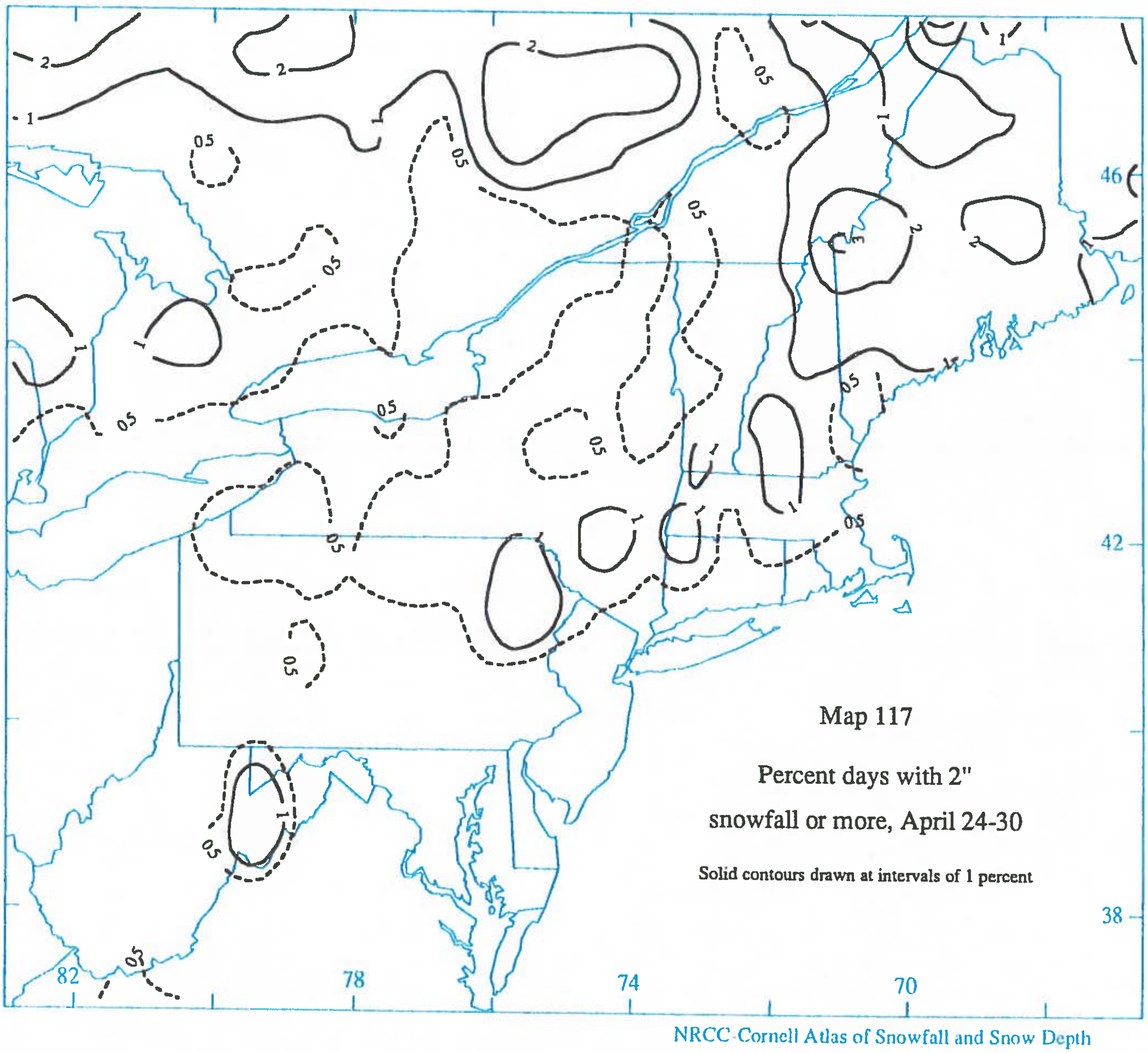


Map 116

Percent days with 1" snowfall or more, April 24-30

Solid contours drawn at intervals of 1 percent

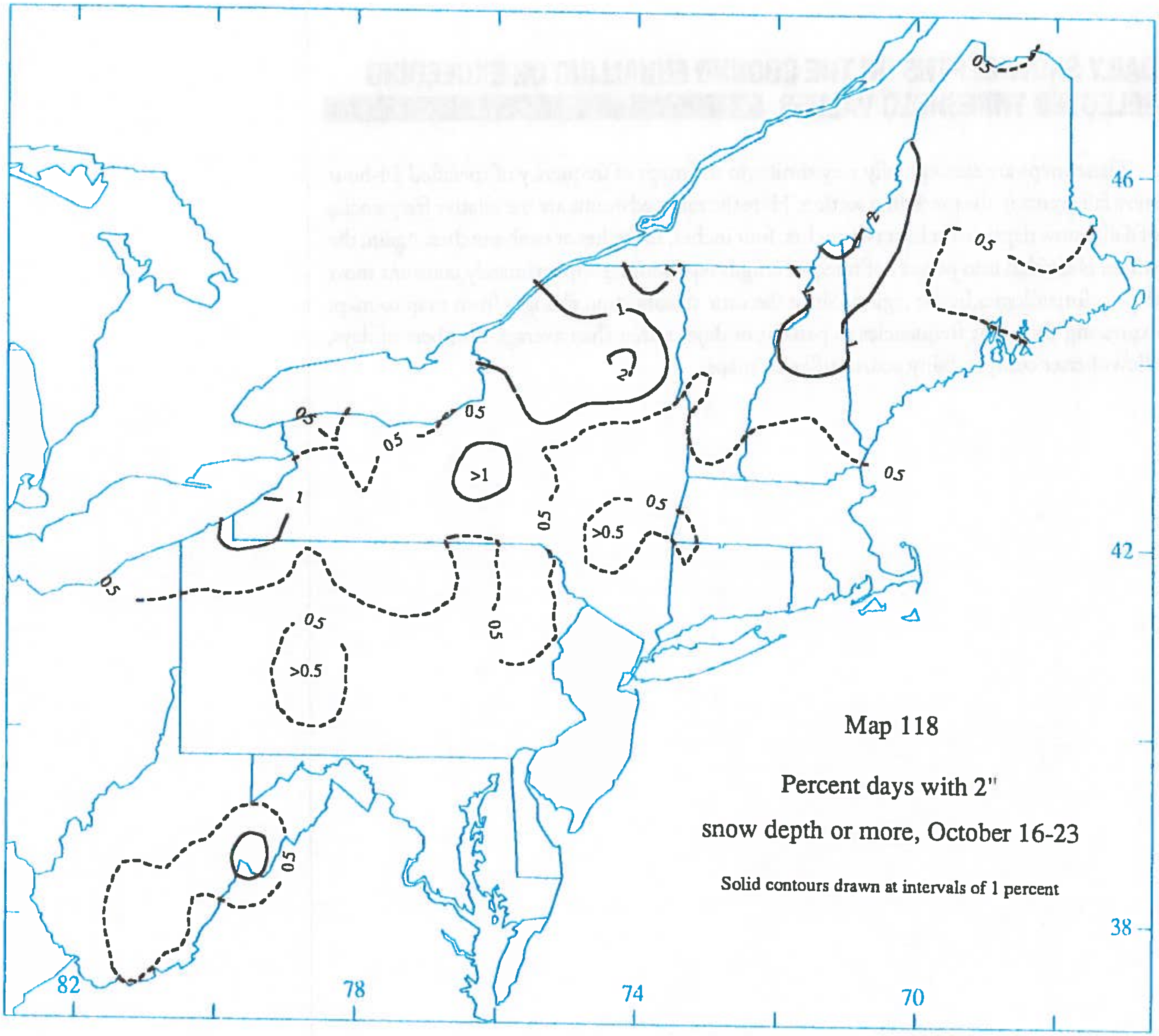
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 117
Percent days with 2"
snowfall or more, April 24-30
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

DAILY SNOW DEPTHS ON THE GROUND EQUALLING OR EXCEEDING SELECTED THRESHOLD VALUES

These maps are conceptually very similar to the maps of frequency of specified 24-hour snowfall events in the preceding section. Here the mapped events are the relative frequencies of daily snow depths of at least two inches, four inches, six inches or twelve inches. Again, the winter is divided into periods of unequal length representing approximately constant snow depth climatologies in the region. Since the time stratification changes from map to map, expressing the event frequencies as percent of days, rather than average numbers of days, allows better comparability across different maps.

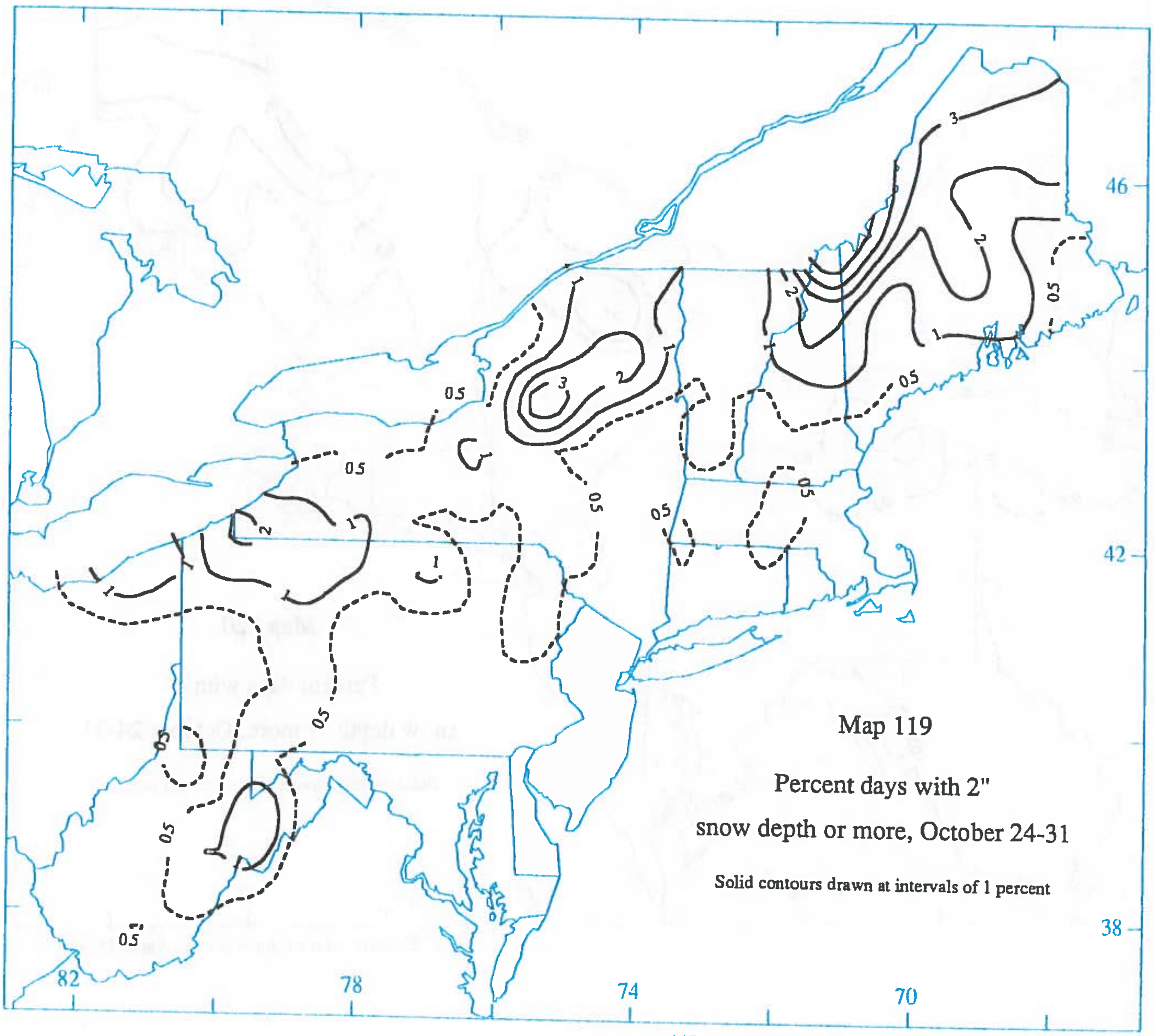


Map 118

Percent days with 2"
snow depth or more, October 16-23

Solid contours drawn at intervals of 1 percent

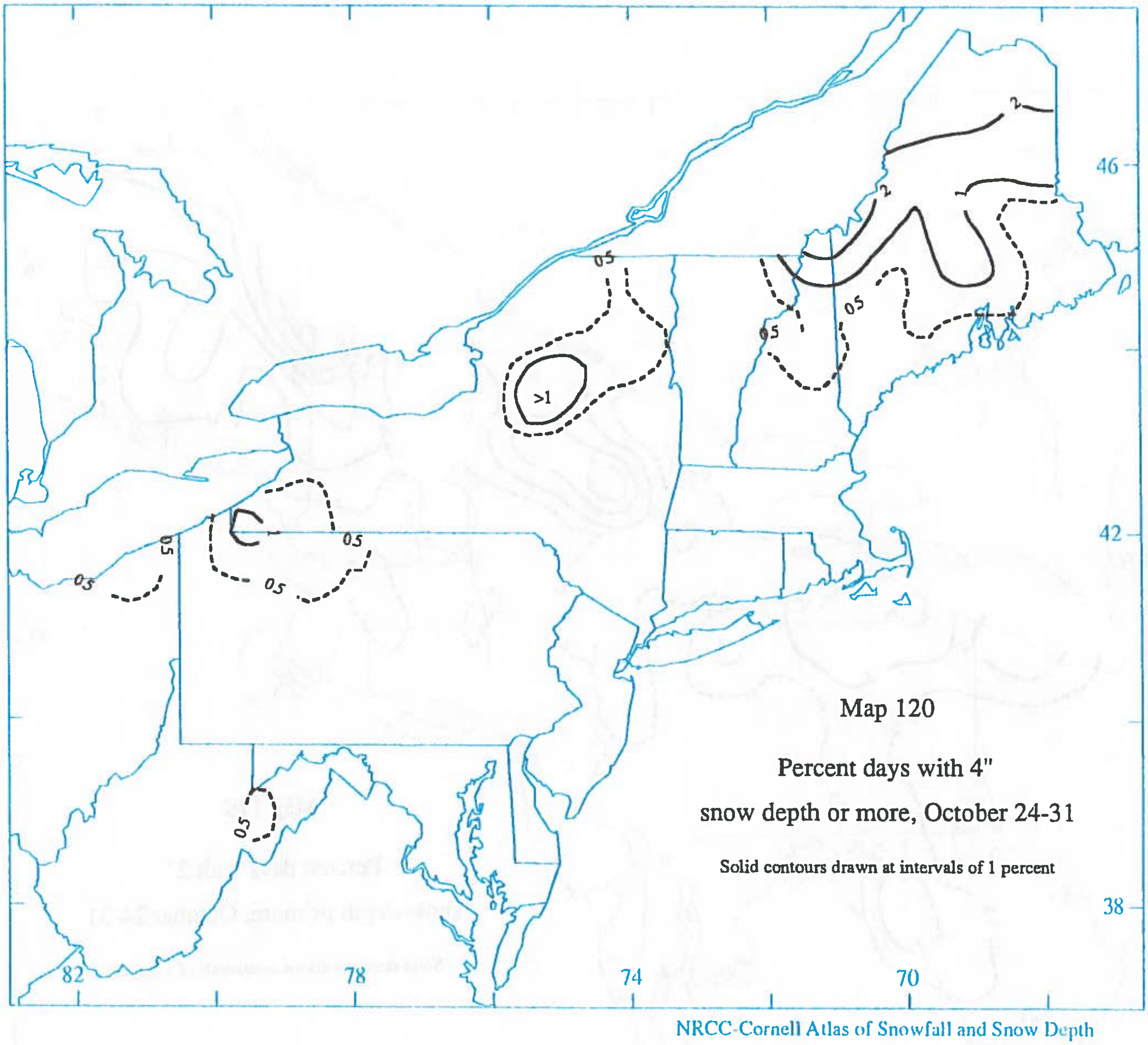
NRCC-Cornell Atlas of Snowfall and Snow Depth



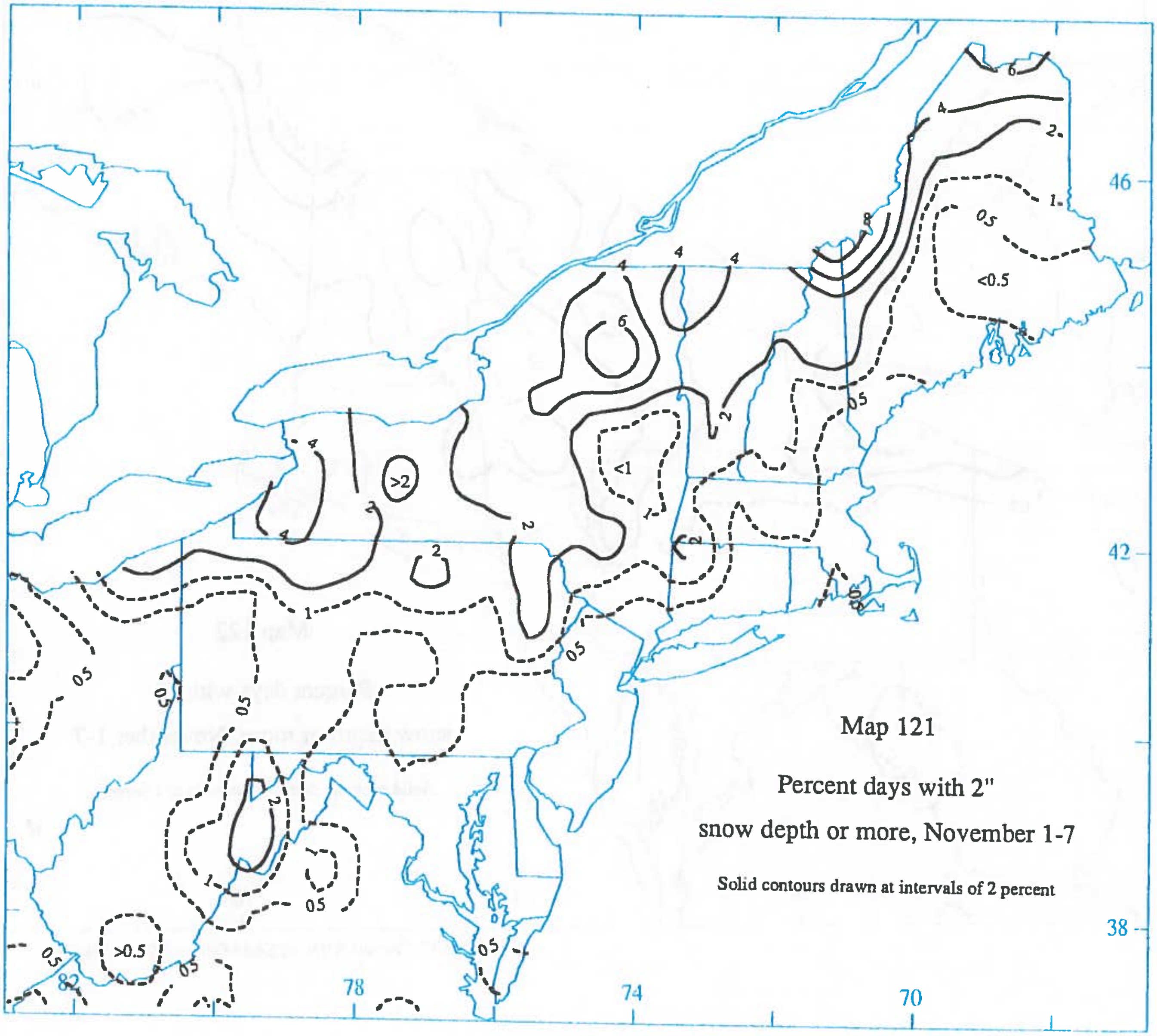
Map 119

Percent days with 2"
snow depth or more, October 24-31

Solid contours drawn at intervals of 1 percent



46
42
38
82
78
74
70
2
2
1
0.5
0.5
0.5
0.5
>1
0.5
0.5
0.5
0.5
0.5
1
Map 120
Percent days with 4"
snow depth or more, October 24-31
Solid contours drawn at intervals of 1 percent
NRCC-Cornell Atlas of Snowfall and Snow Depth



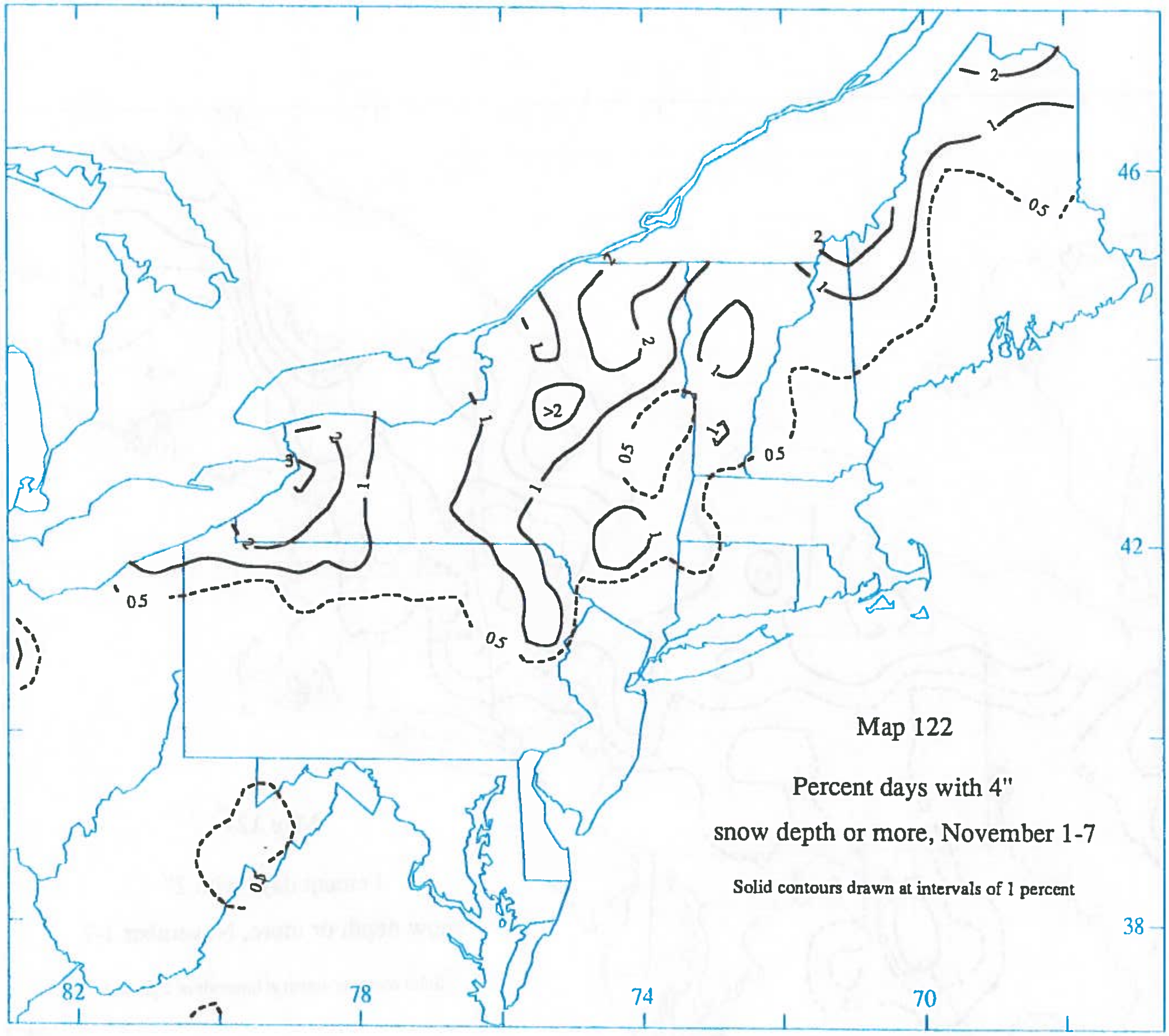
Map 121

Percent days with 2"

snow depth or more, November 1-7

Solid contours drawn at intervals of 2 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

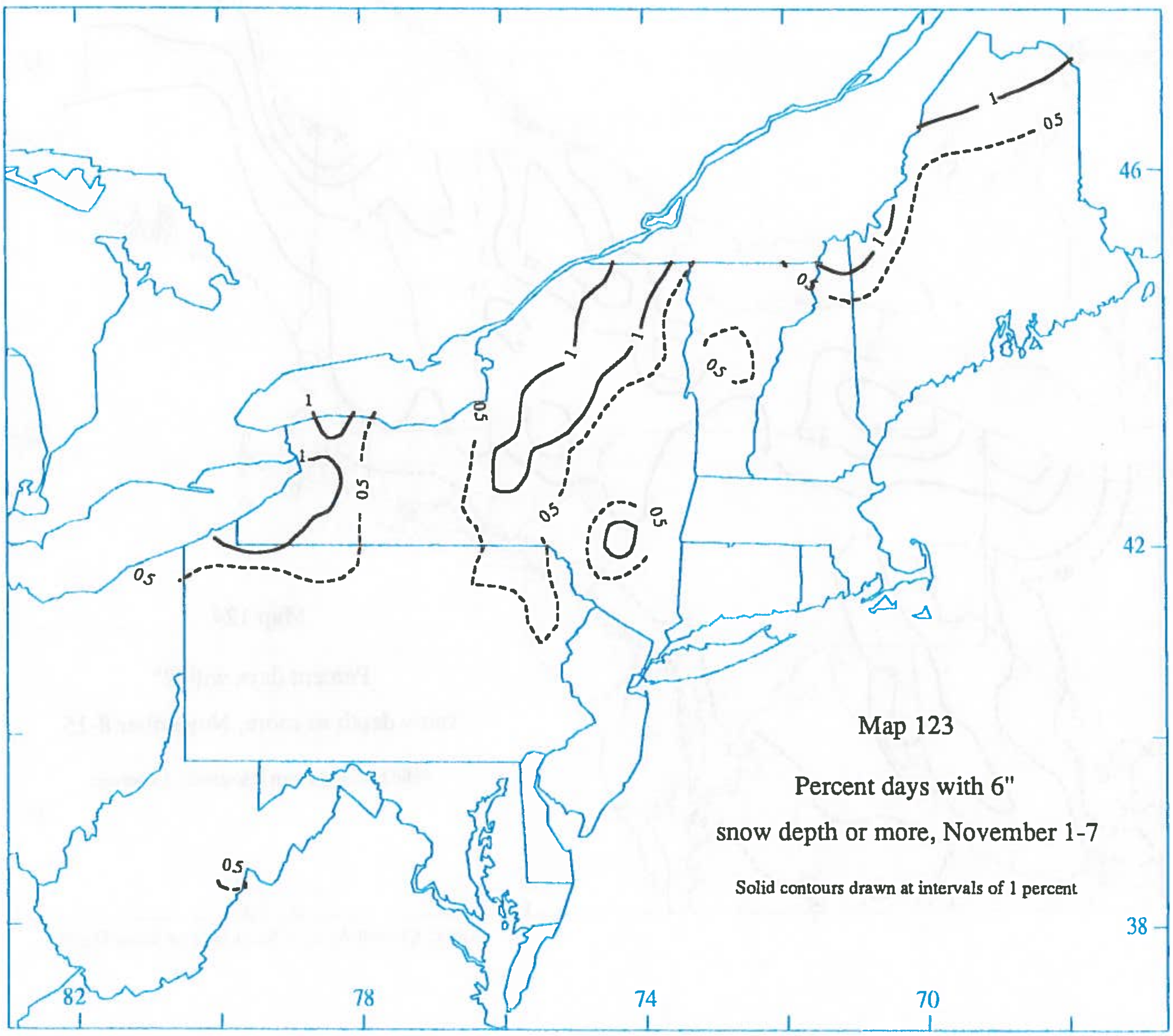


Map 122

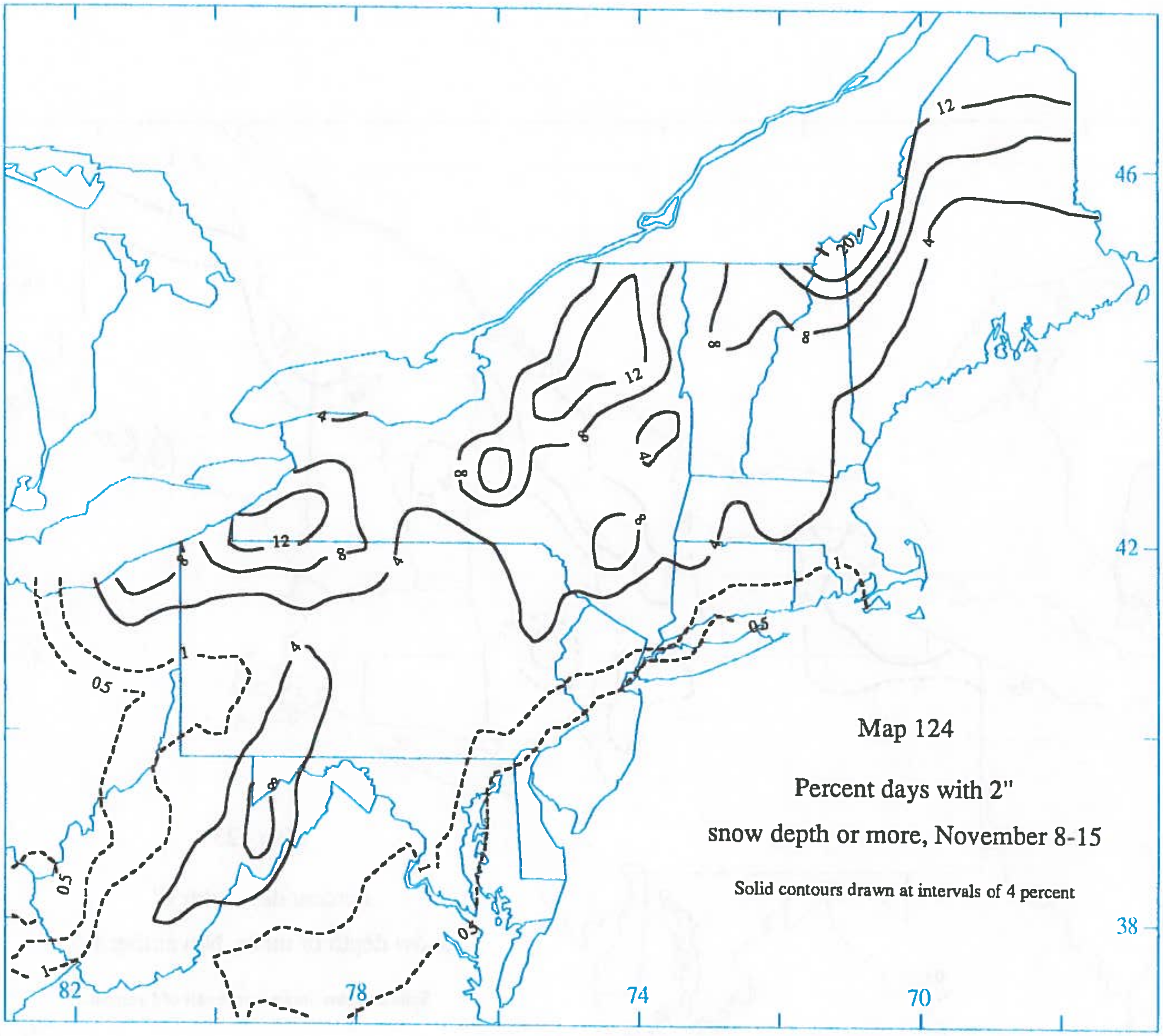
Percent days with 4"

snow depth or more, November 1-7

Solid contours drawn at intervals of 1 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

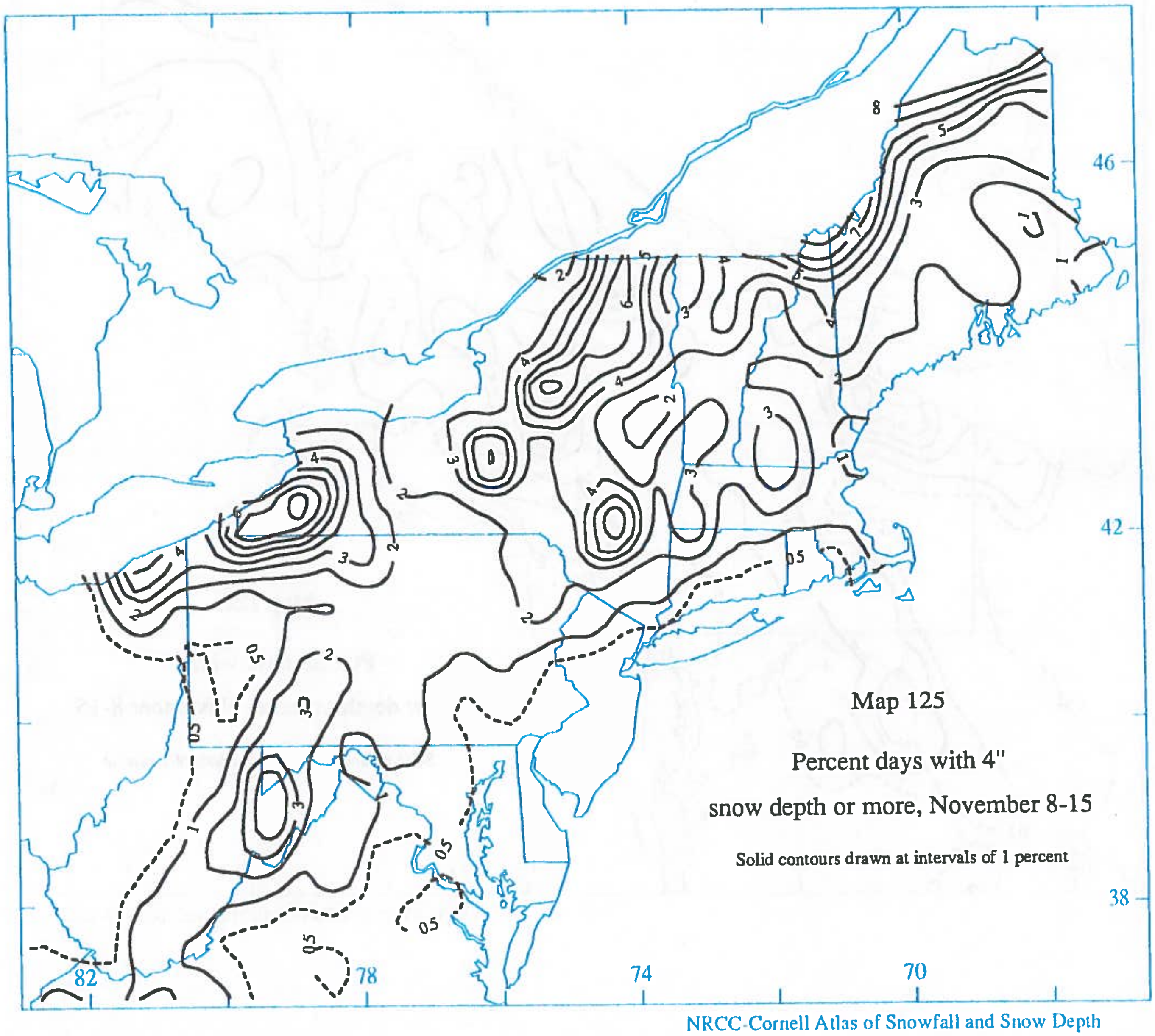


Map 124

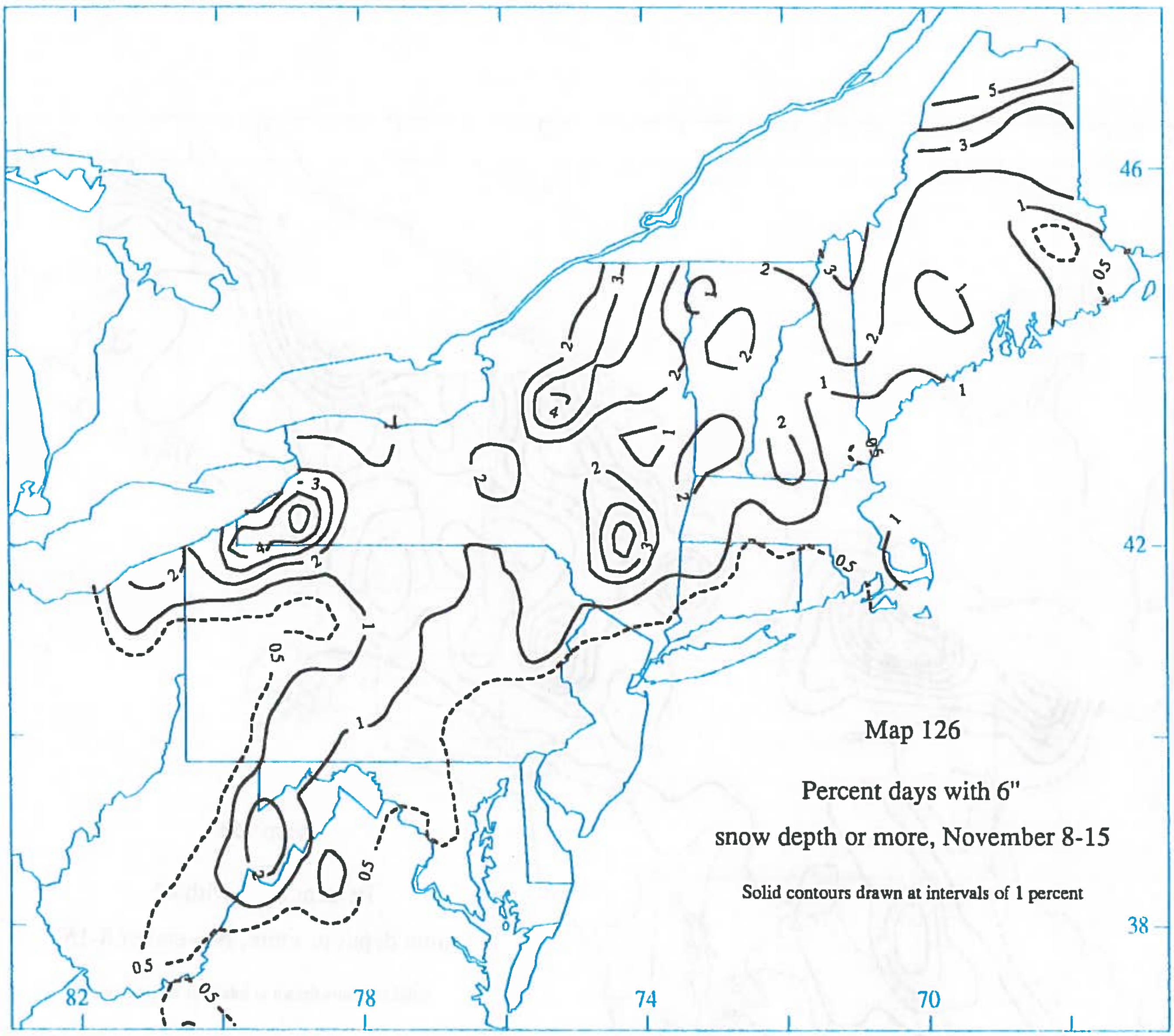
Percent days with 2" snow depth or more, November 8-15

Solid contours drawn at intervals of 4 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 125
Percent days with 4"
snow depth or more, November 8-15
Solid contours drawn at intervals of 1 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth

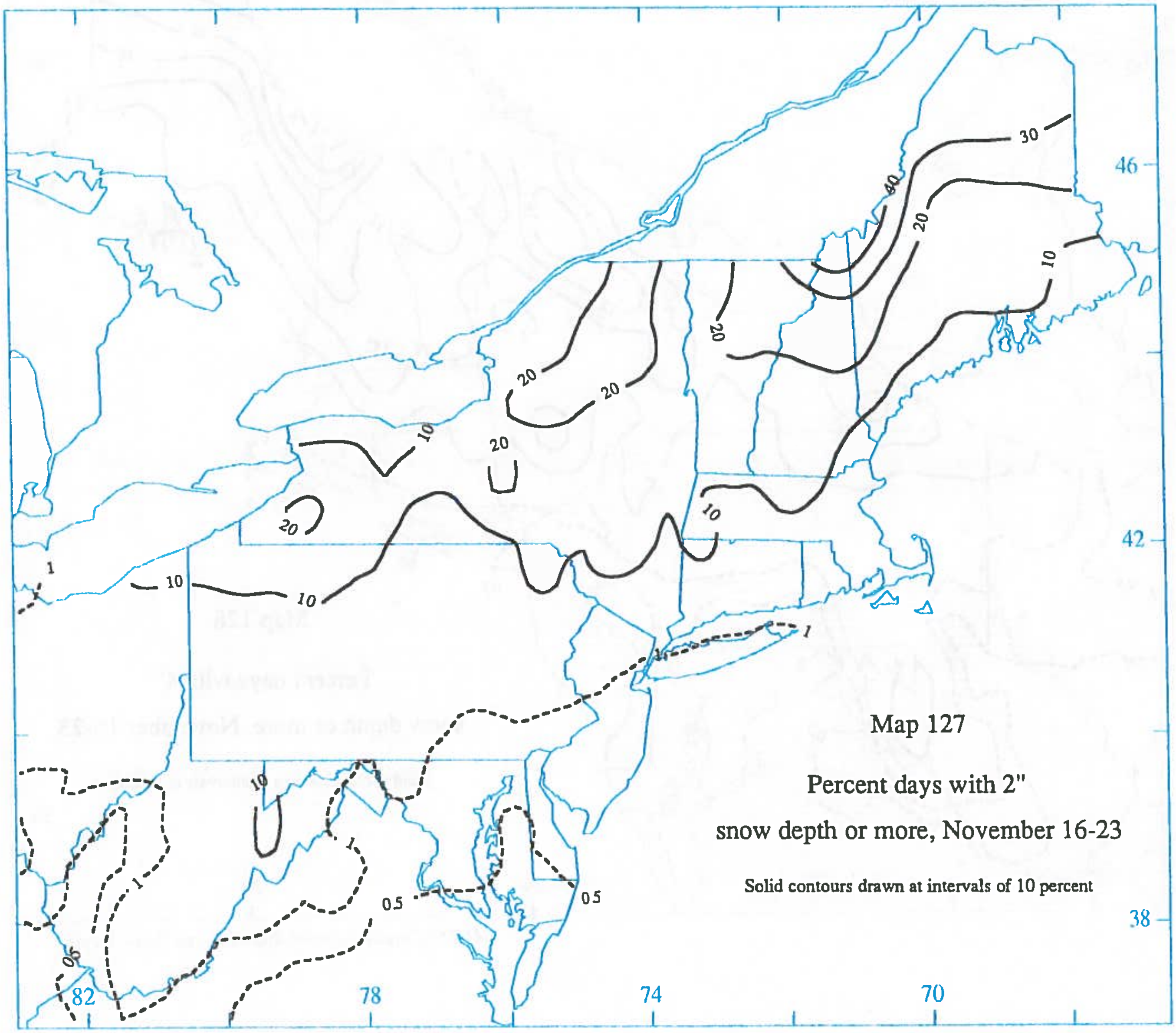


Map 126

Percent days with 6" snow depth or more, November 8-15

Solid contours drawn at intervals of 1 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

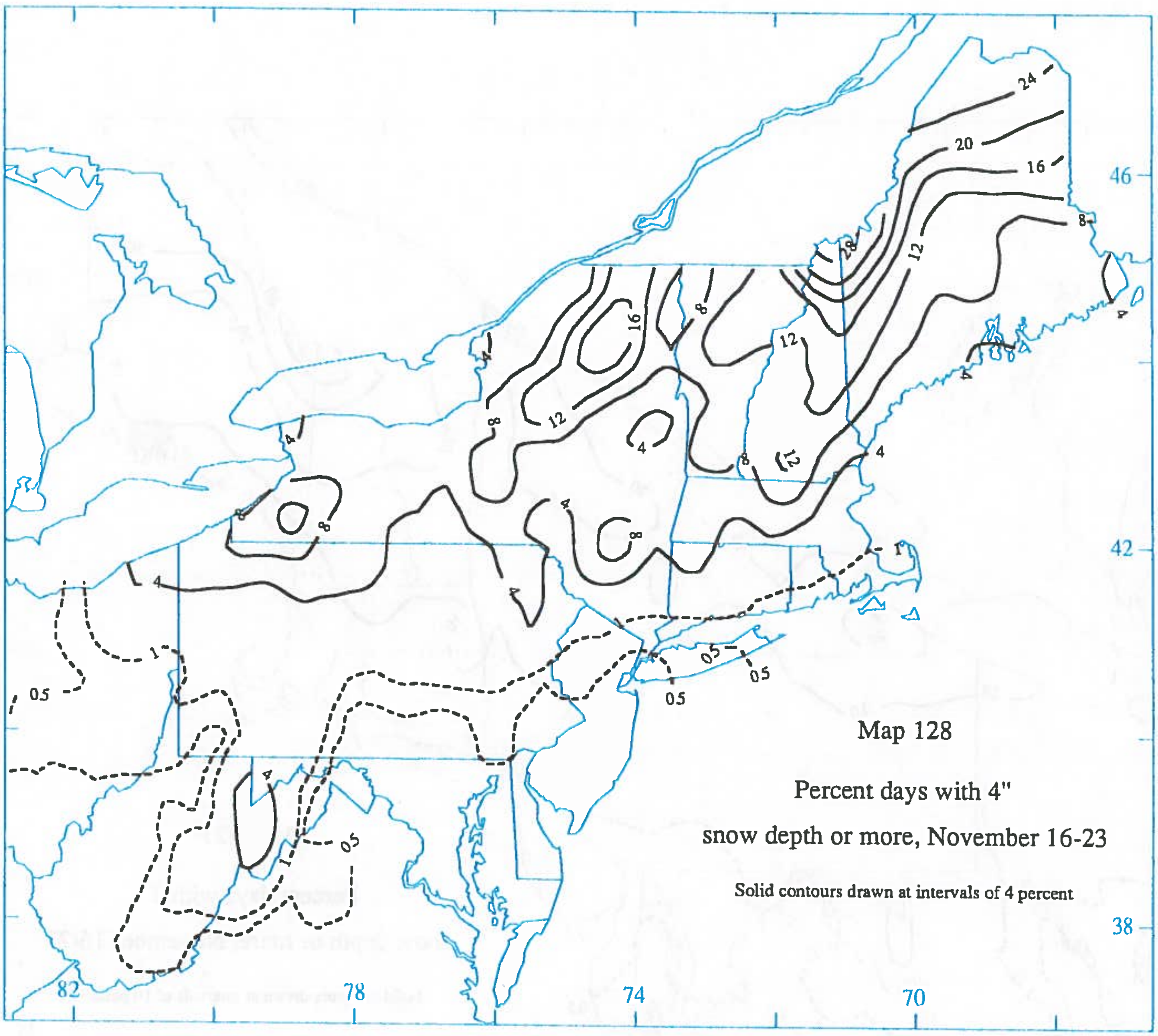


Map 127

Percent days with 2" snow depth or more, November 16-23

Solid contours drawn at intervals of 10 percent

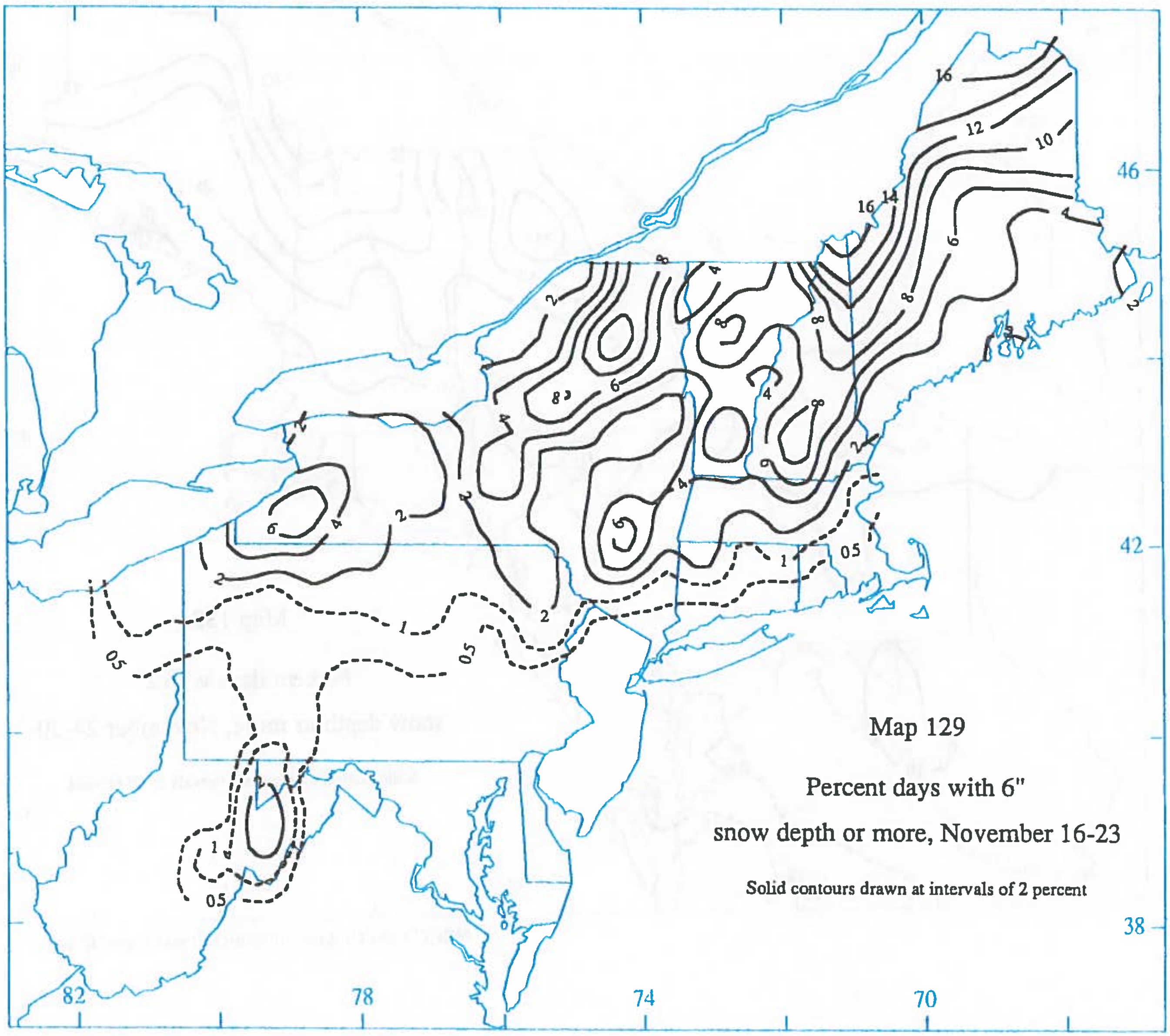
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 128

Percent days with 4" snow depth or more, November 16-23

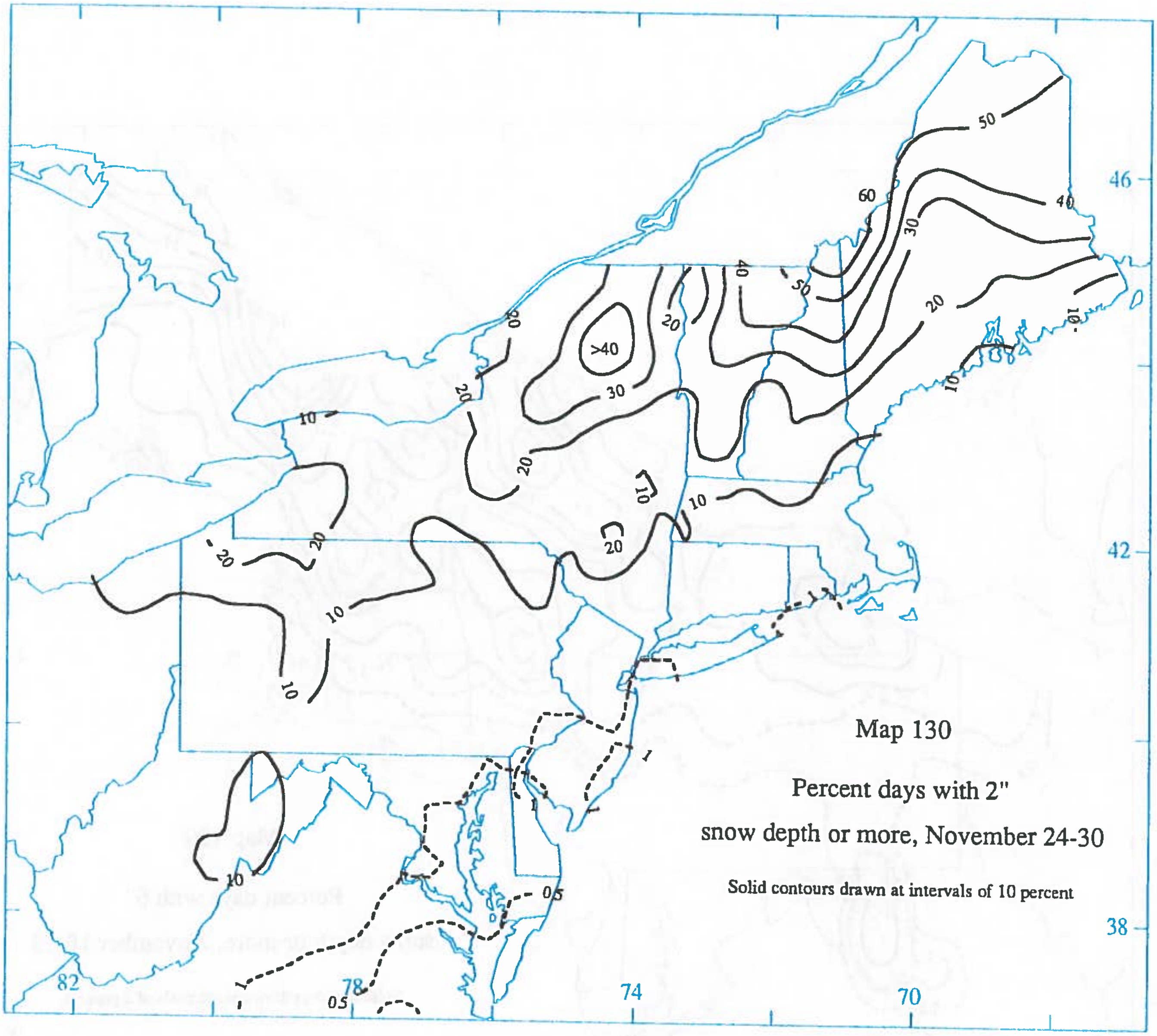
Solid contours drawn at intervals of 4 percent



Map 129

Percent days with 6" snow depth or more, November 16-23

Solid contours drawn at intervals of 2 percent

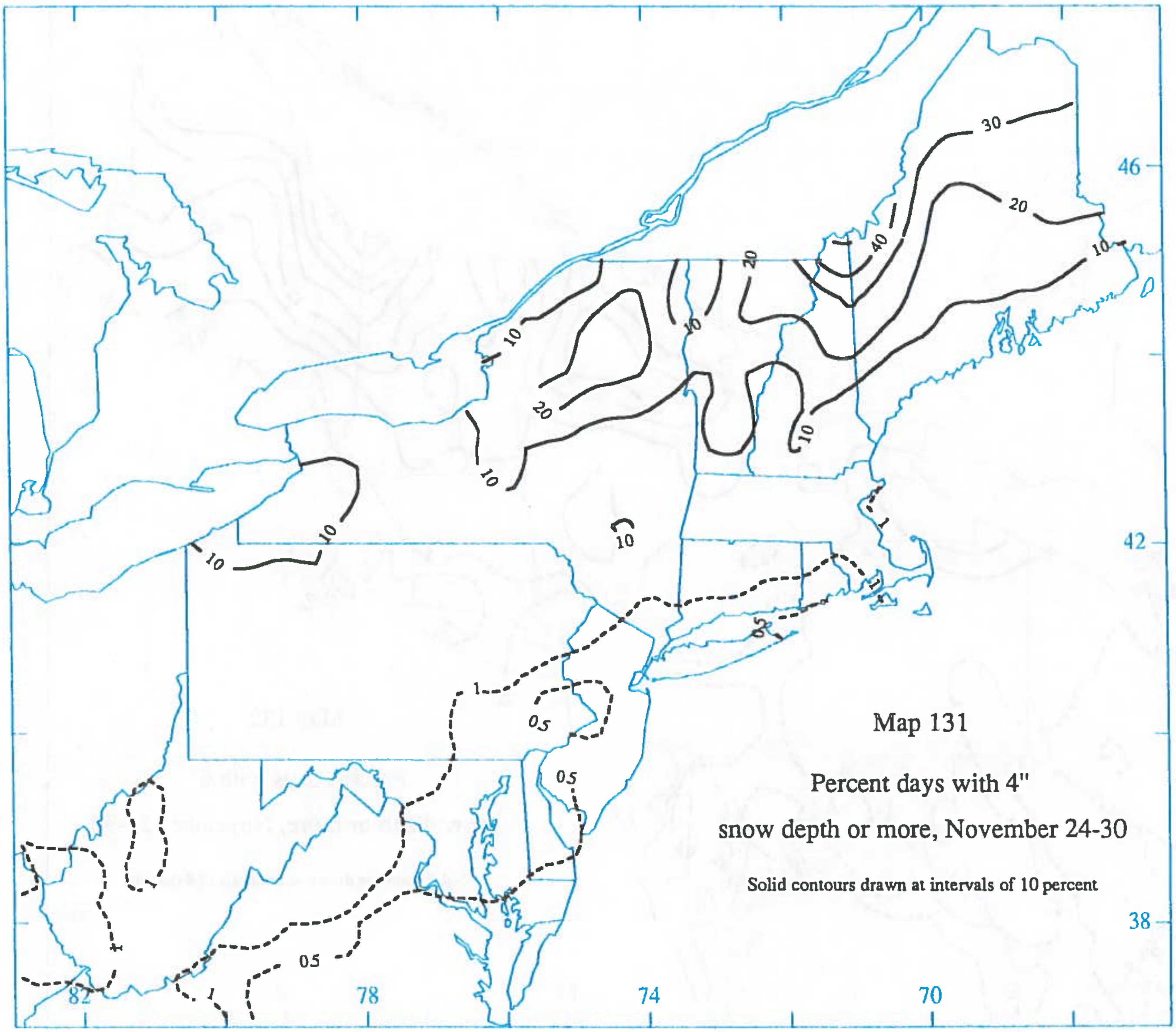


Map 130

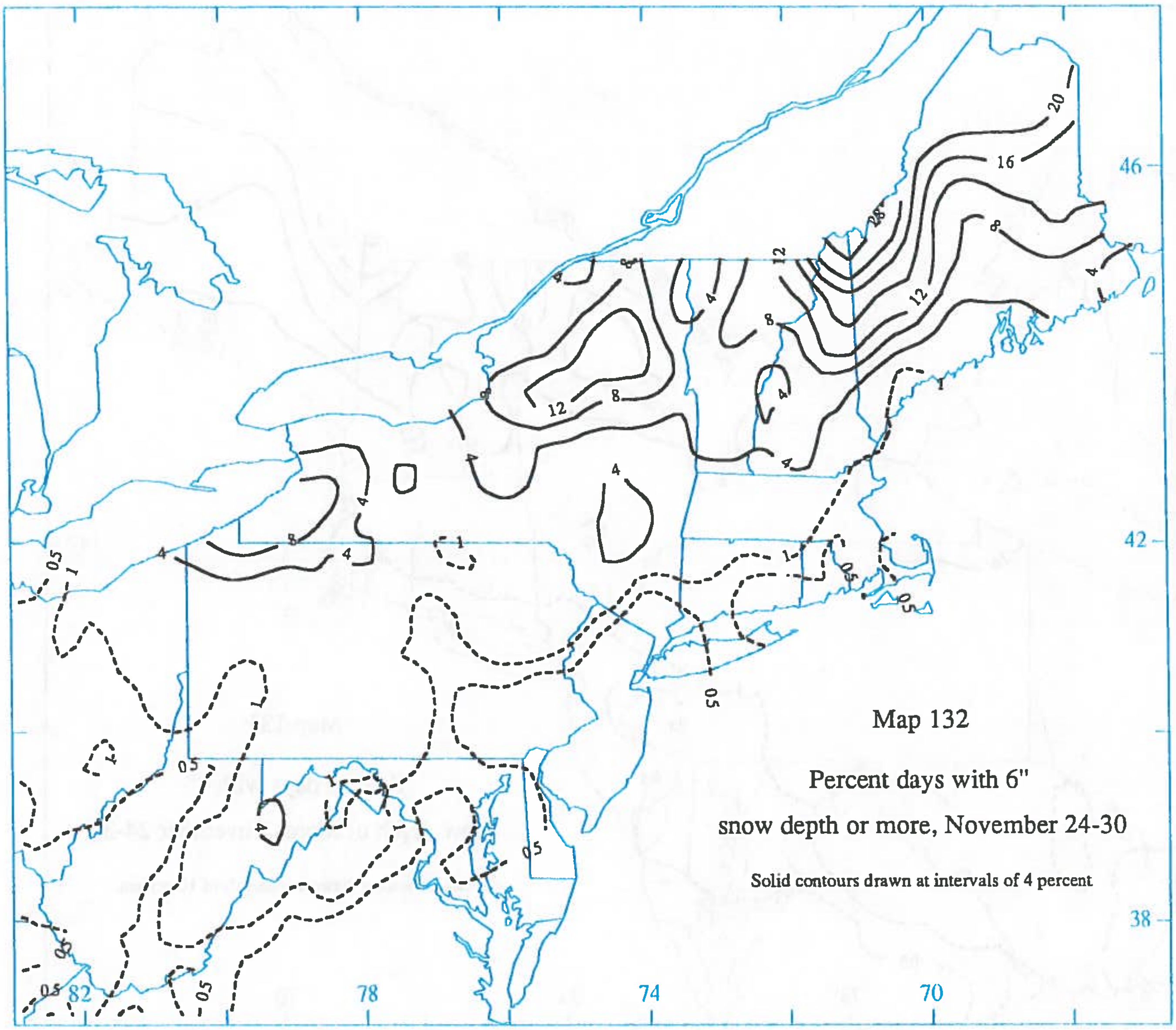
Percent days with 2" snow depth or more, November 24-30

Solid contours drawn at intervals of 10 percent

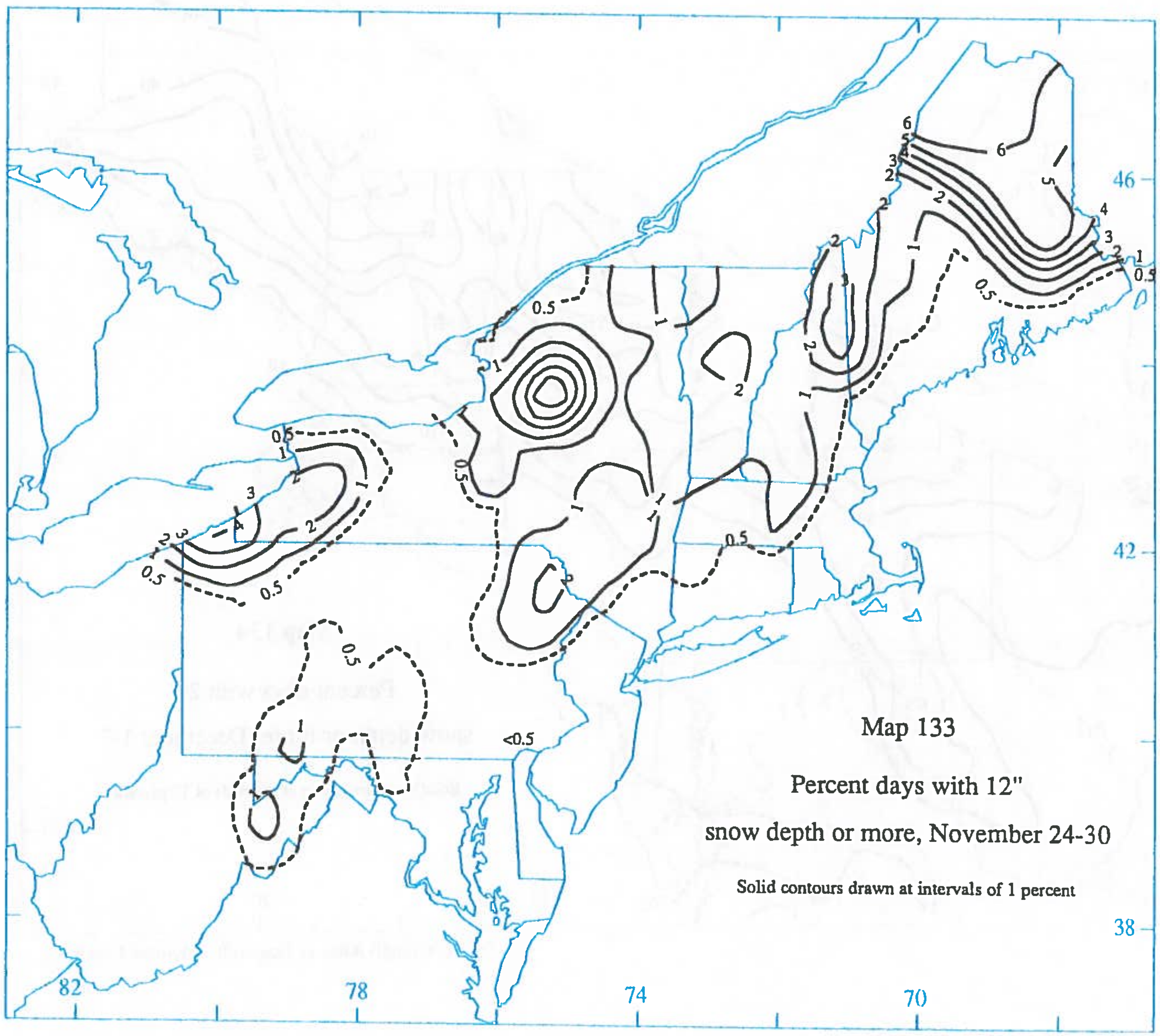
NRCC-Cornell Atlas of Snowfall and Snow Depth



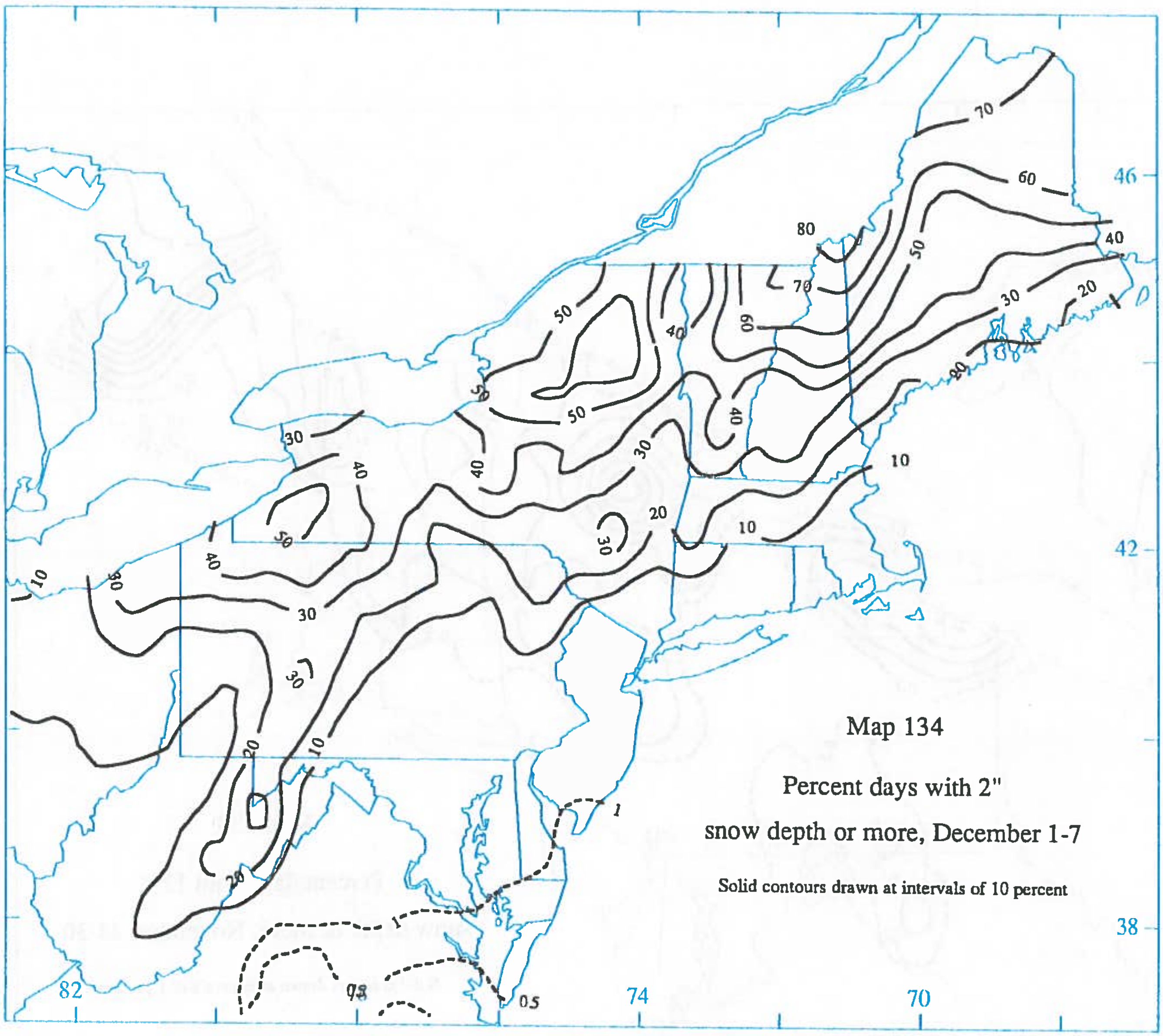
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC Cornell Atlas of Snowfall and Snow Depth

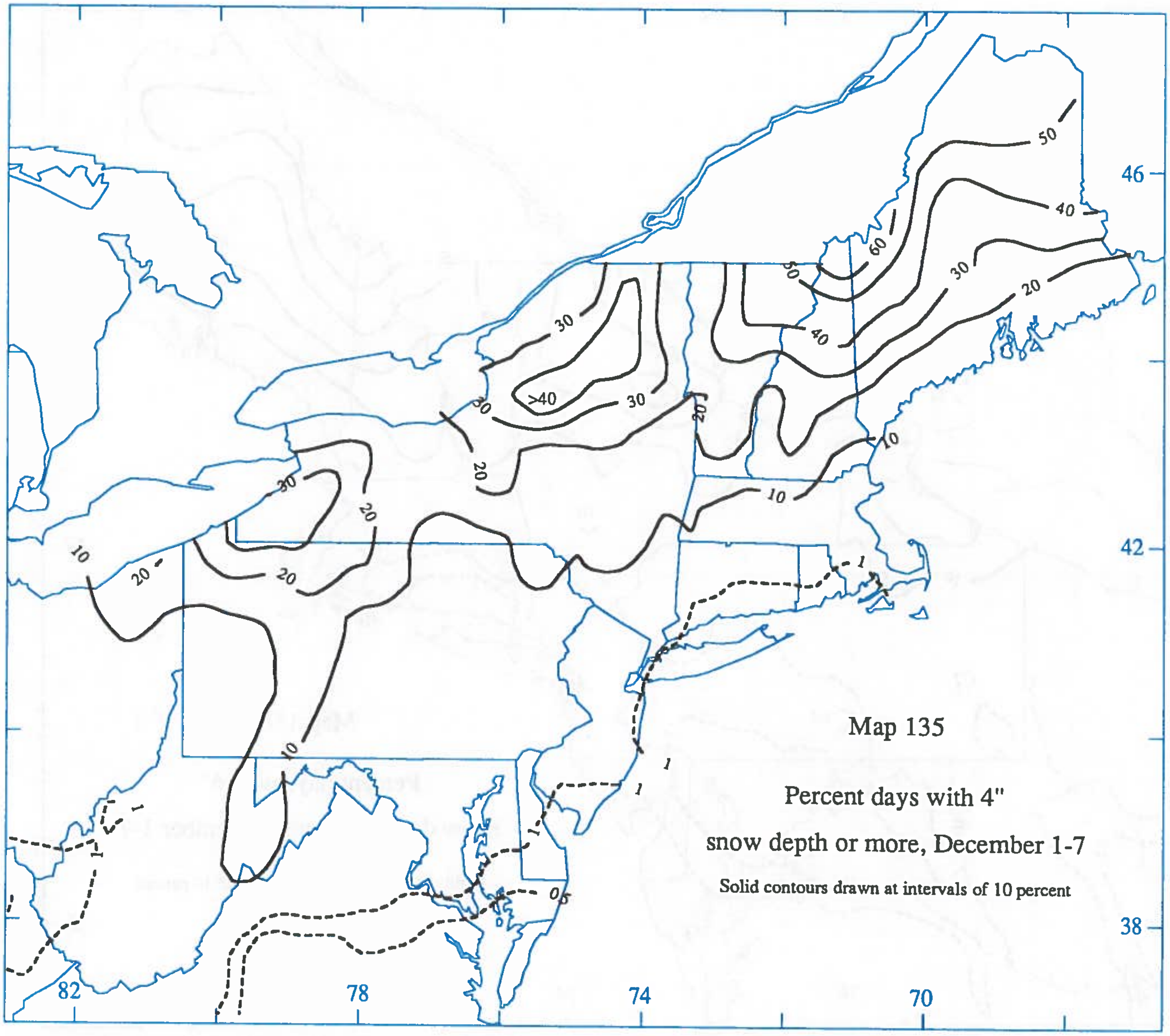


Map 134

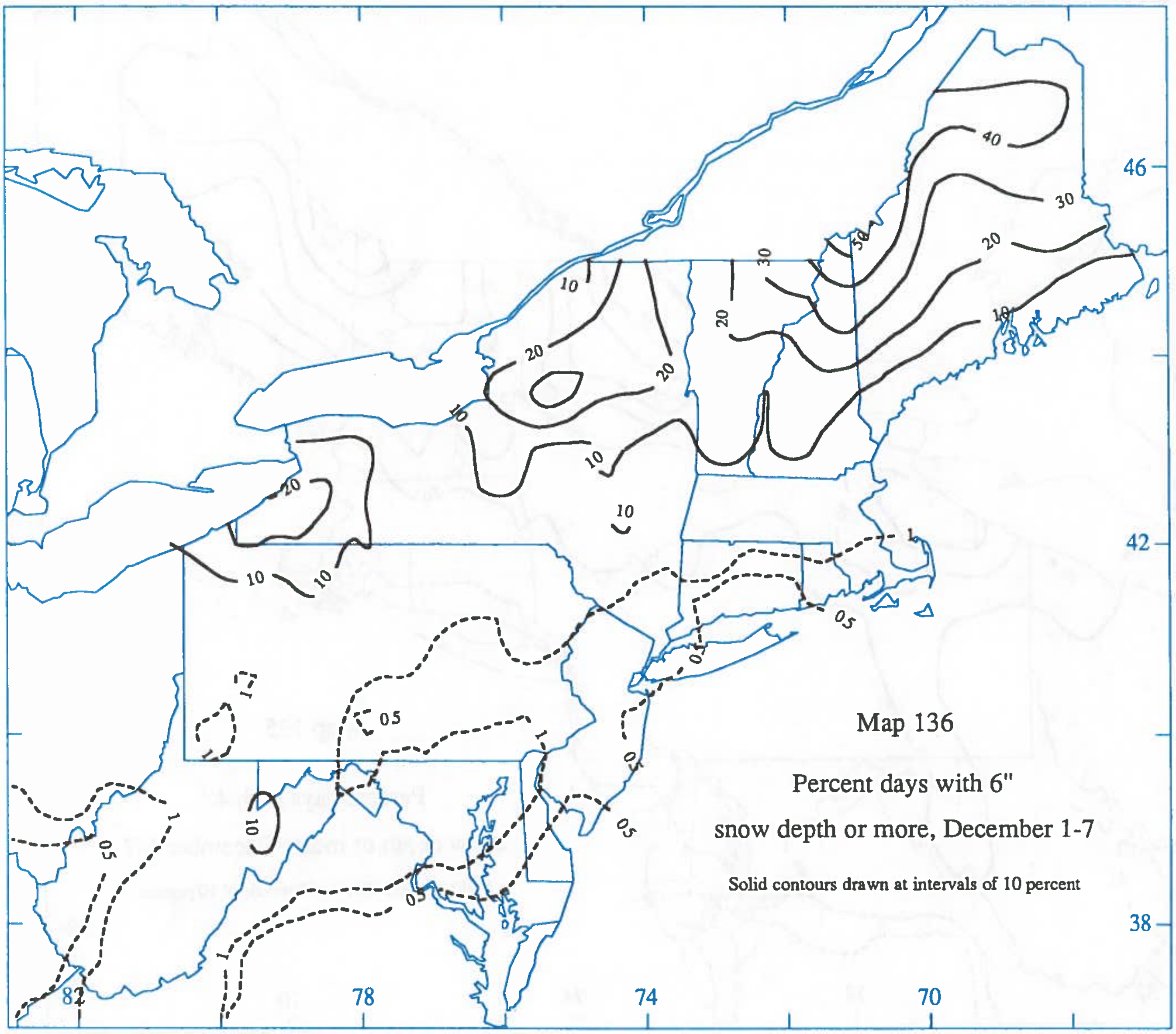
Percent days with 2" snow depth or more, December 1-7

Solid contours drawn at intervals of 10 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



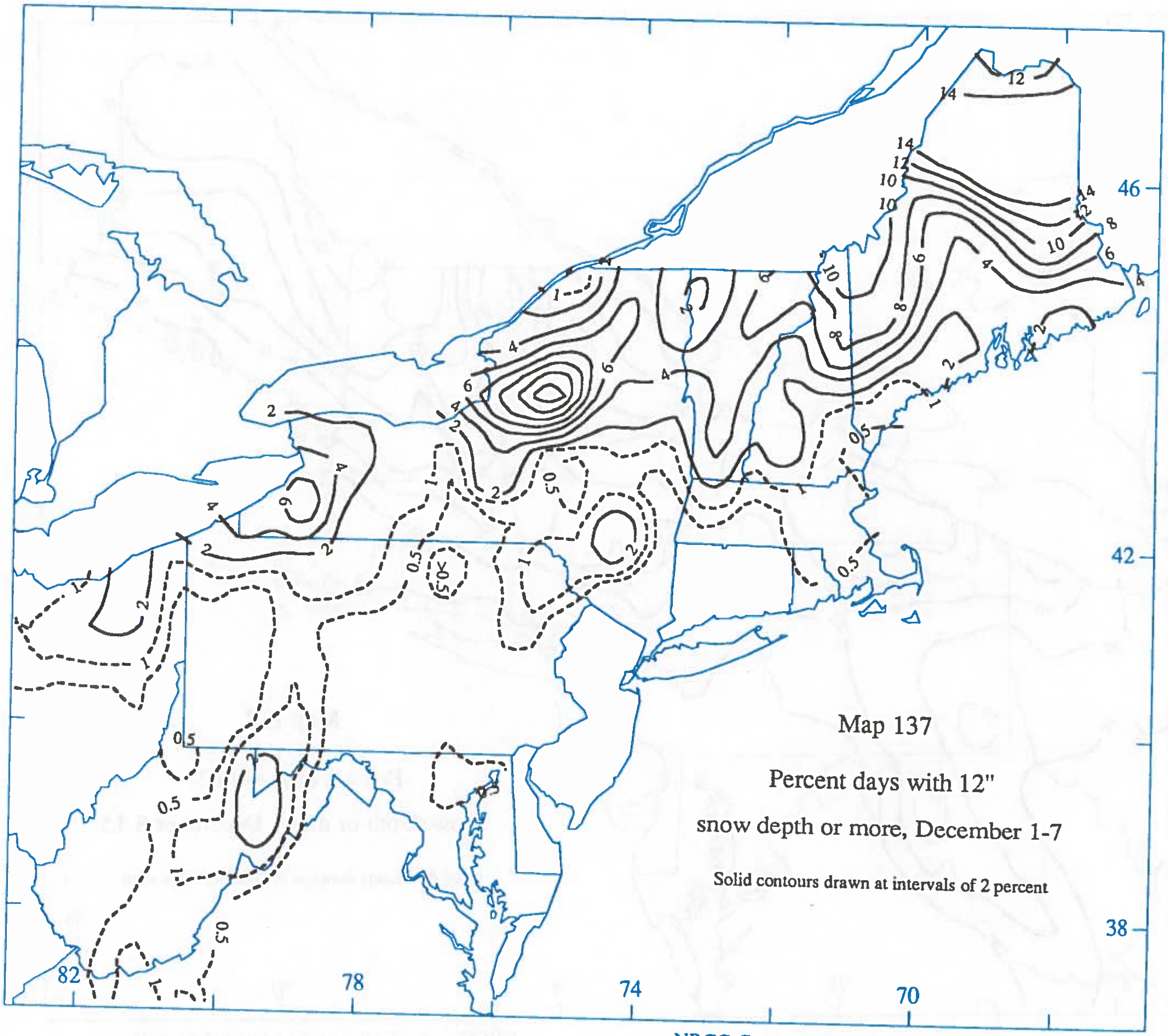
NRCC-Cornell Atlas of Snowfall and Snow Depth



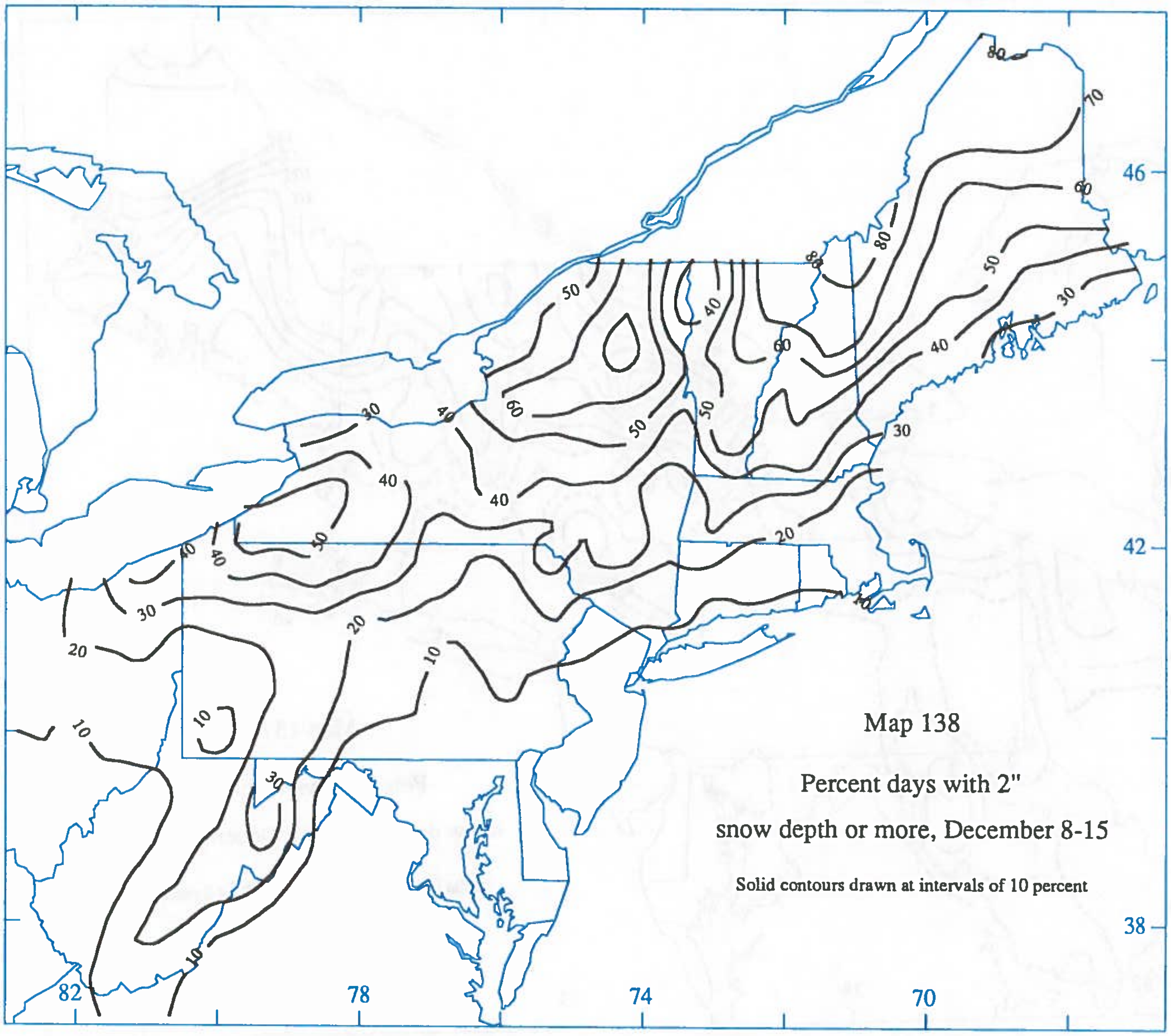
Map 136

Percent days with 6" snow depth or more, December 1-7

Solid contours drawn at intervals of 10 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

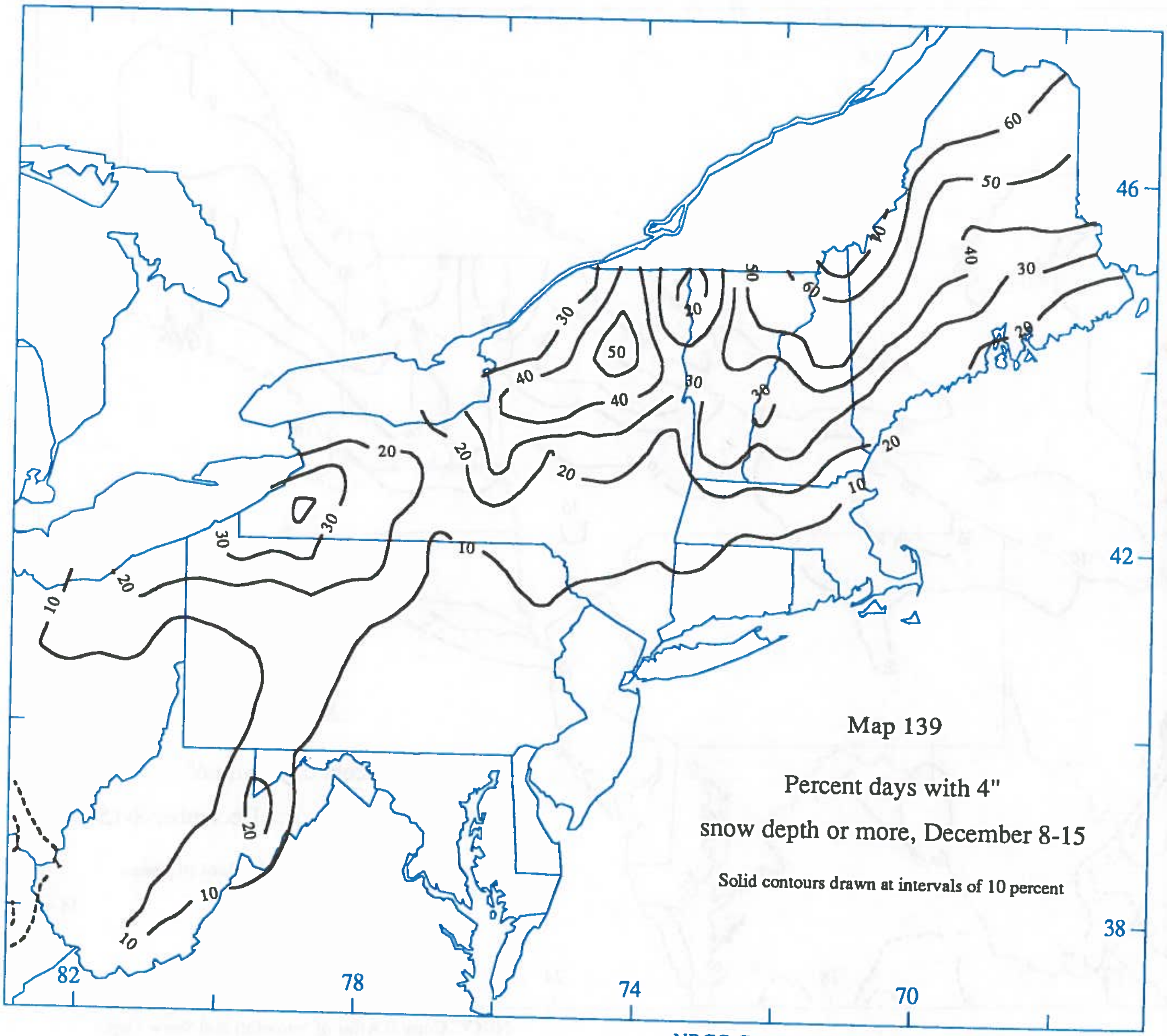


Map 138

Percent days with 2" snow depth or more, December 8-15

Solid contours drawn at intervals of 10 percent

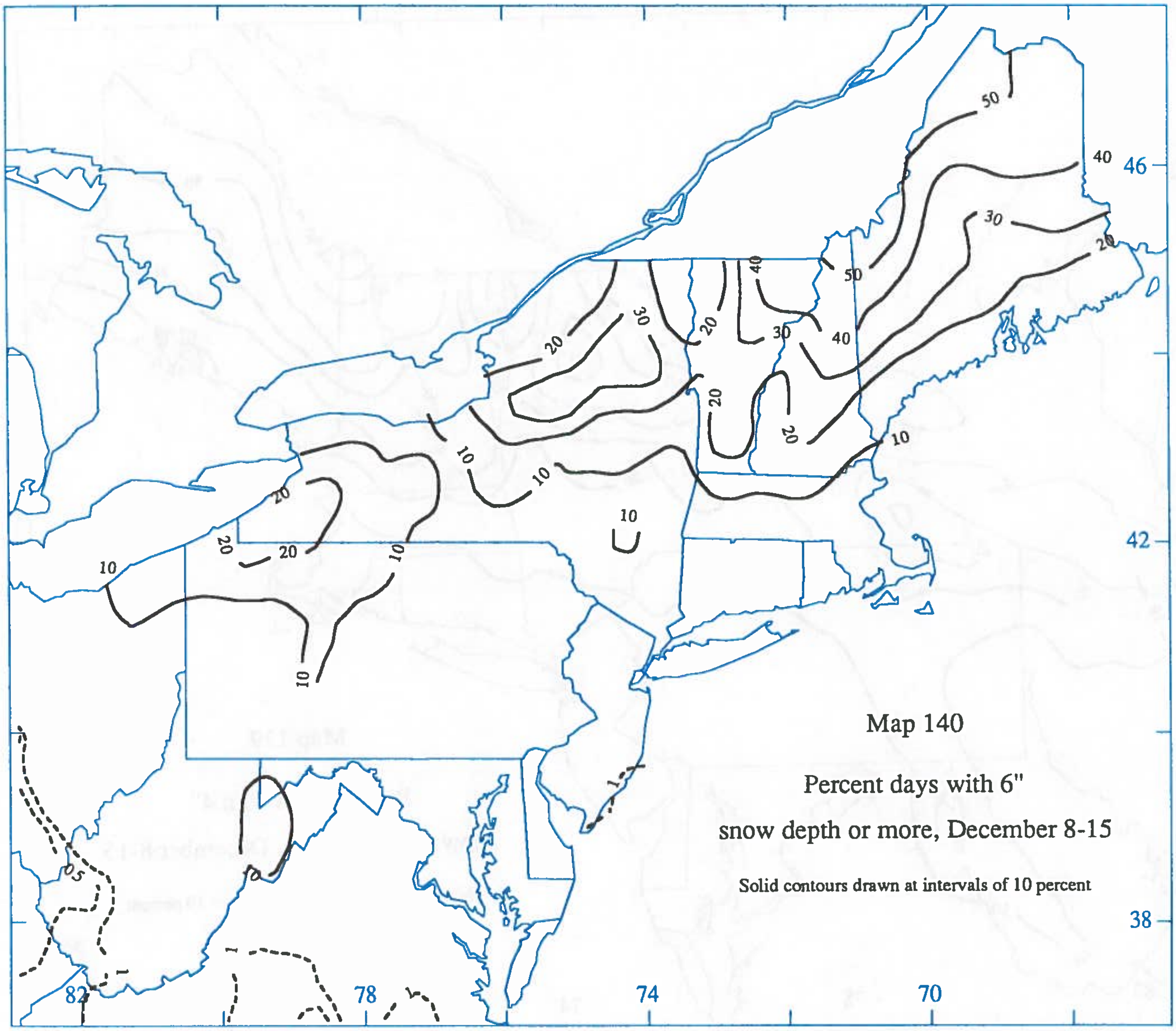
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 139

Percent days with 4" snow depth or more, December 8-15

Solid contours drawn at intervals of 10 percent

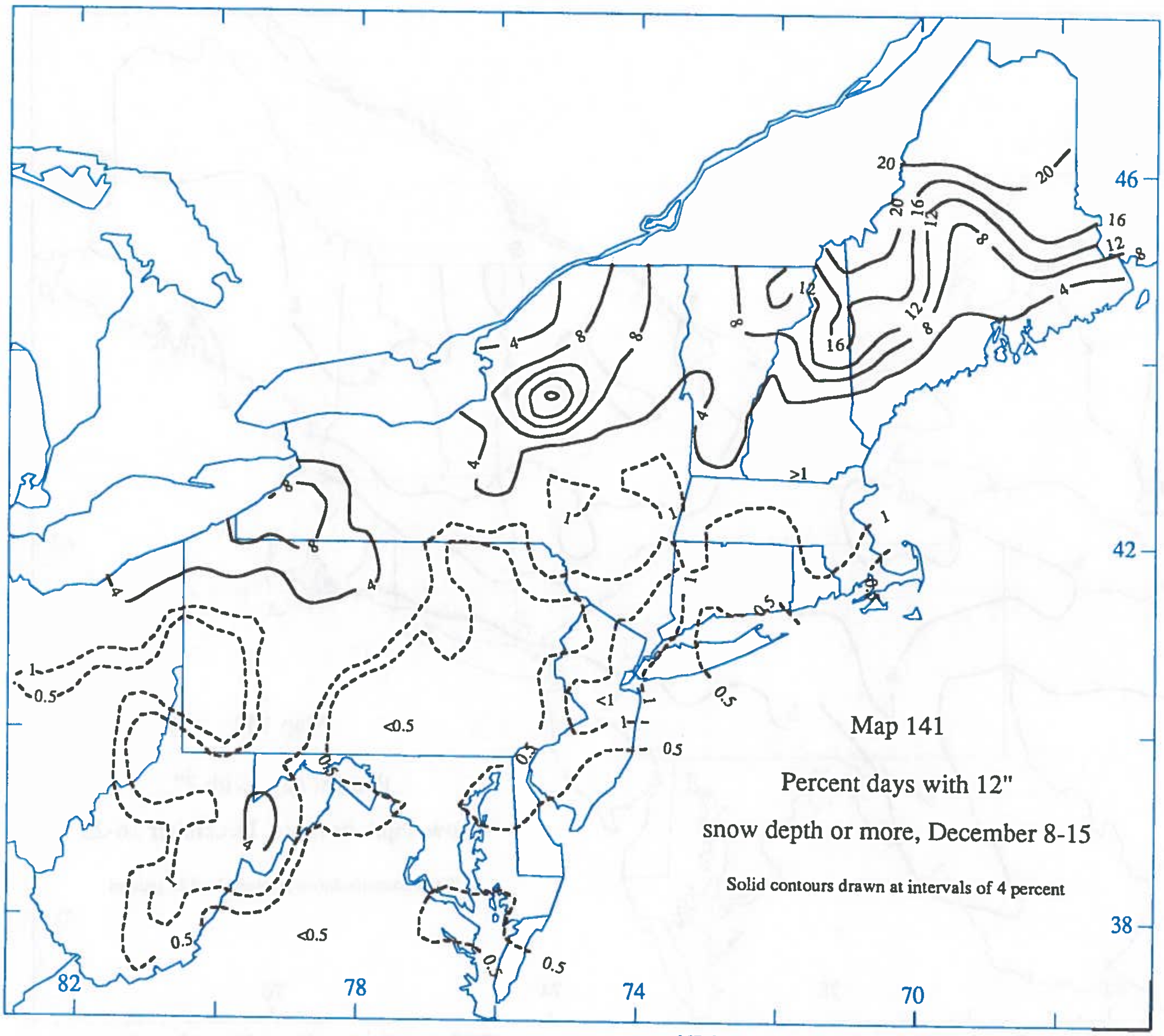


Map 140

Percent days with 6" snow depth or more, December 8-15

Solid contours drawn at intervals of 10 percent

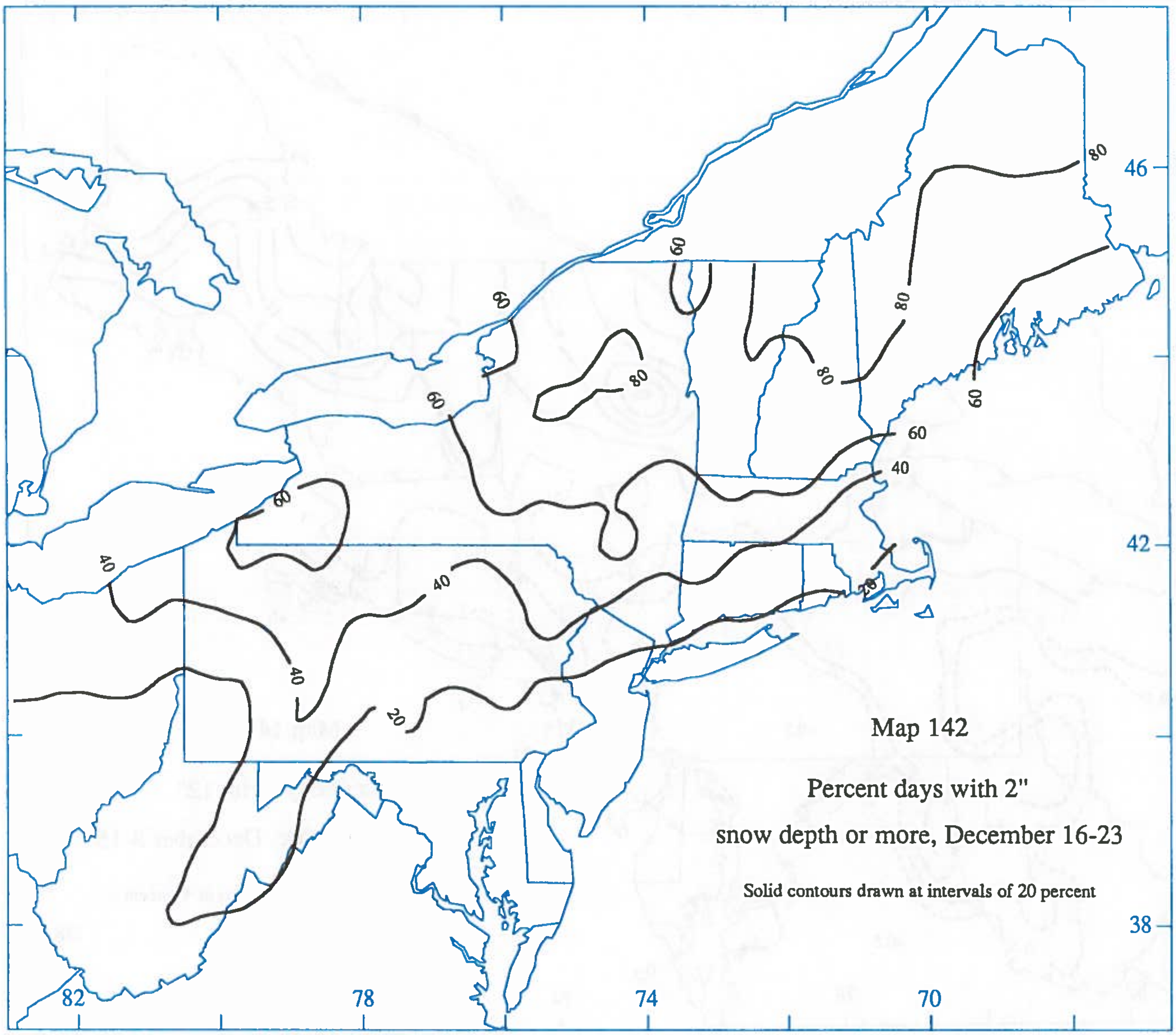
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 141

Percent days with 12" snow depth or more, December 8-15

Solid contours drawn at intervals of 4 percent

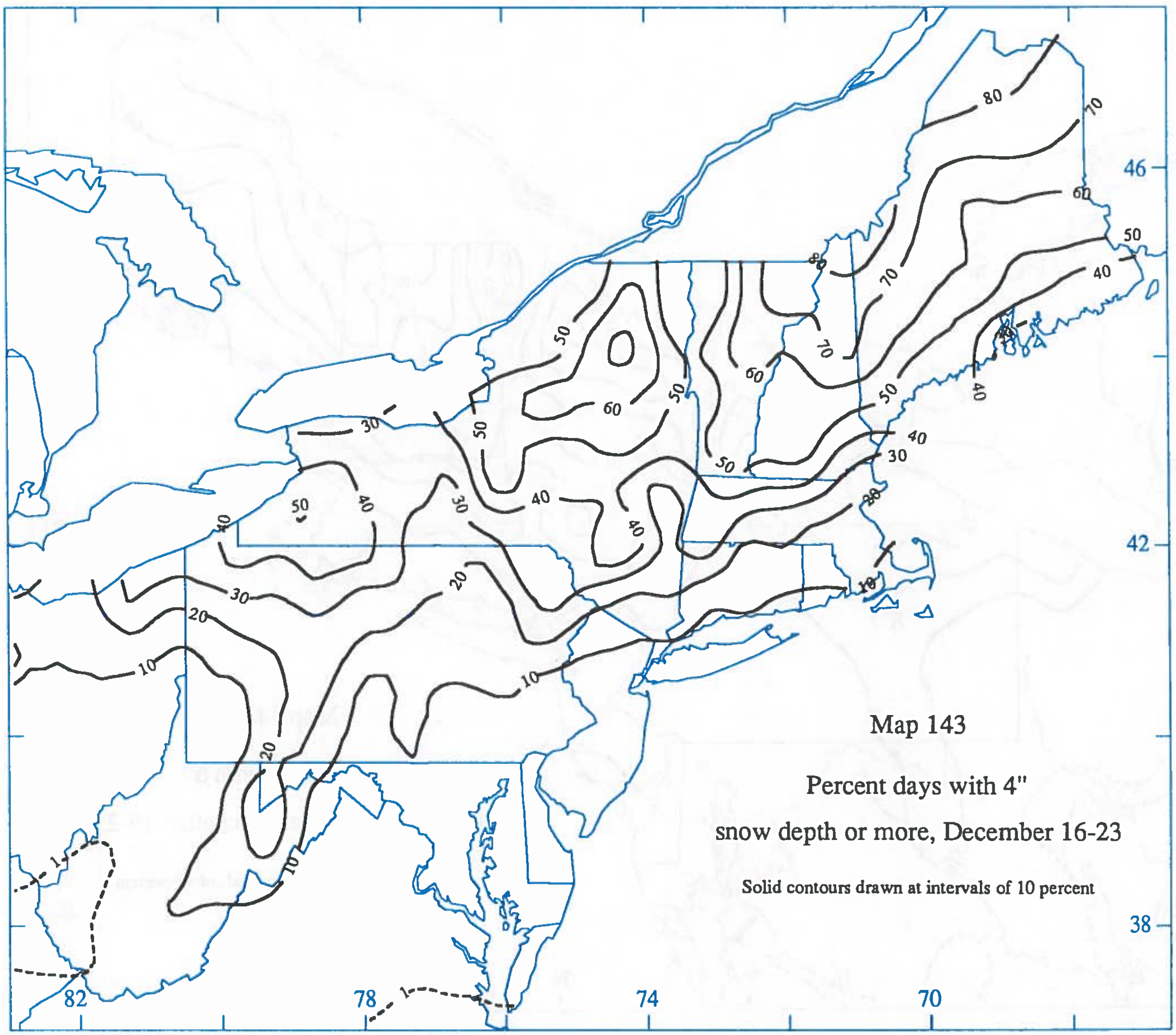


Map 142

Percent days with 2"

snow depth or more, December 16-23

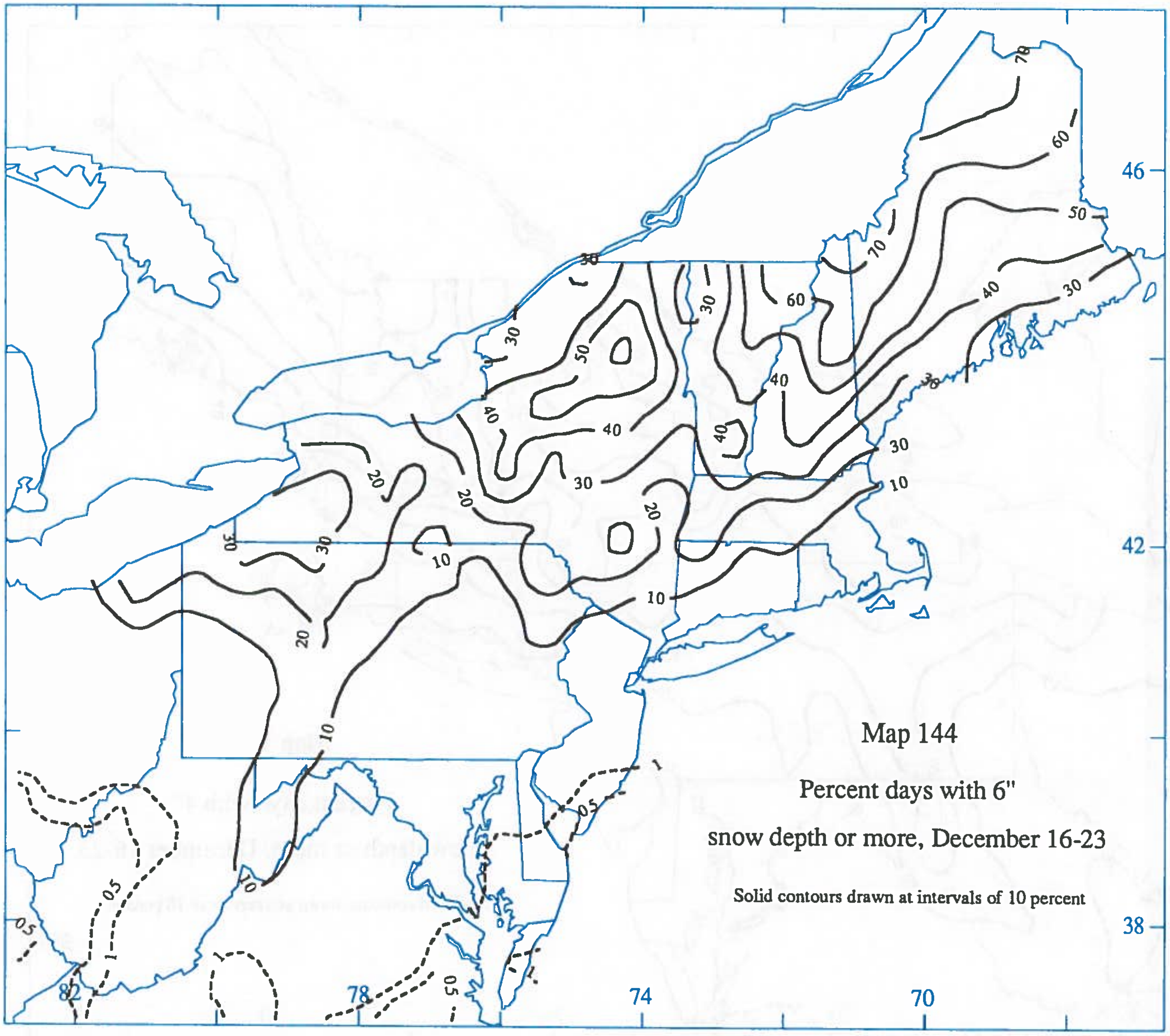
Solid contours drawn at intervals of 20 percent



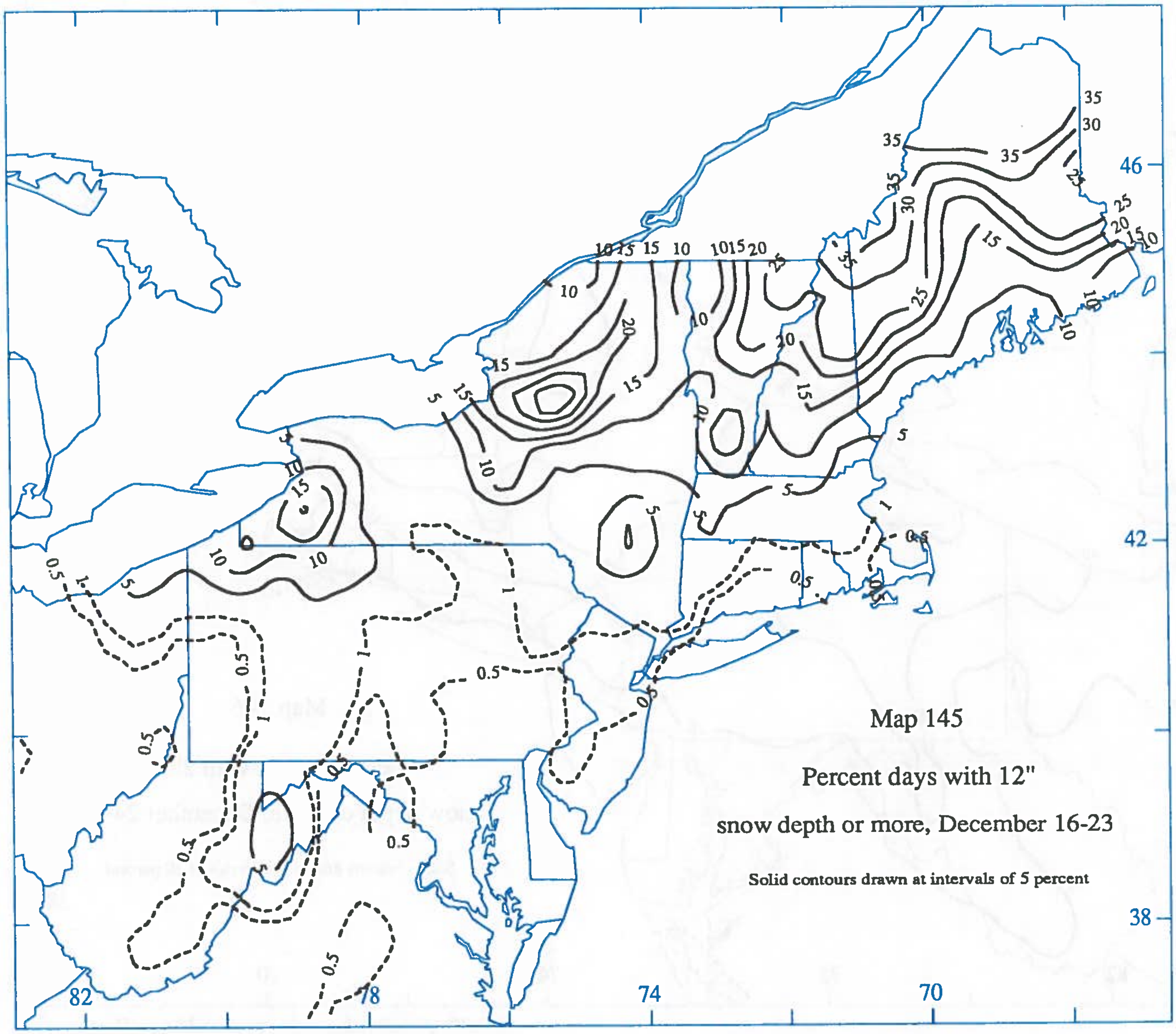
Map 143

Percent days with 4" snow depth or more, December 16-23

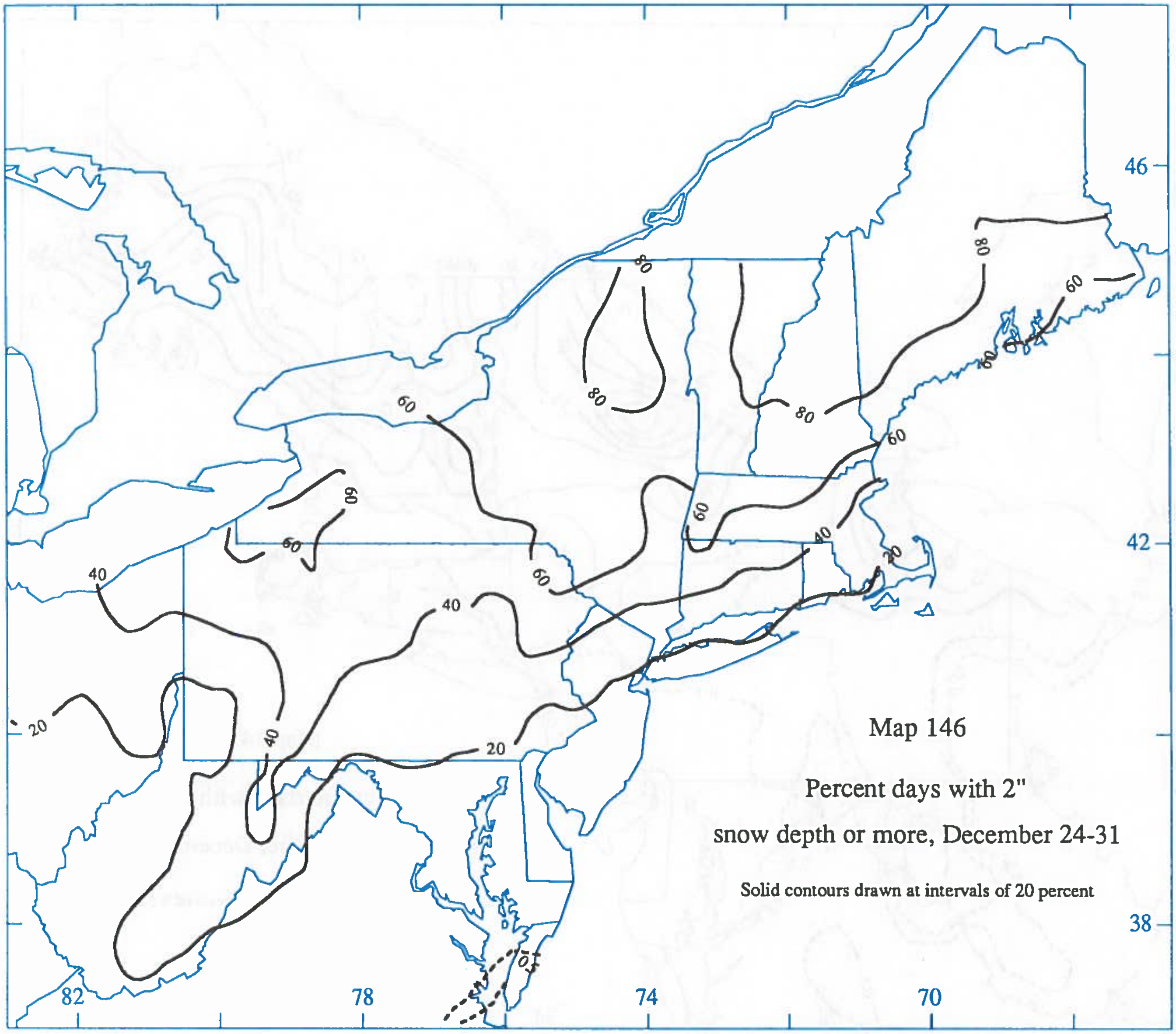
Solid contours drawn at intervals of 10 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth



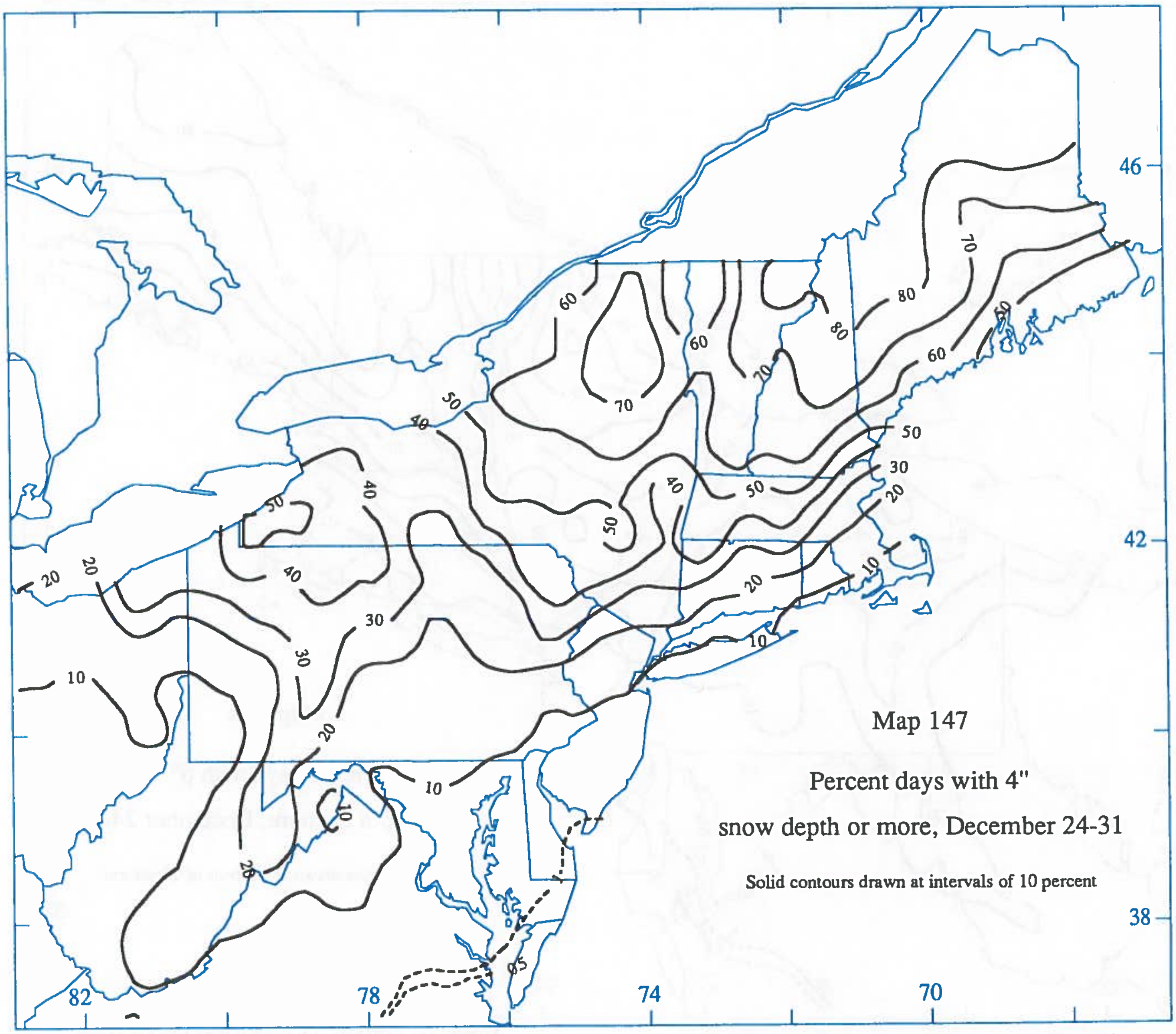
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 146

Percent days with 2" snow depth or more, December 24-31

Solid contours drawn at intervals of 20 percent

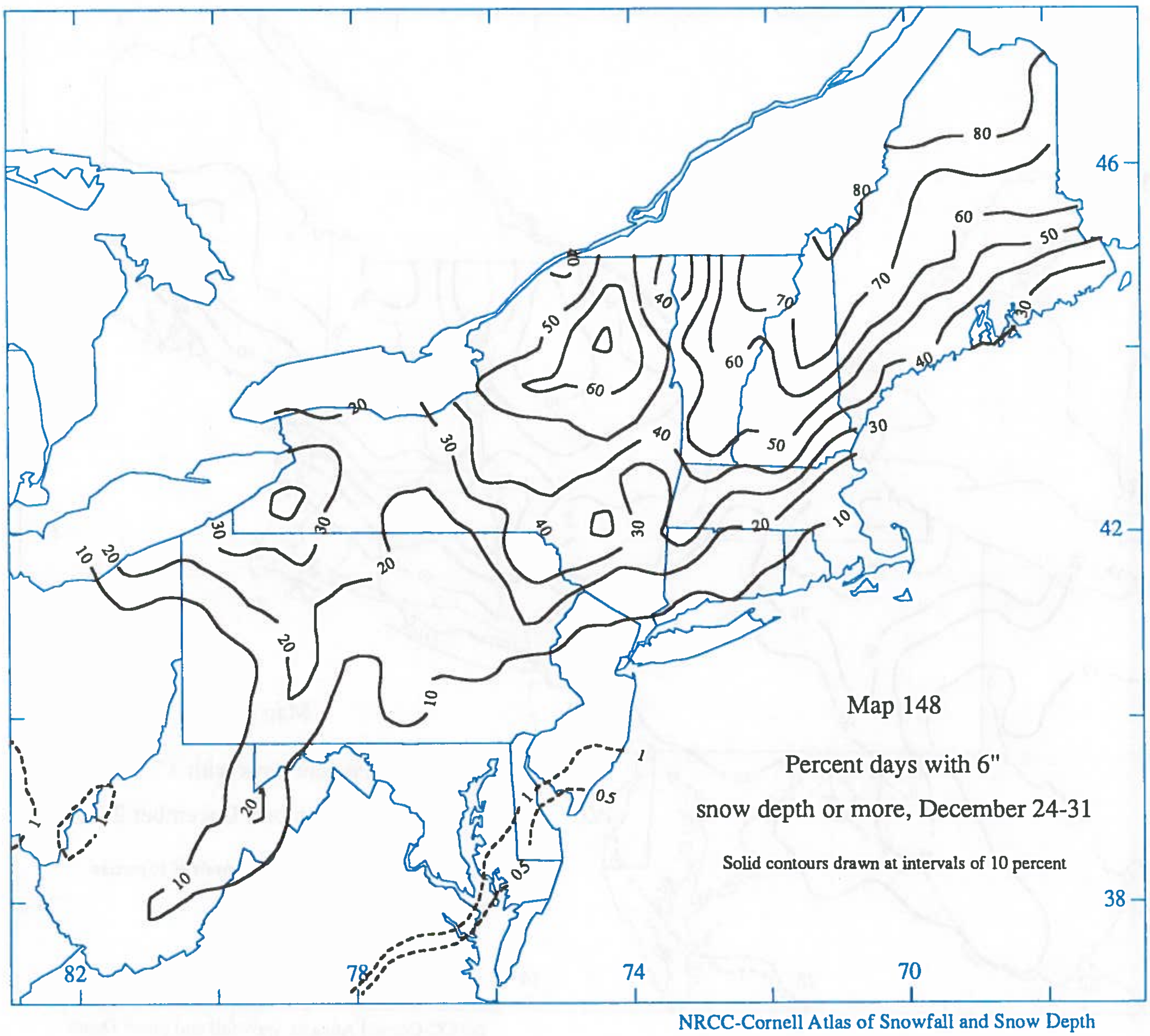


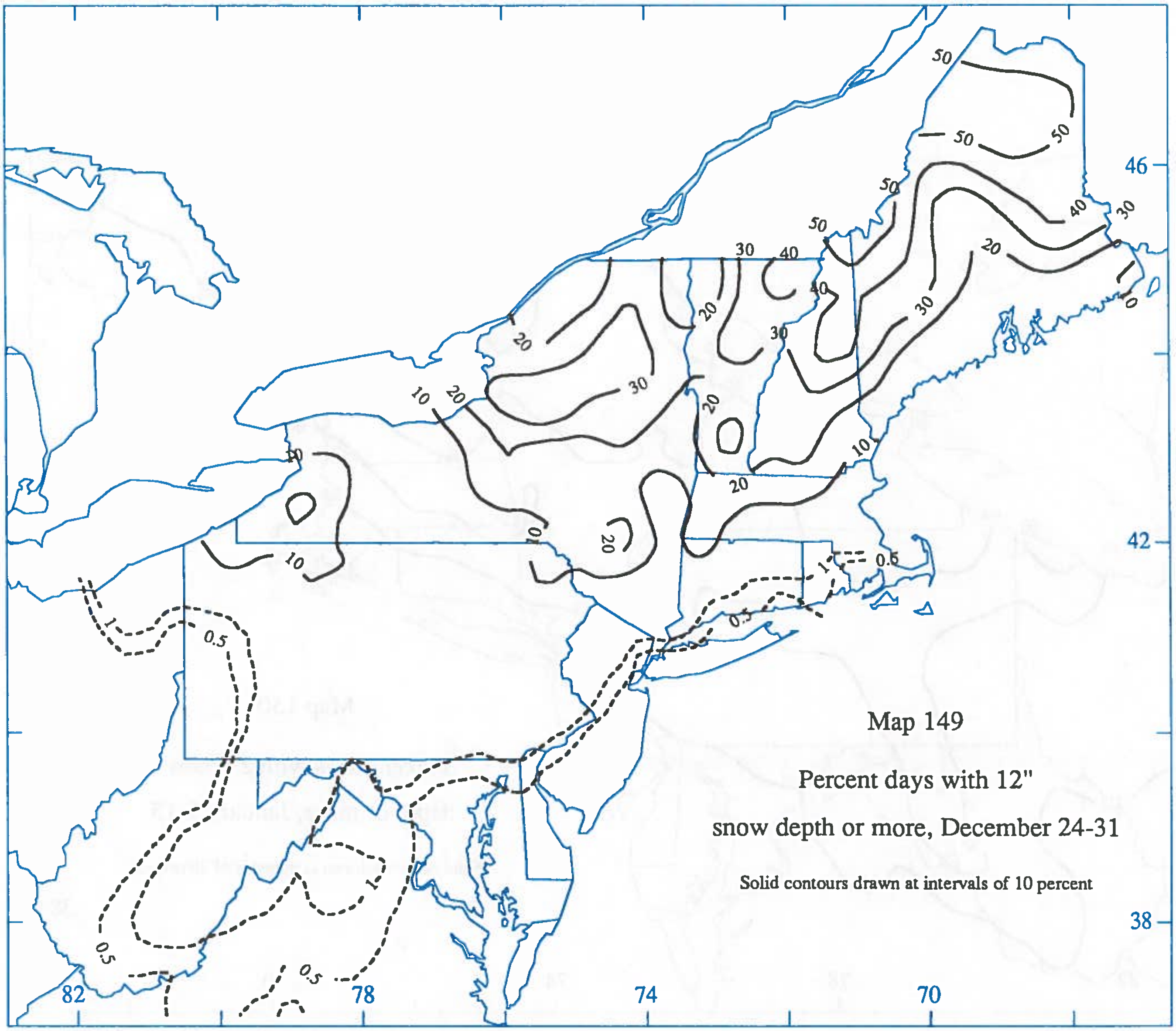
Map 147

Percent days with 4" snow depth or more, December 24-31

Solid contours drawn at intervals of 10 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

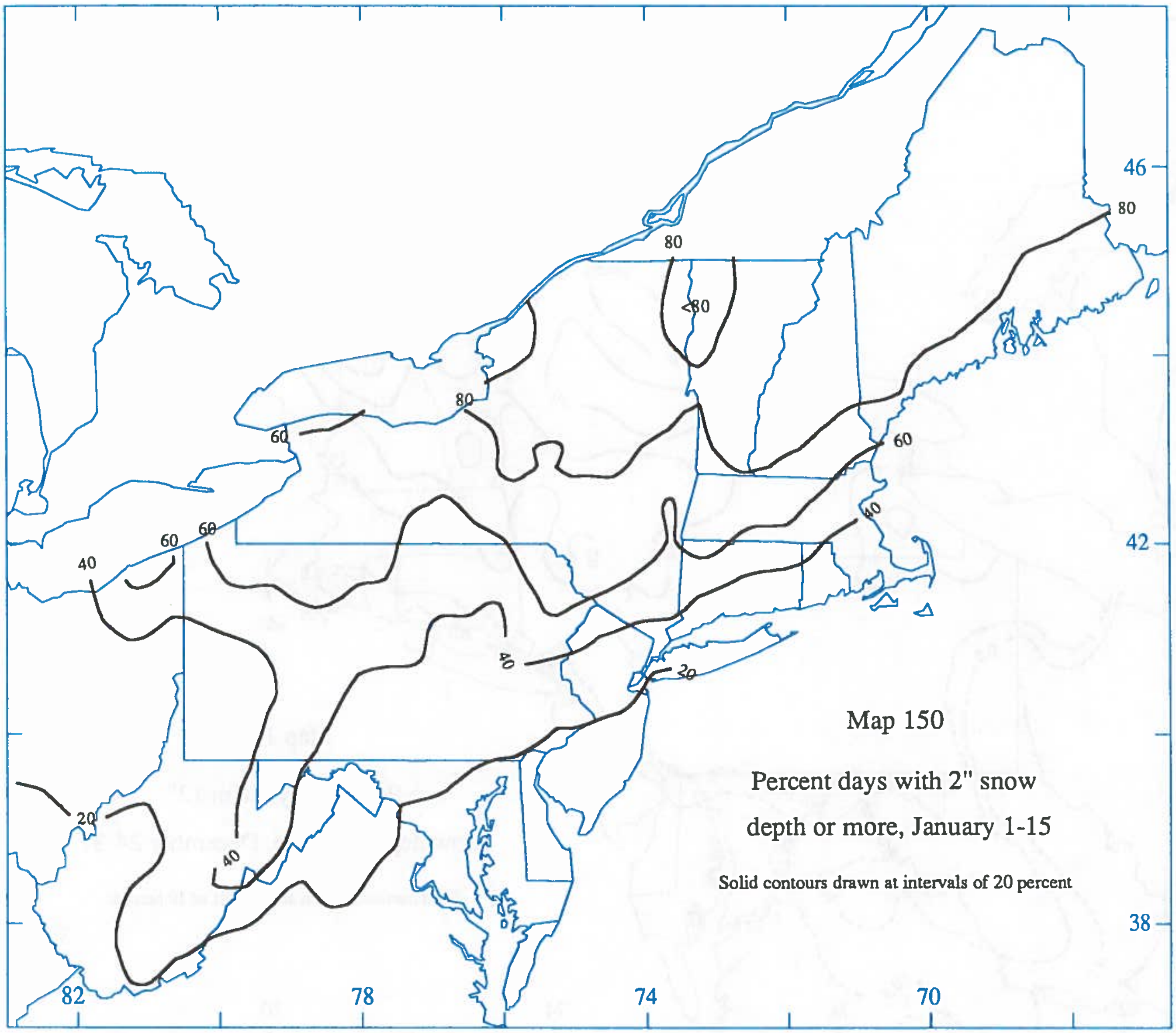

Map 148
Percent days with 6" snow depth or more, December 24-31
Solid contours drawn at intervals of 10 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



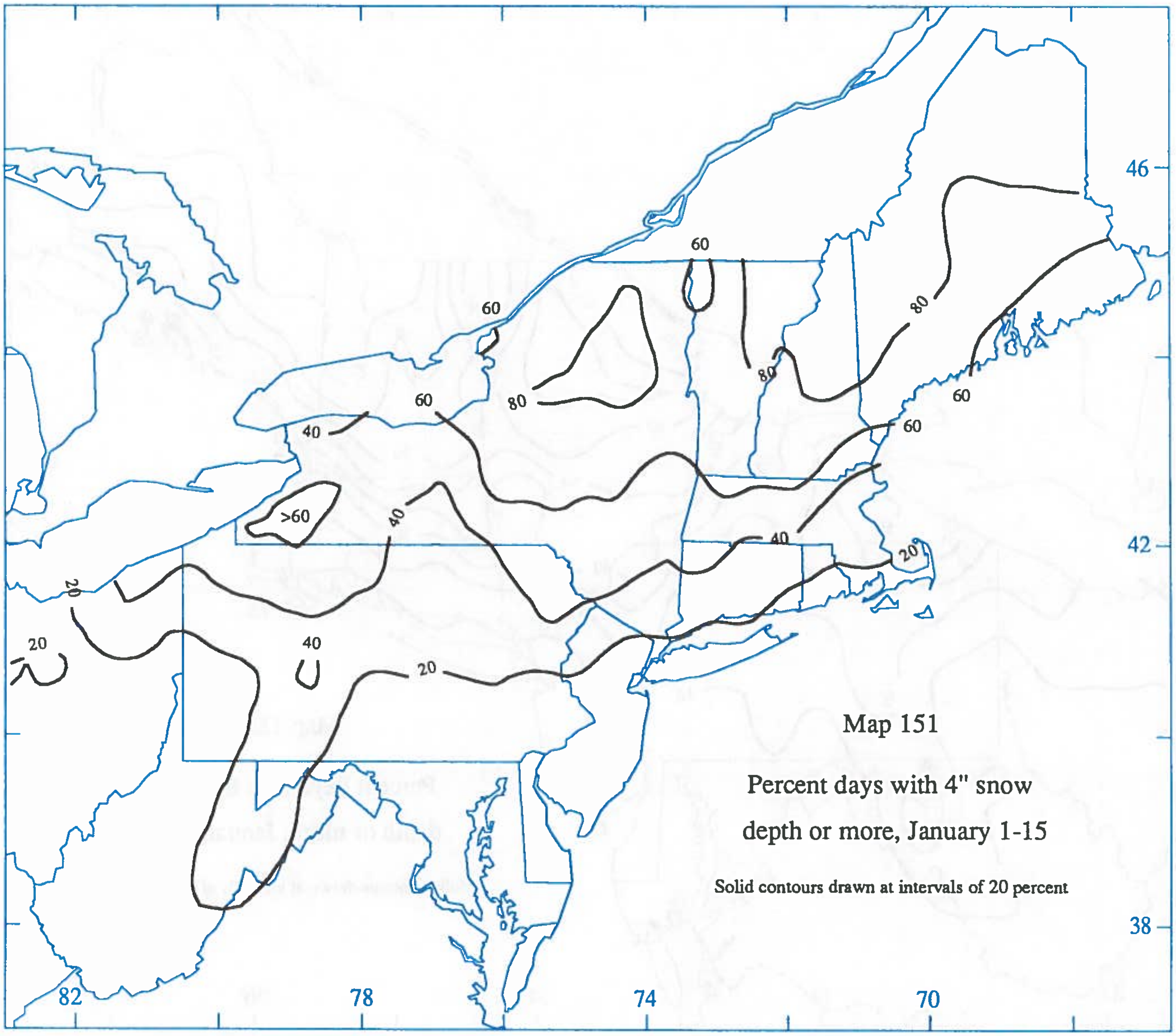
Map 149

Percent days with 12" snow depth or more, December 24-31

Solid contours drawn at intervals of 10 percent



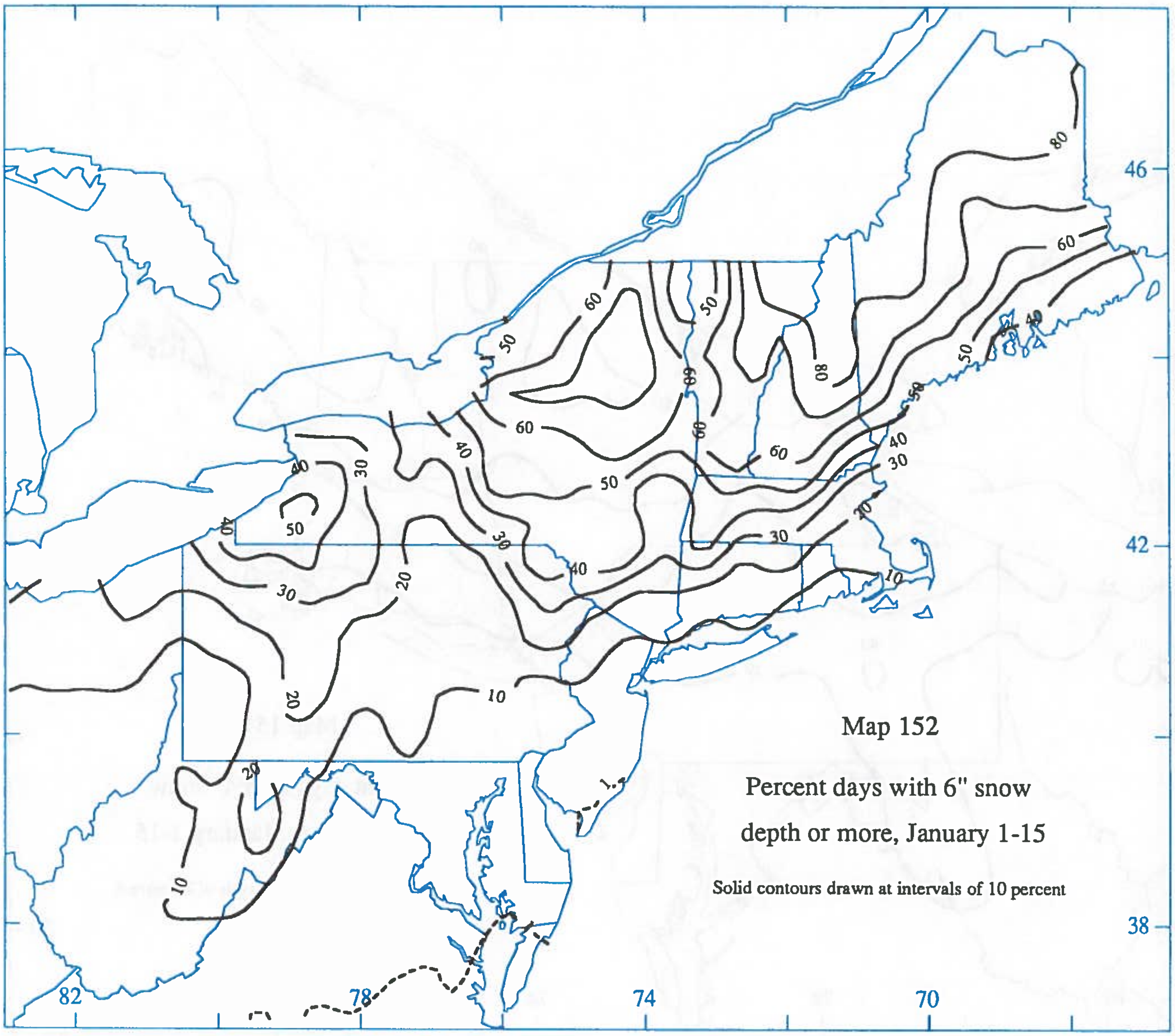
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 151

Percent days with 4" snow depth or more, January 1-15

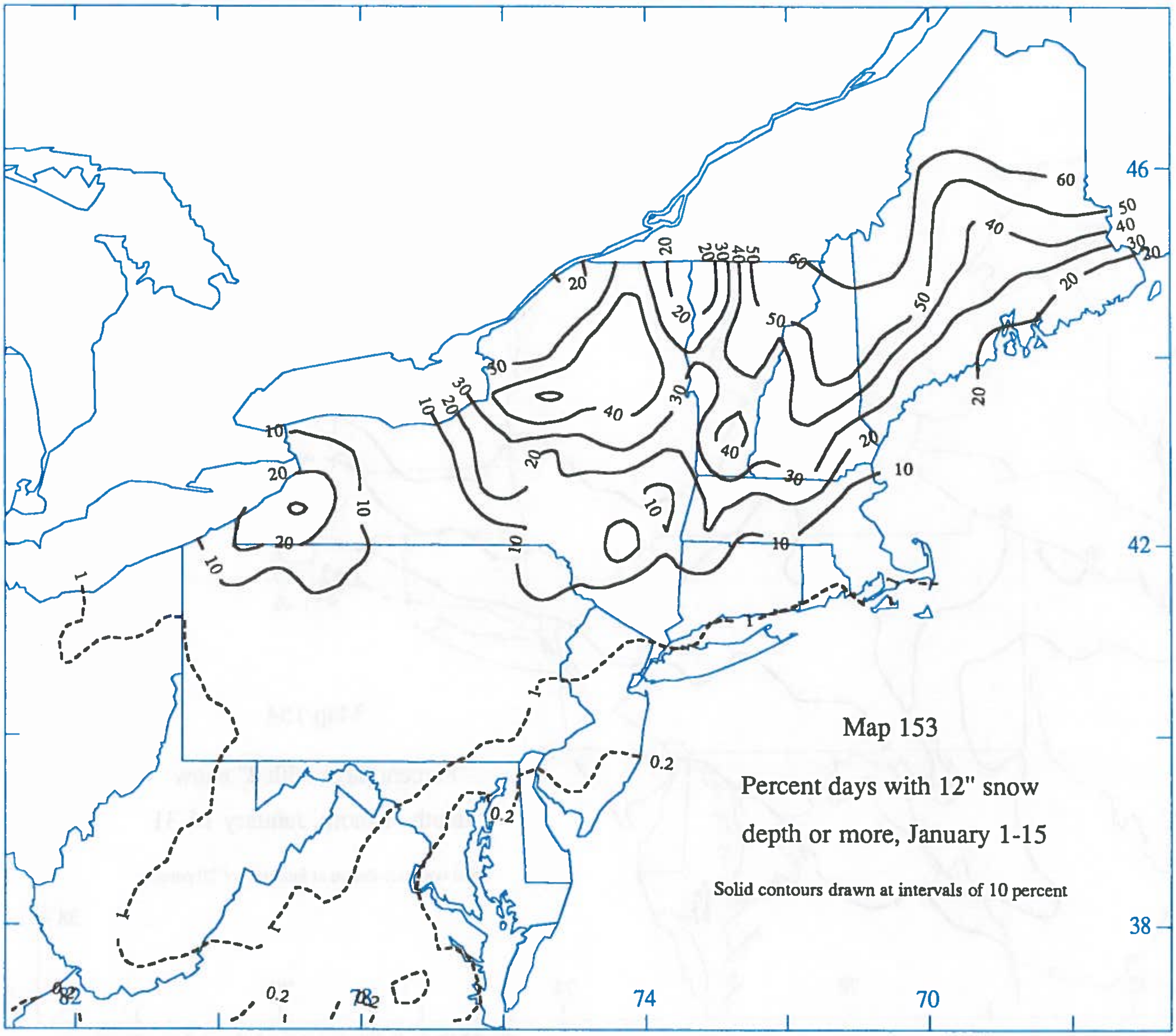
Solid contours drawn at intervals of 20 percent



Map 152

Percent days with 6" snow depth or more, January 1-15

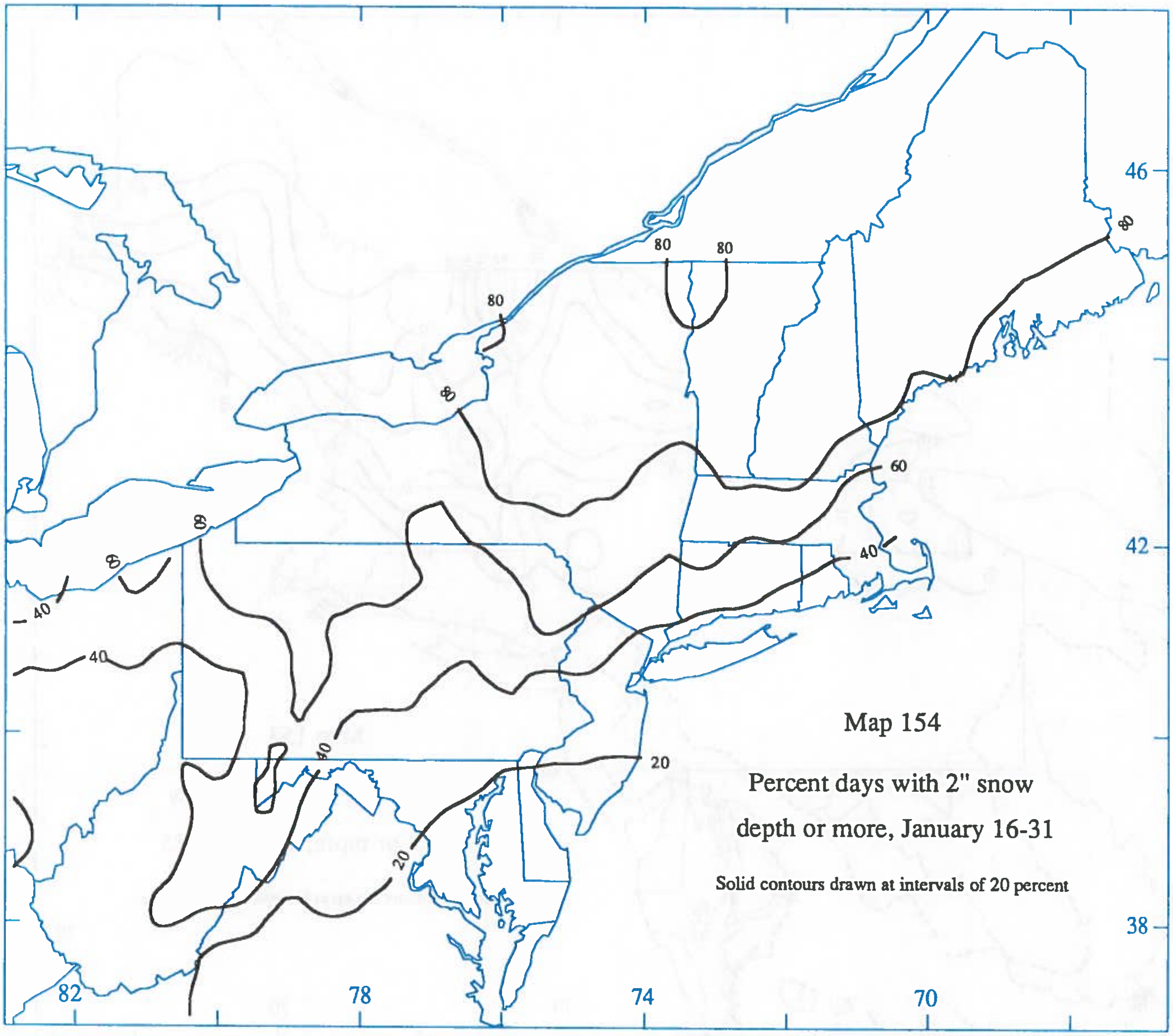
Solid contours drawn at intervals of 10 percent



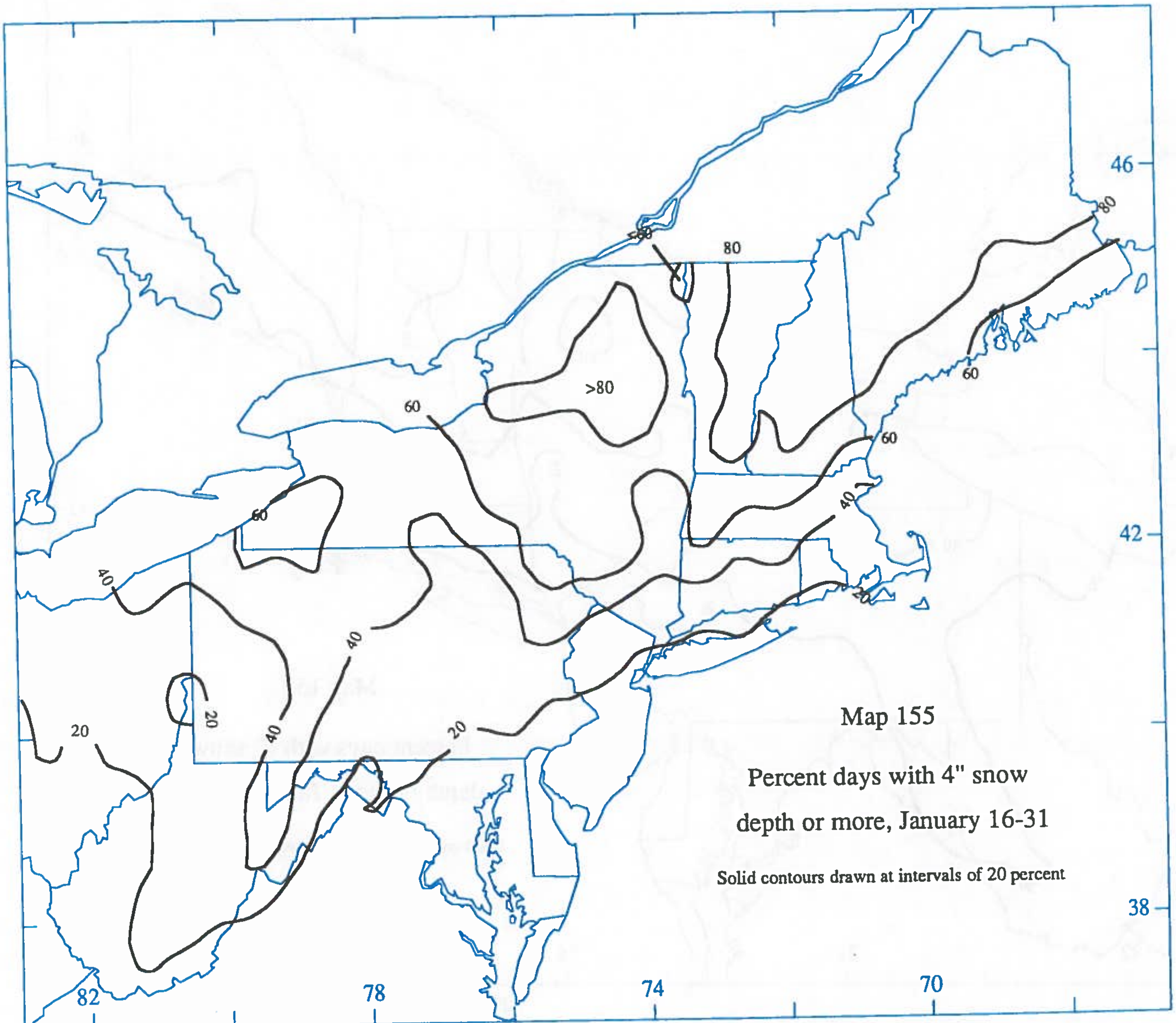
Map 153

Percent days with 12" snow depth or more, January 1-15

Solid contours drawn at intervals of 10 percent



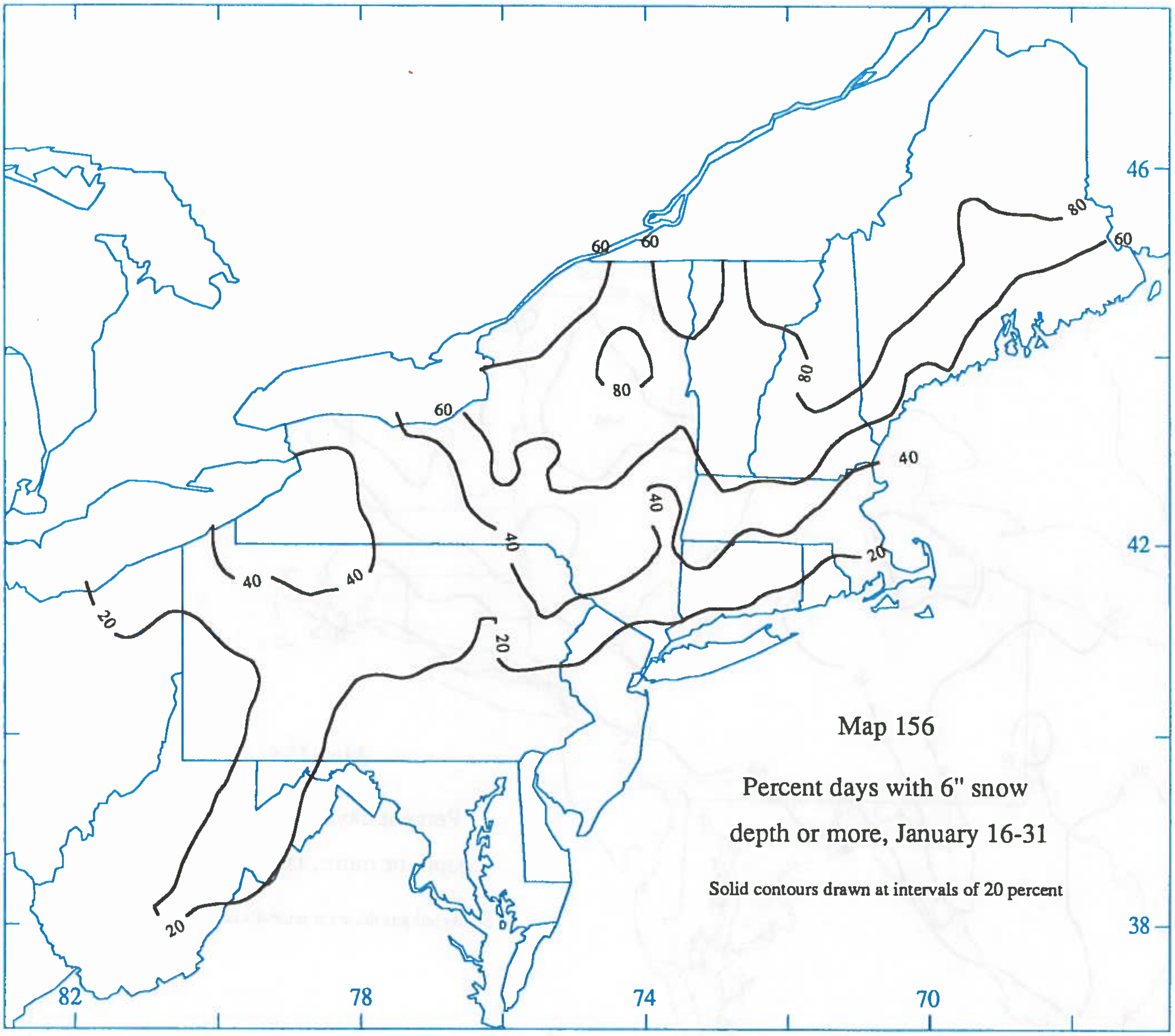
NRCC-Cornell Atlas of Snowfall and Snow Depth



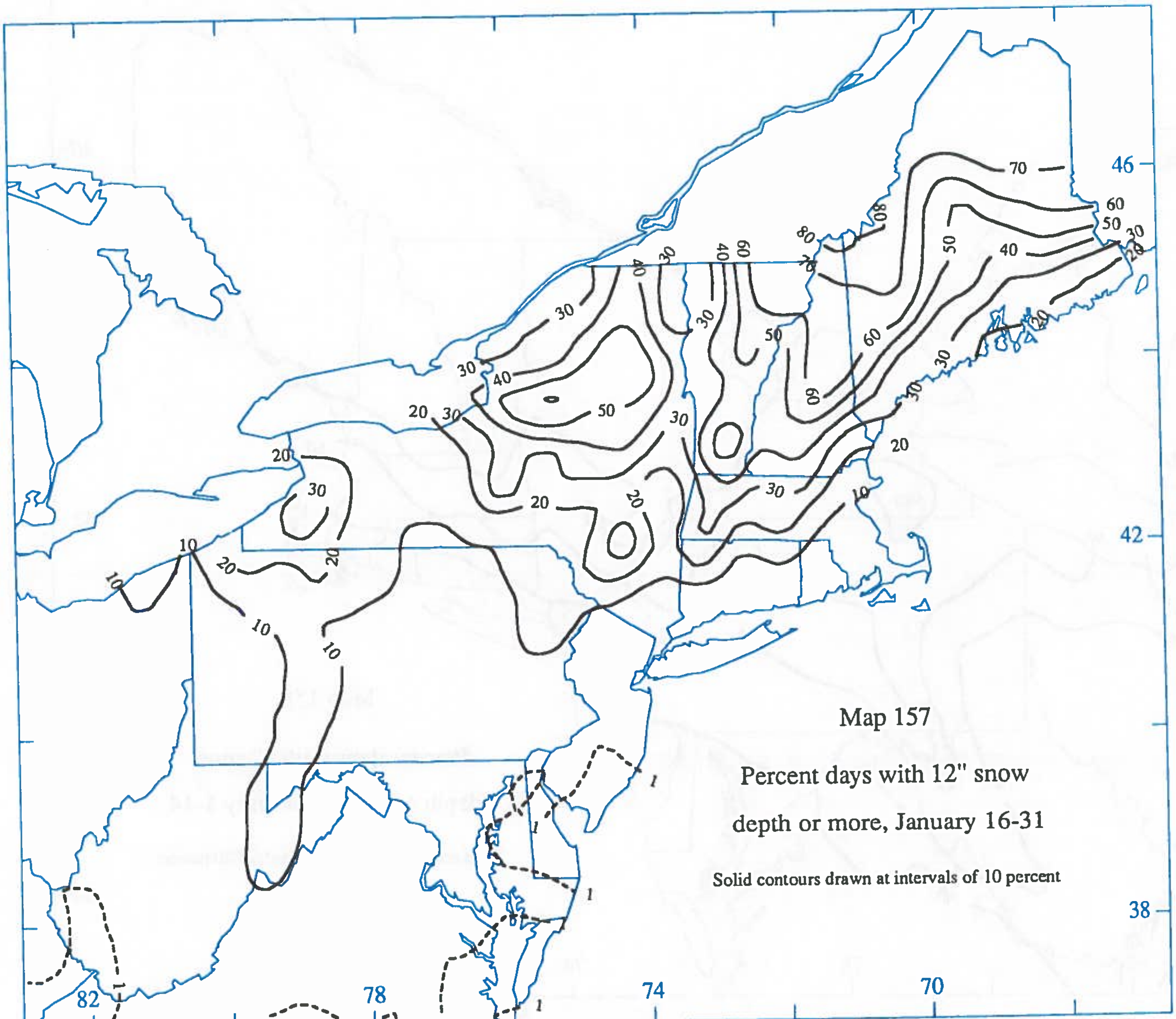
Map 155

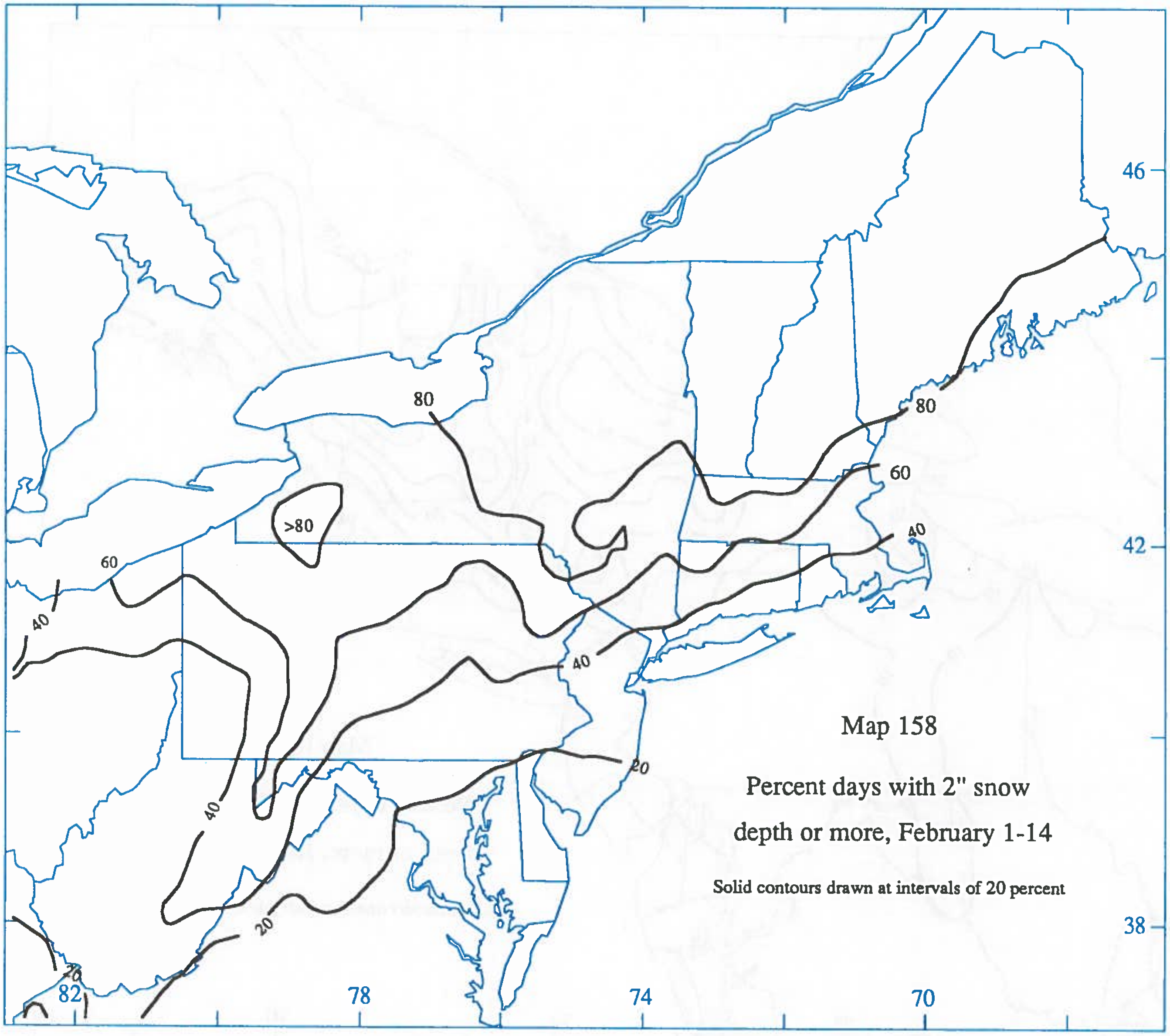
Percent days with 4" snow depth or more, January 16-31

Solid contours drawn at intervals of 20 percent

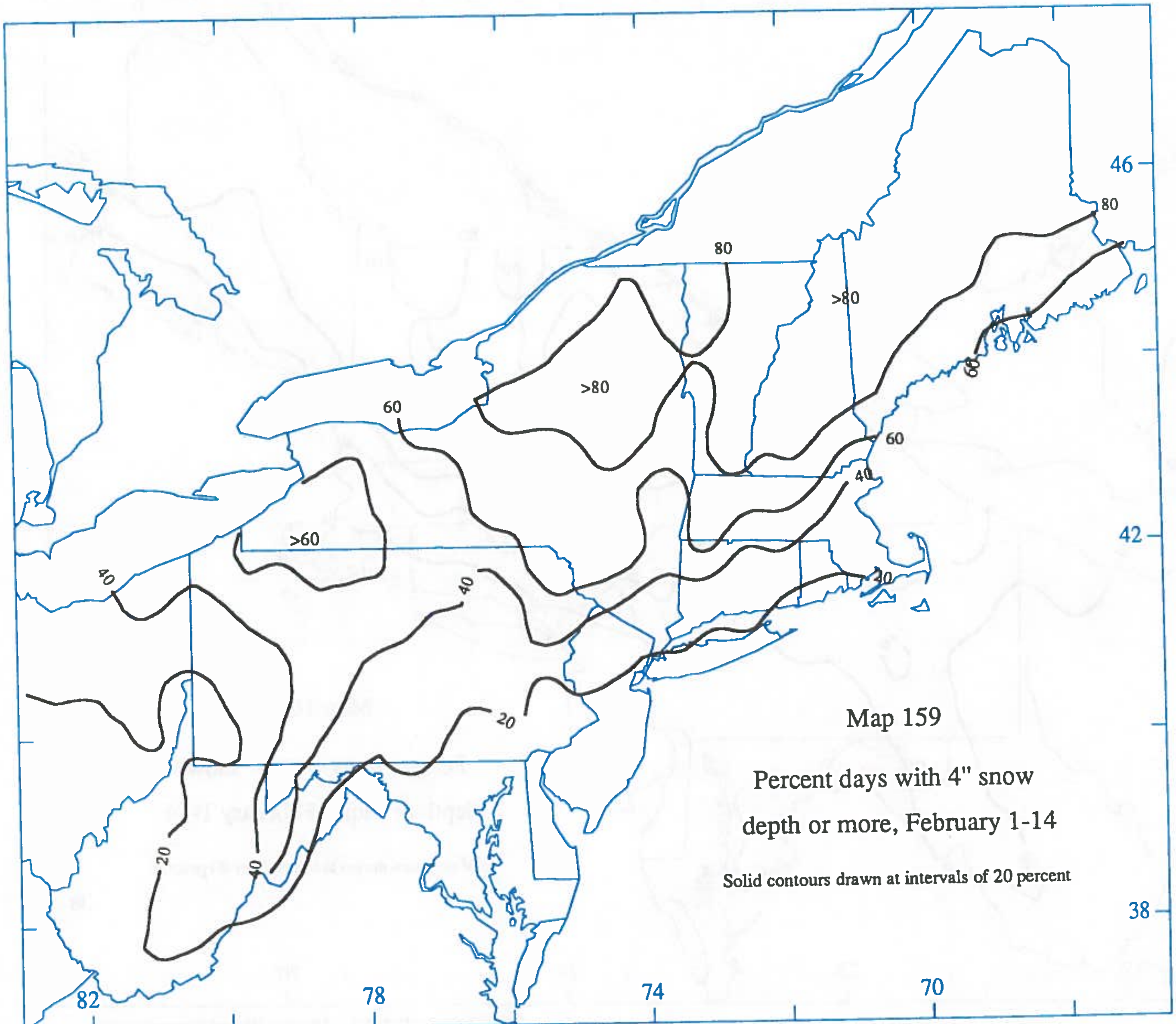


NRCC-Cornell Atlas of Snowfall and Snow Depth


Map 157
Percent days with 12" snow
depth or more, January 16-31
Solid contours drawn at intervals of 10 percent
46
42
38
82
78
74
70



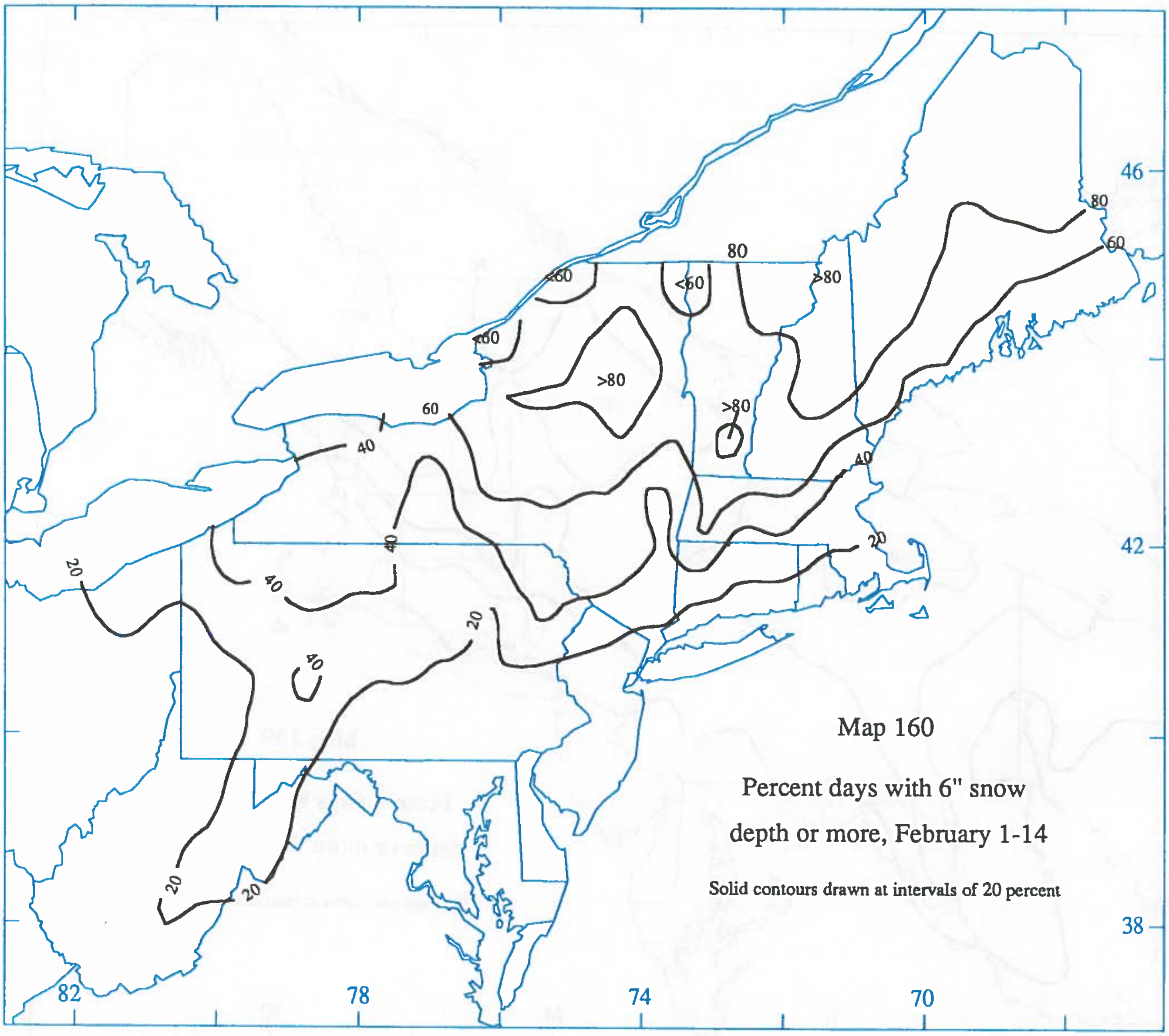
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 159

Percent days with 4" snow depth or more, February 1-14

Solid contours drawn at intervals of 20 percent

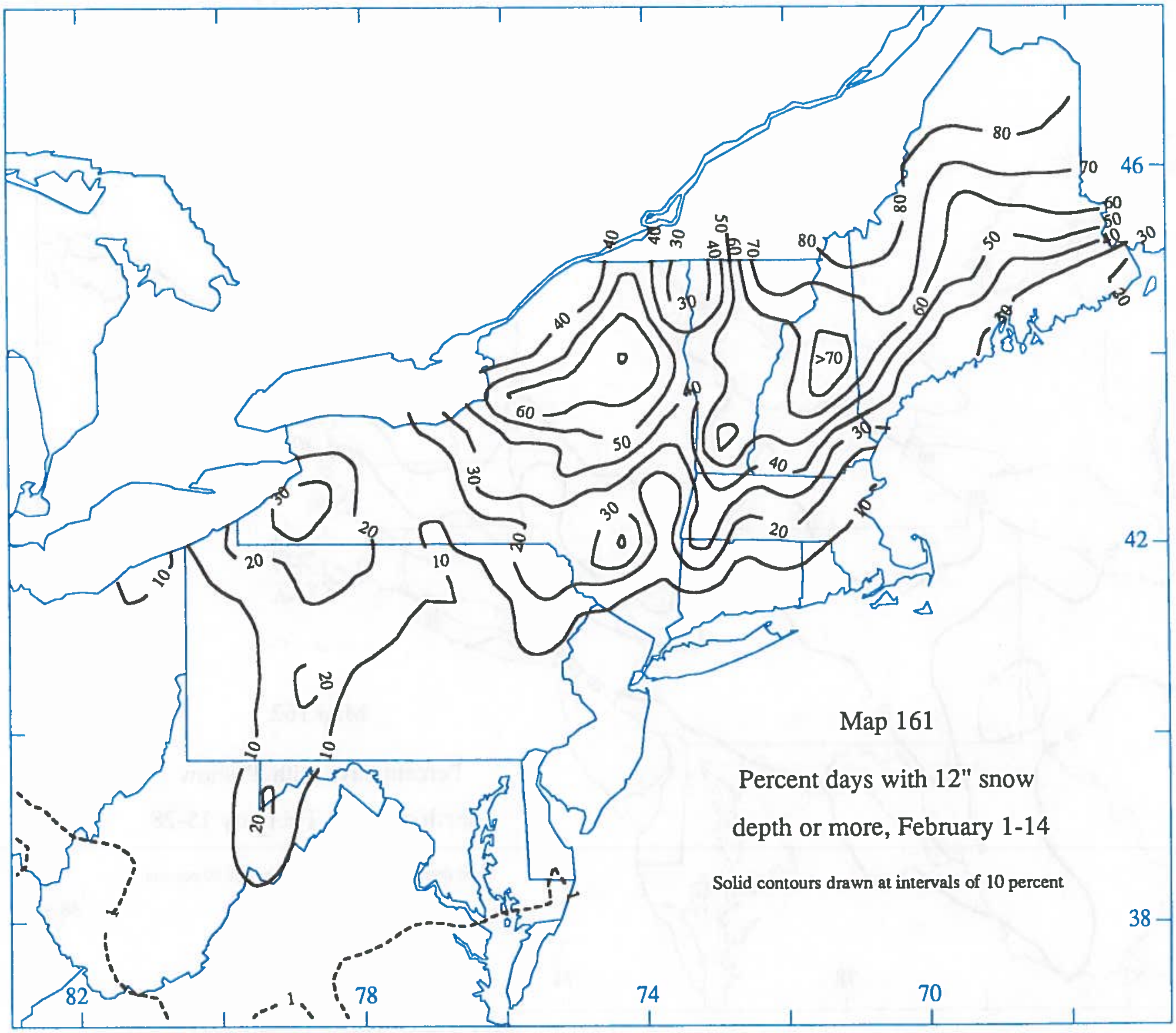


Map 160

Percent days with 6" snow depth or more, February 1-14

Solid contours drawn at intervals of 20 percent

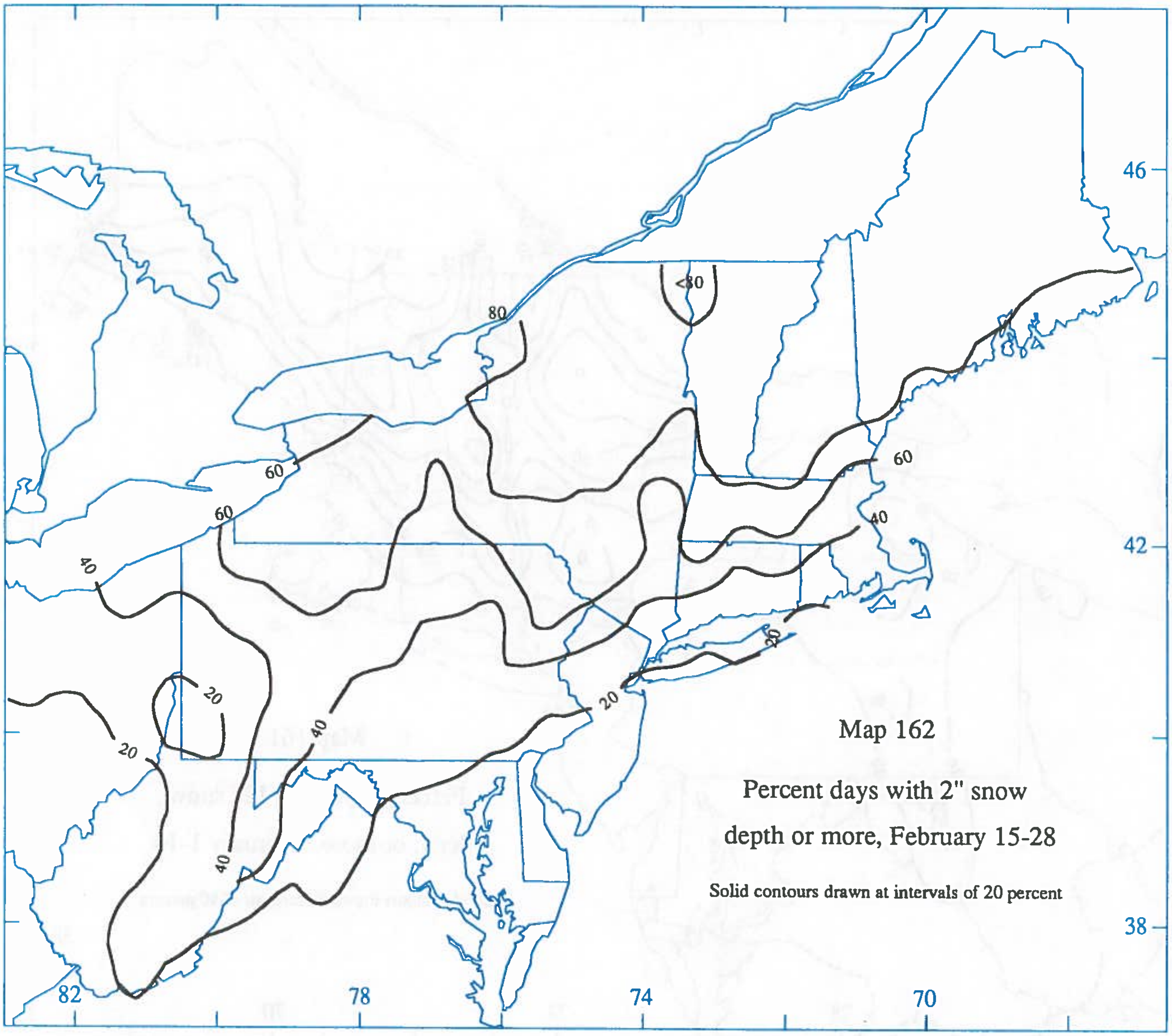
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 161

Percent days with 12" snow depth or more, February 1-14

NRCC-Cornell Atlas of Snowfall and Snow Depth

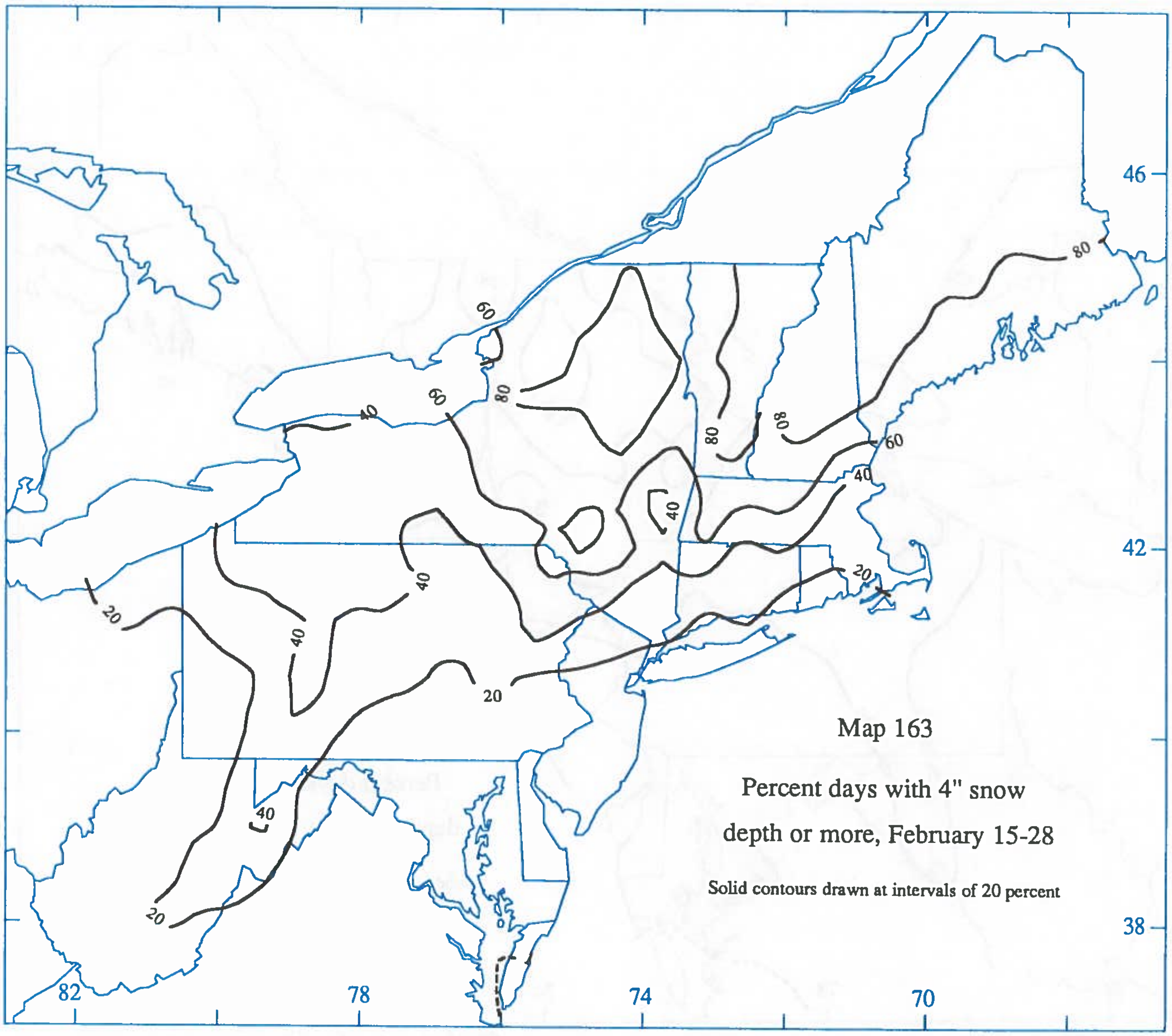


Map 162

Percent days with 2" snow depth or more, February 15-28

Solid contours drawn at intervals of 20 percent

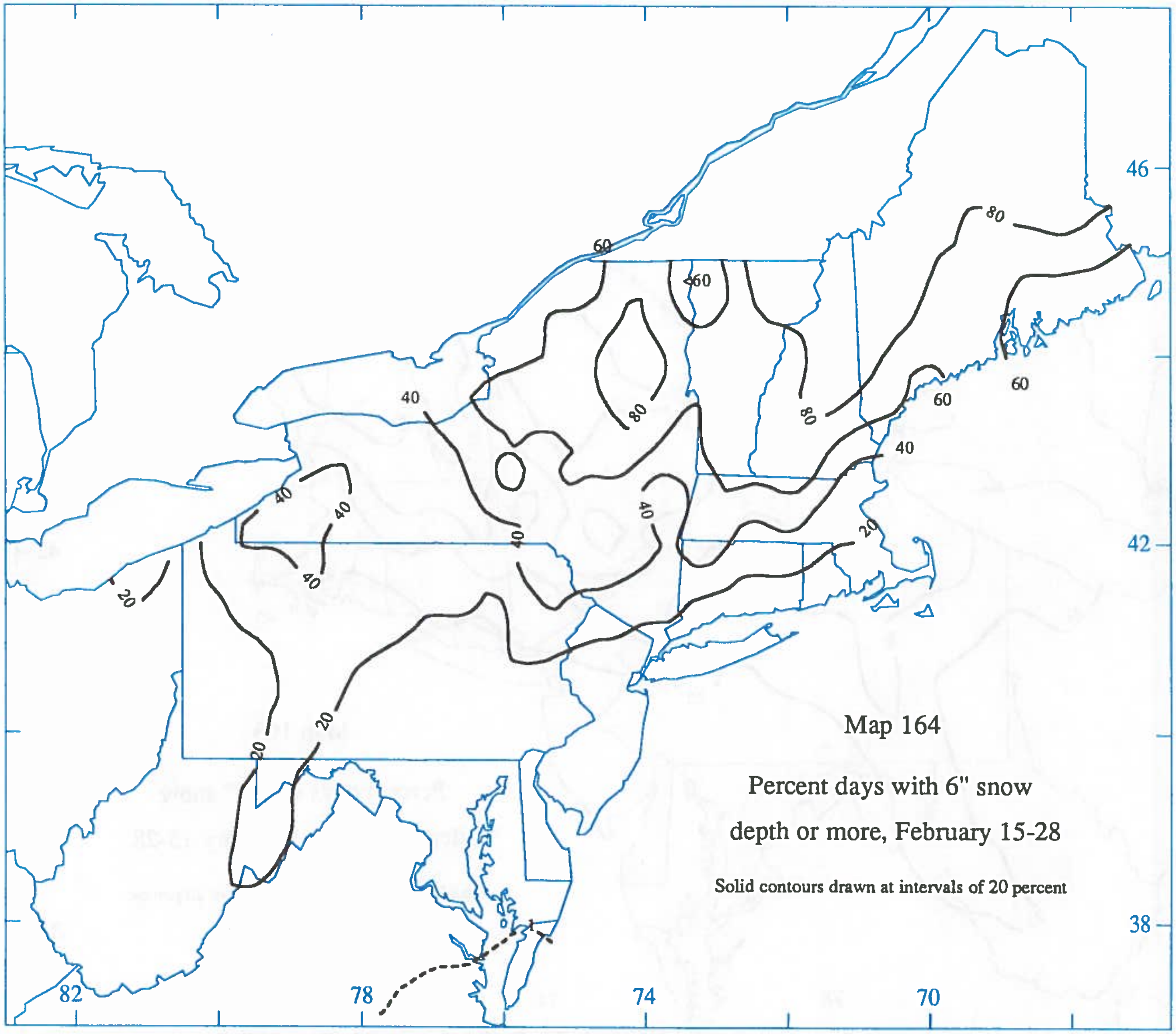
NRCC-Cornell Atlas of Snowfall and Snow Depth



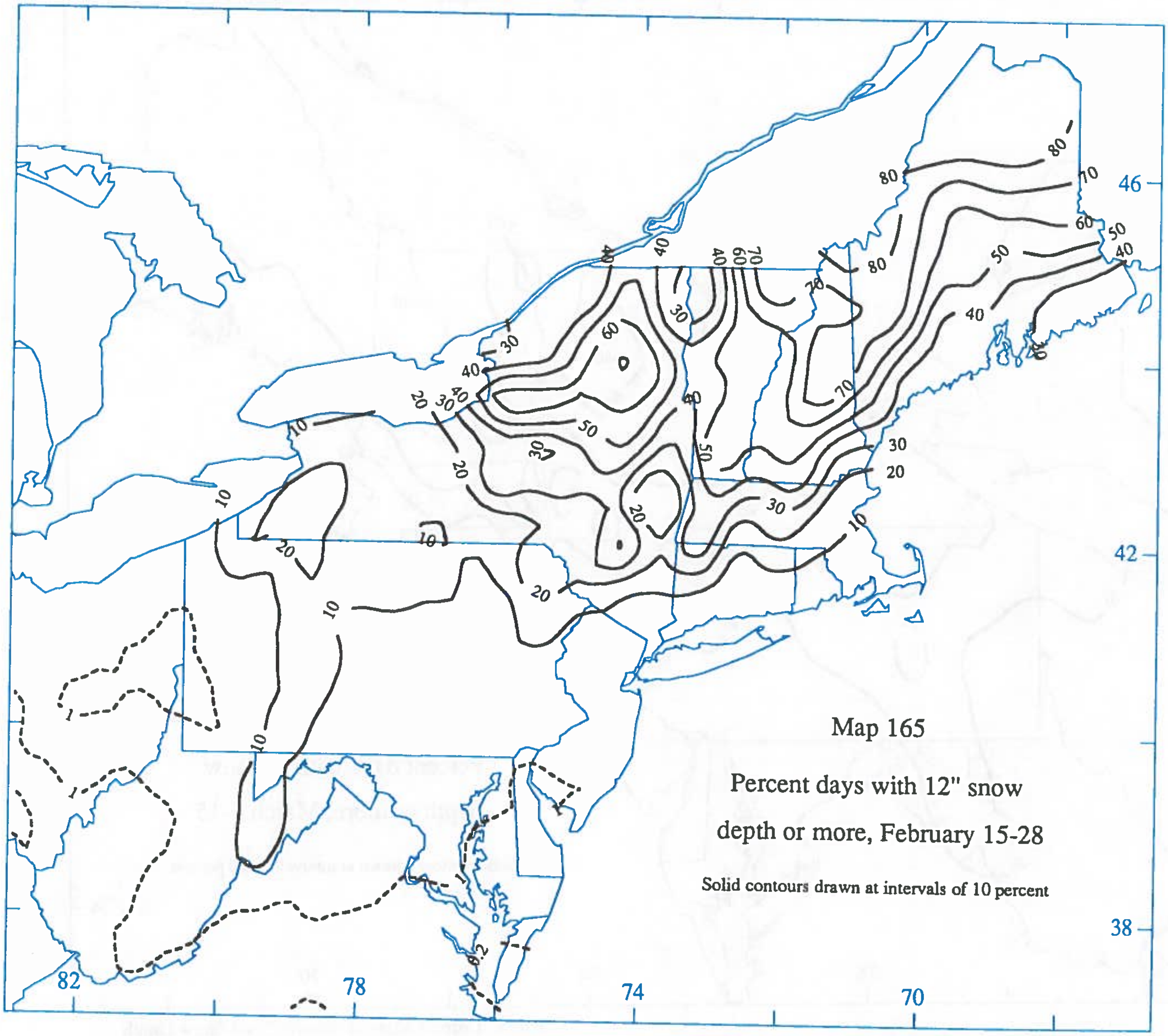
Map 163

Percent days with 4" snow depth or more, February 15-28

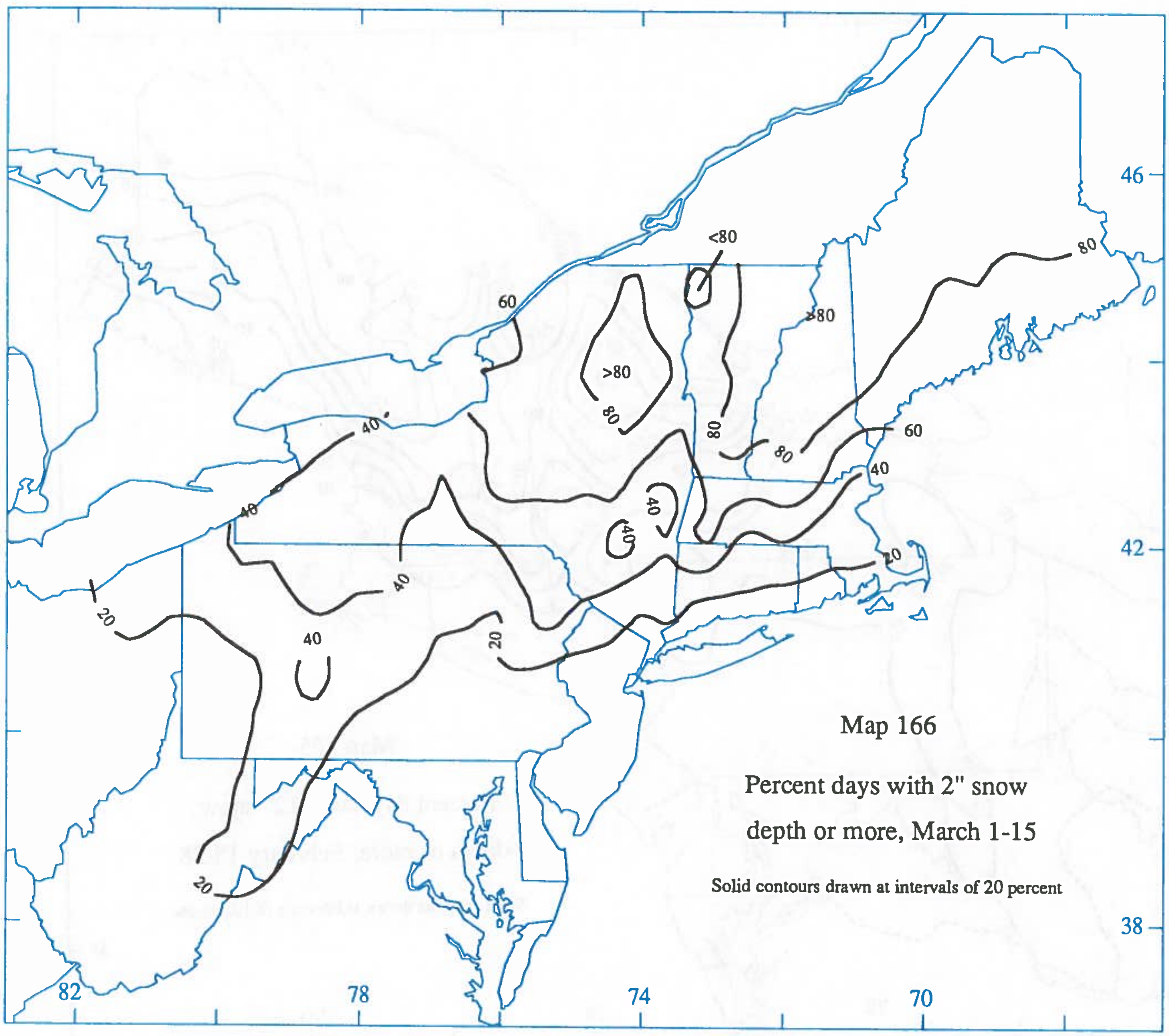
Solid contours drawn at intervals of 20 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

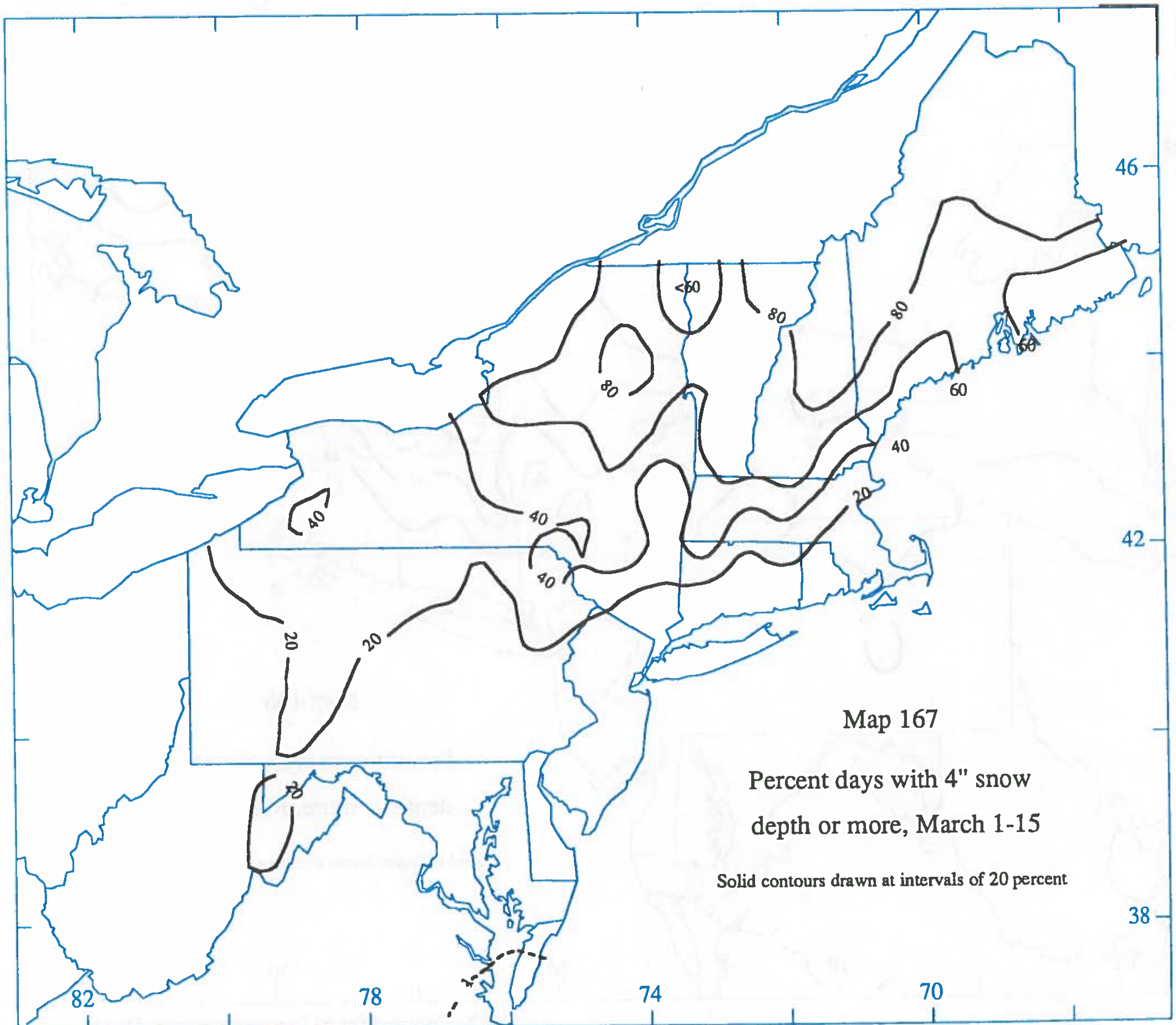


Map 166

Percent days with 2" snow depth or more, March 1-15

Solid contours drawn at intervals of 20 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

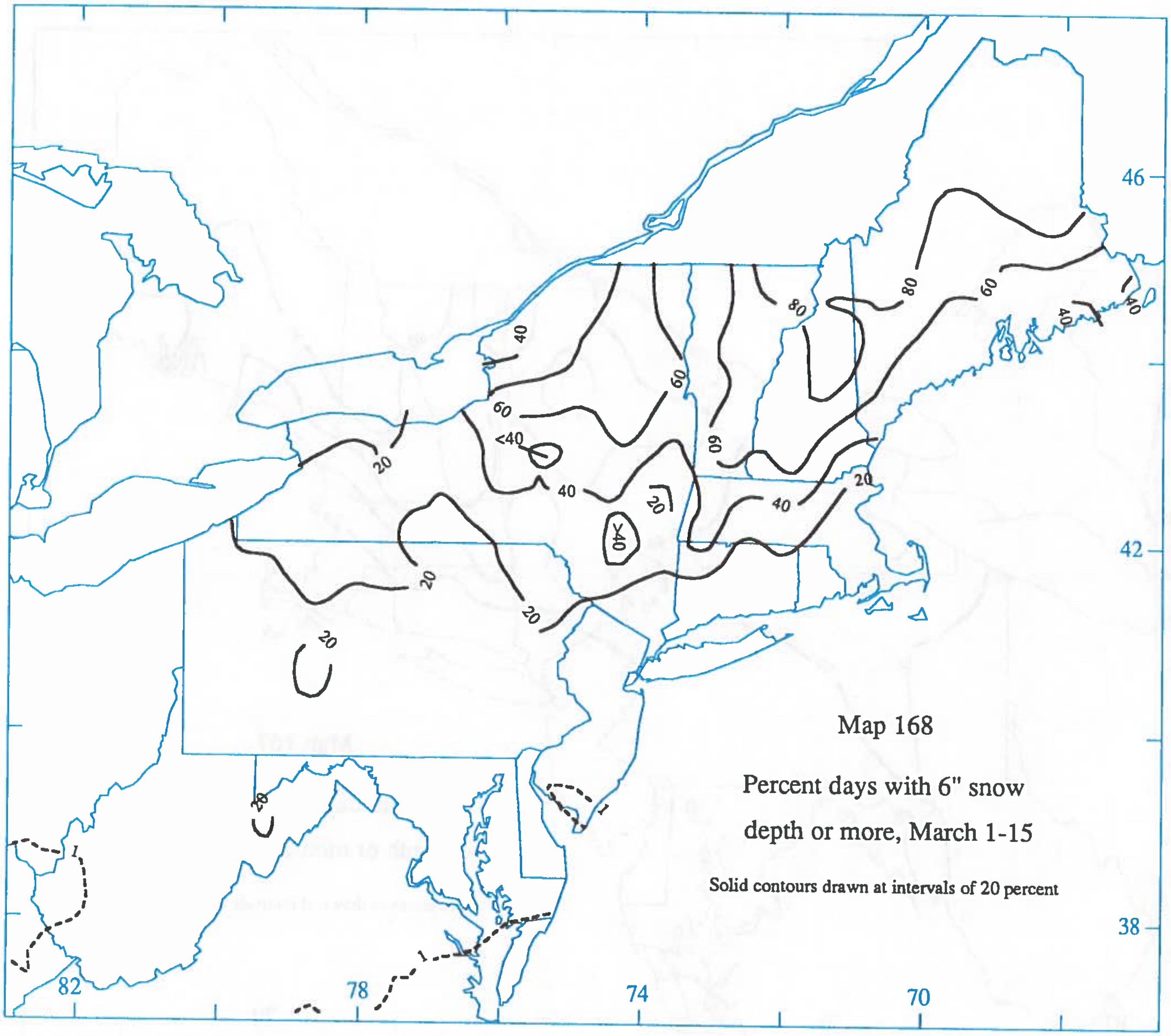


Map 167

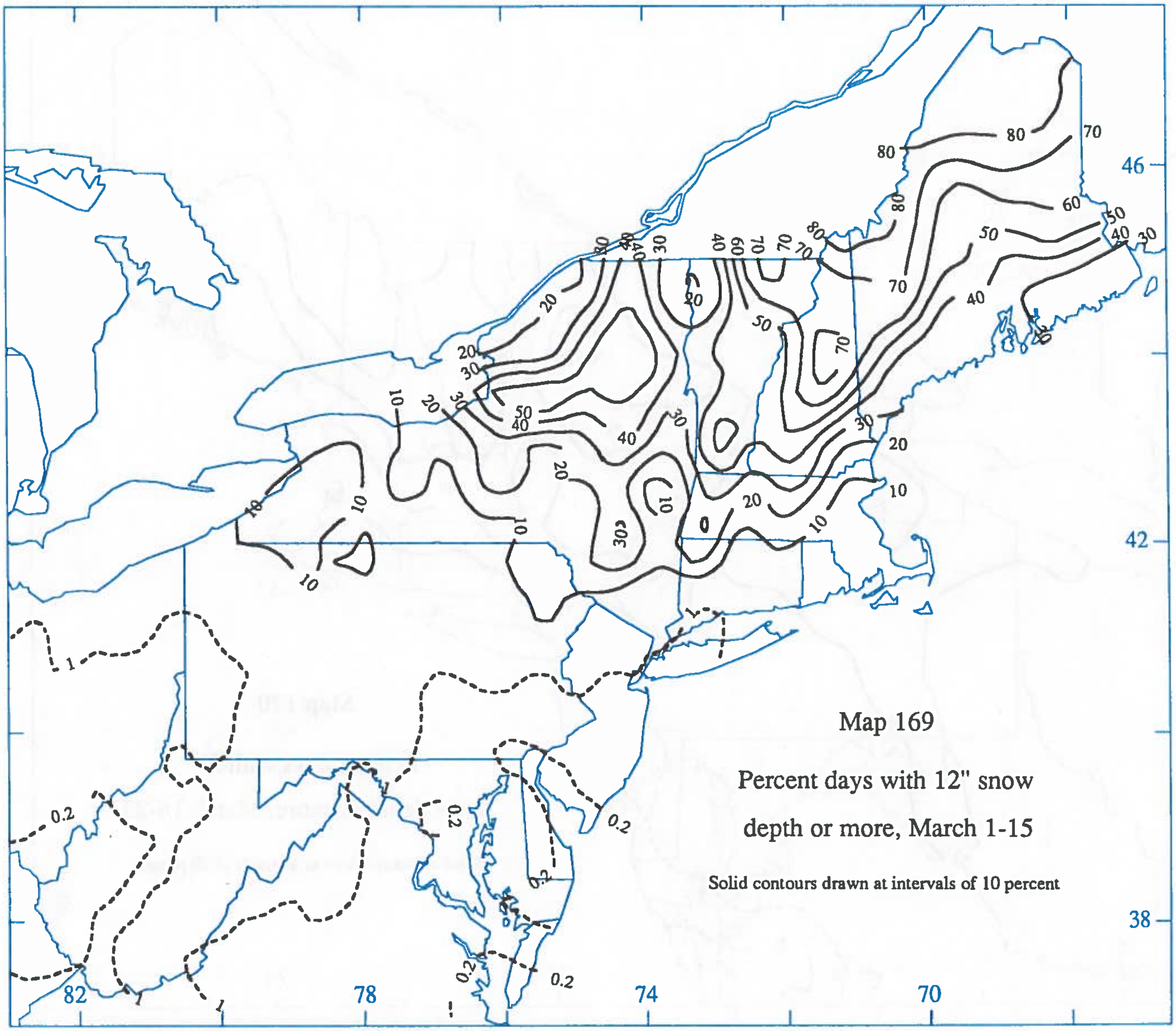
Percent days with 4" snow depth or more, March 1-15

Solid contours drawn at intervals of 20 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



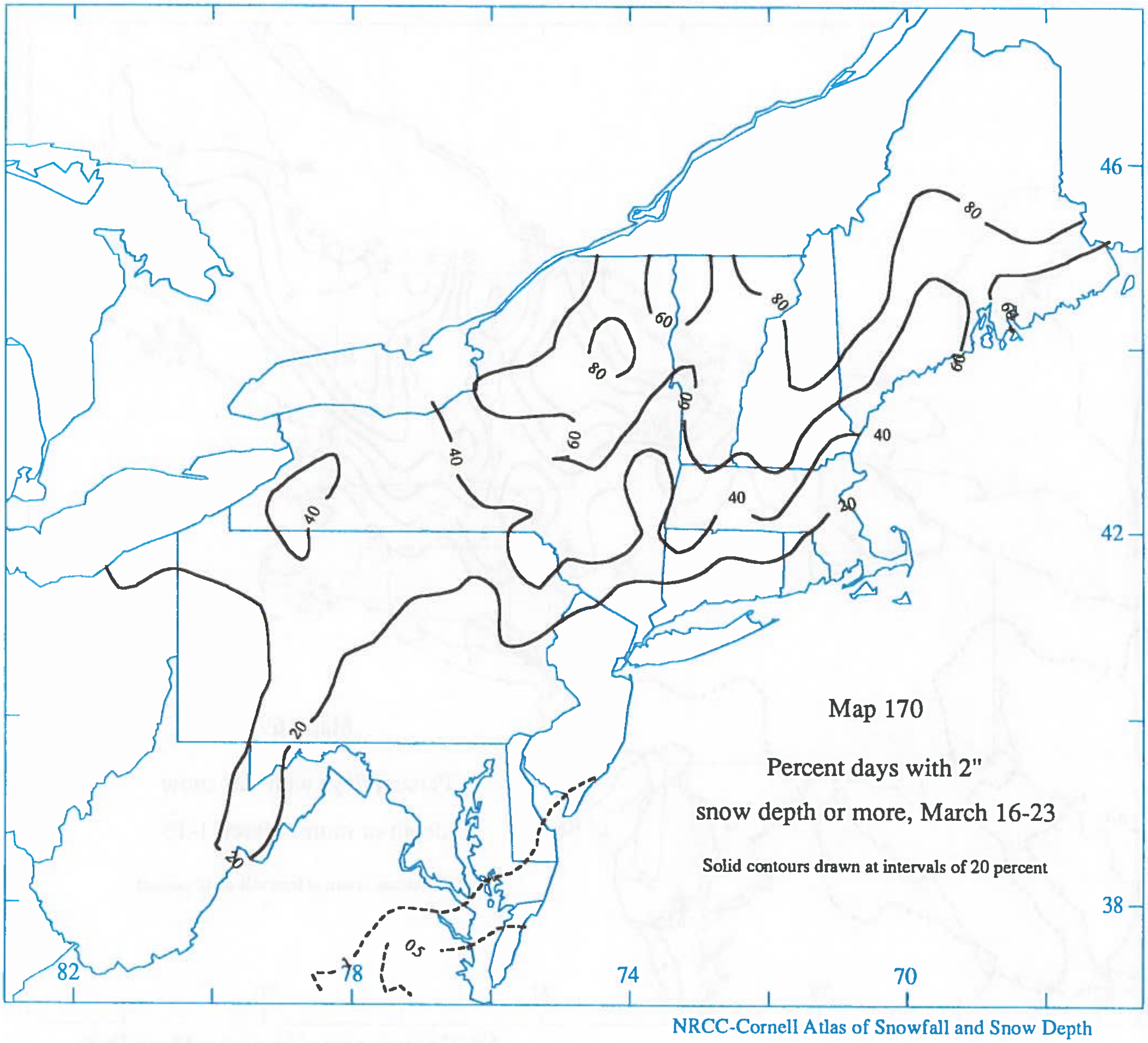
NRCC-Cornell Atlas of Snowfall and Snow Depth



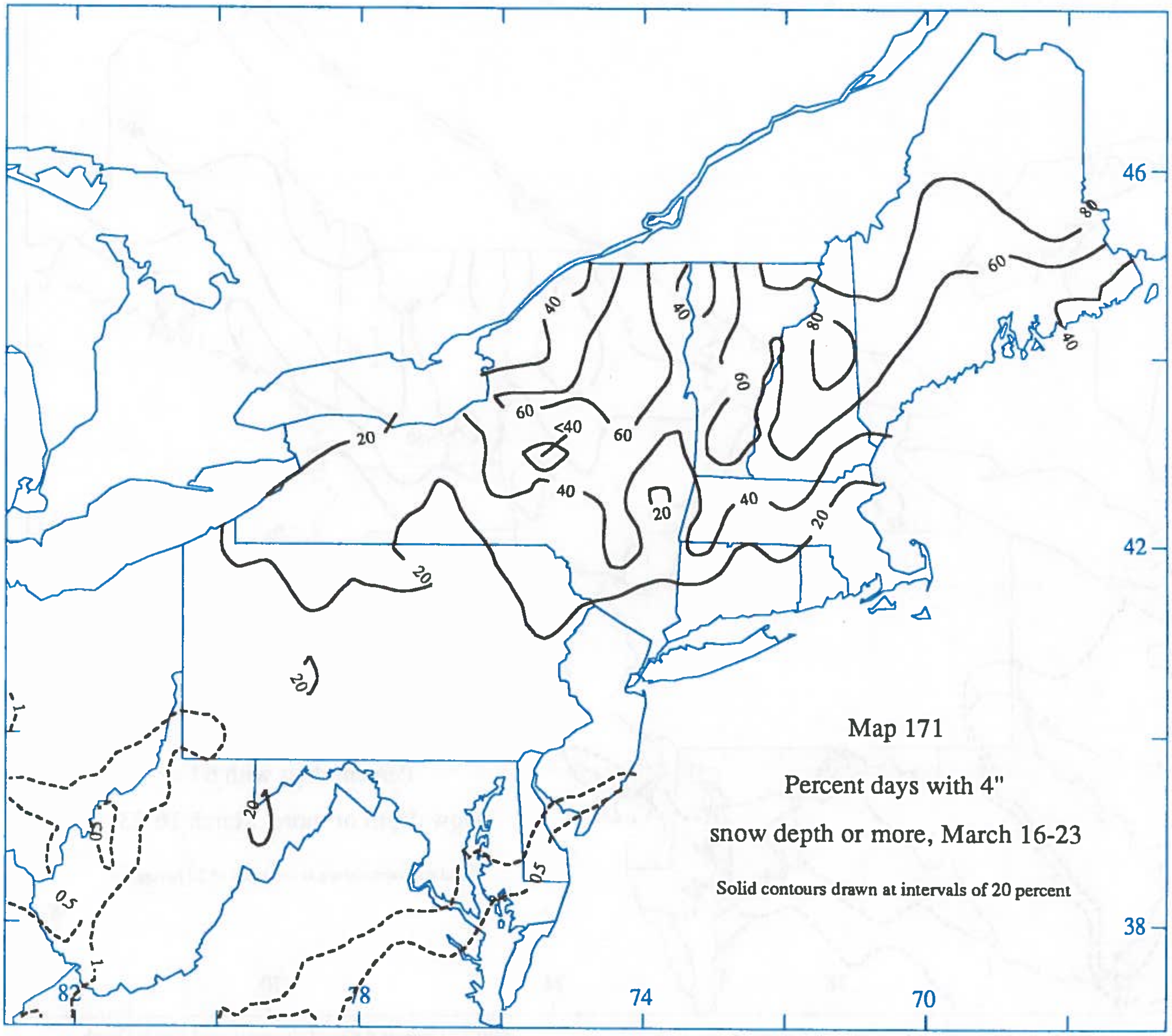
Map 169

Percent days with 12" snow depth or more, March 1-15

Solid contours drawn at intervals of 10 percent



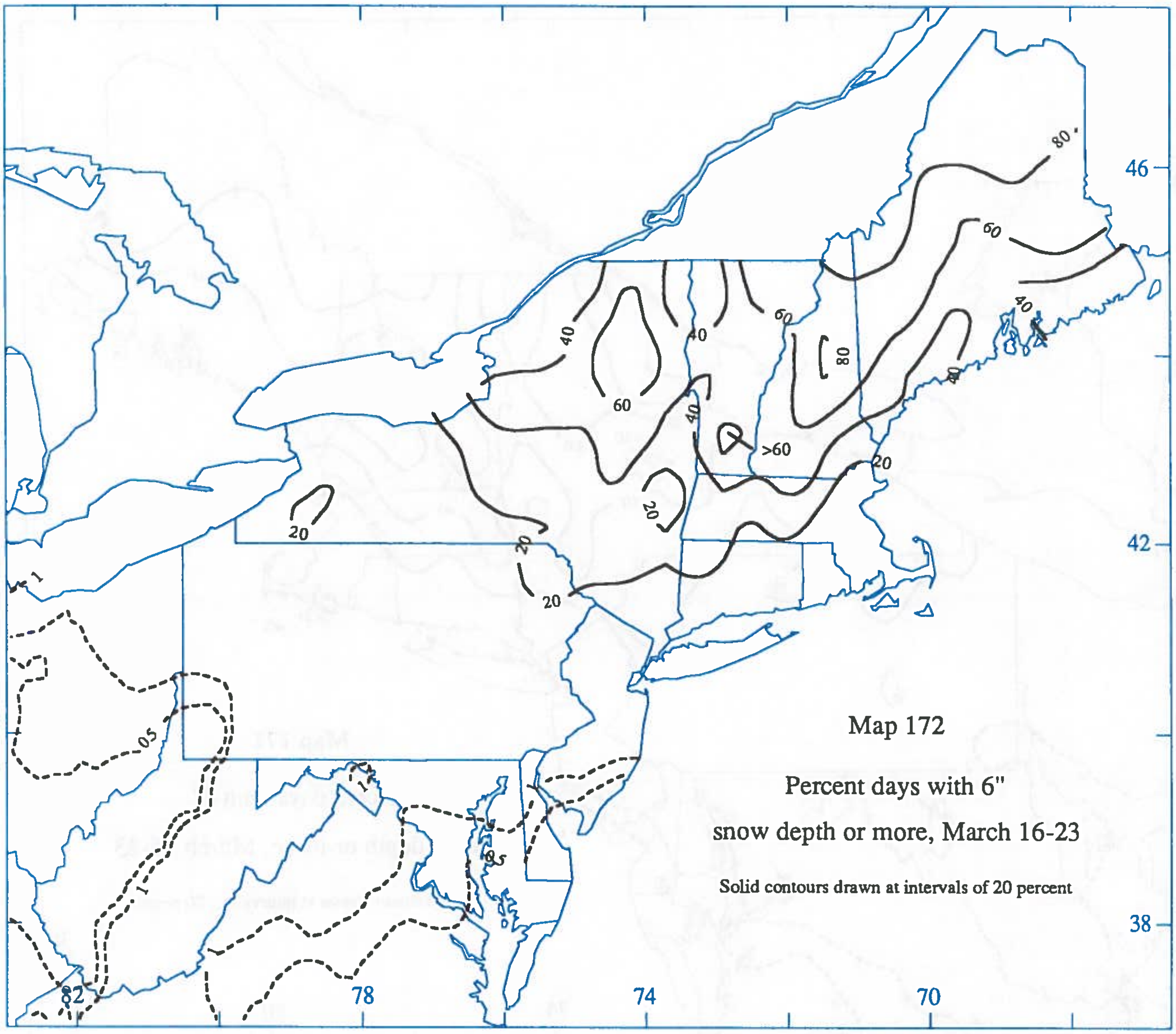
Map 170
Percent days with 2"
snow depth or more, March 16-23
Solid contours drawn at intervals of 20 percent
46
42
38
82
78
74
70
80
60
40
20
05
NRCC-Cornell Atlas of Snowfall and Snow Depth



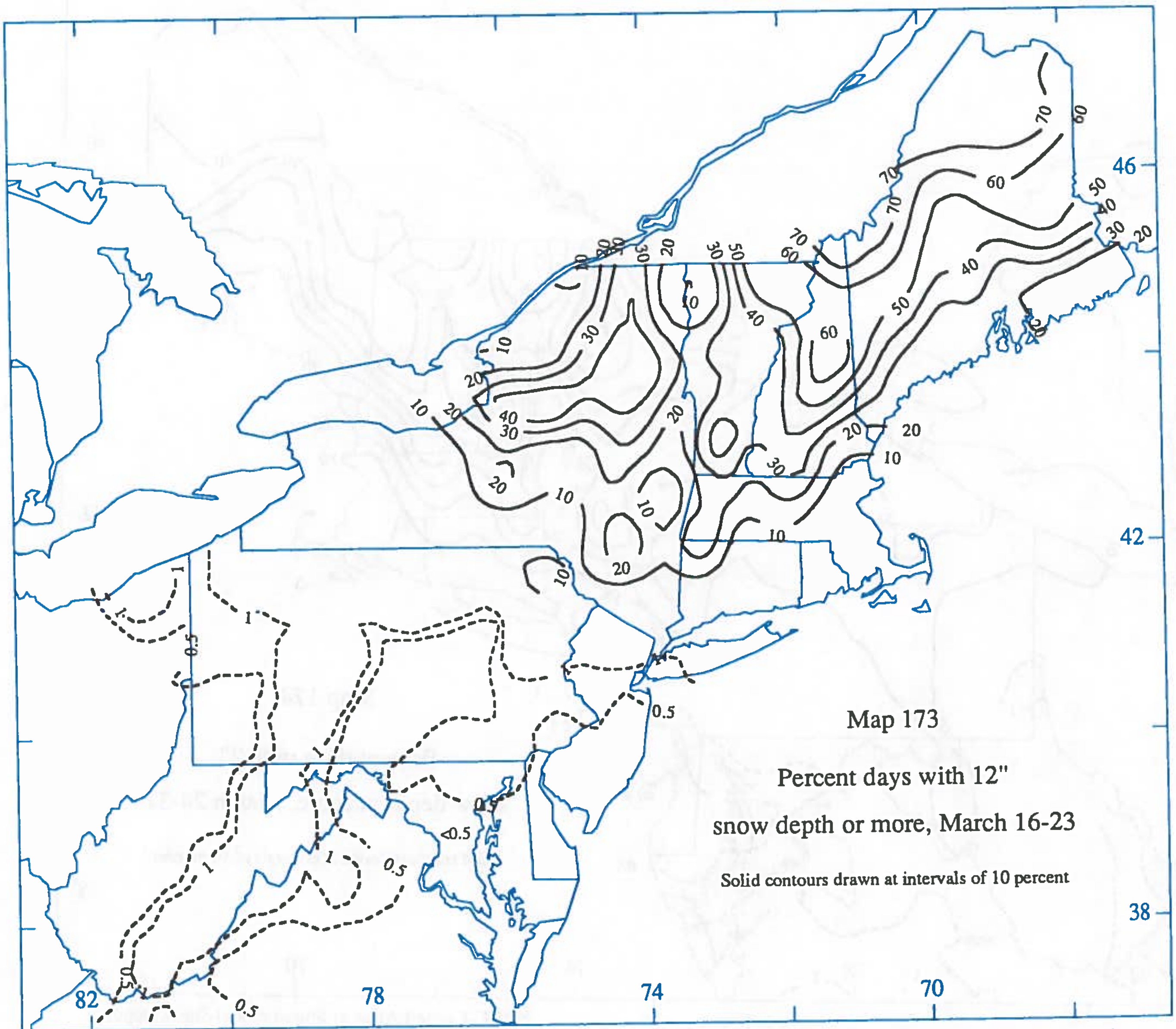
Map 171

Percent days with 4" snow depth or more, March 16-23

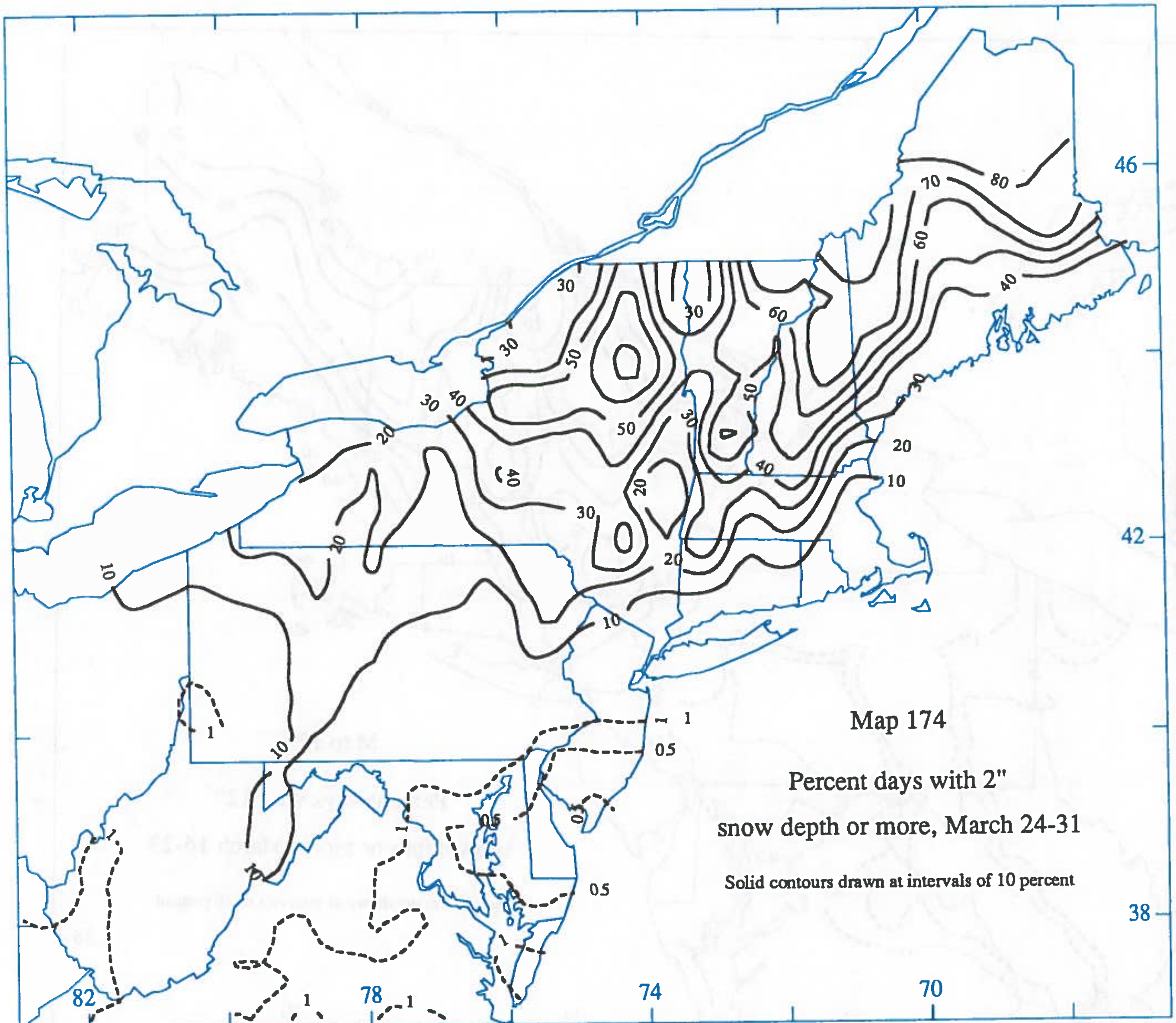
Solid contours drawn at intervals of 20 percent



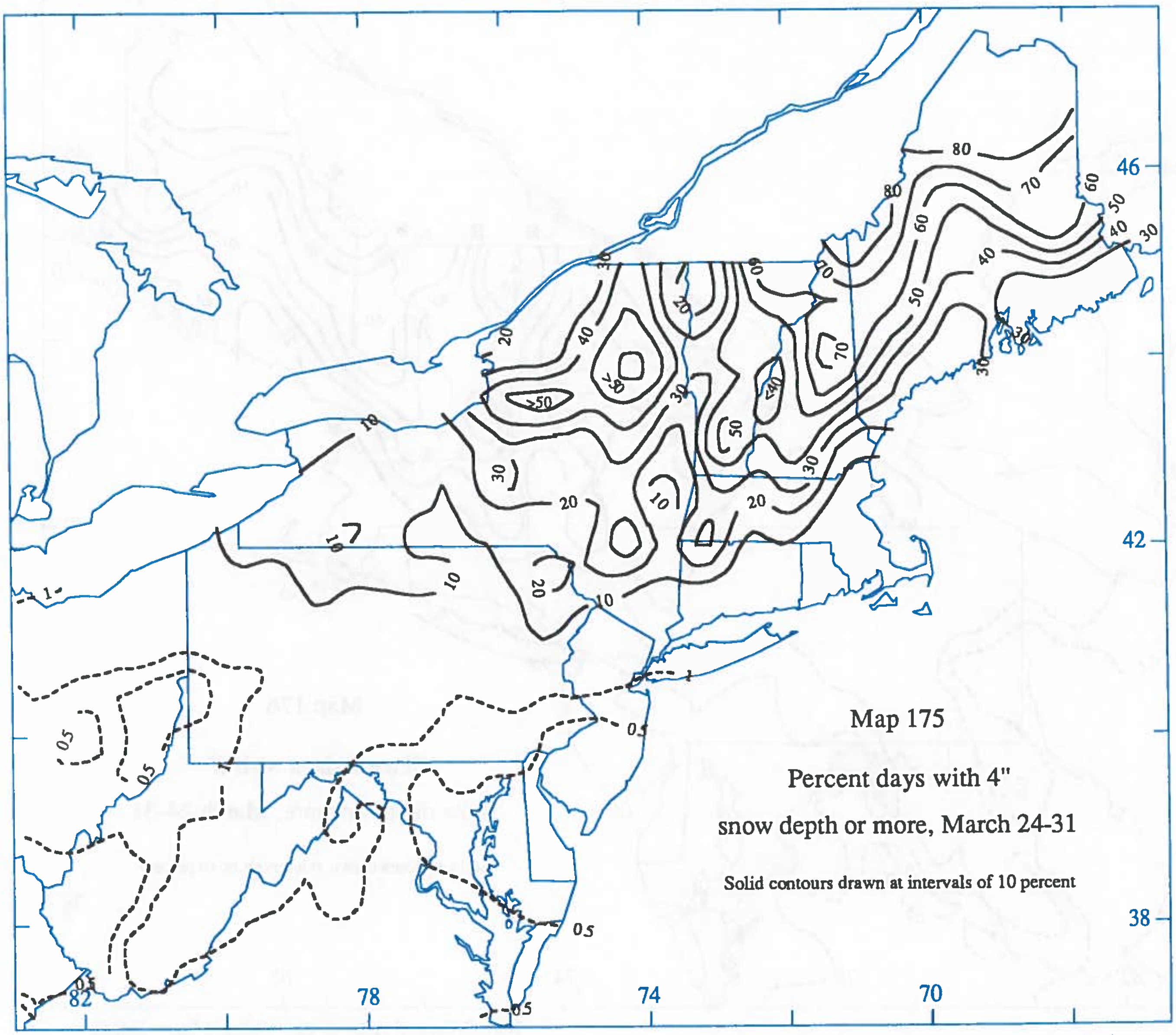
NRCC-Cornell Atlas of Snowfall and Snow Depth



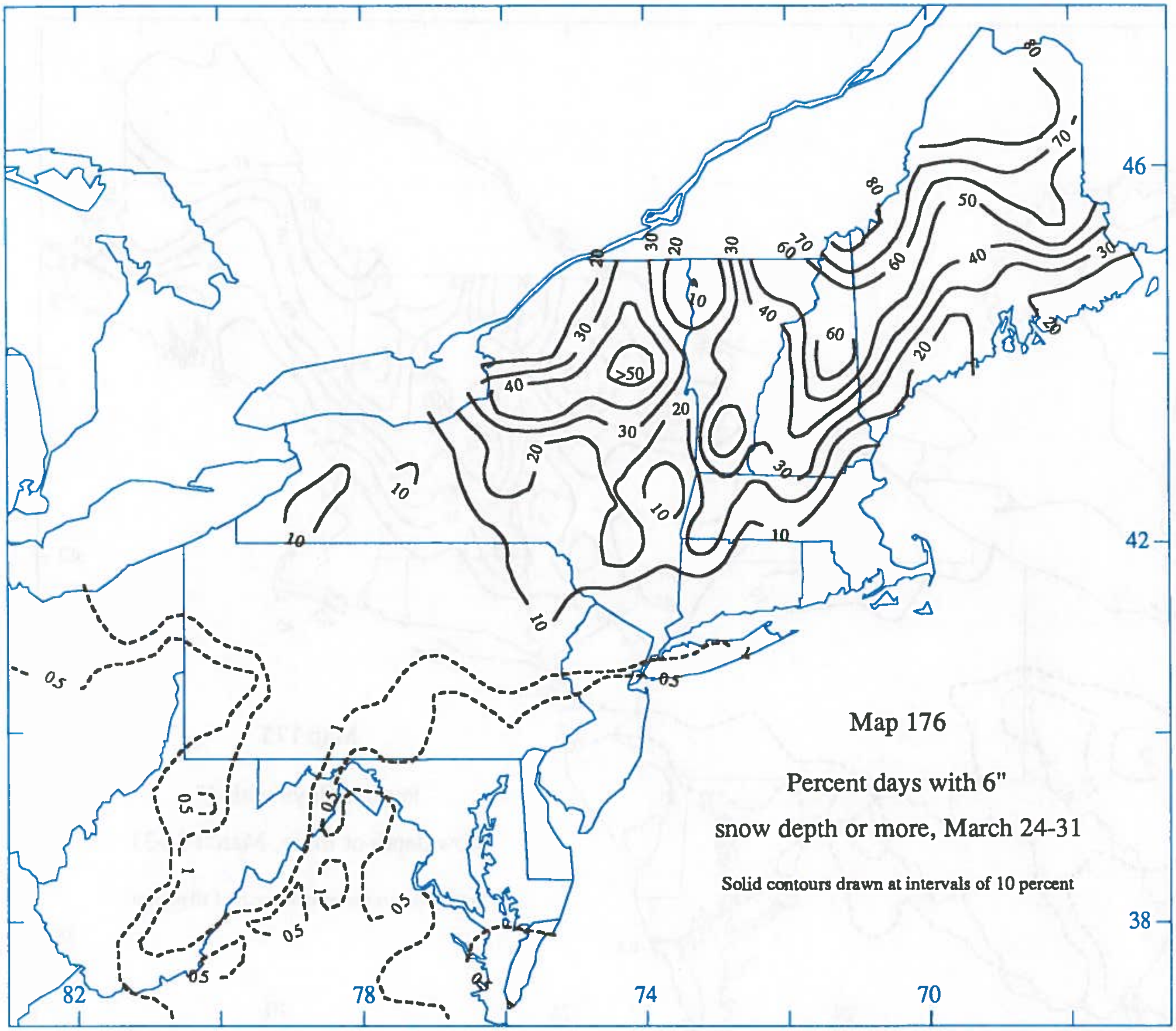
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



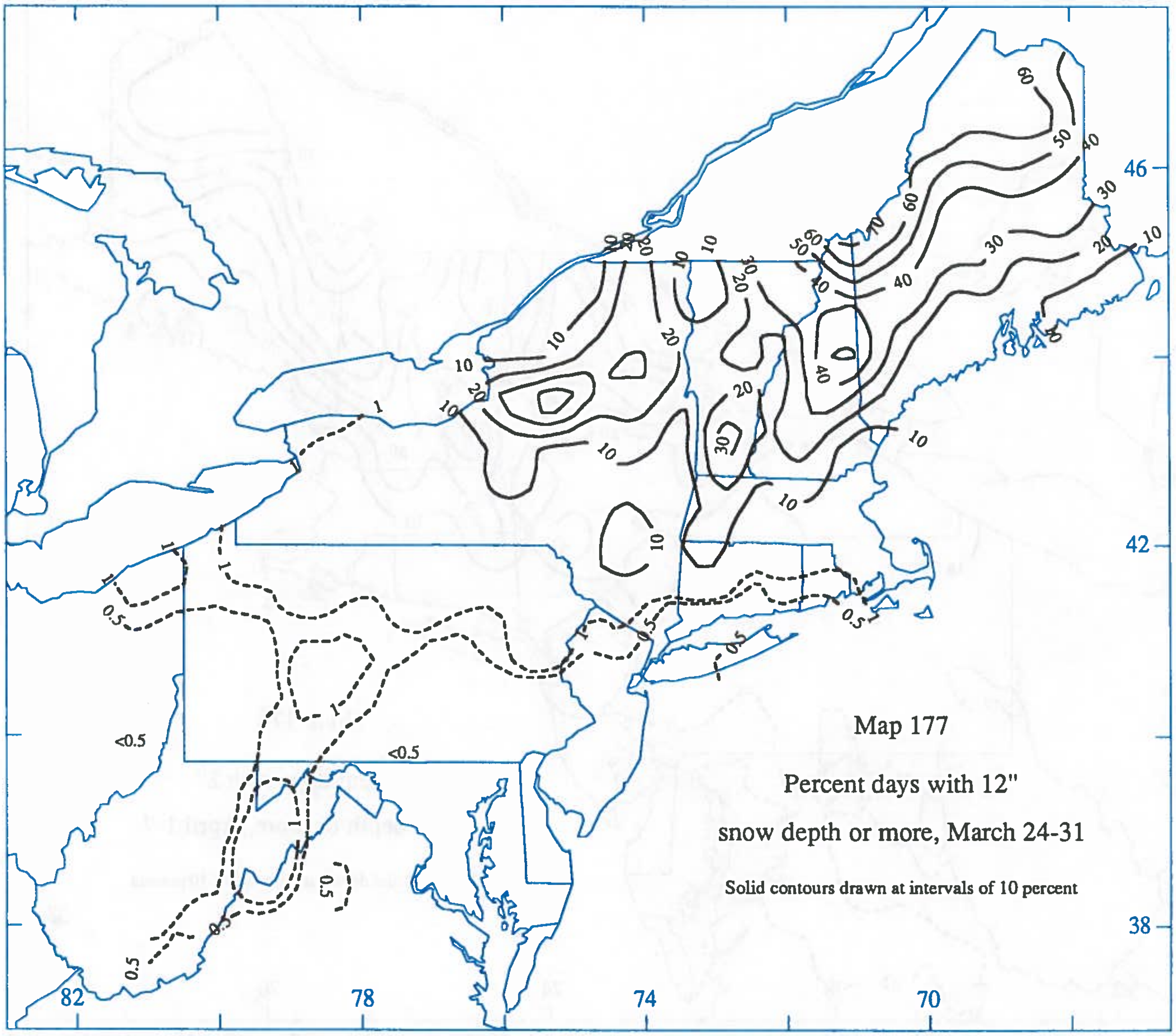
NRCC-Cornell Atlas of Snowfall and Snow Depth



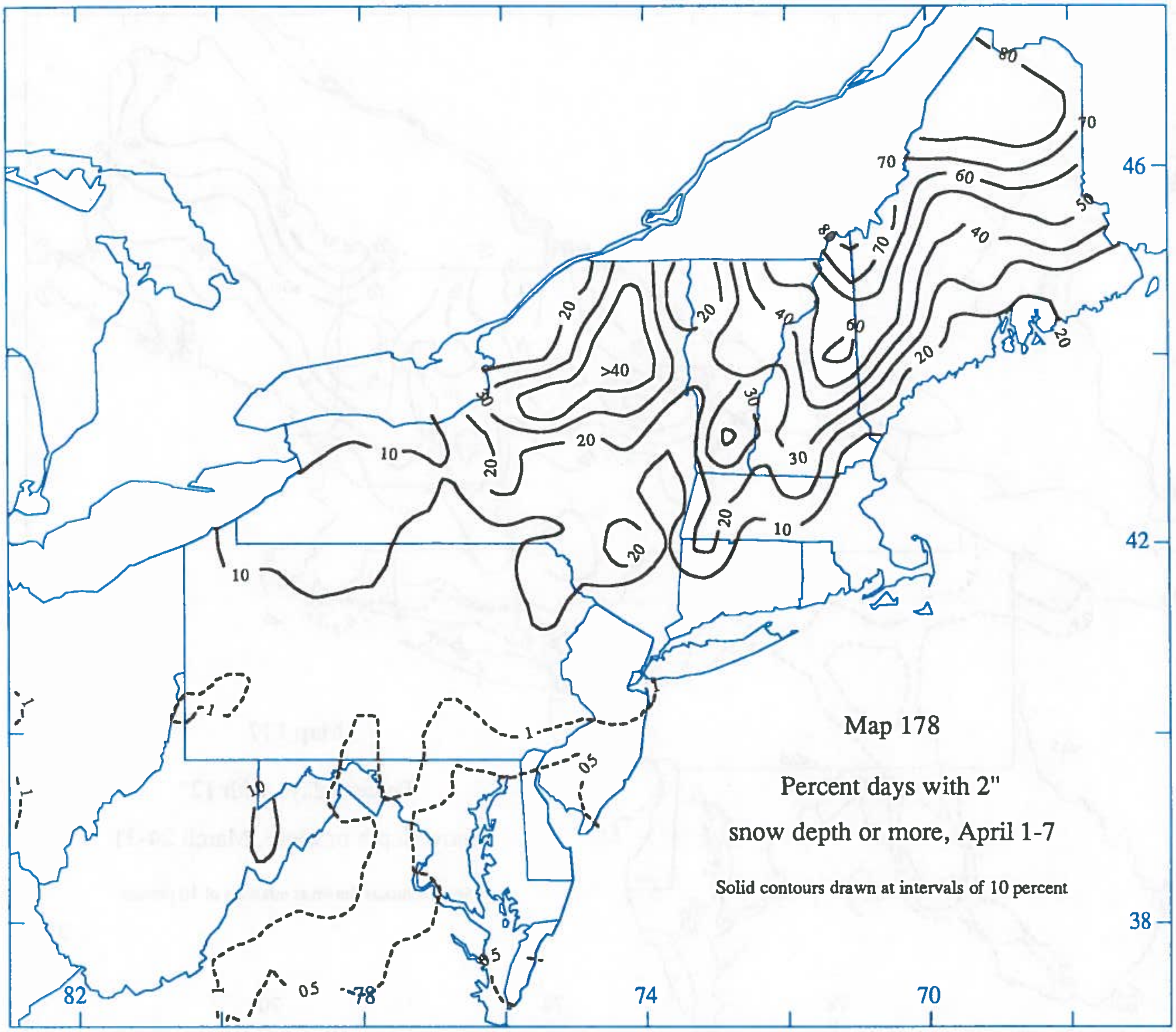
Map 176

Percent days with 6" snow depth or more, March 24-31

Solid contours drawn at intervals of 10 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

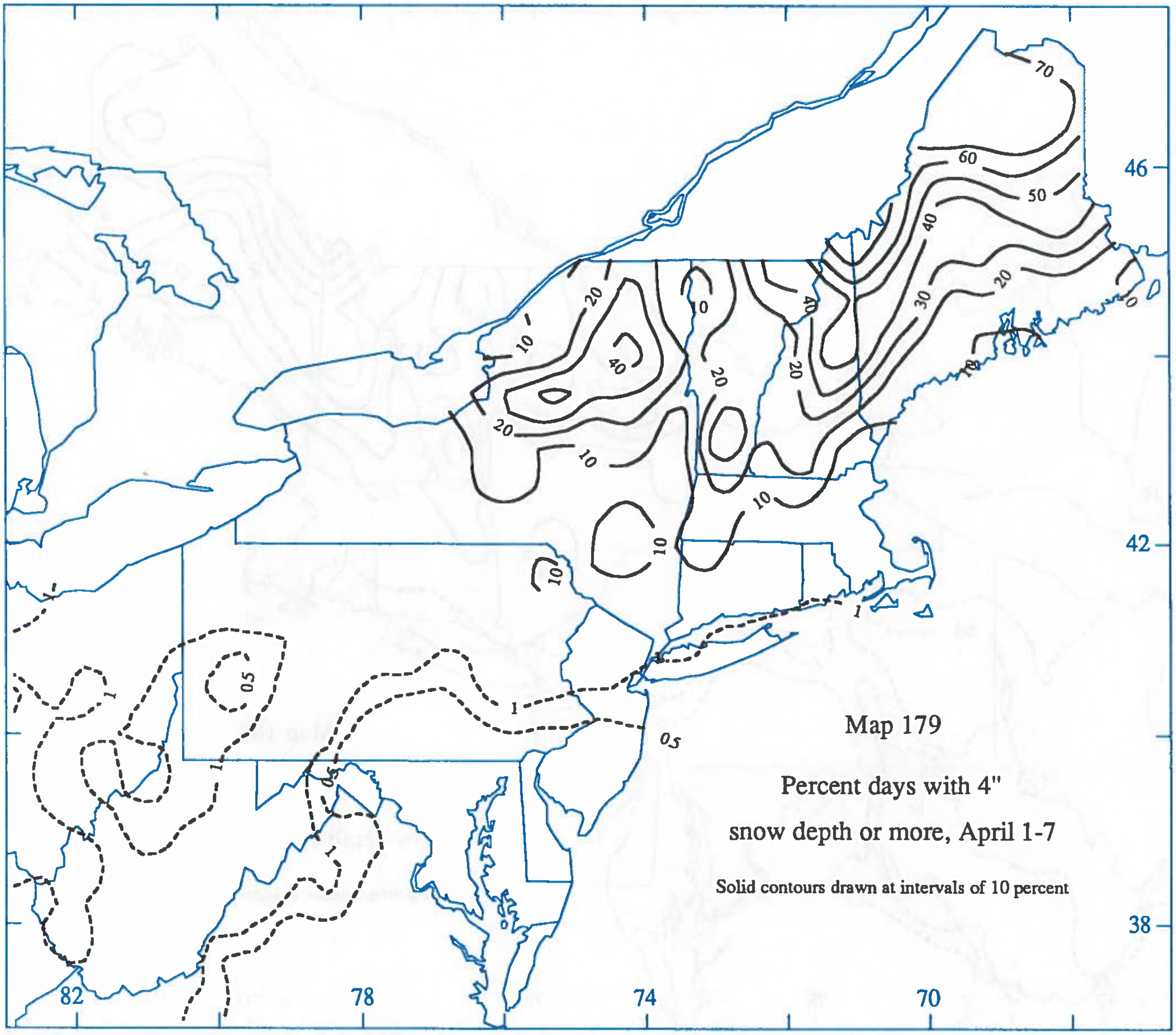


Map 178

Percent days with 2" snow depth or more, April 1-7

Solid contours drawn at intervals of 10 percent

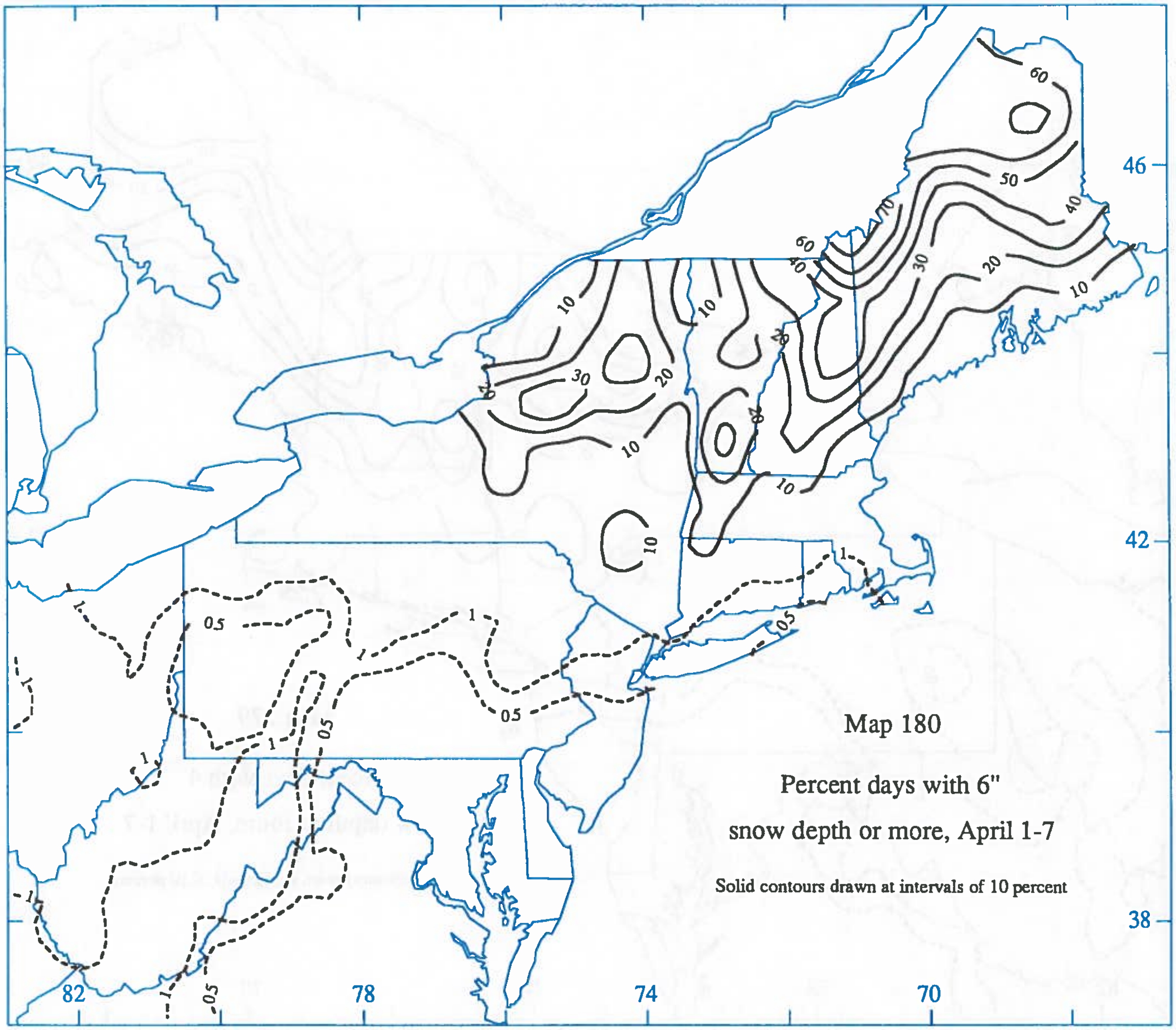
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 179

Percent days with 4" snow depth or more, April 1-7

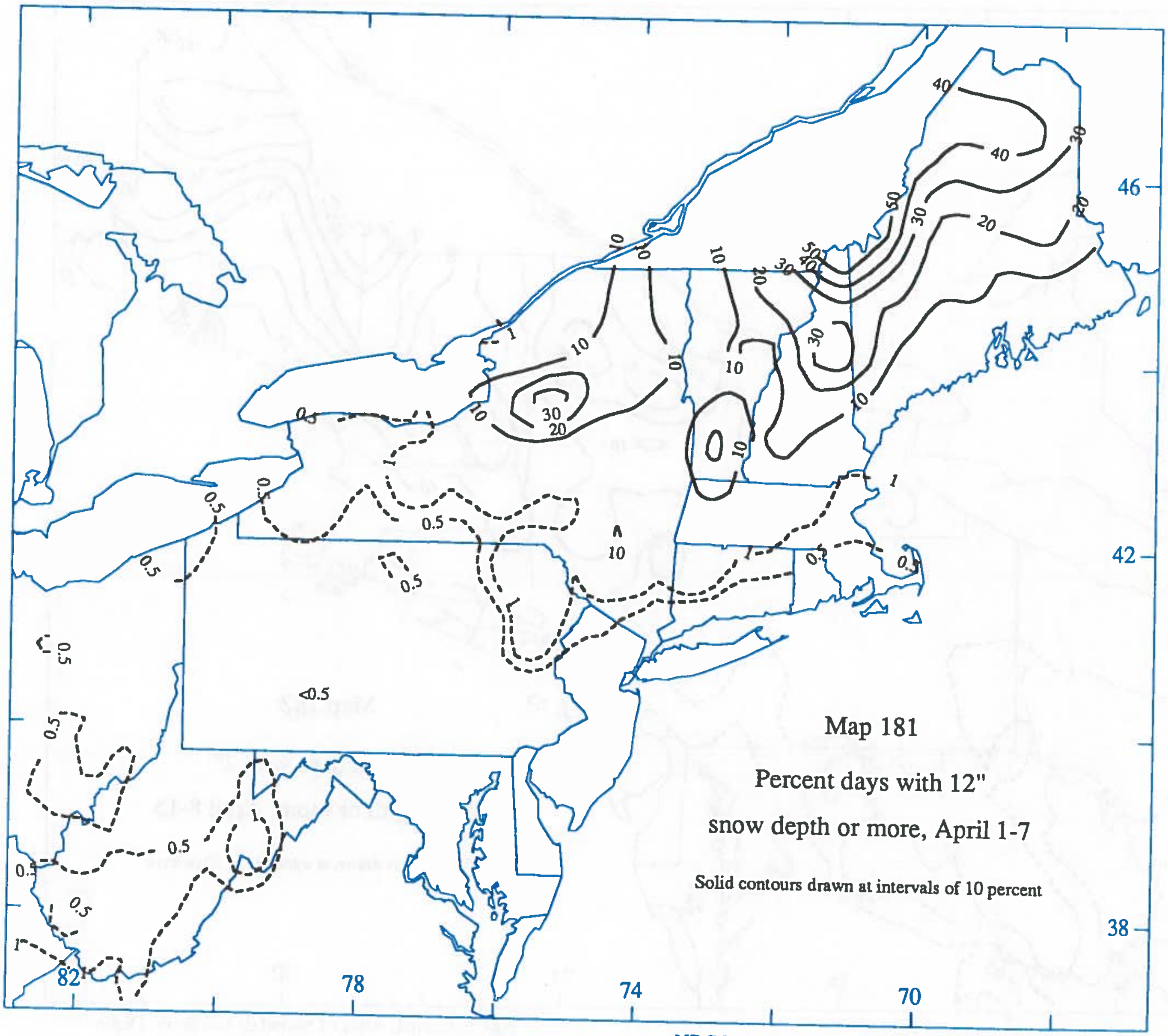
Solid contours drawn at intervals of 10 percent

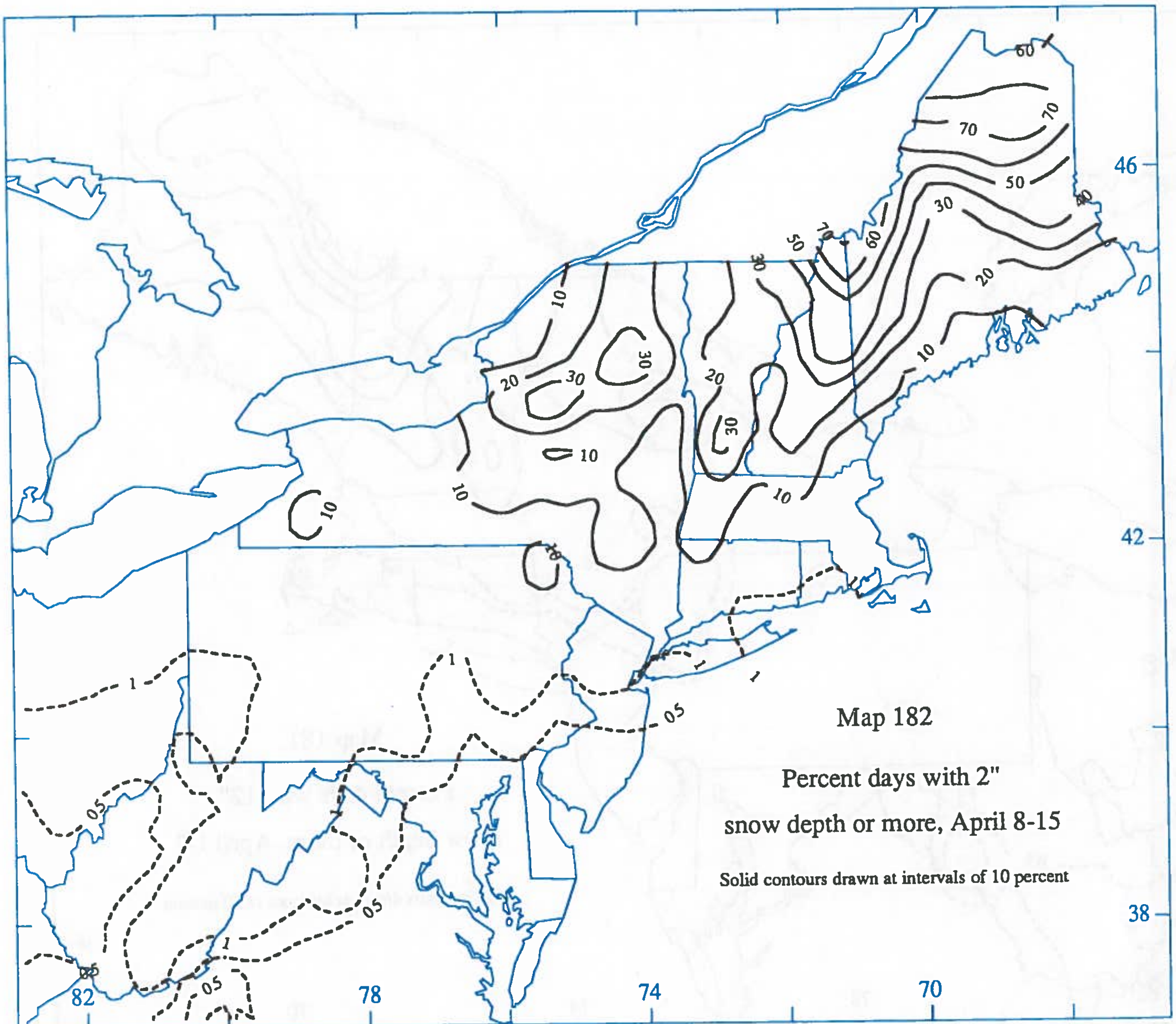


Map 180

Percent days with 6" snow depth or more, April 1-7

Solid contours drawn at intervals of 10 percent

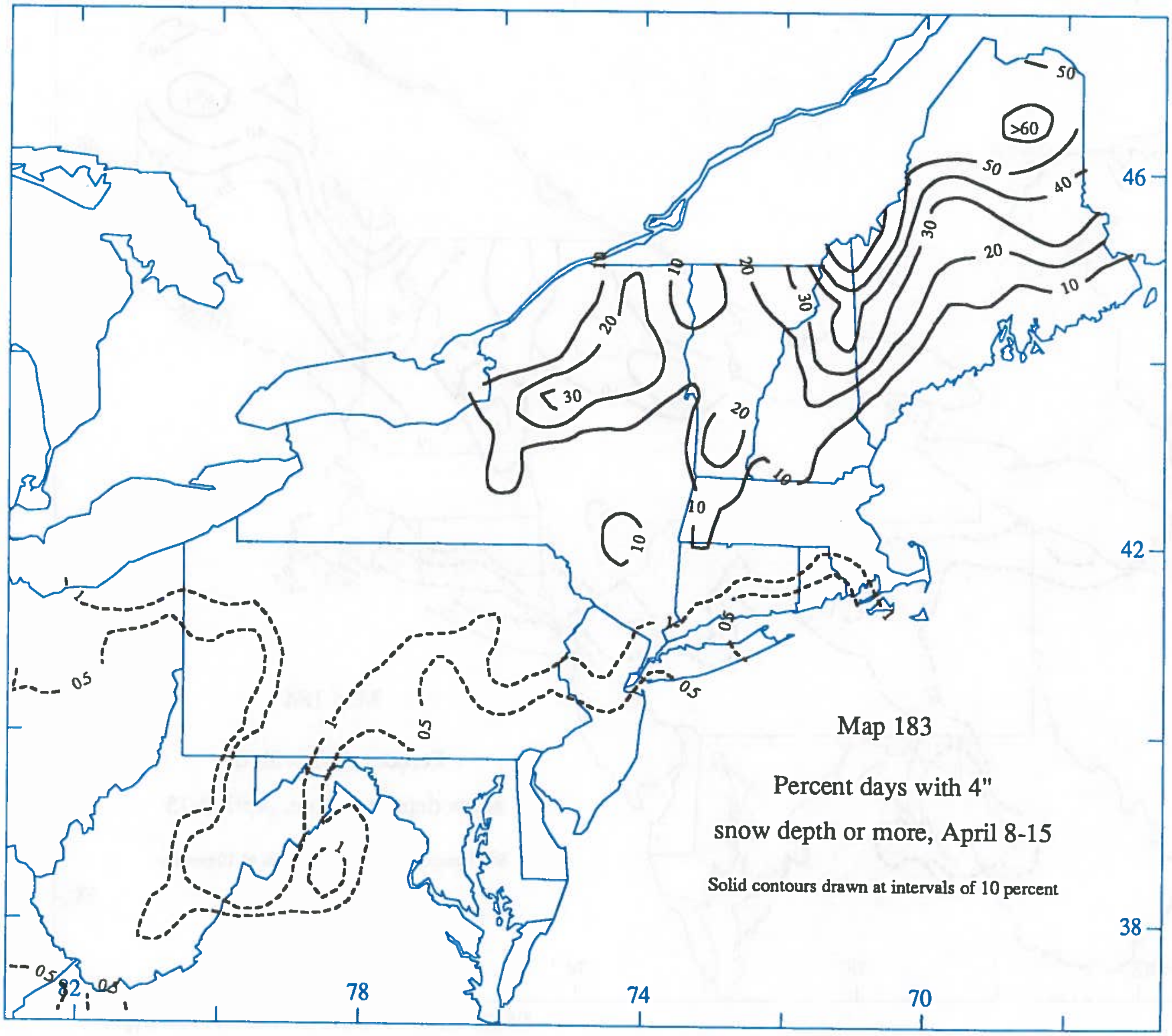

46
42
38
82
78
74
70
Map 181
Percent days with 12"
snow depth or more, April 1-7
Solid contours drawn at intervals of 10 percent



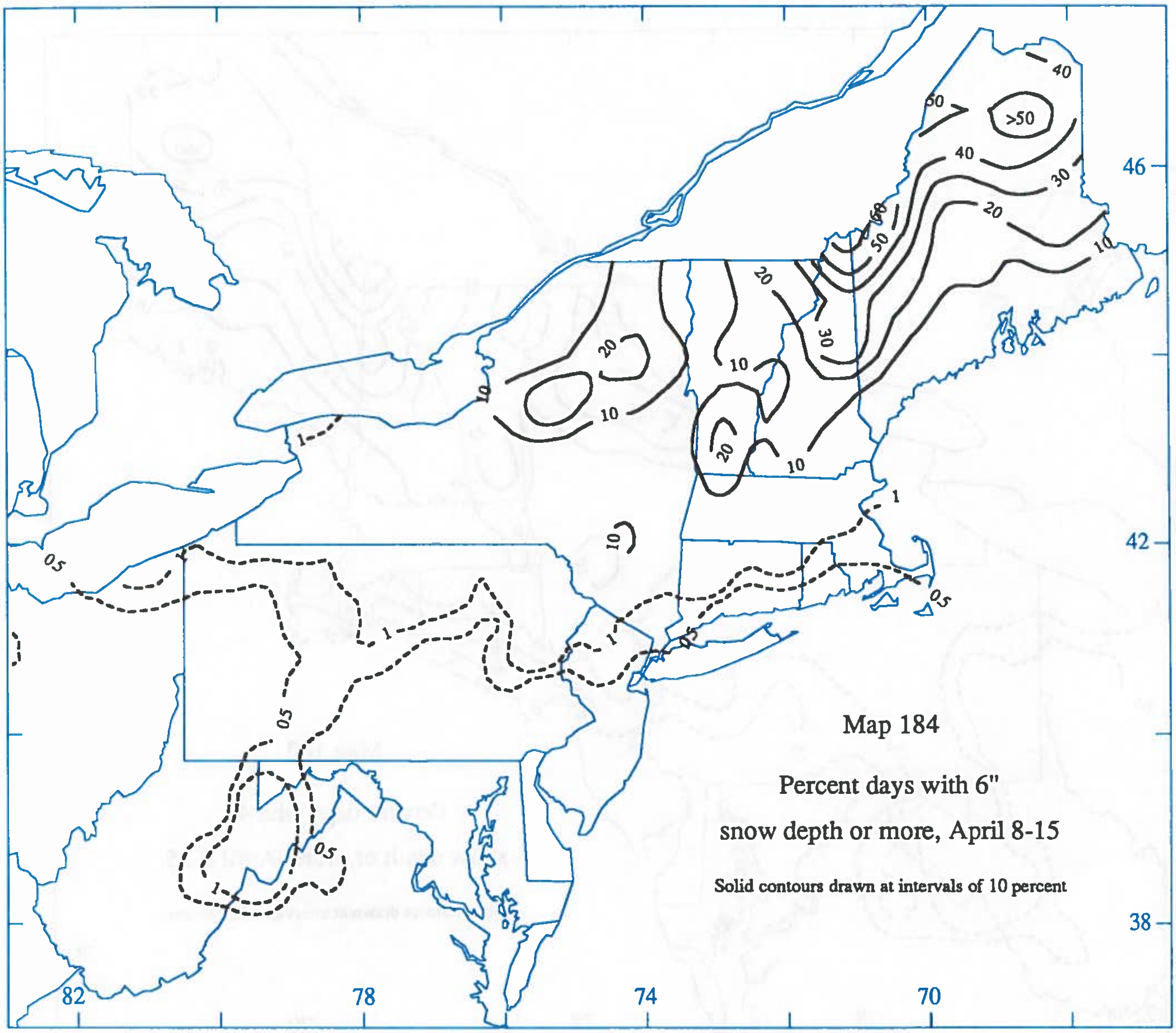
Map 182

Percent days with 2" snow depth or more, April 8-15

Solid contours drawn at intervals of 10 percent



NRCC-Cornell Atlas of Snowfall and Snow Depth

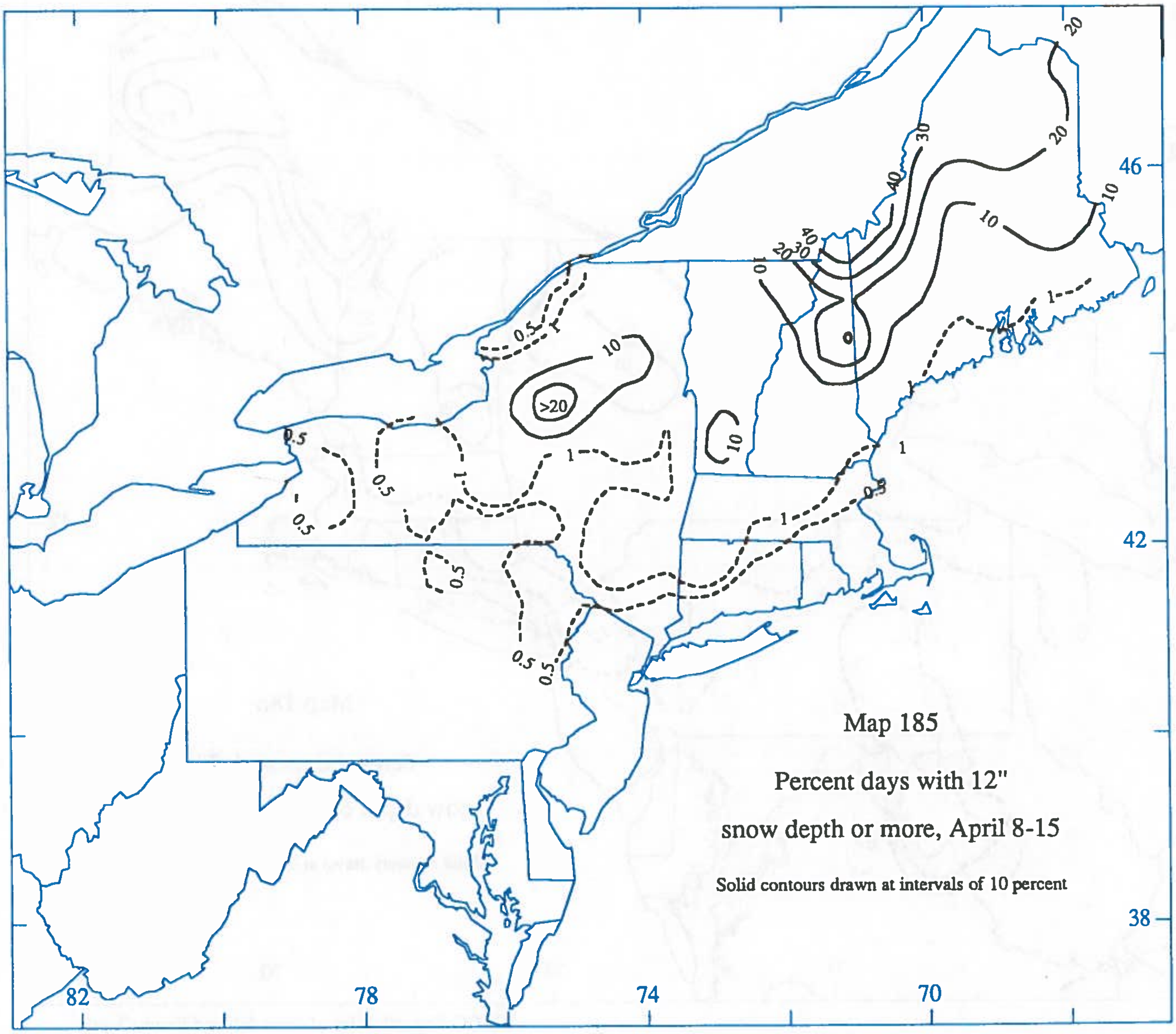


Map 184

Percent days with 6" snow depth or more, April 8-15

Solid contours drawn at intervals of 10 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth

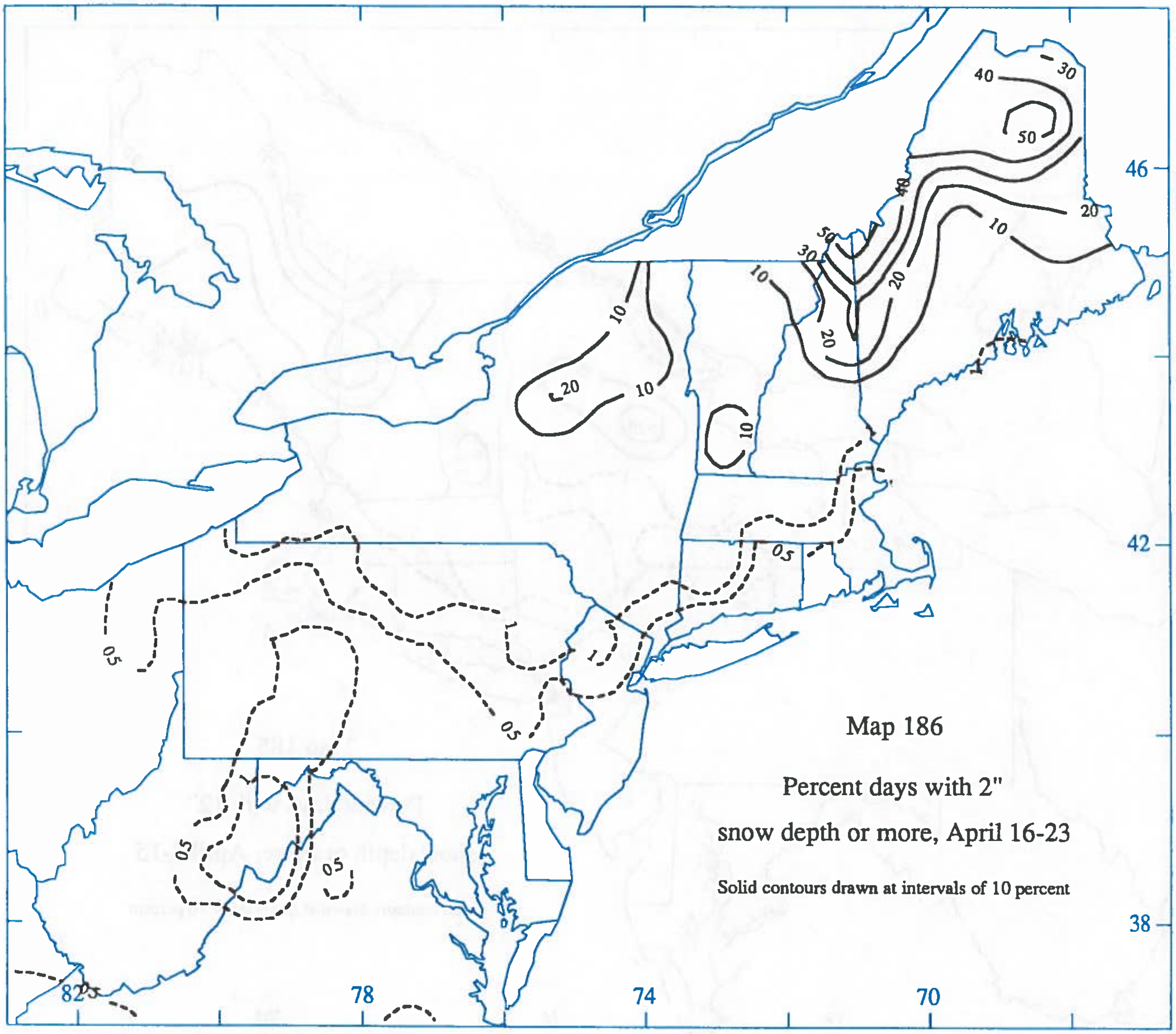


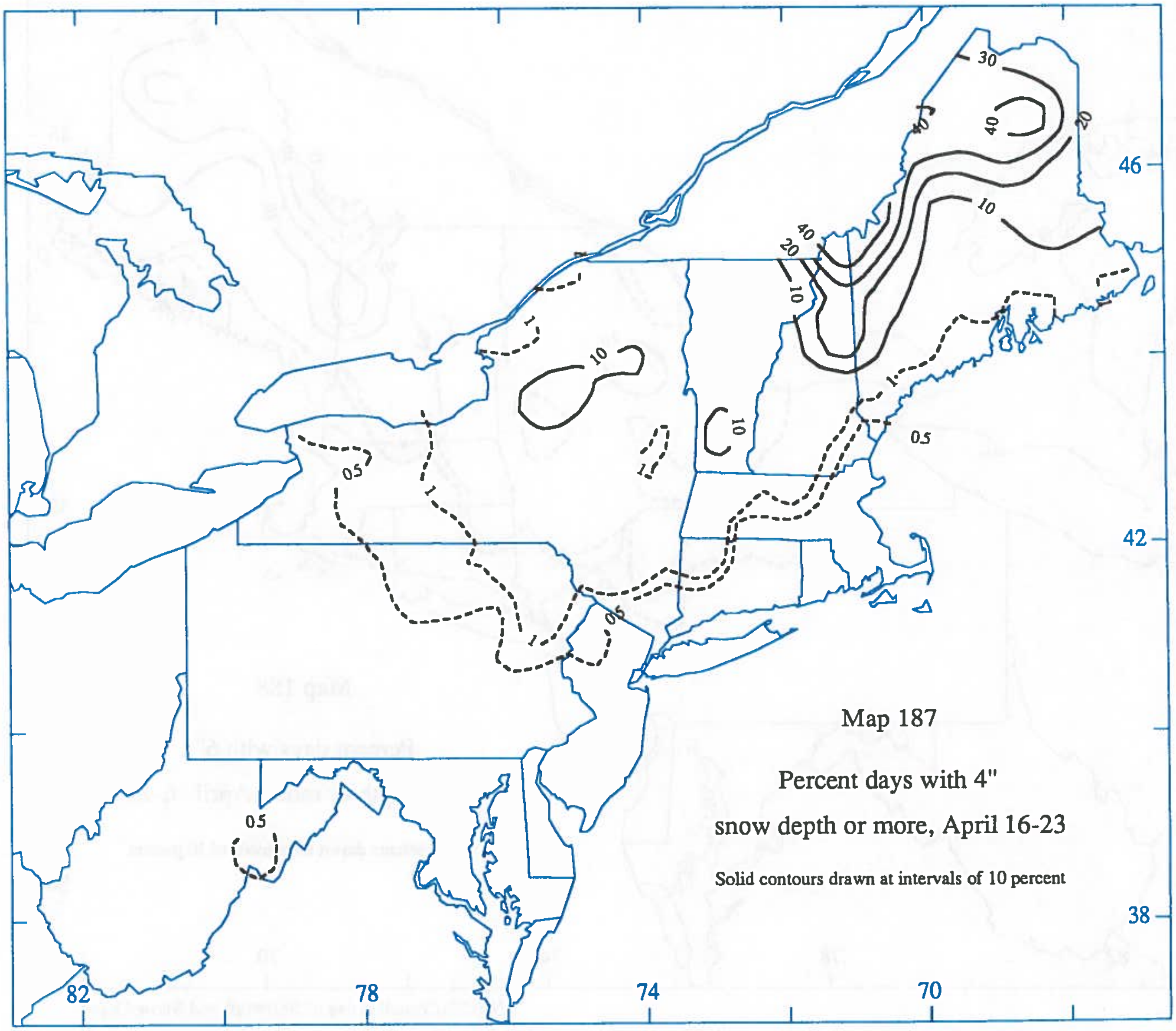
Map 185

Percent days with 12"

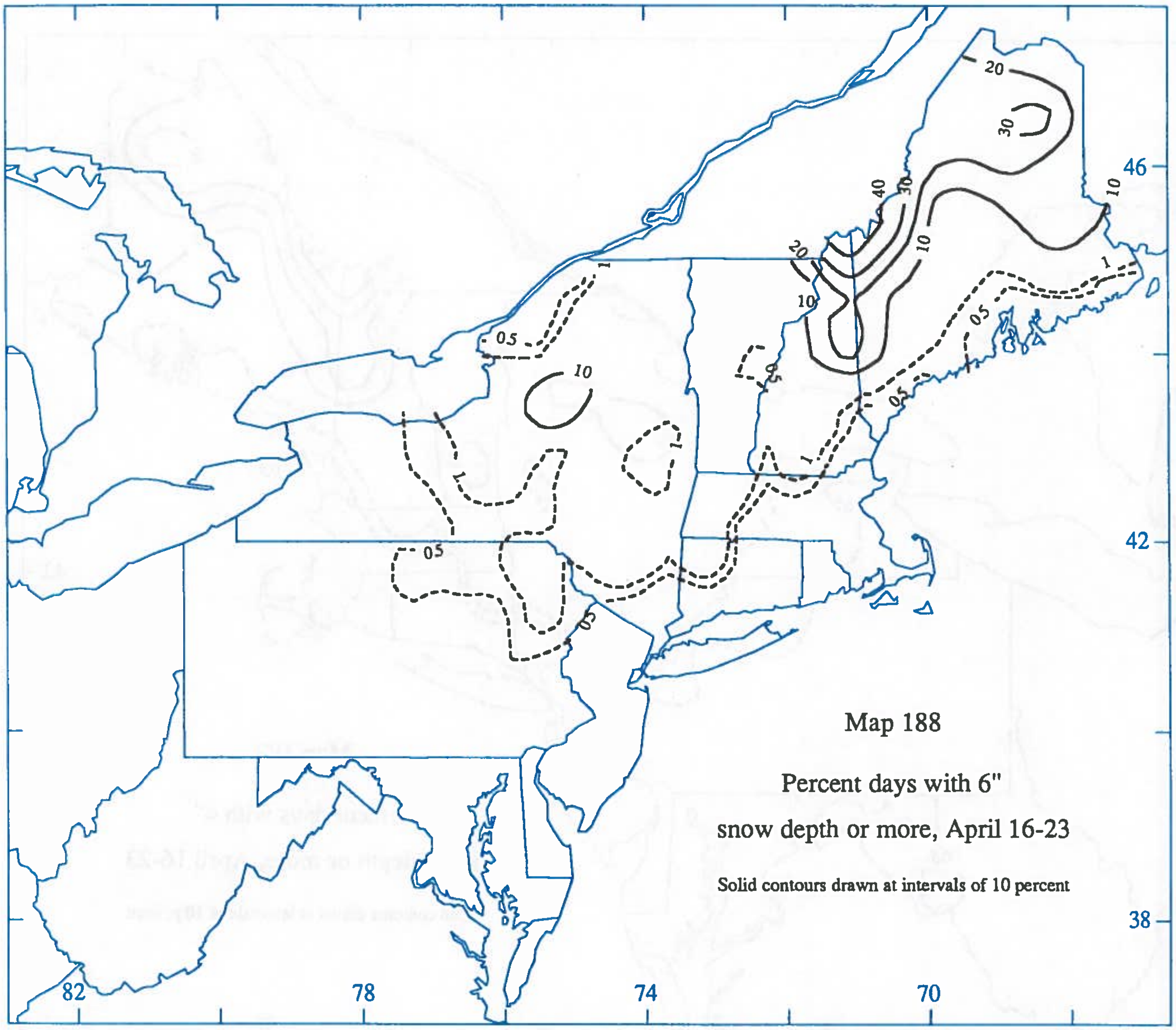
snow depth or more, April 8-15

Solid contours drawn at intervals of 10 percent


Map 186
Percent days with 2"
snow depth or more, April 16-23
Solid contours drawn at intervals of 10 percent
46
42
38
82
78
74
70
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 187
Percent days with 4"
snow depth or more, April 16-23
Solid contours drawn at intervals of 10 percent
46
42
38
82
78
74
70

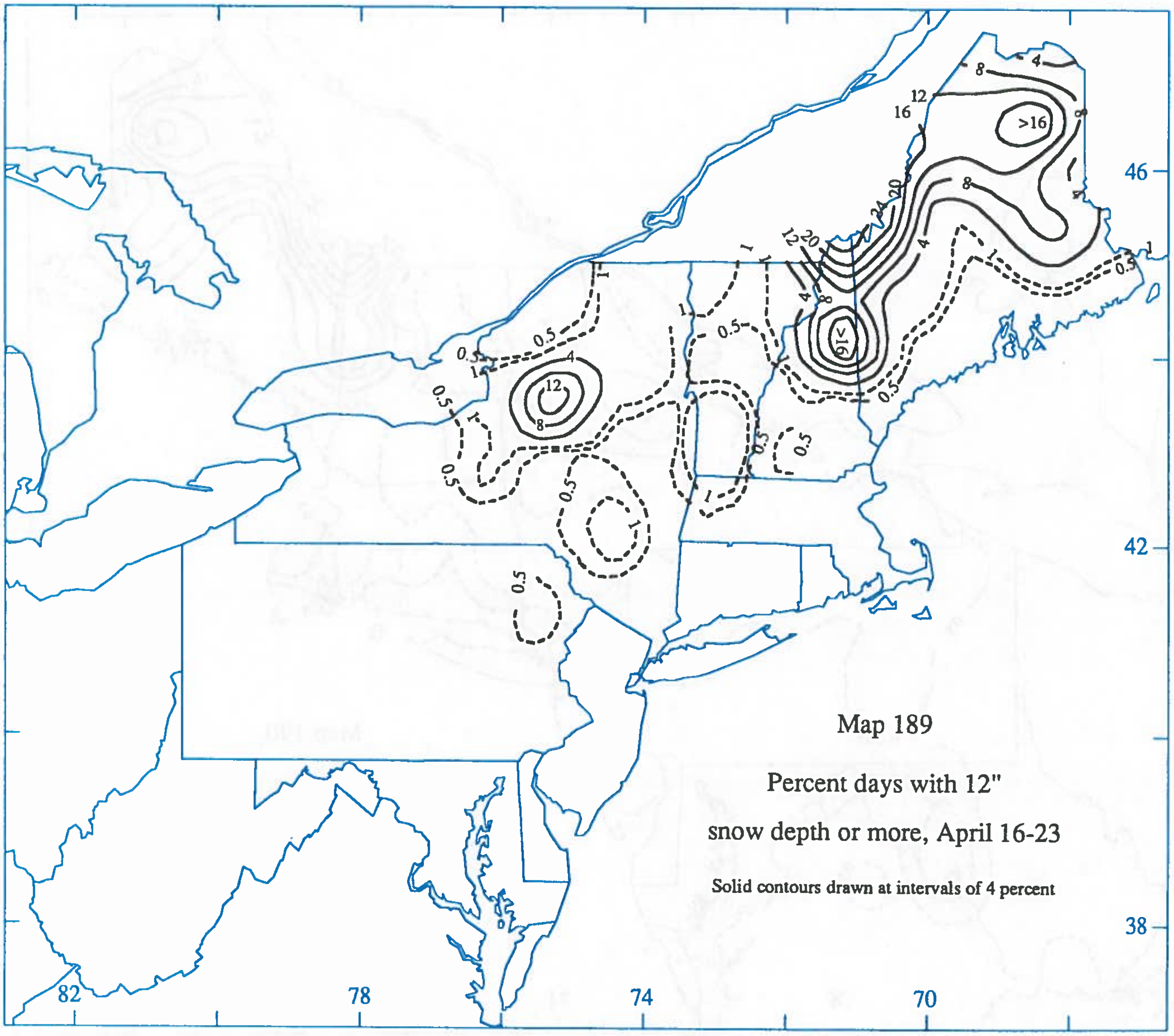


Map 188

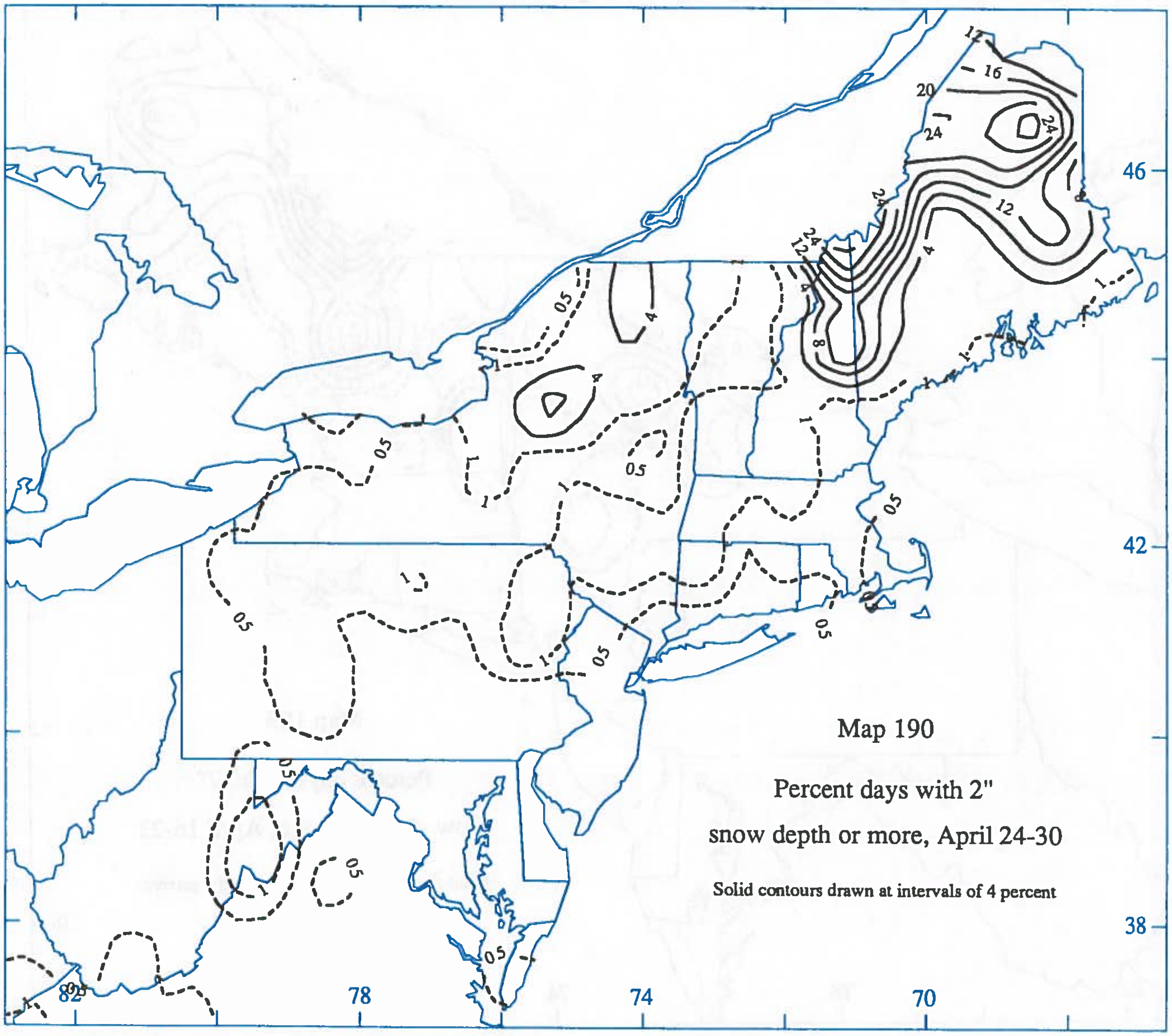
Percent days with 6" snow depth or more, April 16-23

Solid contours drawn at intervals of 10 percent

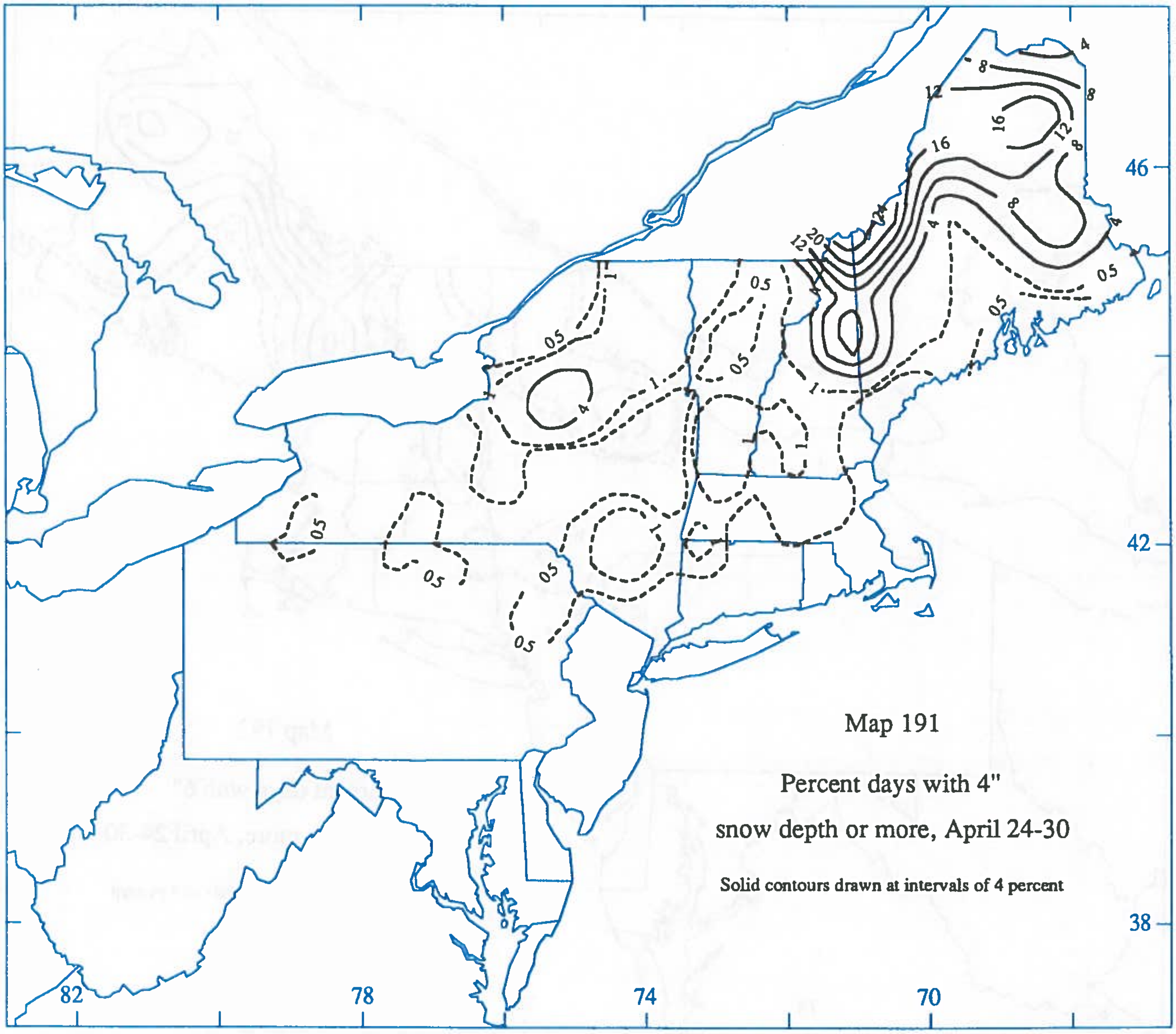
NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth



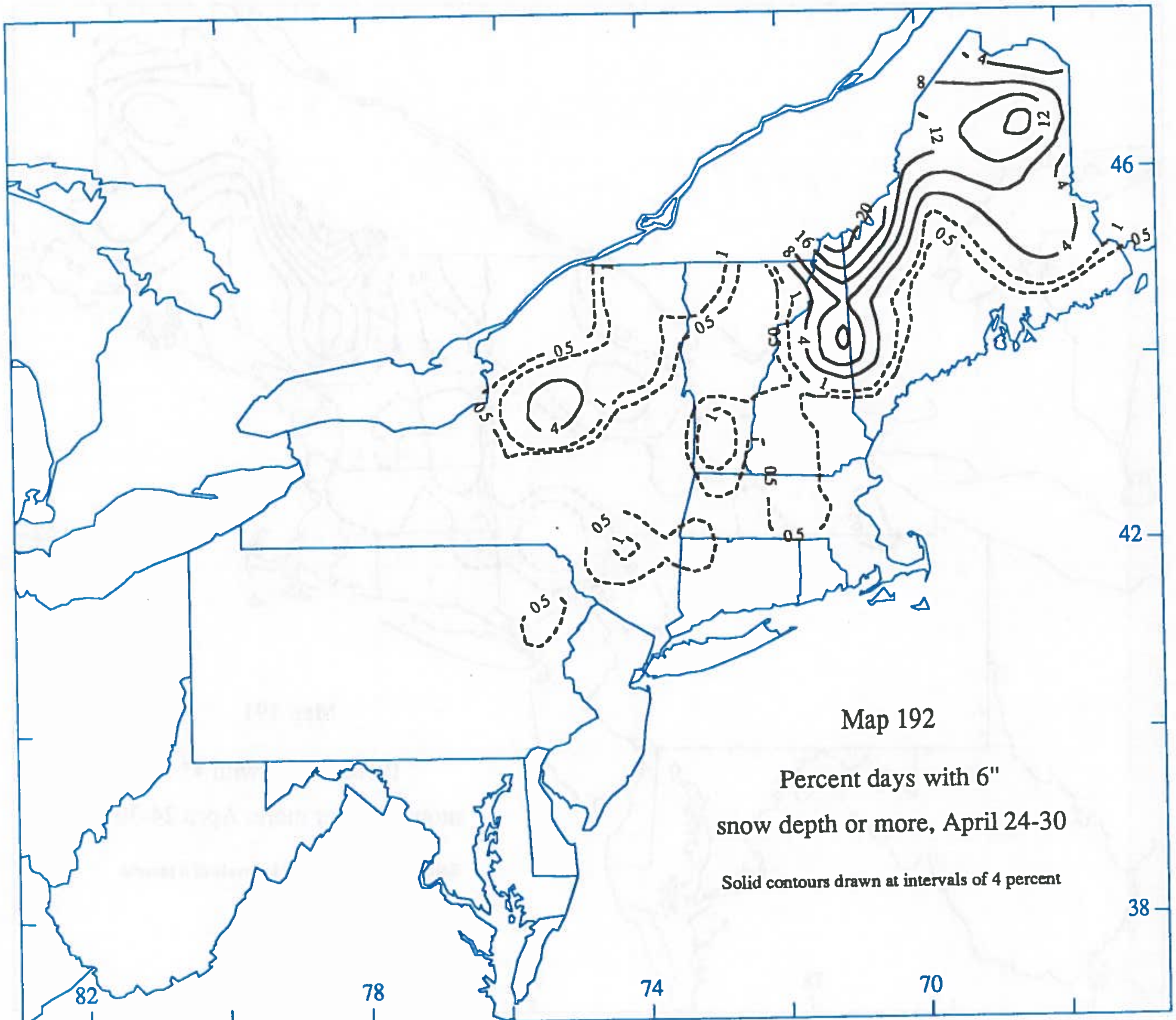
NRCC-Cornell Atlas of Snowfall and Snow Depth



Map 191

Percent days with 4" snow depth or more, April 24-30

Solid contours drawn at intervals of 4 percent



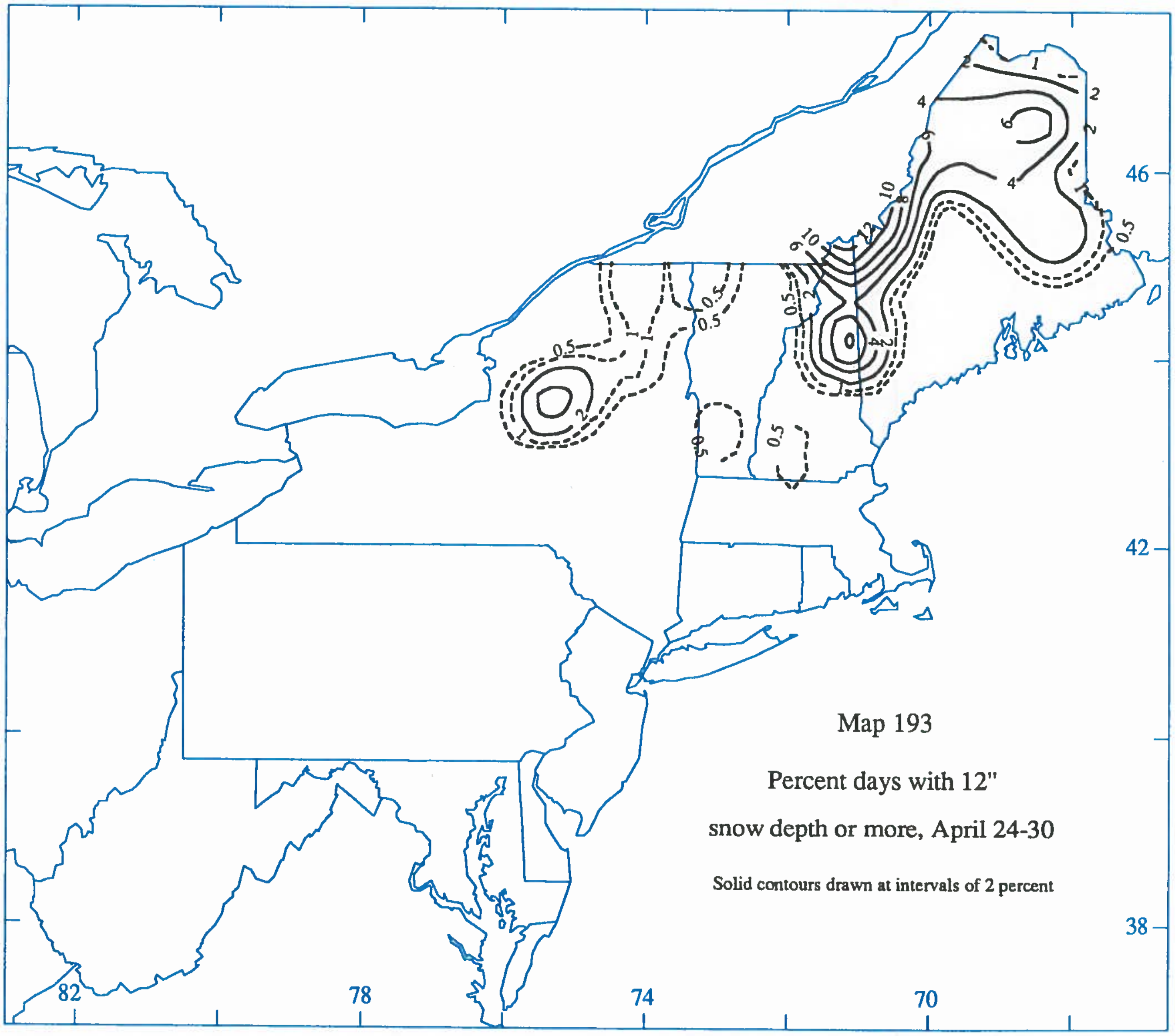
Map 192

Percent days with 6"

snow depth or more, April 24-30

Solid contours drawn at intervals of 4 percent

NRCC-Cornell Atlas of Snowfall and Snow Depth



NRCC-Cornell Atlas of Snowfall and Snow Depth

NOTES

NRCC RESEARCH SERIES

Knapp, W.W. and K.L. Eggleston, *Some Impacts of Recent Climate Variability on the Northeast,* NRCC Research Publication RR 91-1.

Wilks, D.S., *Gamma Distribution Probability Tables for Use in Climatology,* NRCC Research Publication RR 91-2.

Samelson, D., *A Simple Method for Predicting Snowpack Water Equivalent in the Northeastern United States,* NRCC Research Publication RR 92-1.

Wilks, D.S., *Spline Interpolated Parameters for Adjusting Climatological Precipitation Distributions using the 30- and 90-Day Outlooks,* NRCC Research Publication RR 92-2.

DeGaetano, A.T., K.L. Eggleston, and W.W. Knapp, *A Method to Produce Serially Complete Daily Maximum and Minimum Temperature Data for the Northeast,* NRCC Research Publication RR 93-2.

DeGaetano, A.T., W.W. Knapp, and K.L. Eggleston, *Standardizing Growing Degree Day Totals for Differences in Temperature Observing Schedules,* NRCC Research Publication RR 93-3.

DeGaetano, A.T., K.L. Eggleston, and W.W. Knapp, *Daily Solar Radiation Estimates for the Northeastern United States,* NRCC Research Publication RR 93-4.

NRCC DIGITAL DATA SETS

Eggleston, K.L. and D.S. Wilks, *Gridded Monthly Precipitation Distribution Parameters for the Continental United States,* NRCC Data Set DS 92-1.

Cember, R.P., K.L. Eggleston, and D.S. Wilks, *Digital Snowfall and Snow Depth Probabilities for the Northeastern United States and Southeastern Canada,* NRCC Data Set DS 93-1.

CORNELL
UNIVERSITY

Department of Soil, Crop and Atmospheric Sciences
Ithaca, New York 14853

Produced by the Northeast Regional Climate Center
6/93 7.5C 125-3326