AMERICAN HIGHER EDUCATION: SPATIAL VARIATION

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Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
DOCTOR OF EDUCATION
July, 1975

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ACKNOWLEDGMENTS

Many have assisted me in this study. The ideas and encouragement of my adviser, Dr. John F. Rooney, Jr., have been especially helpful. Appreciation is expressed to the other committee members, Professors Richard D. Hecock, Steven W. Tweedie, and Thomas A. Karman, for their helpful comments and suggestions in the preparation of this thesis; to Dr. Keith D. Harries for his useful critique; to the Oklahoma State University Cartographic Service personnel for their advice and for the addition of the cartographic "cosmetics;" and to Mrs. Anna Gleason for the typing of the manuscript. I also want to acknowledge some of those who have helped to lighten the load along the way: Kathy, Olivia Newton-John, Kris and Rita, Bob Dylan, Annie Dillard, and Alex. Sincere thanks to each and every one.

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CHAPTER I

INTRODUCTION

A Neglected Field

Institutional education is an increasingly important activity of mankind. Yet geographers have paid surprisingly little attention to the spatial aspects of institutional education activities. Geographers in recent decades have initiated systematic examination of such social and cultural phenomena as language, religion, health care, crime, sport, and music. But they have largely ignored the spatial study and analysis of education.

American Geography: Inventory and Prospect, a significant "guidepost" in American geographical research, lacked an inventory of educational geography and completely ignored the prospect of research in educational geography.[1] With more geographers engaged in the educational realm than in any other single professional pursuit, it is paradoxical that a "Geography of Education" is almost nonexistant as an organized subject of investigation. The seemingly little concern and interest in the geography of education is even more puzzling when one considers the economic importance, almost everywhere in the contemporary world, of institutional education activities. For example,

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[1] Preston E. James and Clarence F. Jones, eds., American Geography: Inventory and Prospect (Syracuse, N. Y., 1954).

in the United States education is considered, by most measures, to be "big business."

Eisen was one of the first to recognize and to state the need for research in the geography of education. She urged: "Studies of the characteristics of institutionalized education in many areas both in the United States and in other countries are needed in the development of the geography of education as a phase of systematic geography."[2]

More recently, McCune has issued the challenge to the profession:

> The geography of education appears to me to be a useful frontier field for geographic research . . . . Research in the geography of educational activity may provide rich dividends in the improving of our human condition, surely the goal of all geographers.[3]

Regarding American education, McCune observed:

> Significant differences in the geographical patterns of education are found within the United States, but although there is a vast literature on all phases of education, studies by geographers or others on the geography of American education are surprisingly rare.

McCune further stated that American education

> trends have geographical aspects that merit study by concerned practitioners of our discipline . . . . Spatial variations in educational opportunities, organizations, and achievements call for geographical analysis of a high order.[4]

Probably the most urgent call to date for the spatial examination of institutional education was that issued by Hones and Ryba:

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[2]Edna E. Eisen, "The Geography of Education," Journal of Geography, 50 (December, 1951), p. 382.

[3]Shannon McCune, "The Geography of Education," Economic Geography, 44 (1968), page preceeding p. 1.

[4]Shannon McCune, "The Geography of Education in the United States," Geographical Review, 61 (1971), pp. 295, 297.

> . . . it seems very evident that work such as the distribution and spatial patterns of educational institutions, levels of educational opportunity or achievement, and the various background factors, influencing such spatial development could be profitably studied geographically . . . . The geography of education is indeed a potentially vast and complex subject, the scope of which seems far from realized. It is suggested that its development at this time would be consistent with current trends in both education and geography. Surely it is the responsibility of geographers to recognize now that the time is most opportune, even overdue, for demonstrating the value of this most neglected field of study?[5]

Zelinsky noted the lack of geographical research in American higher education:

> Little work has been done on the geography of education in the United States and none apparently on the historical geography of higher education. An analysis of colleges, especially the private liberal arts college, might yield important insights into the cultural geography of the nation.

Elsewhere in his book he lamented: "Unfortunately, there has been virtually no work done to date on the origin, spread, and geographical significance of such items as . . . colleges."[6]

Statement of the Problem

"A salient characteristic of higher education in this country is its diversity."[7] It is generally known that colleges and universities are not uniformly distributed over the United States, either qualitatively or quantitatively. For example, if a person holds a mental

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[5]Gerald H. Hones and Raymond H. Ryba, "Why Not a Geography of Education?" Journal of Geography, 71 (March, 1972), pp. 137, 139.

[6]Wilbur Zelinsky, The Cultural Geography of the United States (Englewood Cliffs, N. J., 1973), pp. 52, 107.

[7]W. Vance Grant and C. George Lind, Digest of Educational Statistics, 1973 (Washington, D.C., 1974), p. 67.

map of American higher education, it is likely the private universities are located largely in the Northeast, private four-year colleges are abundant in the Midwest, and public institutions tend to dominate in the West. A brief examination of a map of American college and university locations provides evidence of spatial variation in the density of institutions. There are "college rich" and "college poor" areas. The Carnegie Commission on High Education has observed that "situations vary greatly from state to state in the proportion of students in private and in public institutions, and in other ways."[8]

These and other spatial patterns in American higher education pose the questions which this study attempts, in part, to answer: What are the macro-scale spatial patterns of American colleges and universities? How does American higher education vary from place to place? What are the reasons for the diversity of American higher education?

Review of the Literature

A search of the relevant literature indicated few related studies have been undertaken. American geographers appear to be interested in the effective teaching of their subject, with much attention and research justly being directed to the content and methods of instruction in geography (geographic education). The geography of education, however, has seemingly been of little concern. Reported studies of educational phenomena by American geographers have been remarkably few. Attention has been focused largely on literacy, educational level,

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[8]Carnegie Commission on Higher Education, Who Pays? Who Benefits? Who Should Pay? (New York, 1973), p. 8.

school districting, and other aspects of public education.[9] Many of the studies of the spatial organization of educational facilities, such as those by Eisen,[10] Gross,[11] Philbrick,[12] Mohamed,[13] Bunge,[14] Jenkins and Shepherd,[15] Evenden,[16] Florin,[17] and Lowry,[18] have dealt primarily with problems of public elementary and secondary schools. In some studies geographical techniques were applied to an educational problem, such as the delimitation of school district boundaries by Yeates.[19]

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[9]Herbert G. Kariel and Patricia E. Kariel, Explorations in Social Geography (Reading, Mass., 1972), pp. 135-170.

[10]Edna E. Eisen, Educational Land Use in Lake County, Ohio (Chicago, 1948).

[11]Herbert H. Gross, Educational Land Use in the River Forest-Oak Park Community (Illinois) (Chicago, 1948).

[12]Allen K. Philbrick, The Geography of Education in the Winnetka and Bridgeport Communities of Metropolitan Chicago (Chicago, 1949).

[13]Harold Mohamed, "An Investigation of Some Factors Affecting the Efficient Organization of Secondary School Attendance Units" (Unpub. Ph.D. dissertation, Northwestern University, 1967.)

[14]William Bunge et al., "A Report to the Parents of Detroit on School Decentralization," Man, Space, and Environment, ed. Paul W. English and Robert C. Mayfield (New York, 1972).

[15]Michael A. Jenkins and John W. Shepherd, "Decentralizing High School Administration in Detroit: An Evaluation of Alternative Strategies of Political Control," Economic Geography, 48 (1972) pp.95-106.

[16]Leonard J. Evenden, "The Diffusion of Public Educational Changes in North Carolina and the Regionalization of 'Progress'," Southeastern Geographer, 9 (1969), pp. 80-93.

[17]John W. Florin, "The Diffusion of the Decision to Integrate: Southern School Desegration, 1954-1964," Southeastern Geographer, 11 (1971), pp. 139-144.

[18]Mark Lowry, "Schools in Transition," Annals of the Association of American Geographers, 63 (1973), pp. 167-180.

[19]Maurice Yeates, "Hinterland Delimitation: A Distance Minimizing Approach," Professional Geographer, 15 (1963), pp. 7-10.

and Maxfield,[20] and the locations of high schools by Hall.[21] Carey, Macomber, and Greenberg[22] have identified some educational factors and patterns of Washington, D.C., and Herning[23] has examined some spatial aspects of educational opportunity in Oklahoma.

Little has been done to apply geographical methodology to the study of higher education. As Zelinsky has stated, "The social and cultural geography of college populations is still almost terra incognita."[24] Henderson and Hart described the spatial patterning and character of Black colleges, which they viewed as "essentially a regional phenomenon."[25] Schofer conducted a study of "Some Geographic Aspects of Higher Education in the United States," utilizing a systems-theoretic framework.[26] Schofer examined what he considered the major components of the educational system--students, institutions, and

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[20]Donald W. Maxfield, "Spatial Planning of School Districts," Annals of the Association of American Geographers, 62 (1972), pp. 582-590.

[21]Fred L. Hall, Location Criteria for High Schools (Chicago, 1973).

[22]George W. Carey, Lenore Macomber, and Michael Greenberg, "Educational and Demographic Factors in the Urban Geography of Washington, D.C.," Geographical Review, 58 (1968), pp. 515-537.

[23]John Herning, "Some Geographical Aspects of Educational Opportunity in Oklahoma" (Unpub. seminar paper, Oklahoma State University, 1973).

[24]Zelinsky, p. 136.

[25]Janet St. Cyr Henderson and John Fraser Hart, "The Development and Spatial Patterns of Black Colleges," Southeastern Geographer, 11 (1971), pp. 133-138.

[26]Jerry P. Schofer, "On Some Geographic Aspects of Higher Education in the United States: A Systems Approach" (Unpub. Ph.D. dissertation, Pennsylvania State University, 1971).

control groups--and found them interacting in patterns analogous to those included in Central Place Theory, but with more identifiable non-economic determinants of location. Schofer's analogous Central Place Theory was tested by Butt using the higher education institutional universe of Oklahoma.[27]

Ehrenberger made a comparative analysis of two redistricting proposals for the Michigan two-year colleges.[28] A study that explicitly dealt with spatial (or regional) variations in American higher education was that of Andrews, in which the spatial distributions of selected aspects of the two-year public colleges were mapped and examined.[29] Alanen examined some basic characteristics of the college-age population, related these findings to possible enrollment impacts, and discussed some possible future policy issues.[30]

Gilbert's[31] descriptive study of university towns and Patton,s[32] examination of the diffusion of university types both used European

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[27]Paul L. Butt, "Higher Education and Central Places--Real World Observations: Oklahoma" (Unpub. seminar paper, Oklahoma State University, 1975).

[28]Donald Ehrenberger, "A Comparative Analysis of Two Redistricting Proposals for the Junior-Community Colleges in the State of Michigan" (Unpub. M. A. thesis, Western Michigan University, 1972).

[29]Alice C. Andrews, "Some Demographic and Geographic Aspects of Community Colleges," Journal of Geography, 73 (Feb. 1974), pp. 10-16.

[30]Arnold R. Alanen, "The Magnitude and Mobility of the College Age Population: Questions for the Future of Higher Education," Journal of Geography, 73 (November, 1974), pp. 29-34.

[31]E. W. Gilbert, The University Town in England and West Germany (Chicago, 1961).

[32]Clyde P. Patten, "The Origins and Diffusion of the European Universities," Yearbook of the Association of Pacific Coast Geographers, 31 (1969), pp. 7-26.

examples. An historical-geographical approach was followed by Palmer[33] in his idiographic treatment of West Point, and by Tewksbury[34] in his study of pre-Civil War colleges in the United States (although Tewksbury was not a geographer by profession, he employed a spatially based approach to the problem of the location of higher educational facilities). Several geographers have investigated college student migration, including Stewart,[35] McConnell,[36] Brannen,[37] Brownell and Stanley,[38] Kariel,[39] Alanen,[40] Scipione,[41] and Fairweather.[42]

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[33]Major Dave R. Palmer, "West Point, the Geographic Key to the Continent," Proceedings of the 8th Annual Meeting (N. Y. - N.J. Division of the AAG, 1 (1967), pp. 1-9.

[34]Donald G. Tewksbury, The Founding of American Colleges and Universities Before the Civil War (New York, 1932).

[35]John Q. Stewart, "The 'Gravitation,' or Geographical Drawing Power of a College," AAUP Bulletin, 47 (1941), p. 70.

[36]Harold McConnell, "Spatial Variability of College Enrollment as a Function of Migration Potential," Professional Geographer, 17 (1965), pp. 29-37.

[37]Nancy L. Brannen, "The Spatial Pattern of Enrollment at the University of Cincinnati: A Case Study Concerning Factors Influencing the Sphere of Influence of a Large University" (Unpub. M. A. thesis, University of Cincinnati, 1967).

[38]Joseph Brownell and William Stanley, "A Cartographic Analysis of Changing Student Hinterlands of the SUNY Colleges of Arts and Sciences," Proceedings of the 8th Annual Meeting (N.Y. - N.J. Division of the AAG), 1 (1967).

[39]Herbert G. Kariel, "Student Enrollment and Spatial Interaction," Annals of Regional Science, 2 (1968), pp. 114-127.

[40]Arnold R. Alanen, "College Student Migration: Implications for Higher Educational Planning in Minnesota" (Unpub. Ph.D. dissertation, University of Minnesota, 1973).

[41]Paul A. Scipione, "A Computer Solution for Determining Student Migration," Professional Geographer, 25 (1973), pp. 249-254.

[42]Malcolm Fairweather, "Kent State University: A Geographical Study of Its Service Area" (Unpub. M. A. thesis, Kent State University,

A review of the American educational literature revealed no reported works related or similar to the topic of this study. Comparative education deals with the comparison of systems of education on an area basis. One can find many examples in the comparative education literature of studies in which the "geographical background" is deemed relevant. Often, in sections titled "Determinants of National Character" or "Geographic and Economic Factors," a simplistic, near-deterministic approach has been reflected in considering "the effect of these geographical and economic factors in determining the outlook and shaping the educational pattern."[43] Such general phrases as "the differences of educational opportunity reflect differences in the physical character of the regions and countries of the continent" are not supported by evidence or any data mapped at even an unsophisticated level.[44] Additionally, comparative education deals almost exclusively with national comparisons; intra-nation differences appear to be rarely examined by comparative educators.[45]

Studies outside the geographical literature related to this research topic and worthy of note included Anderson, Bowman and Tinto,[46]

1970), and "A Spatial Analysis of Oklahoma Undergraduates Attending the University of Oklahoma and Oklahoma State University, 1972-1973" (Unpub. Ed.D. dissertation, Oklahoma State University, 1974).

[43]Vernon Mallinson, An Introduction to the Study of Comparative Education (London, 1966), pp. 28-57.

[44]Laurence Gale, Education and Development in Latin America (London, 1969), p. 4.

[45]Lewis Spolton, "Methodology in Comparative Education," Comparative Education, 4 (1968), p. 109.

[46]C. Arnold Anderson, Mary Bowman, and Vincent Tinto, Where Colleges Are and Who Attends: Effects of Accessibility on College Attendance (New York, 1972).

an investigation of the effects of accessibility on college attendance; Astin,[47] a study of Who Goes Where to College; Bowker,[48] a brief discussion of selected aspects of "Quality and Quantity in Higher Education;" the Carnegie Commission's[49] report on New Students and New Places, which briefly treated of "Regional Diversity;" Chambers'[50] descriptive, non-analytic book on American higher education facilities; Feinstein et al.,[51] an economic appraisal of higher education in the United States; Folger and Nam,[52] a Bureau of the Census publication on the Education of the American Population; Gossman et al.,[53] a study of interstate college student migration; Harris,[54] a national statistical "portrait" of American higher education (somewhat outdated); Jencks and Riesman,[55] a brief qualitative look at some regional

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[47] Alexander W. Astin, Who Goes Where to College? (Chicago, 1965).

[48] Albert H. Bowker, "Quality and Quantity in Higher Education," Journal of the American Statistical Association, 60 (1965), pp. 1-15.

[49] Carnegie Commission on Higher Education, New Students and New Places (New York, 1971), pp. 31-34.

[50] M. M. Chambers, Higher Education in the Fifty States (Danville, Ill., 1970).

[51] Otto Feinstein et al., Higher Education in the United States (Lexington, Mass., 1971).

[52] John K. Folger and Charles B. Nam, Education of the American Population (Washington, D.C., 1967).

[53] Charles S. Gossman et al., Migration of College and University Students in the United States (Seattle, 1968).

[54] Seymour Harris, A Statistical Portrait of Higher Education (New York, 1972).

[55] Christopher Jencks and David Riesman, The Academic Revolution (Garden City, N. Y., 1968), pp. 155-198.

variations in American higher education; and Willingham,[56] an examination of free-access higher education

Research Design

The following methodological procedure was used in this study.

Indicators

The indicators, characteristic of American institutional higher education, used in the analysis were selected.[57]

Identification

The contemporary patterns of the selected higher education indicators, representing the American higher education institutional universe, were identified and mapped. The approach was ecological with the fifty states and the District of Columbia serving as the units of analysis.[58] A factorial analysis of the selected indicators

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[56]Warren W. Willingham, Free-Access Higher Education (New York, 1970).

[57]For the purpose of this study, the Carnegie Commission on Higher Education definitions are utilized. Thus, "higher education" is defined as "academic programs on a college or university campus," as distinguished from "further education" ("quasi-academic and nonacademic programs involved in training specific skills through industry, the military, and other institutions") or "post secondary education" (both higher and further education"). Carnegie Commission on Higher Education, Priorities for Action (New York, 1973), p. 5.

[58]The scale of analysis employed in this study is general (state) rather than individual (institution). This level of generalization, of course, has its caveats. Patterns of variation may be hidden within the units of analysis; individual qualities which might prove definitive at a micro-scale are blurred within the general characteristics of the group. The aggregate, or ecological, statistic may in fact be a crude average summarizing an internal heterogeneity. It

was then performed to identify the dimensions of spatial variation in American higher education, and the resultant dimensions, utilizing factor scores, were mapped. A regionalization of higher education in the United States, based on a grouping of the dimensions, was then accomplished and aggregate higher education regions were identified and mapped.

Interpretation

A set of higher educational variables (indicators) and a set of outside variables--historical, demographic, socioeconomic, and attitudinal--chosen on the basis of their theoretical relationship to higher education were correlated using a canonical analysis model. Additionally, some qualitative evidence was presented suggesting that general historical processes and circumstances, and public attitudes and feelings toward higher education were contributing forces in the spatial form of contemporary American higher education.

Implications

Some implications of the findings of this study were briefly discussed, including their application as a useful tool in higher

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is argued that these problems are exaggerated, and that the real value of the ecological scale of analysis can be confirmed by innumerable empirical studies. It is suggested that the ecological unit submerges the eccentricities of individuals and offers the best measurement of a general trend. The ecological (in this case, the state) unit is also the scale of analysis at which much higher educational planning and decision-making is carried out, because many programs and organizational structures are state-wide.

educational resource management and planning, and their serving as a basis for further research in the locational patterns of higher educational institutions.

Justification of the Study

As a universal socio-cultural phenomenon, any aspect of education, anywhere, certainly merits academic investigation. But, as it has been pointed out, there are few studies of educational phenomena by geographers. Educational researchers have been increasingly interested, at least in a marginal way, in some of the spatial characteristics of the material with which they have been principally concerned. For example, in educational psychology regional variations in abilities and attainments, as measured by tests, have long been recognized. Explicit geographical treatment, however, has generally been absent. Similarly, educational sociologists have often utilized spatial concepts such as the urban/rural dichotomy and regional variations, but they have rarely explored these spatial aspects very far. Thus, research in educational geography is overdue. This study, then, is intended as a small contribution to the building of a literature and understanding in a geography of education.

Education is a major activity in the United States. Education is an "industry" comprising a significant sector of the economy. It is now larger than agriculture as a proportion of the gross national product and the prospects are for its continued growth.[59] The

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[59]Kenneth E. Boulding, "The University as an Economic and Social Unit," Colleges and Universities as Agents of Social Change, ed. W. John Minter and Ian M. Thompson (Berkeley, Cal., 1968), p. 75.

United States now devotes more than seven per cent of its gross national product to formal education. In higher education alone, in the fall of 1970, an estimated 7.6 million students were enrolled on over 2500 campuses, instructional staffs totaled 593,000, and expenditures totaled 26.1 billion dollars.[60] Such a massive involvement of people, capital, and facilities is itself deserving of the geographer's attention as a landscape feature of some significance.

If this study reveals some order amid diverse phenomena, then some progress toward a better understanding of the location of institutional higher education in the United States may result. An awareness of this order can serve as a basis for further research into the patterns of higher education. At the pragmatic level, the findings of this study might complement those by higher educational planners, administrators, and economists, and aid in better planning of future patterns of higher educational activities and facilities. At a theoretic level, such increased understanding can eventually lead to a nomothetic model of higher education location. Any study which may partially serve to help lay the foundation for such a model certainly merits undertaking, if only for this reason.

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[60] McCune, "The Geography of Education in the United States," p. 295.

CHAPTER II

INDICATORS

Components

In agreement with Land's definition of "social indicators," in this study "higher educational indicators" refer to higher educational statistics that (1) are components in a higher educational system model or of some particular segment or process thereof, (2) can be collected and analyzed at various times and accumulated into a time-series, and (3) can be aggregated or disaggregated to levels appropriate to the specifications of the model.[1] As Land stated:

> The important point is that the criterion for classifying a social statistic as a social indicator is its informative value which derives from its empirically verified nexus in a conceptualization of a social process.[2]

The higher educational system model serving as the framework for the selection of the higher educational indicators for this study is a modified version of that formulated by Schofer.[3] Schofer

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[1]Kenneth C. Land, "On the Definition of Social Indicators," American Sociologist, 6 (1971), pp. 322-325.

[2]Ibid., p. 323.

[3]Jerry P. Schofer, "On Some Geographic Aspects of Higher Education in the United States: A Systems Approach" (Unpub. Ph.D. dissertation, Pennsylvania State University, 1971).

proposed that

> . . . the major inputs into the locational aspects of higher education are . . . (1) the nature of the educational institution itself, (2) the locational decisions made by the students, and (3) the locational decisions made by the . . . control groups.[4]

The modified Schofer model utilized in this study proposes six major components of the higher educational institution. An aggregate institution component appears to suffice in Schofer's system model. But when hypothesizing the primary components of the institution, obviously such an aggregate component must be disaggregated. Thus, Schofer's institution component is disaggregated into size, economic type, and quality components. Figure 1 shows the relationships between Schofer's major components of a higher educational system and the major components of the higher educational institution model employed in this study.

The indicators of American higher education utilized in this study have thus been selected to provide information about the proposed six major components of the higher educational institution. It should be noted that these higher educational indicators, like any other kind of information, are, of themselves, silent; it is the use to which they are placed that is important in terms of analyzing, interpreting, inferring, and evaluating.

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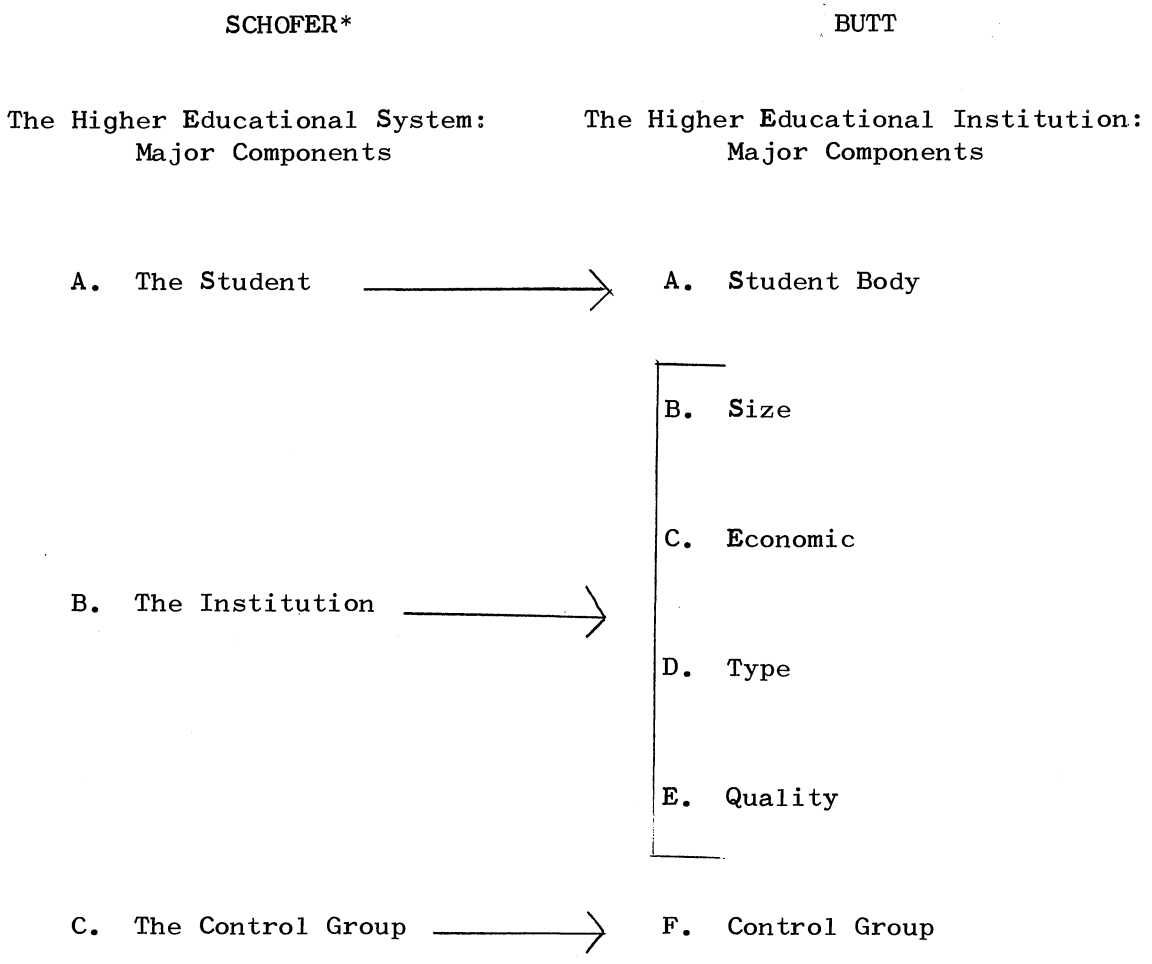
[4]Schofer, p. 22.



*Source: Jerry P. Schofer, "On Some Geographic Aspects of Higher Education in the United States: A Systems Approach" (Unpub. Ph.D. dissertation, Pennsylvania State University, 1971), pp. 26-64.

Figure 1. Major Components of Higher Education

Description, Definition and Intended Measurement

The following are the higher educational indicators that have been selected and are used in identifying the spatial patterns and variations in contemporary American higher education at the state level. See Table I for a listing of these indicators and the sources of data.

TABLE I

HIGHER EDUCATIONAL COMPONENTS, AND INDICATORS USED IN STATE ANALYSIS

Components and Indicators	Source(s)
A. Student Body	
1. Sex (% male), 1972	1
2. Minority students (% total enrollment), 1972	2
3. Attendance status (% full-time), 1972	1
4. Level of enrollment (graduate enrollment as % total enrollment), 1972	1
5. Residence status (% from within state), 1968	3
B. Size	
6. Student enrollment (total), 1972	1
7. Student enrollment (% total population 18 years and over), 1973	1,4
8. Number of institutions (per 100,000 population 18 years and over), 1970	4
9. All earned degrees conferred (% total enrollment), 1970-71	5
C. Economic	
10. Expenditures ($ per student), 1970-71	6
11. Tuition and fees, resident student at public university with largest enrollment (average $), 1973-1974	7
12. Productivity ($ per degree), 1970-71	5,6

TABLE I (Continued)

Components and Indicators	Source(s)
D. Type	
13. University enrollment (% total), 1972	1
14. Four-year college enrollment (% total), 1972	1
15. Two-year college enrollment (% total), 1972	1
16. Earned doctor's degrees conferred (% total) 1970-71	5
E. Quality	
17. Student-faculty ratio, 1967	1,8
18. Faculty compensation, rank of professor at public university with largest enrollment (average $), 1973-74	9
19. Academic space (% total assignable space), 1970-71	10
20. Library resources (volumes per student), 1971	1,11
21. Regional attractiveness (total enrollment as % total regional population 18 years to 24 years), 1970	1,4
F. Control Group	
22. Public enrollment (% total), 1972	1
23. Private enrollment independent of church (% total private), 1970	1

Sources of Data:

1. United Stated Department of Health, Education, and Welfare, Office of Education, Fall Enrollment in Higher Education, 1967, 1970, 1971, 1972, 1973 (Washington, D.C., 1969, 1972, 1973, 1974, 1975).

2. United Stated Department of Health, Education, and Welfare, Office for Civil Rights "Undergraduate Enrollment of Minorities in U. S. Higher Education," Chronicle of Higher Education 8 (November 11, 1974), pp. 8-11.

3. United States Department of Health, Education, and Welfare, Office of Education, Residence and Migration of College Students (Washington, D.C.).

4. United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States (Washington, D.C., 1968, 1969, 1971, 1973, 1974).

5. United States Department of Health, Education, and Welfare, Office of Education, Earned Degrees Conferred, 1970-71 (Washington, D.C., 1973).

6. United States Department of Health, Education, and Welfare, Office of Education, Financial Statistics of Institutions of Higher Education, 1970-71 (Washington, D.C., 1974).

7. College Scholarship Service, "Tuition and Fees, 1973-74 and 1974-75," Chronicle of Higher Education, 8 (March 25, 1974), pp. 9-10.

8. United States Department of Health, Education and Welfare, Office of Education, Numbers and Characteristics of Employees in Institutions of Higher Education, Fall, 1967 (Washington, D.C., 1970).

9. American Association of University Professors, "Average Faculty Compensation at More than 1,500 Institutions," Chronicle of Higher Education, 8 (April 29, 1974), pp. 9-10.

10. United States Department of Health, Education, and Welfare, Office of Education, An Estimate of Construction Needs for Higher Education by 1980 (Washington, D.C., no date).

11. United States Department of Health, Education, and Welfare, Office of Education, Library Statistics of Colleges and Universities, Fall, 1971 (Washington, D.C., 1973).

A1. Sex of student body (per cent male). This demographic indicator is intended to measure variation in the male-female ratios of student bodies.

A2. Minority students (per cent of total undergraduate, full-time enrollment). This demographic indicator is intended to measure variation in the proportions of student bodies belonging to minority groups, including Black, American Indian, Spanish-surnamed, and Oriental.

A3. Attendance status of student body (per cent full-time). This variable is intended to measure variation in the proportion of the student body that is full-time.

A4. Level of enrollment of student body (graduate enrollment as per cent of total enrollment). An indication of the relative size of the graduate (or conversely, undergraduate) student body is provided.

A5. Residence status of student body (per cent from within the state). This pertains to the drawing power and radius of reputation of the state's institutions. When a large percentage is drawn from the immediate vicinity (state), the student body is usually less cosmopolitan and less diverse in experiences and interests.

B.6 Student enrollment (total). This is one--and the most frequently employed--measure of the absolute size of institutional higher education. As Alanen stated:

> Whereas the educational process certainly involves much more than simply counting students as they march through the portals of academe, the numerical theme provides the nexus to most, if not all, policy and decision making undertaken in higher education. Whether the problem involves financing, building programs, course and program offerings, faculty tenure, or whatever, the question of total student numbers emerges as a pervasive and dominant matter of concern.[5]

B.7 Student enrollment (per cent of total population 18 years and over). This is a measure of the relative size of institutional higher education.

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[5]Arnold R. Alanen, "The Magnitude and Mobility of the College Age Population: Questions for the Future of Higher Education," Journal of Geography, 73 (November, 1974), pp. 29-34.

B8. Number of institutions (per 100,000 population 18 years and over). This is intended to serve not only as an indicator of size but also as an estimate of accessibility to colleges and universities. Generally, the larger the number of institutions, the greater is the opportunity for a college education.

B9. All earned degrees conferred (per cent of total student enrollment). This size indicator focuses on the output of institutional higher education for a specified academic year.

C10. Expenditures (dollars per student). This value reflects the investment that the state's institutions (public and private) make in the college education of their students. It is additionally assumed that the quality of higher education offered the student is higher where the expenditures are higher.

C11. Tuition and fees, resident student at public university (main campus) with largest enrollment (average dollars for nine months). This economic indicator is, additionally, a crude measure of accessibility. Generally, lower tuition and fees place a college education within the economic reach of a larger percentage of the population.

C12. Productivity (dollars per degree). Since productivity is a major concern of industrial-oriented America, the cost-per-unit of output of colleges and universities--which in many aspects are analogous to industry--is considered here to be an indicator worthy of inclusion. This value is determined for each state by dividing total annual expenditures by all earned degrees conferred in the same year. It is assumed that "productivity" increases as dollars per degree decreases.

D13. University Enrollment (per cent of total). The proportion of total enrollment that can be typed "university" is measured. "Universities," as defined by the Office of Education, are "institutions that (a) give considerable stress to graduate instruction, (b) confer advanced degrees as well as bachelor's degrees in a variety of liberal arts fields, and (c) have at least two professional schools that are not exclusively technological."[6]

D14. Four-year college enrollment (per cent of total). The percentage of total students enrolled in four-year colleges is measured. "Four-year colleges" include institutions offering higher educational programs that extend at least four years beyond high school but are not classificable as universities.

D15. Two-year college enrollment (per cent of total). This indicator measures the proportion of total enrollment that is attributable to community or junior colleges. Included are institutions with programs of at least two but less than four years of college-level work.

D16. Earned doctor's degrees conferred (per cent of total). Intended to measure relative emphasis on the doctorate, this indicator may also identify "scientist sources."[7] It is assumed that most scientists are trained in graduate schools; some states are

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[6]United States Department of Health, Education, and Welfare, Office of Education, Inventory of Physical Facilities in Institutions of Higher Education, Fall, 1971 (Washington, D.C., 1973), p. 46.

[7]Ronald Abler, John S. Adams, and Peter Gould, Spatial Organization: The Geographer's View of the World (Englewood Cliffs, N. J., 1971), pp. 200-201.

better endowed with graduate schools than others and can thereby produce more doctorates (scientists) per capita.

E17. Student-faculty ratio (students per one faculty). This is intended to assess instructional quality. It is assumed that instructional quality is such that the highest quality instruction is a one-to-one tutorial session and the lowest is a one-to-mass lecture. Thus, generally the smaller the ratio, the higher is the quality, representing more individual contact between the student and the faculty. "Faculty" is full-time instructional faculty.

E18. Faculty compensation, rank of professor at public university (main campus) with largest enrollment (average dollars for nine months). This is intended to be an indicator of quality. Reflected here is the competitive position of the state's institutions in the task of faculty recruitment. Under open-market conditions, the more highly qualified professors tend to locate where the financial compensations are greater. These compensation values are not corrected for differences in cost-of-living from place to place.

E19. Academic space (per cent of total assignable space).[8] As the percentage of total assignable space devoted to academic uses increases, the quality of higher education also is assumed to increase. "Academic facilities" include three major

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[8] "Assignable space" is defined as "the sum of all areas on all floors of a building assigned to, or available for assignment to, an occupant except for custodial, circulation, mechanical, and construction areas." United States Department of Health, Education, and Welfare, Office of Education, Inventory (Washington, D.C., 1973), p. 1.

subcategories of campus space: "instructional and library facilities," "instruction-related facilities," and "related supporting facilities."[9]

E20. Library resources (volumes per student). This surrogate measure is calculated by dividing total state volumes by total state enrollment. This information is assumed to reflect the academic quality and facilities of the state's institutions. "Volumes" includes all holdings (including duplicates) except micro-form units and periodical titles.

E21. Regional attractiveness (student enrollment as per cent of total regional population 18 years to 24 years). This indicator is intended to measure the extent to which a state's institutions attract the region's college-age population. "Region" is here defined as a state and all contiguous states. Contiguity can be either line or point.

F22. Public enrollment (per cent of total). The extent of public (or conversely, private) control of enrollment is revealed by this indicator. Publicly controlled institutions are those controlled by local, state, or federal governments. All other institutions are included in the privately controlled category.

F23. Private enrollment that is independent of church (per cent of total private). This measure provides an indication of the proportion of private enrollment that is under nondenominational control.

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[9]United States Department of Health, Education, and Welfare, Office of Education, Distribution of Physical Facilities Among Institutions of Higher Education Grouped by Level, Control, and Enrollment Size, Fall, 1968 (Washington, D.C., 1970), p. 33.

Some higher educational indicators that were considered but not utilized in this study include:

1. Admissions requirements. This is probably one of the best indicators of individual institutional quality, but due to the lack of a common denominator of the requirements--for example, ACT scores and College Board scores--this indicator is not very meaningful when aggregated at the state scale.
2. Faculty with earned doctorate (per cent total). This is a measure of the degree of formal training received by the faculty, and as such, is a surrogate measure of quality. But such data aggregated at the state scale are not available to the author.
3. Phi Beta Kappa chapters (per cent of total number of institutions). Colleges and universities must meet certain standards of excellence before the nation's oldest and most distinguished scholastic honorary society will establish chapters on their campuses. Thus, the percentage of total institutions having PBK chapters offers a surrogate measure of the quality of the state's institutions. But five quality indicators are sufficient for this study, and the selected indicators are believed to be more meaningful than this one.
4. American Association of University Professors chapters (per cent of total number of institutions). The AAUP is intended to represent and encourage the professional interests of the faculty. It concerns itself with academic freedom, salaries, and other working conditions. Faculties on campuses having AAUP chapters may be presumed, generally, to be better organized, more concerned with professional conditions and development, and better able to secure representation of faculty interests in the administrative decisions

of the institution. As such, this could be considered a surrogate indicator of quality, but it is not included in this study for the same reason the prior indicator is not used.

5. Assignable space (square feet per student). The inference here is that the quality of higher education increases as the assignable space per student increases. This indicator is not included because, sometimes when expanded beyond a critical assignable space, campus resources are drained and quality may decrease.

6. Unisex institutions (per cent of total). This demographic indicator measures the proportion of colleges/universities that have all-male or all-female student enrollments. Formerly, this indicator would have shown greater state-to-state variation, but with the almost ubiquitous trend toward coeducational institutions in contemporary American higher education, there are now many states with no unisex higher educational institutions.

7. Black institutions (per cent of total number of institutions). The predominantly black college, resulting from the maintenance of "separate but equal" educational facilities, is essentially a Southern phenomenon, with most of the non-Southern states having no such institutions.[10] Because it is believed a "black college measure" is reflected in the "minority students" indicator--although it is recognized the two do not measure the same entity--such an indicator is not included in this study.

8. Revenue (dollars per student). This economic indicator reflects

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[10]Janet St. Cyr Henderson and John Fraser Hart, "The Development of Spatial Patterns of Black Colleges," Southeastern Geographer, 11 (1971), pp. 133-138.

the total financial resources that are potentially available to the student. It is assumed that the quality of higher education offered the student is higher where the revenue is higher. But with a Spearman rank-order correlation of +.996 between revenue and expenditures, the inclusion of a revenue indicator in this study would be redundant.

9. Attrition rate (per cent of total undergraduate enrollment which "drops out"). This value can be determined by dividing the total baccalaureate degrees awarded in the spring of a specified year by the total first-time student enrollment in the fall four years previously. It is, thus, a gross effort--the value is contaminated by inter-state transfers--to measure a state's ability to hold its students and move them through its requirements to a successful termination. This indicator is not utilized because it is doubtful the indicator would measure very well what it is intended to measure.

The spatial patterns of the 23 selected higher educational indicators will be examined in the next chapter, and state-to-state variation in these indicators will be cartographically identified. The 23 selected indicators will then be collapsed into a smaller number of basic dimensions or "composite indicators," and the state patterns and variations of these dimensions will be identified. Using these dimensions of higher education, the states will then be grouped and higher education regions will be identified.

CHAPTER III

IDENTIFICATION

Indicator Patterns

The objective of this chapter is to identify the generalized spatial patterns and variations of contemporary American higher education. The state-to-state patterns and variations of the selected higher educational indicators are presented in Figures 2-24. These maps present the quintile patterns of each selected indicator. For individual state rankings and values of the indicators, see Appendix A.

Assuming a limited acquaintance with demographic patterns and educational history, some patterns manifested on the maps might have been expected, such as the positive correlation between the general population and the total enrollment in higher education (Figure 7, the concentration of minority students in the Southeast and the Southwest (Figure 3), and the dominant role played in the West by the university (Figure 14) and by the public institution (Figure 23). The maps also reveal some less expected patterns, perhaps, including the large enrollments per total population of the West (Figure 8), and the greater "productivity" of the interior American mid-continent (Figure 13).

No attempt is made to describe verbally the spatial pattern and variation of each indicator. The maps themselves reveal the patterns much more efficiently and effectively than such prose statements.

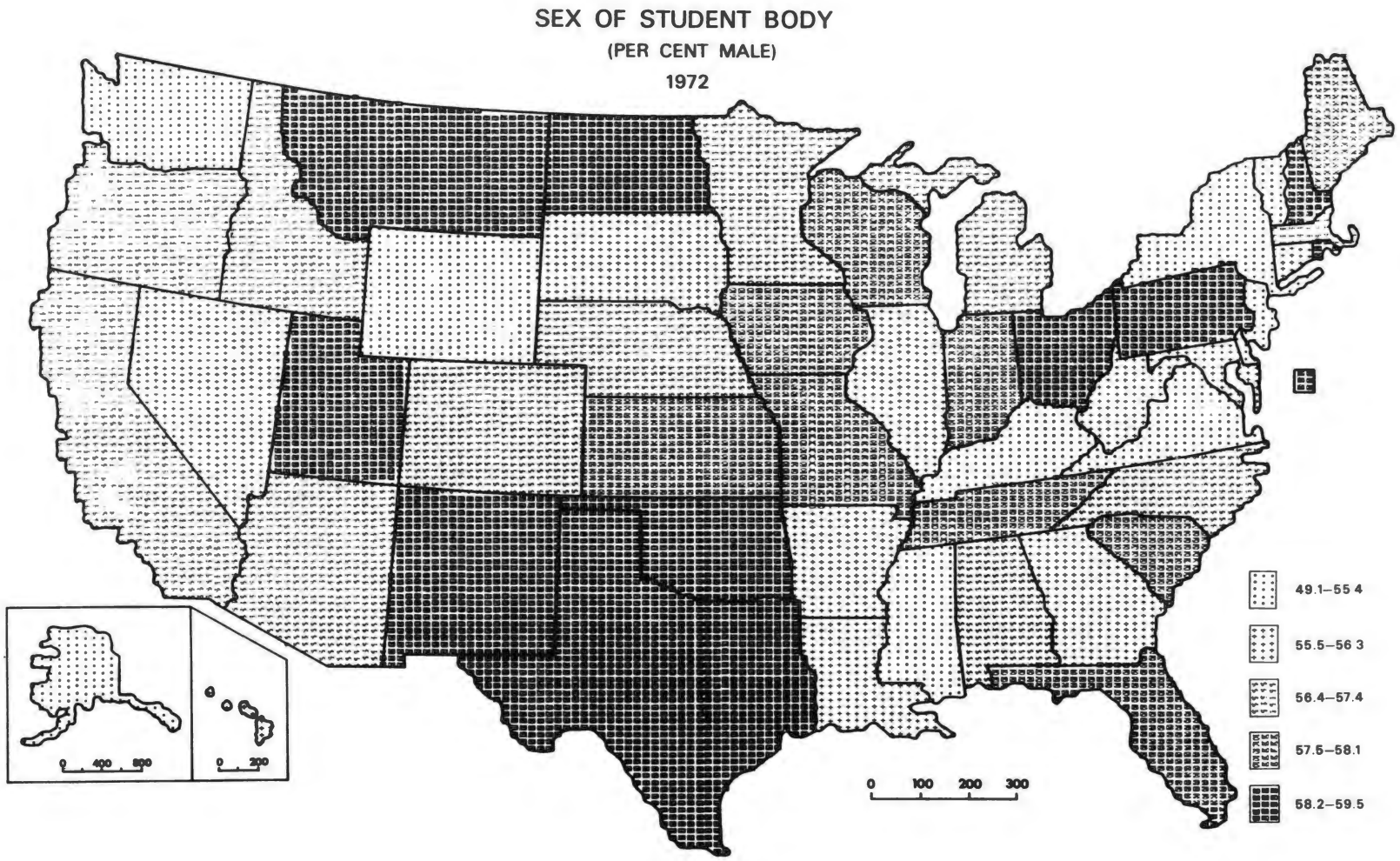

Figure 2. Sex of Student Body

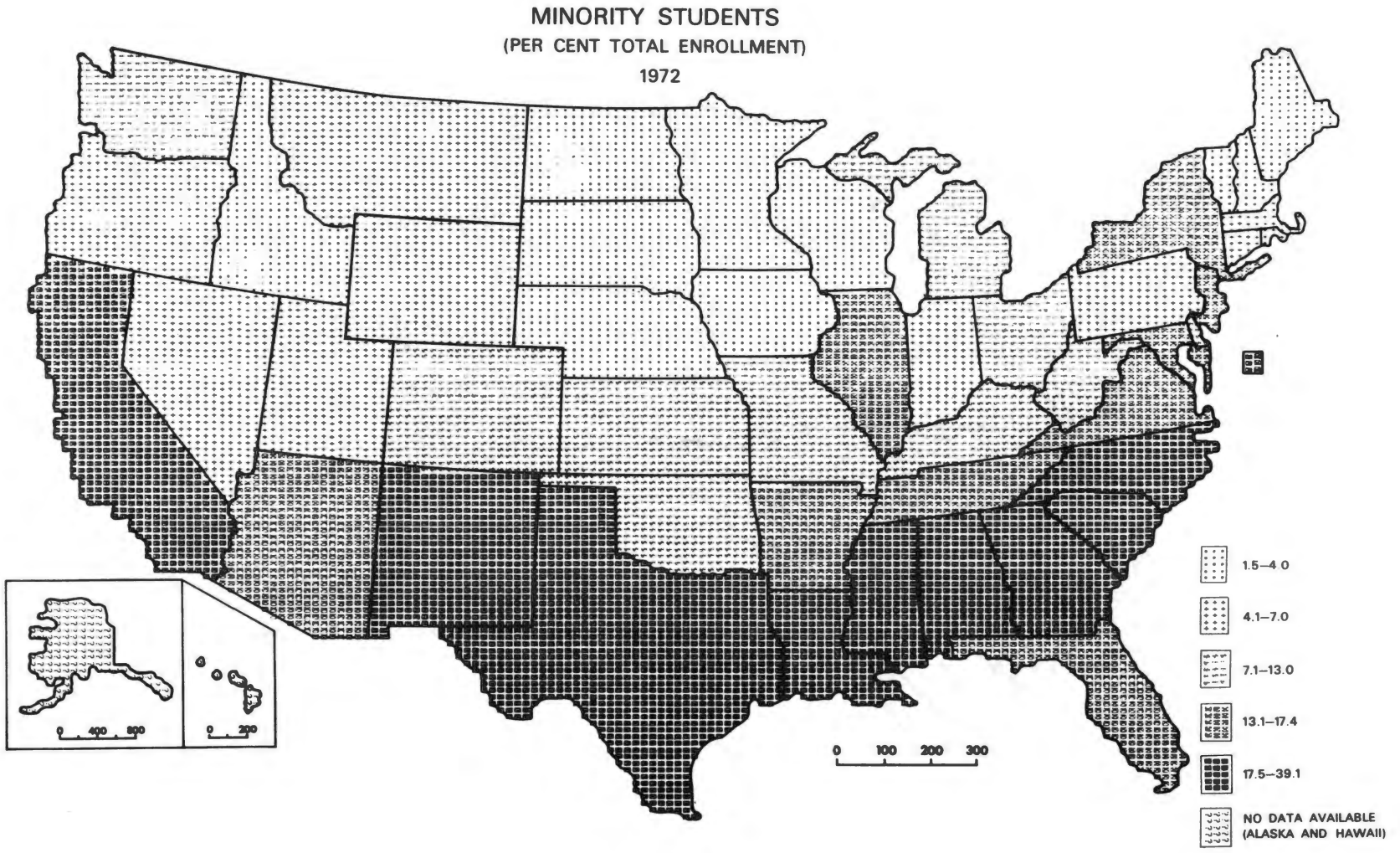

Figure 3. Minority Students

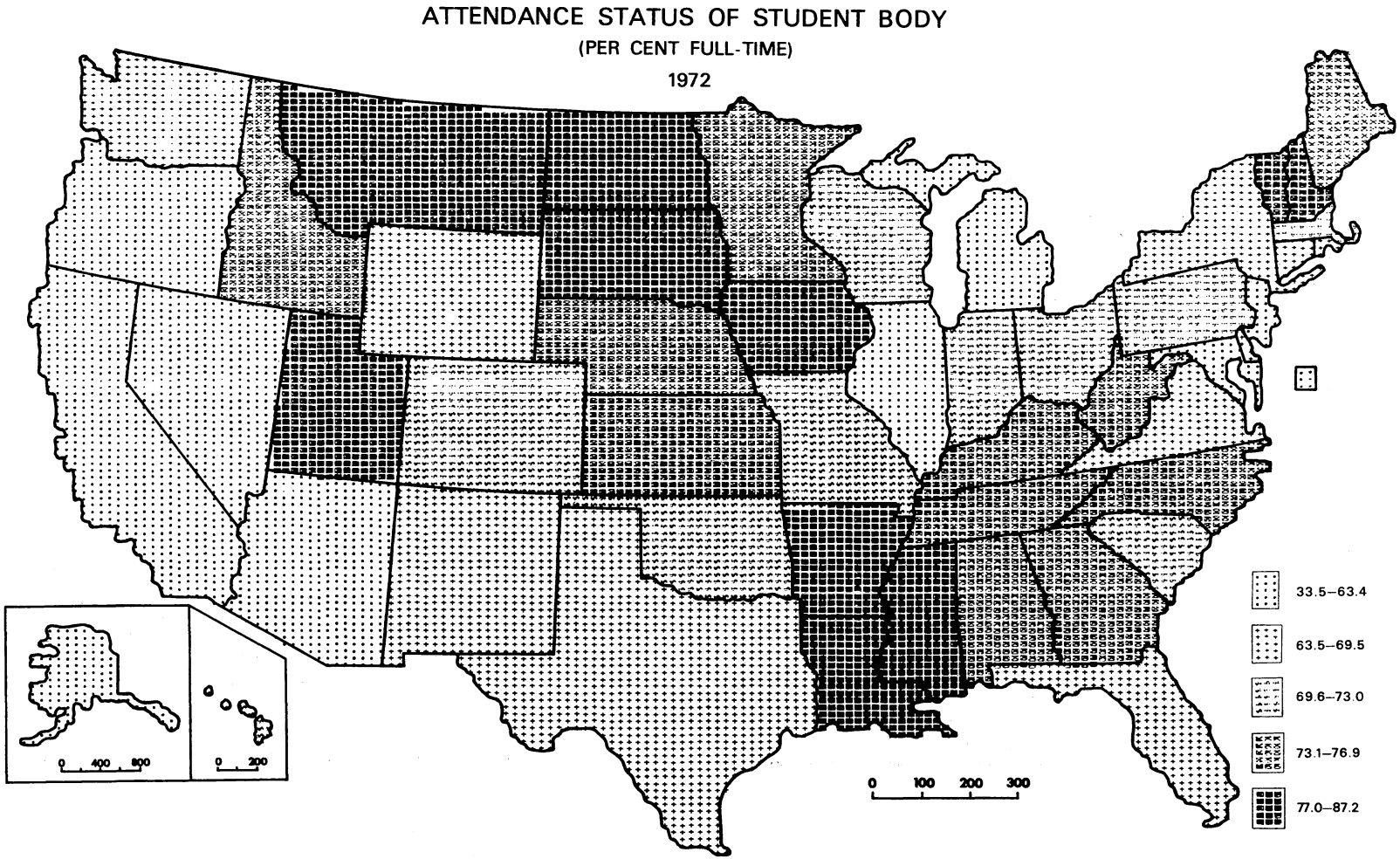

Figure 4. Attendance Status of Student Body

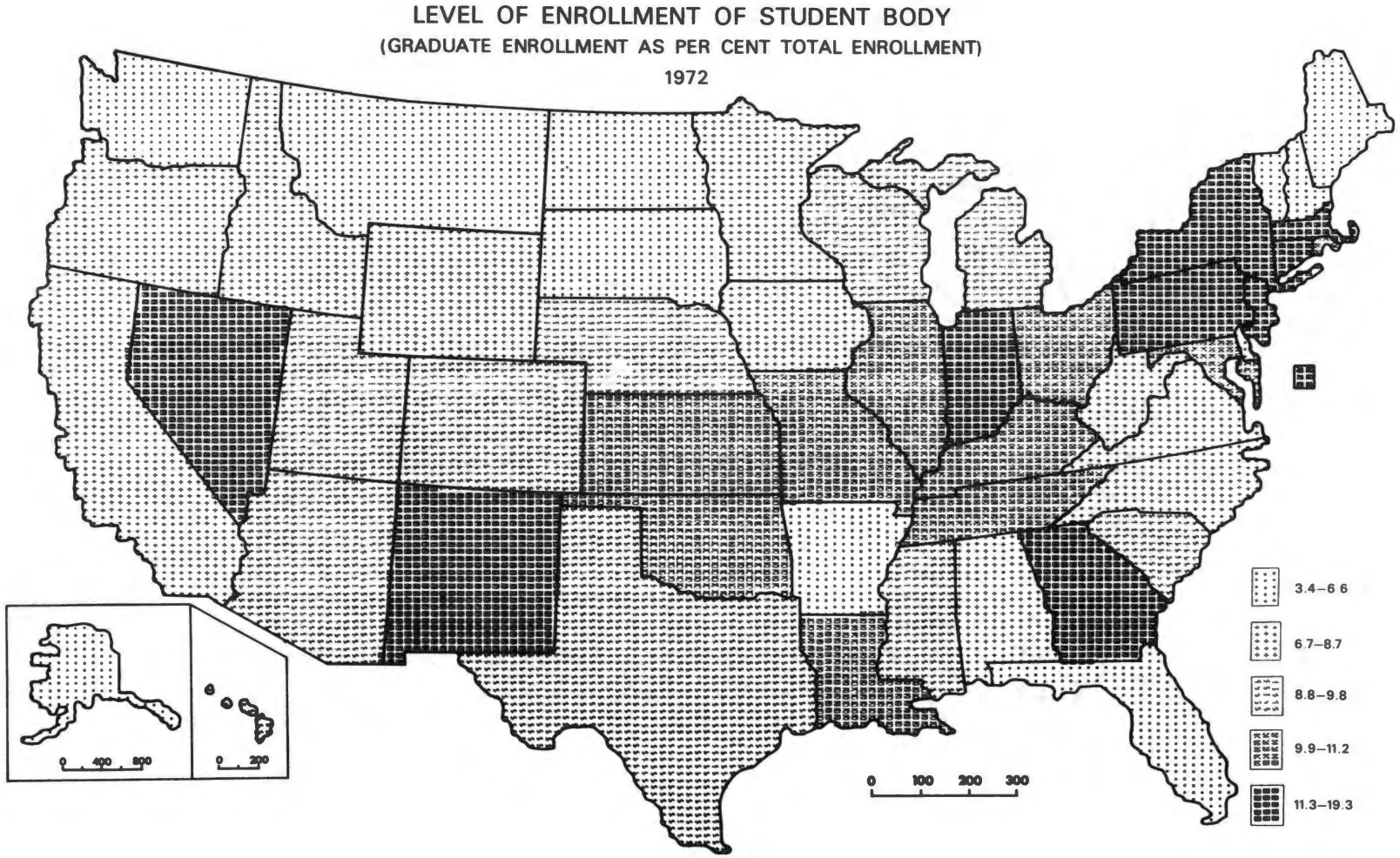

Figure 5. Level of Enrollment of Student Body

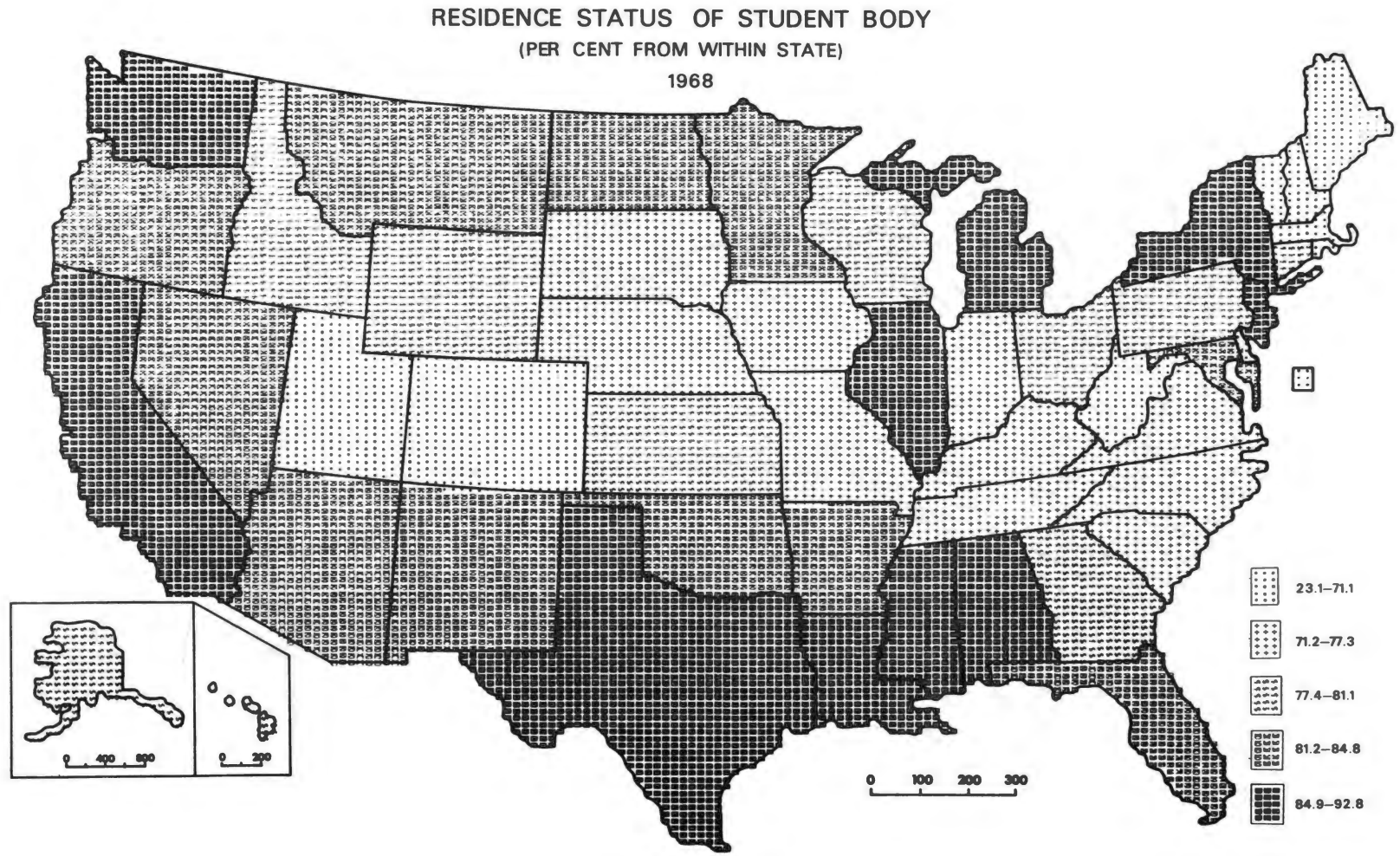

Figure 6. Residence Status of Student Body

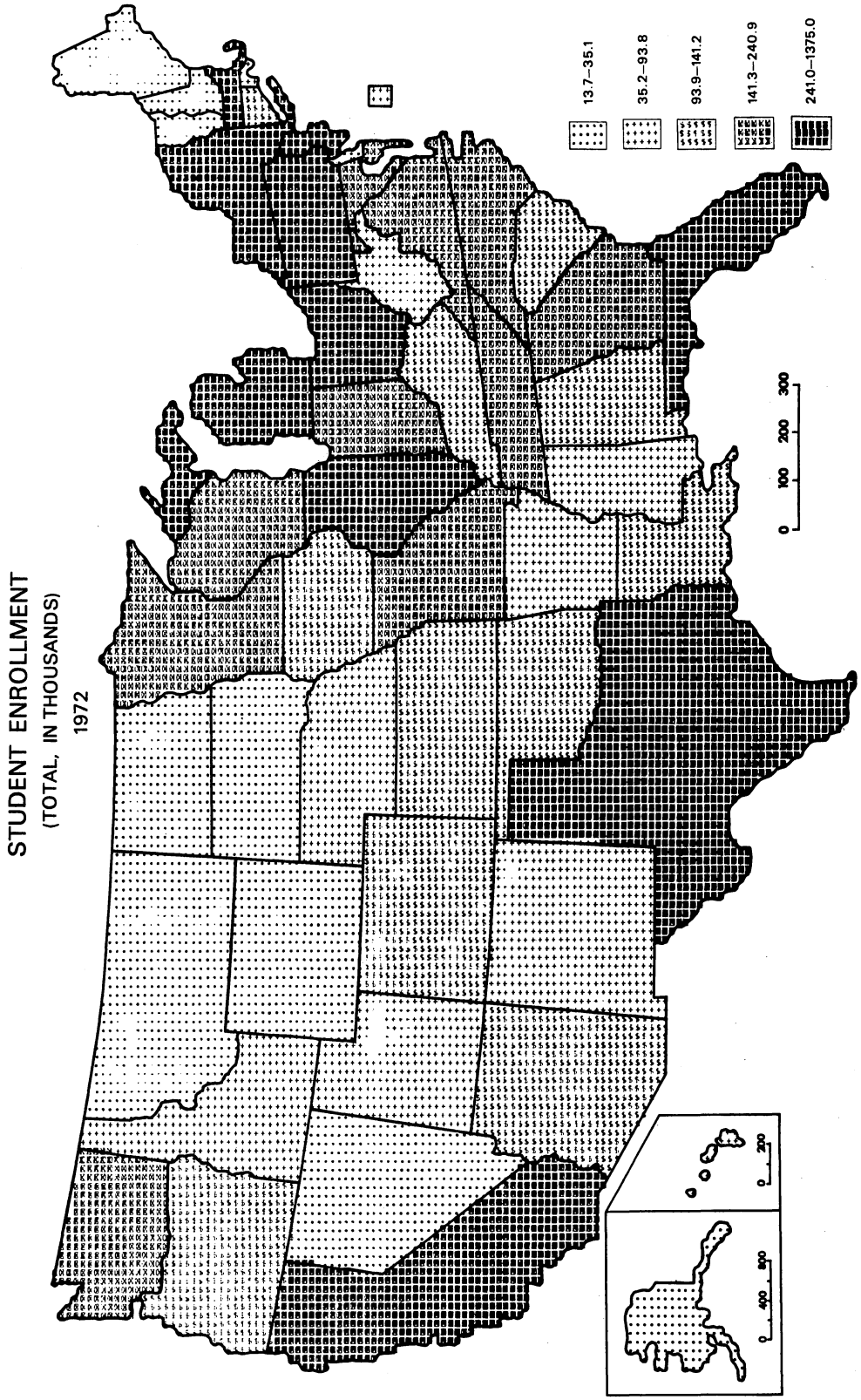

Figure 7. Student Enrollment, 1972

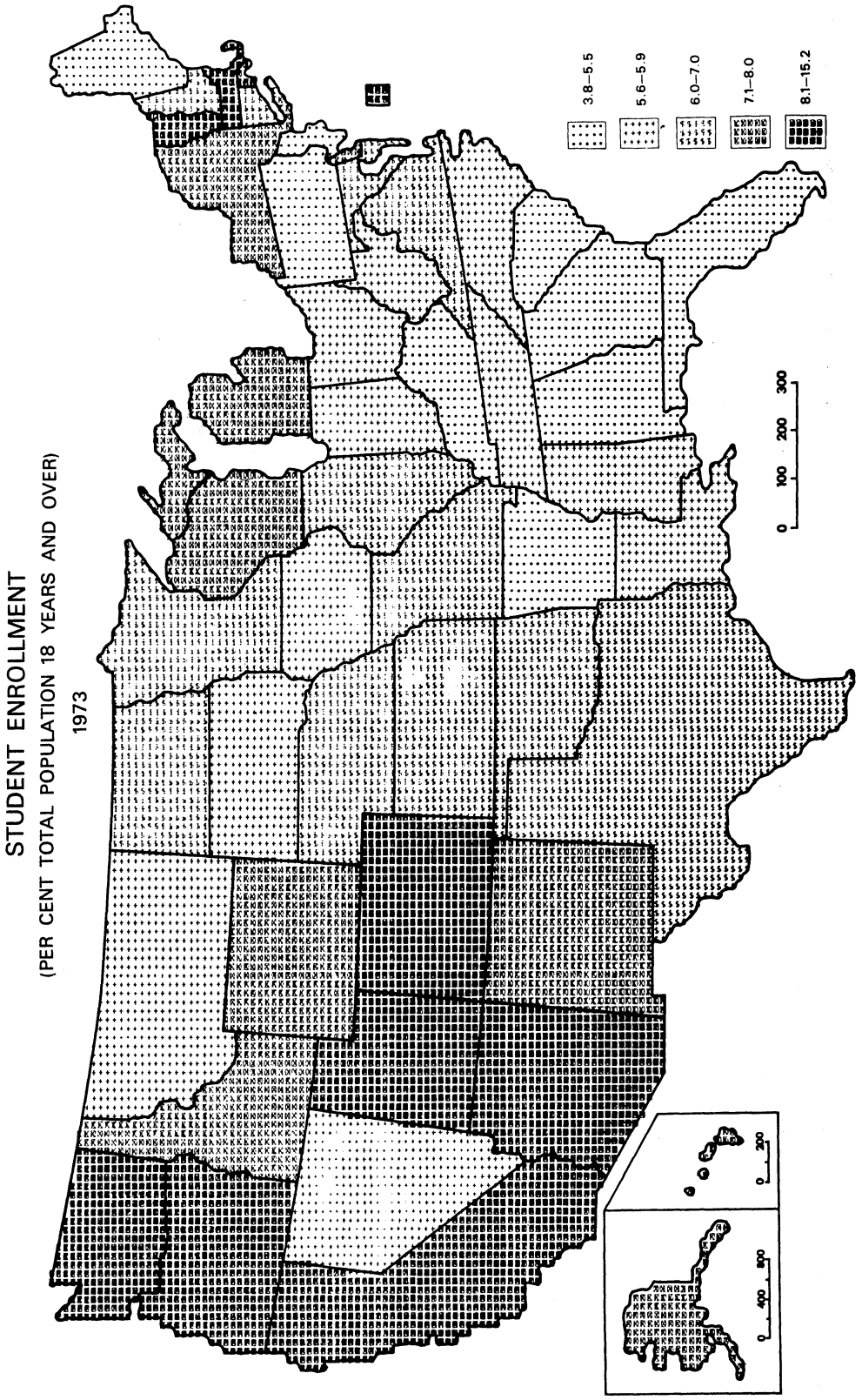

Figure 8. Student Enrollment, 1973

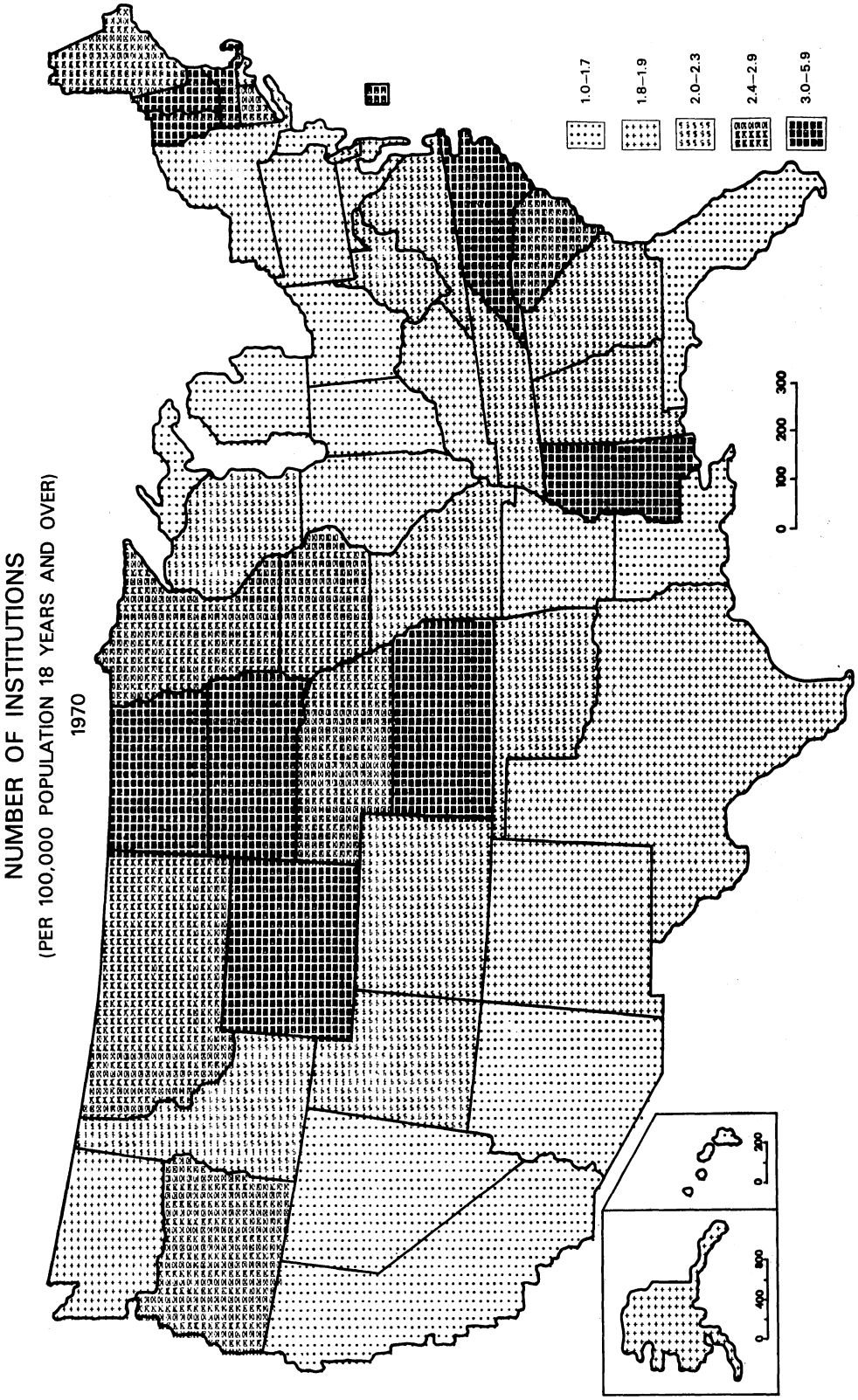

Figure 9. Number of Institutions

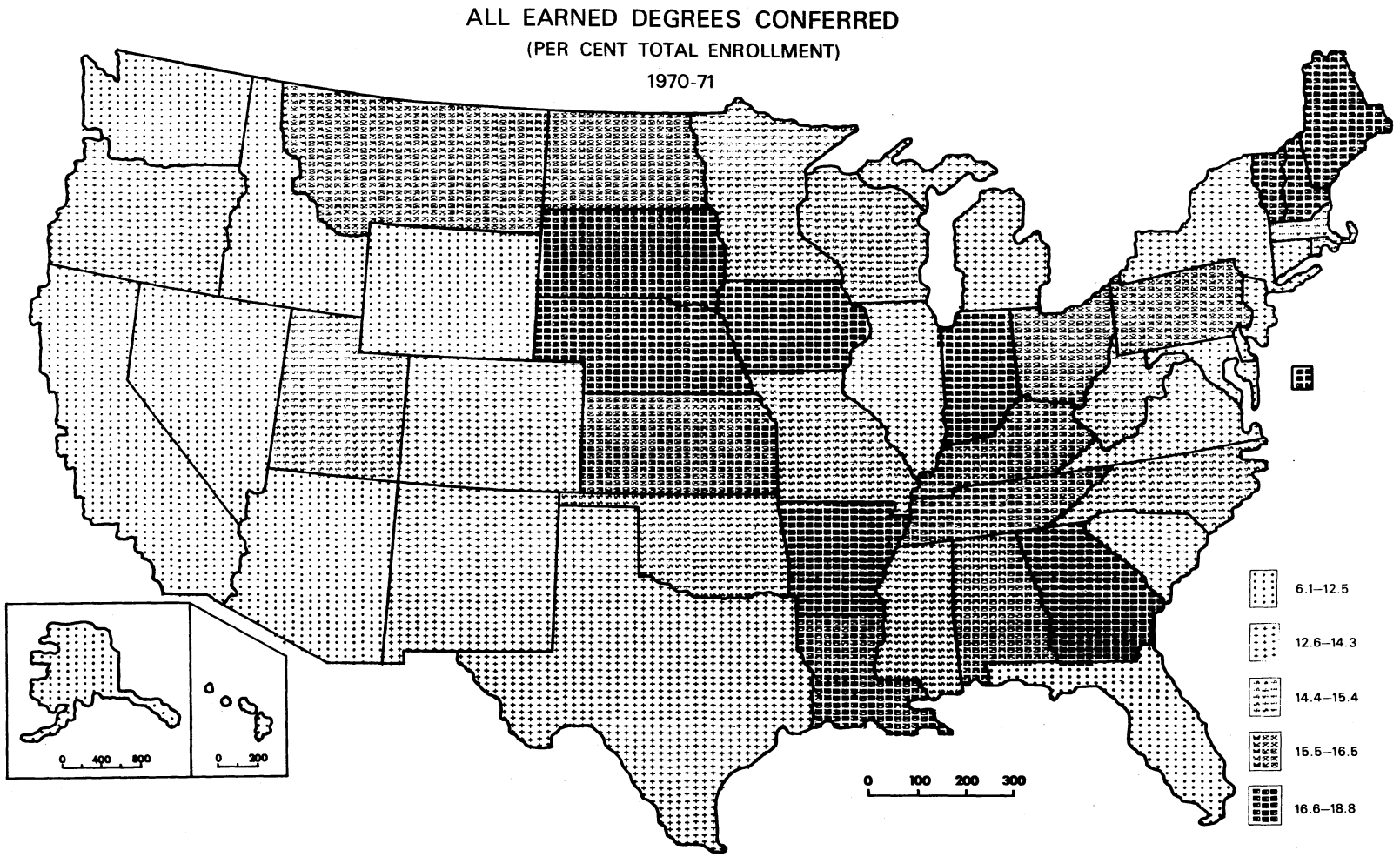

Figure 10. All Earned Degrees Conferred

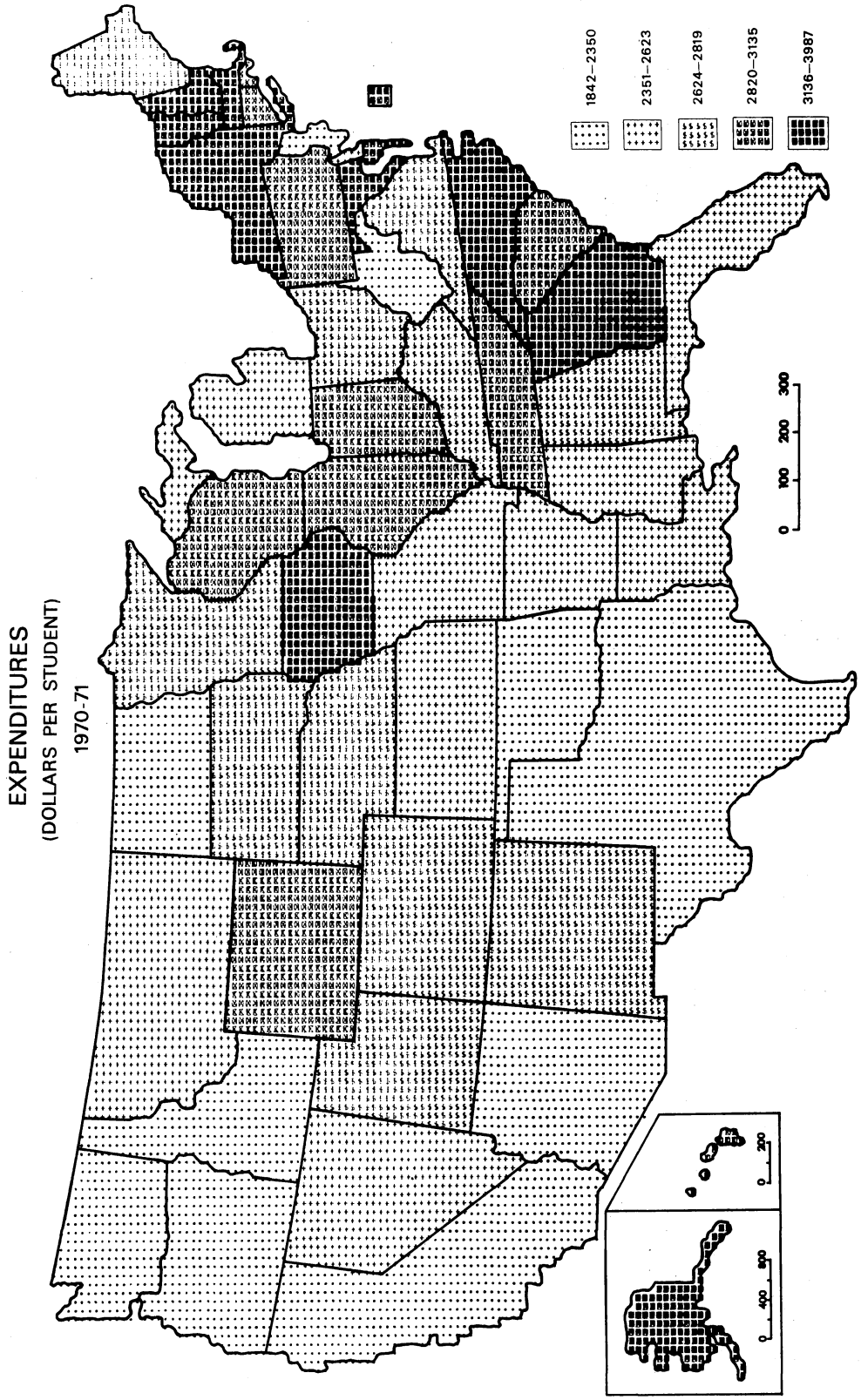

Figure 11. Expenditures

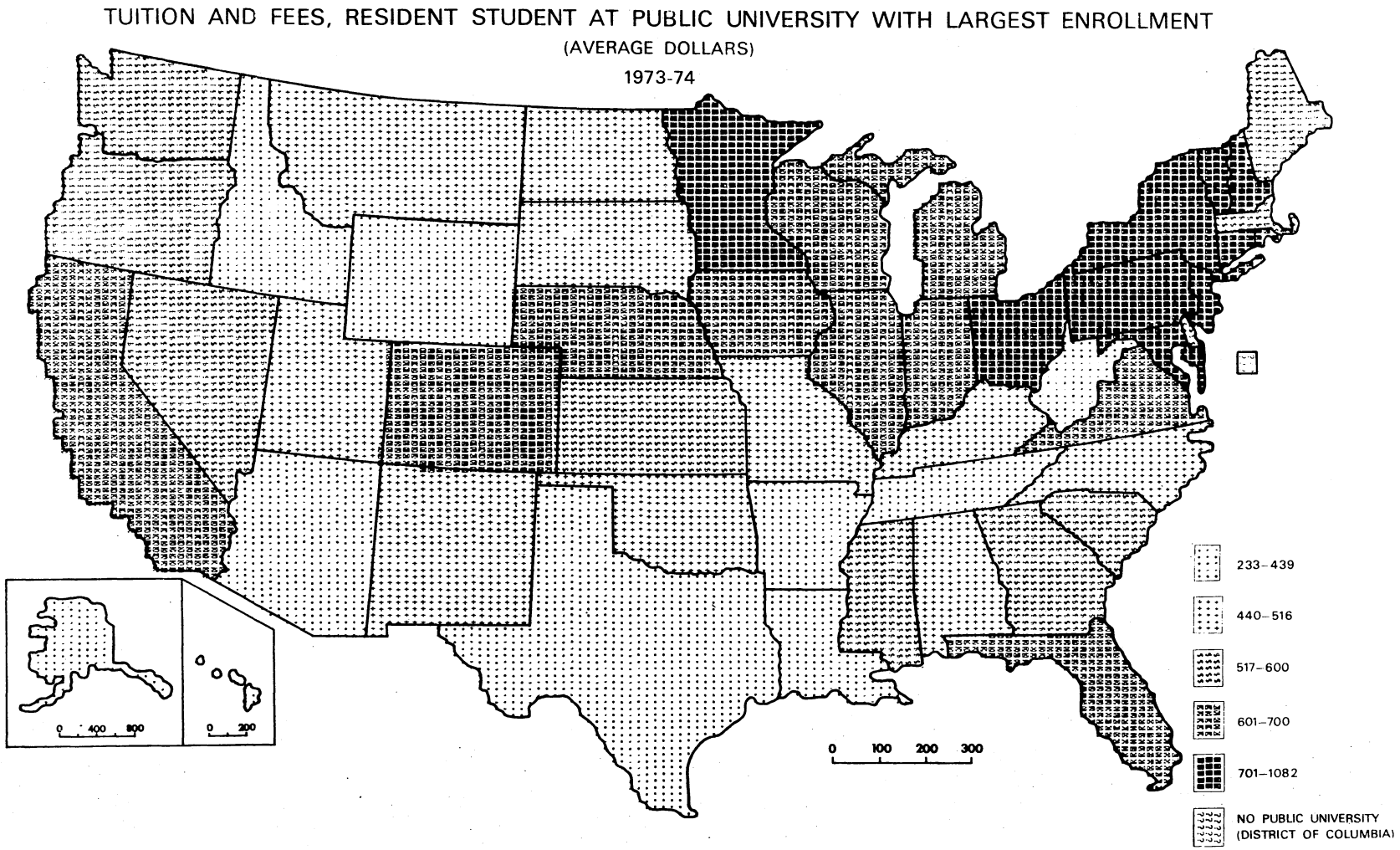

Figure 12. Tuition and Fees, Resident Student at Public University With Largest Enrollment

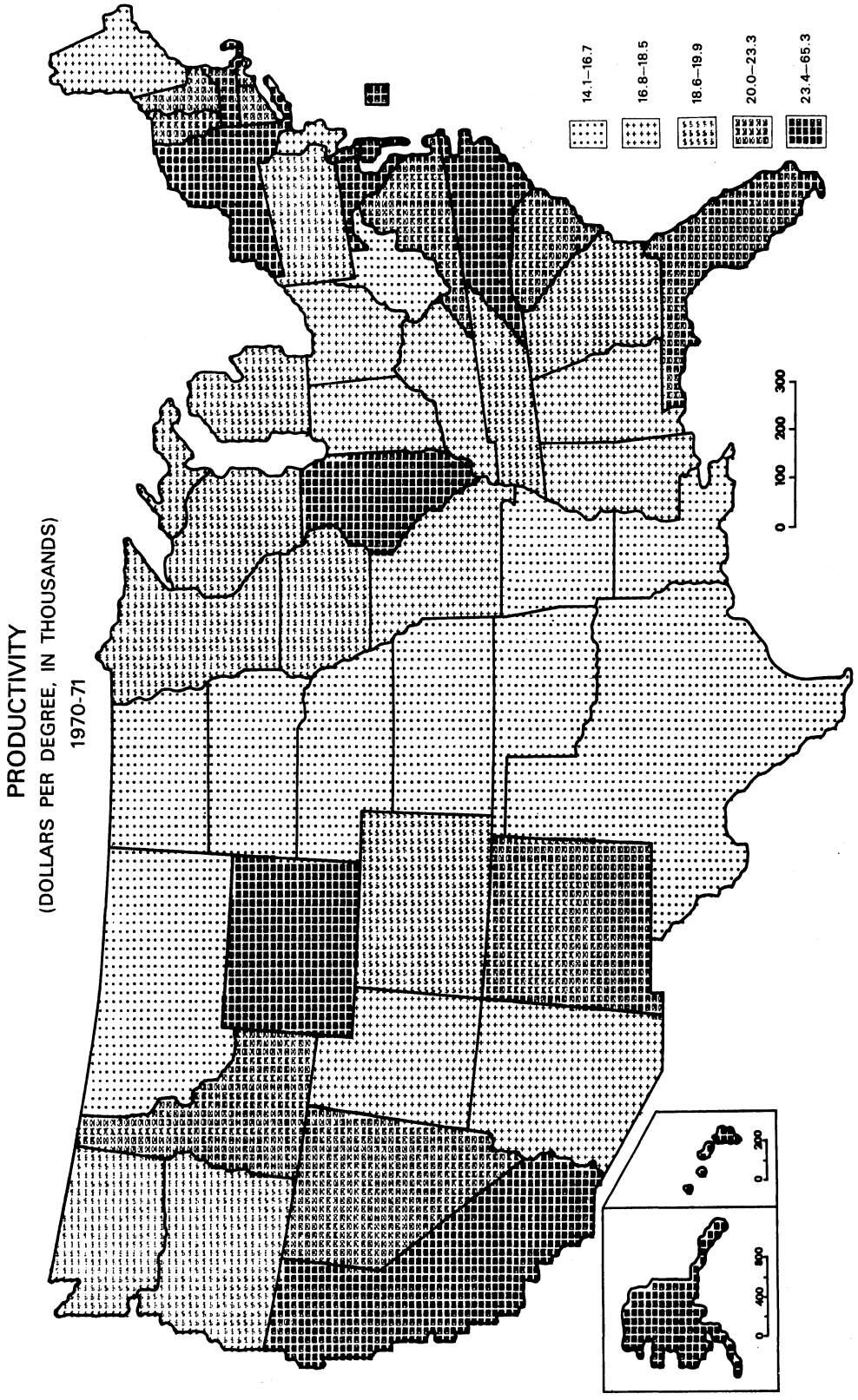

Figure 13. Productivity

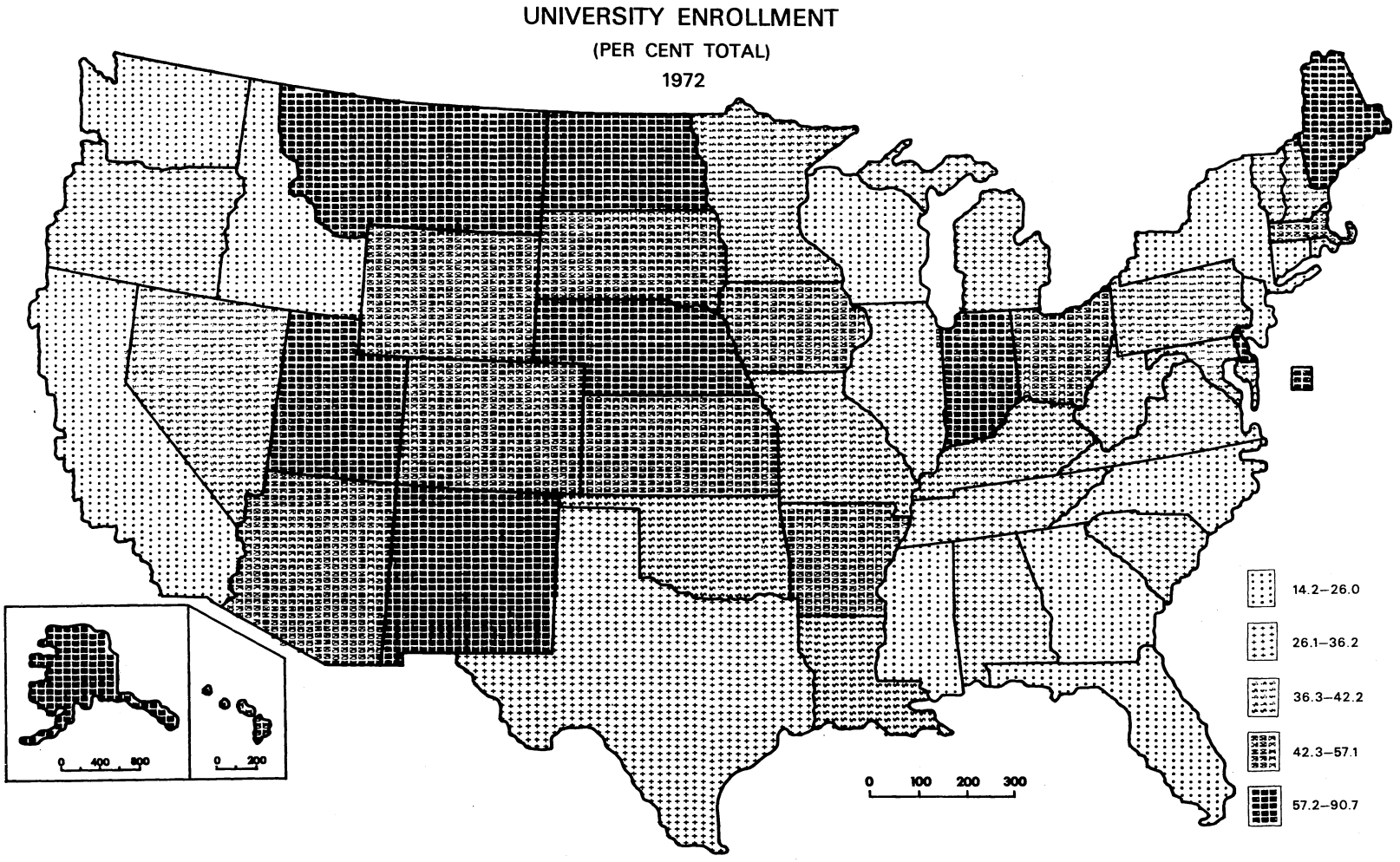

Figure 14. University Enrollment

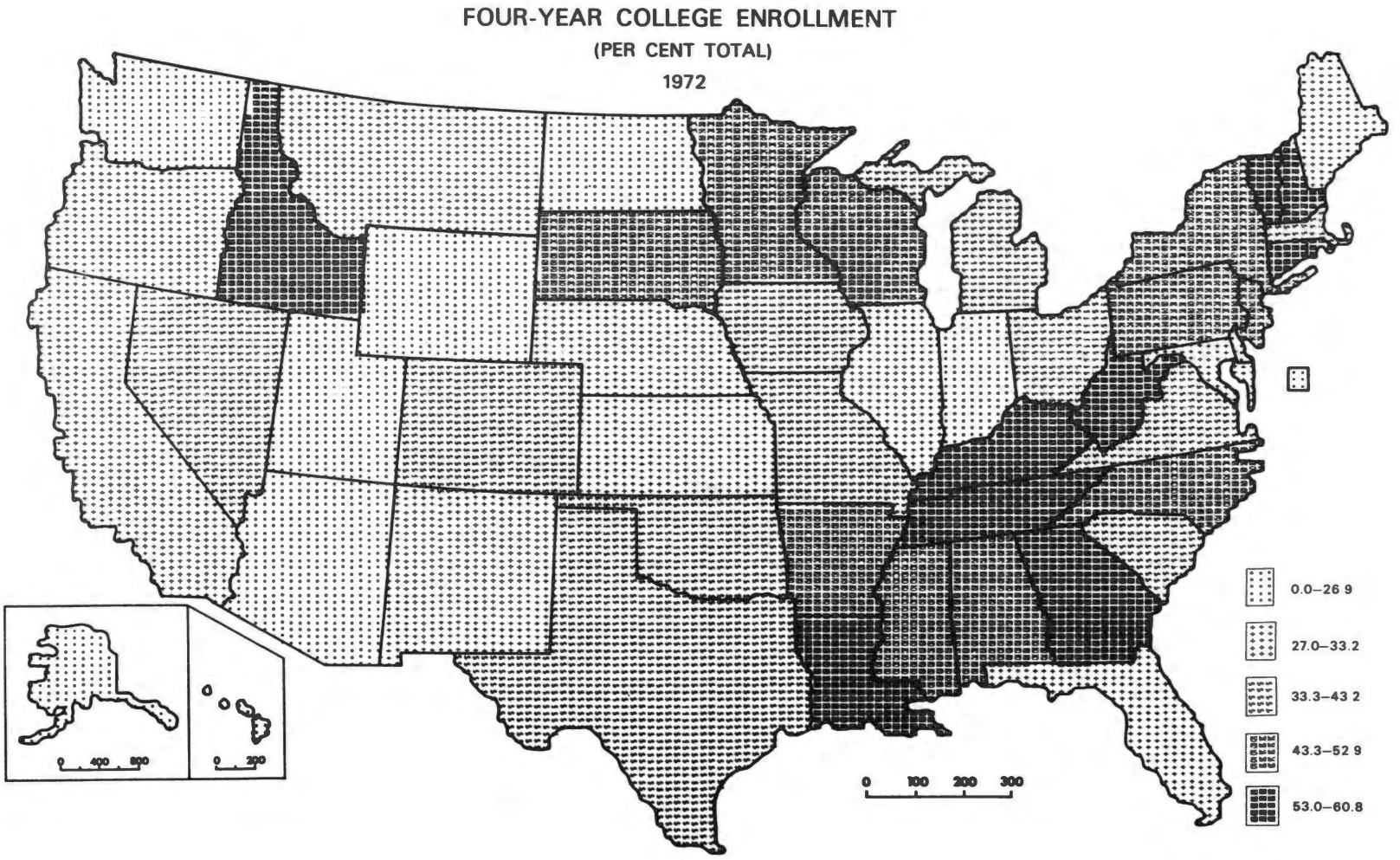

Figure 15. Four-Year College Enrollment

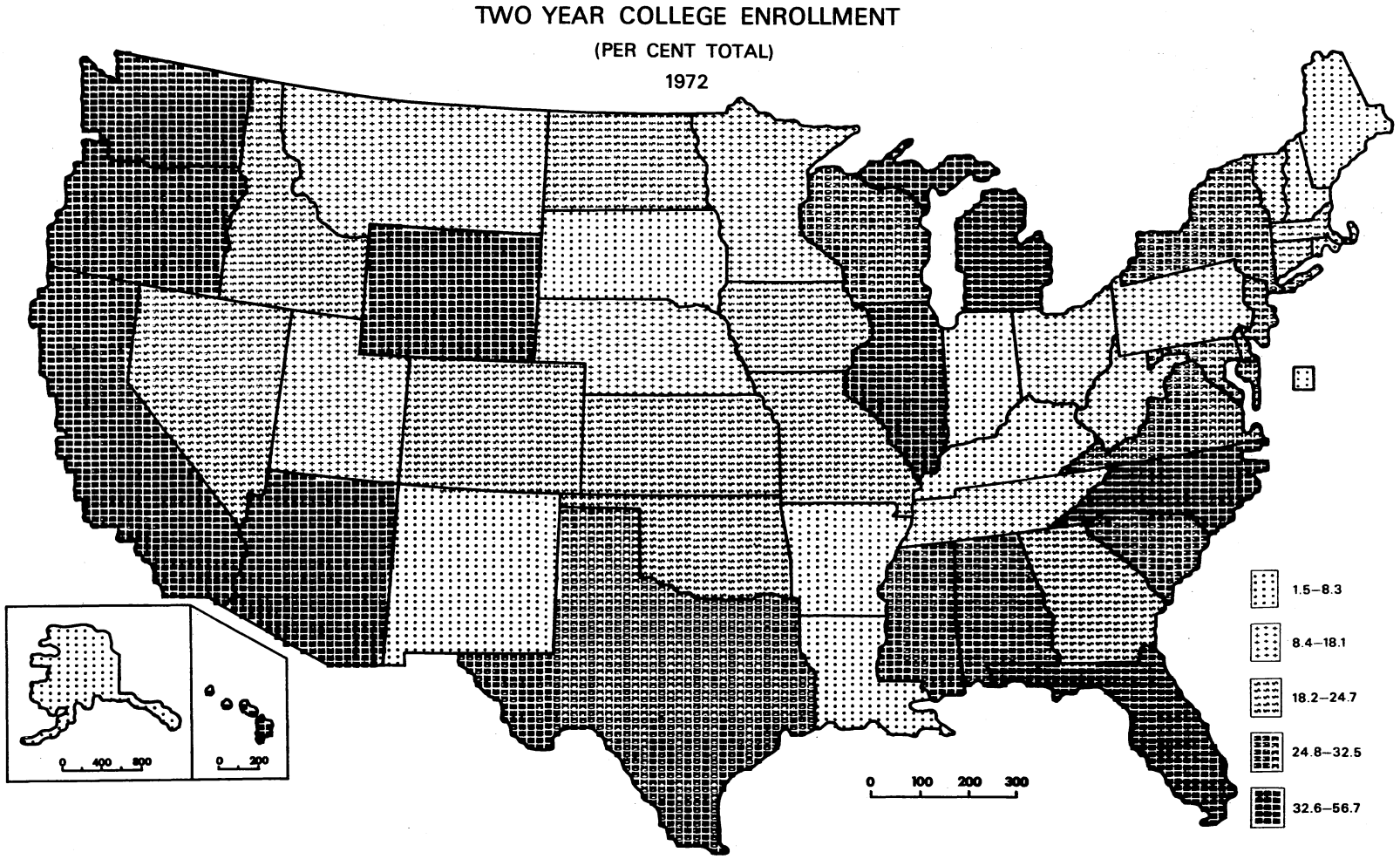

Figure 16. Two-Year College Enrollment

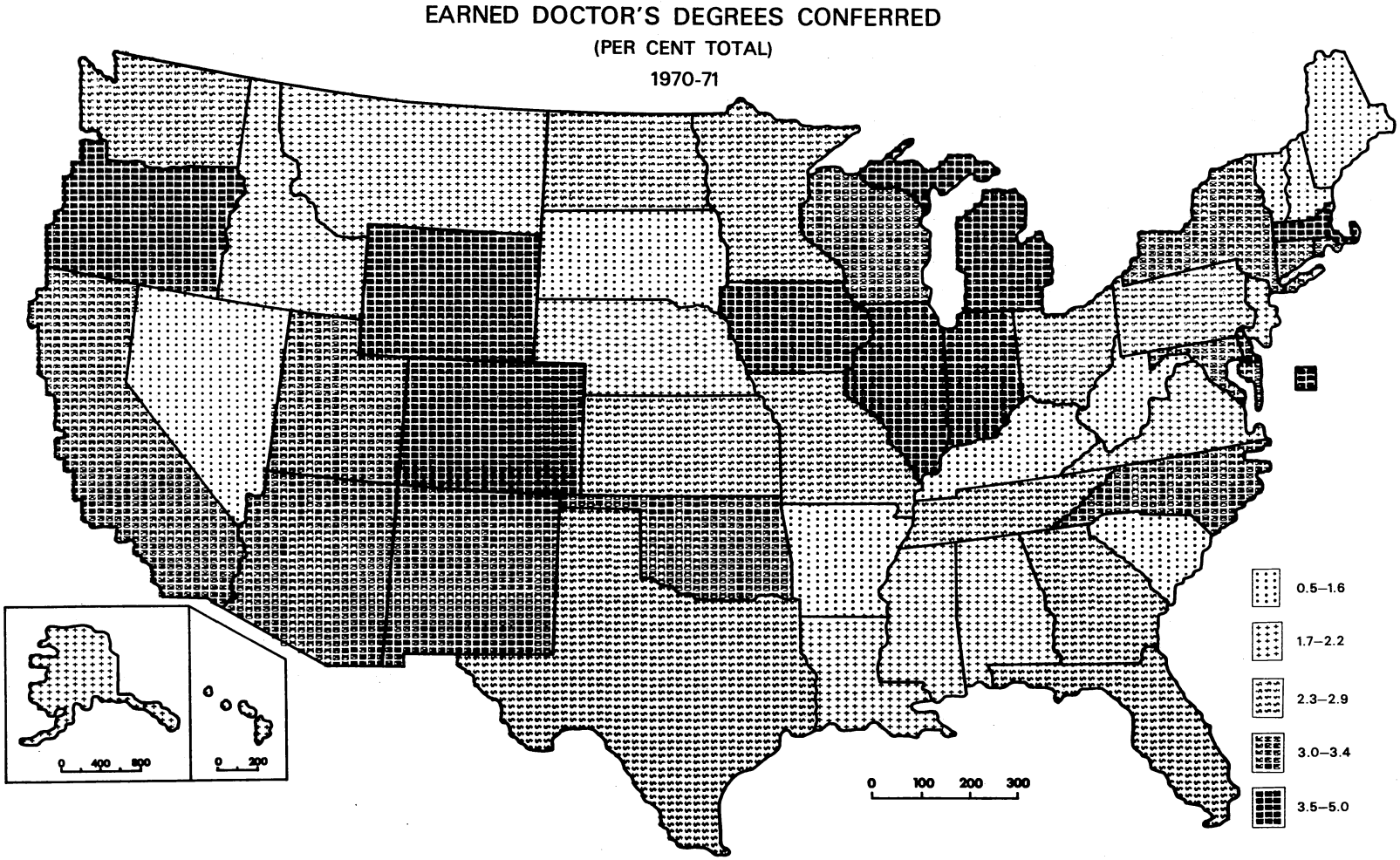

Figure 17. Earned Doctor's Degrees Conferred

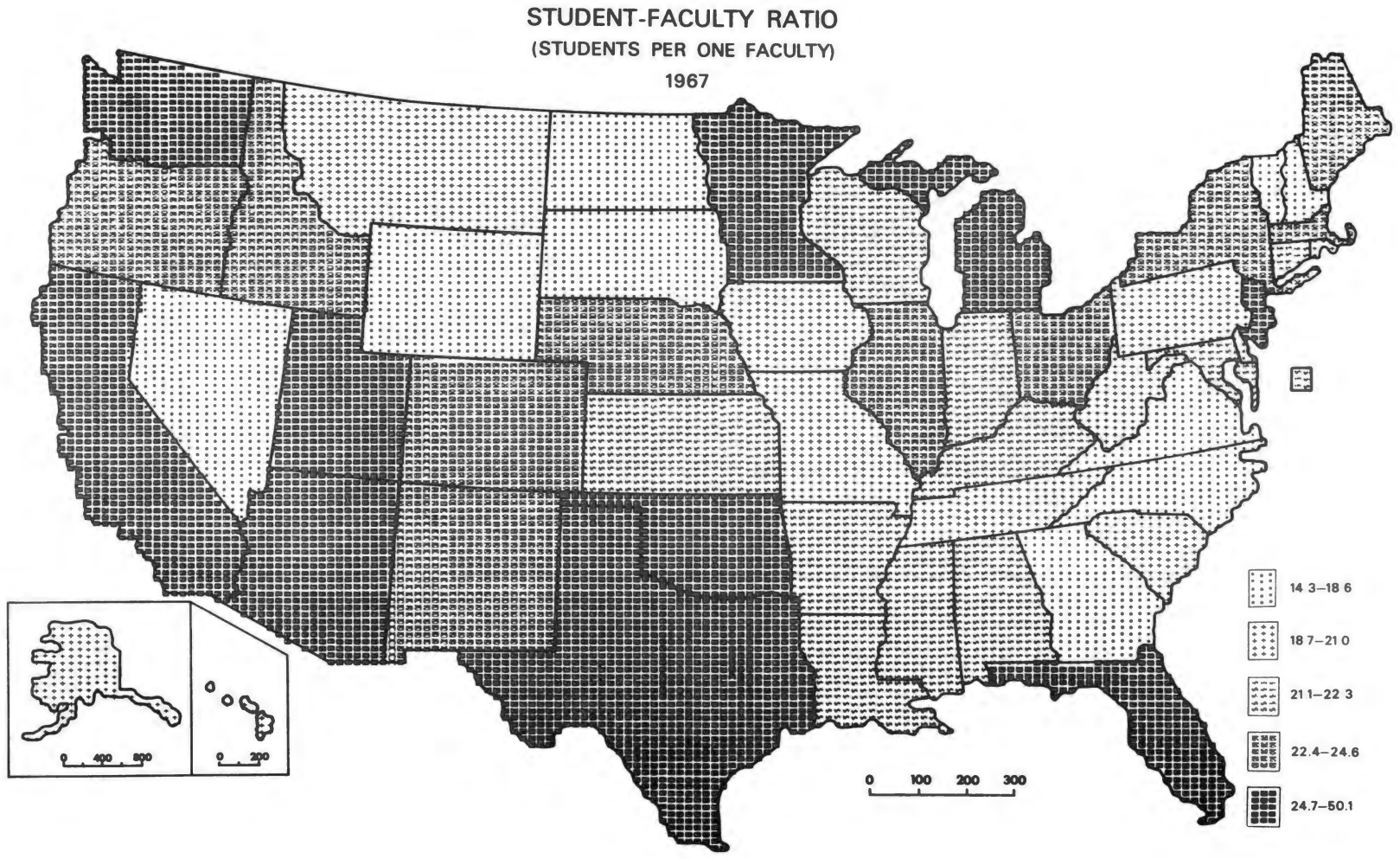

Figure 18. Student-Faculty Ratio

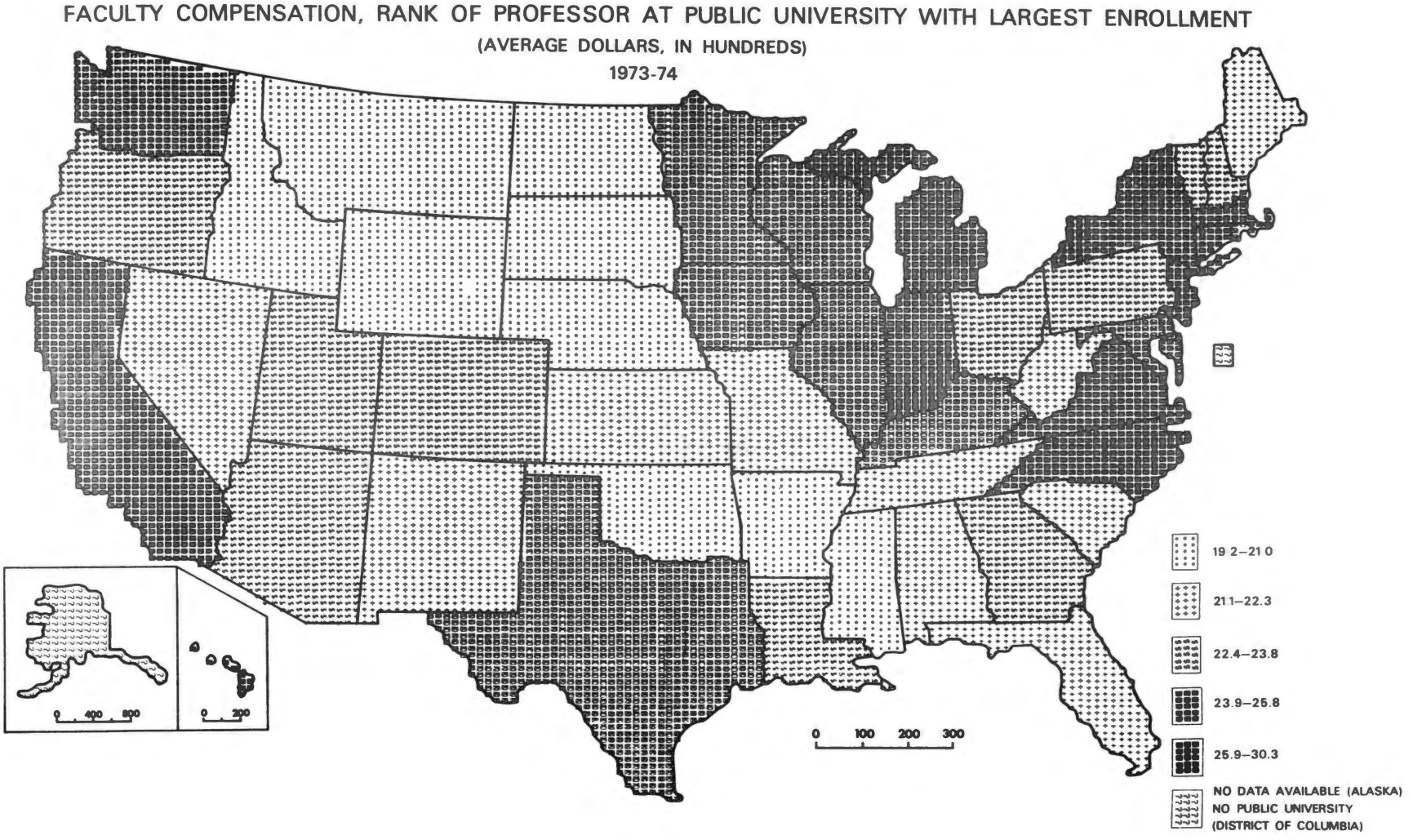

Figure 19. Faculty Compensation, Rank of Professor at Public University With Largest Enrollment

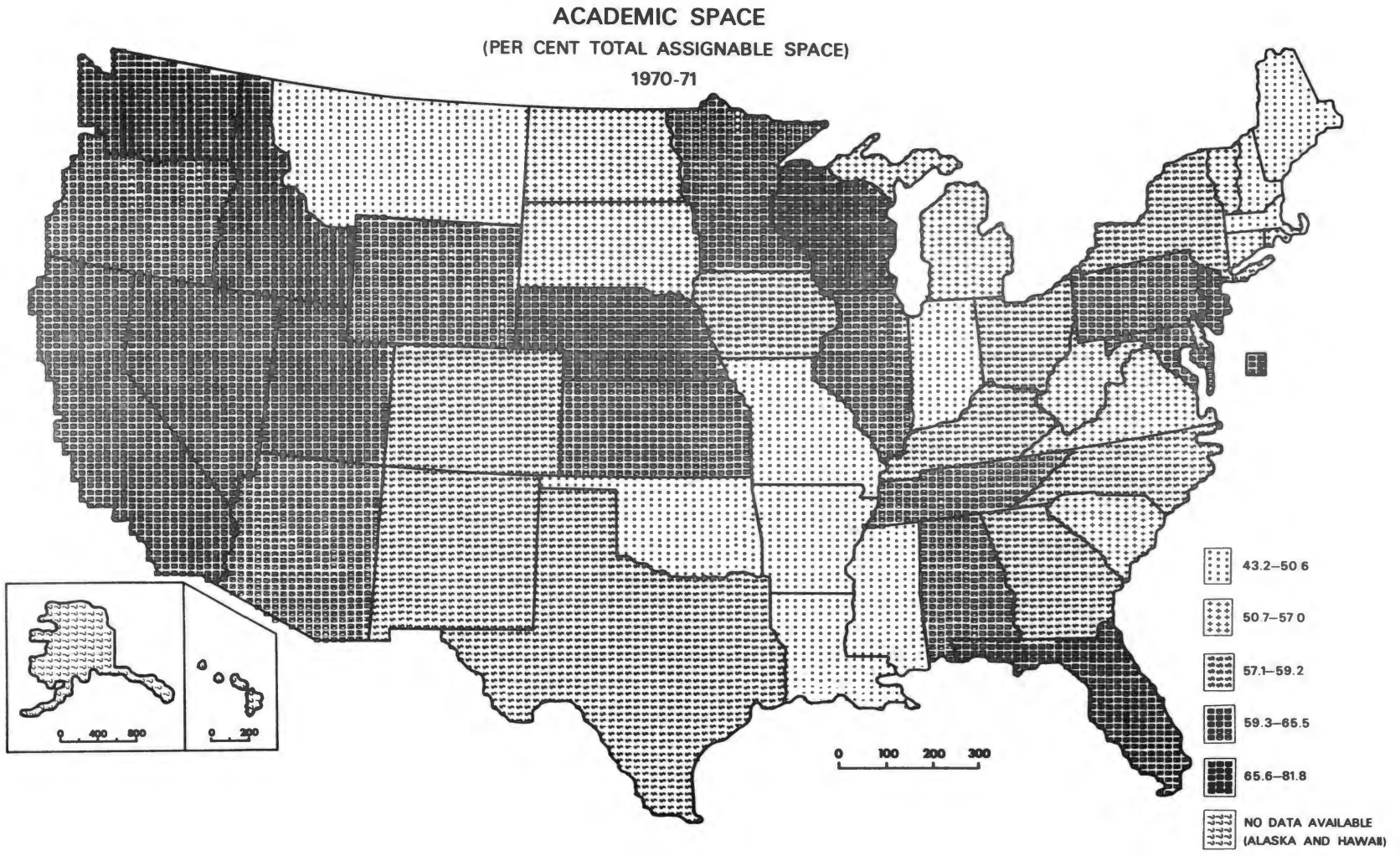

Figure 20. Academic Space

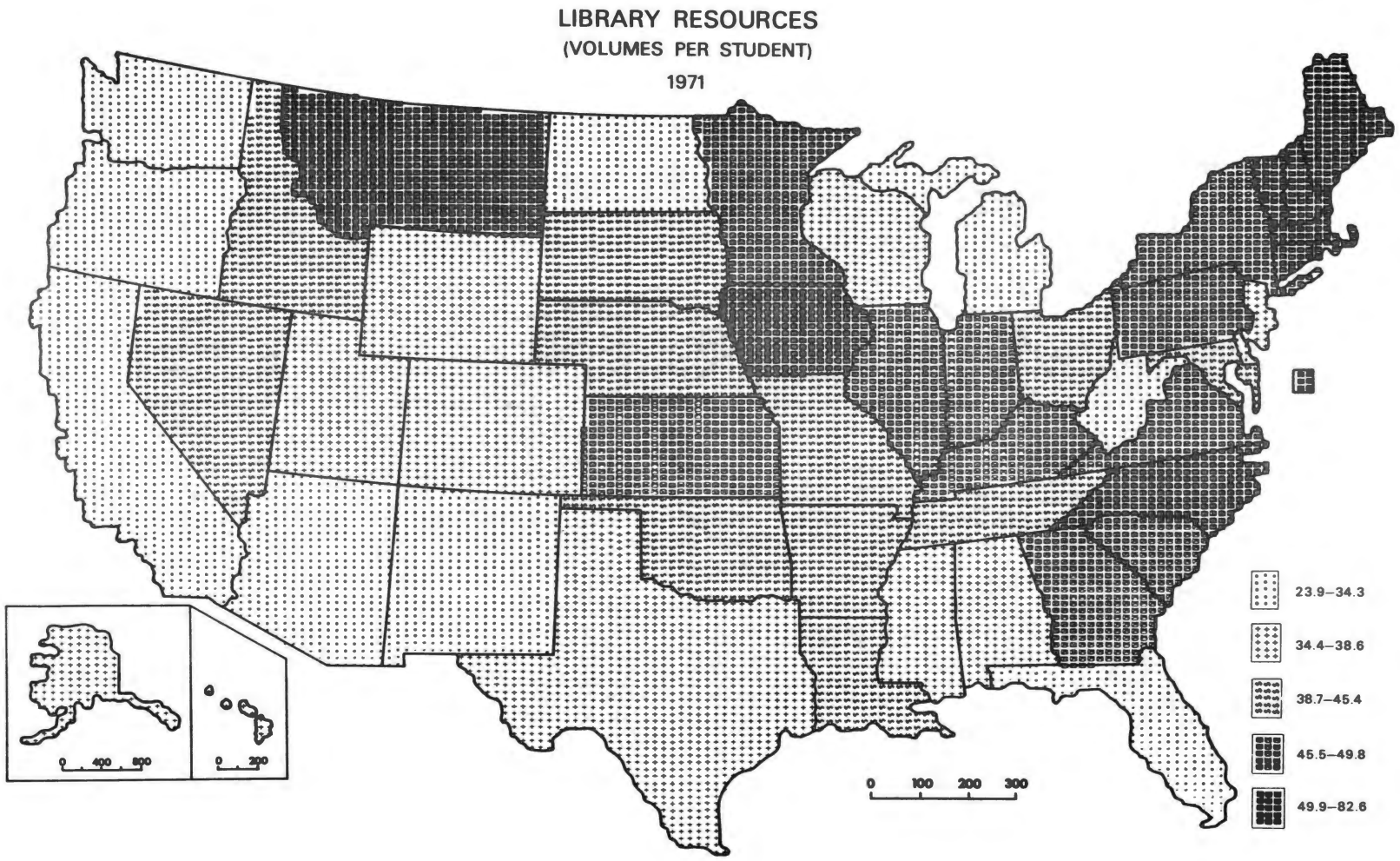

Figure 21. Library Resources

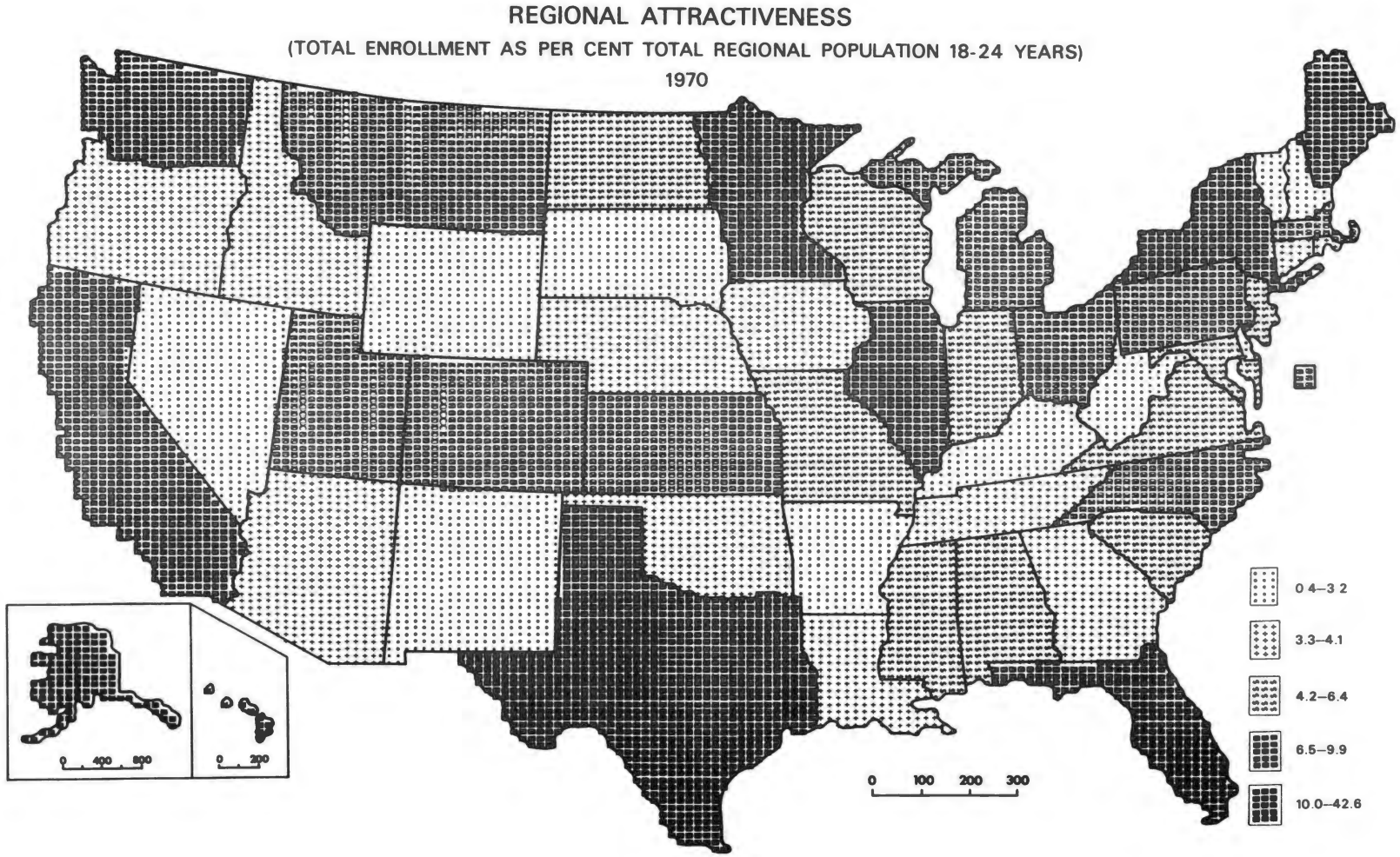

Figure 22. Regional Attractiveness

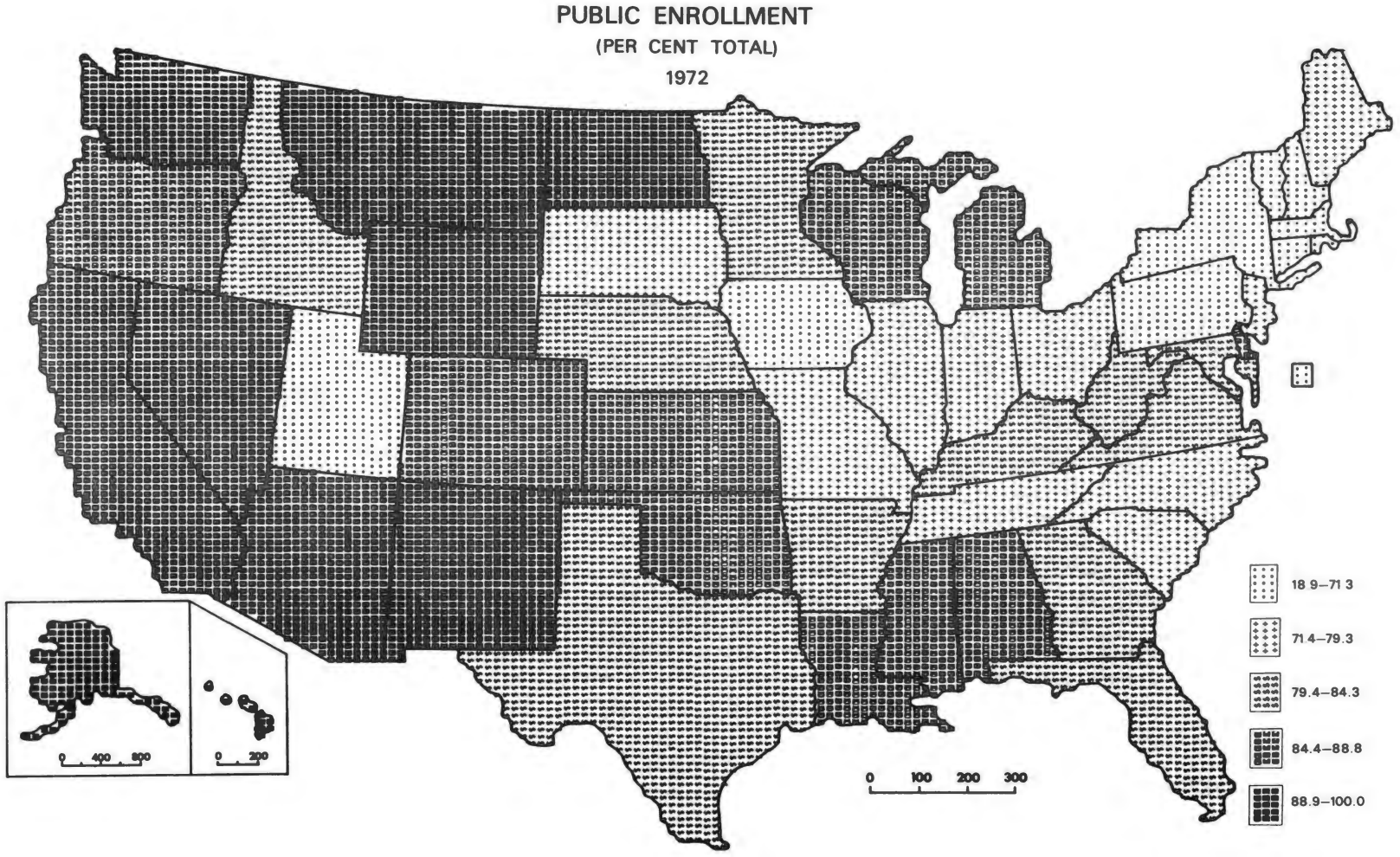

Figure 23. Public Enrollment

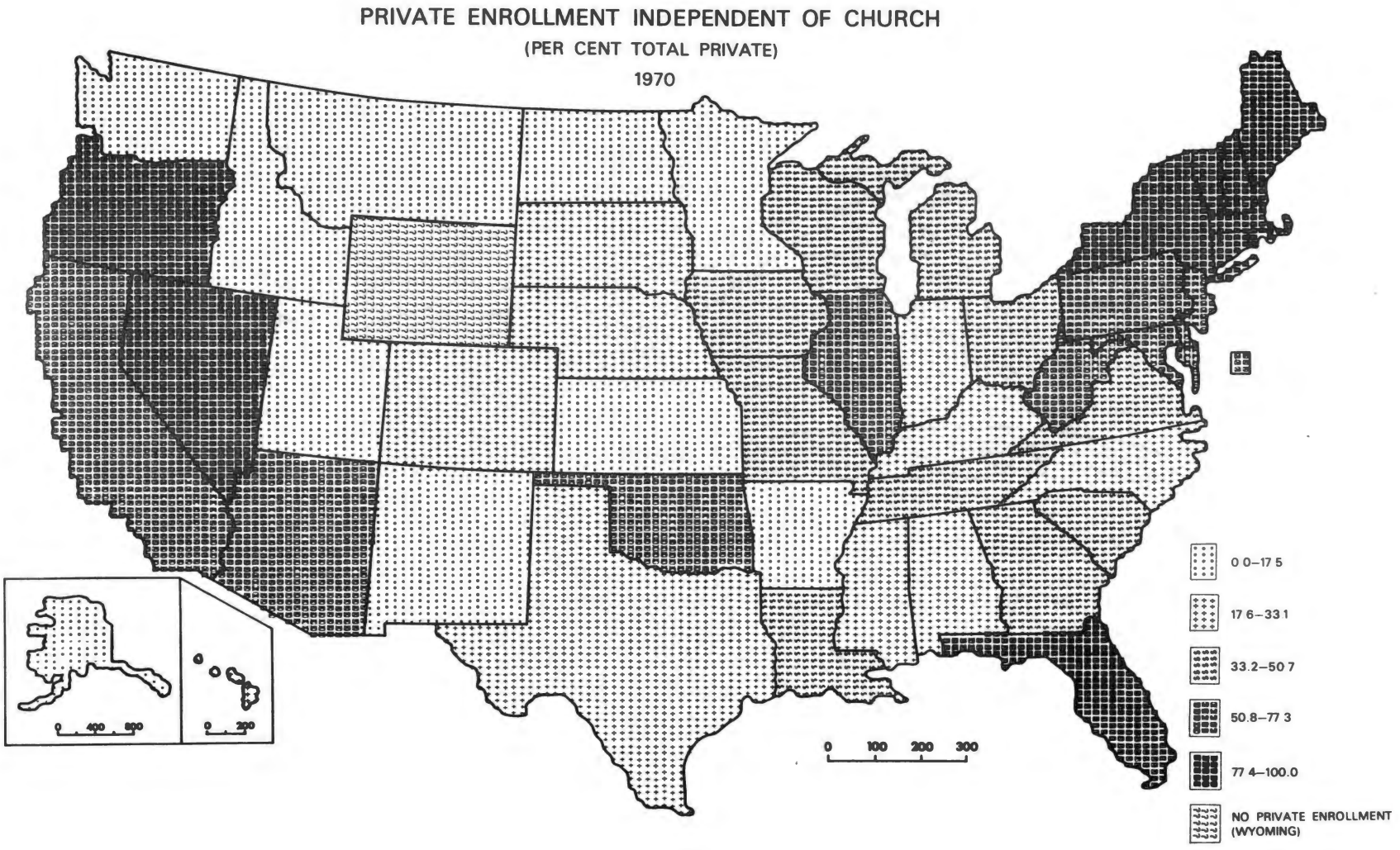

Figure 24. Private Enrollment Independent of Church

Dimensional Patterns

It is advanced in this study that the subject of the geography of higher education at the macro-scale merits attention and that some currently used multivariate techniques of analysis can aid in comprehending the areal complexities and variation of higher education. The most effective route toward delimiting the spatial and other structures imbedded in the 23 indicator patterns (Figures 2-24) appears to be the factor analytic approach. The usefulness of factorial analysis in regional studies and in regionalization has become increasingly appreciated over the past ten years.[1]

Factorial analysis can be described as a summarizing device which operates in terms of the inter-relationships among a set of input variables (or indicators) and identifies, in the order of their significance, a series of factors (or dimensions) which are diagnostic of the input and which account for measurable amounts of the initial variance. The nature of each factor can be identified from its associations with the original variables, expressed through correlation measures termed factor loadings. Factor scores are calculated for each of the original measurement units and these allow spatial patterns to be identified. Thus, the purpose of this section, to reduce the 23 indicator patterns to a parsimonious number of underlying dimensional patterns, can be achieved.

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[1]Maurice Yeates, An Introduction to Quantitative Analysis in Human Geography (New York, 1974), pp. 207-208.

This study utilized the factor analytic technique of principal components analysis (run in an R-mode).[2] The first seven factors extracted were retained and rotated orthogonally.[3] The communality values (h^2) indicate that these first seven factors account for much of the variance of the indicator data matrix (see Table II). The total proportion of variance accounted for in Table II is .810; that is h^2 = 18.62 divided by N indicators, 23.

The results of the factorial analysis are summarized in Table III, which shows the relative strengths of the seven retained factors as expressed by eigenvalues and by the proportion of variance accounted for by each factor. The structure of the seven factors, as revealed by the high-loading indicators, is presented in Table IV. The last output from the analysis was that of factor scores, which were computed for each factor for each state (see Appendix B), thus allowing the patterns to be identified in geographical space (Figures 25-31).[4]

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[2]Jolayne Service, A User's Guide to the Statistical Analysis System (Raleigh, N. C., 1972), pp. 201-207. This factorial analysis program performs a principal components analysis with an orthogonal rotation of the factor matrix employing Kaiser's varimax criterion.

[3]All factors for which eigenvalues were greater or equal to unity were retained for rotation.

[4]It should be noted that the factor scores are standardized, having a mean of zero and variance one. These scores are interpreted in the same way as the data for the original indicators. That is, the highest scores indicate those states that are highest in association with a particular factor, whereas the lowest scores indicate the opposite.

TABLE II

COMMUNALITY (h^2) VALUES, ARRANGED ACCORDING TO RANK ORDER

Indicator	h^2
Productivity ($ per degree)	0.96
University enrollment (% total)	0.95
Minority students (% total enrollment)	0.90
Attendance status (% full-time)	0.89
Public enrollment (% total)	0.89
Number of institutions (per 100,000 population 18 years +)	0.88
Level of enrollment (graduate enrollment as % total enrollment)	0.87
Student enrollment (% total population 18 years +)	0.86
Expenditures ($ per student)	0.86
Residence status (% from within state)	0.85
Two-year college enrollment (% total)	0.85
All earned degrees conferred (% total enrollment)	0.84
Four-year college enrollment (% total)	0.83
Faculty compensation, rank of professor (average $)	0.83
Regional attractiveness (total enrollment as % total regional population 18 years to 24 years)	0.83
Tuition and fees, resident student (average $)	0.81
Library resources (volumes per student)	0.79
Student enrollment (total)	0.78
Sex (% male)	0.72
Private enrollment independent of church (% total private)	0.69
Student-faculty ratio (students per one faculty)	0.67
Earned doctor's degrees conferred (% total)	0.63
Academic space (% total assignable space)	0.44
	$\Sigma h^2 =$ 18.62

TABLE III

HIGHER EDUCATIONAL FACTORS: EIGENVALUES AND VARIANCE EXPLAINED

Factor Number	Factor Description	Eigenvalue (total=23)	Explained Variance (%)	Cumulative Explained Variance(%)
1	Productivity	5.5	23.8	23.8
2	Fewer Resources/ Opportunities	4.1	18.0	41.8
3	University vs. College	2.9	12.5	54.3
4	East vs. West	2.3	9.9	64.2
5	Northwest vs. Southeast	1.6	6.8	71.0
6	Attractive Nodes	1.3	5.5	76.5
7	Minority Students	1.1	4.5	81.0

TABLE IV

HIGHER EDUCATIONAL FACTOR STRUCTURE: POSITIVE AND NEGATIVE ROTATED FACTOR LOADINGS,* ARRANGED ACCORDING TO RANK ORDER

Factor 1: Productivity

Indicator	Loading
Productivity ($ per degree)	-.902
Sex (% male)	.815
All earned degrees conferred (% total enrollment)	.617
Attendance status (% full-time)	.605

Factor 2: Fewer resources/Opportunities

Indicator	Loading
Public enrollment (% total)	.907
Library resources (volumes per student)	-.853
Expenditures ($ per student)	-.816
Residence status (% from within state)	.805
Tuition and fees, resident student (average $)	-.640
Number of institutions (per 100,000 population 18 years and over)	-.560

Factor 3: University vs. College

Indicator	Loading
University enrollment (% total)	-.906
Private enrollment independent of church (% total private)	.607
Two-year college enrollment (% total)	.530
Four-year college enrollment (% total)	.521

TABLE IV (Continued)

Factor 4: East vs. West	
Indicator	Loading
Student enrollment (% total population 18 years and over)	.789
Earned doctor's degrees conferred (% total)	.708
Four-year college enrollment (% total)	-.671
Attendance status (% full-time)	-.554
Academic space (% total assignable space)	.515
Two-year college enrollment (% total)	.510
Factor 5: Northwest vs. Southeast	
Indicator	Loading
Level of enrollment (Graduate enrollment as % total enrollment)	-.706
Number of institutions (per 100,000 population 18 years and over)	.702
Faculty compensation, rank of professor (average $)	-.555
Factor 6: Attractive Nodes	
Indicator	Loading
Regional attractiveness (total enrollment as % total regional population 18 years to 24 years)	.834
Student enrollment (total)	.736
Student-faculty ratio (students per one faculty)	.570
Faculty compensation, rank of professor (average $)	.505
Factor 7: Minority Students	
Indicator	Loading
Minority students (% total enrollment)	.919

*Only factor loadings of $\pm$ .500 or higher are included in this table.

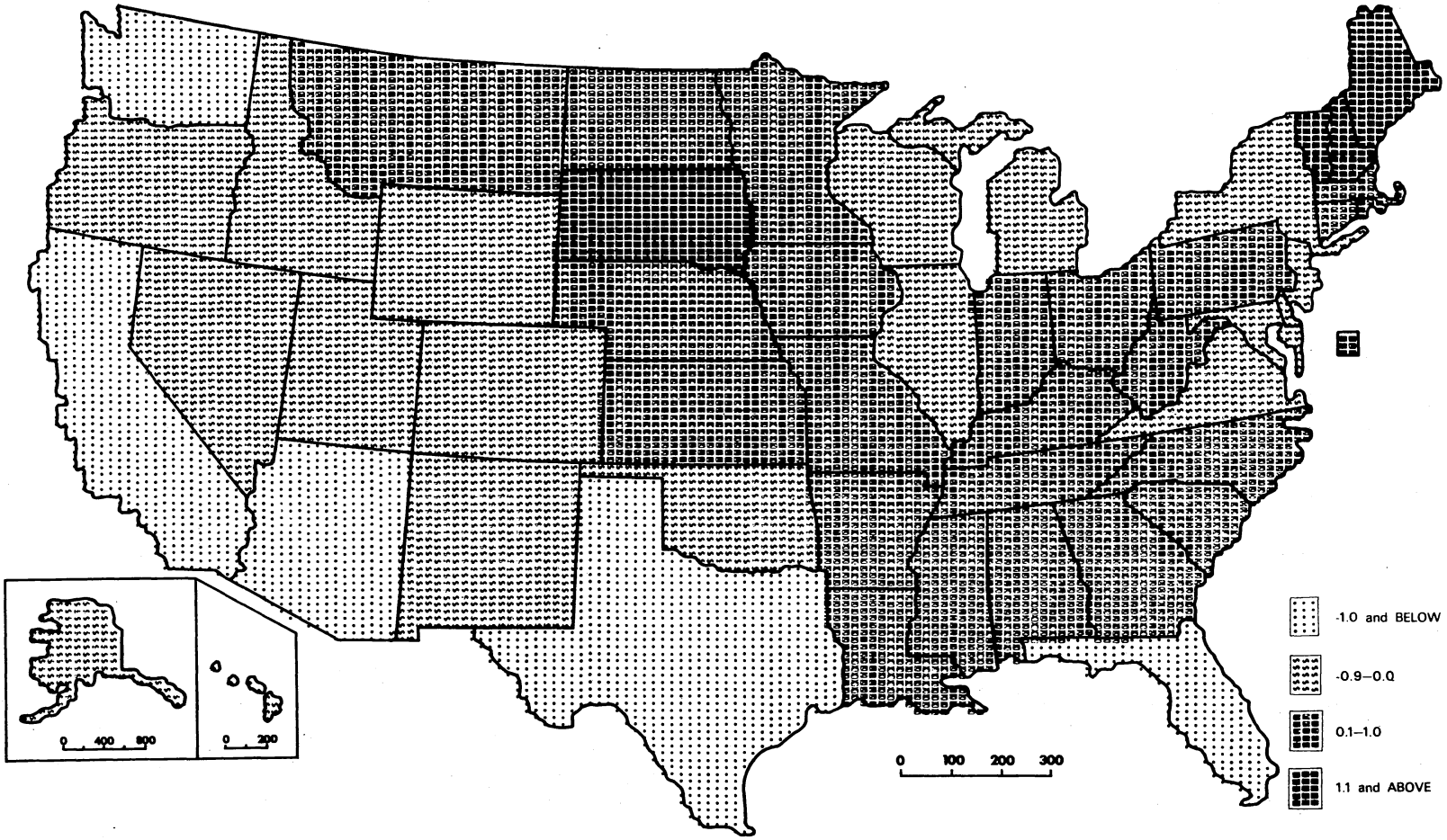

Figure 25. Factor 1: Productivity

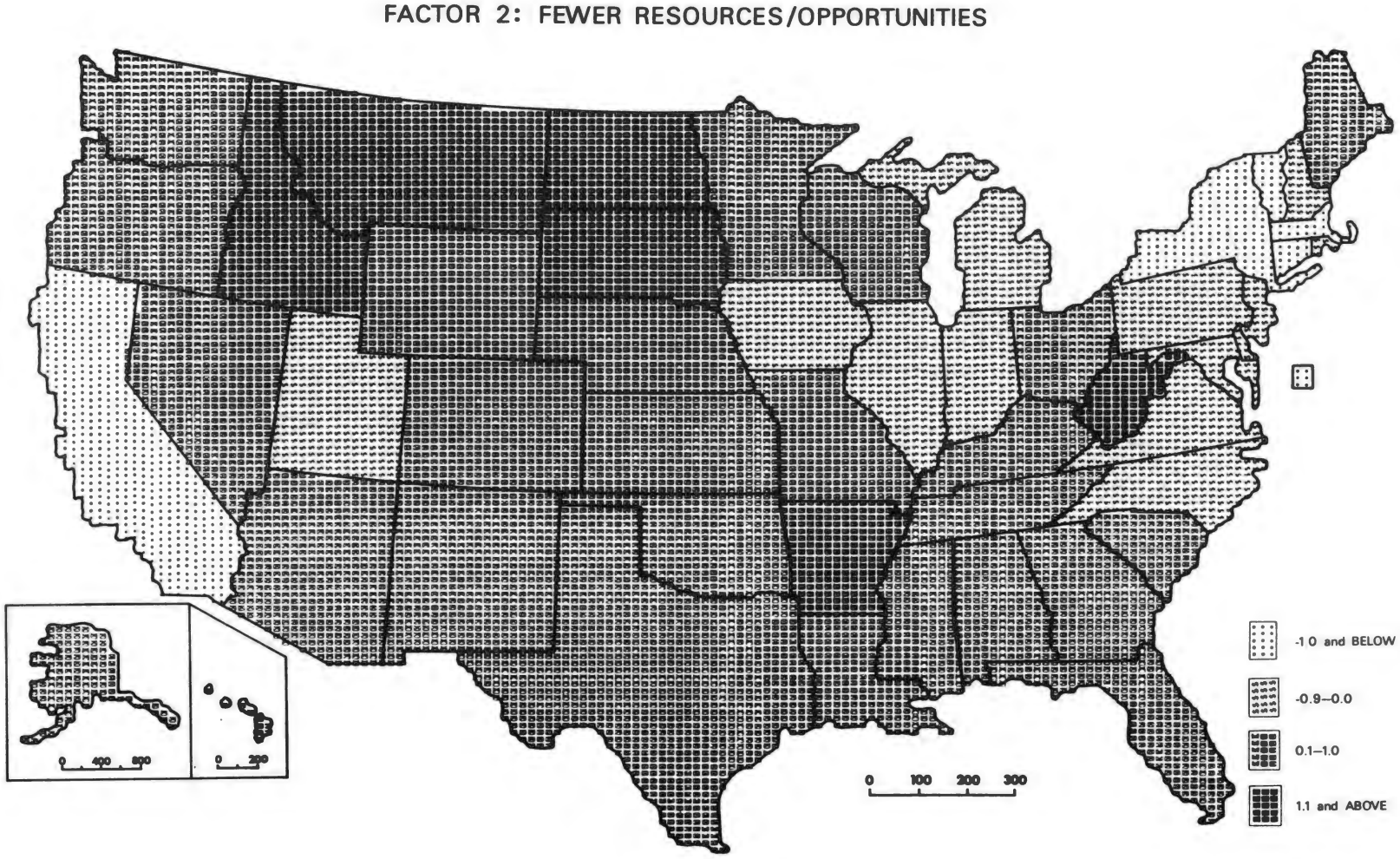

Figure 26. Factor 2: Fewer Resources/Opportunities

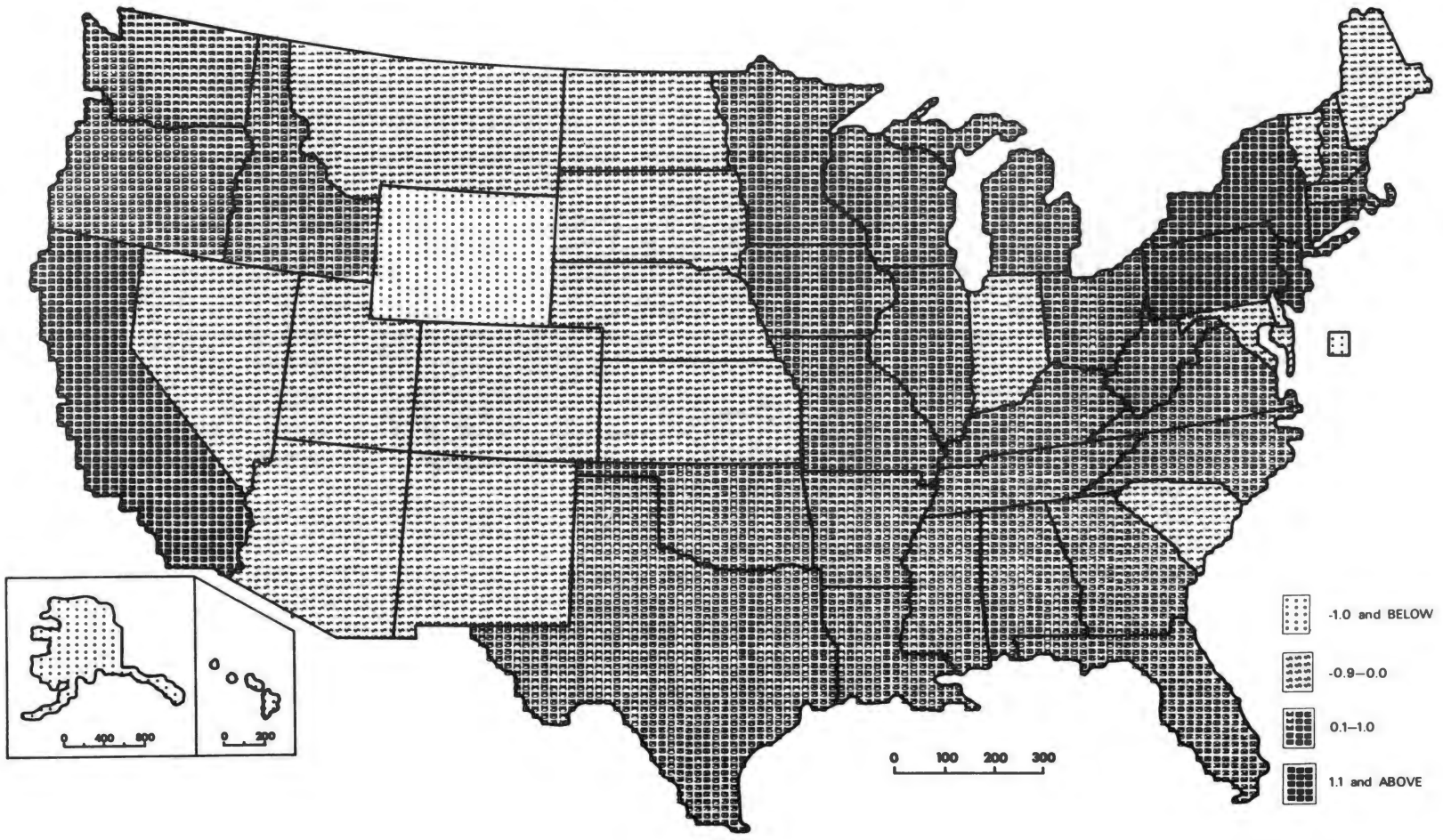

Figure 27. Factor 3: University vs. College

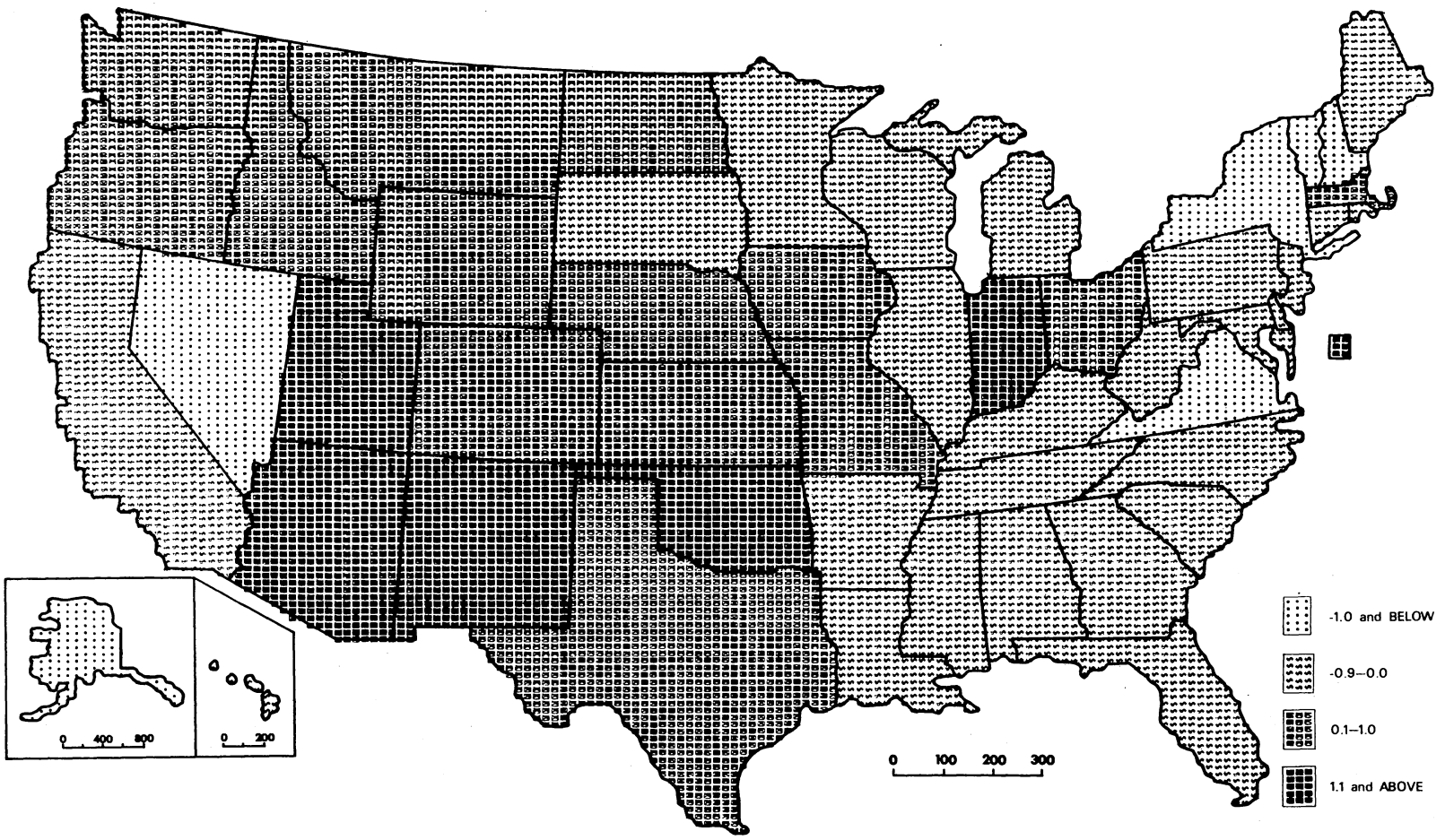

Figure 28. Factor 4: East vs. West

FACTOR 5: NORTHWEST VS. SOUTHEAST

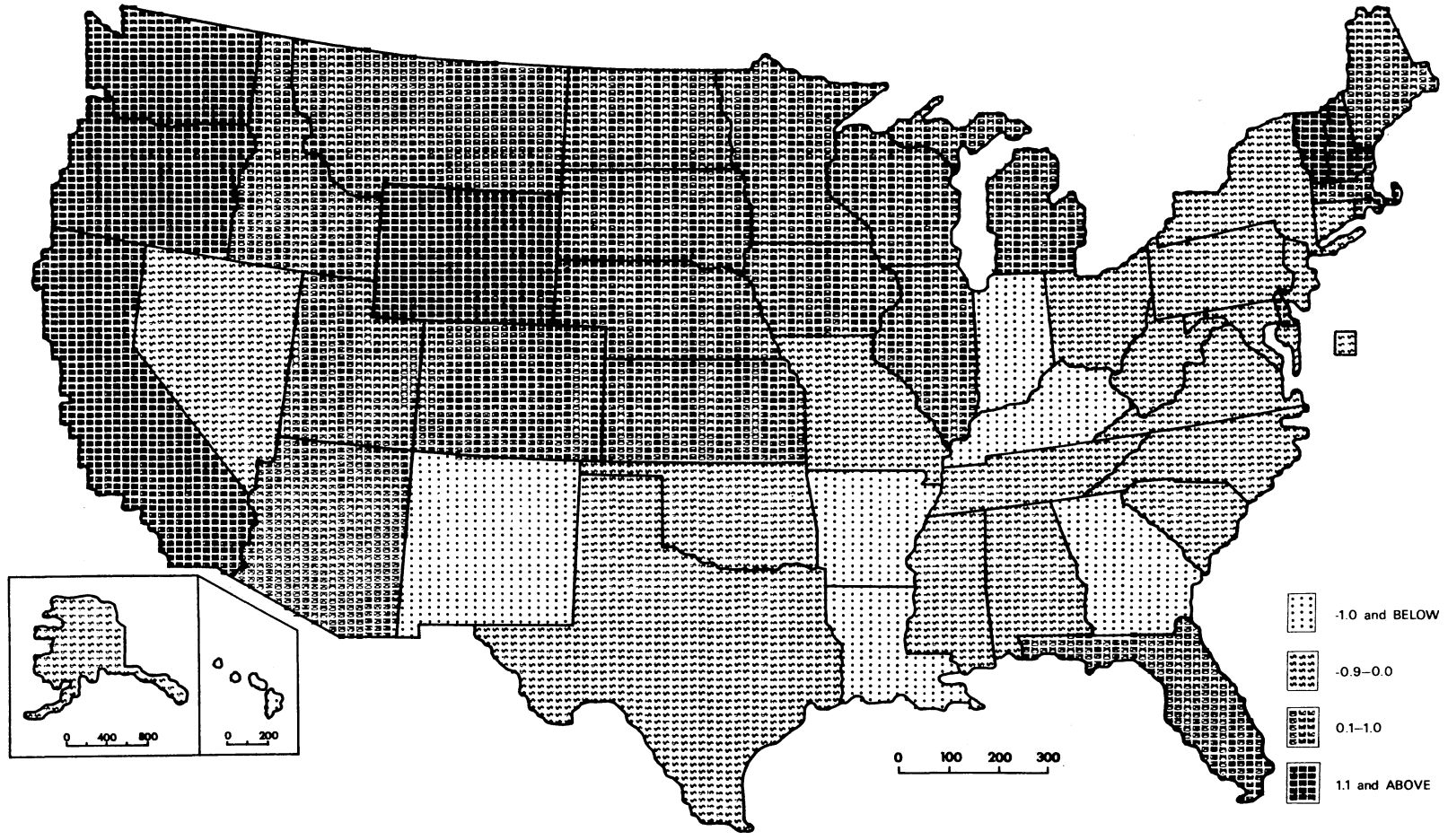

Figure 29. Factor 5: Northwest vs. Southeast

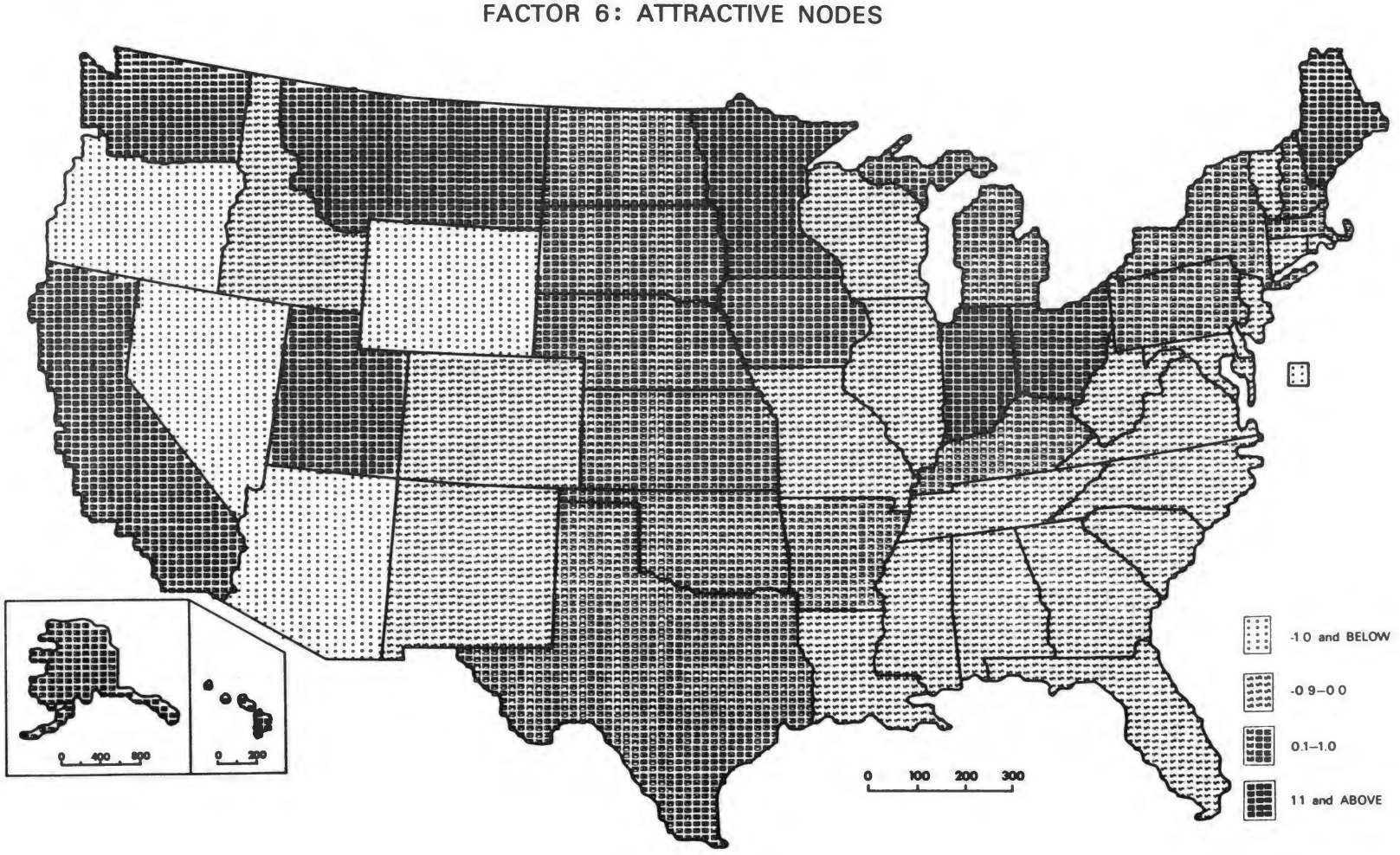

Figure 30. Factor 6: Attractive Nodes

FACTOR 7: MINORITY STUDENTS

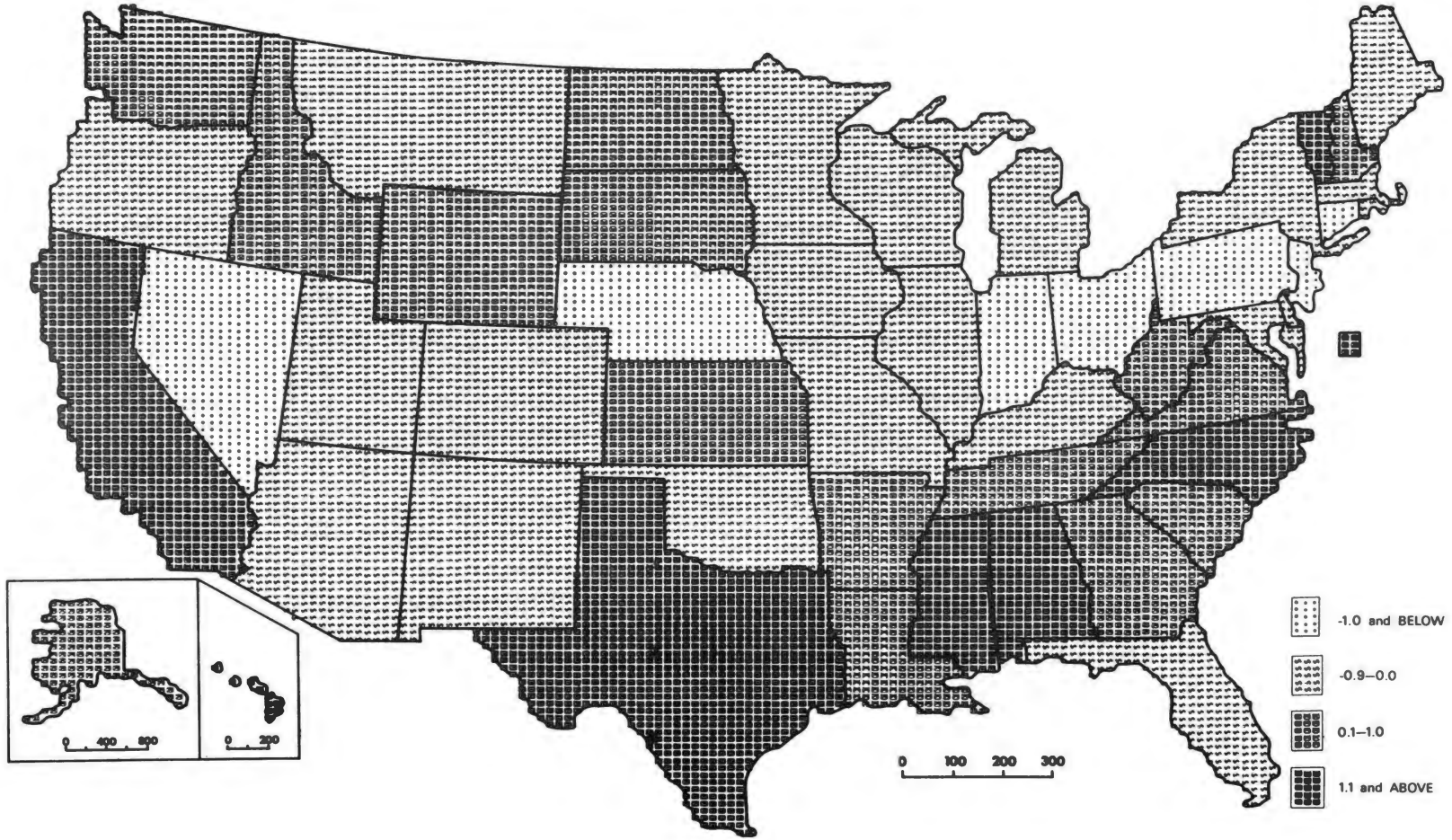

Figure 31. Factor 7: Minority Students

The factor scores are presented cartographically in four discrete intervals, two indicating scores above the mean and two indicating scores below the mean. Since none of the factors emerging from this analysis, as set forth in Table IV and Figures 25-31, is intuitively obvious and since nothing closely resembling them has been found in the previous literature, it seems appropriate to describe and discuss each in turn.

Factor 1: Productivity

This factor accounts for 23.8 per cent of the variance, which exceeds any of the other factors in explanatory power. It has the highest loadings on those indicators reflecting productivity. Productivity (dollars per degree) loads highest (-.902).[5] Also reflecting productivity are the high positive loadings of all earned degrees conferred (.617) and full-time students (.605). The per cent of students who are male is probably not indicative of productivity, and the reason for its high positive loading (.815) on this factor is not immediately obvious.

In spatial terms, a rural-urban dichotomy--with notable exceptions--is apparent in this dollars-per-degree type of productivity (Figure 25). The large urban states, such as California and New York, likely score negatively due to large part-time student enrollments. The large urban states also are places where the cost of living is higher and the dollar does not buy as much, including educational degrees.

Note: A low productivity (dollars per degree) value indicates a high productivity. Thus, the high negative loading indicates high productivity (dollars per degree).

Factor 2: Fewer Resources/Opportunities

From the evidence of the loadings, this factor (accounting for 18.0 per cent of the variance) might be considered an inverse measure of higher educational well-being. High negative loadings include library resources (-.853), expenditures (-.816), tuition and fees (-.640), and institutions per population (-.560). Clearly, this factor indicates fewer available resources and opportunities in higher education, and an examination of Figure 26 seems to confirm this. The states showing the highest positive scores are West Virginia, Arkansas, and the northern Plains and Mountain states; also scoring positively are the rest of the Plains and Mountain states, and the South. These same states usually appear as "sinks" when many socioeconomic indicators are mapped.[6] The more affluent northeastern states, California, and Utah score negatively on this factor, indicating more abundant higher educational resources and opportunities, and reflecting general socioeconomic "peaks."

The high positive loadings on Factor 2 are public enrollment (.907) and resident students (.805). Thus, there are relatively fewer opportunities for private higher education in the positively scoring states, unlike the northeastern states of the nation which have traditionally placed a greater stress on private colleges and universities. With fewer higher educational resources and opportunities, the states scoring positively tend to attract fewer out-of-state students, which is reflected in the higher percentages of resident enrollment in these states.

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[6]For example, see David M. Smith, The Geography of Social Well-Being (New York, 1973).

Factor 3: University vs. College

Both the map patterns and the identity of the indicators loading high on this factor point toward a university-college polarity (Figure 27). The high negative loading on this factor is university enrollment (-.906). The high positive loadings are private enrollment that is nondenominational (.607), two-year college enrollment (.530), and four-year college enrollment (.521). Those states which score positively might be labelled the "college states;" they include most of the eastern states and the Pacific Coast states. The states that display negative scores are the "university states;" the Plains and Mountain states form an areal cluster of such negative scores.

Emphasis on the university-type of higher education is particularly strong in such states as Alaska (where the University of Alaska accounted for 90.7 per cent of the total enrollment in 1972), Delaware, Wyoming, Hawaii, and the District of Columbia, all with scores $>+1$. In these first four states a single state university dominates the higher educational scene; in the District of Columbia five private universities account for most of the student enrollment.

Factor 4: East vs. West

When examining the indicator loadings on Factor 4, it appears to be the most ambiguous and perplexing factor among the entire set. The high positive loadings are student enrollment relative to the population (.789), earned doctor's degrees conferred (.708), academic space (.515), and two-year college enrollment (.510). The high negative loadings are four-year college enrollment (-.671) and full-time students (-.554). But given the dichotomization of the spatial

pattern (Figure 28), with most of the eastern states clustered on the negative side of the scale and most of the western states clutered on the positive side of the scale, it seems appropriate to label this factor in regional terms.

Thus, the West, relatively, is generally characterized by larger student enrollments, more doctorates conferred, more academic space, and larger two-year college enrollments, but smaller four-year enrollments and fewer full-time students. Higher education in the Southwest especially tends to exhibit these characteristics, as confirmed by the spatial configuration of scores $>+1$.

Factor 5: Northwest vs. Southeast

An examination of the indicator loadings on this factor, as in the previous factor, is not immediately suggestive of a descriptive label. The high positive loading is institutions per population (.702); the high negative loadings are graduate enrollment (-.706) and faculty compensation (-.555). The dichotomization of the areal pattern (Figure 29), again as in Factor 4, does seem to provide a fitting label for this factor. The line of bisection in this case, though, is a diagonal separating the positive-score Northwest from the negative-score Southeast. The only positive-score states found on the southeastern side of the bisector are five New England states, Delaware and Florida.

Considering the loadings, then, the states in the northwestern half of the nation have a relatively large number of undergraduate colleges (in which faculty compensations are lower than in the southeastern half of the nation). In examining the "northwestern" states that scored $>+1$, the undergraduate emphasis reflects the importance

of the two-year institution. For example, in Wyoming seven of the eight higher educational institutions are two-year types. Although these seven colleges only accounted for 44 per cent of Wyoming's total enrollment in 1972, they accounted for 88 per cent of Wyoming's higher educational institutions. Two-year colleges account for 58 per cent of the higher educational institutions in Washington, 46 per cent in California, and 43 per cent in Oregon. The undergraduate emphasis in Vermont and New Hampshire, however, is due to the prevalence of another type of institution, the four-year undergraduate college.

Factor 6: Attractive Nodes

This factor identifies the states with higher drawing power, the "attractive nodes" of higher education. All the high loadings on this factor are positive; they are regional attractiveness (.834), total student enrollment (.736), student-faculty ratio (.570), and faculty compensation (.505). The states scoring positively on this factor are those states that tend to attract a large proportion of resident students, as well as non-resident students from neighboring states (Figure 30). This attraction is reflected in higher student enrollments, more students per faculty, and higher faculty compensations.

As one would intuitively expect, the "attractive" states are generally surrounded by "less attractive" states, those scoring negatively on this factor. These latter are the states from which the attractive nodes draw students. The Southeast noticeably does not exhibit this interspersed pattern of attractive-less attractive

states; the entire Southeastern part of the nation scores negatively on this factor. It should be noted that the non-contiguous states of Alaska and Hawaii probably show high positive scores due to their isolation, with the resultant retention of large percentages of resident students. "Corner" states, such as Maine and Washington, would also be expected to attract more resident students due to their lessened accessibility to the rest of the nation.

Factor 7: Minority Students

The last of the factors has only one high loading: minority students (.919). This factor obviously identifies states where minority students account for a large percentage of the total enrollment. An examination of the spatial patterns (Figure 31) tends to substantiate this. States scoring $>+1$ include "Deep South" states (black), the District of Columbia (black), Texas and California (black and chicano), and Hawaii (oriental). Areas generally showing negative scores include New England, the Middle Atlantic states, Florida, the Midwest, the Plains states, and the Mountain states; all of these are areas with small percentages of minorities. Not readily apparent is the reason(s) for the high positive score of Vermont (where minority students account for only 2.6 per cent of the total enrollment), or for the negative score of New Mexico (24.3 per cent minority students).

In summary, by means of factorial analysis it has been possible to reduce the input data, selected to cover as wide a range as possible of American higher education characteristics, to a smaller number of underlying dimensions. This should not be construed to mean that this factorial analysis necessarily discovered the "fundamental" categories

associated with the spatial variation of American higher education. The factors may not be exhaustive because of the possible omission of important measures not included in the present analysis. However, this factor analytic examination of the data set has, perhaps, yielded some new insights into the spatial variation of American higher education, and the factors identified in this analysis do suggest analytic areas in which additional indicators may be sought.

Regional Patterns

The factor-analytic results can be aggregated further to yield a higher level of geographical abstraction: the composite regions implicit in the factor scores. A cluster analysis was conducted on the seven sets of factor scores.[7] The cluster analysis was performed with a contiguity constraint relaxed and then with a contiguity constraint imposed. Figures 32 and 33 are translations of the resultant dendograms (or taxonomic trees) into cartographic terms. These maps identify American higher education regions.[8]

Examining the noncontiguous regions in Figure 32, the most disaggregated region appears to be that composed of twelve states scattered around the nation. This region might aptly be labelled

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[7]The computer program used was CONGRP, from the University of Iowa, Department of Geography Program Library. The grouping procedure selected was Ward's (or HGROUP) algorithm. At each step of the cluster analysis this algorithm joins that pair of groups such that the new group makes the least possible increment to the pooled within-group sum of the squared distances.

[8]Both Figures 32 and 33 represent step 44 of the cluster analysis. At this step seven groups remain to be clustered, hence, the seven regions depicted on each of these maps.

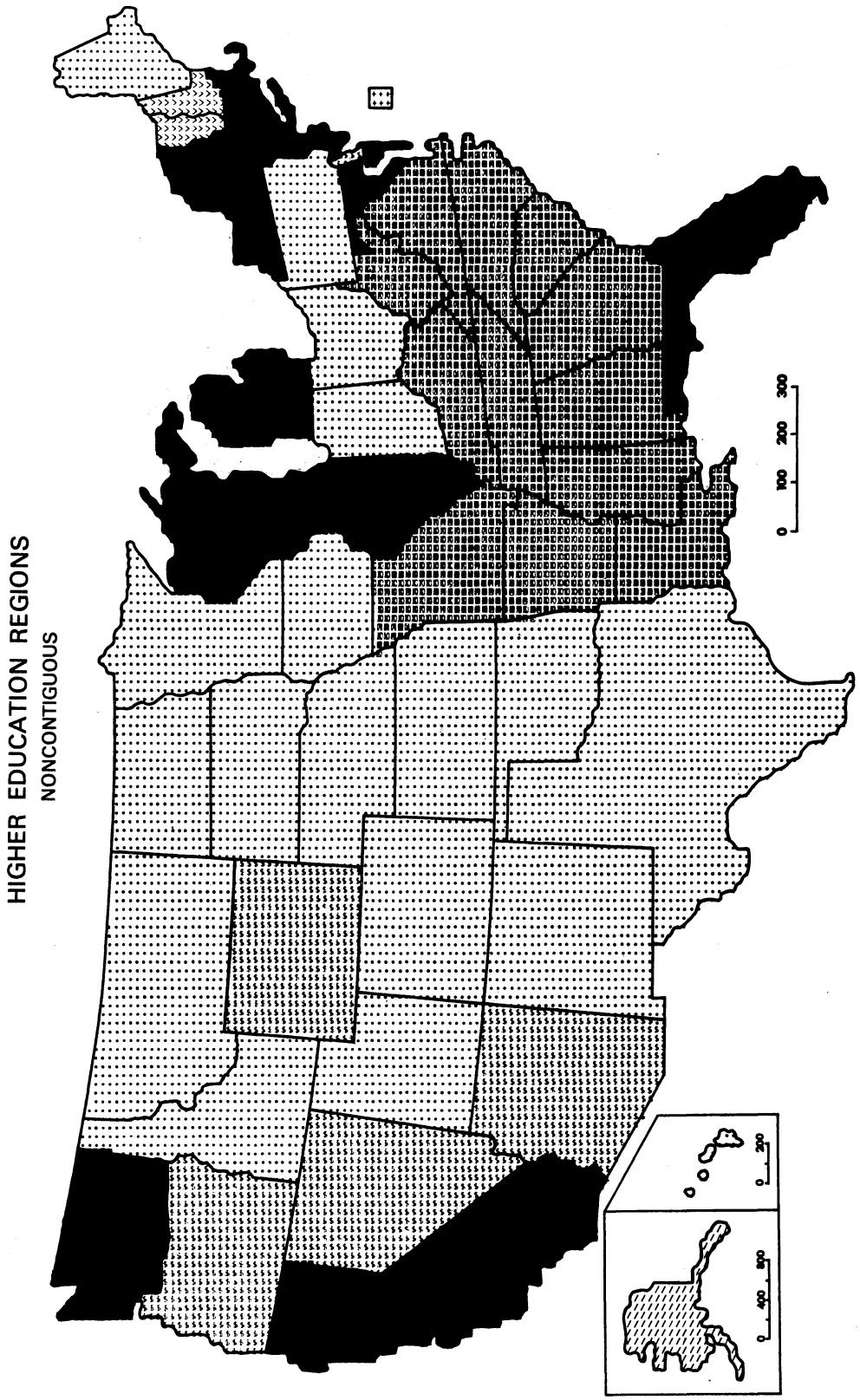

Figure 32. Higher Education Regions, Noncontiguous

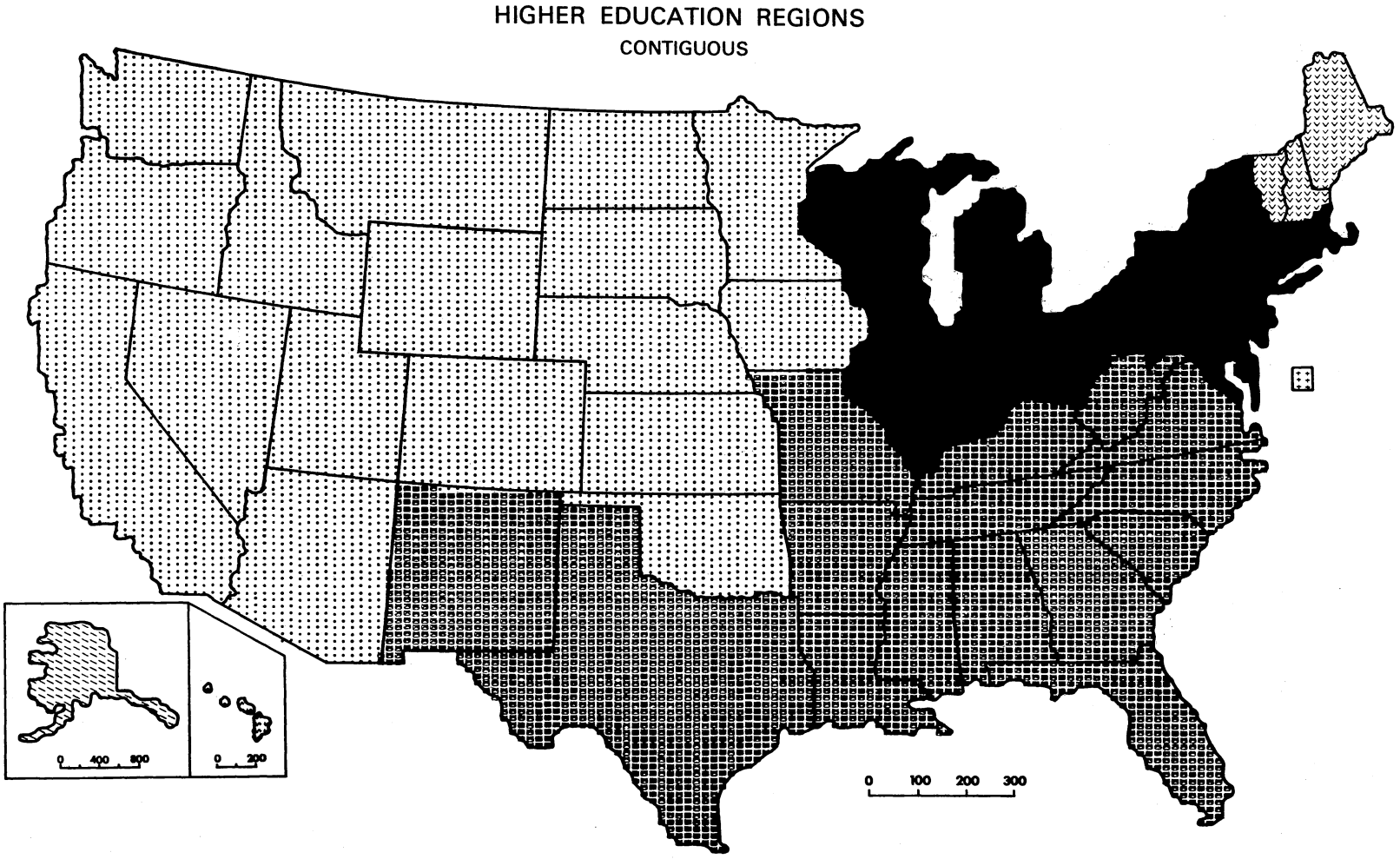

Figure 33. Higher Education Regions, Contiguous

The Leaders and reflects relatively urbanized states with relatively economically successful populations and relatively high levels of achievement in higher education. The states included in this region are New York, California, Massachusetts, Connecticut, Rhode Island, Illinois, Michigan, Wisconsin, New Jersey, Maryland, Florida, and Washington.

A Mid-Continent region appears as a thirteen-state cluster in the Plains and Mountain states, a three-state cluster in the Northeast (Indiana, Ohio, and Pennsylvania), plus the outliers of Maine and Hawaii. Territorially the largest of the regions, it is also probably the most higher educationally diverse; if the cluster analysis had been mapped one step previously, this region would have been subdivided, with Maine, Pennsylvania, Ohio, Indiana, Minnesota, Iowa, Nebraska, and Utah forming a separate region (a "Midwest + Utah and Maine" subregion and a "Plains and Mountains" subregion).

It is probably the domination of the public university and the public two-year college that groups Delaware with the four western states of Arizona, Nevada, Oregon, and Wyoming, forming another somewhat amorphous region. This West + Delaware region merges with "The Leaders" in the subsequent step of the cluster analysis.

The South is a twelve-state cluster that seems to represent a sensible combination in cultural, historical, and economic terms. This region is predictably bereft of Florida, where the out-migrants from the North have cancelled out the southern folk of northern Florida.

The two-state grouping of Vermont and New Hampshire may well represent the torso of the traditional New England culture--and higher

education--area after the amputation of Connecticut, Rhode Island, and Massachusetts by Megalopolis. After forming a two-state region earlier in the grouping procedure, they reject merger with other areas until very late in the clustering, when the only other holdouts are the highly aberrant Alaska and the District of Columbia.

The other two regions to be discerned in Figure 32 are single states. Alaska and the District of Columbia reject convergence until all other areas are clustered. Alaska forms a region that, perhaps, can be termed "The Contemporary Frontier." Higher education there, like the state, is in a developmental stage. The dominance of a single state university in Alaskan higher education was previously noted. Alaska was the only state in 1972 in which over half of the student enrollment was female, indicative, perhaps, of a frontier area where the males are traditionally more involved in primary economic activities than in tertiary activities.

The last area to join the other fifty states in the clustering process was the District of Columbia. The reason for this holding out is apparent after an examination of Appendix A; the District of Columbia almost always appears at or near the top or the bottom of the ranking lists of the higher educational indicators. This is probably due to the fact that the District of Columbia is a city, rather than a state. Perhaps most pronounced is the privateness of higher education in the nation's capital. Eighty-one per cent of the District of Columbia's student enrollment in 1972 was private. An appropriate label for this region may be "The Capital of Private Education." Additionally, higher education in the District of Columbia is characterized by the nation's highest percentage of minority students,

highest percentage of graduate students, lowest percentage of resident students, highest percentage of students per population, and most library volumes per student (not including the holdings of the Library of Congress).

When a contiguity constraint is imposed in the cluster analysis the American higher education regions shown in Figure 33 emerge. The largest of the territorial aggregations can be labelled The West, incorporating parts of the noncontiguous "Mid-Continent," "West + Delaware," and "Leaders" regions. The West is generally a region of public and university/two-year type higher education, with a relatively large proportion of the population enrolled as students.

The Northeast is a thirteen-state cluster coinciding with the highly populated and urbanized American "manufacturing belt." In economic, historical, and cultural terms, this northeastern aggregation would probably have been predictable. The Northeast is generally a region of abundant higher educational resources, especially the four-year college, when measured absolutely, but on a per capita basis, it generally ranks below the West. Delaware, because of the contiguity constraint, merges with this region.

The Extended South embraces fifteen states, the twelve core states from the previous grouping procedure plus Florida, Texas, and New Mexico. Oklahoma, a state representing cultural transition, is aligned with the West rather than the South. That there is a persistent "Southern" higher education region probably should not be surprising; when almost any social, cultural, or economic phenomenon is mapped the South constitutes a distinctive area. The Extended South, a region with a relatively high percentage of minority students, is generally

characterized by fewer higher educational resources and opportunities. This is reflected in the South's relatively low drawing power of students from outside the region.

Maine merges with Vermont and New Hampshire to form a Northern New England region. Jencks and Riesman have previously noted the distinctiveness of Northern New England's higher education:

> Northern New England seems quite content to remain an academically underdeveloped area. Perhaps this is because the existence of so many private, small, and often experimental colleges gives residents and legislators an impression of academic abundance. In practice, however, colleges like Bennington, Goddard, Marlboro, Middlebury, Dartmouth, Colby, and Bowdoin draw most of their students from Massachusetts, Connecticut, and New York rather than from their immediate neighborhoods. The same is true of the University of Vermont, which while now fully public was for many years a private liberal arts college with publicly supported agriculture and engineering schools. Half of its students still come from out of state, despite admissions standards and tuition charges higher than many private institutions. Vermont undergraduates also follow the private pattern by majoring in liberal arts far more than in occupational specialties. Maine and New Hampshire have more conventional public universities, but neither ranks very high in academic prestige compared with either state universities elsewhere or the general New England standard. As a result, the student from Vermont, New Hampshire, or Maine who wants to attend a major-league university usually looks outside his state. Despite the fact that 40 per cent of the students from these states go elsewhere, however, none has a substantial scholarship program to open this option to its poorer residents. Unlike California, there is no public feeling that every student has a right, regardless of means, to attend a suitable institution . . . .[9]

The three remaining regions consist of single states. The previously-mentioned anomalies of the District of Columbia again cause it to be the last area to enter the clustering process. Because Alaska and Hawaii are not contiguous with any other areal units in the analysis,

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[9]Christopher Jencks and David Riesman, The Academic Revolution (Garden City, N. Y., 1968), pp. 171-172.

they, of course, form single-state regions. But both of these isolated states probably merit regional status. As previously discussed, the frontier element in Alaska gives a distinctiveness to Alaskan higher education; even when a contiguity constraint was relaxed Alaska rejected convergence with any other area until almost the end of the grouping procedure.

It also seems reasonable that Hawaii be given regional distinction. Hawaii culturally and ethnically cannot be expected to align closely with any of the other fifty states. Indeed, in the cluster analysis with contiguity relaxed, Hawaii rejected merger with any other area until late in the grouping procedure (step 42). Hawaiian higher education appears to be dominated by the university and two-year college types of institutions and by public control.

In the preceding section it was shown that there is a distinctly non-random spatial grouping of the individual factor scores. In this section, Figure 32 (the noncontiguous regions) shows the same to hold true for all the factors when aggregated. The variations in American higher education examined in this chapter tend to be regionally arrayed, for whatever reasons. In general, two types of higher education regions can be recognized: those corresponding to first-order socio-cultural areas (The West, The Northeast, and The South); and those reflecting specific populations/habitats (Northern New England, the District of Columbia, Alaska, and Hawaii).

A set of American higher education regions has been identified in this chapter. The aim of the next chapter is an interpretation of these regional patterns of higher education, utilizing an outside (non-higher educational) set of data in an attempt to gain greater insight.

CHAPTER IV

INTERPRETATION

Predictor Variables

This chapter seeks to provide a generalized interpretation of state-to-state variations in higher education. The difficulty of analyzing the discovered patterns solely in terms of internal evidence prompted an interpretation based on another set of data. Therefore, a number of variables were selected on the basis of their potential contribution to an interpretation of variations in higher education, as suggested in the educational research literature. In broad terms, the outside variables are descriptive of the temporal frame of development, demographic status, socioeconomic status, and attitudes. Rather than being determinants of higher education patterns, these variables are simply predictors which gain their predictive power through their association with higher educational variables.[1]

The following are the predictor variables that have been selected and are used in attempting to interpret the spatial patterns and variations in contemporary American higher education at the state scale. Table V provides a listing of these variables and the sources of data.

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[1]This view reflects that of Robert E. Herriott, "Some Social Determinants of Educational Aspiration," Harvard Educational Review, 33 (1963).

TABLE V

PREDICTOR VARIABLES USED IN STATE ANALYSIS

Variable	Source
1. Number of years from statehood to 1972	1
2. Urban population (% total), 1970	2
3. White population (% total), 1970	2
4. Enrollment in public schools (% school-age population), 1971	3
5. Median school years completed (persons 25 years old and over), 1970	2
6. Persons 25 years old and over completing four or more years of higher education (% total), 1970	2
7. Median family income, all families ($), 1969	2
8. Civilian labor force 16 years old and over employed in white-collar occupations (% total civilian labor force), 1970	2
9. Total state appropriations for higher education (% total state general revenue), 1972	4

Sources of Data:

1. World Almanac and Book of Facts, 1975 (New York, 1974).

2. United States Department of Commerce, Bureau of the Census, County and City Data Book, 1972 (Washington, D.C., 1973).

3. National Education Association, Estimates of School Statistics, 1971-72 (Washington, D.C., 1971).

4. Education Commission of the States, State Tax Support of Higher Education: Revenue Appropriation Trends and Patterns, 1963-73 (Denver, 1974).

The rationale for the selection of each variable is presented briefly, and some terms are defined. The general hypothesis is that the fundamental spatial patterns of higher education and of the selected outside variables are interdependent.

1. Number of years from statehood to 1972. It seems likely that the contemporary patterns of higher education, to various degrees, are a function of the developmental time-frame. This variable, it should be noted, serves only as an approximate indicator of the higher education developmental time-frame; for example, it ignores the pre-revolutionary foundings of the colonial colleges and the pre-statehood foundings of many other institutions. The base date for the District of Columbia is established as 1790, the year that it was created as the seat of the federal government by an Act of Congress.
2. Urban population (per cent of total). In terms of many socioeconomic indicators, including educational achievement, median income, and occupational types, urban populations differ significantly from rural populations.[2] "Urban" is defined as places of 2500 or more inhabitants.
3. White population (per cent of total). Racial/ethnic origin has and continues to contribute to differences in socioeconomic indicator values from place to place. For example, the mean educational achievement of white students has been shown to be higher at every level of schooling than that of students who are members

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[2]Supportive evidence of such differences was presented in Irene B. Taeuber and Conrad Taeuber, People of the United States in the 20th Century (Washington, D.C., 1971).

of minority groups.[3] "White population" is the total population minus the Black, American Indian, Spanish-surnamed, and Oriental populations.

4. Enrollment in public schools (per cent of school-age population). Greater enrollment in public schools generally results in increased high school graduates (output) which generally leads to increased demand for and participation in higher education (input). "School-age population" is that part of the population age five through 17, inclusive.

5. Median school years completed (persons 25 years old and over). In a society characterized by greater educational achievement, the demand for and participation in all levels of education, including higher education, is generally greater. It is a "spiraling effect" in which "education leads to more education;" parents generally desire their children to attain (or surpass) the educational level of the parents.[4]

6. Persons 25 years old and over completing four or more years of higher education (per cent of total). Similar to general educational achievement, there is a tendency for higher education to generate a demand and push for more higher education. In a society with a greater percentage of college graduates, attitudes toward higher education tend to be more positive; higher education is

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[3]Tetsuo Okada, Wallace M. Cohen, and George W. Mayeske, "Growth in Achievement for Different Racial, Regional and Socio-Economic Groupings of Students"(Washington, D.C., 1969). (Mimeographed).

[4]This hypothesis was given support by James S. Coleman et al., Equality of Educational Opportunity (Washington, D.C., 1966).

often perceived not only as desirable but as necessary for career and status. There is generally an increased demand for and participation in higher education, with the educational background of the parents serving as a stimulus to the children to achieve similar heights of learning.[5]

7. Median family income, all families (dollars). There are measurable financial returns associated with, though not necessarily the result of, educational achievement.[6] Educated citizens tend to be productive citizens, whose efforts, abilities, and increased demands add to an area's economic growth. General economic well-being and growth and higher educational well-being and growth are somewhat dependent on each other; an increase in education generally leads to increased earning capacity, which usually results in added general revenue (taxes), some of which usually is spent on education.

8. Civilian labor force 16 years old and over employed in white-collar occupations (per cent of total civilian labor force). White-collar occupations generally require more formal education than blue-collar occupations. Thus, in a population containing a greater proportion of white-collar workers there tends to be a greater demand for and participation in higher education. It has

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[5]Coleman et al.

[6]Studies documenting the relation between educational attainment and economic productivity include Herman P. Miller, Income Distribution in the United States (Washington, D.C., 1966); J. N. Morgan et al., Income and Welfare in the United States (New York, 1962); and Theodore W. Schultz, The Economic Value of Education (New York, 1963).

been shown that children of white-collar workers, generally representing higher socioeconomic status, are more likely to attend college than the children of blue-collar workers.[7] "White-collar workers" includes professional, managerial, sales, and clerical types.

9. Total state appropriations for higher education (per cent of total state general revenue). The pattern and development of higher education in an area is, to a large part, a result of the general attitudes toward higher education in that area's population. This surrogate variable reflects the attitudes of state populations via their commitment to finance higher education.

A Canonical Model

It is hypothesized that the historical, demographic, socioeconomic, and attudinal variables presented in the previous section (and listed in Table V) are capable of accounting for a significant amount of the variation in the higher educational variables (listed in Table I). In view of this hypothesized relationship between two sets of variables, canonical correlation was selected as the method of analysis.[8] A

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[7] Coleman et al.

[8] T. W. Anderson, An Introduction to Multivariate Statistical Analysis (New York, 1958), in which the formal mathematics of canonical correlation were given, stated that this technique "is of particular usefulness in exploratory studies. The investigator may have two large sets of variates and may wish to study the interrelations" (p. 288). For application of canonical correlation to geographical analysis, see Leslie J. King, Statistical Analysis in Geography (Englewood Cliffs, N. J., 1969), pp. 217-222, and Mark S. Monmonier and Fay E. Finn, "Improving the Interpretation of Geographical Canonical Correlation Models," Professional Geographer, 25 (1973), pp. 140-142.

canonical correlation model combines some of the advantages of both multiple linear regression and factorial analysis by yielding correlations between factors for two sets of variables--a criterion set (dependent variables) whose spatial variations are to be interpreted, and a predictor set (independent variables) whose spatial variations provide a basis for the interpretation.[9] In the model used in this study, the higher educational variables constitute the criterion set, and the historical, demographic, socioeconomic, and attitudinal variables make up the predictor set (Table VI).[10]

The interrelationships of the two data sets are identified by pairs of factors termed "canonical vectors." Canonical vectors, like factors, are made up of linear functions or combinations of the original variables. These linear functions are termed "canonical loadings" and are expressed as correlations; the variables with the highest canonical loadings identify the nature of the canonical vectors. In the analysis the loadings are determined such that the correlation between the canonical vectors in each pair is maximized, and such that each pair of canonical vectors is orthogonal (uncorrelated) with all other pairs of canonical vectors. The first pair of canonical vectors extracted has the highest correlation, and subsequent pairs not only account for the maximum amount of correlation of the residual variance but are also made orthogonal to the first pair. The researcher is therefore able to

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[9]Although the terms "criterion" and "predictor" suggest causality, in this study causality remains unproven.

[10]The higher education variables that loaded highest on each of the seven factors (see Chapter III, Table IV) were selected to represent the criterion set.

TABLE VI

ELEMENTS OF THE CANONICAL MODEL

Criterion Variables:

1. Productivity ($ per degree)
2. Public enrollment (% total)
3. University enrollment (% total)
4. Student enrollment (% total population 18 years and over)
5. Level of enrollment (graduate enrollment as % total enrollment)
6. Regional attractiveness (total enrollment as % total regional population 18 years to 24 years)
7. Minority students (% total enrollment)

Predictor Variables:

8. Number of years from statehood to 1972
9. Urban population (% total)
10. White population (% total)
11. Enrollment in public schools (% school-age population)
12. Median school years completed (persons 25 years and over)
13. Persons 25 years and over completing four or more years of higher education (% total)
14. Median family income, all families ($)
15. Civilian labor force 16 years and over employed in white-collar occupations (% total civilian labor force)
16. Total state appropriations for higher education (% total state general revenue)

describe the independent ways in which the relationships are specified between the two sets.

The results of the canonical correlation analysis are shown in Table VII.[11] The loadings of the canonical vectors are presented in Tables VIII and IX, and the first six canonical vectors, those with "high" canonical correlations, are verbally identified below.

Canonical Vector 1

The first criterion vector, associated with productivity, is strongly correlated (.93) with the median family income parameter associated with the first predictor vector. The first canonical vector, thus, appears to reveal a monetary relationship, indicating an inverse ("productivity" increases as the value, dollars per degree, decreases) association between productivity and median family income.

Canonical Vector 2

The second pair of canonical vectors reveals the relationship between level of higher educational enrollment (graduate versus undergraduate), and white population and appropriations for higher education.

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[11]The canonical analysis program used in this study was that of the Statistical Analysis System. See Jolayne Service, A User's Guide to the Statistical Analysis System (Raleigh, N. C., 1972), pp. 179-189. The data utilized in this analysis was considered to be the total population; therefore an inferential test was unnecessary. But since the program calculated Bartlett's Chi-square, the values are presented to the interested reader. The first five were significant at the one-per cent level, the sixth was significant at the ten-per cent level, and the last, as might be expected from a canonical correlation of only .08, was not statistically significant at any reasonable level of significance.

TABLE VII

RESULTS OF CANONICAL ANALYSIS

Canonical Vector	Canonical Correlation	Chi-square	Degrees of Freedom	Probability
1	.93	232.11	63	.0001
2	.85	152.73	48	.0001
3	.76	101.16	35	.0001
4	.70	65.55	24	.0001
5	.68	38.32	15	.0009
6	.53	13.41	8	.0978
7	.08	0.29	3	.9578

TABLE VIII

CANONICAL LOADINGS: CRITERION VARIABLES

Criterion Variable	Canonical Vector 1	2	3	4	5	6	7
Productivity	-.64	.42	-.42	-.36	.30	-.10	.03
Public enrollment	-.32	-.19	.65	-.62	-.16	-.13	.01
University enrollment	-.37	-.37	-.15	-.21	.27	.41	.65
Student enrollment	-.54	-.12	.28	.48	.59	-.12	-.18
Level of enrollment	.13	.63	.18	.55	-.28	-.02	.42
Regional attractiveness	-.49	.36	.14	-.06	.19	.55	-.52
Minority students	.55	.49	.48	-.32	.29	-.20	.01

TABLE IX

CANONICAL LOADINGS: PREDICTOR VARIABLES

Predictor Variable	Canonical Vector 1	2	3	4	5	6	7
Number of years from statehood to 1972	.67	.42	-.40	.33	-.12	-.26	-.12
Urban population	-.25	.53	.42	.63	.04	.23	.10
White population	-.09	-.57	-.27	.59	-.08	-.22	.42
Enrollment in public schools	-.37	-.35	.16	-.15	.34	-.16	.00
Median school years completed	-.66	-.20	.02	.48	.15	.27	.14
Persons 25 years and over completing four or more years of higher education	-.66	.24	.15	.31	.55	-.13	-.05
Median family income	-.71	.47	-.23	.44	-.03	.11	-.04
Civilian labor force 16 years and over employed in white-collar occupations	-.58	.42	.15	.36	.42	-.04	.33
Total state appropriations for higher education	-.10	-.57	.59	.10	-.38	-.29	-.01

The relationship is inverse: as the per cent of the population that is white and as the per cent of general revenue allocated for higher education decrease, the per cent of student enrollment that is in graduate school tends to increase. This may represent not an absolute increased emphasis on graduate studies in large-minority, lower-appropriations states, but rather a relative emphasis due to a lessened undergraduate enrollment.

Canonical Vector 3

The third pair of canonical vectors are principally indicators of public enrollment in higher education and state appropriations for higher education. It is a direct relationship: as the per cent of state taxes appropriated for higher education increases, the per cent of the total student enrollment attributable to public colleges and universities also tends to increase.

Canonical Vector 4

The relationship between public enrollment in higher education and urban population is underlined by the fourth pair of canonical vectors. It is an inverse association, with the per cent of the higher educational enrollment that is public tending to decrease as urban-ness (per cent of the population that is urban) increases. This vector confirms an established relationship in the educational geography of the United States: that the locational patterns of public colleges and universities generally exhibit a rural bias.[12]

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[12]For example, Jerry P. Schofer, "On Some Geographic Aspects of Higher Education in the United States: A Systems Approach" (Unpub.

Canonical Vector 5

The fifth pair of canonical vectors relates to student enrollment in higher education relative to the total population and to the per cent of the population completing four or more years of higher education. This vector illustrates the expected direct relationship between these two variables: the more students per population, then the tendency for more college graduates per population.

Canonical Vector 6

The sixth canonical vectors, relating to regional attractiveness among the criterion set, and to appropriations for higher education among the predictor set, add little statistical explanation and some puzzlement. The analytic program output indicates a weak inverse relationship between attractiveness and appropriations, which is not what would intuitively be expected.

In summary, the selected outside variables with the greatest predictive power include median family income, appropriations for higher education (this variable loads highest on three predictor vectors), white population, urban population, and persons completing four or more

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Ph.D. dissertation, Pennsylvania State University, 1971), and Paul L. Butt, "Higher Education and Central Places--Real World Observations: Oklahoma" (Unpub. seminar paper, Oklahoma State University, 1975). Both presented empirical evidence that the locational patterns of publically-controlled institutions tend to be distributed according to the administrative principle of Central Place Theory, whereas privately-controlled institutions tend to be distributed according to the marketing principle of Central Place Theory. There is, therefore, a tendency for public colleges and universities to be located in rural or small urban areas and for private colleges and universities to be found in larger urban areas.

years of higher education. The selected outside variables with less predictive power include the developmental time-frame (measured as the number of years from statehood to 1972), median school years completed, enrollment in public schools, and white-collar labor force.

What has been presented here was a very aggregated statistical association. The results did not reveal any startling insights relating to higher educational location theory, but rather served to confirm and extend certain empirical interrelationships previously suggested in the literature. The canonical analysis of the aggregate state data, perhaps, contributed a perspective on the ways in which spatial differences in higher education and other variables are interrelated. The canonical model provided a conceptual framework within which interrelationships could be specified, and an operational format by which the strength of structural associations could be measured.

Some Qualitative Interpretation

In attempting to understand the macro-scale spatial variations in American higher education, a few additional interpretative comments of a qualitative nature seem in order. The data for some hypothesized relevant variables were not readily available or were not adequately quantifiable for inclusion in the predictor set of the canonical model.

When examining the first-order, contiguous higher education regions (Figure 33), one might easily speculate that these regions somewhat reflect the product of general historical processes and circumstances. Throughout the American developmental period, socioeconomic growth, including educational growth, generally proceeded more rapidly in the Northeast than in the South. Folger and Nam suggested that the

slower development of Southern education may be explained in part by the following factors:

1. The aristocratic tradition, which favored private over public schools and was unconcerned about universal education.

2. The large Black population, which received almost no education during the slavery period, and very little in the second half of the nineteenth century.

3. The predominantly rural population.[13]

The fewer resources and opportunities in contemporary Southern higher education probably are a reflection of this regional lag in educational development.

The distinctiveness of higher education in the West--characterized by public control, university type, and high student enrollment per population--probably stems largely from the West having been settled and developed after the passage of the first Morrill Act (1862), and much of the West's higher educational development having occurred after the second Morrill Act (1890). Unlike in the East, the development of the private sector of higher education in the West generally followed the development of the public sector. Due to the competition from the land-grant institutions, private colleges and universities have never been as successful in the West as they were in the East. Western higher education has been greatly influenced by the land-grant institutions, which stand pre-eminently for the principle that every citizen is entitled to receive some form of higher education.

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[13]John K. Folger and Charles B. Nam, Education of the American Population (Washington, D.C., 1967), p. 18.

The canonical model indicated that public attitudes and feelings toward higher education, as measured by the surrogate "total state appropriations for higher education," were a strong predictor. Therefore, if one is attempting to gain an understanding of state-to-state variations in higher education, it seems requisite that one be acquainted with the history of each state and its development which accounts for the differences in the way it supports higher education.

Some regional variations in public attitudes regarding higher education were noted by Jencks and Riesman.[14] Perhaps an extreme attitude is represented by Northern New England (already noted in Chapter III of this study), where the view seems to be that "higher education is mainly for those who can pay for it." Private institutions are the mainstay of higher education in Vermont, New Hampshire, and Maine; even many of the public institutions are private in spirit if not in law. Somewhat similar attitudes and traditions as those of Northern New England, but not as extreme, characterize higher education in Massachusetts, Connecticut, New Jersey, Pennsylvania, and Maryland, and to a lesser extent, in New York and Rhode Island.

In the Midwest--in states like Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin--the sectarian colleges were eclipsed by the land-grant institutions in the late nineteenth and early twentieth centuries. Because public higher education offered pragmatic studies, it tended to gain widespread appeal and to win the support of the populaces of these states. Once a state made a

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[14]Christopher Jencks and David Riesman, The Academic Revolution (Garden City, N. Y., 1968), pp. 171-177.

commitment to public higher education it seemed to perpetuate itself, even under conditions that probably would not have favored it initially. Thus, there was no reversion to the privately dominated system, but rather an expansion of public universities and colleges.

> Like medieval cathedrals, public universities in these states seem to have become symbols of communal solidarity, a focus of civic pride, and a tribute to faith in ideas that transcend the here and now . . . . As a result of their symbolic role as the embodiment of local democracy, state universities have generally obtained more adequate appropriations than other equally useful public enterprises, such as public health, elementary education, and the like.[15]

In the South and in the Rocky Mountains, support for both public and private higher educational institutions is generally less than in the rest of the nation (notable exceptions in the South are Texas, North Carolina, and Florida). This is probably attributable to a smaller tax base, more limited employer's demands for college graduates, and an apparently smaller proportion of competent potential college applicants.[16] "The alliance between self-interested farmers and enlightened business and professional men on which public universities often depend for appropriations is not usually very strong in these areas."[17] And perhaps most important, the Southern and Mountain cultural traditions do not tend to encourage the support of higher education; anti-intellectualism is widespread in most Southern and Mountain states. Probably one reflection of this are the relatively

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[15] Jencks and Riesman, p. 173.

[16] On regional variations in high school seniors' abilities, see Coleman et al.

[17] Jencks and Riesman, p. 174.

few Southern and Mountain institutions that have attained national academic reputations.

The Pacific Coast resembles the Midwest in its widespread support of higher education, with the emphasis similarly on the public sector. The other attitudinal extreme is likely represented in California (previously noted in Chapter III of this study), where the public feeling is that "every student has a right, regardless of means, to attend a suitable institution."

In this chapter an attempt was made to interpret the spatial patterns and variations of American higher education. Employing both quantitative and qualitative approaches, it was an attempt to rise from a conception of the spatial form of American higher education to an understanding of the forces which gave rise to it. In the last chapter some implications of the findings of this study--implications for application and implications for further research--will be presented.

CHAPTER V

IMPLICATIONS

It is hoped that the macro-scale patterns and variations identified and interpreted in this study have revealed some order in the spatial form of American higher education, and have resulted in an increased understanding of the geography of higher education in the United States. The factorial and canonical ecologies produced some patterns hitherto unseen and, perhaps in some cases, unforeseen. An awareness of these patterns and variations can serve as a pragmatic tool in higher educational resource management and planning, and as a basis for further research into the location of institutional higher education.

Effective higher educational resource management and planning, particularly at the state and inter-state levels, can benefit from information on the macro patterns and variations. The variations in higher educational resources and opportunities presented in this study especially have implications for the allocation of public--as well as private--funds for higher education, both at the state and national levels. The likely future expansion of regional (multi-state) management and planning in higher education will require knowledge of macro patterns and variations such as those revealed in this study.

Another example of a potential utilization of the findings in this study might be provided by the regional accrediting associations

in the United States. It seems reasonable to assume that accrediting associations would tend to be more meaningful and more effective users of resources as their contiguous territories of jurisdiction approach homogeneity. The contiguous higher education regions presented in this study (Figure 33) represent such an attempt at homogeneity, within the limits of the selected indicators data set. It might prove useful, or at least interesting, to examine the spatial correspondence between these higher education regions and the regions of the accrediting associations (Table X).

The spatial form of higher education is significant to educational administrators, planners, and governmental officials since it impinges directly upon such problems as cost, current and future needs, volume and quality of student enrollment, and basic educational policy. Effective solutions to these problems require an understanding of the forces and conditions producing them; studies such as this can contribute to the achievement of this understanding.

This study can serve as a basis for further research into the locational patterns of higher education. This study is a beginning, an exploratory probe of the macro-scale patterns and variations; studies similar in methodology and objectives can be undertaken at other scales. The spatial aspects of American higher education merit investigation at the meso-scale of intra-state and at the micro-scale of the individual institution. The higher educational spatial forms of other cultures outside the United States also deserve study. Additionally, the temporal dimension warrants attention; this study examined only contemporary patterns and variations in higher education. Further research, whatever the study area or scale, might examine the spatial

TABLE X

CORRESPONDENCE BETWEEN ACCREDITING ASSOCIATION REGIONS AND HIGHER EDUCATION REGIONS, BY STATE*

Accrediting Association Region		Higher Education Region
New England Association		
Maine	Vermont	Northern New England
New Hampshire		
Connecticut	Rhode Island	
Massachusetts		
Middle States Association		
Delaware	New York	
Maryland	Pennsylvania	The Northeast
New Jersey	(District of Columbia)	
North Central Association		
Illinois	Michigan	
Indiana	Ohio	
Arkansas	New Mexico	
Missouri	West Virginia	
Southern Association		The Extended South
Alabama	North Carolina	
Florida	South Carolina	
Georgia	Tennessee	
Kentucky	Texas	
Louisiana	Virginia	
Mississippi		
Northwest Association		
Idaho	Oregon	
Montana	Utah	The West
Nevada	Washington	
Western Association		
California	(Alaska)	
Nevada	(Hawaii)	

Arizona	Nebraska	
Colorado	North Dakota	
Iowa	Oklahoma	
Kansas	South Dakota	
Minnesota	Wyoming	

*The three single-state higher education regions are indicated in parentheses. Nevada is a member of two associations; Wisconsin is not a member of any of these associations.

form of higher education through time.

As previously mentioned, it should not be assumed that this study necessarily discovered the dimensions associated with the macro spatial variation of American higher education. The factors of Chapter III may not be (and probably are not) exhaustive because of the possible omission of important measures not included in this study. In further studies, additional indicators of institutional higher education might be sought. One such indicator is that which would measure academic program emphasis; areal variation in program emphasis might be revealed via humanities regions, social science regions, physical science regions, and the like.

The set of outside variables used in the interpretation of the higher educational patterns and variations is also far from exhaustive. In spite of the existing multitude of quantitative statistics, additional quantitative (as well as qualitative) data are needed to better interpret and understand the spatial form of higher education. This is especially so for the more imponderable social and political variables, such as religion and political leaning. The spatial patterns of organizational and private endowments to higher education also demand examination in further interpretation.

Some of the data needed for meaningful indicators and meaningful predictors of higher education already exist, but are scattered and fragmented. There are gaps to be filled and new data to be developed. And, most importantly, the data must be presented in an orderly, comprehensive fashion; they must be analyzed and interpreted in a way that will contribute to effective planning and revision of plans for achieving educational goals. Hopefully, this study has accomplished

this, and will prove to be an interesting and useful contribution to geographical and higher educational literature and thought.

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APPENDIX A

STATE RANKINGS AND VALUES FOR HIGHER EDUCATIONAL INDICATORS

TABLE XI

STATE RANKINGS AND VALUES FOR SEX OF STUDENT BODY, 1972
(Per Cent Male)

Rank	State	Value	Rank	State	Value
1	District of Columbia	59.5	26	Alabama	56.7
1	Oklahoma	59.5	26	California	56.7
			26	Colorado	56.7
3	Texas	59.3			
			29	North Carolina	56.6
4	New Hampshire	58.8			
4	New Mexico	58.8	30	Minnesota	56.4
6	Utah	58.6	31	Oregon	56.3
7	Montana	58.4	32	Georgia	56.2
8	North Dakota	58.3	33	Louisiana	56.1
			33	West Virginia	56.1
9	Ohio	58.1			
9	Pennsylvania	58.1	35	Arkansas	56.0
9	Rhode Island	58.1	35	Connecticut	56.0
12	Iowa	57.9	37	Nevada	55.9
12	Wisconsin	57.9	37	South Dakota	55.9
14	Kansas	57.8	39	Hawaii	55.8
			39	Illinois	55.8
15	Florida	57.7			
15	Indiana	57.7	41	Maryland	55.4
15	Maine	57.7			
15	South Carolina	57.7	42	New Jersey	55.3
			42	Washington	55.3
19	Missouri	57.6			
			44	Kentucky	55.2
20	Tennessee	57.4			
			45	New York	54.8
21	Arizona	57.2			
			46	Virginia	54.7
22	Michigan	57.0			
			47	Delaware	54.4
23	Idaho	56.9	47	Wyoming	54.4
23	Nebraska	56.9			
			49	Mississippi	52.8
25	Massachusetts	56.8			
			50	Vermont	51.3
United States mean = 56.6			51	Alaska	49.1

TABLE XII

STATE RANKINGS AND VALUES FOR MINORITY STUDENTS, 1972
(Per Cent Total Enrollment)

Rank	State	Value	Rank	State	Value
1	District of Columbia	39.1	27	Missouri	7.6
2	Mississippi	26.8	28	Kentucky	7.3
3	Louisiana	26.6	29	Kansas	7.0
4	New Mexico	24.3	30	Nevada	6.8
5	Alabama	22.8	31	Rhode Island	6.6
6	North Carolina	19.8	32	Connecticut	6.2
7	Texas	19.3	33	Indiana	6.1
8	California	19.1	34	Massachusetts	5.9
9	Georgia	17.4	35	Pennsylvania	5.6
9	South Carolina	17.4	36	Oregon	5.5
11	Arkansas	15.6	37	Montana	4.3
12	Virginia	15.4	37	Wyoming	4.3
13	Maryland	14.5	39	Utah	4.0
14	Arizona	14.2	40	Idaho	3.9
15	Illinois	13.5	40	Wisconsin	3.9
16	New York	13.4	42	Nebraska	3.7
16	Tennessee	13.4	43	Minnesota	3.1
18	Florida	13.0	44	New Hampshire	3.0
18	New Jersey	13.0	45	South Dakota	2.9
20	Delaware	11.3	46	Iowa	2.8
20	Oklahoma	11.3	47	North Dakota	2.6
22	Colorado	11.1	47	Vermont	2.6
23	Michigan	10.3	49	Maine	1.5
24	Ohio	9.0	Note:	No data available for Alaska and Hawaii	
25	Washington	7.8			
25	West Virginia	7.8			

United States mean = 10.9

TABLE XIII

STATE RANKINGS AND VALUES FOR ATTENDANCE STATUS OF STUDENT BODY, 1972
(Per Cent Full-Time)

Rank	State	Value	Rank	State	Value
1	New Hampshire	87.2	26	Pennsylvania	71.0
2	Iowa	84.5	26	Wisconsin	71.0
3	North Dakota	83.5	28	Colorado	70.8
4	Arkansas	83.1	29	Indiana	70.7
5	Vermont	82.1	30	Massachusetts	69.8
6	Montana	81.2	31	Missouri	69.5
7	South Dakota	80.7	32	Rhode Island	69.3
8	Mississippi	79.9	33	Texas	69.2
9	Utah	77.1	34	New Mexico	68.1
10	Louisiana	76.9	34	Virginia	68.1
11	Nebraska	76.6	36	Florida	67.4
12	West Virginia	76.2	37	Washington	65.7
13	Minnesota	76.1	38	Delaware	64.9
14	North Carolina	76.9	39	Connecticut	64.3
15	Tennessee	75.8	40	Wyoming	64.2
16	Kansas	75.6	41	New York	63.4
17	Maine	75.3	42	Illinois	62.9
18	Idaho	74.3	43	Oregon	62.6
19	Kentucky	73.9	44	Michigan	62.0
20	Alabama	73.0	45	New Jersey	59.2
20	Georgia	73.0	46	Maryland	58.2
22	Hawaii	72.2	47	District of Columbia	56.4
23	Oklahoma	71.5	48	Arizona	51.7
24	Ohio	71.9	49	Nevada	51.2
24	South Carolina	71.9	50	California	50.2
			51	Alaska	33.5

United States mean = 69.9

TABLE XIV

STATE RANKINGS AND VALUES FOR LEVEL OF ENROLLMENT OF STUDENT BODY, 1972
(Graduate Enrollment as Per Cent Total Enrollment)

Rank	State	Value	Rank	State	Value
1	District of Columbia	19.3	26	Mississippi	8.9
2	Connecticut	17.2	27	Arizona	8.8
3	New York	15.6	28	Colorado	8.7
4	Indiana	15.4	28	Nebraska	8.7
5	New Jersey	13.0	28	South Carolina	8.7
6	Massachusetts	12.9	31	Iowa	8.6
7	Georgia	12.6	32	Alabama	8.4
8	Pennsylvania	12.1	32	California	8.4
9	Nevada	11.7	34	Minnesota	7.9
10	New Mexico	11.2	35	Oregon	7.6
11	Maryland	11.0	36	North Carolina	7.3
12	Louisiana	10.6	36	Wyoming	7.3
12	Missouri	10.6	38	Virginia	7.2
12	Rhode Island	10.6	39	Idaho	6.8
15	Kentucky	10.4	40	West Virginia	6.6
16	Tennessee	10.3	41	Delaware	6.5
17	Ohio	10.1	41	Florida	6.5
18	Kansas	9.9	43	Vermont	6.0
18	Oklahoma	9.9	44	North Dakota	5.9
20	Illinois	9.8	45	Arkansas	5.8
21	Michigan	9.7	46	New Hampshire	5.6
21	Texas	9.7	46	Washington	5.6
23	Hawaii	9.5	48	South Dakota	5.1
24	Utah	9.4	49	Montana	5.0
25	Wisconsin	9.1	50	Maine	4.4
			51	Alaska	3.4

United States mean = 9.2

TABLE XV

STATE RANKINGS AND VALUES FOR RESIDENCE STATUS OF STUDENT BODY, 1968
(Per Cent From Within State)

Rank	State	Value	Rank	State	Value
1	California	92.8	26	Hawaii	78.9
2	Texas	90.1	27	Wyoming	78.4
3	New York	88.1	28	Georgia	78.3
4	New Jersey	87.6	29	Idaho	78.2
5	Louisiana	87.5	29	Wisconsin	78.2
6	Mississippi	87.2	31	Connecticut	77.3
7	Michigan	86.8	32	South Dakota	77.0
8	Illinois	86.2	33	Kentucky	76.1
9	Washington	85.0	34	South Carolina	75.6
10	Alabama	84.8	35	Virginia	75.5
11	Arkansas	84.7	36	Nebraska	75.1
12	Montana	84.5	37	Missouri	74.9
13	Florida	84.3	38	Indiana	72.2
14	Oklahoma	83.9	39	Tennessee	71.7
15	North Dakota	83.4	40	Iowa	71.1
16	Oregon	82.5	40	North Carolina	71.1
17	Minnesota	82.3	42	West Virginia	69.6
18	Nevada	82.1	43	Colorado	68.9
19	Arizona	81.3	44	Utah	67.6
20	Maryland	81.1	45	Massachusetts	66.6
20	New Mexico	81.1	46	Maine	64.8
22	Ohio	80.9	47	Rhode Island	63.8
23	Pennsylvania	80.3	48	Delaware	58.8
24	Alaska	79.4	49	New Hampshire	46.7
25	Kansas	79.0	50	Vermont	39.9
			51	District of Columbia	23.1

United States mean = 76.2

TABLE XVI

STATE RANKINGS AND VALUES FOR STUDENT ENROLLMENT, 1972
(Total in Thousands)

Rank	State	Value	Rank	State	Value
1	California	1375.0	27	Alabama	118.8
2	New York	850.5	28	Iowa	109.5
3	Texas	487.6	29	Kentucky	108.2
4	Illinois	486.4	30	Kansas	107.9
5	Pennsylvania	429.7	31	South Carolina	93.8
6	Michigan	406.7	32	Utah	82.3
7	Ohio	390.3	33	District of Columbia	80.5
8	Massachusetts	321.9	34	Mississippi	80.3
9	Florida	260.1	35	Nebraska	66.1
10	New Jersey	240.9	36	West Virginia	63.6
11	Wisconsin	217.8	37	Arkansas	53.9
12	Indiana	201.4	38	Rhode Island	50.0
13	North Carolina	198.5	39	New Mexico	48.5
14	Washington	193.1	40	Hawaii	42.5
15	Missouri	188.9	41	Idaho	35.1
16	Virginia	176.5	42	Maine	34.6
17	Maryland	168.0	43	New Hampshire	30.2
18	Minnesota	158.0	44	North Dakota	29.8
19	Tennessee	147.3	45	South Dakota	28.9
20	Georgia	141.2	46	Montana	28.2
21	Louisiana	134.4	47	Delaware	27.8
22	Connecticut	131.0	48	Vermont	25.7
23	Colorado	129.2	49	Wyoming	17.7
24	Arizona	123.7	50	Nevada	17.3
25	Oregon	123.2	51	Alaska	13.7
26	Oklahoma	122.2			

United States mean = 180.4

TABLE XVII

STATE RANKINGS AND VALUES FOR STUDENT ENROLLMENT, 1973
(Per Cent Total Population 18 Years and Over)

Rank	State	Value	Rank	State	Value
1	District of Columbia	15.2	28	Nebraska	6.3
2	Utah	11.3	29	New Hampshire	6.2
3	California	10.4	30	Virginia	6.0
4	Arizona	10.3	31	Missouri	5.9
5	Vermont	9.0	32	Montana	5.8
6	Oregon	8.6	32	North Carolina	5.8
6	Washington	8.6	32	South Dakota	5.8
8	Massachusetts	8.2	35	Mississippi	5.7
9	Rhode Island	8.1	36	Indiana	5.6
10	Colorado	8.0	36	Iowa	5.6
11	Hawaii	7.8	36	Louisiana	5.6
12	Wyoming	7.7	39	Nevada	5.5
13	Delaware	7.6	39	Ohio	5.5
14	Wisconsin	7.3	39	Tennessee	5.5
15	Michigan	7.2	39	West Virginia	5.5
16	Alaska	7.1	43	Alabama	5.3
16	New York	7.1	43	Pennsylvania	5.3
18	Idaho	7.0	43	South Carolina	5.3
18	New Mexico	7.0	46	Florida	5.2
20	Kansas	6.9	46	Maine	5.2
20	North Dakota	6.9	48	New Jersey	5.1
20	Oklahoma	6.9	49	Kentucky	4.9
23	Illinois	6.5	50	Georgia	4.7
23	Maryland	6.5	51	Arkansas	3.8
23	Texas	6.5			
26	Connecticut	6.4			
26	Minnesota	6.4			

United States Mean = 6.8

TABLE XVIII

STATE RANKINGS AND VALUES FOR NUMBER OF INSTITUTIONS, 1970
(Per 100,000 Population 18 Years and Over)

Rank	State	Value	Rank	State	Value
1	Vermont	5.9	26	Colorado	2.0
2	South Dakota	4.0	26	Delaware	2.0
3	New Hampshire	3.9	26	Rhode Island	2.0
4	District of Columbia	3.8	26	Utah	2.0
4	Wyoming	3.8	26	Virginia	2.0
6	Kansas	3.5	31	West Virginia	1.9
7	Massachusetts	3.1	32	Illinois	1.8
7	Mississippi	3.1	32	Maryland	1.8
7	North Dakota	3.1	32	New Mexico	1.8
10	North Carolina	2.9	32	New York	1.8
11	Iowa	2.8	32	Pennsylvania	1.8
11	Nebraska	2.8	37	Alaska	1.7
11	Oregon	2.8	37	Arkansas	1.7
11	South Carolina	2.8	37	Kentucky	1.7
15	Montana	2.7	37	Texas	1.7
16	Maine	2.5	37	Washington	1.7
17	Minnesota	2.4	42	Arizona	1.6
18	Connecticut	2.3	42	Michigan	1.6
19	Alabama	2.2	44	California	1.5
19	Idaho	2.2	45	Hawaii	1.4
19	Missouri	2.2	46	Florida	1.3
19	Tennessee	2.2	46	Indiana	1.3
19	Wisconsin	2.2	46	Nevada	1.3
24	Georgia	2.1	46	Ohio	1.3
24	Oklahoma	2.1	50	New Jersey	1.2
			51	Louisiana	1.0

United States mean = 2.3

TABLE XIX

STATE RANKINGS AND VALUES FOR ALL EARNED DEGREES CONFERRED, 1970-71
(Per Cent Total Enrollment)

Rank	State	Value	Rank	State	Value
1	South Dakota	18.8	26	Rhode Island	14.7
2	Indiana	18.0	27	North Carolina	14.4
3	Nebraska	17.9	27	Wisconsin	14.4
4	Iowa	17.3	29	Minnesota	14.3
4	Vermont	17.3	30	Colorado	14.1
6	New Hampshire	17.1	30	New York	14.1
7	Arkansas	17.0	32	South Carolina	13.6
8	District of Columbia	16.8	33	Connecticut	13.5
9	Georgia	16.5	33	Michigan	13.5
9	Maine	16.5	33	New Mexico	33.5
11	Pennsylvania	16.2	36	Illinois	13.3
12	Montana	16.1	37	Texas	12.9
13	North Dakota	15.9	38	Virginia	12.8
14	Alabama	15.8	39	New Jersey	12.7
14	Kansas	15.8	40	Oregon	12.5
16	Kentucky	15.7	41	Nevada	11.8
17	Tennessee	15.6	41	Wyoming	11.8
18	Louisiana	15.4	43	Florida	11.7
18	Ohio	15.4	44	Hawaii	11.6
20	Massachusetts	15.1	44	Washington	11.6
20	Utah	15.1	46	Maryland	11.5
22	Missouri	15.0	47	Arizona	10.9
23	Mississippi	14.9	48	Idaho	9.5
23	West Virginia	14.9	49	Delaware	8.1
25	Oklahoma	14.8	50	California	8.1
			51	Alaska	6.1

United States mean = 14.2

TABLE XX

STATE RANKINGS AND VALUES FOR EXPENDITURES, 1970-71
(Dollars Per Student)

Rank	State	Value	Rank	State	Value
1	Alaska	3987	26	New Mexico	2693
2	District of Columbia	3953	27	Alabama	2686
3	New Hampshire	3818	28	Colorado	2681
4	Vermont	3775	29	Utah	2680
5	Massachusetts	3566	30	South Dakota	2656
6	North Carolina	3421	31	Nebraska	2623
7	Iowa	3355	32	Mississippi	2564
8	New York	3292	33	Missouri	2559
9	Maryland	3165	34	Kansas	2520
10	Georgia	3135	35	Nevada	2509
11	Pennsylvania	3126	36	Michigan	2503
12	Indiana	3121	37	Arkansas	2487
13	Illinois	3093	38	Louisiana	2480
14	Hawaii	3075	39	Florida	2416
15	South Carolina	2939	40	Montana	2386
16	Connecticut	2931	41	Delaware	2350
17	Rhode Island	2920	42	Oregon	2338
18	Tennessee	2911	43	New Jersey	2303
19	Wisconsin	2863	43	North Dakota	2303
20	Wyoming	2819	45	Washington	2264
21	Minnesota	2805	46	West Virginia	2243
22	Kentucky	2805	47	California	2236
23	Maine	2761	48	Oklahoma	2230
24	Ohio	2727	49	Texas	2136
25	Virginia	2701	50	Idaho	1913
			51	Arizona	1842

United States mean = 2778

TABLE XXI

STATE RANKINGS AND VALUES FOR TUITION AND FEES, RESIDENT STUDENT AT PUBLIC UNIVERSITY WITH LARGEST ENROLLMENT, 1973-74
(Average Dollars)

Rank	State	Value	Rank	State	Value
1	Vermont	1082	27	Oregon	530
2	New Hampshire	1060	28	Delaware	520
3	Pennsylvania	855	28	Georgia	520
4	New York	798	30	Mississippi	516
5	Ohio	795	31	Alabama	510
6	Rhode Island	760	32	Missouri	500
7	New Jersey	730	32	South Dakota	500
8	Connecticut	715	34	Kentucky	480
9	Maryland	700	34	Utah	480
9	Minnesota	700	36	Oklahoma	475
11	Michigan	696	37	Montana	471
12	Illinois	690	38	New Mexico	460
13	Indiana	650	39	North Dakota	456
14	California	640	40	North Carolina	439
15	Virginia	622	41	Wyoming	410
16	Iowa	620	42	Arkansas	400
17	Nebraska	613	43	Tennessee	399
18	Colorado	600	44	Arizona	370
18	Florida	600	45	Alaska	352
18	Wisconsin	600	46	Idaho	346
21	South Carolina	570	47	Louisiana	320
22	Washington	564	48	West Virginia	310
23	Kansas	550	49	Texas	266
23	Maine	550	50	Hawaii	233
23	Massachusetts	550	Note:	No public university in District of Columbia	
26	Nevada	532			

United States mean = 562

TABLE XXII

STATE RANKINGS AND VALUES FOR PRODUCTIVITY, 1970-71
(Dollars per Degree, in Thousands)

Rank	State	Value	Rank	State	Value
1	Alaska	65.3	27	Colorado	19.0
2	Maryland	27.6	28	Georgia	18.9
3	California	27.5	29	Oregon	18.7
4	Hawaii	26.5	30	Tennessee	18.6
5	Delaware	26.1	31	Michigan	18.5
6	Wyoming	24.0	32	New Jersey	18.2
7	North Carolina	23.7	33	Kentucky	17.8
8	Massachusetts	23.6	34	Ohio	17.7
9	District of Columbia	23.5	34	Utah	17.1
10	Illinois	23.3	36	Indiana	17.3
10	New York	23.3	37	Mississippi	17.2
12	New Hampshire	22.3	38	Alabama	17.0
13	Connecticut	21.8	38	Missouri	17.0
13	Vermont	21.8	40	Arizona	16.9
15	South Carolina	21.6	41	Maine	16.7
16	Nevada	21.2	42	Texas	16.6
17	Virginia	21.1	43	Louisiana	16.1
18	Florida	20.7	44	Kansas	16.0
19	Idaho	20.1	45	Oklahoma	15.1
20	New Mexico	20.0	46	West Virginia	15.0
21	Rhode Island	19.9	47	Montana	14.8
22	Wisconsin	19.8	48	Nebraska	14.7
23	Minnesota	19.6	49	Arkansas	14.6
24	Washington	19.5	50	North Dakota	14.5
25	Iowa	19.4	51	South Dakota	14.1
26	Pennsylvania	19.3			

United States mean = 20.4

TABLE XXIII

STATE RANKINGS AND VALUES FOR UNIVERSITY ENROLLMENT, 1972
(Per Cent Total)

Rank	State	Value	Rank	State	Value
1	Alaska	90.7	26	Pennsylvania	38.5
2	Indiana	76.4	27	Vermont	38.2
3	District of Columbia	75.0	28	Maryland	38.0
4	Utah	72.9	28	Missouri	38.0
5	Maine	68.8	30	New Hampshire	36.2
6	New Mexico	65.1	31	Illinois	34.6
7	Delaware	63.0	32	South Carolina	34.5
8	Nebraska	61.2	33	Tennessee	33.0
9	Montana	60.8	34	Texas	32.8
10	North Dakota	57.1	35	Michigan	31.7
11	Wyoming	56.4	36	Virginia	31.3
12	Ohio	54.3	37	Rhode Island	30.9
13	Hawaii	52.5	38	West Virginia	29.1
14	South Dakota	50.6	39	Oregon	27.9
15	Arizona	47.0	40	Alabama	26.0
16	Kansas	46.0	41	Mississippi	25.4
17	Colorado	45.7	41	Washington	25.4
18	Iowa	43.7	43	Florida	24.5
19	Arkansas	42.6	44	New York	24.0
20	Massachusetts	42.2	45	North Carolina	23.4
21	Kentucky	41.5	46	Idaho	23.0
22	Nevada	41.4	47	Connecticut	22.5
23	Minnesota	41.0	48	New Jersey	22.3
23	Oklahoma	41.0	49	Wisconsin	21.9
25	Louisiana	40.4	50	Georgia	20.5
			51	California	14.2

United States mean = 41.7

TABLE XXIV

STATE RANKINGS AND VALUES FOR FOUR-YEAR COLLEGE ENROLLMENT, 1972
(Per Cent Total)

Rank	State	Value	Rank	State	Value
1	West Virginia	60.8	26	Texas	36.5
2	Rhode Island	60.7	27	Nevada	35.8
3	New Hampshire	60.5	28	Colorado	35.1
4	Georgia	60.3	29	Michigan	33.9
5	Kentucky	57.0	30	Iowa	33.5
6	Louisiana	55.6	31	Ohio	33.2
7	Connecticut	55.5	32	Oregon	33.1
8	Tennessee	55.1	33	Kansas	32.0
9	Idaho	54.5	33	New Mexico	32.0
10	Vermont	52.9	35	Montana	30.9
11	Wisconsin	52.5	36	Maryland	30.6
12	New Jersey	52.2	37	Nebraska	29.5
13	Arkansas	51.1	38	California	29.1
14	Alabama	49.3	39	Florida	28.7
15	New York	48.7	40	Illinois	27.7
16	Pennsylvania	48.6	41	Maine	26.9
17	South Dakota	47.9	42	Washington	25.5
18	Minnesota	44.4	43	North Dakota	24.7
19	North Carolina	44.1	44	Indiana	19.5
20	Mississippi	43.2	45	District of Columbia	18.5
21	Virginia	42.6	46	Utah	14.1
22	Missouri	42.3	47	Hawaii	12.9
23	Oklahoma	39.9	48	Delaware	8.9
24	Massachusetts	39.7	49	Arizona	8.8
25	South Carolina	38.3	50	Alaska	7.6
			51	Wyoming	0.0

United States mean = 37.4

TABLE XXV

STATE RANKINGS AND VALUES FOR TWO-YEAR COLLEGE ENROLLMENT, 1972
(Per Cent Total)

Rank	State	Value	Rank	State	Value
1	California	56.7	27	Colorado	19.2
			27	Georgia	19.2
2	Washington	49.1	29	Oklahoma	19.1
3	Florida	46.8	30	North Dakota	18.2
4	Arizona	44.2	31	Massachusetts	18.1
5	Wyoming	43.6	32	Minnesota	14.6
6	Oregon	39.0	33	Utah	13.0
7	Illinois	37.7	34	Pennsylvania	12.9
8	Hawaii	34.6	35	Ohio	12.5
9	Michigan	34.4	36	Tennessee	11.9
10	North Carolina	32.5	37	West Virginia	10.1
11	Maryland	31.4	38	Nebraska	9.3
11	Mississippi	31.4	39	Vermont	8.9
13	Texas	30.7	40	Rhode Island	8.4
14	Delaware	28.1	41	Montana	8.3
15	New York	27.3	42	District of Columbia	6.5
16	South Carolina	27.2	43	Arkansas	6.3
17	Virginia	26.1	44	Maine	4.3
18	Wisconsin	25.6	45	Indiana	4.1
19	New Jersey	25.5	46	Louisiana	4.0
20	Alabama	24.7	47	New Hampshire	3.3
21	Iowa	22.8	48	New Mexico	2.9
21	Nevada	22.8	49	Alaska	1.7
23	Idaho	22.5	50	Kentucky	1.5
24	Connecticut	22.0	50	South Dakota	1.5
24	Kansas	22.0			
26	Missouri	19.7			

United States mean = 20.9

TABLE XXVI

STATE RANKINGS AND VALUES FOR EARNED DOCTOR'S DEGREES CONFERRED, 1970-71
(Per Cent Total)

Rank	State	Value	Rank	State	Value
1	Wyoming	5.0	27	Kansas	2.4
2	District of Columbia	4.5	27	North Dakota	2.4
3	Indiana	3.9	27	Texas	2.4
3	Massachusetts	3.9	30	Missouri	2.3
5	Colorado	3.8	30	Tennessee	2.3
6	Iowa	3.7	32	Georgia	2.2
7	Delaware	3.5	33	Louisiana	2.1
7	Illinois	3.5	33	Mississippi	2.1
7	Oregon	3.5	33	New Jersey	2.1
10	Michigan	3.4	36	Alaska	2.0
11	Arizona	3.3	37	Nebraska	1.9
11	California	3.3	37	Virginia	1.9
11	Utah	3.3	39	Hawaii	1.8
11	Wisconsin	3.3	40	Idaho	1.7
15	Maryland	3.2	41	Alabama	1.6
16	Connecticut	3.1	41	Montana	1.6
16	New Mexico	3.1	43	Arkansas	1.3
16	New York	3.1	43	South Carolina	1.3
16	Rhode Island	3.1	45	Kentucky	1.2
20	North Carolina	2.9	45	Nevada	1.2
20	Oklahoma	2.9	47	New Hampshire	1.1
22	Florida	2.7	47	West Virginia	1.1
22	Minnesota	2.7	49	South Dakota	0.9
22	Washington	2.7	50	Vermont	0.7
25	Ohio	2.5	51	Maine	0.5
25	Pennsylvania	2.5			

United States mean = 2.5

TABLE XXVII

STATE RANKINGS AND VALUES FOR STUDENT-FACULTY RATIO, 1967
(Students per one Faculty)

Rank	State	Value	Rank	State	Value
1	Utah	50.1	27	Kansas	21.3
2	Oklahoma	38.5	28	Wisconsin	21.2
3	Washington	35.1	29	Alabama	21.1
4	California	35.0	29	Indiana	21.1
5	New Jersey	33.5	31	District of Columbia	21.0
6	Texas	27.0	32	Rhode Island	20.2
7	Arizona	25.7	33	Montana	20.1
8	Michigan	24.9	34	Missouri	19.8
8	Minnesota	24.9	35	Hawaii	19.7
10	Florida	24.6	36	Tennessee	19.5
11	Oregon	24.5	37	Iowa	19.3
12	Idaho	24.4	38	Pennsylvania	19.2
12	New Mexico	24.4	39	South Carolina	18.9
14	New York	24.2	40	West Virginia	18.7
15	Massachusetts	23.1	41	Alaska	18.6
16	Ohio	22.8	42	North Dakota	18.5
17	Colorado	22.6	43	Delaware	18.1
18	Maine	22.4	43	Georgia	18.1
18	Nebraska	22.4	45	North Carolina	18.0
20	Illinois	22.3	45	Virginia	18.0
21	Connecticut	22.2	47	Wyoming	17.3
22	Arkansas	21.9	48	New Hampshire	17.1
23	Kentucky	21.7	49	South Dakota	16.5
24	Mississippi	21.6	50	Vermont	14.6
25	Louisiana	21.5	51	Nevada	14.3
26	Maryland	21.4			

United States mean = 22.6

TABLE XXVIII

STATE RANKINGS AND VALUES FOR FACULTY COMPENSATION, RANK OF PROFESSOR AT PUBLIC UNIVERSITY WITH LARGEST ENROLLMENT, 1973-74
(Average Dollars, in Hundreds)

Rank	State	Value	Rank	State	Value
1	New Jersey	30.3	27	Louisiana	22.6
2	New York	30.2	28	Vermont	22.5
3	Virginia	28.7	29	Colorado	22.4
4	Michigan	27.8	30	Oregon	22.3
5	California	27.2	31	New Mexico	22.1
6	Massachusetts	26.4	32	Florida	21.8
6	North Carolina	26.4	33	Nevada	21.6
8	Hawaii	26.2	33	Tennessee	21.6
9	Connecticut	25.9	35	Alabama	21.5
10	Indiana	25.8	35	South Carolina	21.5
11	Illinois	25.3	37	Kansas	21.2
11	Minnesota	25.3	38	Missouri	21.1
13	Wisconsin	25.2	39	Maine	21.0
14	Delaware	24.9	39	West Virginia	21.0
15	Maryland	24.7	41	Nebraska	20.9
15	Washington	24.7	42	Oklahoma	20.7
17	Rhode Island	24.5	43	Arkansas	20.6
18	Texas	24.3	44	Wyoming	20.2
19	Iowa	24.2	45	Montana	19.7
20	Kentucky	23.8	46	North Dakota	19.6
21	Georgia	23.4	47	Mississippi	19.4
21	Ohio	23.4	48	Idaho	19.2
23	Pennsylvania	23.1	48	South Dakota	19.2
24	Utah	23.0			
25	Arizona	22.9			
26	New Hampshire	22.7			

Note:

No data available for Alaska.

No public university in District of Columbia.

United States mean = 23.3

TABLE XXIX

STATE RANKINGS AND VALUES FOR ACADEMIC SPACE, 1970-71
(Per Cent Total Assignable Space)

Rank	State	Value	Rank	State	Value
1	Nevada	81.8	26	Kentucky	57.7
2	Nebraska	77.9	27	New York	57.6
3	California	73.9	28	North Carolina	57.1
4	Idaho	71.9	29	Iowa	57.0
5	New Jersey	70.7	30	South Dakota	55.5
6	Washington	68.8	31	Connecticut	54.4
7	Wisconsin	66.8	32	Rhode Island	52.9
8	Florida	66.4	33	South Carolina	52.8
9	Utah	65.6	34	North Dakota	52.2
10	District of Columbia	65.5	35	Michigan	52.0
11	Tennessee	65.4	36	Delaware	51.8
12	Maryland	64.9	37	Vermont	50.9
13	Arizona	63.7	37	West Virginia	50.9
14	Illinois	62.6	39	Virginia	50.6
15	Pennsylvania	62.2	40	Massachusetts	50.0
16	Oregon	62.0	41	Oklahoma	49.6
17	Minnesota	61.7	42	Montana	49.5
18	Alabama	60.5	43	Maine	49.0
19	Wyoming	60.1	44	Mississippi	48.5
20	Kansas	59.2	45	Missouri	46.4
21	Ohio	58.6	46	New Hampshire	45.5
22	Georgia	58.5	47	Indiana	45.4
23	Texas	58.4	48	Louisiana	45.1
24	New Mexico	58.0	49	Arkansas	43.2
25	Colorado	57.9	Note:	No data available for Alaska and Hawaii.	

United States mean = 58.1

TABLE XXX

STATE RANKINGS AND VALUES FOR LIBRARY RESOURCES, 1971
(Volumes per Student)

Rank	State	Value	Rank	State	Value
1	District of Columbia	82.6	27	Louisiana	42.2
2	Connecticut	80.1	28	Ohio	41.3
3	New Hampshire	74.3	29	Maryland	39.1
4	Massachusetts	67.0	30	Oklahoma	38.8
5	Maine	64.5	31	Idaho	38.6
6	Vermont	59.8	32	Utah	37.8
7	North Carolina	55.6	33	Texas	37.5
8	Iowa	54.3	34	Alabama	37.2
9	Montana	49.9	35	Colorado	36.3
10	Rhode Island	49.8	36	New Jersey	36.2
11	Kansas	49.4	36	Wisconsin	36.2
12	Pennsylvania	48.8	38	Alaska	35.6
13	Kentucky	48.2	39	Mississippi	35.2
14	South Carolina	47.5	40	Hawaii	35.0
15	Indiana	46.6	41	Wyoming	34.3
15	New York	46.6	42	New Mexico	34.2
17	Illinois	45.9	43	Michigan	33.7
18	Minnesota	45.8	43	North Dakota	33.7
19	Georgia	45.5	45	Oregon	33.3
20	Virginia	45.4	46	West Virginia	32.9
21	Tennessee	45.2	47	Delaware	32.3
22	Missouri	44.8	48	Washington	28.9
23	Nevada	44.5	49	Florida	28.2
24	South Dakota	44.3	50	California	25.7
25	Nebraska	43.7	51	Arizona	23.9
26	Arkansas	42.4			

United States mean = 43.9

TABLE XXXI

STATE RANKINGS AND VALUES FOR REGIONAL ATTRACTIVENESS, 1970
(Total Enrollment as Per Cent Total Regional Population 18-24 Years)

Rank	State	Value	Rank	State	Value
1	California	42.6	26	North Dakota	4.6
2	Hawaii	33.5	27	Indiana	4.3
3	Washington	24.3	27	South Carolina	4.3
4	Alaska	22.2	29	Alabama	4.2
5	Texas	17.9	30	Mississippi	4.1
6	Maine	16.4	31	Connecticut	4.0
7	New York	15.5	31	Nebraska	4.0
8	Florida	13.7	31	Rhode Island	4.0
9	Minnesota	11.4	34	Georgia	3.9
10	Illinois	9.9	35	Louisiana	3.5
11	Massachusetts	9.3	35	Oregon	3.5
12	Montana	8.7	37	Arizona	3.4
13	Michigan	8.6	38	Idaho	3.3
14	Utah	8.5	38	Iowa	3.3
15	Colorado	7.9	38	Tennessee	3.3
15	Ohio	7.9	41	Oklahoma	3.2
17	Pennsylvania	7.0	42	New Hampshire	3.1
18	Kansas	6.5	43	West Virginia	2.8
19	District of Columbia	6.4	44	South Dakota	2.6
19	North Carolina	6.4	45	Kentucky	1.8
21	Maryland	5.7	45	New Mexico	1.8
21	Wisconsin	5.7	47	Wyoming	1.7
23	Virginia	5.3	48	Arkansas	1.4
24	New Jersey	5.2	49	Delaware	1.0
25	Missouri	4.7	50	Vermont	0.8
			51	Nevada	0.4

United States mean = 7.6

TABLE XXXII

STATE RANKINGS AND VALUES FOR PUBLIC ENROLLMENT, 1972
(Per Cent Total)

Rank	State	Value	Rank	State	Value
1	Wyoming	100.0	26	Kentucky	82.1
2	Nevada	99.4	27	Georgia	81.8
3	Arizona	98.0	28	Maryland	81.1
4	North Dakota	95.4	29	Minnesota	80.3
5	New Mexico	91.8	30	Idaho	80.0
6	Montana	91.0	31	Nebraska	79.3
7	Hawaii	90.5	32	South Dakota	78.0
8	Alaska	90.4	33	Ohio	75.1
9	California	89.8	34	North Carolina	74.9
10	Washington	88.8	34	South Carolina	74.9
11	Colorado	88.7	34	Tennessee	74.9
12	Oregon	88.6	37	Indiana	73.8
13	Mississippi	88.5	37	Maine	73.8
14	Kansas	88.1	39	Missouri	72.6
15	Michigan	87.4	40	Illinois	72.3
16	Delaware	86.3	41	New Jersey	71.3
17	Wisconsin	85.9	42	Iowa	65.8
18	Alabama	85.8	43	Utah	61.3
19	Louisiana	85.2	44	Connecticut	60.8
20	Oklahoma	84.3	45	New York	60.1
21	Arkansas	84.1	46	Pennsylvania	58.0
22	Virginia	83.6	47	Rhode Island	55.7
23	Texas	83.3	48	New Hampshire	54.3
24	West Virginia	83.0	49	Vermont	53.7
25	Florida	82.6	50	Massachusetts	41.9
			51	District of Columbia	18.9

United States mean = 78.0

TABLE XXXIII

STATE RANKINGS AND VALUES FOR PRIVATE ENROLLMENT
INDEPENDENT OF CHURCH, 1970
(Per Cent Total Private)

Rank	State	Value	Rank	State	Value
1	Nevada	100.0	27	Ohio	35.8
2	Connecticut	89.0	28	Wisconsin	34.9
3	New York	86.6	29	Virginia	34.0
4	Massachusetts	86.2	30	Georgia	33.1
5	Maine	85.1	31	Nebraska	30.2
6	Vermont	80.4	32	Alabama	29.0
7	New Hampshire	79.1	33	Kentucky	23.6
8	Oregon	77.7	34	Colorado	22.9
9	Florida	77.3	35	North Carolina	22.5
9	Rhode Island	77.3	36	Indiana	22.1
11	Delaware	71.7	37	South Dakota	21.8
12	California	69.3	38	Texas	21.7
13	Maryland	68.0	39	Hawaii	18.4
14	New Jersey	65.6	40	Mississippi	17.5
15	West Virginia	63.8	41	New Mexico	13.5
16	Arizona	61.9	42	Washington	12.9
17	Pennsylvania	58.6	43	Minnesota	11.3
18	Illinois	57.7	44	Arkansas	9.2
19	District of Columbia	51.8	45	Utah	4.2
20	Oklahoma	50.7	46	Idaho	1.6
21	Missouri	46.5	46	Kansas	1.6
22	Michigan	45.5	48	Alaska	0.0
23	Louisiana	42.9	48	Montana	0.0
24	South Carolina	38.8	48	North Dakota	0.0
25	Tennessee	38.7	Note:	No private enrollment in Wyoming.	
26	Iowa	38.0			

United States mean = 42.6

APPENDIX B

STATE HIGHER EDUCATIONAL FACTOR SCORES

TABLE XXXIV

STATE HIGHER EDUCATIONAL FACTOR SCORES

State	Factor 1	2	3	4	5	6	7
Alabama	0.04	0.81	0.53	-0.31	-0.68	-0.60	1.21
Alaska	-0.36	0.86	-5.68	-1.96	-0.93	1.31	0.57
Arizona	-1.58	0.27	-0.46	1.28	0.67	-1.98	-0.44
Arkansas	0.71	1.66	0.13	-0.31	-1.31	0.65	0.64
California	-3.19	-1.36	1.40	-0.12	1.56	1.82	1.92
Colorado	-0.15	0.12	-0.33	0.65	0.15	-0.18	-0.01
Connecticut	0.59	-1.39	1.19	-0.62	-0.52	-0.90	-1.02
Delaware	-0.60	-0.21	-1.50	-0.13	0.47	-1.44	-0.78
District of Columbia	1.74	-1.90	-2.55	4.53	-0.94	-3.28	3.55
Florida	-1.10	0.34	0.67	-0.25	0.90	-0.59	-0.12
Georgia	0.42	0.19	0.82	-0.69	-1.25	-0.60	0.67
Hawaii	-0.45	0.42	-1.28	-0.43	-1.03	2.77	1.21
Idaho	-0.39	1.25	0.03	0.02	0.73	-0.71	0.32
Illinois	-0.69	-0.82	0.43	-0.38	0.13	-0.02	-0.12
Indiana	0.58	-0.45	-0.24	1.11	-1.63	1.03	-2.09
Iowa	0.89	-0.23	0.09	0.29	0.43	0.40	-0.41
Kansas	0.38	0.63	-0.20	0.71	0.50	0.10	0.41
Kentucky	0.59	0.63	0.22	-0.70	-1.11	0.40	-0.62
Louisiana	0.18	0.86	0.52	-0.02	-2.43	-0.25	0.76
Maine	1.07	0.43	-0.65	-0.19	0.69	1.45	-0.91
Maryland	-0.68	-0.76	-0.13	-0.68	-0.15	-0.99	-0.71

TABLE XXXIV (Continued)

State	Factor 1	2	3	4	5	6	7
Massachusetts	0.74	-1.81	0.26	0.20	0.04	0.35	-0.08
Michigan	-0.85	-0.25	0.81	-0.03	0.04	0.21	-0.40
Minnesota	0.07	0.17	0.15	-0.20	0.40	1.22	-0.44
Mississippi	0.07	0.99	0.01	-0.55	-0.44	-0.90	2.51
Missouri	0.41	0.37	0.34	0.13	-0.30	-0.24	-0.10
Montana	0.64	1.52	-0.62	0.55	0.14	1.16	-0.03
Nebraska	0.54	0.57	-0.33	0.62	0.78	0.14	-1.19
Nevada	-0.58	0.21	-0.04	-1.04	-0.01	-2.47	-2.33
New Hampshire	2.50	-0.82	0.23	-1.08	1.35	0.93	0.19
New Jersey	-0.88	-0.51	1.62	-0.71	-0.50	-0.12	-1.39
New Mexico	-0.16	0.44	-0.58	1.24	-1.71	-0.35	-0.21
New York	-0.58	-1.84	1.68	-1.03	-0.53	0.90	-0.09
North Carolina	0.22	-0.34	0.07	-0.59	-0.48	-0.16	1.87
North Dakota	0.36	1.56	-0.68	0.90	0.72	0.34	0.08
Ohio	0.08	0.03	0.48	0.26	-0.33	1.02	-1.26
Oklahoma	-0.12	0.69	0.69	1.48	-0.04	0.18	-0.36
Oregon	-0.68	0.14	0.15	0.18	1.51	-1.56	-0.21
Pennsylvania	0.55	-0.57	1.06	-0.32	-0.10	0.60	-1.21
Rhode Island	0.82	-0.81	0.72	-0.07	0.06	-0.38	-0.74
South Carolina	0.38	0.29	-0.00	-0.43	-0.24	-0.43	0.94
South Dakota	1.34	1.30	-0.49	-0.32	0.68	0.40	0.43
Tennessee	0.47	0.35	0.38	-0.02	-0.69	-0.54	0.28
Texas	-1.03	0.54	0.83	0.82	-0.76	0.69	1.20

TABLE XXXIV (Continued)

State	Factor 1	2	3	4	5	6	7
Utah	-0.25	-0.25	-0.66	3.05	0.87	2.07	-0.87
Vermont	2.39	-1.15	-0.86	-1.92	2.72	-0.18	1.38
Virginia	-0.16	-0.05	0.14	-1.22	-0.48	-0.03	0.51
Washington	-1.63	0.29	0.11	0.28	1.55	1.01	0.73
West Virginia	0.46	1.27	0.38	-0.65	-0.23	-0.64	0.23
Wisconsin	-0.21	0.02	0.71	-0.10	0.52	-0.26	-0.29
Wyoming	-0.69	0.38	-1.96	0.65	1.27	-1.51	0.20

VITA

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Candidate for the Degree of

Doctor of Education

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