

Introduction

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A problem of first order significance in planning an atlas is to determine its purpose. From its inception, *The national atlas of the United States of America* was designed to be of practical use to decision makers in government and business, planners, research scholars, and others needing to visualize country-wide distributional patterns and relationships between environmental phenomena and human activities. Consequently, the 765 maps in this volume constitute a scientific presentation, in cartographic format, of the principal characteristics of the country, including its physical features, historical evolution, economic activities, socio-cultural conditions, administrative subdivisions, and place in world affairs.

EVOLUTION OF THE NATIONAL ATLAS PROJECT

Production of a national atlas of the United States of America had been advocated by various Federal agencies, professional organizations, and commercial firms, but the magnitude of the task and the scope of research required were deterring factors. A prototype volume of some 400 pages was completed in 1952 by the American Geographical Society, with funds from the American Council of Learned Societies and considerable guidance and inspiration from Dr. Samuel W. Boggs, then Geographer of the U.S. Department of State. The unanimous opinion of ten major publishing firms to which that prototype was presented at a meeting in New York City was, however, that compilation and production of a national atlas should be a government responsibility, and they were not prepared to undertake the project.

Recognizing that national atlases had been produced by official agencies in more than 30 other countries, and that responsibility for the broad scope of national atlas subject matter is divided among many agencies in the United States, the Association of American Geographers focused attention on this problem at a national conference, and asked the National Academy of Sciences-National Research Council to create an interagency National Atlas Committee. Late in 1954, the Academy established, under the able chairmanship of Dr. Carleton S. Barnes, Geographer in the Department of Agriculture, a Committee on the National Atlas of the United States, with representatives from a score of Federal mapping agencies. The primary functions of the Committee were to draft basic specifications and to coordinate the cartographic work of those agencies so that maps they normally made for other purposes could be accumulated as a looseleaf collection that would eventually become a national atlas. Between 1954 and 1961 the cooperating agencies published some 80 sheets of thematic maps of the United States, but in spite of standards established by the Academy Committee, the need became apparent for a more formal arrangement of the maps, more comprehensive scope of the subject matter, greater uniformity of quality, and centralized distribution of map sheets. Consequently, in 1961, the Committee on the National Atlas of the United States proposed its own termination, and recommended through the President of the National Academy of Sciences that responsibility for the national atlas be placed in a single Federal mapping agency, preferably the Geological Survey in the U.S. Department of the Interior.

After careful consideration of a letter from the President of the National Academy of Sciences, and with the concurrence of the Director of the Geological Survey, the Secretary of the Department of the Interior responded on March 10, 1961, accepting the recommendation of the National Academy of Sciences.

Congress appropriated funds to begin work on the *National atlas* in 1963, and the Library of Congress provided, on reimbursable loan, the Chief of its Geography and Map Division, Dr. Arch C. Gerlach, to serve as Editor. He planned and organized the National Atlas Project, and subsequently, as Chief Geographer of the Geological Survey, he continued his functions as Editor. Liaison officers to the National Atlas Project were appointed by 84 agencies and bureaus, base maps were prepared at four scales, and the fundamental design principles and specifications were formulated in collaboration with an advisory group of eminent cartographers and geographers.

GENERAL REFERENCE MAPS

The first part of the *National atlas* is devoted to general reference maps which contain most of the 41,000 place names recorded in the index. These maps have been included in the Atlas for the convenience of readers who desire basic locational information. Pages 6 through 45 contain sections of a new map of the 50 States at the scale of 1:2,000,000. They are followed by five pages containing maps at 1:500,000 of the 27 largest cities in the country, and four pages showing outlying areas of the United States in the Pacific and Caribbean at scales of 1:250,000 and 1:1,000,000. In addition, inside the back cover are transparent plastic overlays that are segmented to fit over Atlas maps. One set contains boundaries and names of the country's 3,049 counties at 1:7,500,000, a second names many of the physical features shown on the 1:7,500,000 relief map (p. 56-57), and a third contains names of both physical features and populated places on maps of Alaska at a scale of 1:17,000,000 and on special subject maps at 1:17,000,000 and 1:34,000,000.

SPECIAL SUBJECT MAPS

Special subject maps that relate statistical data to places and reveal distributional patterns on a national basis are included in a 281-page section. These maps, also known as thematic maps, convey significant concepts of man-environment relationships and interactions, and constitute scientific bases for analyzing the economic development of the country. They are smaller in scale than the general reference maps, and emphasize accuracy of concept and effectiveness of visual impact. Furthermore, the reduction of data to scales suitable for special subject maps in atlases requires scientific generalization and symbolization on base maps that have been carefully designed to exclude extraneous content which would obscure or clutter the fundamental message of each map.

For this *National atlas*, data were collected from official, or other primary sources, categorized, and processed to achieve high standards of validity, and plotted at suitable scales. It was necessary to select map subjects on the basis of completeness and definitiveness of the data. Many of the maps bear notes referring users to source documents or to maps at larger scales if they desire more detail than can be shown at Atlas scales.

For the thematic cartographer, scale reflects a mental process, a way of thinking, rather than a ratio between distance on the map and distance on the earth. It is in the conversion of base survey material to thematic map scales that the judgment of the cartographer determines the effectiveness or potential visual impact of the map. In the process, he decides what to omit, what to exaggerate, and how to categorize and symbolize data to achieve the most appropriate emphasis.

The special subject maps of the United States are limited to three scales (1:7,500,000, 1:17,000,000, and 1:34,000,000) to facilitate comparison of data but at the same time to allow some flexibility in the amount of detail to be shown for each subject. Alaska is shown as an inset at half scale on many of the maps because sufficiently detailed statistics were not available for the period prior to statehood to warrant full scale treatment. New base maps at each scale, and with separation plates based on content as well as color were prepared so that different combinations could be readily made depending on the special subject matter to be added.

All maps of the United States, including the general reference map at 1:2,000,000 are on the Albers conical equal area projection; standard parallels are 29³⁰' and 45³⁰' N. latitude for maps of the 48 conterminous States, and 55° and 65° N. and 8° and 18° N. latitude for Alaska and Hawaii, respectively. The Albers conical equal area projection was selected because equivalence of area is very important for validity of maps showing distributional patterns and relationships. The projection is simple to construct, is suitable for segmenting and reassembling, shows very small errors in scale, and has long been popular for special subject maps of the United States which have large east-west expanse in the middle latitudes.

Among other standard specifications adopted for maps of the *National atlas* were:

- A simple scotch rule frame in dark gray to bound the maps, to improve the legibility of coordinate values, and to aid registration of plates, so that attention would not be distracted from the map itself.
- A medium gray tint on the map margin outside the frame to avoid the attraction of the eyes to white margins, to emphasize the map, and to minimize the evidence of soil caused by map use.
- A light gray tint over foreign land areas to complete the neutral background against which to display most effectively maps of the United States on which special subject data have been plotted in symbols, patterns, or tints over a white background.
- Widely used symbols to facilitate reader recognition.
- Simple, clear type styles, including Contemporary Optima for marginalia, titles, and legends; free flowing Announcements Italic script for hydrographic names; Copperplate Gothic for political units; Univers for cities and cultural features; and Times Roman for nonhydrographic physical features, text, and index. Within those style groups, combinations of capital letters, lowercase, italics, and variations in size and boldness provide adequate flexibility. In general, the policy of using the fewest possible different type styles and faces on one map has been applied, and place names have been aligned along parallels instead of being curved or tucked in at odd angles. Nevertheless, the use of 4-point type for small place names may cause some inconvenience to readers but less than would be necessitated by looking elsewhere for their locations. Furthermore, the inclusion of smaller cities and towns on general reference maps of the Atlas illustrates more effectively the now dominantly urban character of the country.

The adoption of these standards and guidelines for maps throughout the Atlas was essential for economy and unity rather than informality, in the resultant product. There are enough variations within the

established standards to allow ample freedom in design to fit a wide range of subject matter and to avoid monotony. Considerable latitude was permitted in determining the concepts to be presented and the area patterns to be emphasized for each thematic map. When those judgments were fully clarified, a priority list of map components was made so that lower priority items were subordinated to those of higher priority, and nonessential content was omitted to avoid cluttering the map.

In the thematic section of this *National atlas*, subdivisions deal in sequence with the physical, historical, economic, and socio-cultural characteristics of the country, but there are two additional map groups that serve special purposes. One of these contains maps showing more than 60 current types of administrative division of the United States, including maps of counties, judicial districts, civil defense areas, postal zones, congressional districts, forest districts, soil conservation districts, time zones, and dozens of other administrative divisions of the country. The other very useful group of maps shows the extent of coverage and graphically indexes the locations of map sheets, charts, and air photographs available from Federal agencies, describes their particular functions and utilities, and illustrates a representative portion of each different set and series.

PHYSICAL CHARACTERISTICS OF THE ATLAS

PAPER.—The quality of map reproduction, as well as the appearance and durability of the completed product, depend to a large extent upon the characteristics of paper used. It should be ink receptive and soil resistant, have a high index of stability, be durable and tear resistant, and have a high folding strength. In addition, atlas paper should be light in weight, highly opaque to permit printing in color on both sides, have a surface that will take offset impressions of fine screens, and maintain consistency of whiteness and reflectance throughout shipments received over a period of time. Also important are such factors as the absence of acids, of curl, and of noise while in use. Several synthetic and plasticized papers were tested, and found to be excellent in image receptivity, freedom from "pick" or surface lint when subjected to several applications of ink, durability, and quietness, but as a group they were heavy, costly, and to some people, slightly repellent to the touch.

Through cooperation by the Council on Library Resources, more than a dozen kinds of paper and some bindings for the *National atlas* were tested at the W. J. Barrow Research Laboratory in Richmond, Virginia. Additional tests were made by the U.S. Government Printing Office, and bids were requested for paper having all of the following specifications:

Fiber content	at least 92 percent alpha
Ash filler	less than 15 percent
pH (acidity)	at least 6
Tear resistance	at least 75 grams in weakest direction
Wax test (pick)	at least 14 inkins
Brightness	at least 88.2 percent
Thickness	at least .0051 inch
Opacity	at least 95.2 percent
Weight	at least 70 pounds per 500 sheets, 26 x 36 inches
Folding endurance	at least 900 folds without breaking

BINDING.—Looseleaf bindings were seriously considered because they permit publication of map sheets, folios, or sections of the Atlas before the entire work has been completed and thus make new maps available to users as soon as possible. In addition, looseleaf bindings allow the replacement of damaged pages, the insertion of additional or revised map sheets as they become available, and the removal of selected pages for exhibits, discussions, or reproduction. Solid bindings, on the other hand, cost less than looseleaf bindings, reduce the spinal thickness of volumes, are easier to shelf, and are less likely to lose pages through theft or to have them disarranged by careless users. Furthermore, solid bindings give an impression of finished work with greater prestige and are certainly more popular with librarians.

The results of a survey made during the early stages of the project revealed that 84 percent of those responding preferred a solid binding. It was recognized that the binding should be durable and sufficiently flexible to permit large books to open flat and there should not be a conspicuous channel or separation along the spinal fold. Lack of such a channel is particularly important for *The national atlas of the United States of America*, because many of the maps extend across the spinal fold. Tests by the W. J. Barrow Research Laboratory had indicated conclusively that if a perfect matching of adhesive and paper were achieved, the adhesive bindings could be frozen, baked, steamed, soaked, and tumbled in box testing equipment and not show the effects as soon as the best sewn bindings. In addition to being more durable and more flexible than sewn bindings, the adhesive bindings are less costly.

Consequently, bids were solicited from eight companies to bind prototype copies of the *National atlas* by means of a modified "Perfect Binding," a specification requested was that adhesive penetration along the spinal fold should be not less than one thirty-second of an inch nor more than one sixteenth of an inch. Resultant products were submitted to the Chicago Paper Testing Laboratory at Chicago, Illinois for openability and durability tests in the Universal Book Tester, and those which held up best were given supplemental tests for heat (140°F) and cold (20°F) flexing. Tests followed the techniques described in the American Library Association Publication LTP-10, "Development of Performance Standards for Binding Used in Libraries, Phase II." Photographs taken every 15 minutes traced the gradual appearance of separations between the hinge and the cover, along the backbone, between signatures, and along the hinge reinforcement. Also tested were the flexibility and durability of cover stocks, and of lettering applied to the covers by means of stamping and silk screening.

INDEXING.—Carefully planned indexes are fundamental to atlas use, but there are many problems of arrangement, content selection, space consumption, and cost to be considered. In preparing the index to *The national atlas of the United States of America*, a 1968 report of

the National Atlas Commission of the International Geographical Union was used as a guideline. The index does, however, resemble to some extent a gazetteer because it shows much more than locational data for places. For a detailed description of the content, method of alphabetization, and format of the index, see page 337.

The names for 41,000 entries in the index were alphabetized by computer and printed out at larger scale by a photo-mechanical process. The output was then carefully edited and reduced 66 percent for offset reproduction and inclusion in the Atlas.

ACKNOWLEDGMENTS

The national atlas of the United States of America is to a large extent the joint product of many agencies, professional organizations, commercial firms, and individuals. However, responsibility for its scope and organizational plan, for the preparation and scribing of its maps, and for reproduction of maps and other material in the completed work was firmly placed on the Geological Survey by the National Academy of Sciences, the Secretary of the Interior, and the Bureau of the Budget.

Recognition of the significant roles of the then Director of the Geological Survey, Thomas B. Nolan, Associate Director Arthur A. Baker, and Chief Topographic Engineer George D. Whitmore is richly deserved, as are the efforts of the current Associate Director, William A. Radlinski, and Chief Topographic Engineer, Robert H. Lyddan in bringing this project to successful completion.

Contributing agencies, bureaus, organizations, and commercial firms are listed on page vi, and Atlas maps prepared by specialists bear the names of individual scholars who are responsible for them. It is, however, to the teamwork of staff members and consultants who actually produced this *National atlas of the United States of America*, that a note of special appreciation is due.

It is not practical to name the scores of people who have had some significant part in planning or producing the *National atlas* but among those who made substantive contributions of note are:

William B. Overstreet, Project Chief, assisted by C. William Beetschen in the management of compilation, by Jackson C. Allen and Ernest E. Offenbacher in the management of production and by Mrs. Emily L. Marica as Administrative Assistant for the project. They provided the leadership and direction which were so essential to a project of this magnitude.

Compilation staff members who exercised the greatest independence of judgment and who drew on their own scientific knowledge in gathering data from primary and official sources, who processed and classified those data to achieve realistic distributional patterns, and who designed maps in the format to be followed by map finishers and plate makers are:

C. R. Gilman	Nina S. Roberts
Robert T. Halpin	Henry Sauber
Gordon F. Kells	Mary Alison Shaw
Esther H. Keys	Joyce M. Smith
Lois E. Mason	Ross E. Vaughn
T. Nakaya Mecklenburg	John H. Wittmann

Appreciation for assistance in establishing the principles of map design applied throughout the Atlas is due particularly to Hal Shelton and Joan M. Kemp and to staff designer Eugene E. Zang, who also reviewed each map prior to approval for printing.

Appreciation must also be expressed for the contributions of many others than the compilers and designers of Atlas maps, including particularly the group of map finishers who worked with such skill and dedication for the successful presentation of Atlas maps in final form for reproduction.

Finally, but by no means of least importance, acknowledgment must be made of the contributions of the consultants who assisted in the selection, presentation, and review of individual maps and Atlas sections, as well as those individuals who constituted the advisory panel that prepared the initial plans and specifications for the *National atlas*:

Advisory Panel	Consultants
Robert M. Coffin	James R. Anderson
Edward B. Espenshade, Jr.	R. W. Armstrong
Fred W. Foster	James A. Bier
Richard Edes Harrison	Robert Dolan
George F. Jenks	William H. Goetzmann
Erwin Raisz	Edmond H. Hammond
Hal Shelton	William H. Kuehler
Robert J. Voskuil	Henry E. Scott

LOOKING AHEAD

This *National atlas of the United States of America* constitutes one more significant link in the achievement of eventual world-wide coverage by thematic maps envisaged by the National Atlas Commission of the International Geographical Union. That objective, as well as the production of revised editions of this and other national and regional atlases in the future, may be greatly expedited by the repetitive coverage at short time-lapse intervals, possible from orbiting satellite systems. Such systems may expedite the production of more up-to-date and less costly regional and state as well as national atlases, or even make it possible to obtain directly from data storage banks and electronic computers the types of information now gained in part from maps and atlases. Meanwhile, sheets of this Atlas will be updated as new information becomes available, with completely revised editions of the Atlas to be issued periodically.

The horizons of cartographic research and technology appear to be unlimited, but more immediate needs must still be fulfilled by cartographic works of a more traditional nature, of which it is hoped this *National atlas* constitutes another milestone.


William T. Pecora, Director, U.S. Geological Survey