

The New USDA Plant Hardiness Zone Map

Peter Del Tredici

The publication of this map provides an opportunity to review the history of hardiness zone maps.

The new Plant Hardiness Zone Map, updated for the first time in twenty-five years, was released by the United States Department of Agriculture this past February. Unlike the previous edition, the map includes Alaska and Hawaii and is detailed enough to show county lines within the states. In addition, the map includes Canada and Mexico for the first time. According to Dr. Marc Cathey, Director of the National Arboretum in Washington, D.C., who oversaw the updating and production of the map, such expansion is appropriate given that "we share many plants, both native and introduced, with these countries."

The large-format map, measuring four feet by four feet, has eleven color-coded zones based on ten-degree (Fahrenheit) differences in the *average annual minimum temperatures*. As in the old map, each zone is divided into A and B regions based on five-degree differences. One new zone, Zone 11, has been added (including parts of Mexico, California, Hawaii, and Florida) where the average annual minimum temperature is above forty degrees Fahrenheit.

Data from 14,500 weather stations, gathered between 1974 and 1986, went into this update—more than twice as many stations as were used for the maps introduced in 1960 and 1965. With the additional data, small areas of microclimates are indicated for the first time. These are either cool pockets caused by mountaintop elevations or hot spots due to the heat of cities or protected valleys. The

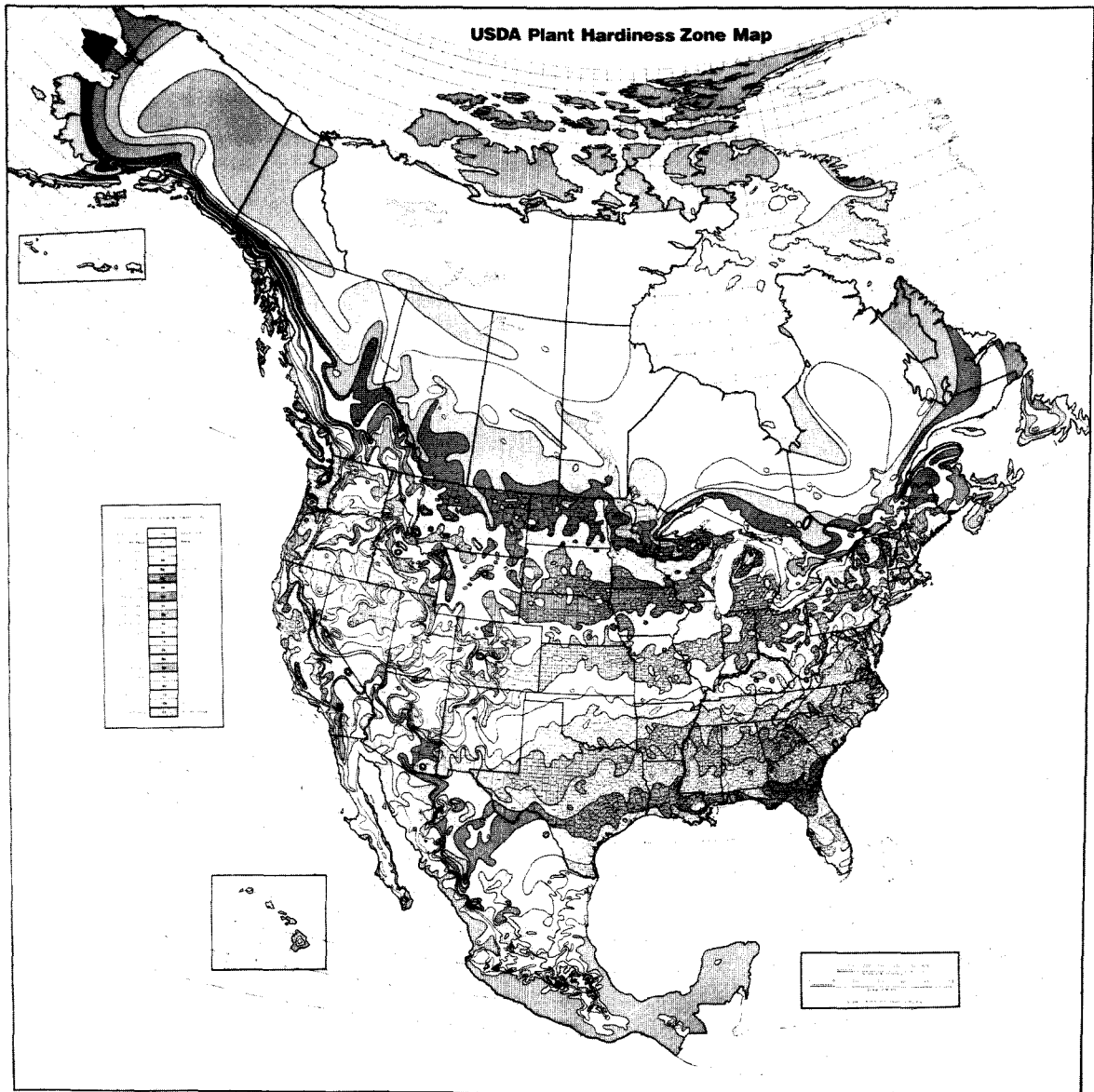
wealth of new data used to create the map also allows the borders of the zones to be drawn in more detail than before.

According to its makers, the new map does not seem to uncover any global warming trend, but it does reveal some regional changes. On both coasts, but particularly in the Southeast, temperatures are given as five to ten degrees cooler in the winter than on the previous map. Isolated pockets of the Northeast are slightly warmer, and sections of the Midwest show some minor changes, as do parts of Canada.

Since 1960, when the USDA published its first zone map, considerable confusion has arisen from the fact that it used different temperature ranges to define its zones than did its well-established predecessor, the Arnold Arboretum zone map. The publication of the latest 1990 USDA map, based as it is on more abundant and more accurate data than the Arnold Arboretum map, provides the perfect opportunity to resolve this confusion. At long last, the United States has a single, *standardized* zone map. There can be little doubt that this new USDA map is superior to any, and all, previous efforts.

Brief History of Hardiness Zone Maps

This is perhaps the appropriate time to take a brief look at the history of hardiness zone maps, the first of which was published in 1927, in Alfred Rehder's ground-breaking *Manual of Cultivated Trees and Shrubs*. This

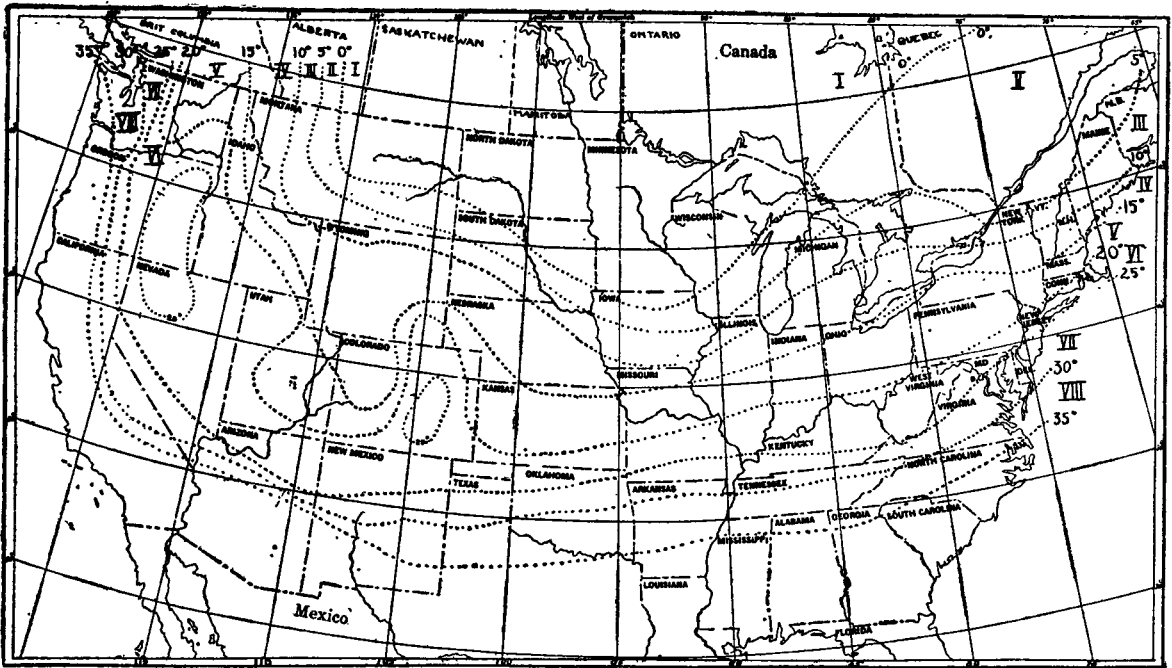


The new 1990 USDA Hardiness Zone Map.

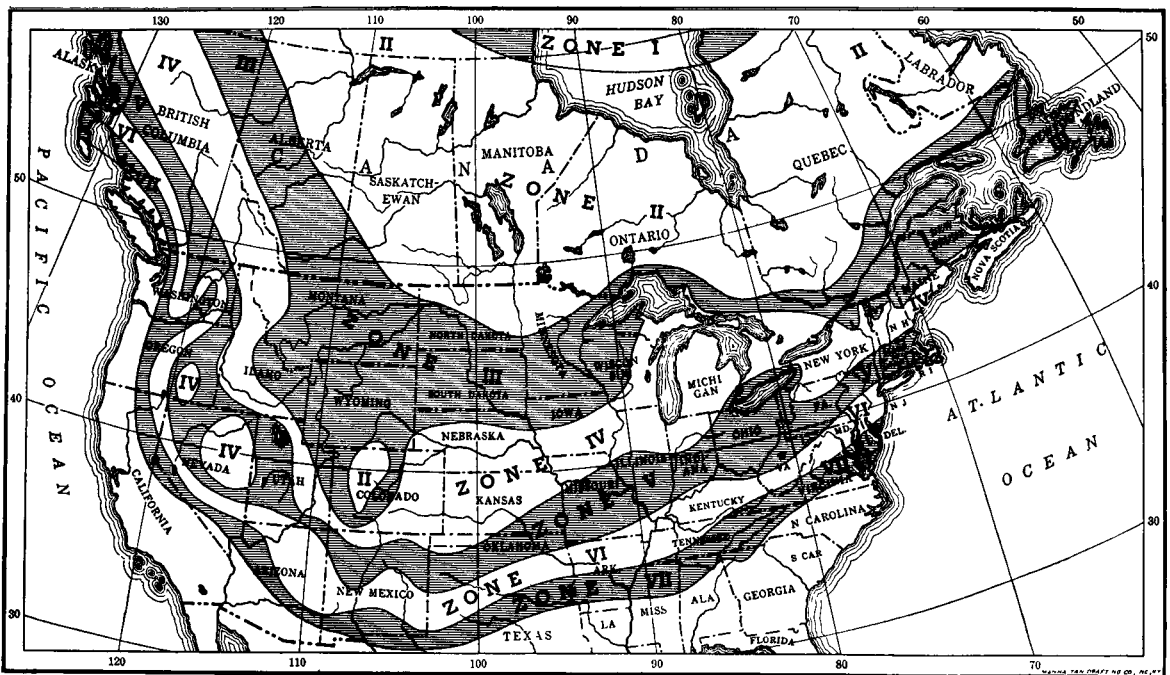
early attempt divided the cold temperate United States into eight zones characterized by *uniform five-degree (Fahrenheit) differences in the lowest mean temperature of the coldest month*. All the plants listed in the *Manual* were assigned, at least tentatively, to one of the hardiness zones. As can be seen in

the accompanying figure, the lines separating the zones were very approximate.

Rough as it was, however, this map stood alone until 1938 when Donald Wyman, using data from a U.S. Weather Bureau map for the years 1895 through 1935, redrew its contours based on the *average annual minimum tem-*



The first Hardiness Zone Map from the first edition of Alfred Rehder's Manual of Cultivated Trees and Shrubs, published in 1927. The contour lines are based on the lowest mean temperature of the coldest month.



The second Hardiness Zone Map from the second edition of Rehder's Manual, published in 1940. The contour lines shown here are based on average annual minimum temperatures.

peratures, and published a new map in his book *Hedges, Screens and Windbreaks*. While based on a different temperature standard than Rehder's map, the contours of the two are remarkably close. Wyman's new map was published in the second edition of Rehder's *Manual* (1940), and the hardiness ratings of the various plants were adjusted accordingly. Wyman, with assistance from various Arnold Arboretum staff members, updated his map in 1951, 1967, and, ultimately, in 1971.

Unlike Rehder's original map, however, Wyman's hardiness zones were not based on a *uniform* number of degree differences. Some of his zones had 15-degree ranges in the average annual minimum temperature, while others were based on 5- or 10-degree ranges. In particular, it is worth noting that Boston is located in one of the two 5-degree zones.

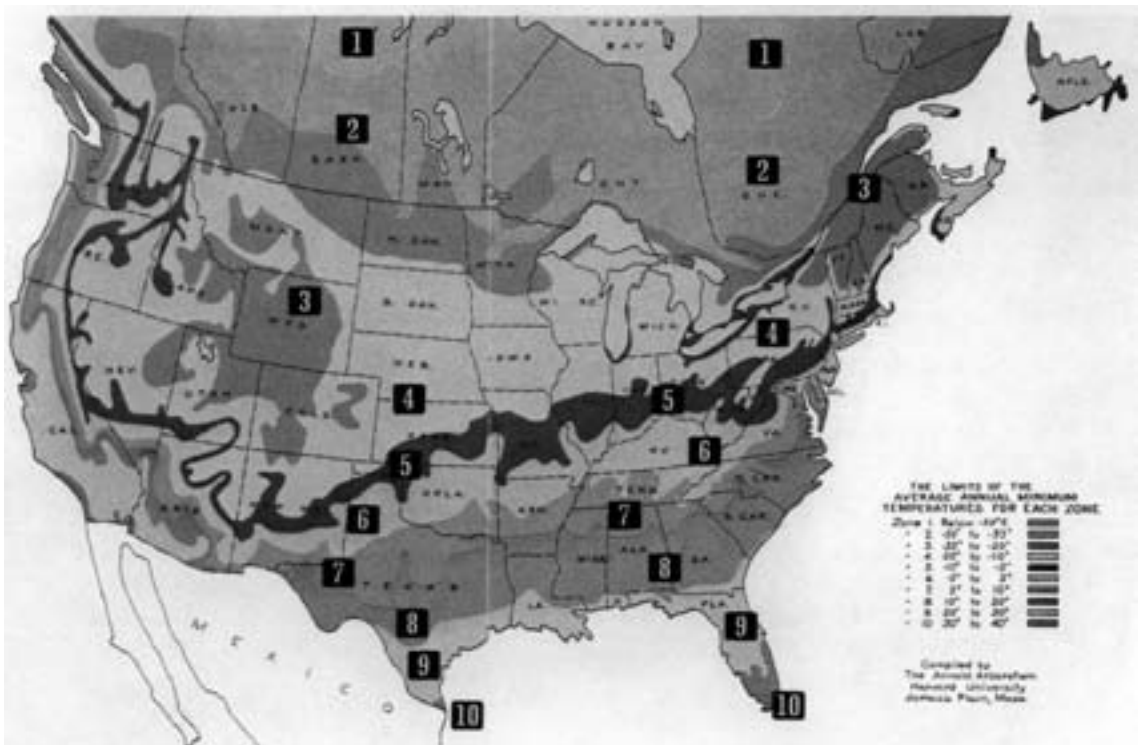
This lack of uniformity was called into question in 1960 when the USDA produced

its first hardiness zone map with zones based on uniform ten-degree ranges in average annual minimum temperature. It is interesting to note that while both the USDA and the Arnold Arboretum maps were based on the same weather station data, their differences were only in *where* the contour lines were drawn. From this perspective, it is clear that the uniformity of the USDA zones is preferable to the arbitrary Arnold Arboretum zones.

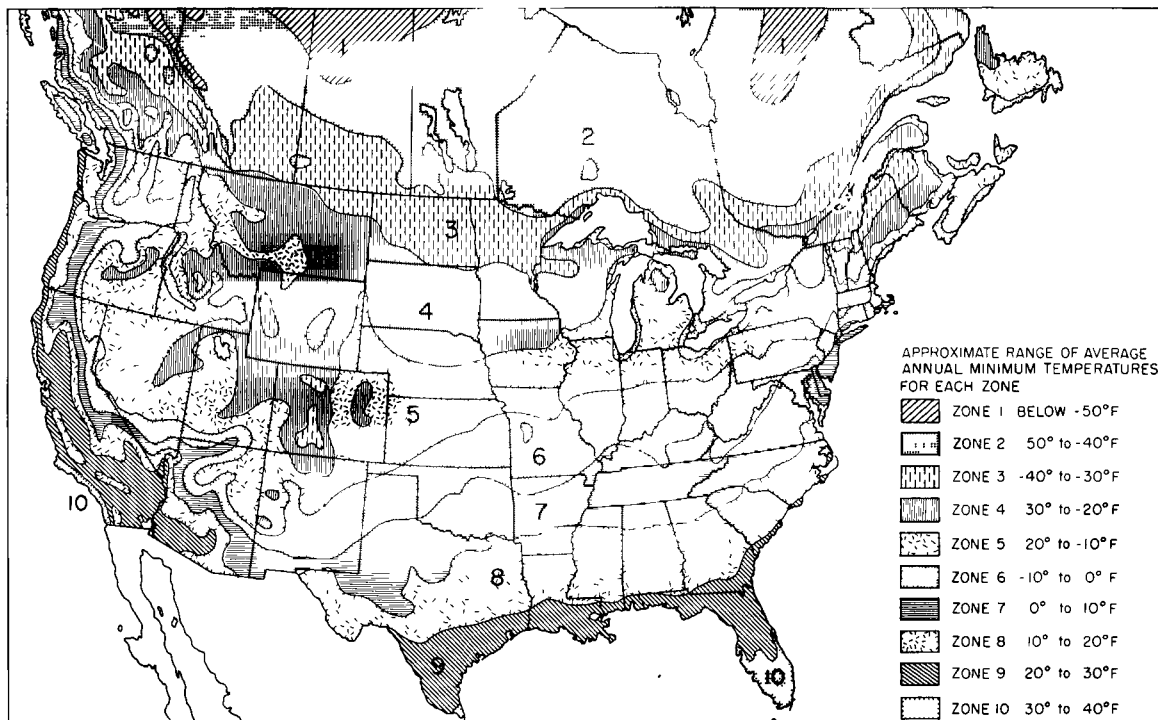
Limitations

In considering national hardiness zone maps, one should not overlook the intrinsic limitations of the whole concept of hardiness zones. Alfred Rehder was the first to point out these limitations in his 1927 *Manual*:

There are, however, many other factors besides temperature in winter which will influence the hardiness and growth of certain plants, as soil, its physical as well as chemical composition, exposure, rainfall,



The Arnold Arboretum Hardiness Zone Map from 1967.



The USDA Hardiness Zone Map published in 1960.

humidity of the air, shelter from cold winds. As a rule one may say that plants stand cold better in a drier situation than in a wet one, and that deciduous trees and shrubs prove hardier in a more exposed situation and in a climate with higher summer temperature, while evergreen plants prefer a sheltered situation, and like a more humid climate and less extreme summer and winter temperatures.

Indeed, as most gardeners have learned during the 1980s, taking "microclimate" variations into account often allows gardeners to grow plants that, according to the hardiness maps, should not survive in their area. At the Arnold Arboretum, for example, it is known that the fluctuating temperatures of early spring can be more damaging to some plants (particularly those from northeast Asia) than

the minimum winter temperatures.

Taken with a hefty dose of skepticism, however, hardiness zone maps do provide gardeners with a useful guide to the plants they can grow safely in their area.

Availability

Copies of the new USDA Hardiness Zone Map are available through the Superintendent of Documents, Government Printing Office, Washington, DC 20402, for \$6.50 (Misc. Publ. 1475); or from the Arnold Arboretum Bookshop, 125 Arborway, Jamaica Plain, MA 02130.

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