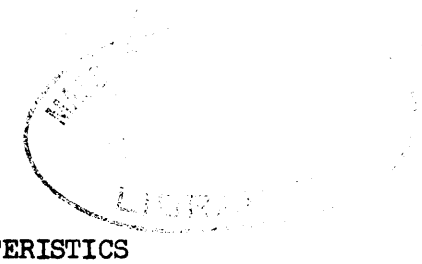

INTRA-METROPOLITAN MIGRATION AND TOWN CHARACTERISTICS

A Description of the Boston Metropolitan Area As a Dynamic Social Ecological System

by

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ABSTRACT

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A Description of the Boston Metropolitan Area
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Submitted to the Department of City and Regional Planning on February 6, 1967, in partial fulfillment of the requirements for the degree of Master of City Planning.

A Dynamic Social Ecology of the Boston Metropolitan Area was constructed by mapping factor scores of towns on factors constructed by a principal components factor analysis solution for selected town population characteristic (static) and town migration characteristic (dynamic) variables and by analysing the relationship of different variables to these factors. These variables measured percentages of town populations or migration flows which possessed selected characteristics. The source of this information was a survey conducted by Wilbur-Smith and Associates for the Boston Regional Planning Project for transportation planning purposes, but which also contained a significant amount of social-economic information.

The results of the analysis show:

1. That migration characteristics add significant information to our knowledge of Metropolitan Social Ecology.

2. That strong regional patterns at greater than town scale exist in the Boston Metropolitan Area.

3. That an apparent anchor to this Metropolitan region is a wedge characterized by high percentages of persons with occupation professional manager and families of high income. Strong growth patterns indicated by high immigration of moderate and high income persons appear associated with this wedge, particularly, along the routes of accessibility to it.

4. That other areas of change are apparently associated with new routes of accessibility.

5. That there is a strong pattern of emigration from the core area.

6. That factor analysis is an effective method of forming generalizations from large bodies of statistical data on social characteristics of a Metropolitan Area.

ACKNOWLEDGEMENTS

The author is indebted to the following persons: To Professor James Beshers for his helpful suggestions in creating a strategy of analysis and for his continuous comments and suggestions; to Professor Aaron Fleisher for assistance in giving definition to the problem; to Peter M. Allaman for his invaluable programming in preparing the data for analysis and for his incisive suggestions; to Donald C. Royse for his assistance in preparing the maps; and, of course, to my wife for her support and patience throughout the preparation of this report.

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Chapter I

INTRODUCTION

The City or Urban Planner in his concern for the spatial location of social activities must conceive of the city as a dynamic social system. It is with the development of a description of a metropolitan area as a dynamic social ecological system that this study concerns itself. In addition this study attempts to illustrate the usefulness of the electronic digital computer as a tool in developing a description of a system of high complexity of this sort.

The City as a Dynamic System

In his classic work on Social Ecology Burgess was concerned with describing the Social Ecology of a City as a Dynamic System. Thus, in one of the earliest conceptions of the city as an ecological system, Burgess describes the city as a generalized system of concentric bands of differentiated function radiating out from the core. Burgess's classical "ideal construction of the tendencies of any town" is not static. The "Loop" is surrounded by the "Area of Transition which is being invaded by business and light manufacture." This is surrounded by a third area "inhabited by the workers in industries who have escaped from the area of deterioration but who desire to live within easy access of their work (italics underlining the dynamics of the construction are mine)." These three bands are

surrounded in turn by the "Residential Zone" and the "Commuters Zone." Burgess goes on to point out "the tendency of each inner zone to extend its area by the invasion of the next outer zone."[1]

Subsequent social ecologists, also, in their theoretical constructions, have been concerned with the dynamic aspects of the ecology. The concept "Social Ecology," indeed, contains within it a dynamic sense. For ecology, among other things, concerns itself with competition, dominance and succession. In actual empirical analysis, however, cities have been described in static terms - that is, described by the residential locations of persons at a point in time. The constraint has been the unavailability of information on the flows of persons migrating from one residential location within a city to another. I use the term "Dynamic Social Ecology" to draw a distinction.

The exception to this generalization has been the possibility of describing the static situation at two points in time, thus to determine the net flows and from there to deduce what the dynamics are. This is the approach that was taken by Sweetser in his study of the Boston Metropolitan Area and also by this author in a study undertaken jointly with Donald C. Royse.[2] This was not, however, the approach taken in the present report.

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[1] Burgess, W.E., "The Growth of the City: An Introduction to a Research Project" in Theodorson, G.A., Studies in Human Ecology, New York, Harper & Row (1961), pp. 37-44, reprinted from Park, E., E.W. Burgess, and R.D. McKenzie, ed. Chicago, University of Chicago Press (1925), pp. 47-62.

[2] The reader is referred to: a previous illustration of the usefulness of the electronic digital computer to this end - Clarke, W.L. and D.C. Royse, "A Markovian Model of Social Status and Physical Adapted Space," unpublished (June, 1965); and to Sweetser, F.L., Patterns of Change in the Social Ecology of Metropolitan Boston; 1950-1960, Division of Mental Hygene, Massachusetts Department of Mental Health (1962)

This report rather concerns itself with the problem of describing at a point in time both the static characteristics of residential areas and the rate of change of these characteristics. As a bonus, since it could be done at little additional cost, the static and dynamic characteristics of residential areas were related to public actions of these same areas namely, the percentage vote for the Republican Candidate for President in 1964 (Goldwater) and the per student school budget.

Point of Departure

The report takes as its point of departure the work of Shevky and Bell.[3] They construct a theoretical model in which they postulate three "interrelated trends" which they consider as central to the modernizing of industrial society. They postulate further that these trends have a defining character with respect to the "social differentiation and stratification of the contemporary city." These three trends are: "(1) the distribution of skills, (2) the organization of productive activity, and (3) the composition of the population."

With the first "trend" they associate the "changing distribution of skills: lessening importance of manual productive operations - growing importance of clerical, supervisory, management operations." From this in turn they develop the "construct" - "social rank (economic status)" composed primarily of the "measures" occupation type, amount of schooling and amount of rent.

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[3] Shevky, E. and W. Bell, Social Area Analysis, reprinted in part in Theodorson, op. cit., pp. 226-235.

With the second "trend" they associate the "changing structure of productive activity: lessening importance of primary production - growing importance of relations centered in cities -lessening importance of the household as economic unit." From this in turn they develop the "construct"- "urbanization (family status)" composed primarily of the "measures" fertility, the proportion of women at work and the proportion of families living in single family dwelling units.

With respect to this second construct Shevky and Bell point out that there is an important aspect of Urbanization which their construct does not take into consideration which is the range of relations that tend to be centered in the city in the United States. This omission will become important later in the discussion of the analysis conducted as part of the present study.

Finally, with the third "trend" they associate the "changing composition of population: increasing movement - alterations in age and sex distribution - increasing diversity." From this in turn they develop the "construct" - "segregation (ethnic status)" composed primarily of the "measures" the degree of isolation of racial and national groups.

Bell (1952)[4] testing these three typological elements using factor analysis on data for the Los Angeles Area concluded that "the three factors are necessary to account for the observed social variation between census tract populations," and further that they are "adequate" to explain the areal variation of most census tract information. His conclusions were further supported by Professor Robert C. Tryon in an

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[4] ibid., p. 230.

independent analysis of census tract data for the Bay Region (San Francisco) in 1940[5] and later by a study of ten cities by Maurice D. Van Arsdol, Jr., Santo F. Camilleri, and Calvin F. Schmid (1958).[6]

General Theoretical Considerations

Spatial (and non-spatial) sub-systems of relative independence can be described of most social systems, including those which are spatially defined as a "city."[7] Such descriptions concern themselves with the extent that meaningful social interactions take place within sub-systems rather than between sub-systems. Further, for a description of the dynamic character of the larger social system, it is necessary to describe the linkages between these sub-systems. Particularly in the case of cities, because of rapid increase of possibilities of communication and movement between locations, the importance of understanding these linkages is increasing.

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[5] ibid.

[6] Van Arsdol, M.D.,Jr., S.F. Camilleri, and C.F. Schmid, "The Generality of Urban Social Area Indexes," reprinted in Theodorson, op. cit., pp. 236-243, from the American Sociological Review, XXIII (June, 1958), pp. 277-84.

[7] I use "city" here not in the conventional sense of a politically defined jurisdiction with defined boundaries and form of government, but as a loosely bounded area of continuous urbanization and which acts as a social system of high independence (in the same sense as I discussed above) between it and other continuous areas of urbanization. Continuous urbanized areas which a century ago were confined to areas politically defined as cities have now spread with the improvement of transportation and communication into what is usually referred to as a "Metropolitan Area." I would thus consider both the politically defined city of a century ago and the Metropolitan area of today "cities" since I consider that both represent areas of relative independence. Though this distinction on the surface may seem trivial this author feels that the delineation of areas of relative independence (not of political subdivisions) is of crucial importance in describing the"city" as a Dynamic Social Ecological System.

These linkages, in general, are of two types: First are actual flows of different types between sub-systems and second are potential flows. Actual flows in theory can be measured; whereas potential flows are much more a matter of interpretation.

In describing the dynamics of a system one has the choice of either looking at the linkages with respect to the sub-systems or of looking at the sub-systems with respect to the linkages. If, as in this study, the city is to be described as composed of spatially defined sub-systems, one would be concerned with the flows or potential flows of persons of certain characteristics or of goods or of intangibles, such as money between towns.

These flows may be seen as moving a certain "distance". This might be geographic "distance", or it might be "distance" along some social dimension, such as the percentage of persons in the spatially defined sub-system whose occupation was professional or manager. Thus, a spatial sub-system with a low percentage of persons with occupation professional or manager would be seen as at a great distance in this specific occupational sense from a spatially defined sub-system with a high percentage of persons with occupation professional or manager, and a person or household moving from one of these sub-systems to another would be seen as travelling a great "distance." In the same sense two spatially defined sub-systems might be described as contiguous geographically or with respect to some other characteristic.

Were, however, the other perspective taken, one would be concerned with looking at flows composed of particular characteristics with respect to the sub-systems of origin and destination.

Thus Henny in his Massachusetts Institute of Technology Master of City Planning Thesis[8] examines the flow of a particular group of families - the flow of families from central city residential locations into attached dwelling units in suburban locations, but with the characteristic that the wage earner remained employed in the central city. Henny demonstrated first that families of high education and high income made such moves at a greater than average rate and second that families of high education and high income moved a great distance upward along variables measuring the quality of local school systems.

Leyland in his Massachusetts Institute of Technology Master of City Planning Thesis,[9] on the other hand, focuses on variables describing characteristics which movers do not want changed - that is variables along which they want to move no distance when they are moving geographically. Thus a person might move to a small area of Cambridge, which is the area of Leyland's study, because of forced relocation, or because of a job change, yet wishing to maintain his position on such variables as: "racial predominance," "demolition threat," "social status," or "economic saving." In such an instance the spatial distance moved may indeed be the only relevant aspect of the move.

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[8] Henny, L.M., "Educational Opportunities and Residential Choices," unpublished, Massachusetts Institute of Technology Master of City Planning Thesis (August, 1966).

[9] Leyland, G.P., "Migration to and Within a Small Area," unpublished, Massachusetts Institute of Technology Master of City Planning Thesis (May, 1966).

This brings us to a distinction which, no doubt, should be made at this point - this is between what might be termed "stable dynamics" and what might be termed "unstable dynamics." The "stable dynamics" of a city would be movements between locations in a city which do not alter the structure of the city; whereas "unstable dynamics" would be movements or net movements which represented a change in this structure. Thus, if new persons moved into an area at a rate just equal to the aging of the population, plus the outflow of persons with similar characteristics, then such an area would be dynamically stable.

Leyland's thesis concerns itself primarily with what I have termed "stable dynamics." That is, he concerns himself with normal flows in the housing market more than with the changes in that flow. Leyland does, however, hypothesize the implications of changes in the housing market on these flows as unstabilizing factors. The movers of Henny's sample, on the other hand, could be either stabilizing or unstabilizing; it is not clear, nor is it his primary concern. His concern is with the move itself. According to Henny's results, were a school system of "high quality" created in an area characterized by low education and low income, this area would likely evolve into a high income and high education area. Were this to happen, it would be an example of unstable dynamics (unless this were a consistant Metropolitan pattern).

In the present study inquiry is made both into stable and unstable dynamics. Patterns of change are investigated by examining the correlation between what in the analysis is called "static" and "dynamic" characteristics of towns. The "static" characteristics are

the characteristics of the population at a point in time whereas the "dynamic" characteristics are the characteristics of recent migrants to and from the town. Examination of these correlations permits a determination of whether the flow of persons to a town is of the replenishing sort (stable) or is part of a changing regional pattern (unstable).

In the analysis of this report patterns of flow are superimposed upon the static pattern in order to determine the association between the flow pattern and the static pattern and thus to suggest areas of potential flow. From sociological theory it is a known fact that persons of like attributes tend to locate near one another (the results of this report uphold this proposition at a regional scale). One can proceed from this proposition to suggest that areas of like attributes are linked by a high degree of potential, if not actual, flow.

From the discussion above about describing sub-systems, it is clear that the choice of units of analysis is crucial.[10] The units of analysis should be sufficiently small that either they coincide with relatively independent Metropolitan sub-systems or such that several units joined together coincide with such sub-systems. The choice for this study was dictated by the availability of time and

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[10] Beshers in his article "Statistical Inferences from Small Area Data" (Beshers, J.M., "Statistical Inferences from Small Area Data," Social Forces, volumn 38, no. 4 (May, 1960)) discusses the problem of determining whether a choice of areas as units of analysis are "'good enough' for....research purposes." The criteria Beshers suggests vary depending upon the purposes, but in general the concern is for minimizing variation on the variables of concern within the units and maximizing the variation between units. Clearly, towns are only relatively homogeneous, nor do they as units maximize differences between units. Thus, they cannot be considered as the optimal choice of units from this perspective and thus, the results of the analysis can be expected to be weaker than would occur with a more optimal choice.

information. There is the possibility that they were too large to comprehend all the meaningful sub-divisions at regional scale.

For purposes of spatially related planning the description of a Metropolitan, dynamic social ecological system encompassed by this report should lead ultimately to the development of a predictive model of the city as a dynamic social ecological system.[11] This report can be best conceived, perhaps, as an exploratory experiment, or better yet as a series of exploratory experiments intended to improve our general knowledge as to the nature of this dynamic social ecological system.

Some of these experiments will be seen as successes and others as failures. The scope of these experiments is limited and defined by the availability of information, and by costs both in terms of money and in terms of time.

Because of the preliminary and searching nature of these experiments the limitation of costs both financial and of time seem quite appropriate. On the other hand, an attempt is made to bring as much information as could be conceived as relevant to bear upon the problem under the limitations of these costs.

In the main these experiments center around an attempt to weed sufficiently from a vast array of information (See Table) originally brought to bear on the problem such that the problem would become revealed in its more crucial essentials.

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[11] Beshers has suggested that the planner should conceive of himself as involved in a game against nature. Thus, he must concern himself not only with what will happen if he does nothing but also what are the likely counter moves that nature will make in response to his own moves.

Doubtless due to the limitation of perspectives of any one investigator and also due to the non-existence of much possibly relevant material some important aspects of the problem are overlooked. The hope, however, is to increase the general body of knowledge that can be brought to bear on the problem of creating a dynamic model of the city social system - particularly to the problem of describing the dynamics of that system. The problem is seen as that of any scientific investigator - that of describing as many aspects of a phenomenon as possible, limited only by their costs in regard to their conceivable relevancy.

The Data Source

A study of dynamic aspects of the Social Ecology of Boston was made possible by the existance of a sample survey conducted by Wilbur-Smith and Associates for the Boston Regional Planning Project primarily for purposes of transportation planning.[12] For, in addition to most of the Social - Economic variables familiar to and used by most Social Scientists, this survey included two questions crucially important in determining spatially related migration characteristics: where the household lived just prior to its present residence and how long the household had lived at the present address. These latter two variables allowed the construction of variables measuring the rates of flow of persons with different social characteristics between sub-areas of the Metropolitan area. In addition several

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[12] The survey information was made available from computer tapes in the possession of the Massachusetts Institute of Technology Department of City and Regional Planning. The reader is referred to:
Boston Regional Planning Project "Comprehensive Traffic and Transportation Inventory" Final Report, Boston (1965).
The BRPP Survey population was 4% of total population in dense areas of the region and 7% in the more sparsely settled areas of the region.

variables with respect to physical mobility were available which are not generally available to city planners such as: the number of automobiles possessed by a household.

Due to limitations of cost and of time this Boston Regional Planning Project Survey was the primary data source used. United States Census Data and subjective knowledge of the Metropolitan area were used as checks to the accuracy of the Boston Regional Planning Project Data.

Choice of the Units of Analysis

With the single exception that the City of Boston was subdivided into 13 communities which were treated as towns, towns were chosen as units of analysis for the following reasons:

1. There are many statistics which are available aggregated to towns. Thus, for instance, voting information, school information, Boston Regional Planning Project Survey information, and United States Census information all can be aggregated to towns.

2. Towns are important, independent actors in the Metropolitan social system - they provide, for instance, schools and public services, such as water, sewage disposal, and recreational facilities.

3. There are sufficient numbers of towns in a Metropolitan Region that they can be studied using statistical techniques of analysis.

4. Towns were used rather than flows for the following reason: The choice of perspective depends upon the use to which one intends to put the result. If one is interested in manipulating, or sees as manipulatable, the flows with respect to the towns (an example would be increasing accessibility, indoctrination, increase of communication and so forth), then the obvious route to take is to use flows as units.

If one is interested rather in what a town might do to abet or deter linkages or flows then the route to take is to look at towns with respect to linkages. In this investigation one concern was to show how the dynamics of a social ecology might be linked to actions which a social sub-system - the choice was to use towns - could take in order to change the dynamics. Towns were seen as actors in the Metropolitan Arena.

Choice of Variables

It was decided that it was appropriate to measure characteristics of town populations and characteristics of migration flows between towns as percentages of total town populations and of immigration or emigration flows. Thus, the character of the population or of the flow was measured, not the quantity. A household residing at its present residence for less than five years was considered as an "immigrant" to its town of residence and as an "emigrant" from its prior town of residence. Thus, each household was counted twice - once as part of an immigrant flow and once as a part of an emigrant flow. Variables available from the BRPP Survey which it appeared might be relevant to a dynamic social ecology were used.

The choice of these variables represented the first iteration (Cycle 1) of the process of limitation of information on social characteristics of the Metropolitan area with the ultimate aim a series of generalities. These variables were grouped into catagories which suggested their relevance to a social ecology such as "Life Cycle" and "Mobility."

It was felt that variables such as age should be divided into several sub-variables since different age groups would be expected to act differently in the ecological system. Thus, age was divided into the variables: percentage of persons age 5-9; percentage of persons age 10-14; percentage of persons age 15-29; percentage of persons age 30-59; percentage of persons age 60 plus. Similar divisions were made of most of the variables such that they defined relatively homogeneous sub-groups.

The static characteristics of the town were measured by the characteristics of all residents of the town at the time the survey was taken. Thus, the "immigrants" to a town were compared to the stable population plus the "immigrant." An alternative approach might have been to compare the "immigrants" with the stable population. Recent migrants might also be compared with the population ten years preceding to determine if there is a lag in the process of perception of characteristics, the decision to migrate, and the actual migration.

Chapter II

DESCRIPTION OF THE ANALYTICAL PROCEDURE

First, the general approach taken to the analysis will be discussed repeating for the sake of clarity some of the points made in the introduction. This will be followed by more detailed considerations of the analysis. The analytical procudure is represented in tabular form in a table appended to the report.

Five basic groups of variables considered relevant to the development of dynamic social ecology were selected,each being divided first into categories and then into individual variables within those categories. The variables were chosen on the basis of a large set of specific hypotheses about a dynamic social ecology, though no integrated theory such as that proposed by Shevky and Bell was suggested here - rather all variables available from the BRPP Survey which could be argued as conceivably relevant were used. All towns in the BRPP defined Eastern Massachusetts region were used with the exception that seven with inadequately small sample sizes were eliminated and the City of Boston was divided into 13 communities which were considered in the subsequent analysis as units equivalent to towns. Variables were represented in all cases as percentages of town populations or of migration flows. Variables were chosen such that they would represent relatively homogeneous segments of the population. Thus, for instance, instead of using

median income of a town which would be the same for a town with a bipolar distribution half high income and half low income, as it would be with a town with all persons of middle income, the percentages of persons in four income ranges were used

The five basic groups chosen were:

1. Conventional socio-economic measures of households and persons - what I have termed "Static Characteristics."

2. Characteristics of migration flows between towns - what I have termed "Dynamic Characteristics. These in turn are divided into characteristics of Immigrants and Emigrants. Every person who moved between towns used in the analysis thus was counted twice - once as an emigrant for his prior town and once as an immigrant for his new town. The character of the flow was what was measured.

3. Characteristics of persons or households who migrated into the towns of the study region from areas outside the region. These I have called "Outsiders." Again it was the character of the flow that was measured.

4. Spatial characteristics of migration flows between towns. The intent was to measure both in terms of airline distance and with respect to the center of Boston (State House) where the immigrants to a town were coming from and where the emigrants were going to. These were called "spatial" characteristics.

5. "Distance" moved with respect to selected non-spatial characteristics of towns. The intent was to determine what percentage of the immigrants to a town came from towns the same (within defined limits) with respect to selected characteristics or to what extent immigrants were moving a "distance" upward or downward, with respect

to these characteristics. These were called "Comparison" characteristics. In addition two characteristics indicating how the town acted as a whole on public issues were included. These were the "percentage republican vote for President in 1964" and the "per capita school budget" for the town (in the case of the City of Boston the per capita school budget for the City was used for each of the twelve communities).

Cycle 1 - Elimination of Variables by Inspection

Some variables could be eliminated at once as redundant. Thus, for instance, in the dichotomy rented-owned, no information was added by including both variables "percentage housing structures rented" and "the percentage of housing structures owned." Only one was selected for further analysis. In other cases such as "Households in 2-4 family structures" it wasfelt that the variable would add nothing to the two extremes single and multi-family housing, and only the variables "households in single family structures" and "households in multi-family structures" were used. Clearly, many subjective judgments were involved.

Cycle 2 - Factor Analysis by the Five Basic Groups

Factor analysis[13] was conducted on each of these groups primarily

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[13] The factor analysis employed was that available in the "Data-Text System" - one of the statistical analyzers available in the Harvard University Computer Systems. The Data Text Manual ("The Data Text System: A computer language for social science research designs," Preliminary Manual, September, 1966) describes the principal components solution employed as follows: "This factor analysis program calculates Hotelling's Principal Components Solution, according to the procedures outlines in Harman, H.H., Modern Factor Analysis, University of Chicago Press, 1960, Chapter 9, pp. 154-191. The Standard Power Method is used in the iterative computations which are carried out to an accuracy of six decimal places, or to the accuracy achieved from a maximum of 200 iterations. For the purpose of improving the speed of convergence, the iterative process is aided by the Aitken's Delta-Square Method of acceleration (see Faddeeva, V.N., Computational Methods of Linear Algebra, Dover Press, 1959, pp. 202-219)."

for the purpose of eliminating more variables, but as it turned out, these analyses proved interesting in their own right. First, these factor analyses gave a basis of comparison with the later factor analysis, which combined selected variables from all five, such that it could be determined to what extent the Dynamic factors added information to what was known from the Static Factors by themselves. Second, these factor analyses indicated dimensions which though interesting were too weak to show up in the final analysis. Since the original intent was to use this stage solely for the purpose of eliminating variables, however, it was not structured in the most fruitful way. Some of the most interesting variables (Mobility and Life Style) were left out and some variables that could have been hypothesized to be redundant were indeed redundant and weakened the factors.

In addition this first factor analysis was used to eliminate some of the variables that had poor distributions. They were quickly isolated by their peculiar behaviour which was to fail to correlate with any of the other variables. Thus, one should be wary of generalizing from the variables that scored low on all factors in this analysis and also in the "Combined" analysis. In some cases the behaviour of these variables is not because of poor distribution. Thus, we would expect the distribution of college students and perhaps of construction workers to be independent of the other variables used.

Cycle 3 - Factor Analysis of Selected Variables From all the Groups Combined

Approximately half of the variables of the first factor analysis cycle were eliminated either because of redundancy or because they were

statistically unreliable. The remainder was included in this "combined" factor analysis. The factors were analyzed and interpreted in terms of the variables that composed them. Maps were prepared from the Factor Scores.

Cycle 4 - A Final Iteration (See Appendix D)

A final iteration has been included with what was considered to be the "best" set of variables in terms of statistical validity and relevancy to the five factors created by Cycle 3 - the combined factor analysis. This was concluded too late for complete analysis, but we note that it does not significantly alter the conclusions from the results of the combined analysis though some of the weaker factors have a slightly different orientation.

Mapping of Towns

A typology of towns was constructed by mapping the extremes of the factor scores for all five combined factors. An arbitrary cut off limit of greater than 1.000 or less than -1,000 was used to define extreme with the exception: cases where, although the score was less than plus or minus one, the factor scores were strongly skewed around one factor. In such cases the town was included as an extreme.

For comparative purposes mappings were made of the strongest "static" and "dynamic" factors of Cycle 2. In addition, also for comparative purposes, mappings were made of extreme values (defined as being one standard deviation from the mean) of towns on five individual variables. These five variables were those which most closely resembled the five combined factors in distribution. A mapping was also made of the extremes of total population of the towns in the sample. Total population approximates density to the extent that the towns are of equal area.

The towns of small population should be looked at with greater skepticism because of the small sample that they represent - particularly with respect to the migration characteristics, since these are already a small part of the total sample.

Summary Maps

An analytical map summarizing the results of the combined factors represents graphically the dynamic social ecology of the Metropolitan Area. A map was also prepared summarizing the "dynamic" factors alone.

Factor Rotations

An additional experiment tried, but which for the most part turned out to be a conceptual dead end, was the use of factor ratations[14] to analyze the data. Two factor rotations were attempted: First, a Varimax rotation by variables and second, a Varimax rotation by units. The principal components factors which were used for the analysis in this study create factors in which the first factor is created on the criteria of explaining as much of the variance as is possible in one factor; a second factor is then created which explains as much as possible of the remaining variance until one of three stopping criteria is reached. The three criteria are specified as a limit to the number of factors, as a limit to the amount of variance to be explained, or to the latent route. The Varimax rotation

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[14] The rotation procedure is described in the Data Text Manual (loc. cit.) as follows: "The Analytic rotations were designed to be a mathematical approximation to the simple structure criteria proposed by Thurstone in Multiple Factor Analysis. The procedure for these analytic rotations are described in Harman, Modern Factor Analysis, Chapter 14. The Varimax method proposed by Kaiser attempts to simplify the columns of the factor loading matrix so that each factor is readily identifiable by variables. . . .It is equally valid to position the factors in relation to scores on units."

transforms the same factors such that they each explain roughly the same amount of variance and such that they either emphasize the differences between groups of variables or emphasize the differences between the units. It can be useful in interpreting the factors. However, if a rotation is used to emphasize the factors the units tend to be distorted. The relative importance of the variables is also distorted. It was discovered in the present analysis that much more meaningful and interpretable spatial patterns were created by the Principal Components solution though the variable rotation was of some help in interpreting the factors.

The stopping criterion used for the factor analyses used in this study was the first reached of the following: A. Maximum Number of Factors - 8; Minimum Latent Root - 1.00; Minimum percent of Communality - 10.00.

Chapter III

RESULTS

Cycle 2 - Factor Analysis by the Five Basic Groups

The factors created by each of the five basic groups will be discussed individually. In the case of the "static" and "dynamic" factors, the maps made from the extremes of the factor scores will be discussed as well.

Group A. Static Factors

We note that though the variables used were not the same, three of the factors are associated with the same dimensions discussed by Shevky and Bell.

Static Factor 1 which I have named "Urbanism-Suburbanism" corresponds with what Shevky and Bell called "Urbanization." Like the Shevky and Bell index it contains variables related to age, persons in households, house structure, and owner or tenant. The map of Static Factor 1 reveals a strong spatial distribution of high extremes in the core region and low scores in a band of towns around the core.

Static Factor 2 I have named "Income-Occupation" corresponds closely to the Shevky and Bell "Social Rank." It dichotimizes high income persons with occupation professional-manager on the one hand, and on the other, families of $4000-6999 income, of semi-skilled occupation, and persons employed in manufacturing. The map of Static Factor 2 reveals a strong wedge of towns on the low extreme (occupation professional-manager) and outlying towns on the high extreme - particularly a cluster

of towns in the southwest corner of the region.

Static Factor 3 which I have named "Stability-Industry I" dichotimizes high percentages of persons at the same address for 20 or more years and high percentage of persons occupation salesman on the one hand and on the other government employees and persons at the present address less than five years. It is interesting to note that with respect to this dimension Roxbury with its recent negroe population, many presumably working in civil service jobs, showed up similar to Harvard where the military base Fort Devens is located.

The inner ring of suburbs to the north and south were characterized by a high extreme on this factor.

Static Factor 4 on the other hand dichotimizes salesmen (white collar workers) who are associated with areas of recent immigration on the one hand, and on the other, persons at the same address for 20 or more years. The distribution of these extremes geographically is: salesmen areas of recent immigration are in the core and selected towns to the south; whereas, the other extreme, persons at same address 20 plus years, are located in outlying towns to the north and west.

The existence of these last two factors suggests an additional dimension perhaps overlooked by the construct of Shevky and Bell. This is that salesmen (and perhaps whitecollar workers in general) locate spatially in a city in a pattern distinct from that represented by the professional-manager - semi-skilled dichotomy. On the other hand, it is perhaps this pattern which Shevky and Bell refer to when they suggest the existence of a dimension reflecting "the range of relations centered in the city."

Group B. Dynamic Factors

Dynamic Factor 1 - "Life Cycle Immigration" displays a pattern of moderate to high income family immigration ($7000 plus) in the northwestern and southwestern sectors and also the southeastern sector with zones of average immigration in between. High net emigration occurs in the core city and towns and in several of the outlying cities. We note that whereas areas of high immigration (and high net immigration) are associated with the immigration of families of moderate and high income; that areas of net emigration are characterized by single persons of low income (the variables single persons and low income are highly correlated suggesting that it is the single persons who have low income. This, furthermore, makes subjective good sense since the bulk of these would be students or widowed and retired old persons).

Dynamic Factor 2 "Life Cycle Emigration" - my interpretation of this factor is that there is a system of differential employment opportunities at work in the Metropolitan area and that some areas are particularly unsuited for young persons[15] and other areas are particularly unsuited for moderate income ($7000-9999) families.

Dynamic Factor 3 - "Income Level Migration I" shows the occurance of two distinct patterns of immigration and emigration. Towns scoring high on this factor are characterized both by immigration and by emigration of families of high income ($7000 plus) families. This suggests that these are linked by a "shuffling" of families back and

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[15] Unfortunately, information on the age of the migrants was not easily obtained from the BRPP Survey due to placement of survey information with respect to migration on separate computer tape from survey information with respect to age, but because of high correlation of low income ($0-3999) with single persons and with ages 16-29 and because of the low correlation between migration and old age, we assume that the low income migrants are in most cases single persons.

forth between them. The other extreme of towns with middle income families ($4000-6999) are apparently linked by a similar "shuffling." This situation would appear to be one of stable dynamics. We note, however, that the areas of high income "shuffling" are areas of net emigration whereas the areas of middle income "shuffling" are associated with high net immigration (low net emigration).

Dynamic Factor 4 "Income Level Migration II" - gives an indication of the unstable aspects of dynamic factor 3. Here we note certain areas associated with the invasion of high income couples (one would guess they were young couples since they are more likely to move than old couples) and other areas of invasion of middle income ($4000-6999) families.

Dynamic Factors 5 and 6 Dynamic Factors 5 and 6 were unmapped, since in the principal components solution each factor is weaker than the preceding one, these two factors were sufficiently weak to be difficult of interpretation. Moreover, these factors have to do primarily with persons of moderate income ($7000-9999) which represents a fuzzy area between strong patterns of middle and high income groups. The factors suggest, however, that this group emigrates in a pattern distinct from that of the middle income group (again perhaps differential ecomonic opportunities) and they tend to immigrate where there is high emigration (not high net emigration) and thus of high interchange. One would suppose further that these are families of middle age in the process of establishing themselves and who thus have not yet settled into a stable pattern.

Group C. Outsider Factors[16]

Outsider Factor 1 is similar to Dynamic Factor 1 in reflecting the dichotomy of urban areas with low income immigrants and suburban areas of high income immigrants. We note, further, that the high outsider immigration is associated first (from Outsider Factor 2) with high income and second with low income in central city locations (presumably college students).

Group D. Spatial Factors

The spatial factors added little to the generalities that could be made from the distribution of the variables themselves. These distributions show that as a mean for all towns 52% of all households migrated to a location within the same sector, 18% immigrated to a clockwise sector, 16% to a counterclockwise sector (reflecting a greater net immigration to the south shore than to the north shore) and 13% to an opposite sector. They show further that 45% of all households immigrated from an inside ring, 44% immigrated to another town in the same ring, and 11% immigrated from an outside ring. They show finally that 57% migrated only 0-10 miles, 28% migrated 10-20 miles, 14% migrated 20-40 miles, and only 1% migrated more than 40 miles to another town within the area.

The spatial factors reflected relationships structured into the problem, such as short distance immigrants, were short distance emigrants. The only surprises were that persons who immigrated from a clockwise sector also immigrated from an outside ring and that "millers" (persons who moved within the same town) were independent of the other variables.

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[16] Maps of the Outsider, spatial, and comparison factor scores were not included since they do not add significant information.

Since there were not many outsider variables included, outsider factors were more useful in weeding variables than in forming generalities.

Group E. Comparison Factors

The results of the comparison factor analysis was, like that of the spatial factor analysis, disappointing. There were two problems: First, in some cases the distributions were not very good - primarily because of the difficulty of establishing ahead of time good criteria for what should be considered a move to a town the "same" on a variable and what should be considered as a move "more" or "less" with respect to a variable. The second problem was that in general a move "more" or "less" with respect to a variable merely reflected an extreme distribution in that town with respect to that variable.

Thus, though it means something to say that a migrant is moving a great "distance" with respect to a variable, it does not add much information to say that a town already with an extreme distribution, with say persons of high income, also has an above average distribution of persons who came from areas with a less extreme distribution of persons of high income.

The "comparison" factors closely resemble the "static" factors; the first one having to do with Suburbanism-Urbanism; the second with respect to Income and Occupation; and the remaining ones being more of an echo of poor statistics than anything else. Again, however, the distribution of some of the variables are interesting. Thus, 56% of all persons moved such as to increase the percentage of persons in their town living in single family housing; 25% remaining the same (plus or minus 5%) on this variable and 19% decrease it. Likewise 51% increased the percentage households with zero autos, 29% remained the same (plus or minus 5%); and 22% decreased it. Likewise 47% increased the percentage of school children, 28% remained

the same, 25% decreased. Thus, we can generalize that moves of migrants in the Metropolitan area were most highly associated with an increase in single family housing, second most with an increase in auto orientation, and third most with an increase in orientation towards school age children. Likewise moves represented little changes on the occupational variables occupation professional-manager, occupation semi-skilled, and industry manufacturing. This last factor supports the observation made above about the independent linkages of areas high on occupation professional-manager and areas high on occupation semi-skilled or industry manufacturing.

Cycle 3 - Factor Analysis of Selected Variables from all the Groups Combined

For the third cycle variables which were strong representatives of the different factors in Cycle 2 in addition to some which appeared interesting even though they were independent of the factors and also in addition to the mobility and life cycle variables (purposely left out of Cycle 2) were selected for a combined factor analysis. The factor loadings and factor scores of these variables are included in Appendix B. In the Table the variables which loaded .400 or more on these factors were rank ordered and left or right adjusted according to whether they loaded positively or negatively. Maps were prepared indicating the towns with high or low factor scores using plus and minus 1.000 as an arbitrary cutting point. The distribution of these variables and towns are discussed in what follows:

Combined Factor 1 - "Suburbanism - Urbanism" - This factor, just as Static Factor 1, closely resembles the Shevky and Bell Construct "Urbanization." We note, however, the presence in this factor

of several migration and non-migration variables not included in the Shevky and Bell study. The non-migration variables of note are: First, the negative loading strength of the variable "percentage households with no autos" and positive loading of the variable "households with two plus autos." We note further that the related variable "households with one auto" loaded heavily on the second factor. Thus, it appears that number of automobiles is a highly significant indicator of spatial location in a city. We note further that the public action variable "percentage Republican vote for President in 1964" loaded very heavily on the Suburbanism (high) side of this dichotomy.

With respect to the migration variables that contributed to this factor we note that areas strongly suburban were areas of high immigration (and also from Cycle 4 of high net emigration), with high numbers of "Millers" (persons moving to new locations within the same town), and with the immigration of single persons, persons age 16-29, and households with incomes $0-3999. Spatially, we note that towns high on this factor fell into two contiguous groups, one to the north and one to the south of Route 9 and the Massachusetts Turnpike, though not including the towns along the turnpike itself. In both cases they were located outside (west of) Route 128.

Combined Factor 2 "Income-Occupation" - This factor closely resembles the Shevky and Bell Construct "Social Rank." Positive on this factor were persons with occupation professional-manager, and negative were persons with occupation semi-skilled, and households with incomes $4000-6999 (and from Cycle 4 in the manufacturing industry).

The strongest variable in this dichotomy was the variable "households with one auto" which was associated with the negative side of the factor (persons with occupation semi-skilled). Also associated with this side was a high percentage of households with children under five. We also note that the strongest variable on the positive (professional-manager) side of this factor, higher than the variable occupation professional-manager itself, was the public action variable per student school budget.

Immigrants to the areas of high occupation professional-manager were households of high income. Immigrants to the areas of high occupation semi-skilled were persons of income $4000-6999. The "shuffling" between towns high on these factors were noted already in our analysis of the dynamic factors. On the map we note the wedge of towns high on this factor extending westward from the center of Boston and the scatter of outlying towns low on the factor with a particularly heavy concentration in the southwestern corner of our region.

Combined Factor 3 "High-Low Emigration" - Areas of high emigration (and from Cycle 4 high net emigration) were associated with high percentage of persons with occupation salesman. Areas of low emigration (and from Cycle 4 of high net immigration though not of high immigration) were associated with high immigration of "outsiders" (these we note on the map are areas on the border of the region). These areas of high immigration of "outsiders" and low emigration were also associated with high Republican vote. Thus, we can generalize that high Republican vote in all cases was associated with high net immigration. Conversely, areas of high net emigration were associated always with a high Democratic vote. If one interprets a Goldwater vote with an ultra-conservative vote then this says something about areas of high

immigration wishing to preserve the status quo before immigration. This presumably is true for both recent and not so recent immigrants. This, of course, has been the classic situation in immigration to America from abroad - that the recent immigrants were the ones who most strongly resisted additional immigration.

On the map we note that the areas of high emigration are core city areas low on occupation professional-manager. Towns low on emigration are those on the boundaries of the area - probably because no information was available on emigration out of the area.

Combined Factor 4 - "Stability" - High positive loading on this factor was associated with areas high on the variables "households at same address 20 plus years" and "persons age 60 plus." On the other end of the dichotomy were towns high on "numbers of school aged children."

Though we have termed this variable "stability" because a high positive score is associated with low change (immigration), these towns are highly unstable from a dynamic point of view; the population is aging with no replenishment of younger immigrants. Because they do not contain the normal amount of old persons or long time residents, the other end of this dichotomy is also in a dynamic sense unstable. Thus, all towns on this map, both those scoring high positively and those scoring high negatively are unstable in the dynamic sense.

We note on the map a line of towns roughly parallel to and south of the locations of Route 9 who scored high on this factor. Perhaps their existance is associated with the construction of new highways and hence with the fading importance of Route 9. This at any rate would be an interesting hypothesis to pursue.

Combined Factor 5 - "Single Person - Family Emigration" -

As the label suggests this factor dichotimizes between towns high on single persons emigration and towns high on family emigration - particularly of families in the income range ($7000-9999). This factor was independent of all the "static" variables included in the study. My hypothesis is that this factor is related to differential employment opportunities, though why this should be true is not at all clear. The fact that the pattern of differential emigration is apparently independent both of the "static" distribution of characteristics and the pattern of "immigration" is, of course, an interesting observation in itself.

Chapter IV

SUMMARY MAPS AND CONCLUSION

Dynamic Social Ecology

A map has been prepared summarizing the five "combined factors" such as to represent the important static and dynamic characteristics of the Metropolitan Area. On this map arrows are used to indicate the areas of greatest immigration and emigration. Though precise direction of migration is not known, the arrows have been oriented radiating from the center of Boston. This convention was chosen since it was determined above that high percentage of migration occurs within the same sector.

We note how immigrants of income $7000 or more are pushing out at the two corners of the wedge of high occupation professional-manager to the west and also in two corridors to the south - towards Providence and along the South Shore.

In the west the wedge of high occupation professional-manager appears to be the determinate of migration. Perhaps industries locating close to this region of high occupational and income status, in turn, induce immigration at its borders. To the south the pattern of immigration would rather seem associated with the new highway patterns in that area.

The areas of high extreme of persons at the same address 20 or more years, except where they are being encroached upon by some recent

migrants, would appear to be old population centers which do not fit this newly evolving pattern.

An emptying of the core would also appear to be an important aspect of this evolving pattern.

Dynamic Factor Summary

A map has been prepared summarizing the first four dynamic factors by superimposing the two factors suggesting the instability of immigration or emigration of selected income groups (Dynamic Factors 2 and 4) on the "stable" areas of interchange (Dynamic Factor 3) and the areas of high immigration and high emigration (Dynamic Factor 1).

This dynamic summary map suggests change occurring in three westward radiating corridors associated with the wedge of high income "shuffling." An additional area of high income immigration occurs on the South Shore. Existing dense areas are characterized by net emigration, particularly along the North Shore. The northernmost part of the region is characterized differential migration - high income couples immigrating and low income families emigrating. Finally, the southwestern corner of the region is, likewise characterized by a differential migration pattern - high income families emigrating and middle income families immigrating.

Conclusion

In Conclusion we note:

1. That migration characteristics add significant information to our knowledge of Metropolitan Social Ecology.

2. That strong regional patterns at greater than town scale exist in the Boston Metropolitan Area.

3. That an apparent anchor to this Metropolitan region is a wedge characterized by high percentages of persons with occupation professional-manager and families of high income. Strong growth patterns indicated by high immigration of moderate and high income persons appear associated with this wedge, particularly, along the routes of accessibility to it.

4. That other areas of change are apparently associated with new routes of accessibility.

5. That there is a strong pattern of emigration from the core area.

6. That factor analysis is an effective method of forming generalizations from large bodies of statistical dataon social characteristics of a Metropolitan Area.

INDEX TO TABLES AND MAPS

TABLES

MAPS

Summary Maps

(These two maps have been located first because they summarize the spatially relevant results of the whole analytical procedure. In fact they are aggregates of, on the one hand, the individual "Combined Factor" Maps and on the other, the "Dynamic Factor" Maps, all of which are also included. These maps are mappings of towns of extreme (absolute value greater than one) high or low factor scores. However, the most salient variables of these factors are also indicated.)

Combined Factor Maps

(These are mappings of extreme (absolute value greater than one) factor scores of the factors created in the factor analysis conducted in Stage 3 on selected variables from each of the groups in Stage 2.)

Dynamic Factor Maps

(These are mappings of extreme (absolute value greater than one) factor scores on some of the factors created for Group B of Stage 2 from the characteristics of the migrant flows.)

Static Factor Maps

(These are mappings of extreme (absolute value greater than one) factor scores of the factors created on Group A of Stage 2.)

12. Static Factor 1 - "Urbanism-Suburbanism"

13. Static Factor 2 - "Income-Occupation"

14. Static Factor 3 - "Stability-Industry I"

15. Static Factor 4 - "Stability-Industry II"

Maps of Individual Variables

(These are mappings of extreme (greater than one standard deviation from the mean) values of the five variables which most closely correspond to the five combined factors.)

16. No Autos (Combined Factor 1)

17. Occupation Professional-Manager (Combined Factor 2)

18. Emigration (Combined Factor 3)

19. Same Address 20 Plus Years (Combined Factor 4)

20. Emigrants-Single Persons (Combined Factor 5)

Additional Maps of Particular Interest

21. Number of Households

22. Per Capita School Budget

23. Republican Vote for President, 1964

Key Map

24. Key Map of Study Area

BASIC GROUPINGS CONSIDERED RELEVANT TO THE DEVELOPMENT OF A DYNAMIC SOCIAL ECOLOGY

CHARACTERISTICS OF HOUSEHOLDS AND PERSONS BY TOWN IN METROPOLITAN BOSTON IN 1963 (MEASURED AS PERCENTAGES OF TOTAL TOWN POPULATION)

CATAGORIES	VARIABLES
MOBILITY	Households no autos Households one auto Households two plus autos Persons with driver's license Persons with no driver's license
LIFE CYCLE	Households with no children Households with children under five Households with children five and over Persons age 5-9 Persons age 10-15 Persons age 16-29 Persons age 30-59 Persons age 60 plus
HOUSING	Households in single family structures Households in 2-4 family structures Households in multi-family structures (5 or more) Rented Owned
CROWDING	Households with one person Households with two persons Households with 3-5 persons Households with 6 plus persons Persons per household
OCCUPATION	Persons with occupation prof/man Persons with occupation salesman Persons with occupation skilled Persons with occupation semi-skilled Persons with occupation unskilled Persons with occupation personal service Persons with occupation school student Persons with occupation college student
PERMANENCY	Households at same address 0-5 years (N.B. these are the households defined as migrants below) Households at same address 6-19 years Households at same address 20 plus years
AFFLUENCE	Households with incomes $0-3999 Households with incomes 4000-6999 Households with incomes 7000-9999 Households with incomes 10,000 plus
INDUSTRY	Persons in industry retail Persons in industry construction Persons in industry manufacturing Persons in industry wholesale trade Persons in industry personal service Persons in industry amusement Persons in industry professional Persons in industry government
FAMILITY	Households with one person employed Households with two plus persons employed

FACTOR ANALYSIS BY GROUPS

HIGH POSITIVE FACTOR LOADINGS (All Loadings Above .400 are Rank Ordered)	HIGH NEGATIVE FACTOR LOADINGS (All Loadings Below -.400 are Rank Ordered)
(See combined factor analysis)	

GROUP A. STATIC FACTORS

STATIC FACTOR 1
"URBANISM-SUBURBANISM"

Rented	
	Households in single family structures
Households in multi-family structures (5 or more)	
	Persons with occupation school student
Persons age 60 plus	
	Persons age 5-9
	Persons age 10-15
Households with incomes $0-3999	
Persons age 16-29	
	Households with 3-5 persons
Households with one person	
	Households with 6 plus persons
	Persons age 30-59
(Variables above these lines have factor loadings greater than .500)	
	Persons with incomes 7000-9999
	Persons with incomes 10,000 plus
Persons in industry personal service	
Households with two persons	
Persons with occupation personal service	
Persons with occupation college student	
Persons with occupation salesman	

STATIC FACTOR 2
"INCOME-OCCUPATION"

Persons with occupation semi-skilled	
	Persons in industry professional
Persons with occupation skilled	
	Persons with occupation prof/man
Persons with incomes $4000-6999	
Persons in industry manufacturing	
	Persons with incomes 10,000 plus
Households with two plus persons employed	

STATIC FACTOR 3
"STABILITY-INDUSTRY I"

	Persons at same address 0-5 years
	Persons in industry government
Persons in industry wholesale trade	
Households at same address 20 plus years	
Persons with occupation salesman	
Households with two persons	
	Households with one persons
	Persons age 16-29
Persons in industry retail	
Persons age 60 plus	
Persons age 30-59	

STATIC FACTOR 4
"STABILITY-INDUSTRY II"

Persons with occupation personal service	
	Households at same address 20 plus years
Persons in industry personal service	
Persons in industry retail	
Households at same address 0-5 years	
Persons with occupation salesman	

VARIABLES WITH LOW LOADINGS ON ALL STATIC FACTORS

Persons with occupation unskilled
Persons in industry amusement

CHARACTERISTICS OF MIGRATION FLOWS BETWEEN TOWNS IN METROPOLITAN BOSTON (MEASURED AS PERCENTAGES OF TOTAL IMMIGRATION OR TOTAL EMIGRATION FLOW)

IMMIGRANTS	LIFE CYCLE	Immigrant households with children under five
		Immigrant households with no children under five
	HOUSING	Immigrant households in single family structures
		Immigrant households in 2-4 family structures
		Immigrant households in multi-family structures (5 or more)
	CROWDING	Immigrant households who own dwelling unit
		Immigrant households who rent dwelling unit
		Immigrant households with one person
		Immigrant households with two persons
		Immigrant households with 3-5 persons
		Immigrant households with 6 plus persons
	AFFLUENCE	Immigrant households with incomes $0-3999
		Immigrant households with incomes 4000-6999
		Immigrant households with incomes 7000-9999
		Immigrant households with incomes 10,000 plus
	VOLUME	"Immigrants" (households which moved from another town within the Boston Metropolitan Area as prior move within the past five years)
EMIGRANTS	LIFE CYCLE	Emigrant households with children under five
		Emigrant households with no children under five
	HOUSING	Emigrant households in single family structures
		Emigrant households in 2-4 family structures
		Emigrant households in multi-family structures (5 or more)
	CROWDING	Emigrant households who own dwelling unit
		Emigrant households who rent dwelling unit
		Emigrant households with one person
		Emigrant households with two persons
		Emigrant households with 3-5 persons
		Emigrant households with 6 plus persons
	AFFLUENCE	Emigrant households with incomes $0-3999
		Emigrant households with incomes 4000-6999
		Emigrant households with incomes 7000-9999
		Emigrant households with incomes 10,000 plus
	VOLUME	"Emigrants" (households which moved to another town within the Boston Metropolitan Area as prior move within the past five years)
		Emigrants as a percent of Immigrants

GROUP B. DYNAMIC FACTORS

DYNAMIC FACTOR 1
"LIFE CYCLE IMMIGRATION"

Immigrant households in single family structures
Immigrant households who own dwelling unit
Immigrant households with incomes $0-3999
Immigrant households with one person
Immigrant households with 3-5 persons
Emigrant households in single family structure
Emigrants as a percentage of immigrants "Immigrants"
- -
Emigrant households who own dwelling unit

DYNAMIC FACTOR 2
"LIFE CYCLE EMIGRATION"

Emigrant households with 3-5 persons
Emigrant households who own dwelling unit
Emigrant households in single family structure
Emigrant households with one person
- -
Emigrant households with incomes $7000-9999
Emigrant households with incomes $0-3999

DYNAMIC FACTOR 3
"INCOME LEVEL MIGRATION I"

Emigrant households with incomes 10,000 plus
Immigrant households with incomes 10,000 plus
Immigrant households with incomes 4000-6999
- -
Emigrants as a percentage of immigrants
Emigrant households with incomes 4000-6999

DYNAMIC FACTOR 4
"INCOME LEVEL MIGRATION II"

Immigrant households with two persons
Immigrant households with 3-5 persons
Immigrant households with incomes $4000-6999
- -
Emigrant households with one person

DYNAMIC FACTOR 5
"INCOME LEVEL MIGRATION III"

Immigrant households with 6 plus persons
Emigrant households with incomes $4000-6999
Emigrant households with incomes 7000-9999
- -
Emigrant households with 3-5 persons

DYNAMIC FACTOR 6
"EMIGRATION"

"Emigrants"
- -
Immigrant households with incomes $7000-9999

VARIABLES WITH LOW LOADINGS ON ALL DYNAMIC FACTORS

Emigrant households with two persons
Emigrant households with 6 plus persons

CHARACTERISTICS OF IMMIGRATION FLOWS FROM OUTSIDE BOSTON METROPOLITAN AREA (MEASURED AS PERCENTAGES OF TOTAL "OUTSIDER" FLOW)	HOUSING	Outsider households in single family structures Outsider households in 2-4 family structures Outsider households in multi-family structures (5 or more)
	CROWDING	Outsider households who own dwelling unit Outsider households who rent dwelling unit Outsider households with one person Outsider households with two persons Outsider households with 3-5 persons Outsider households with 6 plus persons
	AFFLUENCE	Outsider households with incomes $0-3999 Outsider households with incomes 4000-6999 Outsider households with incomes 7000-9999 Outsider households with incomes 10,000 plus
	VOLUME	"Outsiders" (households which moved from outside Boston Metropolitan Area as prior move within the past five years)

GROUP C. DYNAMIC FACTORS-"OUTSIDERS"

OUTSIDER FACTOR 1
"LIFE CYCLE IMMIGRATION"

Outsider households in single family structures
Outsider households who rent dwelling unit
Outsider households with incomes $0-3999
Outsider households with incomes 10,000 plus
- -
"Outsiders"
Outsider households with 3-5 persons

OUTSIDER FACTOR 2
"INCOME LEVEL MIGRATION I"

"Outsiders"
- -
Outsider households with incomes 10,000 plus

OUTSIDER FACTOR 3
"INCOME LEVEL MIGRATION II"

Outsider households with 3-5 persons
- -
Outsider households with incomes 10,000 plus

OUTSIDER FACTOR 4
"INCOME LEVEL MIGRATION III"

Outsider households with incomes $0-3999
- -

SPATIAL CHARACTERISTICS
OF MIGRATION FLOWS
BETWEEN TOWNS
(MEASURED AS PERCENTAGES OF
TOTAL IMMIGRATION OR TOTAL
EMIGRATION FLOW)

IMMIGRANTS	SECTORAL	Households who immigrated from same sector (±20°)
		Households who immigrated from clockwise sector (20° to 80°)
		Households who immigrated from counterclockwise sector (-20° to -80°)
		Households who immigrated from opposite sector
	ANNULAR	Households who immigrated from outside ring
		Households who immigrated from same ring (±4 miles)
		Households who immigrated from inside ring
	DISTANCE	Households who immigrated 0-10 miles
		Households who immigrated 10-20 miles
		Households who immigrated 20-40 miles
MIGRATED WITHIN TOWN		"Millers" (households which moved within same town as prior move within the past five years)
EMIGRANTS	SECTORAL	Households who emigrated from same sector (± 20°)
		Households who emigrated from clockwise sector (20° to 80°)
		Households who emigrated from counterclockwise sector (-20° to -80°)
		Households who emigrated from opposite sector
	ANNULAR	Households who emigrated from outside ring
		Households who emigrated from same ring (±4 miles)
		Households who emigrated from inside ring
	DISTANCE	Households who emigrated 0-10 miles
		Households who emigrated 10-20 miles
		Households who emigrated 20-40 miles

GROUP D. SPATIAL FACTORS

SPATIAL FACTOR 1
"RING MIGRATION"

Households who immigrated from inside ring
Households who emigrated from inside ring
Households who immigrated 0-10 miles
Households who immigrated from same ring (±4 miles)
Households who immigrated 10-20 miles
Households who emigrated 0-10 miles
Households who emigrated from same ring (±4 miles)
Households who immigrated 20-40 miles
- -
Households who emigrated from outside ring
Households who emigrated 10-20 miles
Households who emigrated 20-40 miles
Households who immigrated from outside ring

SPATIAL FACTOR 2
"SECTOR MIGRATION"

Households who immigrated from same sector (±20°)
Households who emigrated from same sector (±20°)
Households who immigrated from opposite sector
Households who emigrated from opposite sector
Households who immigrated from outside ring
- -
Households who emigrated from clockwise sector (20° to 80°)
Households who immigrated from clockwise sector (20° to 80°)
Households who emigrated 0-10 miles
Households who emigrated from outside ring

SPATIAL FACTOR 3
" SECTOR MIGRATION II"

Households who immigrated from clockwise sector (20° to 80°)
Households who emigrated from clockwise sector (20° to 80°)
Households who emigrated from counterclockwise sector (-20° to -80°)
Households who immigrated from counterclockwise sector (-20° to -80°)

SPATIAL FACTOR 4
"SECTOR MIGRATION III"

Households who immigrated from counterclockwise sector (-20° to -80°)
Households who emigrated from counterclockwise sector (-20° to -80°)
- -
Households who emigrated 20-40 miles
Households who emigrated from opposite sector

SPATIAL FACTOR 5
SHORT MIGRATION

Households who emigrated 0-10 miles
- -

VARIABLES WITH LOW LOADINGS ON ALL SPATIAL FACTORS

"Millers"

"DISTANCE" MOVED WITH RESPECT TO SELECTED NON-SPATIAL CHARACTERISTICS OF MIGRATION FLOWS BETWEEN TOWNS

IMMIGRANTS

MOBILITY

New town has fewer households with 0 autos
New town has same (±5%) households with 0 autos
New town has more households with 0 autos

LIFE CYCLE

New town has fewer households with children under five
New town has same (±5%) households with children under five
New town has more households with children under five

New town has fewer school students
New town has same (±5%) school students
New town has more school students

New town has fewer persons age 60 plus
New town has same (±5%) persons age 60 plus
New town has more persons age 60 plus

HOUSING

New town has fewer households in single family structures
New town has same (±5%) households in single family structures
New town has more households in single family structures

CROWDING

New town has fewer households with one person
New town has same (±5%) households with one person
New town has more households with one person

New town has fewer households with 6 plus persons
New town has same (±5%) households with 6 plus persons
New town has more households with 6 plus persons

OCCUPATION

New town has fewer persons with occupation prof/man
New town has same (±5%) persons with occupation prof/man
New town has more persons with occupation prof/man

New town has fewer persons with occupation skilled
New town has same (±5%) persons with occupation skilled
New town has more persons with occupation skilled

New town has fewer persons with occupation unskilled
New town has same (±5%) persons with occupation unskilled
New town has more persons with occupation unskilled

AFFLUENCE

New town has fewer households with incomes $0-3999
New town has same (±5%) households with incomes $0-3999
New town has more households with incomes $0-3999

New town has fewer households with incomes $10,000 plus
New town has same (±5%) households with incomes $10,000 plus
New town has more households with incomes $10,000 plus

INDUSTRY

New town has fewer persons in industry manufacturing
New town has same (±5%) persons in industry manufacturing
New town has more persons in industry manufacturing

GROUP E. COMPARISON FACTORS

COMPARISON FACTOR 1
"LIFE CYCLE I"

New town has more households in single family structures
New town has fewer households with 0 autos
New town has more households with 0 autos
New town has fewer households in single family structures
New town has more households with incomes $0-3999
New town has more households with one person
New town has fewer households with incomes $0-3999
New town has more school students
New town has more households with incomes $10,000 plus
New town has fewer households with school students
New town has more persons age 60 plus
- -
New town has fewer persons age 60 plus
New town has fewer households with one person
New town has same (±5%) households with incomes $10,000 plus
New town has fewer households with 6 plus persons

COMPARISON FACTOR 2
"OCCUPATION I"

New town has fewer persons with occupation skilled
New town has same (±5%) persons with occupation prof/man
New town has more persons with occupation prof/man
New town has fewer persons in industry manufacturing
New town has more persons with occupation skilled
- -
New town has same (±5%) households with one person
New town has more households with incomes $10,000 plus
New town has same (±5%) households with 0 autos
New town has more persons in industry manufacturing

COMPARISON FACTOR 3
"OCCUPATION II"

New town has same (±5%) persons in industry manufacturing
New town has same (±5%) persons with occupation skilled
New town has fewer school students
New town has more persons in industry manufacturing
- -
New town has more school students
New town has more persons with occupation skilled

COMPARISON FACTOR 4
"LIFE CYCLE II"

New town has same (±5%) persons age 60 plus
New town has fewer persons age 60 plus
- -
New town has same (±5%) school students
New town has more households with 6 plus persons
New town has fewer persons with occupation prof/man

COMPARISON FACTOR 5
"OCCUPATION III"

New town has same (±5%) persons with occupation unskilled
New town has more persons with occupation unskilled
New town has more households with children under five
New town has same (±5%) households with children under five
- -

COMPARISON FACTOR 6
"LIFE CYCLE III"

New town has same (±5%) households with 0 autos
- -
New town has same (±5%) households with children under five
New town has fewer households with one person

COMPARISON FACTOR 7
"OCCUPATION IV"

New town has more persons with occupation unskilled
New town has same (±5%) persons with occupation unskilled
New town has same (±5%) households with 6 plus persons
- -
New town has more households with children under five

VARIABLES WITH LOW LOADINGS ON ALL COMPARISON FACTORS

New town has fewer households with children under five
New town has same (±5%) households in single family structures
New town has fewer persons with occupation unskilled

OTHER CHARACTERISTICS OF TOWNS	VOTING	Republican vote, 1964	(See combined factor analysis)
	SCHOOLS	Per student budget	

COMBINED FACTOR ANALYSIS

COMBINED FACTOR 1
"SUBURBANISM-URBANISM"

Households in single family structures
Households no autos
Immigrant households in single family structures
Households with two plus autos
Households in multi-family structures
Outsiders in single family structures
Households with incomes $0-3999
Immigrant households with incomes $0-3999
"Millers"
Persons with driver's license
Persons age 60 plus
Persons age 5-9
New town has fewer households with 0 autos
Households with children under five
Republican vote, 1964
Immigrant households with one person
Persons age 16-29
"Immigrants"
New town has more school students
Persons age 30-59
Persons with occupation prof/man
Households with incomes $7000-9999
Persons age 10-15
Immigrant households with no children under five
Persons with occupation semi-skilled
Immigrant households with incomes $10,000 plus
Outsider households with incomes $10,000 plus
Outsider households with incomes $0-3999
Households who immigrated from same ring
Immigrant households with 3-5 persons
New town has fewer persons with occupation prof/man
New town has fewer persons age 60 plus

COMBINED FACTOR 2
"INCOME-OCCUPATION"

Households with one auto
Per student school budget
Households with incomes $4000-6999
New town has more persons with occupation prof/man
Persons with occupation prof/man
Immigrant households with incomes 4000-6999
Persons with occupation semi-skilled
Immigrant households with incomes $10,000 plus
Households with children under five
Emigrant households with no children under 5

COMBINED FACTOR 3
HIGH-LOW EMIGRATION

"Emigrants"
Persons with occupation salesman
Households who immigrated from same ring
"Outsiders"
Republican vote, 1964
New town has fewer households with 0 autos

COMBINED FACTOR 4
"STABILITY"

New town has more school students
Households at same address 20 plus years
Persons age 60 plus
New town has fewer persons age 60 plus

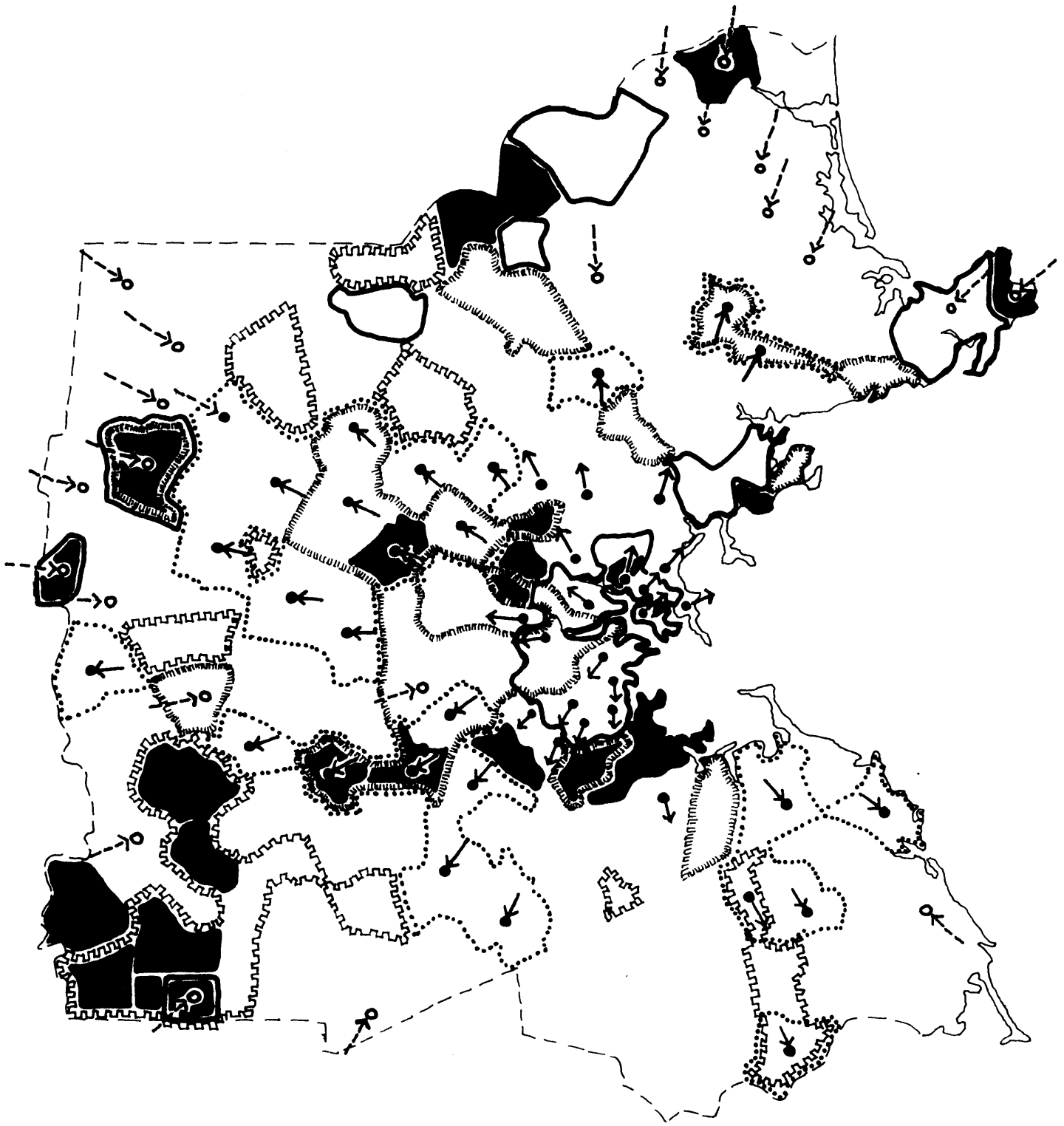
COMBINED FACTOR 5
"SINGLE PERSON-FAMILY EMIGRATION"

Emigrant households with one person
Emigrant households in single family structures
Emigrant households with incomes $0-3999
Emigrant households with 3-5 persons
Emigrant households with incomes $7000-9999
Emigrant households with no children under five
Emigrant households with 6 plus persons

VARIABLES WITH LOW LOADINGS ON ALL COMBINED FACTORS

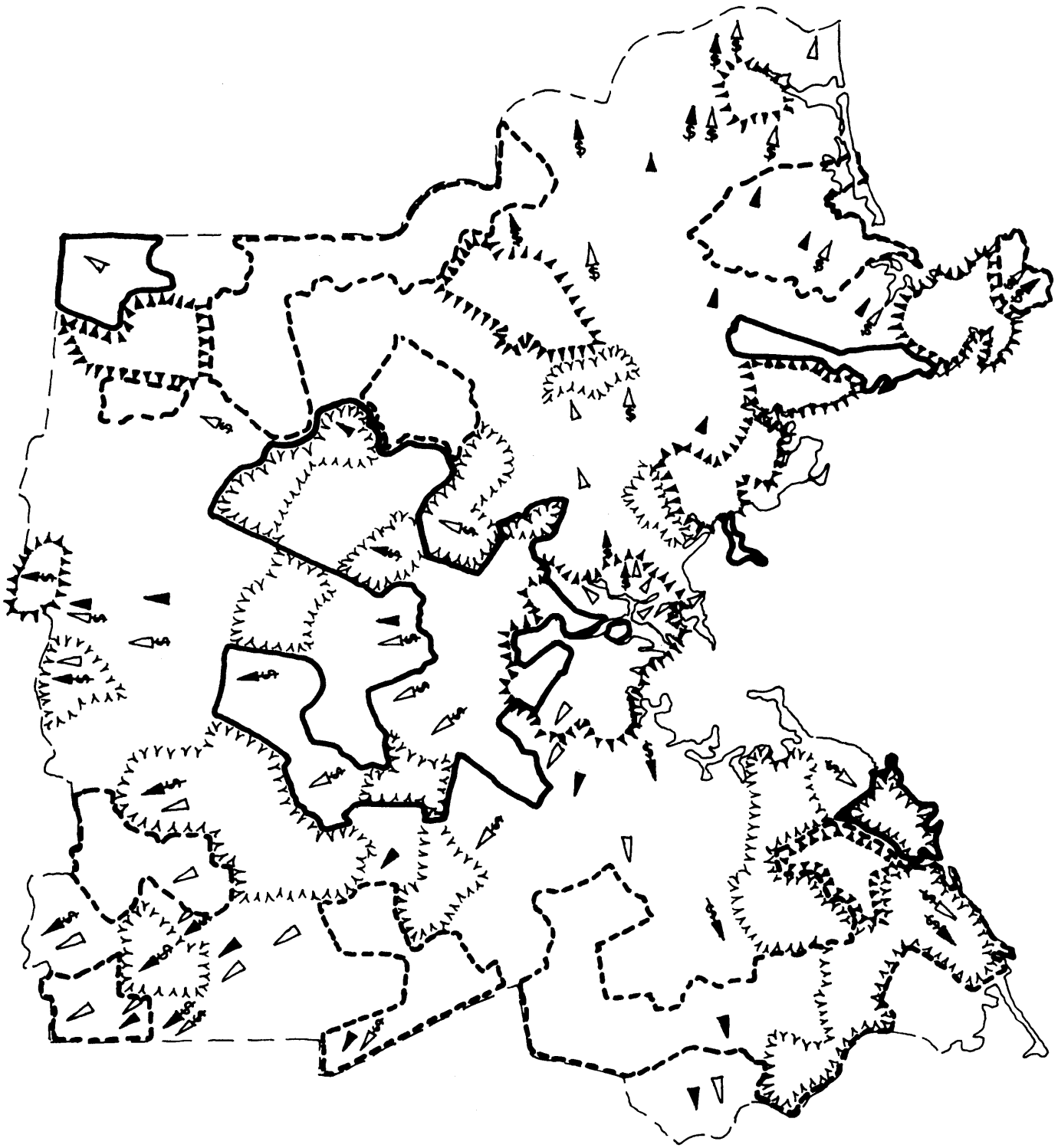
Persons with occupation college student
Immigrant households with incomes $7000-9999
Emigrant households with incomes $4000-6999
Emigrant households with incomes $10,000 plus
Immigrant households with two persons
Immigrant households with 6 plus persons
Emigrant households with two persons
Outsider households with 3-5 persons
Households who immigrated from same sector (±20°)
Households who immigrated from counterclockwise sector (-20° to -80°)
Households who immigrated from opposite sector
Households who emigrated from same ring (±4 miles)
New town has more households with children under five
New town has same (±5%) households in single family structures
New town has fewer households with 6 plus persons
New town has more households with 6 plus persons
New town has more persons with occupation unskilled
New town has same (±5%) school students
New town has more persons in industry manufacturing
New town has same (±5%) persons with incomes $0-3999
New town has fewer persons with incomes $10,000 plus

DYNAMIC SOCIAL ECOLOGY



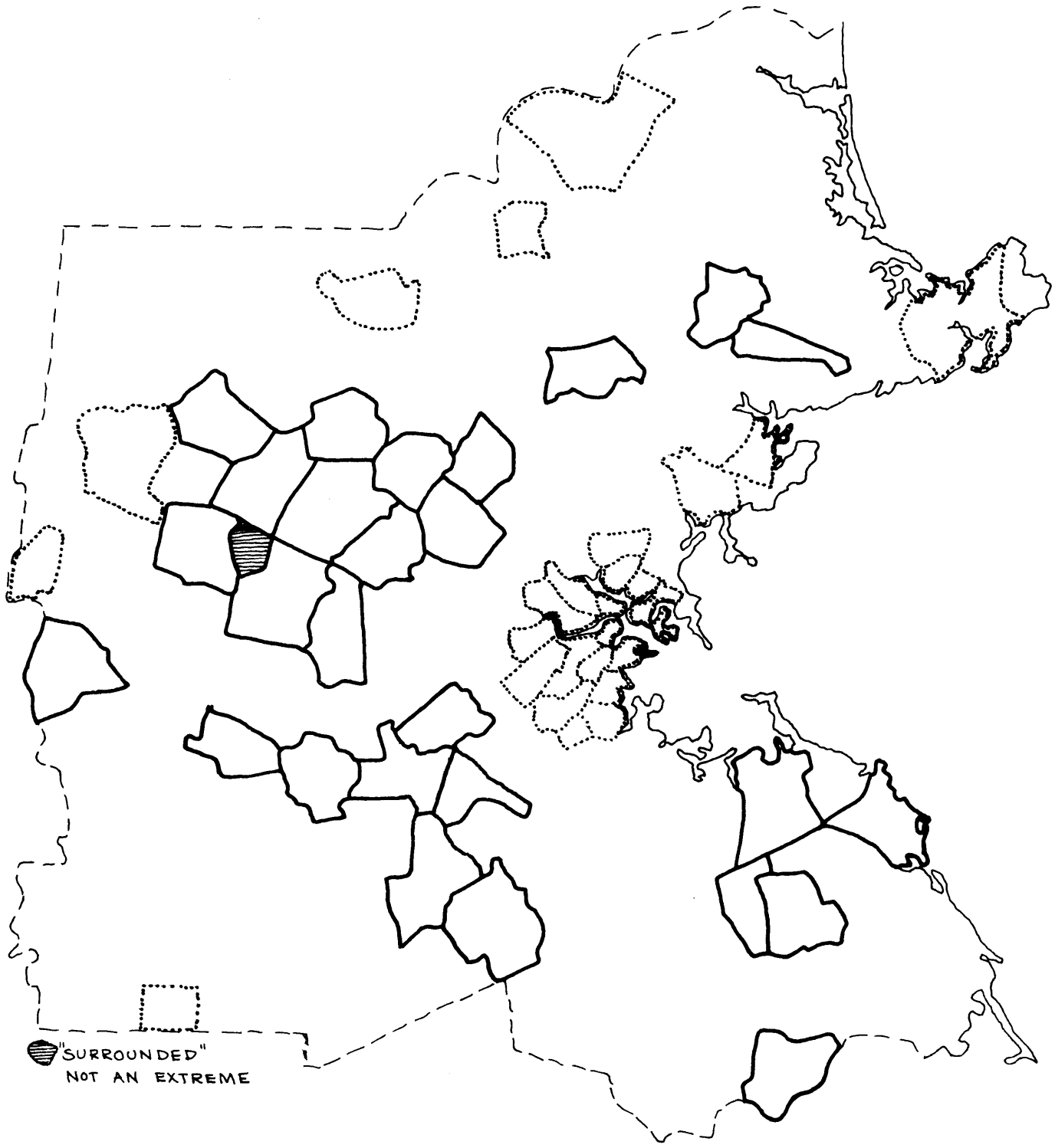
- LOW EXTREME COMBINED FACTOR 1 (MULTIPLE FAMILY HOUSING)
- HIGH EXTREME COMBINED FACTOR 1 (HIGH INCOME SUBURBANISM)
- HIGH EXTREME COMBINED FACTOR 1 (HIGH IMMIGRATION)
- HIGH EXTREME COMBINED FACTOR 3 (HIGH EMIGRATION)
- HIGH EXTREME COMBINED FACTOR 2 (OCCUPATION PROFESSIONAL-MANAGER)
- LOW EXTREME COMBINED FACTOR 2 (OCCUPATION SEMI-SKILLED)
- HIGH EXTREME COMBINED FACTOR 4 (SAME ADDRESS 20+ YEARS)
- LOW EXTREME COMBINED FACTOR 3 (IMMIGRANTS "OUTSIDERS")

DYNAMIC FACTOR SUMMARY



- HIGH EXTREME DYNAMIC FACTOR 1 (HIGH IMMIGRATION)
- LOW EXTREME DYNAMIC FACTOR 1 (HIGH EMIGRATION)
- HIGH EXTREME DYNAMIC FACTOR 2 (HIGH INCOME, FAMILY EMIGRATION)
- LOW EXTREME DYNAMIC FACTOR 2 (LOW INCOME EMIGRATION)
- HIGH EXTREME DYNAMIC FACTOR 3 (HIGH INCOME "SHUFFLING"
- LOW EXTREME DYNAMIC FACTOR 3 (MIDDLE INCOME "SHUFFLING"
- HIGH EXTREME DYNAMIC FACTOR 4 (HIGH INCOME COUPLES IMMIGRATION)
- LOW EXTREME DYNAMIC FACTOR 4 (MIDDLE INCOME FAMILY IMMIGRATION)

COMBINED FACTOR 1
SUBURBANISM - URBANISM



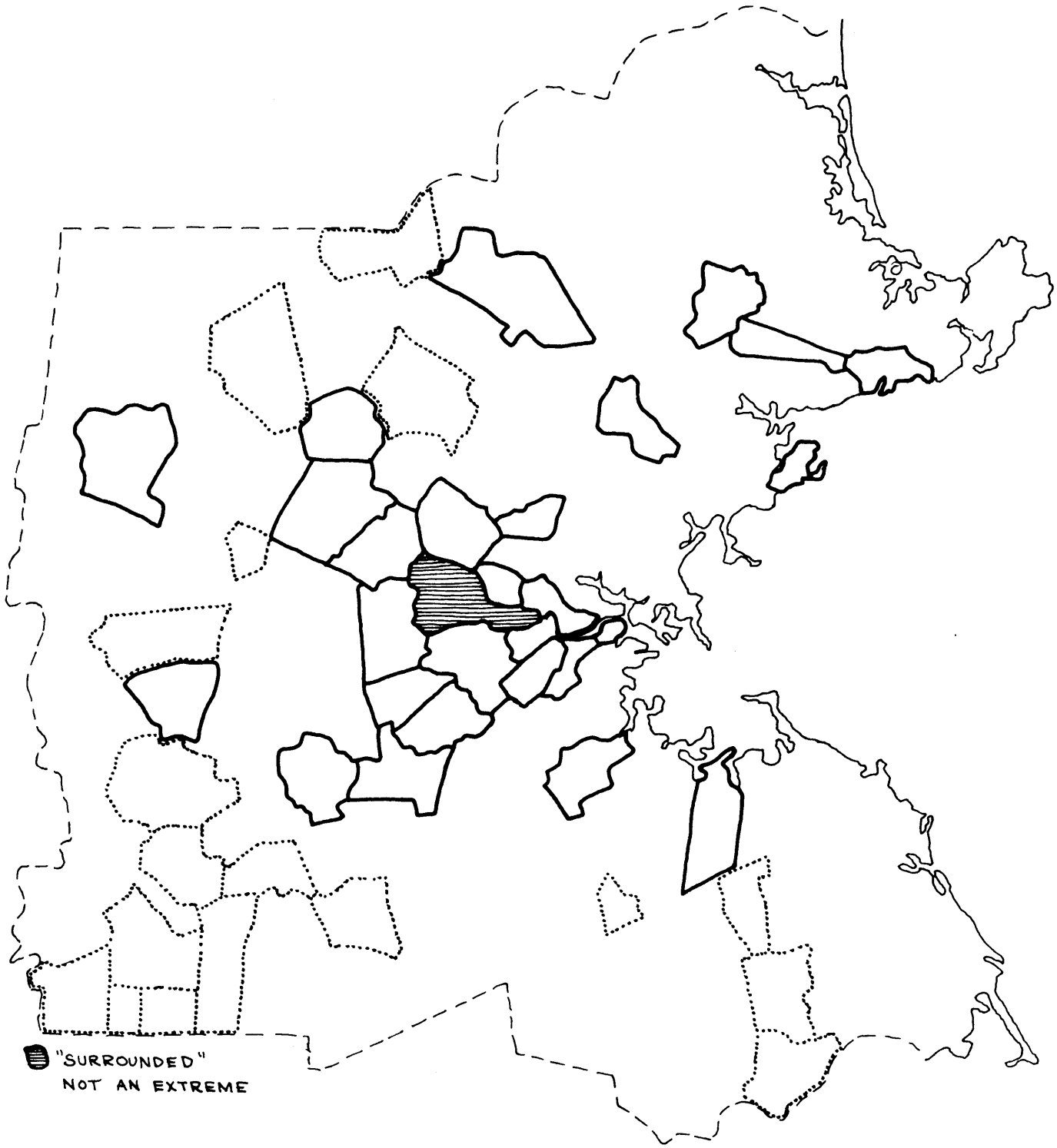
HIGH EXTREME

SINGLE FAMILY HOUSING
2 + AUTOS
HIGH INCOME FAMILIES

LOW EXTREME

MULTI FAMILY HOUSING
NO AUTOS
OLD PERSONS - 60+
YOUNG PERSONS - 16-29
LOW INCOME

COMBINED FACTOR 2
INCOME - OCCUPATION



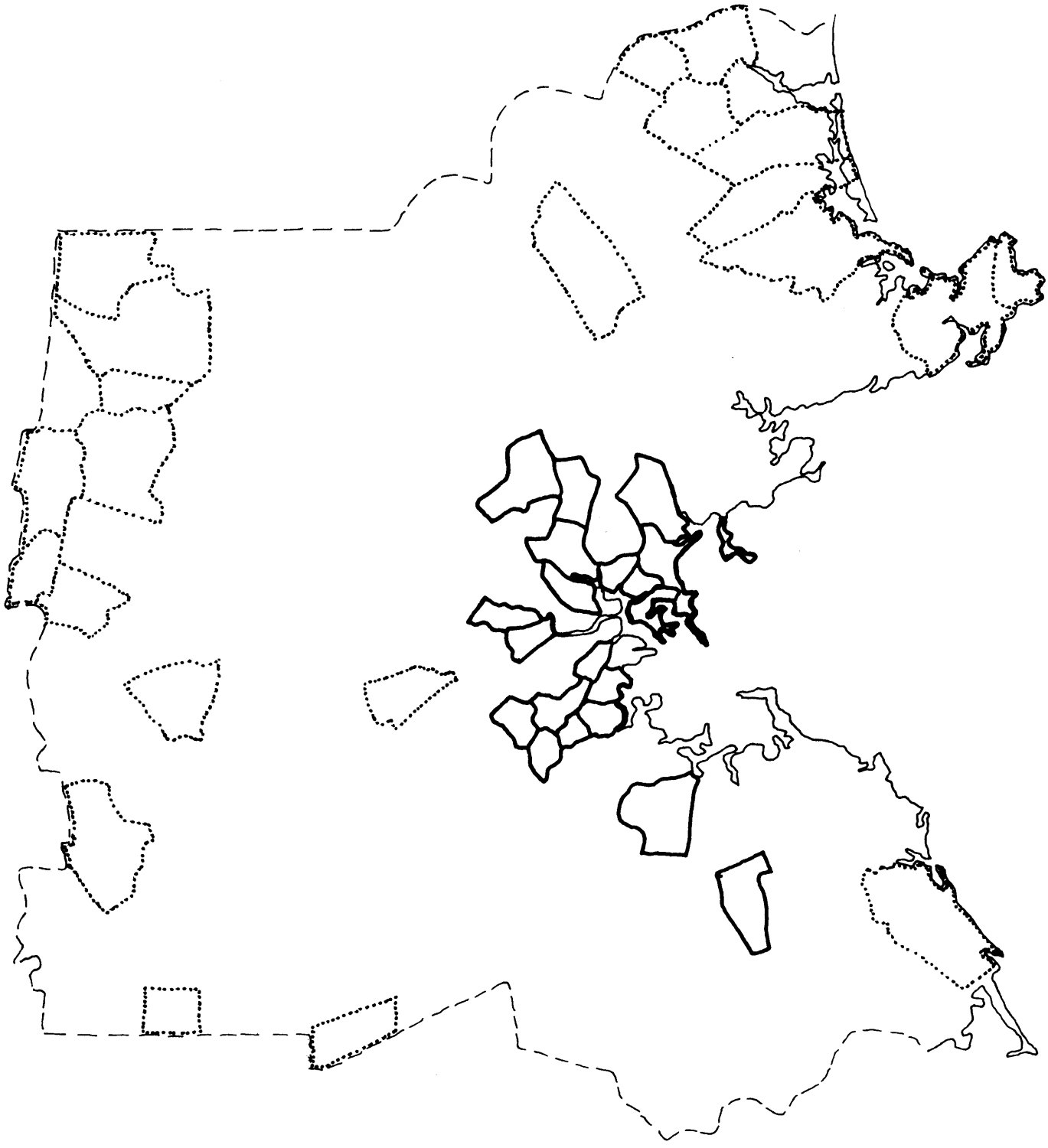
HIGH EXTREME

OCCUPATION PROFESSIONAL—
MANAGER
HIGH INCOME IMMIGRANTS
HIGH PER STUDENT SCHOOL
BUDGET

LOW EXTREME

OCCUPATION SEMI-SKILLED
ONE AUTO
YOUNG FAMILIES
INCOME $4,000 - 6,999

COMBINED FACTOR 3
HIGH-LOW EMIGRATION



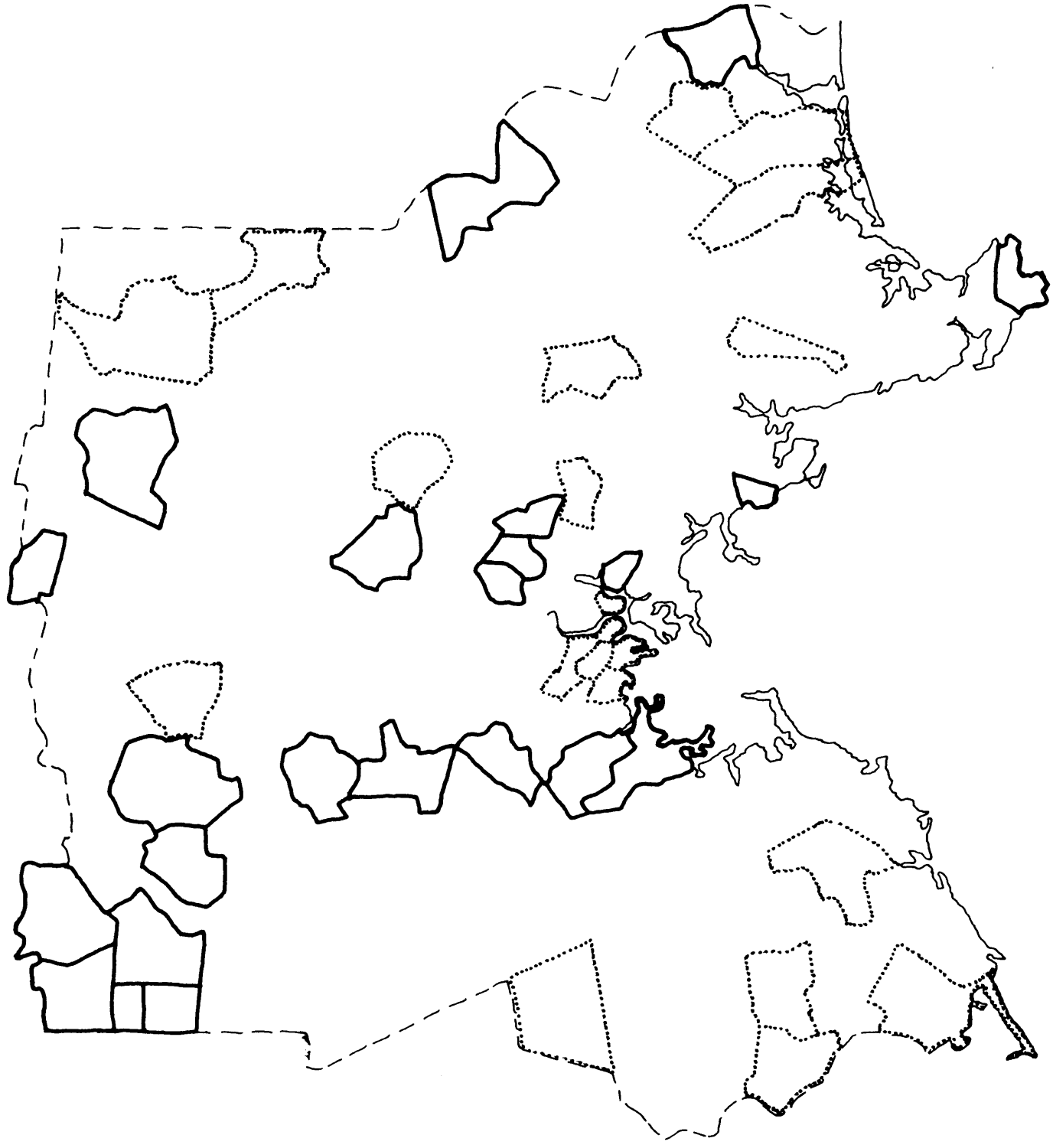
HIGH EXTREMES

HIGH EMIGRATION
OCCUPATION SALESMAN

LOW EXTREMES

LOW EMIGRATION
IMMIGRANTS "OUTSIDERS"

COMBINED FACTOR 4
STABILITY



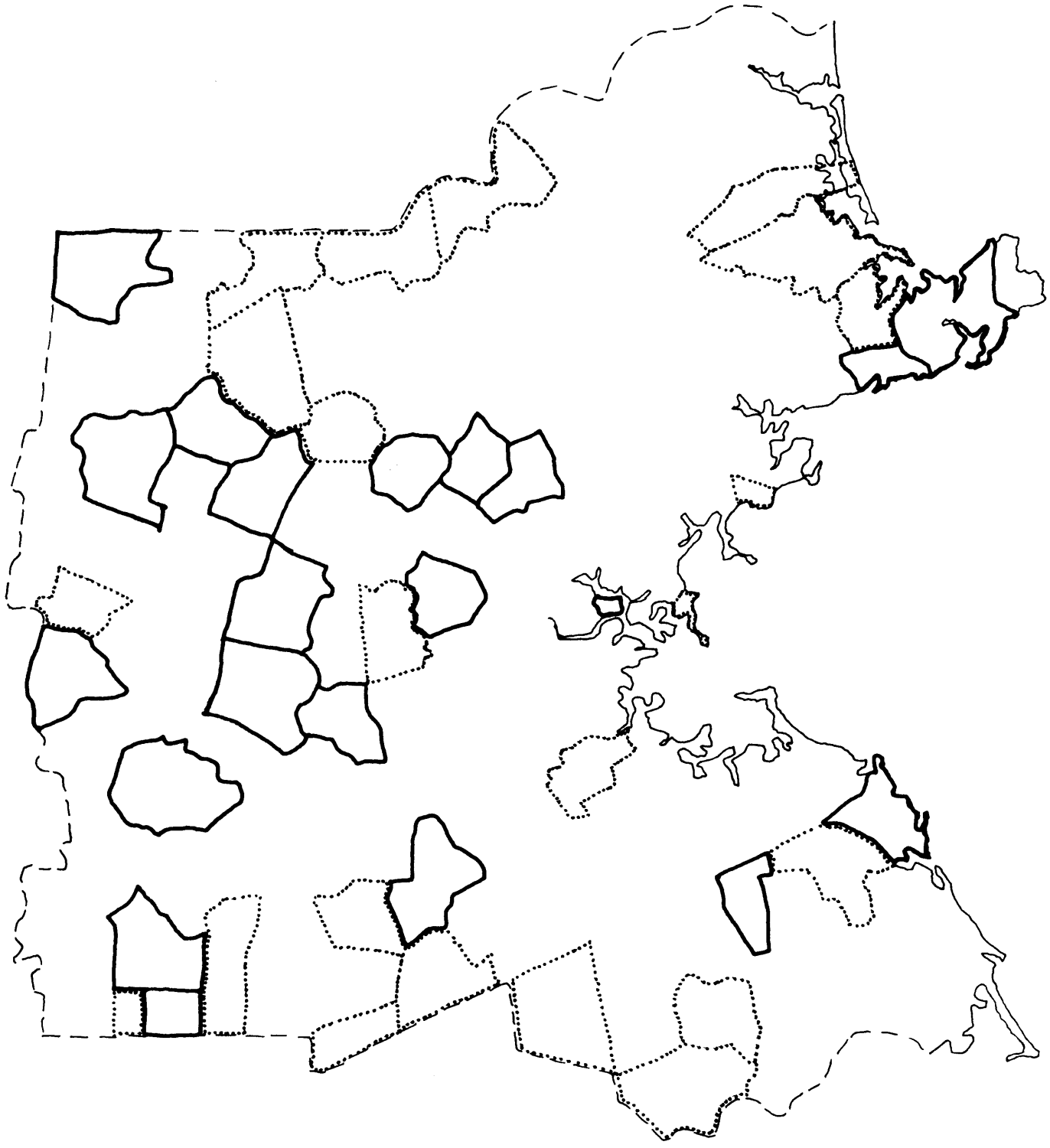
HIGH EXTREMES

HOUSEHOLDS AT SAME ADDRESS
20 + YEARS
PERSONS AGED 60 +

LOW EXTREMES

SCHOOL AGE PERSONS

COMBINED FACTOR 5
SINGLE PERSON - FAMILY EMIGRATION



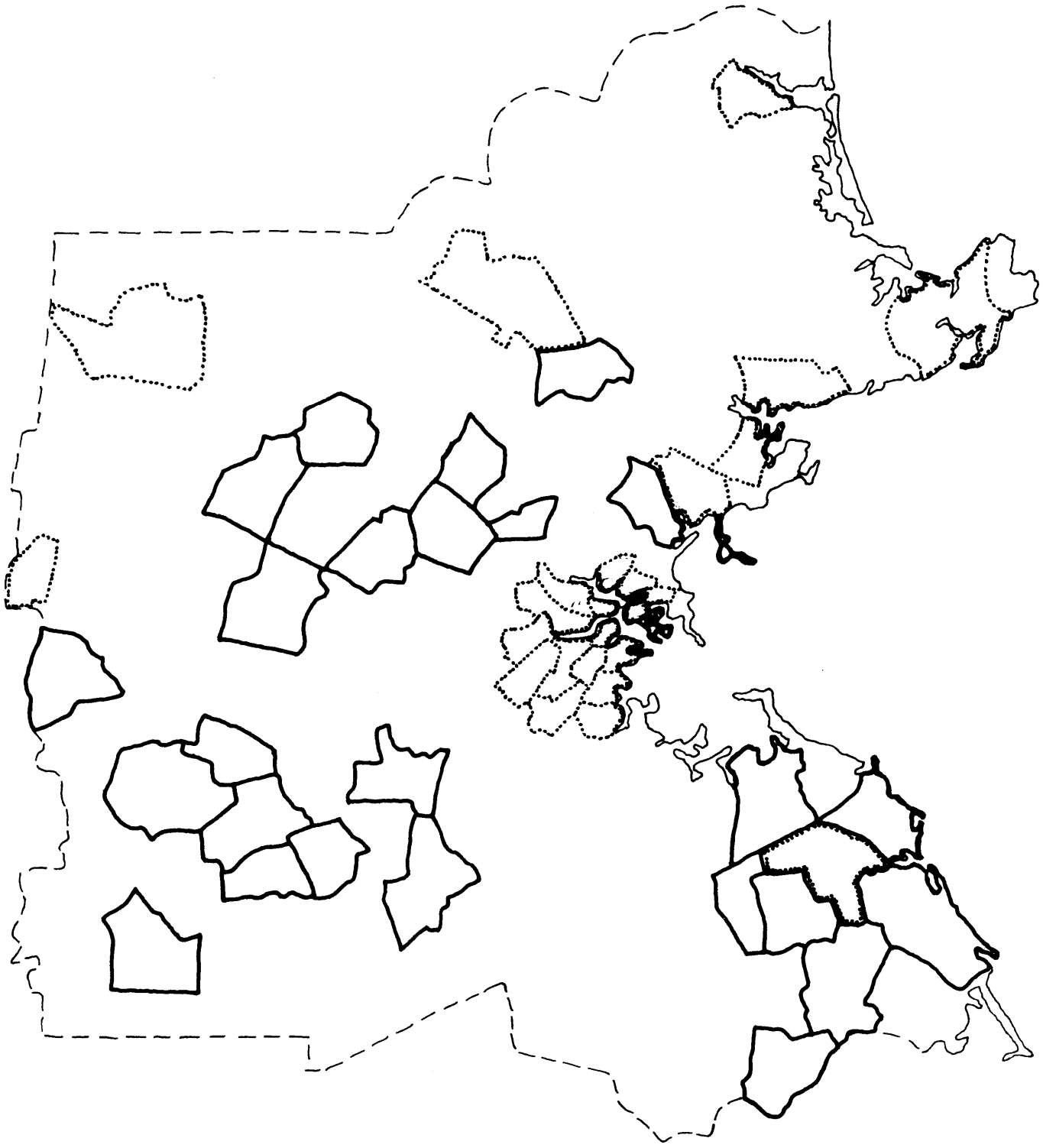
HIGH EXTREME

EMIGRANT FAMILIES WITH
3-5 PERSONS
EMIGRANTS INCOMES $7,000
TO $9,999

LOW EXTREME

EMIGRANTS - SINGLE PERSONS
EMIGRANTS INCOMES $0 - 3,999

DYNAMIC FACTOR 1
LIFE CYCLE IMMIGRATION



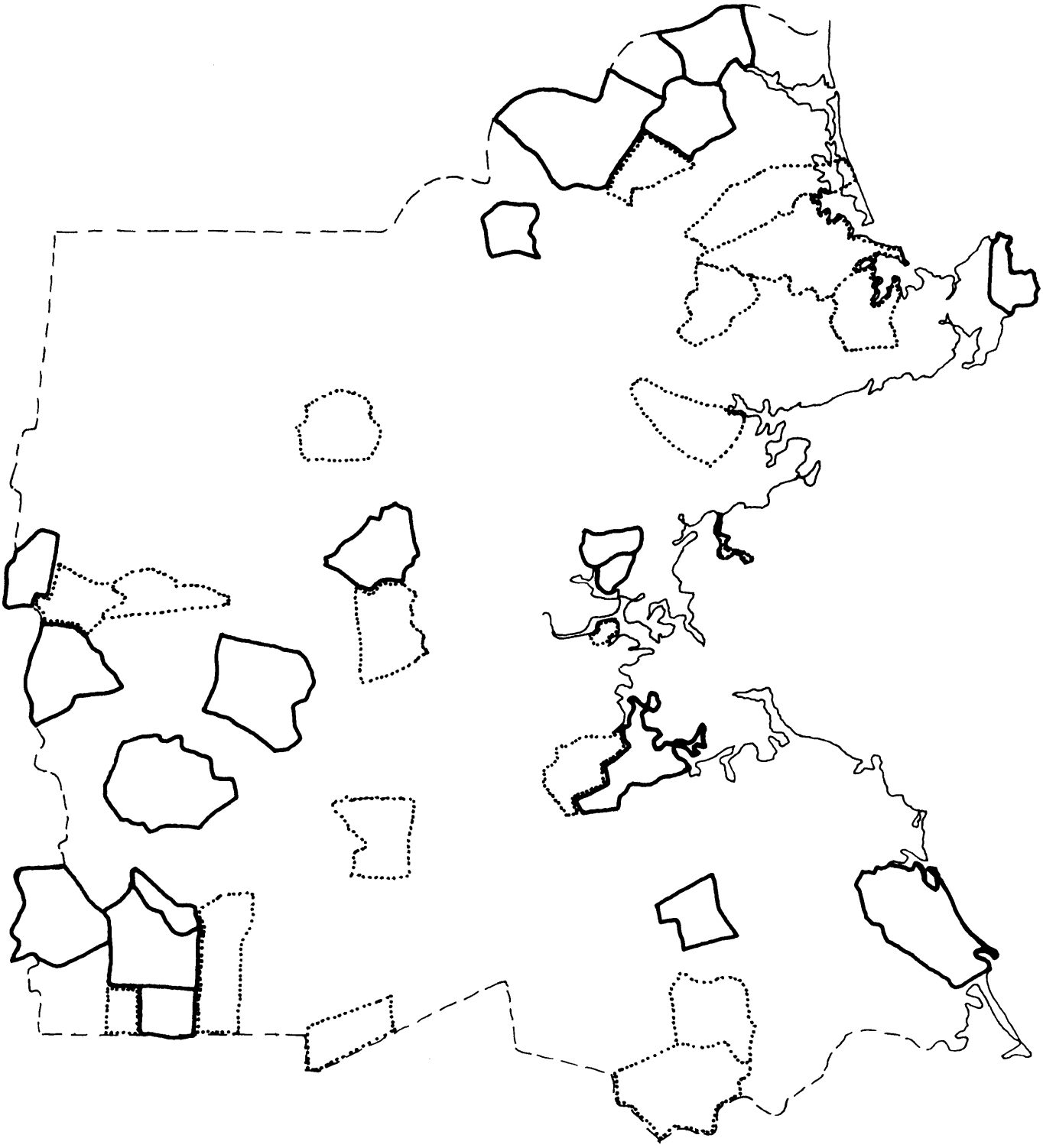
HIGH EXTREME

INCOME $7,000
FAMILIES WITH 3 OR MORE PERSONS
HIGH IMMIGRATION

LOW EXTREME

INCOME $0-3,999
SINGLE PERSONS
HIGH NET EMIGRATION
(EMIGRANTS PER IMMIGRANTS)

DYNAMIC FACTOR 2
LIFE CYCLE EMIGRATION



HIGH EXTREME

EMIGRANT'S INCOME $7,000 - $9,999

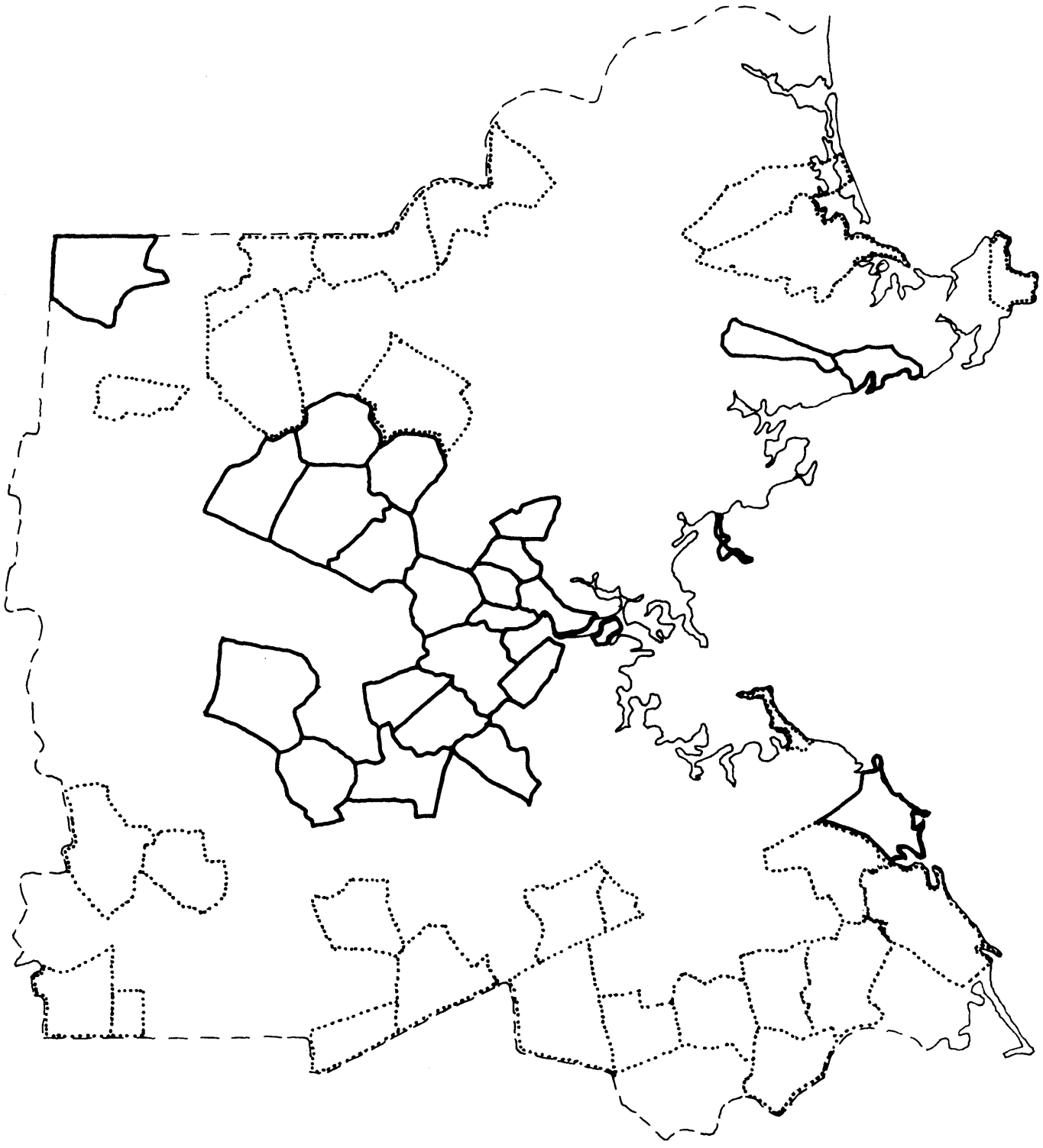
EMIGRANT FAMILIES WITH 3-5 PERSONS

LOW EXTREME

EMIGRANT'S INCOME $0 - 3,999

EMIGRANTS SINGLE PERSONS, COUPLES

DYNAMIC FACTOR 3
INCOME LEVEL MIGRATION I



HIGH EXTREME

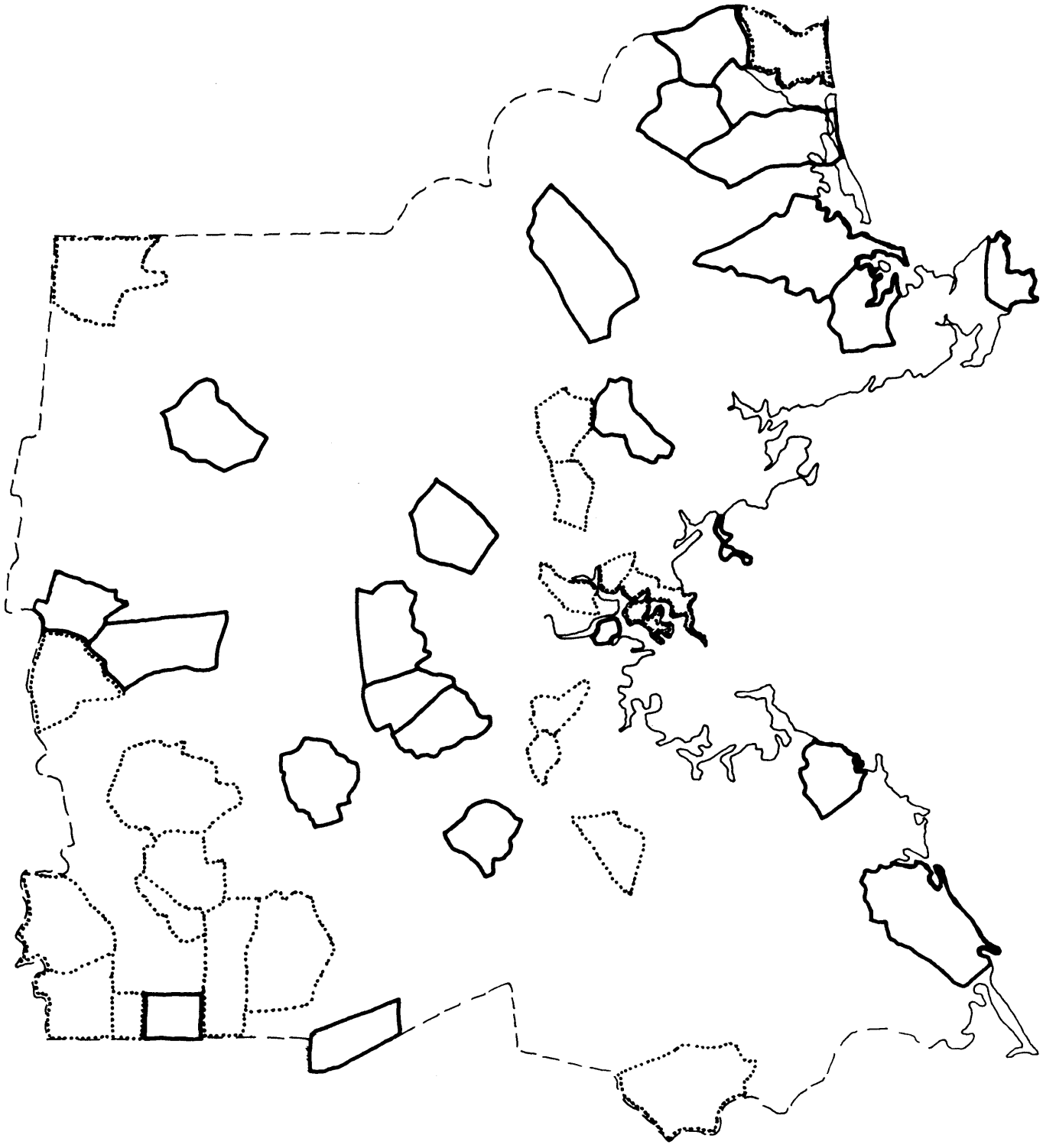
HIGH INCOME EMIGRATION
HIGH INCOME IMMIGRANTS
HIGH EMIGRATION
HIGH NET EMIGRANTS

LOW EXTREME

INCOME ($4,000-6,999) EMIGRANTS

INCOME ($4,000-6,999) IMMIGRANTS

DYNAMIC FACTOR 4
INCOME LEVEL MIGRATION II



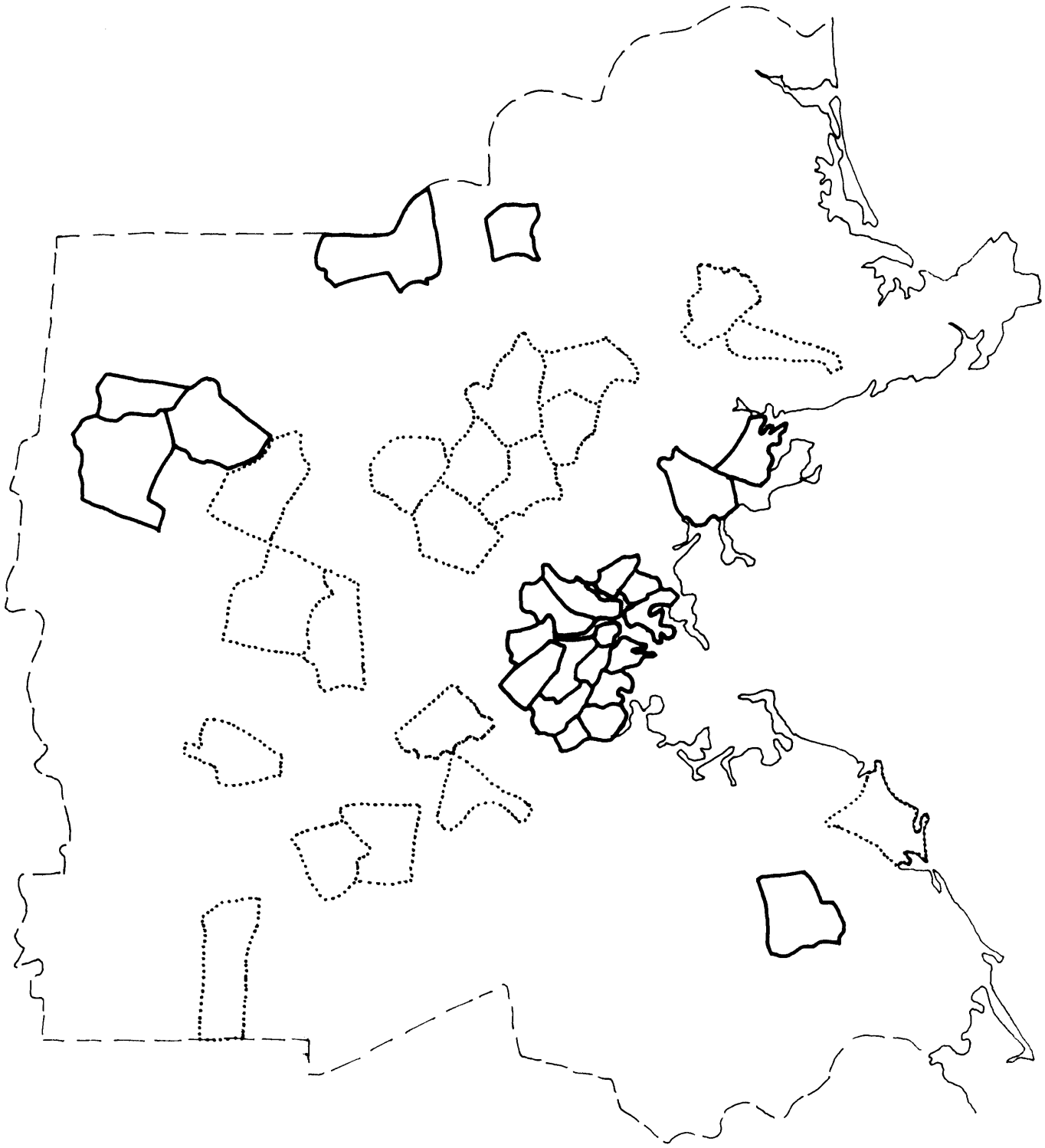
HIGH EXTREME

IMMIGRANTS HIGH INCOME
COUPLES
SINGLE PERSON EMIGRATION

LOW EXTREME

IMMIGRANTS - FAMILIES WITH
3-5 PERSONS
INCOME $4,000 - 6,999

STATIC FACTOR 1
URBANISM – SUBURBANISM



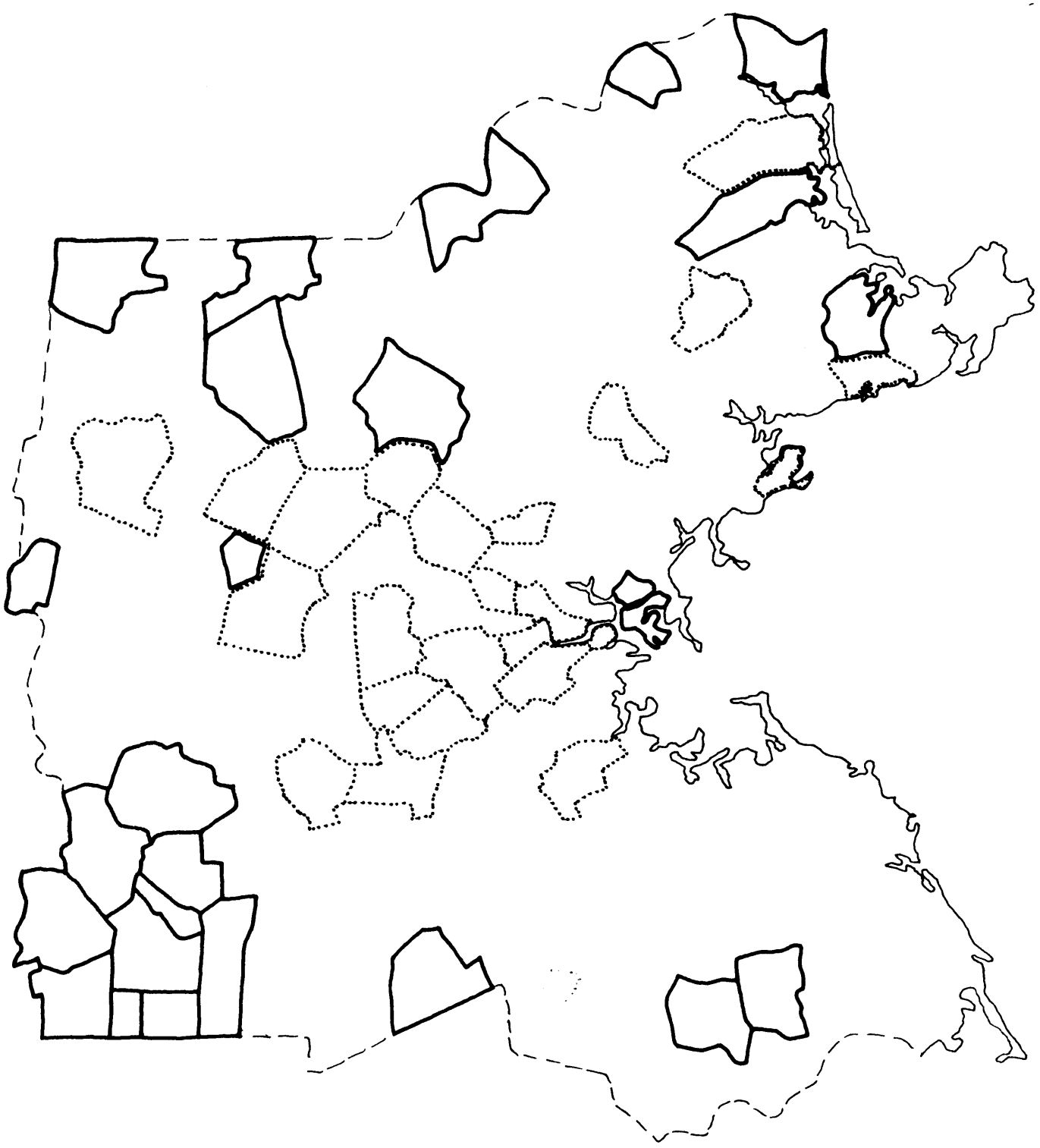
HIGH EXTREME

MULTI FAMILY HOUSING
YOUNG PERSONS - OLD PERSONS
SINGLE PERSONS
LOW INCOME

LOW EXTREME

SINGLE FAMILY HOUSING
FAMILIES WITH CHILDREN
MODERATE TO HIGH INCOME

STATIC FACTOR 2
INCOME - OCCUPATION



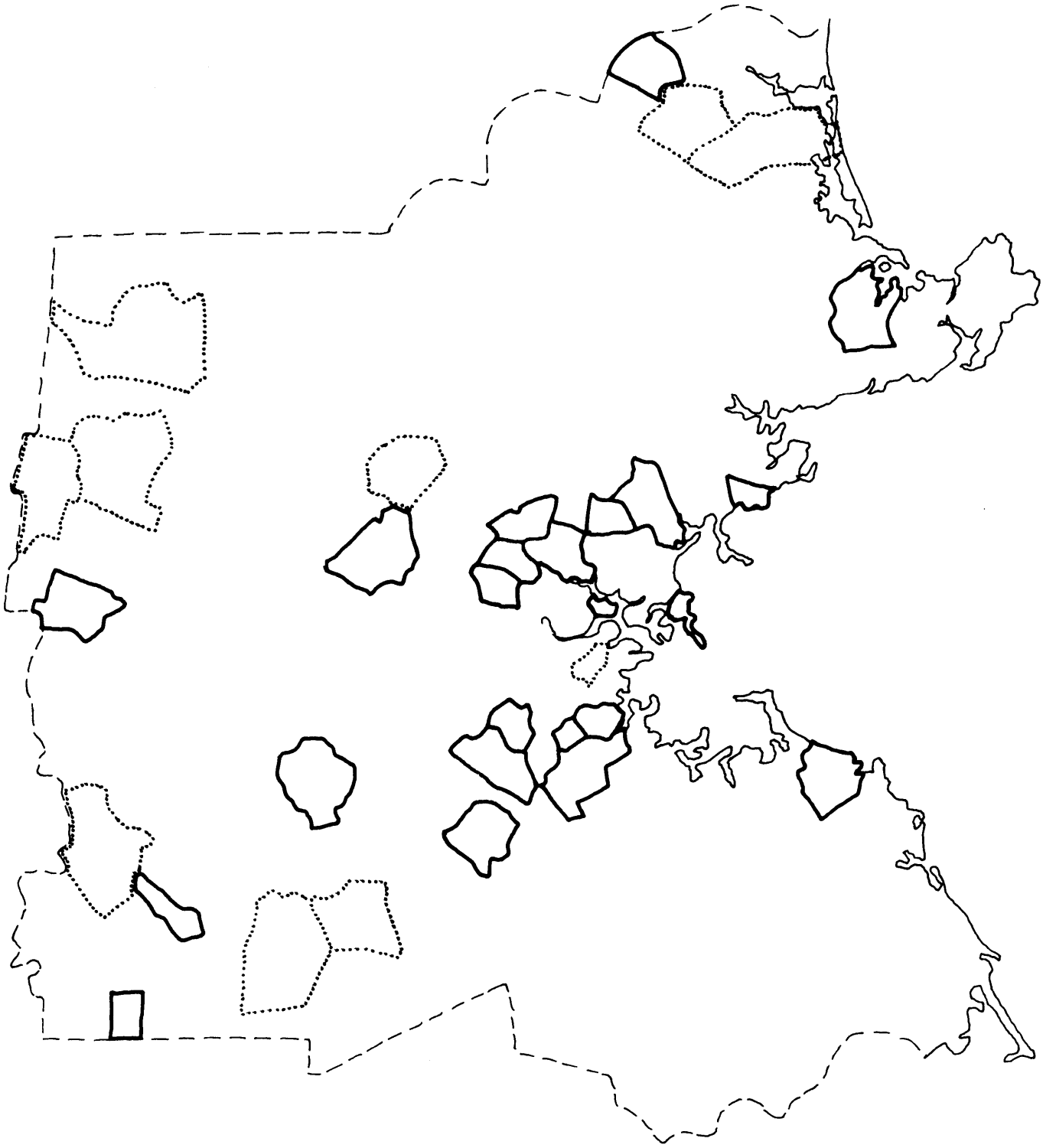
HIGH EXTREME

OCCUPATION SEMI-SKILLED
INCOME $4,000 - 6,999

LOW EXTREME

OCCUPATION PROFESSIONAL/MANAGER
HIGH INCOME

STATIC FACTOR 3
STABILITY - INDUSTRY I



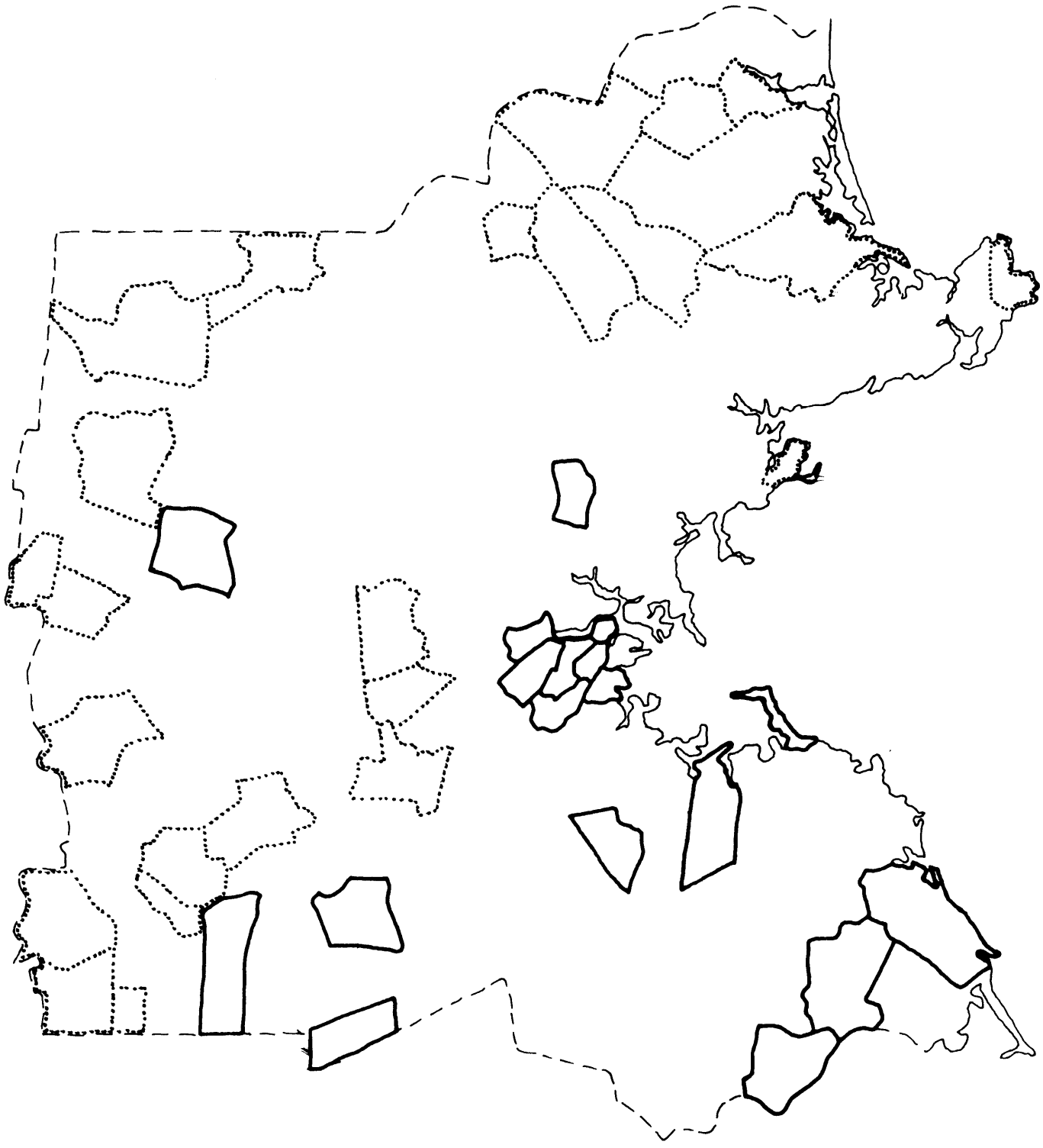
HIGH EXTREME

WHOLESALE-RETAIL
OLD PERSONS
HOUSEHOLDS AT PRESENT ADDRESS
20+ YEARS

LOW EXTREME

GOVERNMENT
HOUSEHOLDS AT PRESENT ADDRESS
0-5 YEARS

STATIC FACTOR 4
STABILITY-INDUSTRY II



HIGH EXTREME

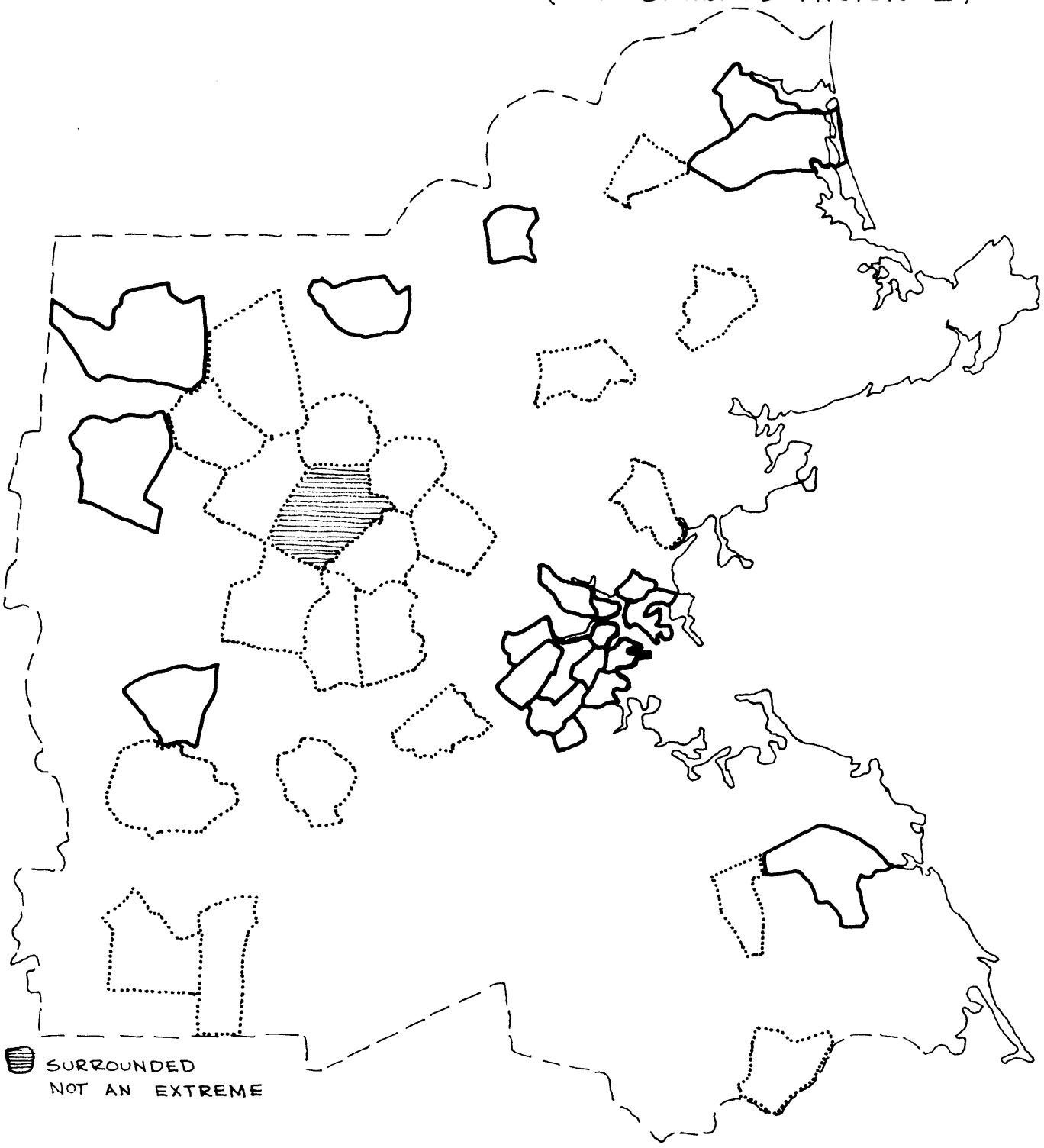
WHITE COLLAR WORKERS
HOUSEHOLDS AT PRESENT ADDRESS
0-5 YEARS

LOW EXTREME

HOUSEHOLDS AT PRESENT ADDRESS
20+ YEARS

NO AUTOS

(SEE COMBINED FACTOR 1)

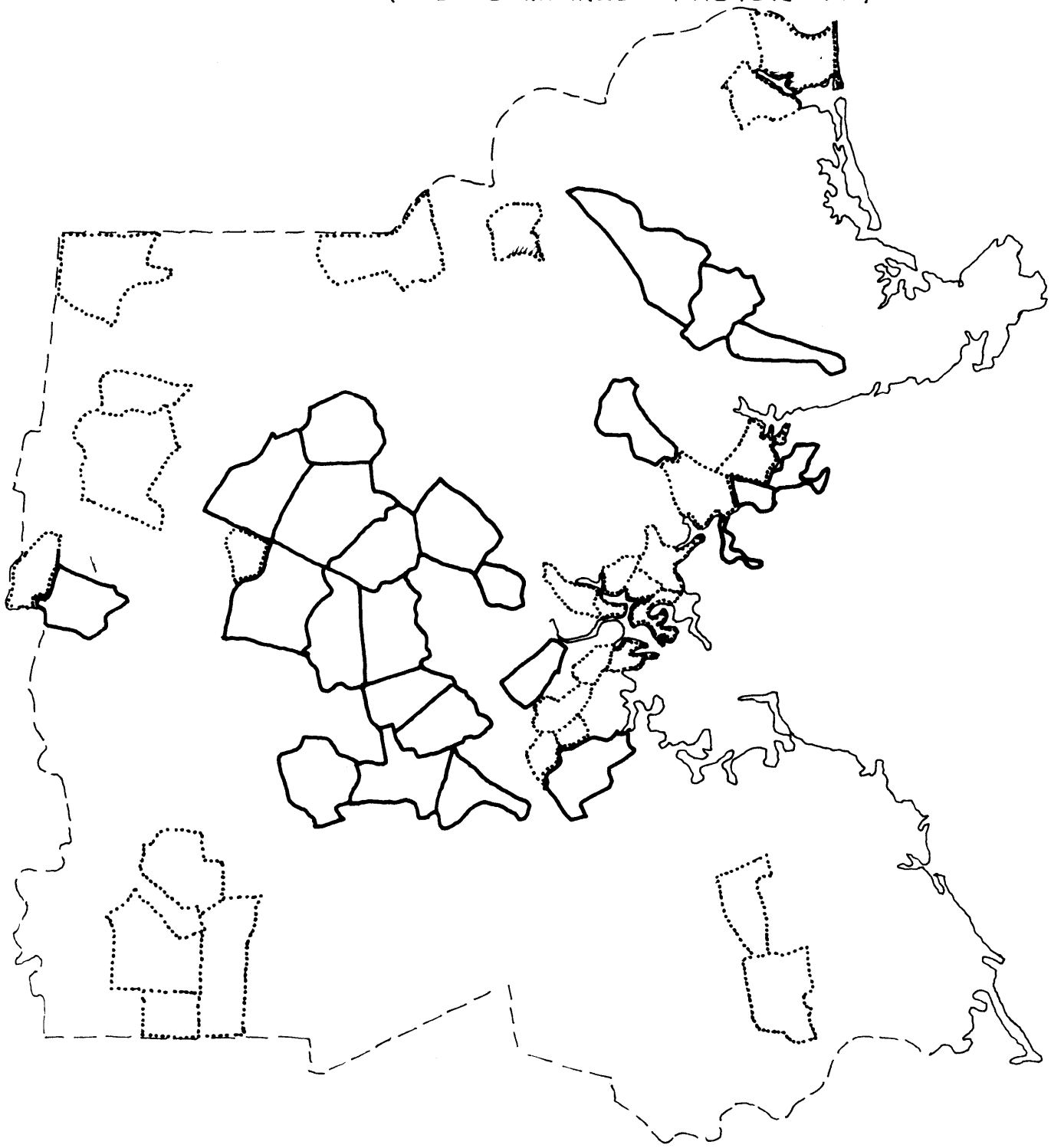


HIGH EXTREME

LOW EXTREME

OCCUPATION PROFESSIONAL-MANAGER

(SEE COMBINED FACTOR 2)

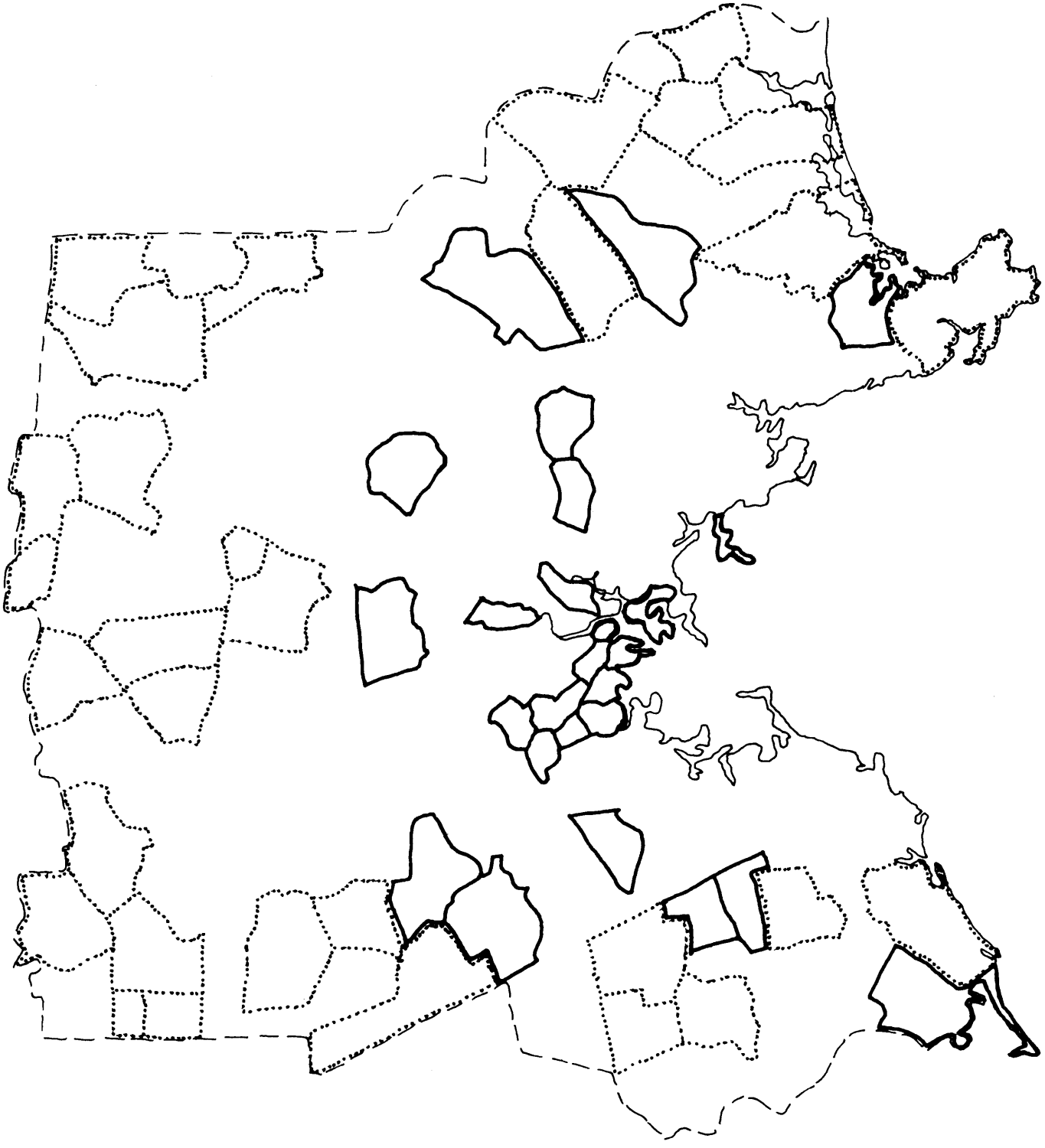


HIGH EXTREME

LOW EXTREME

EMIGRATION

(SEE COMBINED FACTOR 3)

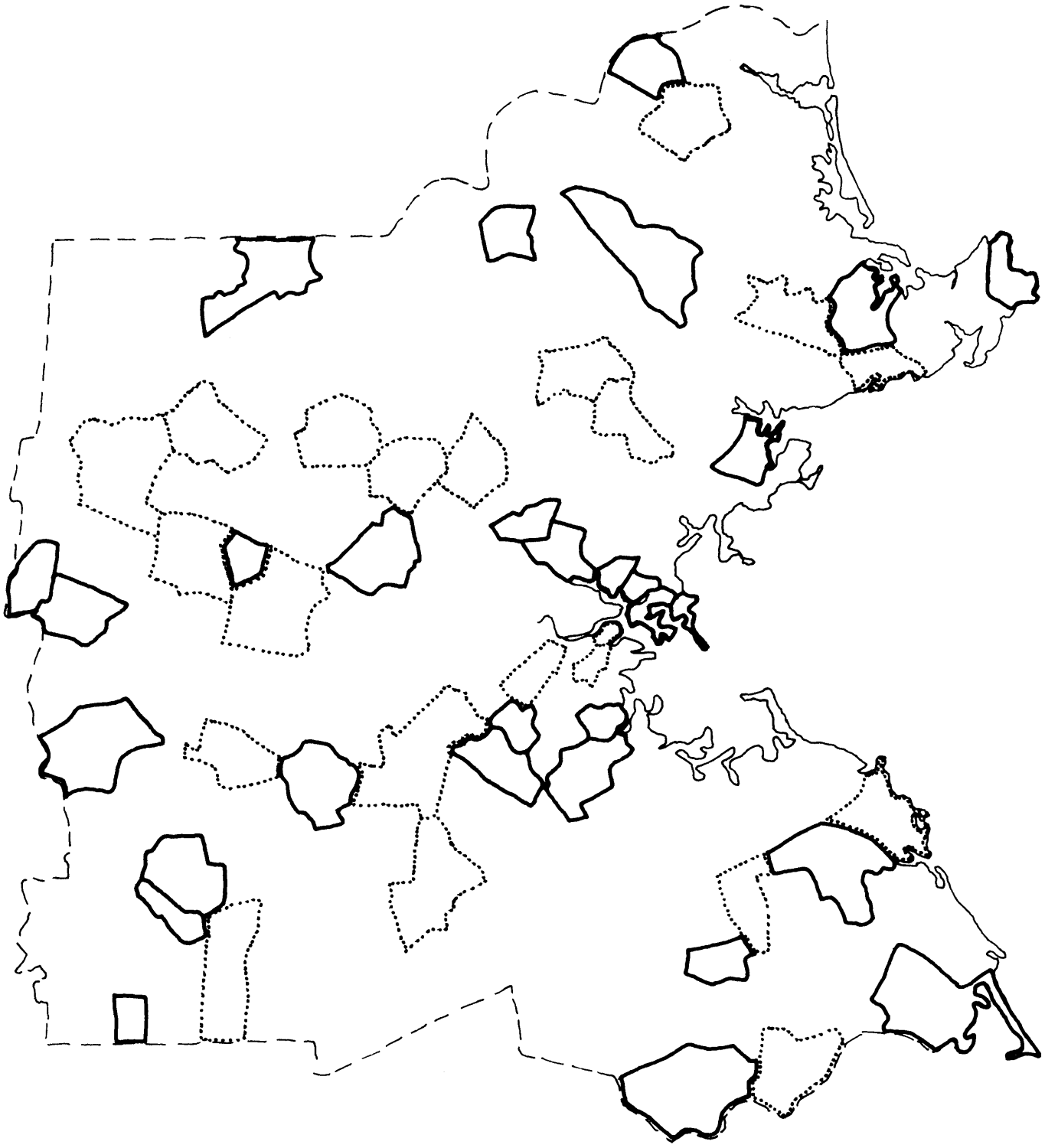


HIGH EXTREME

LOW EXTREME

SAME ADDRESS 20+ YEARS

(SEE COMBINED FACTOR 4)

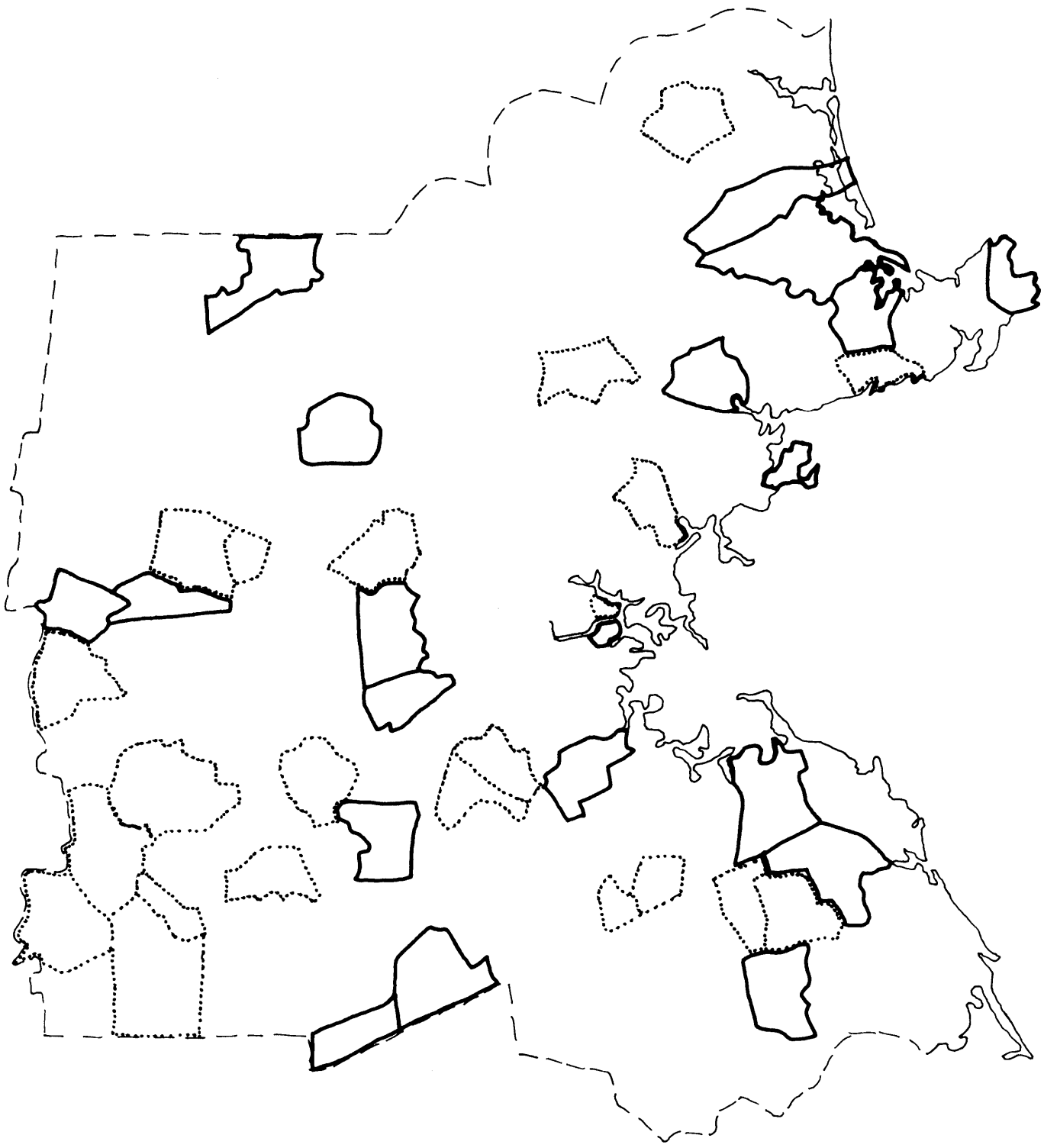


HIGH EXTREME

LOW EXTREME

EMIGRANTS - SINGLE PERSONS

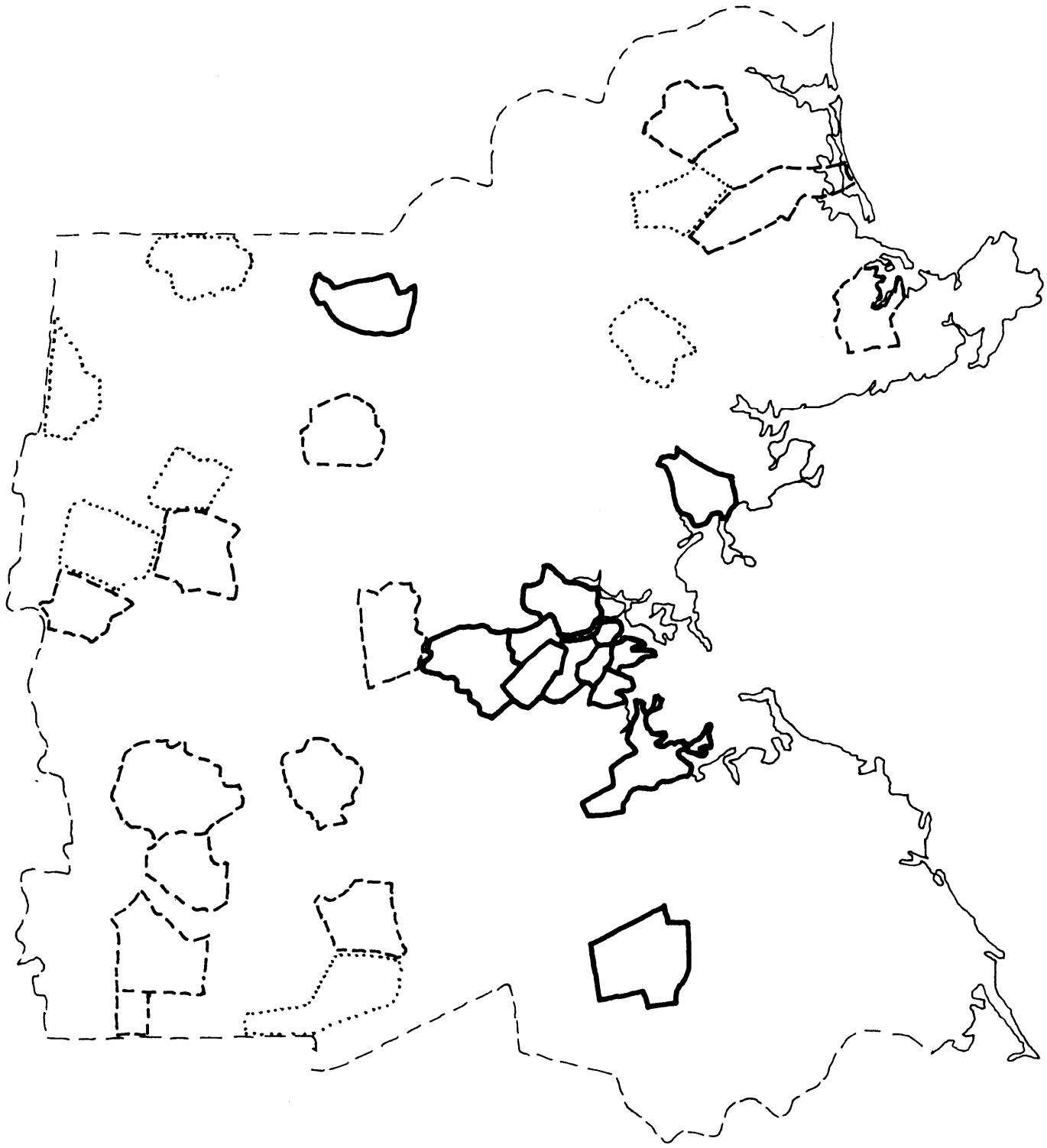
(SEE COMBINED FACTOR 5)



HIGH EXTREME

LOW EXTREME

NUMBER OF HOUSEHOLDS



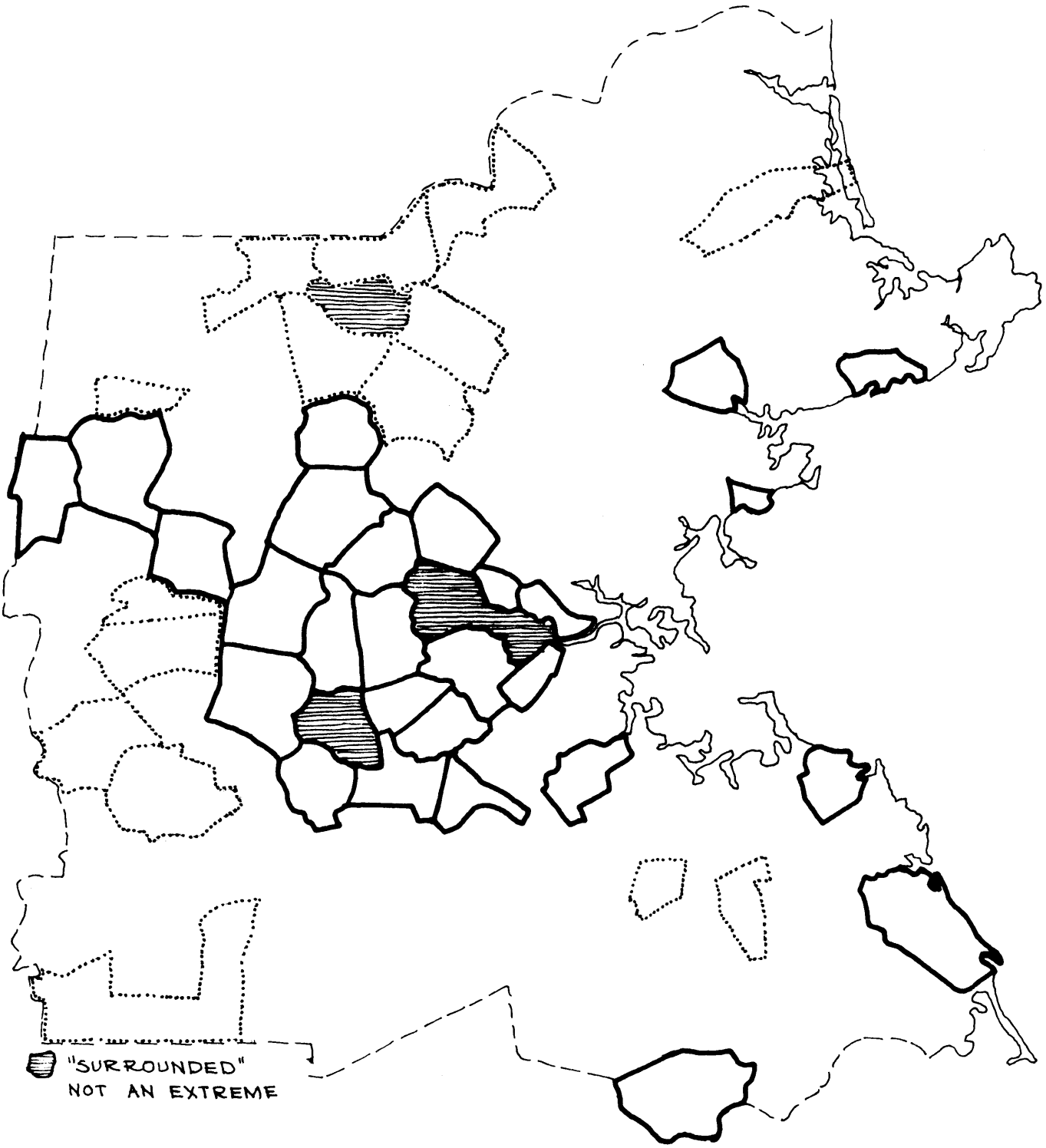
20,001 + HOUSEHOLDS

(ALL TOWNS NOT OUTLINED - 1,001 – 20,000 HOUSEHOLDS)

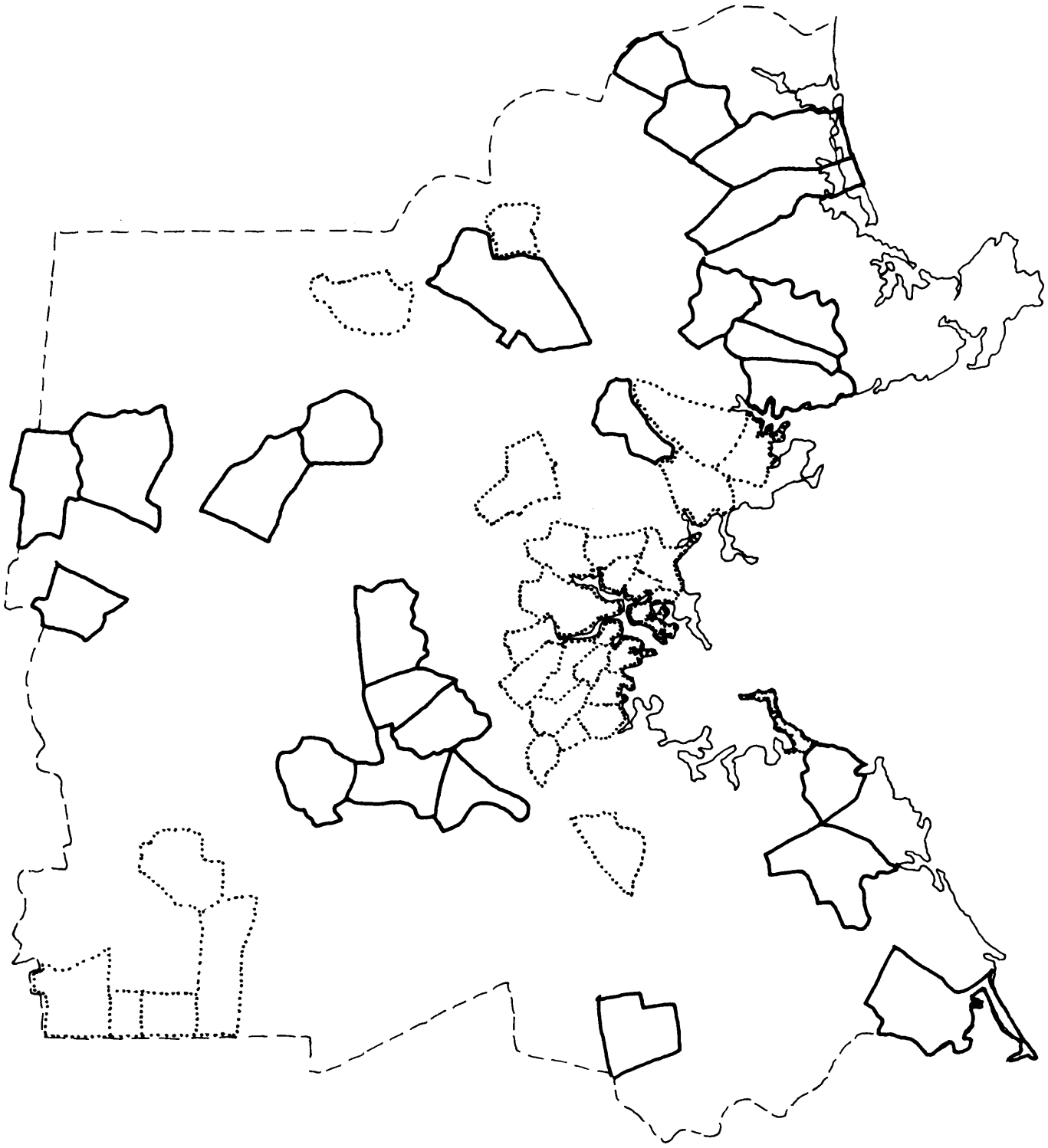
401 – 1,000 HOUSEHOLDS

0 - 400 HOUSEHOLDS (ELIMINATED: SAMPLE TOO SMALL)

PER CAPITA SCHOOL BUDGET



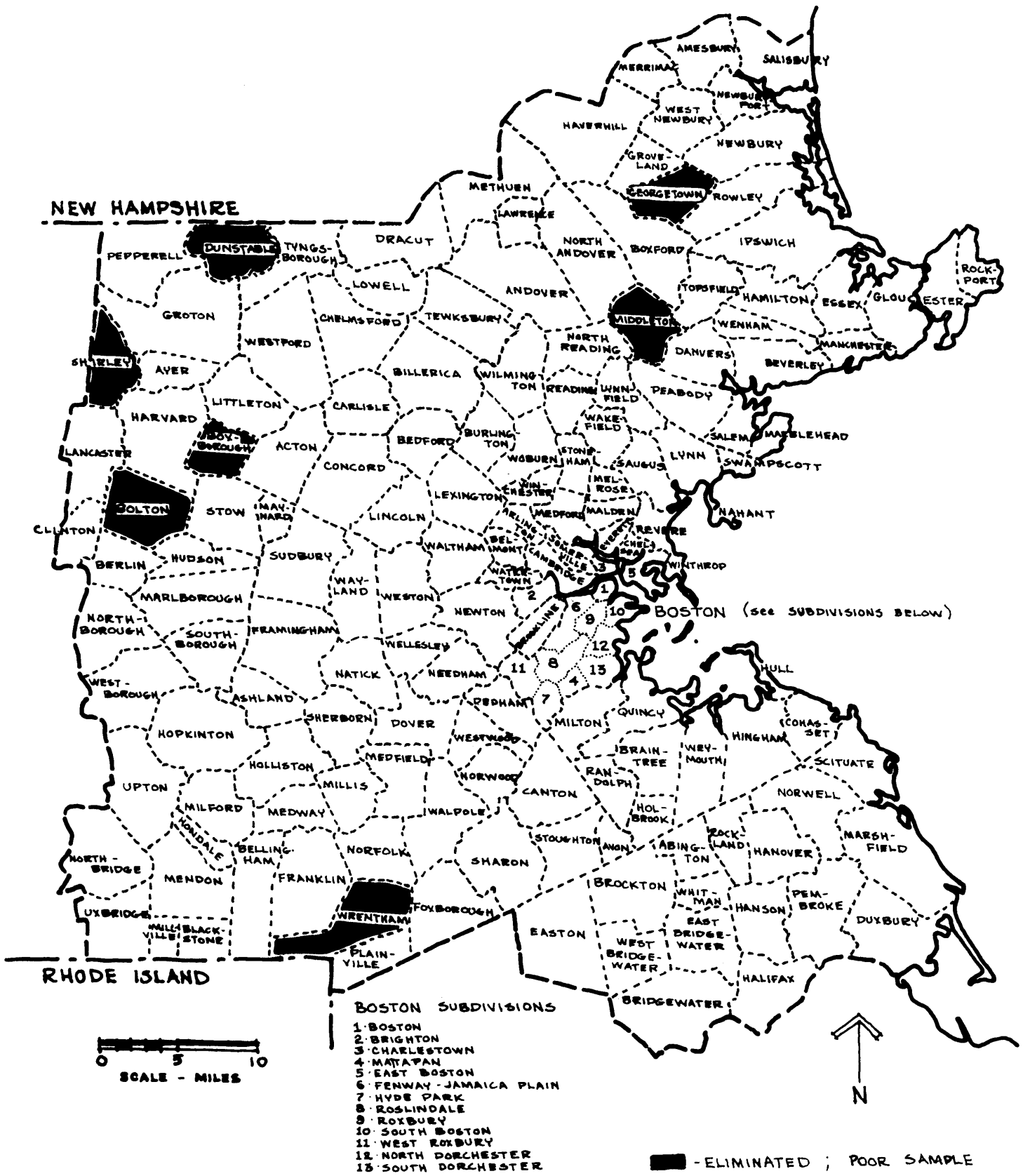
REPUBLICAN VOTE FOR PRESIDENT
1964



HIGH EXTREME

LOW EXTREME

KEY MAP OF STUDY AREA



SOURCE - BOSTON REGIONAL PLANNING PROJECT

APPENDIX A

BASIC DATA STATISTICS OF ALL VARIABLES USED IN CYCLE 2-4

BASIC DATA STATISTICS

VARIABLE DESCRIPTION	VAR NO.	N	MEAN	SD	VARIANCE	SKEWNESS	KURTOSIS
CHILDREN UNDER 5	VAR 1	157	26.223	6.992	48.887	0.317	0.444
NO AUTOS	VAR 2	157	16.019	12.476	155.662	1.522	2.582
ONE AUTO	VAR 3	157	56.554	9.892	97.852	-1.241	2.313
TWO + AUTOS	VAR 4	157	27.395	13.303	176.965	0.839	1.416
DRIVER-S LICENSE	VAR 5	157	54.134	6.755	45.632	-0.948	2.379
SINGLE FAMILY	VAR 6	157	66.121	24.935	621.750	-0.866	-0.204
MULTI FAMILY	VAR 7	157	5.433	8.479	71.889	3.039	10.492
1 PERSON PER DU	VAR 8	157	13.159	8.337	69.510	1.840	4.386
2 PERSONS PER DU	VAR 9	157	24.841	5.579	31.128	0.974	3.817
3-5 PERSONS PER DU	VAR 10	157	48.223	7.760	60.224	-0.973	1.785
6+ PERSONS PER DU	VAR 11	157	13.822	4.353	18.949	0.331	-0.070
AGE 5-9	VAR 12	157	12.707	3.159	9.978	0.161	-0.050
AGE 10-15	VAR 13	157	13.904	2.771	7.679	-0.007	0.406
AGE 16-29	VAR 14	157	19.178	4.474	20.019	2.339	12.016
AGE 30-59	VAR 15	157	41.204	3.617	13.080	-0.841	3.156
AGE 60+	VAR 16	157	13.102	4.377	19.162	0.436	0.035
OCCUPATION PROF/MAN	VAR 17	157	11.790	5.375	28.892	2.093	9.589
SALESMAN	VAR 18	157	9.032	2.679	7.177	0.407	0.217
SKILLED	VAR 19	157	6.637	2.344	5.492	0.155	0.097
SEMI-SKILLED	VAR 20	157	6.994	3.805	14.478	0.780	0.847
UNSKILLED	VAR 21	157	0.777	0.754	0.568	1.107	2.059
PERSONAL SERVICE	VAR 22	157	1.968	1.025	1.050	1.094	2.590
SCHOOL STUDENTS	VAR 23	157	27.917	5.080	25.808	-0.694	0.968
COLLEGE STUDENTS	VAR 24	157	2.350	2.801	7.845	3.618	17.605
INDUSTRY RETAIL	VAR 25	157	4.567	1.648	2.717	0.078	0.101
CONSTRUCTION	VAR 26	157	2.484	1.115	1.243	0.977	2.064
MANUFACTURING	VAR 27	157	12.975	4.626	21.401	0.674	0.550
WHOLESALE TRADE	VAR 28	157	4.268	1.821	3.317	0.081	-0.549
PERSONAL SERVICE	VAR 29	157	2.223	1.219	1.485	1.595	4.572
AMUSEMENT	VAR 30	157	0.121	0.363	0.132	3.087	9.425
PROFESSIONAL	VAR 31	157	5.038	2.304	5.311	1.196	2.159
GOVERNMENT	VAR 32	157	3.427	4.211	17.735	9.857	109.956
RENTED DU	VAR 33	157	27.822	18.982	360.312	1.129	0.777
2+ EMPLOYED	VAR 34	157	27.662	6.302	39.714	0.231	0.658
HERE 0-5 YEARS	VAR 35	157	44.121	8.469	71.724	0.715	2.040
HERE 20+ YEARS	VAR 36	157	16.573	5.946	35.353	0.467	1.451
INCOME 0-3999	VAR 37	157	13.662	7.973	63.574	0.759	0.247
INCOME 4000-6999	VAR 38	157	30.025	10.650	113.413	-0.323	0.042
INCOME 7000-9999	VAR 39	157	19.803	6.729	45.279	0.485	0.215
INCOME 10000 +	VAR 40	157	15.592	10.344	106.993	1.313	1.684
IM SINGLE FAMILY	VAR 41	157	63.459	28.533	814.108	-0.726	-0.515
EM SINGLE FAMILY	VAR 42	157	52.975	18.432	339.745	0.089	0.108
IM OWN DU	VAR 43	157	65.197	23.643	558.974	-0.730	-0.175
EM OWN DU	VAR 44	157	54.841	16.825	283.064	-0.342	0.171
IM INCOME 0-3999	VAR 45	157	10.102	8.556	73.200	0.787	-0.149
IM INCOME 4000-6999	VAR 46	157	34.000	16.121	259.885	0.411	0.801
IM INCOME 7000-9999	VAR 47	157	20.962	10.909	119.005	0.311	0.246
IM INCOME 10000 +	VAR 48	157	15.803	12.018	144.439	1.164	1.557
EM INCOME 0-3999	VAR 49	157	12.134	8.923	79.619	0.811	1.137
EM INCOME 4000-6999	VAR 50	157	31.694	13.782	189.932	-0.020	0.415

BASIC DATA STATISTICS

VARIABLE DESCRIPTION	VAR NO.	N	MEAN	SD	VARIANCE	SKEWNESS	KURTOSIS
EM INCOME 7000-9999	VAR 51	157	19.841	13.947	194.529	1.947	8.022
EM INCOME 10000 +	VAR 52	157	15.166	11.508	132.431	1.025	1.239
IM 1 PERSON PER DU	VAR 53	157	9.917	10.814	116.942	1.464	1.875
IM 2 PERSON PER DU	VAR 54	157	20.529	10.733	115.205	2.730	17.585
IM 3-5 PERSONS PER DU	VAR 55	157	54.248	13.909	193.461	-0.336	1.316
IM 6+ PERSONS PER DU	VAR 56	157	15.299	8.032	64.515	0.452	0.818
EM 1 PERSONS PER DU	VAR 57	157	14.866	11.469	131.530	1.261	2.860
EM 2 PERSONS PER DU	VAR 58	157	20.178	11.510	132.478	0.861	2.857
EM 3-5 PERSONS PER DU	VAR 59	157	49.561	14.687	215.699	-0.475	1.826
EM 6+ PERSONS PER DU	VAR 60	157	14.771	10.235	104.750	0.995	1.806
IMMIGRANTS/HOUSEHOLDS	VAR 61	157	21.747	8.332	69.416	0.201	0.091
EMIGRANTS/HOUSEHOLDS	VAR 62	157	16.980	7.448	55.475	0.452	0.346
EMIGRANTS/IMMIGRANTS	VAR 63	157	86.999	44.562	1985.798	0.790	0.205
IM NO CHILDREN UNDER 5	VAR 64	157	55.497	14.174	200.912	-0.131	1.374
EM NO CHILDREN UNDER 5	VAR 65	157	58.529	15.527	241.077	-0.315	2.381
OUTSIDERS IN SINGLE FAM	VAR 66	157	50.669	34.191	1169.037	-0.099	-1.343
OUTSIDERS INCOME 0-3999	VAR 67	157	13.739	16.842	283.645	1.580	2.308
OUTSIDERS INCOME 10000+	VAR 68	157	18.140	19.126	365.815	1.178	0.927
OUTSIDERS 3-5 PERSONS	VAR 69	157	19.013	18.006	324.204	1.965	6.041
OUTSIDERS RENTED	VAR 70	157	52.064	32.438	1052.251	0.035	-1.172
OUTSIDERS EVER PRIOR	VAR 71	157	17.344	12.698	161.232	1.612	3.410
OUTSIDERS PRIOR 5 YEARS	VAR 72	157	7.973	7.236	52.361	3.000	15.545
MILLERS PRIOR 5 YEARS	VAR 73	157	13.487	7.252	52.597	0.837	0.274
IM SAME SECTOR	VAR 74	157	52.217	22.041	485.826	-0.205	-0.331
IM CLOCKWISE SECTOR	VAR 75	157	17.892	14.993	224.797	1.192	1.715
IM COUNTERCLOCK SECTOR	VAR 76	157	16.471	14.682	215.574	1.546	4.453
IM OPPOSITE SECTOR	VAR 77	157	13.484	12.544	157.358	2.117	6.388
EM SAME SECTOR	VAR 78	157	53.611	24.869	618.480	-0.190	-0.474
EM COUNTERCLOCK SECTOR	VAR 79	157	16.682	16.017	256.548	1.474	3.282
EM CLOCKWISE SECTOR	VAR 80	157	16.191	16.134	260.295	1.327	1.845
EM OPPOSITE SECTOR	VAR 81	157	12.917	14.146	200.114	1.963	5.258
IM OUTSIDE RING	VAR 82	157	11.134	11.168	124.727	1.481	2.961
IM SAME RING	VAR 83	157	43.777	25.413	645.804	0.303	-0.890
IM INSIDE RING	VAR 84	157	45.038	28.792	828.992	-0.079	-1.060
EM INSIDE RING	VAR 85	157	31.949	25.428	646.571	0.823	0.210
EM SAME RING	VAR 86	157	45.777	20.056	402.224	-0.294	-0.175
EM OUTSIDE RING	VAR 87	157	21.637	17.126	293.289	0.276	-0.974
IM 0-10 MILES	VAR 88	157	56.580	26.625	708.881	-0.171	-1.084
IM 10-20 MILES	VAR 89	157	28.178	19.970	398.783	0.444	-0.738
IM 20-40 MILES	VAR 90	157	14.490	15.038	226.135	1.652	2.819
EM 0-10 MILES	VAR 91	157	57.815	21.568	465.195	-0.710	0.086
EM 10-20 MILES	VAR 92	157	27.439	17.567	308.603	1.195	2.001
EM 20-40 MILES	VAR 93	157	13.363	13.319	190.957	2.211	7.685
IM NEWTOWN LESS CHILD 0-	VAR 94	157	1.796	4.017	16.137	3.579	13.974
NEWTOWN SAME CHILD 0-4	VAR 95	157	94.860	16.122	259.917	-4.439	19.817
NEWTOWN MORE CHILD 0-4	VAR 96	157	3.344	15.994	255.793	4.844	22.630
NEWTOWN LESS SINGLE FAM	VAR 97	157	19.229	23.247	540.419	1.304	1.203
NEWTOWN SAME SINGLE FAM	VAR 98	157	24.752	17.624	310.620	1.107	1.473
NEWTOWN MORE SINGLE FAM	VAR 99	157	56.051	29.067	844.889	-0.524	-0.742
NEWTOWN LESS DUS W 1 PER	VAR 100	157	32.312	24.699	610.049	0.586	-0.557

BASIC DATA STATISTICS

VARIABLE DESCRIPTION	VAR NO.	N	MEAN	SD	VARIANCE	SKEWNESS	KURTOSIS
NEWTOWN SAME BUS W 1 PER	VAR 101	157	47.567	25.105	630.271	-0.090	-0.807
NEWTOWN MORE BUS W 1 PER	VAR 102	157	20.134	28.979	839.759	1.331	0.535
NEWTOWN LESS BUS W 6+PER	VAR 103	157	11.083	16.121	259.885	1.749	2.282
NEWTOWN SAME BUS W 6+PER	VAR 104	157	67.159	25.794	665.331	-0.945	0.103
NEWTOWN MORE BUS W 6+PER	VAR 105	157	21.758	28.171	793.585	1.414	0.871
NEWTOWN LESS BUS W 0 AUT	VAR 106	157	50.981	26.478	701.063	-0.151	-0.907
NEWTOWN SAME BUS W 0 AUT	VAR 107	157	28.777	18.495	342.097	0.693	0.509
NEWTOWN MORE BUS W 0 AUT	VAR 108	157	20.274	26.693	712.492	1.368	0.894
NEWTOWN LESS PERSONS 60+	VAR 109	157	24.191	26.956	726.639	0.923	-0.497
NEWTOWN SAME PERSONS 60+	VAR 110	157	60.611	23.872	569.855	-0.508	-0.651
NEWTOWN MORE PERSONS 60+	VAR 111	157	15.185	20.192	407.705	2.077	4.589
NEWTOWN LESS PROF/MAN	VAR 112	157	13.694	17.539	307.614	1.975	3.832
NEWTOWN SAME PROF/MAN	VAR 113	157	64.796	24.300	590.481	-0.843	-0.072
NEWTOWN MORE PROF/MAN	VAR 114	157	21.516	25.851	668.288	1.343	0.890
NEWTOWN LESS SKILLED	VAR 115	157	17.032	24.312	591.075	1.340	0.531
NEWTOWN SAME SKILLED	VAR 116	157	59.701	24.151	583.267	-0.526	-0.408
NEWTOWN MORE SKILLED	VAR 117	157	23.268	25.030	626.476	1.325	1.169
NEWTOWN LESS UNSKILLED	VAR 118	157	1.121	4.272	18.247	6.692	49.166
NEWTOWN SAME UNSKILLED	VAR 119	157	97.293	10.726	115.048	-6.005	39.927
NEWTOWN MORE UNSKILLED	VAR 120	157	1.586	10.018	100.357	7.260	55.170
NEWTOWN LESS SCHOOL STUD	VAR 121	157	24.911	26.069	679.572	1.041	0.098
NEWTOWN SAME SCHOOL STUD	VAR 122	157	27.892	18.370	337.447	1.109	1.484
NEWTOWN MORE SCHOOL STUD	VAR 123	157	47.229	30.923	956.240	-0.063	-1.293
NEWTOWN LESS MANUFACTURI	VAR 124	157	11.745	19.161	367.133	2.226	4.643
NEWTOWN SAME MANUFACTURI	VAR 125	157	71.242	24.233	587.215	-1.038	0.367
NEWTOWN MORE MANUFACTURI	VAR 126	157	16.994	22.860	522.592	1.776	2.691
NEWTOWN LESS INC 0-3999	VAR 127	157	36.006	26.535	704.121	0.554	-0.473
NEWTOWN SAME INC 0-3999	VAR 128	157	43.268	22.933	525.903	-0.072	-0.594
NEWTOWN MORE INC 0-3999	VAR 129	157	20.694	28.322	802.149	1.365	0.620
NEWTOWN LESS INC 10000+	VAR 130	157	22.879	21.968	482.590	1.185	1.094
NEWTOWN SAME INC 10000+	VAR 131	157	44.567	27.847	775.468	0.098	-1.026
NEWTOWN MORE INC 10000+	VAR 132	157	32.586	34.882	1216.778	0.560	-1.219
PERSONS PER HOUSEHOLD	VAR 133	157	3.439	2.416	5.839	4.756	26.868
TOTAL PERSONS	VAR 134	157	20284.350	21365.859	114124988.000	1.694	2.303
TOTAL HOUSEHOLDS	VAR 135	157	6919.471	7720.660	59608595.000	1.921	3.629
TOTAL OUTSIDERS	VAR 136	157	521.726	1015.794	1031837.195	4.394	20.922
TOTAL MILLERS	VAR 137	157	1240.522	1892.821	3582772.281	2.491	6.347
TOTAL IMMIGRANTS	VAR 138	157	1328.968	1401.064	1962981.406	1.945	3.881
TOTAL EMIGRANTS	VAR 139	157	1329.955	1788.913	3200209.094	2.342	5.835
REPUBLICAN VOTE	VAR 140	157	28.892	10.850	117.714	0.155	-0.776
PER STUD SCHOOL BUDGET	VAR 141	157	333.446	74.575	5561.407	0.396	0.884

TOTAL NUMBER OF VARIABLES = 141 *TOTAL NUMBER OF UNITS = 157

APPENDIX B

PRINCIPAL COMPONENTS FACTOR LOADINGS AND FACTOR SCORES OF CYCLE 3 - COMBINED FACTORS

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

			PRINCIPAL COMPONENTS FACTOR LOADINGS					
VARIABLE DESCRIPTION	VAR	NO.	1	2	3	4	5	COMMUNALITY
CHILDREN UNDER 5	VAR	1	.603	-.514	.037	-.210	.058	.676
NO AUTOS	VAR	2	-.874	.195	.061	-.278	.095	.893
ONE AUTO	VAR	3	.031	-.762	.084	.136	-.128	.624
TWO + AUTOS	VAR	4	.797	.382	-.122	.158	.006	.821
DRIVER-S LICENSE	VAR	5	.623	.371	-.369	.161	-.131	.705
SINGLE FAMILY	VAR	6	.896	-.122	-.208	.063	-.080	.872
MULTI FAMILY	VAR	7	-.743	.241	.166	-.177	.127	.686
AGE 5-9	VAR	8	.618	-.284	-.068	-.321	.133	.588
AGE 10-15	VAR	9	.503	-.207	-.002	-.203	.064	.341
AGE 16-29	VAR	10	-.550	.082	-.104	-.300	.016	.411
AGE 30-59	VAR	11	.508	.122	.180	.231	-.043	.360
AGE 60+	VAR	12	-.622	.147	.028	.478	-.123	.653
OCCUPATION PROF/MAN	VAR	13	.508	.678	-.051	.102	-.033	.732
SALESMAN	VAR	14	-.336	.140	.639	.302	.028	.632
SEMI-SKILLED	VAR	15	-.492	-.612	-.171	.139	-.057	.669
COLLEGE STUDENTS	VAR	16	-.319	.356	.156	.011	-.162	.279
HERE 20+ YEARS	VAR	17	-.336	-.194	.058	.492	-.315	.496
INCOME 0-3999	VAR	18	-.720	-.193	-.246	-.187	.071	.656
INCOME 4000-6999	VAR	19	-.286	-.705	-.040	-.094	-.205	.631
INCOME 7000-9999	VAR	20	.505	-.200	.097	-.065	-.012	.309
IM SINGLE FAMILY	VAR	21	.819	-.176	-.281	.018	.103	.792
EM SINGLE FAMILY	VAR	22	.335	-.179	-.120	.313	.490	.497
IM INCOME 0-3999	VAR	23	-.711	-.058	-.170	-.116	.044	.553
IM INCOME 4000-6999	VAR	24	-.182	-.623	.051	-.083	-.238	.487
IM INCOME 7000-9999	VAR	25	.315	-.119	.020	.010	-.085	.122
IM INCOME 10000 +	VAR	26	.488	.565	.039	.097	.211	.613
EM INCOME 0-3999	VAR	27	-.180	.066	-.274	-.290	-.489	.436
EM INCOME 4000-6999	VAR	28	-.114	-.239	.026	-.186	-.162	.132
EM INCOME 7000-9999	VAR	29	-.028	-.259	-.034	.268	.457	.349
EM INCOME 10000 +	VAR	30	.309	.325	.189	.104	.297	.336
IM 1 PERSON PER DU	VAR	31	-.569	.356	-.125	-.376	.025	.608
IM 2 PERSON PER DU	VAR	32	-.283	.160	-.313	.229	.193	.293
IM 3-5 PERSONS PER DU	VAR	33	.458	-.297	.284	.218	-.080	.433
IM 6+ PERSONS PER DU	VAR	34	.344	-.187	.095	-.172	-.151	.215
EM 1 PERSONS PER DU	VAR	35	.002	.396	-.254	-.176	-.539	.543
EM 2 PERSONS PER DU	VAR	36	-.006	.151	.131	-.010	-.330	.149
EM 3-5 PERSONS PER DU	VAR	37	-.092	-.187	.031	.103	.481	.286
EM 6+ PERSONS PER DU	VAR	38	.159	-.269	.036	-.031	.406	.265
IMMIGRANTS/HOUSEHOLDS	VAR	39	.529	-.079	.262	-.314	-.065	.457
EMIGRANTS/HOUSEHOLDS	VAR	40	-.062	.183	.686	-.185	-.023	.542
IM NO CHILDREN UNDER 5	VAR	41	-.501	.381	-.216	.028	.219	.491
EM NO CHILDREN UNDER 5	VAR	42	-.063	.428	-.207	-.145	-.449	.453
OUTSIDERS IN SINGLE FAM	VAR	43	.726	-.162	-.200	.040	-.057	.598
OUTSIDERS INCOME 0-3999	VAR	44	-.484	-.022	-.246	-.145	.083	.324
OUTSIDERS INCOME 10000+	VAR	45	.486	.204	.167	.069	.259	.377
OUTSIDERS 3-5 PERSONS	VAR	46	.283	-.132	.053	.058	-.216	.150
OUTSIDERS PRIOR 5 YEARS	VAR	47	-.017	.333	-.482	-.321	.315	.546
MILLERS PRIOR 5 YEARS	VAR	48	-.685	-.045	.034	.051	.108	.486
IM SAME SECTOR	VAR	49	.194	-.291	-.329	.307	-.220	.374
IM COUNTERCLOCK SECTOR	VAR	50	-.107	.124	.233	-.164	.231	.161

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

VARIABLE DESCRIPTION	VAR	NO.	PRINCIPAL COMPONENTS FACTOR LOADINGS 1	2	3	4	5	COMMUNALITY
IM OPPOSITE SECTOR	VAR	51	-.234	.310	.299	-.341	.093	.365
IM SAME RING	VAR	52	-.468	.124	.504	.280	-.207	.610
EM SAME RING	VAR	53	-.399	.035	.272	-.051	-.130	.254
NEWTOWN MORE CHILD 0-4	VAR	54	.130	-.098	-.041	-.095	-.111	.049
NEWTOWN SAME SINGLE FAM	VAR	55	-.287	-.014	-.064	-.235	.050	.144
NEWTOWN LESS DUS W 6+PER	VAR	56	-.283	.320	-.285	.233	.165	.345
NEWTOWN MORE DUS W 6+PER	VAR	57	.344	-.322	.254	-.325	.122	.407
NEWTOWN LESS DUS W 0 AUT	VAR	58	.614	-.036	.416	.052	-.129	.571
NEWTOWN LESS PERSONS 60+	VAR	59	.402	-.051	.206	-.478	.071	.440
NEWTOWN LESS PROF/MAN	VAR	60	-.413	-.300	-.053	-.100	.238	.331
NEWTOWN MORE PROF/MAN	VAR	61	.342	.701	.035	.089	-.057	.621
NEWTOWN MORE UNSKILLED	VAR	62	-.137	-.172	-.060	.036	.237	.110
NEWTOWN SAME SCHOOL STUD	VAR	63	-.199	-.091	-.053	.463	-.063	.269
NEWTOWN MORE SCHOOL STUD	VAR	64	.514	-.021	.131	-.545	.048	.582
NEWTOWN MORE MANUFACTURI	VAR	65	-.054	-.333	-.238	.197	-.006	.209
NEWTOWN SAME INC 0-3999	VAR	66	.306	-.098	.139	.131	-.052	.143
NEWTOWN LESS INC 10000+	VAR	67	-.253	-.309	-.203	-.073	-.018	.206
REPUBLICAN VOTE	VAR	68	.602	.306	-.437	-.134	-.095	.674
PER STUD SCHOOL BUDGET	VAR	69	.130	.748	.120	.092	.032	.600
LATENT ROOTS			13.891	7.073	3.638	3.483	2.945	31.029

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

UNIT IDENTIFICATION	PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT 1	-.017	-.310	-.661	-1.352	-1.033	3.429
UNIT 2	-.692	-.297	-1.290	1.028	.389	3.439
UNIT 3	-.103	.701	-.083	-.164	-.350	.659
UNIT 4	-.456	-.054	-.118	-.225	.294	.352
UNIT 5	.902	.803	-.448	-.910	-.462	2.701
UNIT 6	.078	.742	-.397	.492	-.897	1.761
UNIT 7	-.007	-.129	-.571	.426	-1.469	2.683
UNIT 9	-1.297	-.689	-1.159	-.261	1.217	5.050
UNIT 10	.708	-.632	.537	.086	-.494	1.440
UNIT 11	.754	-.357	-.046	-.884	-.170	1.508
UNIT 12	-1.117	-.656	-.950	.989	.127	3.573
UNIT 13	-.308	.429	-1.167	-.969	-1.967	6.447
UNIT 14	-1.944	-.596	-.580	.817	.209	5.181
UNIT 15	-1.519	-.473	-.239	.578	.469	3.141
UNIT 16	.727	1.596	-.966	-.019	-.016	4.011
UNIT 17	.732	1.021	.093	-.032	2.477	7.724
UNIT 18	.292	1.601	-.660	.712	-.052	3.594
UNIT 19	-.286	-.435	-1.343	.846	-.982	3.756
UNIT 20	-.494	-.793	-.139	1.353	-1.766	5.840
UNIT 22	1.041	.950	2.012	-1.835	.728	9.932
UNIT 23	-.018	.993	-1.849	-1.088	.702	6.083
UNIT 24	-.807	-.659	-.979	.101	-.785	2.672
UNIT 25	-.820	.452	-1.433	-.278	-.621	3.392
UNIT 26	.454	-.172	.680	-.363	-.332	.942
UNIT 27	-.793	.617	-1.935	1.196	.877	6.953
UNIT 28	.684	-.146	-1.073	-1.093	-2.136	7.396
UNIT 29	-1.377	-.016	-.115	.771	-.655	2.932
UNIT 30	-.584	-.587	-.032	-.404	.274	.925
UNIT 31	.562	-.742	1.579	.407	.583	3.866
UNIT 32	.178	.778	.947	1.836	-2.259	10.011
UNIT 33	1.352	1.002	.405	-.358	-.295	3.211
UNIT 34	1.141	1.143	.071	-1.101	-.090	3.834
UNIT 35	.032	.896	-1.323	-1.234	.681	4.541
UNIT 36	1.453	.704	.509	-.465	1.195	4.510
UNIT 37	-.292	.748	.953	1.242	-.090	3.105
UNIT 38	1.517	-.862	.553	-.548	.354	3.778
UNIT 39	-1.441	-.823	-1.575	-.565	.622	5.942
UNIT 40	1.195	.376	.315	-1.079	1.386	4.754
UNIT 41	.079	1.183	.622	2.386	-.272	7.564
UNIT 42	.639	-1.500	.022	-.885	.095	3.450
UNIT 44	1.240	-.602	.796	-.712	1.012	4.063
UNIT 45	-2.300	1.746	.072	-.811	.659	9.433
UNIT 46	1.709	1.055	-.978	.675	-1.398	7.400
UNIT 47	.718	-.839	.341	-.840	-.796	2.675
UNIT 48	.991	1.770	-.238	.495	.935	5.291
UNIT 49	.393	-1.261	.671	.031	-1.380	4.099
UNIT 51	-1.340	-.352	1.251	1.274	-.126	5.124
UNIT 52	.245	.573	.251	.112	1.882	4.005
UNIT 53	-.684	.341	-1.477	-1.992	.157	6.757
UNIT 54	.395	-.237	-.303	.328	-.332	.521

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

UNIT IDENTIFICATION	PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT 55	.717	-1.067	-.788	1.277	2.438	9.847
UNIT 56	1.259	1.193	.764	.434	.927	4.642
UNIT 57	1.152	1.503	-.187	1.959	.829	8.148
UNIT 58	1.112	-.124	-.366	-.628	1.278	3.413
UNIT 59	-1.117	-.530	-.422	.254	-.232	1.825
UNIT 60	-1.048	-.359	.677	.710	.061	2.192
UNIT 61	-.023	-1.054	-.437	.586	.221	1.694
UNIT 62	-.321	-1.189	-.200	.943	.050	2.449
UNIT 63	-.716	-.115	1.153	.759	-.125	2.445
UNIT 64	.140	.515	.921	.576	-.693	1.944
UNIT 65	.947	-.074	.887	-.032	1.216	3.170
UNIT 66	-.239	1.737	.361	.536	-.054	3.497
UNIT 67	1.341	-.786	.714	-1.143	.708	4.735
UNIT 68	-.133	-.752	-1.452	.087	1.189	4.113
UNIT 69	.806	-.767	.885	.090	.364	2.153
UNIT 70	1.176	2.249	-.616	2.288	.276	12.135
UNIT 72	-1.484	-.515	1.281	-.189	.604	4.509
UNIT 73	.249	-.139	1.257	-1.007	-.096	2.685
UNIT 74	.922	.185	.559	-.061	.622	1.588
UNIT 75	2.020	.734	.248	-.874	1.418	7.457
UNIT 76	.866	-.982	.877	-.852	.257	3.277
UNIT 77	.054	-.822	-.725	-1.218	-1.192	4.110
UNIT 78	.097	.310	.279	.464	-.564	.717
UNIT 79	-.815	.133	.195	.669	1.153	2.496
UNIT 80	-.710	.164	1.049	.949	.282	2.612
UNIT 81	1.591	.509	.446	-.909	.277	3.891
UNIT 82	.508	-.875	-.312	.008	-.929	1.985
UNIT 83	.882	2.788	.282	-.968	-3.462	21.552
UNIT 84	.785	-.932	.510	-.519	.146	2.035
UNIT 85	.818	1.095	.718	1.208	.179	3.876
UNIT 86	.495	-.346	1.349	.086	1.005	3.203
UNIT 87	.612	-1.729	.545	-.569	-.226	4.036
UNIT 88	.763	-1.705	-.226	-1.525	-1.988	9.819
UNIT 89	.306	-.482	.989	-.112	-.155	1.340
UNIT 90	-1.268	2.956	.695	.759	.202	11.445
UNIT 91	.750	-.179	.744	.333	.058	1.262
UNIT 92	.601	.931	-.589	.877	-.141	2.366
UNIT 93	.199	.009	.915	1.316	.402	2.770
UNIT 94	1.352	3.397	-.705	1.369	.861	16.431
UNIT 95	.306	-.993	-.950	-.352	-1.327	3.868
UNIT 96	-.556	-.607	-.849	-1.102	.400	2.771
UNIT 97	.197	-.722	.006	.051	.566	.883
UNIT 98	.521	-.473	-.355	.282	-.670	1.149
UNIT 99	.806	.913	-.373	.462	.072	1.842
UNIT 100	.890	-1.131	.282	-.627	.485	2.779
UNIT 101	.747	-.792	-.311	-.212	-.004	1.327
UNIT 102	.183	1.840	.959	1.627	-1.213	8.458
UNIT 103	1.527	1.427	.267	.246	.186	4.534
UNIT 104	.236	-1.251	-.931	-.741	-1.053	4.147
UNIT 105	.048	-.085	-.107	.723	.071	.549

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

UNIT IDENTIFICATION	PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT 106	.234	-.173	-2.990	-.634	-1.635	12.101
UNIT 107	-.454	-.076	.553	.998	-.000	1.513
UNIT 108	.172	-.379	.243	-.371	-.411	.539
UNIT 109	.962	.079	.052	-.044	-.424	1.115
UNIT 110	.267	-.721	.008	-.763	-.412	1.344
UNIT 111	.911	-.034	.483	.725	1.176	2.973
UNIT 112	.051	2.286	-.995	.367	.195	6.392
UNIT 113	1.689	-.596	.310	.136	.340	3.440
UNIT 114	.654	-.901	.431	-.341	-.010	1.541
UNIT 116	-.048	-.371	-.161	.590	.051	.516
UNIT 117	-.088	-.555	-.891	.510	-1.499	3.617
UNIT 118	-.604	-.530	-.432	.441	.492	1.269
UNIT 119	.265	.268	.497	-.907	-.024	1.211
UNIT 120	.159	-.670	-.645	-.048	-1.150	2.215
UNIT 121	1.351	-1.275	.140	-1.295	-.101	5.158
UNIT 122	1.154	-.572	.012	-.543	-.576	2.285
UNIT 123	.544	-1.251	-.097	-.982	-.571	3.161
UNIT 124	.894	.412	.014	-.285	-.403	1.212
UNIT 125	.272	-.434	.782	-.696	.599	1.717
UNIT 126	.805	-.221	-1.000	.411	.430	2.051
UNIT 127	-.386	.765	-.641	-2.077	-1.568	7.914
UNIT 128	.610	-.801	-.557	-.639	-.192	1.770
UNIT 129	1.023	-1.253	.998	.036	1.471	5.776
UNIT 130	1.179	.862	.316	-.833	1.051	4.032
UNIT 131	.524	-.594	-.369	-.387	-.504	1.157
UNIT 132	-.397	-.698	-.236	.721	-.307	1.314
UNIT 134	-1.829	-.576	1.214	.273	.153	5.250
UNIT 135	-.847	-.599	1.269	.898	-.167	3.520
UNIT 136	-.708	.304	1.707	.433	-.999	4.694
UNIT 137	-.112	.745	-1.655	.733	-2.493	10.050
UNIT 138	-1.295	-1.122	-3.876	2.240	3.234	33.436
UNIT 140	-1.570	-.878	-1.354	1.320	-.339	6.925
UNIT 141	-1.187	1.099	-3.214	-3.143	1.957	26.658
UNIT 142	-.701	-.679	-.511	1.775	-.278	4.440
UNIT 143	-.587	.717	-1.752	.491	-.867	4.921
UNIT 144	.079	-2.291	-.258	1.928	3.452	20.955
UNIT 145	-.269	-1.904	-.343	.928	-.760	5.254
UNIT 146	-.408	-1.232	.978	1.466	-2.026	8.895
UNIT 147	1.084	-.636	-.196	-.030	1.385	3.539
UNIT 148	-.876	-.906	.059	1.630	-.697	4.734
UNIT 149	-.242	1.069	-1.171	-1.120	.031	3.827
UNIT 150	.017	-.902	-1.159	-.925	-.643	3.427
UNIT 151	-.434	-1.116	-.514	.976	-.494	2.895
UNIT 152	-.052	.083	-.876	.464	.716	1.505
UNIT 153	-2.747	2.864	.213	-1.916	.277	19.541
UNIT 154	-2.289	1.274	1.003	-.305	.665	8.402
UNIT 155	-2.384	.210	.690	-2.041	1.533	12.723
UNIT 156	-1.363	.463	1.651	.388	-.538	5.236
UNIT 157	-1.981	-.688	1.190	-.605	.637	6.585
UNIT 158	-2.427	1.628	.447	-1.132	.030	10.020

RUN 3 FACTOR ANALYSIS SELECTED VARIABLES

UNIT IDENTIFICATION	PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT 159	-.288	-.617	1.583	-.653	.019	3.398
UNIT 160	-1.255	-.007	1.959	.314	-.798	6.146
UNIT 161	-2.446	.269	1.275	-3.464	.670	20.131
UNIT 162	-2.295	-.114	.913	-1.326	.536	8.159
UNIT 163	-.731	-.330	2.064	.402	-.337	5.180
UNIT 164	-1.508	.174	2.274	-1.059	-.335	8.711
UNIT 165	-1.165	.120	2.095	.966	-.323	6.799

APPENDIX C

CORRELATION COEFFICIENTS FROM CYCLE 4 - "BEST VARIABLES"

CORRELATION COEFFICIENTS

VARIABLE DESCRIPTION	VAR	NO.	1	2	3	4	5	6	7	8	9	10
CHILDREN UNDER 5	VAR	1	1.000	-.548**	.385**	.229**	.530**	-.433**	.634**	.266**	-.245**	.188*
NO AUTOS	VAR	2	-.548**	1.000	-.310**	-.708**	-.879**	.782**	-.481**	-.403**	.510**	-.422**
ONE AUTO	VAR	3	.385**	-.310**	1.000	-.451**	.084	-.218**	.150	.122	-.074	-.086
TWO + AUTOS	VAR	4	.229**	-.708**	-.451**	1.000	.763**	-.575**	.339**	.290**	-.423**	.461**
SINGLE FAMILY	VAR	5	.530**	-.879**	.084	.763**	1.000	-.779**	.543**	.474**	-.467**	.359**
MULTI FAMILY	VAR	6	-.433**	.782**	-.218**	-.575**	-.779**	1.000	-.450**	-.471**	.462**	-.347**
AGE 5-9	VAR	7	.634**	-.481**	.150	.339**	.543**	-.450**	1.000	.271**	-.399**	.150
AGE 10-15	VAR	8	.266**	-.403**	.122	.290**	.474**	-.471**	.271**	1.000	-.498**	.228**
AGE 16-29	VAR	9	-.245**	.510**	-.074	-.423**	-.467**	.462**	-.399**	-.498**	1.000	-.635**
AGE 30-59	VAR	10	.188*	-.422**	-.086	.461**	.359**	-.347**	.150	.228**	-.635**	1.000
AGE 60+	VAR	11	-.537**	.434**	-.036	-.384**	-.514**	.434**	-.613**	-.481**	.104	-.425**
OCCUPATION PROF/MAN	VAR	12	-.007	-.322**	-.462**	.644**	.353**	-.189*	.104	.108	-.295**	.353**
SALESMAN	VAR	13	-.297**	.256**	.036	-.270**	-.407**	.342**	-.431**	-.338**	.116	.005
SEMI-SKILLED	VAR	14	-.012	.277**	.366**	-.528**	-.318**	.215**	-.161*	-.127	.143	-.179*
MANUFACTURING	VAR	15	.228**	-.121	.295**	-.105	.042	-.062	.098	.005	-.124	.120
HERE 20+ YEARS	VAR	16	-.341**	.125	.219**	-.280**	-.226**	-.030	-.352**	-.047	-.110	-.037
INCOME 0-3999	VAR	17	-.294**	.632**	.113	-.677**	-.599**	.459**	-.261**	-.252**	.440**	-.547**
INCOME 4000-6999	VAR	18	.224**	.117	.572**	-.537**	-.154	.046	.088	-.089	.049	-.206**
IM NO CHILDREN UNDER 5	VAR	19	-.019**	.453**	-.281**	-.212**	-.412**	.438**	-.371**	-.251**	.235**	-.145
IM 1 PERSON PER DU	VAR	20	-.493**	.694**	-.317**	-.414**	-.531**	.559**	-.293**	-.240**	.369**	-.307**
IM 3-5 PERSONS PER DU	VAR	21	.410**	-.467**	.263**	.249**	.386**	-.473**	.250**	.225**	-.322**	.333**
IMMIGRANTS/HOUSEHOLDS	VAR	22	.523**	-.402**	.109	.297**	.465**	-.250**	.396**	.140	-.090	.122
EM NO CHILDREN UNDER 5	VAR	23	-.214**	.158*	-.267**	.050	-.077	.093	-.097	-.129	-.004	.052
EM 1 PERSONS PER DU	VAR	24	-.223**	.008	-.204*	.149	.082	.001	-.136	-.079	.065	.052
EM 3-5 PERSONS PER DU	VAR	25	.125	.050	.117	-.136	-.120	.021	-.047	.083	.008	-.088
EM INCOME 0-3999	VAR	26	-.061	.153	-.010	-.133	-.084	.099	-.035	-.158*	.188*	-.172*
EM INCOME 7000-9999	VAR	27	.133	-.092	.275**	-.119	.034	-.038	-.022	-.025	-.049	.003
EMIGRANTS/HOUSEHOLDS	VAR	28	-.026	.178*	-.073	-.107	-.233**	.247**	-.120	-.095	.051	.152
EMIGRANTS/IMMIGRANTS	VAR	29	-.383**	.463**	-.109	-.352**	-.555**	.398**	-.402**	-.199*	.112	.018
OUTSIDERS PRIOR 5 YEARS	VAR	30	-.066	.187*	-.385**	.110	-.045	.091	.077	-.114	.379**	-.231**
NEWTOWN MORE PROF/MAN	VAR	31	-.093	-.154	-.463**	.486**	.176*	-.043	-.028	.067	-.237**	.298**
NEWTOWN MORE SCHOOL STUD	VAR	32	.332**	-.296**	-.007	.283**	.406**	-.303**	.471**	.654**	-.352**	.203*
REPUBLICAN VOTE	VAR	33	.162*	-.467**	-.253**	.627**	.583**	-.473**	.290**	.317**	-.266**	.242**
PER STUD SCHOOL BUDGET	VAR	34	-.257**	.025	-.581**	.404**	-.019	.060	-.142	-.196*	.002	.117

CORRELATION COEFFICIENTS

VARIABLE DESCRIPTION	VAR NO.	11	12	13	14	15	16	17	18	19	20
CHILDREN UNDER 5	VAR 1	-.537**	-.007	-.297**	-.012	.228**	-.341**	-.294**	.224**	-.619**	-.493**
NO AUTOS	VAR 2	.434**	-.322**	.256**	.277**	-.121	.125	.632**	.117	.453**	.694**
ONE AUTO	VAR 3	-.335	-.462**	.036	.366**	.295**	.219**	.113	.572**	-.281**	-.317**
TWO + AUTOS	VAR 4	-.364**	.644**	-.270**	-.528**	-.105	-.280**	-.677**	-.537**	-.212**	-.414**
SINGLE FAMILY	VAR 5	-.514**	.353**	-.407**	-.318**	.042	-.226**	-.599**	-.154	-.412**	-.531**
MULTI FAMILY	VAR 6	.434**	-.189*	.342**	.215**	-.062	-.030	.459**	.046	.438**	.559**
AGE 5-9	VAR 7	-.613**	.104	-.431**	-.161*	.098	-.352**	-.261**	.088	-.371**	-.293**
AGE 10-15	VAR 8	-.481**	.108	-.338**	-.127	.005	-.047	-.252**	-.089	-.251**	-.240**
AGE 16-29	VAR 9	.104	-.295**	.116	.143	-.124	-.110	.440**	.049	.235**	.369**
AGE 30-59	VAR 10	-.425**	.353**	.005	-.179*	.120	-.037	-.547**	-.206**	-.145	-.307**
AGE 60+	VAR 11	1.000	-.136	.416**	.197*	-.046	.439**	.340**	.115	.312**	.243**
OCCUPATION PROF/MAN	VAR 12	-.136	1.000	-.128	-.645**	-.307**	-.208**	-.444**	-.557**	-.047	-.036
SALESMAN	VAR 13	.416**	-.128	1.000	-.076	-.267**	.215**	.003	-.017	.121	.097
SEMI-SKILLED	VAR 14	.197*	-.645**	-.076	1.000	.689**	.280**	.424**	.476**	.111	-.001
MANUFACTURING	VAR 15	-.046	-.307**	-.267**	.689**	1.000	.193*	.081	.236**	-.136	-.255**
HERE 2o+ YEARS	VAR 16	.439**	-.208**	.215**	.280**	.193*	1.000	.184*	.280**	-.013	-.052
INCOME 0-3999	VAR 17	.340**	-.444**	.003	.424**	.081	.184*	1.000	.345**	.256**	.391**
INCOME 4000-6999	VAR 18	.115	-.557**	-.017	.476**	.236**	.280**	.345**	1.000	-.100	-.017
IM NO CHILDREN UNDER 5	VAR 19	.312**	-.047	.121	.111	-.136	-.013	.256**	-.100	1.000	.504**
IM 1 PERSON PER OO	VAR 20	.243**	-.036	.097	-.001	-.255**	-.052	.391**	-.017	.504**	1.000
IM 3-5 PERSONS PER OO	VAR 21	-.286**	.040	-.053	-.043	.190*	.106	-.357**	-.034	-.584**	-.580**
IMMIGRANTS/HOUSEHOLDS	VAR 22	-.359**	.166*	-.047	-.307**	-.183*	-.481**	-.409**	-.036	-.286**	-.213**
EM NO CHILDREN UNDER 5	VAR 23	.127	.240**	-.084	-.150	-.140	-.087	.027	-.137	.175*	.254**
EM 1 PERSONS PER OO	VAR 24	.044	.228**	-.164*	-.198*	-.184*	-.067	-.040	-.153	.182*	.196*
EM 3-5 PERSONS PER OO	VAR 25	.043	-.145	.073	.065	.029	.038	.165*	.084	.109	-.076
EM INCOME 0-3999	VAR 26	.073	-.071	-.240**	.101	-.048	.041	.174*	.186*	.137	.187*
EM INCOME 7000-9999	VAR 27	.073	-.153	.137	.173*	.032	-.020	.064	.082	.131	-.135
EMIGRANTS/HOUSEHOLDS	VAR 28	-.012	.017	.376**	-.202*	-.312**	-.095	-.160*	-.087	.036	-.039
EMIGRANTS/IMMIGRANTS	VAR 29	.282**	-.175*	.300**	.123	-.070	.285**	.228**	.011	.306**	.149
OUTSIDERS PRIOR 5 YEARS	VAR 30	-.203*	.134	-.276**	-.193*	-.097	-.346**	.114	-.280**	.133	.238**
NEWTOWN MORE PROF/MAN	VAR 31	-.027	.823**	.038	-.624**	-.373**	-.149	-.297**	-.496**	.044	.023
NEWTOWN MORE SCHOOL STUD	VAR 32	-.356**	.186*	-.228**	-.324**	-.253**	-.321**	-.223**	-.122	-.214**	-.079
REPUBLICAN VOTE	VAR 33	-.347**	.513**	-.488**	-.478**	-.156	-.253**	-.320**	-.356**	-.126	-.126
PER STUD SCHOOL BUDGET	VAR 34	.113	.585**	.129	-.610**	-.431**	-.175*	-.234**	-.530**	.136	.120

CORRELATION COEFFICIENTS

VARIABLE DESCRIPTION	VAR NO.	21	22	23	24	25	26	27	28	29	30
CHILDREN UNDER 5	VAR 1	.410**	.523**	-.214**	-.223**	.025	-.081	.033	-.026	-.386**	-.066
NO AUTOS	VAR 2	-.467**	-.402**	.158*	.008	.050	.153	-.092	.178*	.463**	.187*
ONE AUTO	VAR 3	.263**	.109	-.267**	-.204*	.117	-.010	.275**	-.078	-.109	-.385**
TWO + AUTOS	VAR 4	.249**	.297**	.050	.149	-.136	-.133	-.119	-.107	-.352**	.110
SINGLE FAMILY	VAR 5	.386**	.465**	-.077	.082	-.120	-.084	.034	-.233**	-.555**	-.045
MULTI FAMILY	VAR 6	-.473**	-.250**	.093	.001	.021	.099	-.038	.247**	.398**	.091
AGE 5-9	VAR 7	.259**	.396**	-.097	-.136	-.047	-.035	-.022	-.120	-.402**	.077
AGE 10-19	VAR 8	.229**	.140	-.129	-.079	.083	-.158*	-.025	-.095	-.199*	-.114
AGE 20-29	VAR 9	-.522**	-.090	-.004	.065	.008	.188*	-.049	.051	.112	.379**
AGE 30-59	VAR 10	.353**	.122	.052	.052	-.088	-.172*	.003	.152	.018	-.231**
AGE 60+	VAR 11	-.266**	-.365**	.107	.044	.046	.073	.070	-.012	.282**	-.203*
OCCUPATION PROF/MAN	VAR 12	.046	.166*	.240**	.228**	-.145	-.071	-.153	.017	-.175*	.134
SALESMAN	VAR 13	-.053	-.047	-.084	-.164*	.073	-.240**	.137	.376**	.300**	-.276**
SEMI-SKILLED	VAR 14	-.043	-.307**	-.150	-.198*	.065	.101	.173*	-.202*	.123	-.193*
MANUFACTURING	VAR 15	.190*	-.183*	-.140	-.184*	.029	-.048	.032	-.312**	-.070	-.097
HERE 20+ YEARS	VAR 16	.100	-.481**	-.087	-.067	.038	.041	-.020	-.095	.285**	-.346**
INCOME 0-3999	VAR 17	-.357**	-.409**	.027	-.040	.165*	.174*	.064	-.160*	.228**	.114
INCOME 4000-6999	VAR 18	-.134	-.036	-.137	-.153	.084	.186*	.082	-.087	.011	-.280**
IM NO CHILDREN UNDER 5	VAR 19	-.384**	-.266**	.175*	.182*	.109	.137	.131	.036	.306**	.133
IM 1 PERSON PER DU	VAR 20	-.386**	-.213**	.254**	.196*	-.076	.187*	-.135	-.039	.149	.238**
IM 5-9 PERSONS PER DU	VAR 21	1.000	.197*	-.232**	-.152	-.165*	-.213**	.090	.031	-.130	-.209**
IMMIGRANTS/HOUSEHOLDS	VAR 22	.197*	1.000	-.072	.015	-.190*	-.010	.037	.303**	-.522**	-.160*
EM NO CHILDREN UNDER 5	VAR 23	-.232**	-.072	1.000	.454**	-.226**	.292**	-.341**	-.010	.066	.150
EM 1 PERSONS PER DU	VAR 24	-.152	.015	.454**	1.000	-.451**	.505**	-.254**	.059	-.042	.038
EM 5-9 PERSONS PER DU	VAR 25	-.165*	-.190*	-.226**	-.451**	1.000	-.232**	.188*	-.027	.176*	.009
EM INCOME 0-3999	VAR 26	-.213**	-.010	.292**	.505**	-.232**	1.000	-.166*	-.000	-.015	.017
EM INCOME 7000-9999	VAR 27	.090	.037	-.341**	-.254**	.188*	-.166*	1.000	-.077	-.114	-.064
EMIGRANTS/HOUSEHOLDS	VAR 28	.031	.303**	-.010	.059	-.027	-.000	-.077	1.000	.550**	-.285**
EMIGRANTS/IMMIGRANTS	VAR 29	-.163	-.522**	.066	-.042	.176*	-.015	-.114	.550**	1.000	-.183*
OUTSIDERS PRIOR 5 YEARS	VAR 30	-.209**	-.160*	.150	.038	.009	.017	-.064	-.285**	-.183*	1.000
NEWTOWN MORE PROF/MAN	VAR 31	-.037	.137	.276**	.212**	-.129	.009	-.114	.086	-.095	.081
NEWTOWN MORE SCHOOL STUD	VAR 32	.084	.333**	.014	.018	.009	.005	-.106	.134	-.156	-.023
REPUBLICAN VOTE	VAR 33	.061	.207**	.183*	.264**	-.167*	.094	-.139	-.223**	-.360**	.260**
PER STUD SCHOOL BUDGET	VAR 34	-.113	-.058	.254**	.201*	-.040	-.069	-.182*	.172*	.177*	.178*

RUN 4 FACTOR ANALYSIS BEST VARIABLES

VARIABLE DESCRIPTION	VAR	NO.	CORRELATION COEFFICIENTS 31	32	33	34
CHILDREN UNDER 5	VAR	1	-.093	.332**	.162*	-.257**
NO AUTOS	VAR	2	-.154	-.296**	-.467**	.025
ONE AUTO	VAR	3	-.463**	-.007	-.253**	-.581**
TWO + AUTOS	VAR	4	.486**	.283**	.627**	.404**
SINGLE FAMILY	VAR	5	.176*	.406**	.583**	-.019
MULTI FAMILY	VAR	6	-.043	-.303**	-.473**	.060
AGE 5-9	VAR	7	-.028	.471**	.290**	-.142
AGE 10-15	VAR	8	.067	.654**	.317**	-.196*
AGE 16-29	VAR	9	-.237**	-.352**	-.266**	.002
AGE 30-59	VAR	10	.298**	.203*	.242**	.117
AGE 60+	VAR	11	-.027	-.558**	-.347**	.116
OCCUPATION PROF/MAN	VAR	12	.823**	.186*	.513**	.585**
SALESMAN	VAR	13	.038	-.228**	-.488**	.129
SEMI-SKILLED	VAR	14	-.624**	-.324**	-.478**	-.610**
MANUFACTURING	VAR	15	-.373**	-.253**	-.156	-.431**
HERE 20+ YEARS	VAR	16	-.149	-.321**	-.253**	-.175*
INCOME 0-3999	VAR	17	-.297**	-.223**	-.320**	-.234**
INCOME 4000-6999	VAR	18	-.496**	-.122	-.356**	-.530**
IM NO CHILDREN UNDER 5	VAR	19	.044	-.214**	-.126	.136
IM 1 PERSON PER DU	VAR	20	.023	-.079	-.126	.120
IM 3-5 PERSONS PER DU	VAR	21	-.037	.084	.061	-.118
IMMIGRANTS/HOUSEHOLDS	VAR	22	.137	.333**	.207**	-.058
EM NO CHILDREN UNDER 5	VAR	23	.276**	.014	.183*	.254**
EM 1 PERSONS PER DU	VAR	24	.212**	.018	.264**	.201*
EM 3-5 PERSONS PER DU	VAR	25	-.129	.009	-.167*	-.040
EM INCOME 0-3999	VAR	26	.009	.005	.094	-.069
EM INCOME 7000-9999	VAR	27	-.114	-.106	-.139	-.182*
EMIGRANTS/HOUSEHOLDS	VAR	28	.086	.134	-.223**	.172*
EMIGRANTS/IMMIGRANTS	VAR	29	-.095	-.156	-.360**	.177*
OUTSIDERS PRIOR 5 YEARS	VAR	30	.081	-.023	.260**	.178*
NEWTOWN MORE PROF/MAN	VAR	31	1.000	.154	.430**	.595**
NEWTOWN MORE SCHOOL STUD	VAR	32	.154	1.000	.327**	-.048
REPUBLICAN VOTE	VAR	33	.430**	.327**	1.000	.266**
PER STUD SCHOOL BUDGET	VAR	34	.595**	-.048	.266**	1.000

* Correlation Significant at the .05 Level

** Correlation Significant at the .01 Level

APPENDIX D

PRINCIPAL COMPONENTS FACTOR LOADINGS AND FACTOR SCORES OF CYCLE 4 - A FINAL ITERATION

RUN 4 FACTOR ANALYSIS BEST VARIABLES

FEBRUARY

PRINCIPAL COMPONENTS FACTOR LOADINGS

VARIABLE DESCRIPTION	VAR NO.	1	2	3	4	5	COMMUNALITY
CHILDREN UNDER 5	VAR 1	-.601	-.486	-.148	-.296	.109	.718
NO AUTOS	VAR 2	.860	.232	-.117	-.164	.025	.835
ONE AUTO	VAR 3	.006	-.783	.047	-.025	.204	.658
TWO + AUTOS	VAR 4	-.812	.363	.073	.175	-.172	.857
SINGLE FAMILY	VAR 5	-.896	-.116	-.100	.129	-.027	.844
MULTI FAMILY	VAR 6	.761	.248	-.010	-.250	.052	.706
AGE 5-9	VAR 7	-.627	-.264	-.310	-.230	.025	.612
AGE 10-15	VAR 8	-.541	-.185	-.034	-.014	-.044	.330
AGE 16-29	VAR 9	.572	.120	-.362	-.299	-.056	.565
AGE 30-59	VAR 10	-.524	.065	.417	.194	.114	.503
AGE 60+	VAR 11	.644	.127	.284	.316	-.009	.611
OCCUPATION PROF/MAN	VAR 12	-.512	.662	.132	.116	-.088	.740
SALESMAN	VAR 13	.386	.092	.647	-.249	.083	.645
SEMI-SKILLED	VAR 14	.477	-.645	-.143	.267	-.014	.735
MANUFACTURING	VAR 15	.033	-.575	-.103	.428	-.144	.546
HERE 20+ YEARS	VAR 16	.332	-.249	.377	.569	.052	.641
INCOME 0-3999	VAR 17	.698	-.150	-.333	-.009	-.085	.628
INCOME 4000-6999	VAR 18	.293	-.646	-.148	.012	.286	.607
IM NO CHILDREN UNDER 5	VAR 19	.509	.384	-.082	.054	-.135	.434
IM 1 PERSON PER DU	VAR 20	.556	.422	-.332	-.124	.032	.614
IM 3-5 PERSONS PER DU	VAR 21	-.480	-.370	.333	.101	.079	.495
IMMIGRANTS/HOUSEHOLDS	VAR 22	-.525	-.051	-.073	-.506	.341	.656
EM NO CHILDREN UNDER 5	VAR 23	.054	.474	-.237	.277	.344	.479
EM 1 PERSONS PER DU	VAR 24	-.035	.445	-.286	.342	.542	.691
EM 3-5 PERSONS PER DU	VAR 25	.138	-.190	.171	-.234	-.512	.402
EM INCOME 0-3999	VAR 26	.155	.120	-.452	.233	.542	.591
EM INCOME 7000-9999	VAR 27	.043	-.292	.169	-.138	-.339	.250
EMIGRANTS/HOUSEHOLDS	VAR 28	.094	.185	.478	-.497	.498	.767
EMIGRANTS/IMMIGRANTS	VAR 29	.514	.140	.456	-.019	.139	.512
OUTSIDERS PRIOR 5 YEARS	VAR 30	.016	.344	-.553	-.121	-.461	.651
NEWTOWN MORE PROF/MAN	VAR 31	-.353	.697	.189	.067	-.021	.651
NEWTOWN MORE SCHOOL STUD	VAR 32	-.532	.028	-.151	-.364	.181	.473
REPUBLICAN VOTE	VAR 33	-.635	.358	-.304	.207	-.085	.674
PER STUD SCHOOL BUDGET	VAR 34	-.116	.770	.240	-.009	-.126	.679
LATENT ROOTS		8.389	5.346	2.861	2.207	1.995	20.798

RUN 4 FACTOR ANALYSIS BEST VARIABLES

UNIT IDENTIFICATION			PRINCIPAL COMPONENTS FACTOR SCORES					SUM SQUARES
			1	2	3	4	5	
UNIT	1	Easton	-.307	-.009	-.779	.239	-.340	.874
UNIT	2	Amesbury	.705	-.448	-.535	1.121	-1.188	3.651
UNIT	3	Andover	.207	.866	.513	.004	.173	1.086
UNIT	4	Beverly	.440	-.083	.083	-.356	-.023	.335
UNIT	5	Boxford	-.874	.994	-.050	.268	1.204	3.278
UNIT	6	Danvers	-.227	.687	-.019	.948	.718	1.937
UNIT	7	Essex	.209	-.003	.619	1.391	.969	3.300
UNIT	9	Gloucester	.931	-.295	-.856	.529	.182	2.000
UNIT	10	Groveland	-.730	-1.099	.110	-.651	.106	2.188
UNIT	11	Hamilton	-.947	-.155	-.298	-.622	.122	1.412
UNIT	12	Haverhill	1.244	-.784	-.379	1.847	-.810	6.372
UNIT	13	Ipswich	.126	.701	-1.574	1.515	1.953	9.096
UNIT	14	Lawrence	2.021	-.533	.157	.962	-.551	5.623
UNIT	15	Lynn	1.373	-.538	.226	.595	-.249	2.642
UNIT	16	Lynnfield	-.964	1.638	-.151	.796	.034	4.270
UNIT	17	Manchester	-.634	.930	.393	-.785	-2.081	6.370
UNIT	18	Marblehead	-.508	1.424	.261	.947	-.227	3.304
UNIT	19	Merrimac	.342	-.403	.219	2.152	.517	5.224
UNIT	20	Methuen	.559	-.930	-.110	1.481	.464	3.597
UNIT	22	Nahant	-1.101	.628	.545	-1.456	1.532	6.370
UNIT	23	Newbury	-.224	1.331	-2.042	.251	-.588	6.400
UNIT	24	Newburyport	.869	-.234	.038	1.063	.581	2.278
UNIT	25	North Andover	.527	.189	-1.304	.844	-.427	2.908
UNIT	26	Peabody	-.465	-.541	.059	.224	1.094	1.760
UNIT	27	Rockport	.523	.450	-.577	1.396	-1.312	4.480
UNIT	28	Rowley	-.738	.276	-1.614	.799	1.970	7.747
UNIT	29	Salem	1.300	-.077	.074	1.094	-.289	2.982
UNIT	30	Salisbury	.461	-.838	-.502	.382	1.127	2.583
UNIT	31	Saugus	-.631	-1.189	1.326	-1.140	-.263	4.937
UNIT	32	Swampscott	-.016	.959	1.665	.973	.469	4.859
UNIT	33	Topsfield	-1.440	.860	.086	-.027	.752	3.385
UNIT	34	Wenham	-1.158	1.455	-.947	.016	.312	4.452
UNIT	35	West Newbury	-.281	1.012	-1.683	-.406	-2.768	11.763
UNIT	36	Acton	-1.579	.458	.073	-.469	-.585	3.270
UNIT	37	Arlington	.365	.455	1.088	.116	-.020	1.538
UNIT	38	Ashland	-1.250	-.725	.226	-.949	.482	3.272
UNIT	39	Ayer	1.094	-.860	-1.678	-1.005	.162	5.790
UNIT	40	Bedford	-1.348	.132	-.171	-1.777	-.145	5.042
UNIT	41	Belmont	.006	.732	2.195	.687	.047	5.829
UNIT	42	Billerica	-.571	-1.347	-.525	-.963	.416	3.517
UNIT	44	Burlington	-1.190	-.866	-.050	-1.777	.345	5.445
UNIT	45	Cambridge	2.521	1.542	-.591	-1.088	-.587	10.611
UNIT	46	Carlisle	-1.864	.729	-.496	1.095	1.782	8.626
UNIT	47	Chelmsford	-.644	-.759	-.259	-.544	.986	2.326
UNIT	48	Concord	-1.132	1.926	.680	-.130	-1.611	8.067
UNIT	49	Dracut	-.347	-1.443	-.090	.328	.813	2.978
UNIT	51	Everett	1.453	-.462	1.785	.010	.088	5.517
UNIT	52	Framingham	-.142	.296	.092	-1.004	-1.240	2.660
UNIT	53	Groton	.394	.581	-2.213	-.719	-1.001	6.911
UNIT	54	Holliston	-.341	-.109	-.046	-.047	.316	.232

RUN 4 FACTOR ANALYSIS BEST VARIABLES

UNIT IDENTIFICATION			PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT	55	Hopkinton	-1.008	-1.296	.751	-.032	-1.624	5.899
UNIT	56	Lexington	-1.092	1.034	.945	-.044	-.896	3.959
UNIT	57	Lincoln	-.992	1.449	1.714	1.321	-1.523	10.088
UNIT	58	Littleton	-1.068	-.065	-.620	-.695	-.822	2.688
UNIT	59	Lowell	1.086	-.641	-.272	.827	-.064	2.353
UNIT	60	Malden	.994	-.364	.743	-.121	-.066	1.692
UNIT	61	Marlboro	.161	-1.315	-.410	.447	-.619	2.505
UNIT	62	Maynard	.410	-1.133	.307	.313	-.724	2.169
UNIT	63	Medford	.846	-.154	1.265	.033	-.100	2.351
UNIT	64	Melrose	-.294	.416	1.243	.342	.500	2.172
UNIT	65	Natick	-.617	-.042	.663	-.792	-.608	1.818
UNIT	66	Newton	.500	1.566	.760	.221	-.519	3.599
UNIT	67	North Reading	-1.097	-.617	-.605	-1.341	-.710	4.253
UNIT	68	Pepperell	.162	-.980	.007	.599	-1.510	3.625
UNIT	69	Reading	-1.000	-.513	.814	-.703	-.025	2.419
UNIT	70	Sherborn	-1.358	1.960	1.125	.921	-2.037	11.944
UNIT	72	Somerville	1.315	-.313	.956	-.935	.168	3.642
UNIT	73	Stoneham	-.383	-.267	.644	-.766	1.091	2.408
UNIT	74	Stow	-.808	.413	-.420	-1.148	-1.092	3.512
UNIT	75	Sudbury	-2.105	.479	-.256	-.789	-1.766	8.465
UNIT	76	Tewksbury	-.718	-1.230	-.090	-.764	.512	2.882
UNIT	77	Tyngsborough	-.222	-.599	-1.584	.894	.928	4.578
UNIT	78	Wakefield	-.129	.197	.353	.185	.116	.227
UNIT	79	Waltham	.931	-.014	.349	-.433	-.568	1.499
UNIT	80	Watertown	.800	-.139	1.330	-.479	.063	2.661
UNIT	81	Wayland	-1.734	.778	.403	-.750	-.367	4.474
UNIT	82	Westford	-.393	-.823	-.638	.412	.712	1.915
UNIT	83	Weston	-1.479	2.939	-.734	.843	2.989	21.009
UNIT	84	Wilmington	-.608	-1.021	.301	-.713	.367	2.144
UNIT	85	Winchester	-.736	.503	1.201	.661	-.260	2.741
UNIT	86	Woburn	-.396	-.622	.819	-.842	-.283	2.004
UNIT	87	Avon	-.536	-1.684	-.412	-.985	.144	4.283
UNIT	88	Bellingham	-1.064	-1.668	-1.611	-.401	1.965	10.535
UNIT	89	Braintree	-.283	-.358	.753	-.913	-.124	1.625
UNIT	90	Brookline	1.427	2.873	1.009	-.636	-.308	11.803
UNIT	91	Canton	-.597	-.104	.551	-.552	.493	1.217
UNIT	92	Cohasset	-.608	.989	.402	.980	-.241	2.527
UNIT	93	Dedham	-.058	-.189	1.698	-.237	-.299	3.069
UNIT	94	Dover	-1.641	3.217	.666	1.605	-1.340	17.859
UNIT	95	Foxborough	-.244	-.583	-.878	.736	.883	2.492
UNIT	96	Franklin	.346	-.565	-1.543	-.289	-.625	3.294
UNIT	97	Holbrook	-.317	-.790	-.117	-1.006	-.122	1.765
UNIT	98	Hudson	-.284	-.992	-.756	.279	1.103	2.931
UNIT	99	Medfield	-.675	.758	.132	1.122	.597	2.663
UNIT	100	Medway	-.825	-1.058	-.257	-.754	-.372	2.572
UNIT	101	Millis	-.851	-.658	.085	.025	.212	1.210
UNIT	102	Milton	-.130	1.700	2.210	1.835	.504	11.411
UNIT	103	Needham	-1.392	1.252	.505	.030	-.479	3.992
UNIT	104	Norfolk	-.279	-.525	-1.689	.019	1.089	4.393
UNIT	105	Norwood	.228	-.356	.293	.274	.183	.373

RUN 4 FACTOR ANALYSIS BEST VARIABLES

UNIT IDENTIFICATION		PRINCIPAL COMPONENTS FACTOR SCORES 1	2	3	4	5	SUM SQUARES
UNIT 106	Plainville	-.252	-.018	-3.320	1.840	1.287	16.125
UNIT 107	Quincy	.565	-.004	1.222	-.339	-.025	1.928
UNIT 108	Randolph	-.169	-.328	.010	-.568	.914	1.295
UNIT 109	Sharon	-.720	.198	.377	-.239	1.005	1.767
UNIT 110	Stoughton	-.244	-.545	-.791	-.253	.463	1.260
UNIT 111	Walpole	-.596	-.166	.864	-1.015	-.798	2.797
UNIT 112	Wellesley	-.129	2.162	-.006	.692	-.507	5.426
UNIT 113	Westwood	-1.566	-.066	.922	-.993	-.209	4.335
UNIT 114	Weymouth	-.378	-.470	.019	-.481	.438	.788
UNIT 116	Abington	.096	-.315	.494	-.319	-.064	.458
UNIT 117	Bridgewater	.119	-.778	.162	1.259	1.132	3.512
UNIT 118	Brockton	.602	-.624	-.323	.355	-.389	1.134
UNIT 119	Duxbury	-.135	.427	.833	-.121	.342	1.026
UNIT 120	East Bridgewater	-.224	-.536	-.643	.663	.225	1.242
UNIT 121	Halifax	-1.219	-.945	-.586	-1.683	.109	5.568
UNIT 122	Hanover	-1.033	-.640	-1.023	-.534	.785	3.424
UNIT 123	Hanson	-.555	-.780	-.344	-.165	.707	1.562
UNIT 124	Hingham	-.810	.707	-.113	.327	.886	2.061
UNIT 125	Hull	-.431	-.330	.307	-1.223	-.729	2.417
UNIT 126	Marshfield	-.372	.512	-.312	-.849	-1.190	2.634
UNIT 127	Norwell	-.016	.995	-1.311	.706	1.339	5.000
UNIT 128	Pembroke	-.600	-.433	-.931	-.614	.659	2.226
UNIT 129	Rockland	-.845	-1.297	.411	-2.048	-.289	6.846
UNIT 130	Scituate	-1.153	.594	-.427	-.701	-.267	2.428
UNIT 131	West Bridgewater	-.481	-.441	-.090	.088	-.406	.607
UNIT 132	Whitman	.414	-.825	.241	-.010	.286	.991
UNIT 134	Chelsea	1.677	-.831	.650	.487	.179	4.195
UNIT 135	Revere	.846	-.684	.993	-.112	-.063	2.186
UNIT 136	Winthrop	.944	.224	1.292	.819	.679	3.743
UNIT 137	Berlin	.213	.848	-1.633	2.291	1.890	12.251
UNIT 138	Blackstone	1.417	-1.574	-.774	.846	-3.264	16.452
UNIT 140	Clinton	1.403	-1.018	-.115	2.010	-.400	7.221
UNIT 141	Harvard	1.397	1.518	-4.634	-2.071	-2.997	39.000
UNIT 142	Hopedale	.567	-.914	1.394	2.508	-1.225	10.889
UNIT 143	Lancaster	.441	.780	-1.618	1.044	-.958	5.430
UNIT 144	Mendon	-.179	-2.282	.365	.082	-2.665	12.482
UNIT 145	Milford	.126	-1.639	.109	1.912	.201	6.411
UNIT 146	Millville	-.091	-1.986	.660	2.354	-1.235	11.451
UNIT 147	Northborough	-.910	-.615	-.359	.000	-.999	2.333
UNIT 148	Northbridge	.967	-.979	.213	1.343	-1.371	5.623
UNIT 149	Southborough	.458	1.507	-1.141	.553	-.947	4.986
UNIT 150	Upton	-.109	-.905	-1.821	.544	.411	4.611
UNIT 151	Uxbridge	.649	-1.342	-.288	1.488	-1.070	5.666
UNIT 152	Westborough	.057	-.281	.174	.491	-.866	1.103
UNIT 153	Boston	3.071	2.745	-1.045	-1.172	.858	20.167
UNIT 154	Brighton	2.489	1.252	.277	-1.661	.014	10.600
UNIT 155	Charlestown	2.466	.473	-.759	-1.976	-.762	11.367
UNIT 156	Mattapan	1.357	.498	1.268	-1.100	1.120	6.164
UNIT 157	East Boston	1.492	-.602	1.108	-.089	.886	4.609
UNIT 158	Fenway, Jamaica Plain	2.422	1.715	-.635	-1.559	.228	11.691

RUN 4 FACTOR ANALYSIS BEST VARIABLES

UNIT IDENTIFICATION			PRINCIPAL COMPONENTS FACTOR SCORES					SUM SQUARES
			1	2	3	4	5	
UNIT	159	**Hyde Park**	.200	-.572	.858	-1.399	1.088	4.245
UNIT	160	**Roslindale**	1.269	.091	1.329	-1.611	1.694	8.849
UNIT	161	**Roxbury**	2.175	.858	-.969	-2.268	1.626	14.197
UNIT	162	**South Boston**	2.003	.178	.013	-.770	.786	5.254
UNIT	163	**West Roxbury**	.955	-.191	1.669	-.524	1.264	5.605
UNIT	164	**North Dorchester**	1.771	.327	1.056	-1.646	1.237	8.600
UNIT	165	**South Dorchester**	1.380	-.019	1.645	-.546	1.024	5.956

Attachment to:

INTRA-METROPOLITAN MIGRATION AND
TOWN CHARACTERISTICS
by
WILLIAM L. CLARKE
(M.C.P. Thesis, February 7, 1967)

SUPPLEMENTARY APPENDIX E

INTERPRETING THE RESULTS OF THE FACTOR ANALYSIS

Factor Analysis generalizes a large number of measures ("variables") of a set of units (the units of analysis) into a much more limited set of measures ("Factors") of the same units. These factors are created according to different criteria. In general the intent is to explain the most variability in the data with the least number of factors.

In factor analysis the factors are new variables each of which is defined in terms of weightings of all the original variables. The "factor loadings" indicate the weighting of each original variable on each factor. It is perhaps helpful to think of the factor loading as the correlation of the factor to the variable. A negative loading would be thought of as an inverse correlation. By way of example: In Appendix B we note that "Single Family" (Household lives in a Single Facily dwelling unit) is the variable which is most heavily weighted (0.896) on Factor 1. The positive sign indicates that the relation is direct. "No Autos" (Household possesses no automobile) is weighted second highest (-0.874) but the negative sign indicates that the relation is inverse.

If as many factors are produced as there are original variables all variance can be explained. This clearly is of no value in generalizing the data. The objective is to explain a high degree of the variance in terms of the first few factors. The computer program will compute as many factors as there are variables. However, a stopping criterion is generally used to terminate the computer program after it has produced the factors with highest explaining power. Here the computer program was stopped by the first reached of the following:

Maximum number of factors equals 8, Minimum Latent Root (a measure of the amount of variance explained by an individual factor) equals 1.00, Minimum percent of communality equals 10.00.

The communalities (at the right of the page in Appendix B) indicate the degree to which the variance on an individual variable is explained by the factors produced (five in this case). Thus in Appendix B 0.872 of the variance of the variable "Single Family" is explained by the five factors. At the bottom right hand corner of this table in Appendix B we see the figure 31.029 at the juncture of the communalities and the latent roots. This number when compared with the number of variables indicates the total amount of variance explained -- in this case 31.029/69 X 100 equals 45% variance explained.

As I indicated above the factors can be chosen according to different criteria. The criterion that was used in the analysis in this study was that as much variance as possible be explained by the first factor and as much of the remaining unexplained variance by the second factor and so forth until one of the stopping criteria is reached. (Another criterion that might have been used is that the second factor be completely independent (orthogonal) to the first and the third orthogonal to each of the first two and so forth.)

We note in Appendix B a second table of "Factor Scores" against units (for an identification of the units in terms of towns see the similar table in Appendix D). The factor score indicates the position that a unit (here town) occupies on the factor. Thus the town scoring the highest on factor 1 was Unit 75 (Sudbury) which scored 2.020 and the town that scored the lowest was Unit 153 (Downtown Boston) which scored -2.747. If we suppose that this factor indicates a suburban-urban dichotomy Sudbury is the most suburban and downtown Boston the most urban.

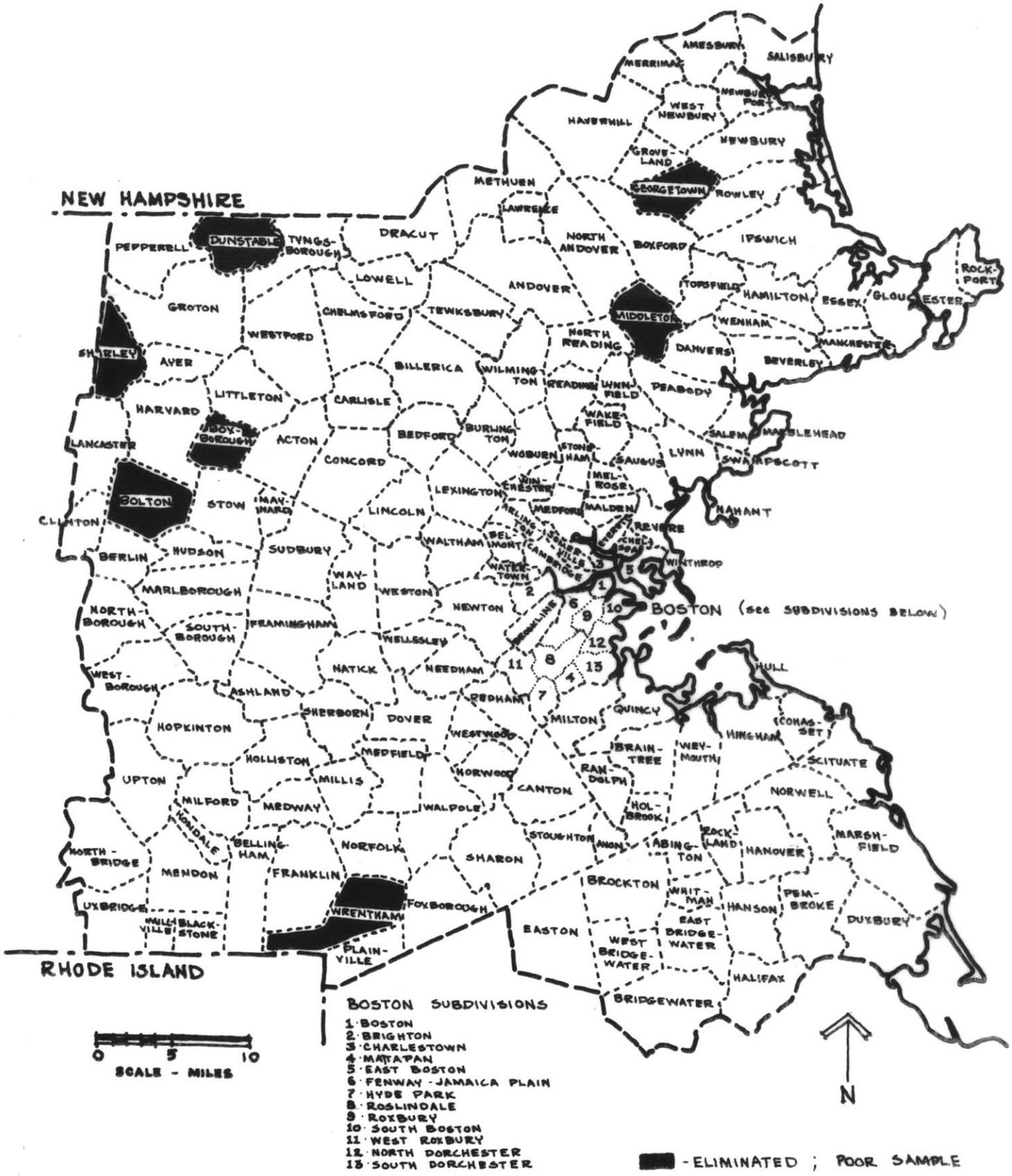
The difficult part of factor analysis comes in the interpretation of the factors. Controversy over the applicability of factor analysis has centered around this interpretation of the factors. The problem is that a town could conceivably have a high score either by scoring high on some of the strongest variables in the factor or by scoring high on many of the weaker variables in the factor.

Here I used the following general procedure to interpret the factors. The variables which weighted heaviest in a factor were considered to determine if there was some common "theme" which the factor appeared to center around. A label then was attached to the factor indicating what this common theme was. For example, weighted heavily in the first factor in the final stage (combined Factor Analysis) were such as: the presence of automobiles, the presence of single family housing, and the lack of multi family housing. The theme this suggested to me and hence which I labelled the factor was that of "Suburbanism - Urbanism". Likewise, I labelled each of the other factors.

SUPPLEMENTARY APPENDIX F
(under separate cover)

BASIC DATA INPUTS: ALL VARIABLES CROSS-TABULATED AGAINST TOWNS

KEY MAP OF STUDY AREA



SOURCE · BOSTON REGIONAL PLANNING PROJECT