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AN ABSTRACT OF THE THESIS OF

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Geographic Information Systems (GIS) have become an essential tool for evaluation and monitoring the biophysical data of natural landscapes. This study addresses the potential for using GIS in the social assessment of human landscapes that are associated with geographic regions of interest. Using the communities surrounding Oregon's federally designated Central Cascades Adaptive Management Area (CCAMA) as a case study, this project attempts to incorporate primary and secondary socio-economic data into map layers suitable for assessment and monitoring purposes. The purpose is two-fold: to provide the responsible resource management agencies (Forest Service and Bureau of Land Management) with useful information about their constituent communities and to test the value of GIS as an aid in the social assessment process.

Initially, population density maps and interviews with community leaders and agency personnel were used to derive maps of aggregate census blocks for spatially defined relevant communities within the study area. These "community maps" became the basis for analyses of the human ecology and provided a method for assessing community well-being.

This study replicates protocols established on the Sierra Nevada Ecosystem Project (SNEP) and two products have resulted. First, a socio-economic scale has been developed drawing on data from the Housing and Population Census. Variables of interest include housing tenure, poverty level, education, employment, and public assistance and have been used to indicate a measure of community well-being. Second, a community capacity scale has been constructed based on quantitative survey data from key informants. This scale includes composite measures of physical infrastructure (e.g. condition of the infrastructure, financial resources, emphasis on quality of business and community), human capital (e.g. support for education, knowledge of the environment, awareness of competitive markets, use of information resources), and social capital or civic responsiveness (e.g. ability to work together, levels of volunteerism, multi-generational family orientation). The two scales combine to provide an assessment of community well-being.

The data from the socio-economic and community capacity scales are plotted on the community maps in the GIS. This allows land managers to visualize the relative differences in their constituent communities. It also provides baseline information and a methodology to continue monitoring social time series data.

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The Capability of a GIS to Contribute to the Social Assessment of Forest Communities: A Case Study of the Central Cascades Adaptive Management Area

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Tenley Boehm Burke, Author

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THE CAPABILITY OF A GIS TO CONTRIBUTE TO THE SOCIAL ASSESSMENT OF FOREST COMMUNITIES: A CASE STUDY OF THE CENTRAL CASCADES ADAPTIVE MANAGEMENT AREA

Introduction

This study addresses the potential for utilizing a Geographic Information System (GIS) to aid in the social assessment effort of the Central Cascades Adaptive Management Area (Central Cascades AMA). The impetus for this project derived from the Central Cascades AMA managers' interest in incorporating social data into their predominantly bio-physical GIS atlas. In most natural resource management agencies, information about stakeholders has largely been lacking. Most information has been generated by other sources (e.g., Census Bureau, County Assessors Office, etc.) and collected for other purposes. Only recently have attempts been made to rectify the imbalance between bio-physical and social data collection and analysis in natural resource settings.

The use of GIS in ecosystem management has proliferated in the past decade. GIS technology, which allows the storage and layering of maps digitally, has increased the efficiency of land management. With its ability to combine map layers of soil, vegetation cover, aspect, slope, drainage, roads, structures, and other such spatial data, a GIS enables managers to better assess the components of an ecosystem to make more informed management decisions. If GIS proves to be a suitable format for displaying socio-economic data about human populations, the base of available information will become richer and a clearer picture of the ecosystem will come into focus by allowing a multiple element analysis.

This project also addresses managing agencies' need for greater insight to their local communities and associated publics. The need for assessing human ecology has become increasingly apparent in the Pacific Northwest in the past decade. Given the amount of litigation (e.g., timber harvest injunctions on federal forests) and the ensuing Northern Spotted Owl versus jobs controversy in the late 1980's, it is clear people have become increasingly more concerned and vocal regarding management of public forest land. The Northwest Forest Plan (USDA & USDI, 1994), developed in answer to the controversies surrounding the management of federal forests, provides guidelines for balancing the range of ecosystem components including wildlife habitat requirements, watershed needs, timber harvest, and jobs. The plan challenges managers to be particularly concerned with the needs of people in local forest communities, and established ten adaptive management areas (AMAs) as places to experiment with and learn how to do adaptive ecosystem management.

The need for this type of study is elucidated in at least two different sources that target potential research goals. In a research needs assessment of all ten AMAs in the Pacific Northwest, Doak (1994) reported that social processes are among the top three broad areas of knowledge and skills to be developed, indicating a strong need for social assessment and monitoring systems. Cissel (1995) included monitoring human effects on community and developing efficient, socially-based monitoring methods in his list of research needs on the Central Cascades AMA.

The role of a monitoring system is inherent to the success of social research efforts. This regularized, systematic collection of data about the human ecology represents a key source of feedback and learning. The monitoring of social information, such as demographics or resident's attitudes, has been historically limited in forest management. Yet, monitoring social variables is crucial for understanding the evolving community

environment in which people reside and interact and within which resource management decisions are undertaken.

By collecting community-based information and constructing map layers, the study will also be able to test the applicability of GIS technology for displaying and assessing socio-economic information at the community scale. The usefulness of a GIS for this type of study has not yet been fully investigated. Thus far, map layers have been created for regional (e.g. county, multi-county, state) assessments using census data at the county level (Machlis et al, 1994). This study will test the appropriateness of GIS analysis for small scale assessments using data at the block group level.

This project is also an effort in adaptive management. Adaptive management applies the concept of "experimentation as policy" to test hypotheses about the response of the ecosystem being altered by human interaction (Lee, 1993). A key element of the adaptive management concept is flexibility in adapting practices to local circumstances by relying on the experience and ingenuity of resource managers and communities (FEMAT, 1993). Working at the community level, this project explores how socio-economic data can be part of the GIS process that serves the experimental nature of adaptive management sites.

Study Description

This study will be described by detailing the research setting, approach, and objectives, along with introducing the key elements of the community-based management concept. Community capacity and community well-being are significant components of this approach to social assessment. In general terms, *community capacity* is the collective ability of residents to respond to both external and internal stresses of the community, to conceive and take advantage of opportunities, and to fulfill needs of residents (SNEP, 1996). *Community well-being* is loosely defined as a measure of a community's conditions and capacity to take advantage of their opportunities (SNEP, 1996). These two important concepts will be described in more detail in the review of previous research.

Research Setting

Central Cascades Adaptive Management Area

The Northwest Forest Plan designated ten Adaptive Management Areas (AMAs) ranging in size from 80,000 to 400,000 acres, (USDA & USDI, 1994). The AMAs were incorporated to support development of innovative and collaborative techniques for achieving the plan's objectives and to provide natural laboratories for both the technical and social challenges of ecosystem management (Johnson et al, 1995). The Central Cascades AMA located in the central Oregon Cascades (Map ii), was chosen as a case study to utilize the adaptive management credo, "try it, monitor it, and learn from it" (Johnson et al, 1995).

From their conception, AMAs were places where agency staff were encouraged to learn about local needs and address them in an individualistic fashion (Stankey and Shindler, 1997). Connections with the local communities were expected to be fostered, capitalizing on local knowledge and skills for management approaches (Stankey and Shindler, 1997). Survey research by Shindler and others (1995) indicates that residents of the communities surrounding the Central Cascades AMA have various opinions about resource agencies, scientific research, and adaptive management. Most are willing to allow experimentation at the AMA and choose science over politics as a means for setting forest policy, but are hesitant to relinquish too much control to either resource agencies or others in the decision-making process. Initially, public support for adaptive management and the AMAs exists, but with a general citizen distrust of government and bureaucracy, those managing the AMA will have to prove the usefulness of adaptive management concepts over time (Shindler et al, 1996).

The Central Cascades AMA is comprised primarily of United States Forest Service (USFS) and the Bureau of Land Management (BLM) lands. A significant portion of the area includes the HJ Andrews Experimental Forest, a research area managed by the USFS Pacific Northwest Research Station. Agency management units having jurisdiction include the Forest Service's Blue River, McKenzie Bridge, and Sweet Home Ranger Districts, BLM McKenzie Resources Area, and the USFS Pacific Northwest Research Station.

The Blue River and McKenzie Bridge Ranger Districts and the BLM Resources Area are located along the McKenzie River Corridor with the associated communities of McKenzie Bridge, Rainbow, Blue River, Finn Rock, Nimrod, Vida, Leaburg, Deerhorn, Walterville, and Marcola. The Sweet Home Ranger District affiliates with the communities of Crawfordsville, Brownsville, Lacomb, and the South Santiam River Corridor communities of Cascadia, Sweet Home, Waterloo, Sodaville, and Lebanon.

The communities included in this study (shown in Map i), along with other rural Oregon communities, tend to have higher unemployment and lower per capita incomes than the state as a whole (OEDD, 1989). They also tend to have declining population numbers (OEDD, 1989). In addition, they are relatively more dependent on single, cyclical natural resource based economies such as forestry and agriculture (OEDD, 1989). Communities dependent on a single industry, who over the years have invested heavily in given forms of development, have become highly adapted to a specific economy (Freudenburg and Gramling, 1992). Given the emphasis on timber extraction and processing in some of the constituent communities, dependence on a single industry may decrease the ability of a community to adapt to changes. Research on community-stability indicates that economic growth of a timber-dependent community relies on both market demand and a reliable supply of forest output (SAF, 1989).

"Community" has become a much studied unit in social science, garnering many definitions and methods of analysis. The "constituent communities" incorporated in this project are those found geographically closest to the Central Cascades AMA forest lands. Residents in these communities potentially have significant interaction with the Central Cascades AMA, through employment, recreation, historical ties, or other factors and represent those local publics that have the most to gain or lose and who the management agencies could be expected to incorporate into adaptive management activities.

McKenzie River Corridor

The McKenzie River Corridor communities have no elected officials and typically form grass roots groups and ad hoc committees to address and solve local issues (Six, 1995). There are roadside stops in Nimrod and Finn Rock with combination grocery and gas stations as well as stores and a K-12 school in Blue River. USFS ranger stations are in both Blue River and McKenzie Bridge (Six, 1995). Snowplowing, road

maintenance, road-kill clean-up, law enforcement, and development and zoning issues all are undertaken by Lane County (Six, 1995).

Although there were several sawmills on the McKenzie, the last mill closed two decades ago (Six, 1995). There are some residents in the McKenzie River Corridor who still depend on timber harvest for their livelihood, but most timber workers are employed beyond the McKenzie River Corridor and do not form a cohesive center to rally around (Six, 1995). The lower and middle McKenzie Valley is dominated by agriculture; mostly filbert, blueberry, and Christmas tree farms. The Upper McKenzie Valley is forest oriented with Forest Service employees, loggers, and sawmill workers, many who commute to the nearby urban center of Eugene/Springfield (Six, 1995). The forest industry is still the occupation with which the residents identify, and while the school district employs the highest number of residents, the Forest Service employs the second highest (Six, 1995).

Although the residents identify with the forestry industry, local logging has dissipated, and some of the multi-generational families have moved away. For the past 10 years the McKenzie Valley has become a bedroom community for Eugene or Springfield with an increasing number of retirees (Six, 1995). Approximately 38% are retired (Shindler et al, 1995). The newcomers tend to have different, urban-oriented ideas, experiences, and values, while not having a history of allegiance to the rural area around them (Six, 1995).

The McKenzie River Valley attracts visitors year-round who enjoy fishing, water activities, hiking, bicycling, winter sports, camping, sight seeing, and photographic opportunities (Snyder and Povey, 1995). Both wild and hatchery fish populations are prospering in the watershed. There are many popular restaurants and business attractions in the valley. New cottage industries compatible with the rural character of the

area help provide a stable, self-sufficient economy for the residents (Snyder and Povey, 1995).

Santiam River Corridor

The Santiam River Corridor also attracts recreationalists with nearby lakes and the mountain pass and the area provides a small town/low cost quality of life attractive to long-time residents and urban refugees (Hovee, 1995). The corridor has potential as a retirement community both for local residents and newcomers and is served by convenience-oriented retailers complemented by emerging recreation businesses (Hovee, 1995). Although a vestige of the timber industry remains, there is an associated investment risk due to timber supply and associated mill uncertainty (Hovee, 1995).

Of the communities surrounding the Central Cascades AMA, the South Santiam River Corridor communities have a stronger tie to the timber industry. During the 1980's, approximately 1% of all the softwoods processed nationally came from the mills in the Sweet Home area (Sweet Home Watershed Assessment, 1995). When the recent timber harvest injunction occurred, the unemployment rate rose to 10% and was not attributed to either the recession or the housing market (Sweet Home Watershed Assessment, 1995). In a recent survey of the area, thirty-seven percent of the residents in the Santiam region were found to have members of their immediate family in the timber industry (Shindler et al, 1995). Guistina Land and Timber Company arrived in the Sweet Home area in the 1990's helping to bring employment up again (Sweet Home Watershed Assessment, 1995).

Research Approach

There are two main objectives of this study. The first objective is to provide the Forest Service and the BLM with useful information about their constituent communities by creating a GIS of socio-economic and community capacity maps. By combining these two GIS layers, a third map portraying the well-being of communities can also be constructed. The second objective is to test the ability of a GIS to aid in the social assessment of human landscapes that are associated with local geographic regions of interest.

The research approach for this study involves first identifying characteristics specific to each community using secondary and primary data sources (see Figure 1). Secondary data from the 1990 Housing and Population Census are utilized to describe socio-economic status and to create a series of maps to depict other social conditions of the region. The data are represented using aggregated census block groups[1]. The block group is one of the spatial units derived by the census for which data are compiled. In contrast, the primary data are derived from a survey of key informants about their community's capacity to adapt to internal and external changes. For purposes of this study, it is called the community capacity survey.

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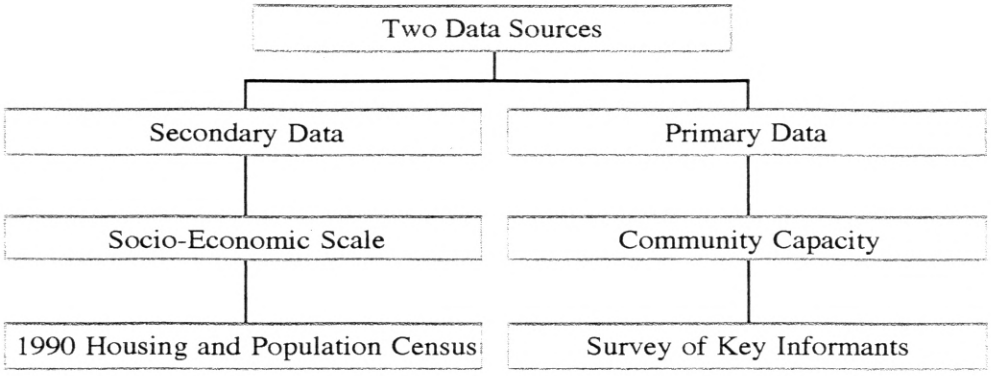
[1] Block groups generally contain between 250-550 housing units, with the ideal size being 400 housing units (Census of Population and Housing, 1990).

Figure 1. Study Structure



Second, a base map is created so that the variables can be plotted within the community aggregations, a spatial unit derived to display the communities using the census block groups. Interviews with key management staff of the Forest Service provided perspectives for spatially representing the communities within the study area by defining community boundaries. Census block groups were used as the primary building blocks and then aggregated to reflect socially relevant community boundaries. This resulted in a map of aggregated census block groups depicting the communities surrounding the Central Cascades AMA.

Finally, variables pulled from the 1990 Housing and Population Census and the community capacity survey were compiled into two scales, the socio-economic scale and community capacity scale. These two scales were combined to indicate community well-being. The base map is used for the depiction of the socio-economic and community capacity scales and of community well-being. It is anticipated that the resulting maps will provide an improved perspective on the communities proximate to the AMA and will help resource managers find more meaningful ways to include citizens in planning processes for ecosystem management (SNEP, 1996).

Finally, a byproduct of pursuing these two objectives will be to provide a framework for keeping the social assessment monitoring system current. The intent is to

establish a baseline so that socio-economic data can be updated every ten years as the census is published. Community capacity can be re-assessed as frequently as necessary through additional surveys. The key to any system is to collect and display the data in a consistent manner. The Central Cascades AMA will be provided with a survey instrument, GIS files, base maps for future data entry, and a general protocol to follow for future data collection and monitoring efforts.

Background Research

In the first section of this chapter, the background research examines literature pertaining to the concept of community and how researchers have used differing variables to target socio-economic status and community capacity. Both socio-economic status and community capacity are components of community well-being (SNEP, 1996) and this relationship will subsequently be explored. Also included in the first section is a review of the literature describing key informant surveys as a data collection method.

The second section describes research efforts that combine social variables in a GIS. Although there has been a recent flurry of "geodemography" research that attempts to use GIS technology to assess community well-being, there are relatively few published studies that bring together *community* data within a GIS. Geodemography is a growing area of research defined as, "spatially referenced data and their use in relation to socio-economic phenomena" (Martin, 1991).

The Concept of Community

Defining "Community"

The concept of community has been defined with a myriad of approaches. In an ethnographic analysis of three forest communities in California, Kusel (1991) describes community as a locality-based shared identity, both as specific place and a sense of belonging and shared identification among individuals who live in that place. "Forest-dependent communities" are adjacent to the forest with high economic dependence on the forest-based industry. Besides the obvious timber and tourism industries, however, other aspects of forest dependence may have little relationship with traditional forest and

wood products economies (Kusel, 1991). These include quality of life attributes such as unpolluted surroundings, recreation opportunities, and a collection of social meanings for ideas like escape and spiritual rejuvenation (Kusel, 1991).

Krannich et al (1994) describe the "local territorial community" as the setting in which people experience a majority of the social ties, interactions, and organization affiliations that constitute the fabric of day-to-day life. The community also is where many other needs involving access to facilities, services, and infrastructure are met. On a spatial scale, the community is a geographic unit consisting of the area which meets these specific needs of residents.

In a study of the changes rural communities are presently undergoing, Wilkinson (1986) breaks the concept of community down into a phenomenon which combines a local ecology (organization through which residents meet their daily needs), a holistic organization (containing sufficient structures to meet daily needs and to express major categories of the common interests of the population), and a field of community actions (collective efforts to solve problems and expressions of identity). In his quest for an understanding of rural social life, Wilkinson (1986) states,

> The community is a key concept for this quest because the community is an important predictor of various other aspects of the quality or well-being of rural social life and because the community, as a dependent variable, is itself an important aspect of social well-being to be explained and understood by sociology. (p.14)

While Kusel (1991), Krannich et al (1994), and Wilkinson (1986) describe the concept of community as geographical or territorial, Carroll (1995) focuses on "occupational communities" where members consist of a group possessing some degree of common life and who see themselves apart from others in society. He describes four components in the definition of the occupational community: people who see themselves

to be involved in the same type of work, whose identity is closely linked to the occupation, those who share norms, values, and perspectives connected to the work setting, and whose network of social relationships link between work and leisure time. The occupational community seems to be a useful way to understand patterns of continuity and change among rural workers in an era in which many are threatened with a loss of occupational self control and as a result, face significant changes in long established ways of life.

The county has been the most common unit of analysis for community stability studies in forest-dependent communities (Machlis and Force, 1988). Yet, people do not typically identify with their county since it is not a unit with real social meaning and life occurs in communities instead of counties (SNEP, 1996). The unit of analysis to target community well-being needs to be "community" since county level analyses tend to ignore within-county heterogeneity that can only be observed with a smaller geographic unit (SNEP, 1996).

Socio-Economic Variables

This section describes variables used in social assessments that specifically target socio-economic status. These variables act as social indicators, which are aggregated statistics that reflect the social condition of a society or social subgroup (Babbie, 1995).

Education

The level of educational attainment within a community indicates the degree to which the residents have gained knowledge and training for both employment purposes and community leadership. There are several methods to measure the amount of educational achievement within an area. Machlis et al (1994) measured "education" by taking the number of students per 1000 population and by the percentage of high school graduates

within the segment of population 25 years or older. In the SNEP communities (1996), "educational attainment" is a weighted measure where those with higher degrees receive a better rating.

Kusel (1991) argues that education is also an indicator of well-being of forest dependent communities. Those communities with more educated people have a more diverse set of skills and a better chance to address changes within their community. Thus, an educated workforce and citizenry is important to community well-being since it is better equipped to constructively change in response to setbacks and opportunities (SAF, 1989). Education indicates human endeavor, skill, and knowledge.

Employment

The degree to which residents in a community are employed is an indicator of socio-economic status (SNEP, 1996). Employment is not only a method of earning a living, it also can be a source of self esteem, thus the number of employed within a region may be a measure of both economic health and personal fulfillment. Relatively high rates of unemployment in a region can mean that opportunities for work are lacking and the regional economy is not altogether healthy (USDA/USDI, 1993).

The variable "employment" can be measured with a variety of methods. In research conducted for the Interior Columbia Basin Ecosystem Management Project, employment is measured by the ratio of part-time to full-time workers (Machlis et al, 1994). SNEP (1996) used the census count of unemployed persons still in the workforce for their unemployment variable. Specific counts of employment in the timber industry versus total employment are also valuable indicators of the degree of forest dependence (Kusel, 1991).

Home Ownership

The percent of home ownership in a community is indicative of both the level of wealth and stability of the residents. The ratio of homeowners to renters indicates the level of residential stability or impermanence (SNEP, 1996). Social assessments often use a housing variable to measure socio-economic status (Kusel, 1991 and Canton-Thompson, 1994).

Poverty

Poverty is a valuable indicator of the socio-economic status in communities and depicts the presence of potentially vulnerable groups (NOAA, 1994). Measuring poverty levels within a region demonstrates how many persons are struggling to survive. The poverty ratio of *persons under poverty level to those over* portrays the number of households that do not have sufficient income relative to the number of dependents (Census of Population and Housing, 1990). The combined measure of the poverty ratio and *poverty intensity*, a poverty measure that weights persons in extreme poverty more than those in less acute poverty, provides a broad representation of the poverty scenario within a community (SNEP, 1996).

Poverty is an important indicator to numerous types of social and economic assessments. For instance, poverty rate is a significant social variable in natural resource management when facing decisions which may adversely affect the public (Machlis, 1994) and a key variable for evaluating rural economies and communities (USDA/USDI, 1993b). Poverty is also considered an indicator of community well-being in timber dependent areas (Kusel, 1991).

Public Assistance

Public assistance as a social indicator within a community represents the level of potentially vulnerable groups (NOAA, 1994). Persons receiving aid from the government, for one reason or another, have not been able to support themselves in the economic conditions facing them. A relatively high rate of public assistance in a region indicates a high level of susceptibility to economic dysfunction.

Public assistance is a good indicator of families in need, which suggests community residents of a relatively lower socio-economic status (SNEP, 1996). Monitoring the amount of social service burden (e.g. welfare, aid to dependent children, and food stamps) can help elucidate whether local communities and economies are experiencing positive or negative changes associated with federal forest management (USDA/USDI, 1993b).

Community Capacity

"Community capacity" is the collective ability of residents to respond to both external and internal stresses of the community, to conceive and take advantage of opportunities, and to fulfill needs of residents (SNEP, 1996). Natural resource-dependent regions, such as communities economically dependent on timber, mining, oil, and the like, have a high degree of susceptibility to external shocks to their economy, leading to possible instability (Gramling and Freudenburg, 1990). The Forest Service's definition of community stability also mirrors the definition of community capacity used in this study: a community's capacity to absorb and cope with change without major hardship to institutions or groups within the community (USDA Forest Service, 1982). Community capacity can be positively or negatively affected by governmental policies

and, therefore, understanding capacity is important in developing effective policy responses (FEMAT, 1993).

Researchers conducting the Sierra Nevada Ecosystem Project (SNEP) (1996) developed a methodology to assess a community's capacity to adapt to change that incorporated three main sub-units of data as the indicators of community capacity. The first sub-unit is the community's *physical infrastructure* including considerations of: conditions and types of roads, types of accessible open space, condition and availability of water and sewer systems, types of transportation corridors and accessibility to large urban centers, and amount of financial capital. *Social capital* or (civic responsiveness) is the second unit, composed of factors relating to levels of volunteerism, willingness to participate in local groups, and amount of community spirit. Third, *human capital* consists of the community members' education and employment training level, the community leaders' knowledge of the physical environment, awareness of local market forces, and their access to information resources.

In Oregon, an additional measure of community capacity exists. The Oregon Economic Development Department (OEDD) started the Community Initiatives Program in 1989 to assist both timber dependent communities facing job losses and other rural communities concerned with their economic future. For each community involved, the Community Initiatives Program utilizes a process that begins with a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. SWOT is a program developed to analyze rural Oregon communities' economic viability. The SWOT methodology (Hovee, 1995) identified specific physical infrastructure and human and social capital characteristics of communities. Through their program a list of "20 survival characteristics of rural communities" was produced (i.e., evidence of community pride, willingness to invest in the future, cooperative community spirit,

active economic development program, acceptance of women in leadership roles, sound and well-maintained infrastructure, etc.).

The next section describes the three components of community capacity (physical infrastructure, social capital, and human capital) and describes the key informant survey process that can be used to collect community capacity data.

Physical Infrastructure

Physical infrastructure includes the physical elements and resources of a community (SNEP, 1996). The value of physical infrastructure to a community is found in the benefits and services it brings to residents. From basic amenities like good water, power, and sewer system and transportation corridors, to quality of life aspects such as the availability of parks, open space, and recreational centers, physical infrastructure serves residents in their regular routine. It also includes the financial capital of the community, how much money the community generates for civic improvements, and a consideration of numerous other facets such as business parks and housing stocks (SNEP, 1996).

Physical infrastructure is associated with the economic environment of a community. There are many elements to a healthy economy for rural communities, including industrial, commercial, and residential land served with necessary infrastructure, available markets, and transportation (OEDD, 1989). Some of the most important conditions relative to community capacity are community infrastructure and services (i.e. transportation facilities, water, energy, recreation, medical care, waste processing, and police and fire protection) and also the availability of capital for developing productive enterprises (SAF, 1989). The Society of American Foresters (SAF) acknowledged their importance to rural forest communities:

> Improvements in the level and quality of public services are essential for enhancing a community's capacity to retain population and economic investment, as well as its ability to grow and diversify. Many local governments in rural resource-dependent communities have had to reduce an already low level of services. This is especially pronounced in timber dependent regions of the Pacific Northwest. Decline in basic industries, combined with a loss in rural wealth, reduces the tax base and severely strains the provision of services. A downward spiral sets in when reduced services and a deteriorating infrastructure make these communities less attractive for new businesses or enterprising residents (SAF, 1989, p.25).

Researchers have approached various ways of representing physical infrastructure, both in variables chosen and in methodology. In one recent example, McGuire et al (1994) examined the role of community strategic planning in levels of development capacity. Here, physical infrastructure provides a quantitative assessment of strategic planning that contributes to building community capacity. A different approach was used for the Bitterroot Valley, where law enforcement, fire service, mental health services, medical care, transportation, education, and shopping were described in a qualitative method as important physical infrastructure concerns (Canton-Thompson, 1994).

Social Capital

Social capital includes the ability and willingness of residents to work together for community goals (SNEP, 1996). Selznick (1992) observed that a thriving community has high levels of cooperation; that is, people participate in many different activities and in many different roles (i.e. government, community volunteer work, etc.). Social capital seems to be a prerequisite for economic development, as well as for proficient government (Putnam, 1993). The presence of involved community members, instead of wealthy but uninvolved residents, can increase local well-being through higher levels of social capital and participation in local governmental roles (SNEP, 1996).

Although not termed "social capital", similar concepts from the literature are related directly to the general social well-being of the community. For example, understanding the need for association and social integration within a community is important in developing effective responses to natural resource policy questions (FEMAT, 1993). Maguire (1991) also noted that citizen participation (i.e. acceptance of change, controversy, and conflict, acceptance of community strengths and weaknesses, effective mechanisms for direct community input) contributes to building capacity in small communities. Community social cohesion, including network ties of local friendships and aquaintanceships, is found to have a positive effect on residential stability and community satisfaction (Sampson, 1991). Finally, in studying factors that contribute to community stability, SAF (1989) found that community identity, pride, and spirit are some of the most important internal conditions relative to community stability exemplified by the following:

> Every successful community has a distinct sense of identity or a shared image of itself. Logging and sawmilling are sources of community pride and identity... Communities that take considerable pride in their shared way of life are generally more successful in eliciting citizen participation in self-governance and support for schools and local projects (SAF, 1989, p.27).

Human Capital

Human capital relates to the skills, education, experiences, and general abilities of the community residents (SNEP, 1996). Communities in economic difficulty with business closures, worker dislocation, under-employment, and new poverty are of great concern in the Pacific Northwest (FEMAT, 1993). Displaced and unemployed workers may tend not to support the community in building a better future (SAF, 1989).

Communities should also be concerned about the loss of skilled and experienced people to better positions elsewhere.

Human capital is closely tied to the leadership within a community. The amount that leaders have worked with other leaders on community projects, whether they belong to community development associations, and the presence of women in leadership positions contribute to the functioning of rural communities as trade and service centers (O'Brien et al, 1991). Stabilizing rural economies requires local leadership and strategic thinking about a region's comparative advantages and how the community fits into the global economy (OEDD, 1989).

The community structure and human capital factors contribute to the building of capacity in small communities (McGuire et al, 1994). Human capital also blends aspects of social capital and physical infrastructure. People must have the skills to work together effectively if they are to adapt to economic and technological change (SAF, 1989). Improvements in physical infrastructure and education require cooperation and strong community leadership (SAF, 1989). Without residents who have the education to further the community's prospects, who share their knowledge and time, the physical infrastructure necessary to survive would not exist. Human capital is related to the socio-economic status through education and employment, but new residents and commuters who settle in an area who boost the human capital may also diminish the social capital through their possible lack of interest, involvement, and ownership in community affairs (SNEP, 1996).

Community Well-Being

Community well-being is a fairly imprecise and multi-faceted measure of a community's conditions and opportunities. The term itself is relatively new, but researchers have used similar descriptors for some time. In a discussion of forest

dependent communities, Kaufman and Kaufman (1946) described a healthy community as one with a prosperous economy and a balance between its population and the natural resources utilized. Other terms associated with community well-being include "standard of living", "quality of life", "welfare", "happiness", and "life satisfaction" and have often been used in other studies to distinguish a good and healthy life (SNEP, 1996). The variables incorporated in SNEP's community capacity and socio-economic scales are not unanimously agreed upon by social scientists as the metric of community well-being, yet they unite a reasonable number of community characteristics with which to depict community well-being. No universal standard of well-being has yet been devised (Kusel, 1991 and SNEP, 1996).

Since there are so many aspects of a community which could indicate its degree of wellness, using a number of data sources such as interviews, census, and surveys should give a better measure of community well-being than any single data source or method. This technique is termed "triangulation" and is defined as cross-checking with other methods including participant observations, interviews, review of secondary information, census, newspapers, questionnaires, etc. to ameliorate the inherent weakness of using a single method (Babbie, 1995). Triangulation seems to be an effective approach to assess community well-being.

Sociological research on forest communities has made a split from the rather stagnant notion of *community stability* to the more multi-dimensional concept of well-being. A faction now focuses on community well-being and social cohesion, incorporating quantitative aspects of employment stability, population stability, and income maintenance and also considers the capacity of communities to address social problems (Beckley and Korber, 1995). The perceived integration and synthesis of residents into their community is found to be a significant part of well-being (Krannich and Greider, 1984), as well as quality of employment (i.e. job satisfaction, occupational

identity and attachment), social cohesion (i.e. communities that have mutual values, teamwork, intercommunication, commitment, and levels of volunteerism), and local empowerment or the opportunity and capacity to act (Beckley, 1995). Well-being within a community has numerous variables, where a conglomeration of several variables would constitute the best measure.

Well-being is not just a socio-economic measure of wealth, but how the socio-economic variables can contribute to what a person can achieve (Kusel, 1991). Well-being at the individual level should include an evaluation of actions which improve or worsen the capability and functioning of individuals and other community members and relate it to the community as a whole (Kusel, 1991). The capability and functionings of the community's members are best assessed using variables such as education, physical infrastructure, human capital, and job availability and training (Kusel, 1991).

Well-being can be approached at a variety of angles for assessing a community's overall condition. Whatever the terms and methods employed, the overall assessment should determine how adept a community is to adjust to a diversity of challenges as well as the general satisfaction of its residents in the opportunities present in the community.

Surveys as a Research Tool

Surveys are a valuable tool to extract primary data from a sample population. Interviewing key informants who are considered knowledgeable on the subject in question can provide valuable insights specific to important questions of interest (Krannich and Humphrey, 1986). Key informants are local people knowledgeable about local conditions, trends, and particular issues of interest (Krannich et al, 1994). Key informant surveys necessitate purposive sampling procedures that actively seek out persons who can represent the perspectives of all groups (Krannich et al, 1994).

The combination of key informants and other survey methods (i.e., interviews, phone and mail surveys, etc.) has been used successfully in multi-community analyses (Krannich and Humphrey, 1986). Researchers also frequently rely on secondary data provided by the U.S. Census Bureau and other agencies for much of their comparative community research (Krannich and Humphrey, 1986). However, secondary data often falls short when attempting to assess factors of human and social capital, and physical infrastructure (Krannich and Humphrey, 1986). The opposite option, in-depth fieldwork and other methods of directly observing social processes (i.e. attending community meetings, etc.), is ideal for single community research, but impractical for comparative studies (Krannich and Humphrey, 1986). Thus, for a comparative study, one involving several communities, it is advantageous to collect primary data for factors of human and social capital, and physical infrastructure.

Use of GIS for depicting socio-economic data

A search of the literature indicates previous research using GIS techniques to map social variables is limited. However, several important studies have been attempted recently and provide useful insights for this study.

Social Indicators in a GIS

Machlis et al (1994) developed a Human Ecosystem Model which was used to produce an atlas of social indicators for the Upper Columbia River Basin to benefit the managers, scientists, politicians, and residents by providing insights to the area's social ecology. The atlas included a number of maps showing county-wide statistics on variables such as percentage of households subscribing to a daily or weekly newspaper, number of books loaned by public libraries per capita per year, number infant deaths per 1000 live births, and number of physicians per 100,000 population. The atlas, produced

with GIS technology, partitions the 100 county region into quartiles for each variable of interest.

The Machlis et al (1994) atlas allows analysis of the region's strengths and weaknesses. One is able, at a glance, to compare counties on numerous social indicators, such as poverty, voting rate, and full-time employment. This is valuable information for managers and politicians to justify funding for various projects and grants to benefit the counties with the highest amount of need. Two shortcomings of this atlas include factors of time and scale. Many of the data used were from the decennial census, so monitoring human change can only occur every ten years with a considerable lag time for data publication due to census processing. The use of the county as the geographical spatial unit is a choice to aggregate communities together. This may not adequately depict some of the less well-off communities because they will be arranged with well-to-do surrounding communities. A community consisting of very low socio-economic conditions can easily be missed on county-wide assessments.

A different approach to social assessment utilizing GIS was undertaken by James Kent Associates and Washoe County, Nevada (1993). An "issue management" tool was developed describing each separate community within Washoe County and used the GIS to monitor each area's individual issues (i.e., a project to convert a water treatment facility to water storage was recently profiled in an "Issue Alert"). The community coordinator in Washoe County keeps up with local issues by meeting people at gathering places, speaking with established contacts, and keeping in touch with county planners who have made similar contacts in their own areas (B. Webb, personal communication, Oct. 1995). Formal "issue reports" are turned in to the county by the community coordinator, while shorter issue statements are submitted to elected officials. The issue statements are loaded into a database linked to a GIS, so that tracking a community's

issues is feasible. The map within the GIS is able to display the spatial relationship between communities and their issues.

By using public opinion to originate the issue statement, the issue management approach attempts to avoid "top-down" management by focusing attention on public attitudes and preferences instead of relying on managers' opinions and biases (B. Webb, personal communication, Oct. 1995). This direct contact with the residents helps management teams develop plans and understand citizens' issues. Politicians can keep up with the pulse of their constituents with the updated database of issue statements. A challenge of issue management is that it will only work if politicians take note of issue statements (B. Webb, personal communication, Oct. 1995).

Another project incorporating issue management and GIS was conducted for the Applegate Partnership by the Rogue Institute for Ecology and Economy (Priester, 1994). The Applegate Partnership was one of the first examples of adaptive management from which FEMAT (1993) modeled AMAs. The Applegate social assessment depicted the valley's community characteristics within a GIS (Priester, 1994).

The assessment also provided a social and economic overview of the Applegate Valley, a GIS and textual description of communities and their issues, a description of the recreation in the valley, and recommendations for community involvement in forest management (Priester, 1994). The information was collected through both census data and key informant interviews on seven cultural descriptors of community (geographic boundaries, social networks, publics[2], recreational activities, settlement patterns, supporting services, and work routines).

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2 A segment of the population or group of people having common characteristics, interests, lifestyle, or some recognized demographic feature. The publics descriptor identifies a group of people who influence the community locally or who live elsewhere and have an interest in the way the community functions (Kent, 1993).

One problem encountered in the Applegate Valley social assessment was in determining neighborhood lines, a process that is labor intensive and based on residents' and community leaders' interpretation of neighborhoods[3]. The census lines are not consistent with the created neighborhood boundaries. This created a gray zone between the census lines and the neighborhood boundary lines, which made it impossible to import census data to accurately fit into the newly determined neighborhoods, except at a cost discussed later.

In order to utilize the vast quantities of valuable census data, issue management data (i.e., all the data pertaining to the neighborhoods which links into the GIS) needs to be collected on spatial scales that match the TIGER line files[4]. The issue management system on the Applegate does not address the problem of the community data not matching the line file, but the Washoe County system did. Washoe County worked in conjunction with the Census Bureau's User Defined Area Program (UDAP), and had their census data configured into user defined areas. Washoe County converted their census data into useful, neighborhood units at a high price ($3,000), with a time lag for converting the data (B. Webb, personal communication, Oct. 1995). These neighborhood units and conversion costs will also apply to future censuses. This ability

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[3] The neighborhood is the smallest geographic unit for tracking issues. People identify with "my house", "my street", "my backyard", and the local park. People also have a clear idea of the neighborhood's boundaries. People generally know the types of people who live in their neighborhood and their differences. In urbanized areas the neighborhood usually covers a few city blocks while in rural areas the neighborhood may be a subdivision or a small town (Kent, 1993).

[4] A TIGER System is an acronym for Topological Integrated Geographic Encoding and Referencing System, developed by the U.S. Bureau of the Census and the U.S. Geological Survey (USGS) for the 1990 Decennial Census. TIGER line files contain digital data at a scale of 1:100,000 of all the streets, roads, railways, and significant hydrographic features in the area the census covers (Antenucci et al, 1991).

to redefine census lines at a cost is important for further applications of issue management.

Combining Social and Bio-Physical Data in a GIS

Several studies also combined social and bio-physical data to get a more detailed representation of the region for ecosystem planning purposes. A study conducted by the Forest and Rangeland Resources Assessment Program (FRRAP) within the California Department of Forestry and Fire Protection analyzed variables within a GIS, such as parcel size, land use fragmentation, transportation networks, ownership type and size, zoning, vegetation type, and topography, to help assess land use pressures that affect the state's forests and rangelands (Tosta and Green, 1988). California's population growth affects the state's wildlands as human uses create smaller ownership parcels, increased conflicts over land use, and changes in rural economies.

Another study undertaken by the Defenders of Wildlife assesses communities using three indices: 1) social, 2) economic, and 3) political forces (E. Backus, personal communication, June, 1995). These indices are displayed within a GIS using previously determined ecological units (E. Backus, personal communication, June, 1995). The indicators for these indices are as follows:

Social index

- agricultural chemical applications
- percent grazing
- percent developed land
- current population density
- current road density

Economic index

- agricultural and range potential
- timber potential
- mineral potential

Political forces index

- park bond ballot measures
- voting results from 1992 to display political and ecological values

These indices are then combined with the regional biophysical data (ecoregions and biodiversity management areas) to form a synthesis view, which leads directly to regional conservation options (E. Backus, personal communication, June, 1995). This is an example of a study combining relevant pre-existing data in the form of social indices with pre-existing biophysical spatial data in a GIS format.

A new study is underway in western Washington using threatened and endangered species population data and projected population growth data by county (J.E. Force, personal communication, Feb. 1997). It is anticipated that by overlapping these data land managers can make more informed planning decisions about the protection of sensitive species' habitat, especially near the areas of rapid population growth. For instance, the managers could choose not to construct a logging road near important habitat where eventually a large number of recreationalists would use the road after the logging trucks were done with the harvest.

These studies in geodemography show that researchers have ventured into an area without an established methodology or a common group of indicators. There have been problems defining which spatial unit is most appropriate for local social assessments, whether it be by county, community, or some ecologically defined unit. Furthermore, the census is a reliable, extensive source of social data, but has been less appealing in community research due to the mismatch of community and census boundary lines. Yet, GIS remains a powerful mapping and management tool and appears to have potential for social research given data extrapolation thus far.

Some of the benefits and shortcomings of the use of GIS for social assessment include:

Benefits:

- Spatially represent the area of interest
- Provide a database to incorporate many social indicators as map layers in addition to physical or biological layers
- Ability to spatially analyze the social indicators by the various tools available within GIS software packages (i.e., query, buffer, distance computations, etc.)
- Provide managers and politicians a visual of their constituency which graphics and charts may not provide perspective
- Ability to overlap information which aids in managers' decision-making processes

Shortcomings:

- Realistic spatial unit (i.e., community or neighborhood) difficult to create
- Census data, a reliable, valuable source of social data, has a time constraint, both in frequency and time-lag from collection to publication

Chapter 4: Methods

This study was designed to emulate the methods used on the Sierra Nevada Ecosystem Project (SNEP), a large-scale program of ecosystem management and assessment in California. The impetus for using the same variables as SNEP was to help bring a continuity to social assessments across the landscape. In addition, the Sierra Nevada and the Central Cascades communities have many similar interests and community issues, both being relatively forest-dependent and influenced by the same federal policies and management agencies. If there is some form of consistency in these studies, further regional analyses may become feasible. On the other hand, if there is no apparent congruity, GIS/social assessment studies could largely remain separate entities with little additional use beyond the specific area in question.

This section describes the basic methodology employed in this study. First is a discussion of *community scale*, the spatial unit used in this study. Next, the specific methods (most of which were originally generated for the Sierra Nevada Ecosystem Project) are described in chronological order. These include:

- development of the *community base maps*
- formation of the *socio-economic scale* using census data
- development and administration of the *community capacity* survey
- creation of additional census-derived maps

In keeping with the adaptive management concept where one learns from trials and errors, alternative methods which were explored but ultimately not pursued are also briefly discussed.

Community Scale

There is an infinite amount of social variables that can be studied, but for the GIS variables need to be able to be mapped and data need to be at a common scale. In order to choose the appropriate scale for analysis, consideration of the final product is imperative. *Community scale* is a scale in which the community is the polygon or the spatial unit to be mapped and assigned one attribute per community. Community scale is more appropriate to the AMA manager's information needs than the county or state level data, since they work directly with the communities. Census data can be obtained at this scale by aggregating census spatial units termed *block groups* into communities.

The census is also a dependable source of data with variables that provide insight about communities' socio-economic status over time. As for the community capacity data, a key informant survey was developed and implemented.

In searching for alternate socio-economic data sources other than the decennial census, the State Employment Division in Salem was contacted. Monthly employment data does exist, but it is total employment by county not community (E. Fairbanks, personal communication, June, 1995). Employment by individual businesses is available at a high cost, but aggregating at the small community scale, disclosure becomes an issue (K. Aldred Cheek, personal communication, May, 1997). It is illegal to publish information that would reveal an individual business' income[5]. Using state employment data would not be conducive to an inexpensive, updatable monitoring system for the community level. Both the State Employment Division and personnel

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[5] All summary level employment and payroll data contained in the State Employment Division covered employment and payrolls by industry and county. Publication is based on county and Standard Industrial Classification (SIC) codes assigned by the Employment Department. State Employment Department law regarding confidentiality of information collected through the Unemployment Insurance tax reports does not allow publication of employment, wage, or any other data that could be identified with an individual employer (State of Oregon, 1995).

contacted in the Community Development Department had no further leads to secondary data sources at the community scale which could be used in this project.

Protocols for Developing the Constituent Community Map

The first step of creating the GIS entailed developing a meaningful *constituent community map* of aggregations of the block group level data into socially recognizable communities. Block groups are the smallest spatial unit at which the data are available and some of the block groups need to be aggregated into larger units to more accurately display the population. These aggregations will represent the constituent communities within the constraints or limitations of the census TIGER lines that form the block groups. The difficulty is that the census block groups are drawn along major roads and physical features that may have little correlation with actual communities. It is important to display and analyze the whole community rather than the separate block groups so as to best study the characteristics of the community.

Figure 2. The Block Group

Densely Populated Areas	Sparsely Populated Areas
- Small block groups	- Larger block groups
- Usually more block groups per community	- Usually few or only one per community
	- Sometimes two small communities per block group

Block groups were aggregated to form socially meaningful units that more closely represent locally defined communities (SNEP, 1996). Socially meaningful units were determined by asking key management staff to partition local areas into relevant communities. These individuals were chosen from Forest Service personnel who over time have worked most closely with their constituent communities. For verification on

several of the more difficult block groups to assign to communities, a long-term county employee well acquainted with the area was consulted. The researcher and key personnel worked together with the following community criteria as identified in SNEP (1996) as a general guideline to create the aggregations:

1) Aggregations must be adjacent or linked block groups.
2) Aggregations are formed around block groups where the majority of the population is associated with a single community.
3) Aggregations must have a minimum population of 500 residents.
4) If more than one community is needed to reach a population of 500, then the communities need to share service centers, commuter service districts, or school systems in order to be aggregated.
5) If there are small dispersed populations that do not meet criteria 3 or 4, but that share demographic characteristics determined by local knowledge, they will be aggregated. These characteristics could include: low density housing, commuting patterns, ethnicity.
6) If the population cannot be grouped successfully, keep it separate to preserve the diversity of the population.
7) If a number of communities are grouped together with no identifiable relationship, aggregation according to the geographic features is possible.

The communities that were determined through this process can be seen in the Constituent Communities Map (**Map i**) and include:

- Blue River
- Brownsville and Crawfordsville
- Cascadia
- Lacomb
- Leaburg and Deerhorn
- Lebanon
- Marcola
- McKenzie Bridge
- Sodaville
- Sweet Home
- Vida
- Walterville
- Waterloo

Because of the smaller population density in the McKenzie River Corridor, most of the block group lines encompass a larger geographic area than in parts of the Santiam River Corridor thus making aggregating actual communities more difficult. Given the criteria, some communities normally would have been separated such as Leaburg and Deerhorn, but they have to be assessed together since they are located in the same block group. Most of the community boundaries in Lane County were developed as imposed by the virtue of the TIGER line files, thus most communities equal one single block group. The boundaries of the block groups were large enough to incorporate the determined communities so few aggregations were necessary. The only block groups in Lane County that were aggregated were in the area of Marcola.

Some of the more specific, technical details of the creation of the base map are important to include as well, such as the software products used and the various steps undertaken to formulate the GIS. A detailed description is presented in Appendix 3.

The Socio-Economic Scale

The socio-economic scale was adapted from SNEP (1996) and the rationale is founded largely on its methodology. The scale is based on a composite of the six socio-economic factors for each of the communities with data taken from the 1990 Housing and Population Census: education, employment, home ownership, poverty, poverty intensity, and public assistance. Each of the variables were calculated for every community, standardized (ensuring that no single one dominates), and normalized to then enter into the *socio-economic scale formula*.

The product of the socio-economic scale formula is entered into a 7-point Likert-type scale with 1 indicating a very low socio-economic score and 7 being very high. The assumptions of the socio-economic scale are that higher levels of home ownership, education, and employment indicate higher levels of socio-economic well-being, while

higher levels of poverty measures and public assistance indicate lower levels of socio-economic well-being.

Data Location

The data for the socio-economic scale variables are found in the 1990 Housing and Population Census. The Bureau of Census publishes the results of its decennial census in several forms. The long form of the census, the STF3 (Standard Tape File) samples 1/6 of the U.S. population. The short form, STF1 samples 100% of the U.S. population. The specific data to be utilized in this study is found in the STF3A portion of the published census and are available from the university library off compact disc in a database file (in D-Base format). The data were then converted to a file usable in a GIS (in ascii format).

The highest resolution geographically for STF3A is the block group. The census variables show personal and housing demographics of the region. The census bureau collects data every ten years, and there is a two year lag time as it processes the data (Census of Population and Housing, 1990). If future maps of the same variables are produced after each census, general trends will appear.

Socio-Economic Scale

The next step inputs the six census variables into the socio-economic scale formula. The locations of the variables in the census data are described below along with rationales for their usage and formulas associated with them. The variables are then combined into the socio-economic scale formula, which is also described below.

Education

Education includes the cumulative "education attainment score," which is weighted more heavily toward higher education (SNEP, 1996). This field of data includes persons 25 years and older. The data are found in the STF3A, P57. (The P designation is simply where in the tape file the variable is positioned in the Population section of the census.)

The level of educational attainment indicates the degree to which residents have knowledge and training for employment purposes and community leadership (SNEP, 1996). Communities which have a higher education level and a diverse set of skills have a better chance to cope with changes (SAF, 1989). Education depicts a positive characteristic indicating human endeavor and knowledge. The formula for education attainment score (EAS) is:

*(EAS) = Σ[(<9th grade), ({9,10th grades}*2), ({High School}*3), ({some college}*4), ({Associate degree}*5), ({Bachelors degree}*6), ({graduate or professional degree}*7),*

where:

- (<9th grade) is the count of those persons 25 years and older who have less than a ninth grade education
- *2 is the number of persons passing 9th or 10th grades multiplied by two

Employment

Employment is a count of people in the labor force. *Unemployment* is a separate count within the employment field and includes persons without a job who are seeking employment, available to accept a position, or waiting to be called back to a job from which they were laid off. It is noted that these data do not portray a precise picture of the unemployment of a region, since frustrated workers who have dropped out of the labor

force are not counted. One has to be employed or actively seeking work to be included in the field. The data are found in the STF3A, P70.

The employment in a community is an indicator of socio-economic status (SNEP, 1996). Measuring employment can imply both economic health of the region and, on a smaller scale, personal fulfillment (NOAA, 1994). Higher rates of unemployment can indicate a lack of opportunities for work and instability of the regional economy (FEMAT, 1993). There is no formula associated with this variable.

For the variables with no formula (i.e. unemployment, home ownership, and public assistance), the method to acquire the number for the final socio-economic formula is as follows:

- The census count of the variable (e.g., unemployment, home ownership, etc.) for each block group in a community aggregation was added together
- The resulting number was then divided by the population count for the community so that undue weight was not placed on the more populous communities
- The quotient was then used in the socio-economic scale formula described later

Home Ownership

Home ownership is defined as the count of all occupied housing units that are owner occupied. The count of the occupied housing units that are renter-occupied constitutes the rest of the field. The field excludes military, prison, and other such group housing. The data are found in the STF3A, H8. (The H designation indicates that this variable is found in the Housing section of the census rather than the Population section (P).)

The level of home ownership in a community is indicative of both the stability of the residents as well as the level of wealth of the community members (SNEP, 1996). The ratio of renters to homeowners indicates the level of residential impermanence and is associated to the socio-economic status of the community (SNEP, 1996). There is no formula associated with this variable.

Poverty

Poverty has two variables associated with it. They are both found in STF3A, P121. Poverty is an indicator of socio-economic status and can depict the presence of potentially vulnerable groups (NOAA, 1994). Poverty levels within a region can demonstrate how much of the population is struggling to survive on their household income. The first poverty measure is characterized by the ratio:

(persons with incomes below poverty level / persons above poverty level).

The second is the relative intensity (%) of poverty of the individuals below poverty level.

The formula for "poverty intensity" (SNEP, 1996) is:

(Poverty Intensity) = Σ[(1{75-99%poverty level}), (3*{50-74%poverty level}), (9*{<50%poverty level})]*

where:

- the count of persons with incomes between 75% and 99% of the poverty level being designated as {75-99%povertylevel} and so forth with 50-74% and <50%[6]

[6] Poverty status is a derived measure that is determined by comparing the income of a family (or unrelated individual) with the appropriate figure in a series of income thresholds. If the particular income is below its threshold, the family (or unrelated individual) is classified as below the poverty level. The thresholds, which vary according to the size of the family, the number of related children, and the age of the householder (for 1- and 2- person households only), have been established as the standard Federal definition of poverty for statistical purposes. The poverty thresholds are adjusted every year in accordance with changes in the Consumer Price Index so that comparisons of poverty statistics between censuses are valid, even though both incomes and prices have been affected by inflation (Census of Population and Housing, 1990). The poverty status of unrelated individuals (persons living alone or who are unrelated to the householder) is determined independently on the basis of his or her own income. Poverty status is not determined for unrelated individuals under 15 years old or for persons living in college dormitories, military barracks, or institutions (Census of Population and Housing, 1990). The range of the poverty level starts at $5,947 in 1989 for a person 65 years old and over to $27,596 for a nine or more person family unit with one related child under 18 years of age (Census of Population and Housing, 1990).

- 3* is the count of persons within the poverty level multiplied by 3.

Public Assistance

The next variable counts the children under the age of 15 living in households with public assistance. Public assistance includes state or federal welfare agencies payments of supplementary security income to low income persons who are 65+, blind, or disabled, aid to families with dependent children (AFDC), and general assistance. It excludes vendor payments from hospital and medical care and Social Security income. The data are found in STF3A, P106.

Public assistance acts as an indicator for families in need and community residents of a relatively lower socio-economic status (SNEP, 1996). Persons receiving aid from the government have not been able to adequately provide for themselves in the economic environment facing them. The higher the rate of public assistance in a community indicates a higher level of susceptibility to economic stress. There is no formula associated with this variable.

The Socio-Economic Scale Formula

The standardized scores or "Z" were calculated by the following method:

$Z = \text{Observation} - \text{Mean} / \sigma$

Where:

σ = standard deviation

> Standardized scores are calculated for each component score before combining them into a single scale. Standardized scores indicate the number of standard deviations above or below the mean that a particular observation falls. Standardization facilitates comparison of scores from distributions. Each of the individual component scores are combined into a single socio-economic scale that is normalized to a base of 100 using 2 standard deviations as reference points (S. Doak, personal communication, June 1995).

The "observation value" calculated for each aggregation is the population-weighted count of the variable for the community. For example, for public assistance, one would add up the number of those on public assistance and divide by the total number in the field[7] to get the population-weighted count or observation value. The mean of those on public assistance for the aggregation is then subtracted from the observation and divided by the standard deviation which produces the standardized score "Z".

The six variables are combined into a socio-economic scale using the following formula. This formula normalizes the component scores to a base of 100 using 2 standard deviations as reference points.

$X = [\Sigma ((Z^{1-6}/Y)-A)*(100/(B-A))]/5$

Where:

Z = *standardized score for each component (1-6)*

Y = *2 if Z component is persons in poverty or poverty intensity, otherwise 1*

A = *-2 *(2 σ below mean)*

B = *2 *(2 σ above mean)*

The resulting socio-economic scores are recorded on a seven-point categorical scale with 1 denoting the lowest score and 7 the highest. An ordinal scale is created from the resulting continuous scores and then separated into categories (1-7) based on the number of standard deviations from the mean of the scale. A rating of 1, indicated a relative "very low" socio-economic score and includes those scores at least two or more standard deviations below the mean (i.e. $\sigma < -2$); *2-low* ($\sigma \geq -2$ *and* < -1); *3-medium-low* ($\sigma \geq -1$ *and* < -0.5); *4-medium* ($\sigma \geq -0.5$ *and* < 0.5); *5-medium-high* ($\sigma > 0.5$ *and* ≤ 1); *6-high* ($\sigma > 1$ *and* ≤ 2); *7- very high* ($\sigma > 2$).

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[7] For public assistance the field is the number of families, for education it is those over 25, employment is the number in the work force.

The Community Capacity Scale

Community capacity is the ability of a community to adapt to many types of circumstances and changing conditions and to fulfill the needs of its residents (SNEP, 1996). The measurement of community capacity should indicate how well a community will respond to external and internal stresses. Based on previous research for the purposes of this study community capacity consists of **physical infrastructure** (SNEP, 1996; OEDD, 1989; SAF, 1989; McGuire et al, 1994; Canton-Thompson, 1994), **human capital** (SNEP, 1996; SAF, 1989; O'Brien et al, 1991; OEDD, 1989; McGuire et al, 1994), and **social capital** (SNEP, 1996; Selznick, 1992; Putnam, 1993; FEMAT, 1993; Maguire, 1991; Sampson, 1991; SAF, 1989) and is computed by determinations from local expert knowledge.

In the SNEP study (1996), because of the infrequent use of "very low" and "very high" on the seven point scale during initial assessments, it was collapsed in subsequent analyses to a five-point scale with the extremes being termed low and high. See Appendix 2 for an example of the SNEP worksheet presented in community workshops. The current study was not structured identically to SNEP. SNEP included workshops and a description of a sample county, which was assessed first and in depth to use as a basis for further assessments. The current study attained these community capacity determinations with a different strategy - a key informant survey, described below.

The Sample

To generate primary data about community capacity, 35 key informants were surveyed by mail and 26 responded by completing the questionnaire. Many informants were knowledgeable about more than one community and asked to complete more than one questionnaire, thus 75 questionnaires were completed. Key informant surveys

followed purposive sampling, which entails identifying potential respondents based on the judgment of academics and agency managers focused on the purpose of the study (Babbie, 1995).

This study utilized key informants, people who were able to provide in depth information about the physical infrastructure, human and social capital of their community and geographic area. These "research collaborators" are frequently used in qualitative research to help generate ideas, information, and data for the group or public that they represent (Henderson, 1991). Typically, this group consists of planners and planning commissioners, community development professionals, current and former county supervisors, education administrators, business people, health and human services providers, and long term residents (SNEP, 1996). Since surveying all leaders is not feasible, using this form of nonprobability sample allows some latitude when defining sample size.

Key informants were located by asking the Forest Service and county personnel already interviewed regarding the Constituent Community Map about who would be most knowledgeable of the communities and capable of accurately filling out a community capacity survey. An initial phone conversation with several key informants led to additional respondents being identified and included in the sample. This process went on until the researcher continually was directed to the same contacts (Henderson, 1991; Babbie, 1995).

Survey Development

A mail-back questionnaire was developed to determine community capacity using a 7 point Likert scale for three distinct categories: human capital, social capital, and physical infrastructure (Appendix 1). The SWOT methodology (Hovee, 1995) provided

specific human and social capital characteristics in a list of "20 survival characteristics of rural communities". Many of these were incorporated into the survey questionnaire.

The overall categories for physical infrastructure, human capital, and social capital (i.e., conditions and types of roads, types of accessible open space, condition and availability of water and sewer systems, types of transportation corridors and accessibility to large urban centers, amount of financial capital, general knowledge of the community, strategies for economic diversification, leadership, and civic responsibility) were adapted from several definitions and discussions of community capacity found in SNEP (1996) and FEMAT (1993). Keeping with the structure of the socio-economic scale, the responses were designed in a Likert-type scale with the relative value of 1=very low, 2=low, 3=medium low, 4=medium, 5=medium high, 6=high, and 7=very high.

Following are a list of attributes ascribed to each category as described in SNEP (1996), FEMAT (1993), and the SWOT analysis (1989):

Human Capital

- degrees to which each community has belief in and support for education
- skills, education, experiences, and general abilities of the community residents
- leader's knowledge of the local physical environment
- leader's and business people's awareness of market forces
- leader's and residents' sophisticated use of information resources

Social Capital

- volunteerism
- community's ability to work together
- evidence of community pride
- multi-generational family orientation
- cooperative community spirit
- participatory approach to community decision making

Physical Infrastructure

- infrastructure
- financial capital
- business and community life

The survey participants rated each assigned community for each of the three capacities. Ratings for each community were then aggregated into a single community capacity score and entered into the GIS as a rating of a community's ability to adapt to change. When combined with the generated socio-economic map, it is intended that the GIS provides a measure of community well-being.

By completing the community capacity survey (Appendix 1), key informants rated varying gradations of physical infrastructure of the community by evaluating descriptions from the lowest physical infrastructure with a rating of 1 to the highest rating of 7. The categories within the survey include: water and sewer system, parks and open space, business and industrial parks, business types, transportation corridors and proximity to urban areas, economic size and diversity of businesses, and financial capital.

Both human and social capital definitions had elements that targeted the community's characteristics in various categories (i.e. the general knowledge of the community, strategies for economic diversification, leadership, and civic responsibility). These were rated by the key informants choosing the number of the six elements listed that fit their community. If they chose none of the elements, the score would be 1 (very low), if all six, the score would be 7 (very high). Human capital also included unemployment rate and education level taken from the census.

The Constituent Community Map was sent to each survey participant for reference along with a map of population by block group to further demonstrate community size, location, and road system. Having the two maps to examine allowed those surveyed to visualize the region and communities being addressed as well as to recognize the

constraints of the block group lines, such as the inability to separate Leaburg and Deerhorn into two communities.

The GIS

The Constituent Community Map is used as the base map for input of the two scales, socio-economic status and community capacity, with the result measuring community well-being. The census data was manipulated within Paradox, a database management program, to create a table displaying one value per community. Some of the communities had more than one block group and therefore had to have values combined for each block group within the boundaries of the community. The resulting table consisted of the geographic information identifying the polygon on the Constituent Community Map as well as the variable count for each polygon or community (e.g., 347 people own their homes in a certain community).

The community capacity survey data was also tabulated to create one value per community and linked to the same table. The community well-being results from averaging socio-economic status and community capacity scores were treated in like fashion. Within the GIS program ArcView, the linked tables allowed the three separate sets of values to be brought into the Constituent Community Map to create three separate maps: Socio-Economic Status, Community Capacity, and Community Well-Being (see Maps 1, 2, 3).

ArcView allows for the display and manipulation of the map layout. This program was used to bring in different layers of both the geographical and orientational features, such as the north arrow, scale bar, roads, and town names as well as interpretational aids, such as term definitions, legend, and title. The census TIGER files provided the data on roads and town names included in these maps.

Additional Variables

This study incorporated a number of additional census variables mapped at the block group level to show greater resolution with the data including:

- population
- persons in the agriculture, fishing, and forestry industries
- median household income
- retirement income
- persons of Hispanic origin
- male to female ratio
- persons working on "rural" farms
- average travel time to work
- single mothers

These maps have two purposes: 1) to provide additional socio-economic factors to assist in the analysis and understanding of the region and 2) to create a baseline of additional variables that may be of future interest.

The five variables from the socio-economic scale were mapped at the block group level and the community level to capture additional resolution and enhance the detail within the community maps including:

- education
- employment
- home ownership
- poverty
- public assistance

This allows comparison between the block group and community maps to see if the community aggregations are homogeneous throughout their range.

Roads Not Taken

There were several first attempts to explore the most useful direction for this study. Attempting to find the appropriate data, scale, and approach led the project down roads

not ultimately followed. Learning from trial and error is an essential component of adaptive management; thus, these routes are outlined here.

PUMS

Public Use Microdata Samples (PUMS) available through the Bureau of the Census were considered as a potential data source. Although these data include more detailed information about the population sampled, the population sampled is for too large of an area to study "community". For instance, Linn county had to be considered as one unit while Lane County was separated into two. This did not allow the data to be used to describe the AMA constituent communities at an appropriate scale.

In the regular census, the "Occupation" variable grouped people in agriculture, fishing, and forestry into one classification, whereas in the PUMS data, forestry workers fell into 14 categories from forestry and conservation scientists to supervisors, forestry and logging workers to cabinet makers and bench carpenters. This level of detail makes it illegal to publish Census Bureau data at a high resolution because it would infringe on personal privacy (Census of Population and Housing, 1990). It would be easy to cross reference this data to pinpoint individuals. Therefore, for the current study, PUMS data were simply not created at the preferred scale.

Issue Management

With the PUMS data not approaching the spatial scale needed for the community assessment, another tack was considered. Before incorporating the methods and variables used in SNEP, the idea of issue management cited earlier was attempted. The Rogue Institute for Ecology and Economy developed a system for the Applegate Partnership including neighborhoods with which the residents identified, a list of

residents' issues, names of key informants to keep abreast of upcoming issues, and a GIS tying everything together. This is more of an anthropological approach, getting to know the people and their concerns.

The major problem with this approach was the census lines. The idea of aggregating the census block groups to designate neighborhoods with which the residents related, and the desire to keep the census data as part of the analysis steered the current research away from the issue management approach. Issue management may actually be easier to implement in a more densely populated area where neighborhoods are more likely to occur along block group lines. The examples of issue management (Applegate and Washoe County) relied heavily on field data and constant updates of issues. There was also the concern that the Central Cascades AMA staff would inherit a system of issue management with very little personnel, funding, or time for implementation and upkeep. The project would need more commitment and buy-in from the Forest Service and BLM.

Findings

This chapter is segmented into two parts. First, the scores from the scales are presented in tabular form. Second, descriptions of the communities are produced from a combination of the findings of the socio-economic and community capacity scales and maps, block group maps, and data generated from the surveys and interviews.

Results from the Socio-Economic and Community Capacity Scales

The following table displays the rankings of the communities by socio-economic score and community capacity score, and an overall community well-being score which is an average of the previous two scores.

Figure 3. Community Socio-Economic Score (SES), Community Capacity (C.C.), and Community Well-Being (W.B.)

Community	SES	C.C.	W.B.
Leaburg & Deerhorn	6	4.62	5.31
Brownsville & Crawfordsville	5	4.65	4.82
Vida	5	4.29	4.64
Lebanon	3	5.79	4.40
Sodaville	6	2.63	4.32
McKenzie Bridge	4	4.62	4.31
Marcola	4	4.60	4.30
Blue River	4	4.08	4.04
Waterloo	5	2.95	3.98
Sweet Home	2	5.43	3.70
Walterville	3	4.12	3.56
Lacomb	4	2.09	3.04
Cascadia	1	1.81	1.40

1=very low, 2=low, 3=med.-low, 4=medium, 5=med.-high, 6=high, 7=very high

Community Descriptions

Following is a list of the communities in order of lowest community well-being to highest. The descriptions presented come from a number of sources including: 1) the results of scores; 2) key informant comments specific to each community found in the survey margins; and 3) census data from the additional block group maps (Maps 9-22). The characterizations specify what makes each community unique among the thirteen presented, although many of the descriptions are somewhat similar. Lower socio-economic scores depict a range of societal needs while low community capacity scores imply a reduction in the ability of communities to reasonably address those needs and to self-develop (SNEP, 1996). Descriptions of several communities were combined because they were similar in socio-economic status, community capacity, and geographic location.

The census and survey data combine to assess well-being on a general level, but one must remember that there are individuals who are affected differently by the various changes in forest management around them (e.g., harvest practices, roadless area designations, etc.). Individuals have varying needs, attitudes, opinions, and reactions to events which affect them or their community. The results of this study should not be viewed as "which communities have well-being", but rather as a general indication as to the balance of socio-economic factors and a community's capacity to adapt to both internally and externally induced change.

Cascadia

Cascadia has the lowest population (333 people in the census count), the highest rate of public assistance, as well as the lowest in each of the following categories: education score, percent of home-owners, community capacity, and overall socio-economic score

of the 13 study communities. The high fraction of renters in this area suggests impermanence of the residents. With the highest percentage of persons receiving public assistance, many of the residents are dependent on governmental aid and may contribute little to the area's social capital. These circumstances may indicate a lowered ability to work with others toward community goals, or even to collectively set goals.

The community is considered a place of refuge, with their own store, post office, and a common set of problems and geography. Cascadia is described as marginally asocial, a haven for counter culture, and does not have a center of town. The elementary school has closed. The residents keep to themselves and reputedly do not value government highly, demonstrated in part by reported illegal building activity. Cascadia has no formal governmental structure or community leadership. Geographically, it is the community in the Santiam River Corridor closest to the Willamette National Forest boundary and is considered rural.

Lacomb

Lacomb has the second lowest community capacity score (2.09) and tied for the highest unemployment at 7%. Yet, it also has the highest percent of homeowners at 86% which contributed to a medium level (4.0) socio-economic score, higher than that of the bordering communities of Lebanon and Cascadia. It has low public assistance rate and a high median household income. Lacomb does not have a large enough physical infrastructure to have a high community capacity score, yet has a good socio-economic score. With a relatively small population (1,855), it currently has a decreased ability to acquire a large amount of infrastructure and services than the larger communities.

From the block group map depicting average travel time to work, Lacomb shows a higher average than all of the communities of 30-45 minutes. This indicates that many

members commute to work outside of the community, most likely to Salem, which probably accounts for their moderate socio-economic status.

Lacomb is an unincorporated town and has no obvious town center, passersby may not know when they had arrived. The community has its own elementary school, church, and store. High school students travel to Lebanon.

Sodaville and Waterloo

The communities of Sodaville and Waterloo are combined because of their geographic proximity and similar scores. Both communities have relatively high and medium-high socio-economic scores (6 and 5) and low community capacity scores (2.63 and 2.95 respectively). It seems the residents are socio-economically well-off, however, the physical infrastructure and human and social capital of the communities are somewhat lacking. They may be too small (Sodaville =1,245 and Waterloo = 1,337 people) to support a diversity of businesses or have large fiscal resources to support additional infrastructure, government, or services. They are geographically close to Lebanon and Sweet Home and can rely on services provided there.

Although relatively small towns, both Sodaville and Waterloo have city councils. Waterloo is working on a grant to fund a public-gathering place, while Sodaville recently expanded its school. Sodaville is incorporated and residents have their own elementary school, store, new water system and small city park (which in fact was the first state park in Oregon). Waterloo is an incorporated town with its own elementary school, store, and auto repair, and is contiguous to a large county park. High school students from both Sodaville and Waterloo go to Lebanon high school.

Walterville

Walterville has a medium-low socio-economic score and a medium community capacity (3 and 4.12 respectively). It has one of the lowest poverty rates at 4% and a high home ownership rate at 80%. Walterville is an unincorporated community (of 989 people) with no formal mechanism for leadership, the community members have informal networks (e.g., church) to work together for the betterment of their community.

Highway traffic is significant for the many travel oriented businesses. Walterville is the first town recreationists drive through to get to the McKenzie River area. This community is supported partly by the tourist trade. Walterville also has the influence of Eugene and Springfield close by which is an employment source for the residents. This proximity to an urban area allows Walterville the flexibility of being a combination of bedroom community and one that supports tourists' needs; it does not rely heavily on the timber industry.

The urban growth boundary from Springfield has encroached into Walterville and the residents are nervous about growth. Residents are generally opposed to change.

Sweet Home and Lebanon

Sweet Home and Lebanon have socio-economic rankings of low (2) and medium-low (3), respectively, and their community capacity rankings are both medium-high (5.43 and 5.79), the highest of the surveyed communities. The larger size of the cities boost their physical infrastructure and human capital scores. Both Sweet Home and Lebanon are considered mill towns with the forest industry playing a major role historically in their economic development. Additional similarities have caused these two communities to be addressed together here.

Lebanon's and Sweet Home's home ownership rates are 67% and 68%, respectively, they have unemployment rates of 6% and 7%, respectively, 10% of their populations are receiving public assistance, and they both have 16% of their population below the poverty level. All of these figures are on the lower socio-economic end of those communities included in this study. The community capacity in both communities shows a high propensity to adapt to various changes at the community level, but the lower socio-economic scores depict communities where various segments of the population are experiencing below average conditions.

The presence of city governments, chambers of commerce, and economic development organizations enhance the cities' community capacity in respect to the smaller communities surveyed. The smaller communities generally do not have a comparative physical infrastructure or human capital and would invariably fall short of the larger cities in the social capital "leadership" section as well. Sweet Home and Lebanon constitute the most densely populated areas incorporated in the study. These cities also have a higher percentage of rentals, housing potentially less permanent tenants who are less well-off than homeowners.

Marcola

Marcola ranks medium in the socio-economic scale (4), community capacity (4.60), and community well-being (4.30). Its population of 2,377 has a relatively low unemployment (4%) and a higher education and home ownership score than most communities. Marcola seems to be much like the aggregation of Brownsville and Crawfordsville in most of the variables represented, although it consistently ranks a little lower.

Marcola's economy is a mixture of commuters, retirees, agriculture, and services. Marcola has one retail store, one restaurant, and its own post office. It is not in a high

traffic route, such as the McKenzie River Corridor or the Santiam Pass, but rather connects the Eugene/Springfield area to Sweet Home.

Blue River (Includes Nimrod, Rainbow, Finn Rock) and McKenzie Bridge

These communities are both medium in socio-economic status and medium (Blue River = 4.08 and McKenzie Bridge = 4.62) in community capacity. They are located east of Deerhorn/Leaburg and Vida along the McKenzie River Corridor (Highway 126), farther away from Eugene and Springfield. Both Blue River and McKenzie Bridge have US Forest Service Ranger Stations which provide jobs and services for the residents.

Even though they are relatively smaller communities (McKenzie Bridge = 642 and Blue River = 2,716) their community capacity scores are higher than other communities their size. The upper McKenzie River Corridor seems to be self-sufficient in carrying out community development. For instance, the Upper McKenzie Rural Fire Protection Department formation and development was locally funded. The McKenzie River Reflections, a weekly corridor newspaper, provides free postings of group activity information for the residents from Cedar Flat to the Santiam Pass and keeps the residents notified of corridor news. Blue River has a medical clinic, while residents living east of Nimrod are covered by the Emergency Action Service.

There is a dependency on the tourist trade, with an emphasis on sportfishing. To appeal to tourists, recreationalists, and residents there are numerous parks, boat landings, a golf course, Cougar and Blue River reservoirs, access to Forest Service recreational trails, and walking and jogging trails. There is an increasing amount of truck traffic through the corridor, bringing both traffic and safety concerns. The corridor has a diversity of businesses locally, with commuters and retirees bringing in income from outside the area.

Generally, the corridor economy is a mix of:

- small mom and pop businesses
- tourist and highway oriented services
- services for residents, agriculture, government workers
- commuters to Eugene and Springfield
- Forest Service employees
- high-tech cottage industry
- transfer payments to retirees

The corridor has a range of opportunities and attracts a variety of residents. While there are certain to be opposing views of forest management practices, the community capacity scores indicate that people work together towards community goals. While their physical infrastructure scores were not as high as a larger community (e.g., Sweet Home and Lebanon), the social and human capital scores depict willingness for community involvement.

Brownsville/Crawfordsville

The aggregate community of Brownsville and Crawfordsville is rated as the second highest in well-being (4.82). The aggregation ranks in the medium or medium-high categories in all three scales. They have a low unemployment rate of 4% and a relatively high education score.

A portion of the community of 2,753 people commutes to Halsey, Lebanon, or Sweet Home for work. The local businesses and employment are a mix of tourist and/or basic services, with visitor dollars having a growing influence. Brownsville is underway with a strategy for small business development and there is a proposal in for funding a plan for site readiness and recruitment of industry into the area.

Deerhorn/Leaburg and Vida

Deerhorn and Leaburg rated with the highest overall well-being score of 5.31 (medium-high), with a high socio-economic score and a 4.62 community capacity score. It has a higher home ownership rate at 76%. Deerhorn and Leaburg also share the lowest public assistance rate (3%) with Vida. Only the bigger cities of Sweet Home and Lebanon scored higher in the community capacity category.

Vida had a medium-high rating for socio-economic status and 4.29 for the community capacity score. It ranks the third highest community in well-being, after Deerhorn/Leaburg and Brownsville/Crawfordsville. It has the highest education score of all the communities and the lowest poverty rate (2%) of all the communities. The communities of the McKenzie River Corridor rank on the relatively higher end of both community capacity and the socio-economic scale, putting them all in the medium to high division.

These two communities had high ratings in the social and human capital sections of the community capacity section. This indicates an ability and willingness to participate in setting and implementing community goals. Combined with strong socio-economic scores, these communities should be able to adapt to changes readily.

Discussion and Implications

This chapter is segmented into three parts. First is a discussion of the findings and research methodology which is broken into two sections: specific community findings and constraints discovered from the survey methodology, including survey content and spatial and sample limitations. The second section illustrates five aspects of the census data which merit further discussion: 1) block groups vs. community spatial scale, 2) interpreting the socio-economic and community capacity scores, 3) the relationship between employment and public assistance, 4) the forestry and farming industries, and 5) basic demography. Third is a discussion on the value of GIS as a social assessment tool including the various assets and limitations observed.

Community Discussion

The communities assessed in this study could all be considered forest-dependent in a broad sense of the term. Some of the communities, such as Sweet Home, have a strong tie to the timber industry, while others, such as Walterville, have stronger economic ties to forest recreation. The communities with the overall stronger tie to forest recreation seem to rank generally higher socio-economically. There could be many reasons behind this correlation, but one could be the higher housing prices in an attractive river corridor where good building sites are scarce. Those higher on the socio-economic scale would more likely have the ability to settle in this region.

In the same vein, the communities with a relatively high dependency on the timber industry are higher in community capacity. This could also be attributed to different inferences. Two of the communities, Sweet Home and Lebanon, are also the two largest, with more traditional physical infrastructure (city council, chamber of commerce,

economic development programs). But, it also could be true that those associated with the timber industry have banded together due to their long-standing interest in their profession and way-of-life and created a stronger social capital. Those newly arriving in a community, such as retirees, may not have the same sort of tight bonds formed and interest in their historical community image.

Some communities are too small to have their own chambers of commerce or have much of a tax base for community improvements. These communities ranked fairly low on the community capacity scale. For example, Sodaville and Waterloo are located quite near Lebanon and Sweet Home and can very easily benefit from the infrastructure, job opportunities, and community amenities available in the larger towns. Most likely from this association, Sodaville and Waterloo are on the higher end of the socio-economic scale.

On the other hand, communities such as Cascadia, which is small but also remote, ranked low on both community capacity and socio-economic status. This could be ascribed to their geographical location and size or it is possible that because of an isolation orientation the residents there may not associate the same sort of positive feelings to the social and human capital characterizations. They may look at their community as somewhere to get away from city life and could potentially be disinterested in being civically involved.

Census Data Constraints

Block Groups vs. Community

The discussion of certain regional factors and attributes of the census data are important to bear in mind when analyzing the socio-economic maps. The maps

presented at the block group level (Maps 9-22) vary significantly from the community level maps (Maps 1-8). The more densely populated block groups in Lebanon and Sweet Home generally have lower socio-economic scores than the less populated surrounding block groups. Within the community maps, the whole community appears to have lower socio-economic characteristics of less home ownership, more public assistance, a higher poverty rate, and higher unemployment. When displayed as a community, these variables average to show a more homogeneous region, but there is actually a sharp disparity between the center of the cities and the outskirts.

For instance, when looking at the unemployment maps (Maps 5 and 10), most of the general area surrounding Lebanon and Sweet Home shows unemployment levels between 0-4.5% in the block group map, except for the block groups of the highest population density which range from 4.5%-18%. At the community map level, Sweet Home's unemployment bumps up to 7% and Lebanon's up to 6%. Therefore, the "inner city" greatly influences the portrayal of the surrounding areas and one should not assume a whole community is homologous when depicted as a "community".

Interpreting Socio-Economic and Capacity Scores

Many of the communities surveyed had medium to medium-high well-being scores with no great disparity between the levels of socio-economic status and community capacity. An important factor in evaluating the final socio-economic and capacity scores, is the fact that low capacity combined with higher levels of socio-economic status does not reduce well-being as much as high capacity and lower levels of socio-economic status (SNEP, 1996). High socio-economic status areas will be able to buy services and deal effectively with problems, if they have sufficient infrastructure. The low socio-economic status areas have less financial means and will probably have to rely on

volunteerism (often more difficult in low income communities) or the county and state to provide certain services.

Unemployment and Public Assistance

The two variables, unemployment and public assistance, provide different types of information: therefore, some intuitive reasoning is appropriate. Those who have dropped out of the workforce and are on some form of welfare will be captured in the public assistance map (Maps 8 and 20) but not the unemployment map (Maps 5 and 10). Only those who are unemployed and actively seeking work will be shown on the unemployment map. The unemployment map should be compared to the public assistance map to see what places have both a high unemployment rate and a high percentage of children on public assistance. These areas have a long road to a healthy community, with the potential lack of jobs and a high percentage of families receiving aid.

It should also be mentioned that the unemployment and the public assistance measures can have limitations in depicting the level of employment and the number of families in need. The unemployment measure is a narrow view of the status of the labor force and is not an accurate representation of reality in areas of chronic unemployment, where frustrated workers, early retirees, and others who are not a part of the labor force by choice are not counted (SNEP, 1996). The measure of public assistance is a good indicator of families in need, yet it will not catch those families who do not believe in receiving assistance no matter their degree of need (SNEP, 1996).

Forestry vs. Farming Industries

An approximate amount of the forest industry in each block group can reasonably be assessed by using two separate maps. Since there are generally few fisheries jobs available in the region, analyzing the map of Farming, Fisheries, and Forestry (Map 11) combined with the map of Rural Farms (Map 12) provides an estimate of the forestry industry is obtainable. This can be accomplished by taking the number of rural farms out of the Farming, Fisheries, and Forestry map numbers and the number left is approximately the persons employed in the forestry industry. This will be important for managers to monitor over time to see the possible change in significance of the forestry industry to their closest publics.

Basic Demography

Future changes in demographics may also indicate a shift in local social values. The monitoring of some basic demographics will allow forest managers to have the ability to assess social change within their constituent communities. For instance, with the change from a timber industry community to a retirement and bedroom community, the attitude towards forest management may also be changing. Retirees and commuters may be interested in preserving the surrounding area in a different way than those employed in the timber industry. The retirement map (Map 21) shows a large percentage of retired households in the McKenzie River area when compared to Sweet Home suggesting differences exist in support of various management practices.

Census measures such as single mothers, Hispanic population, and total population display general changes in the makeup of communities. These can help managers keep track of the changes occurring in communities over time and allow them to target

programs to meet special needs, such as addressing language barriers or implementing an after-school forest program.

Constraints with the Survey

The community capacity segment of this study was a methodological exercise to gather data from key informants that could be quantified for use in a GIS format. The survey developed proved to have certain problems with it. This section discusses some of the limitations discovered through the process of administering the survey and analyzing the results.

Survey Content

The first obvious issue raised was the fact that the choices (i.e. each separate alternative within a question) on the survey may not adequately represent the community at question. For instance, the first question in the physical infrastructure section attempted to determine how sophisticated the water and sewer system is by asking the informant to distinguish between: 1) non-existent sewer; old well system with poor water quality, 2) all septic, no sewer system; wells sometimes with poor water quality, 3) mostly septic some sewer OR old sewer in need of repairs; mostly wells and some public water, sometimes has poor water quality, and so on.

This format leaves the respondent with choices that may not fit their community, especially ones with excellent water quality yet no sewer system. In hindsight, this question should have been separated into two questions, with each given half weight within the physical infrastructure section. The reason that it was combined initially was so water and sewer were not given undue weight when averaged with questions about open space and financial capital. One solution would be to separate them and divide by

two. The basic problem still holds, however, even with this adjustment, that the community may not exactly fit a given description and the informants will hesitate in responding. Most respondents seemed to grasp the inexact nature of the descriptions and returned the surveys without question or problem, thus it appears that this technique is relevant and useful.

The community capacity scores for the smaller communities that rely on larger nearby communities or the county for services (such as Waterloo and Sodaville) were low. The survey had several questions relating to businesses and services of the community which decrease the physical infrastructure rating of the smaller communities possibly more than is accurate. The physical infrastructure section of the survey may be improved with questions that take into account communities that benefit from county or nearby services, such as changing the "economic size and diversity of businesses" question to include adjoining communities if applicable.

A few respondents misread the instructions for the Human Capital and Social Capital sections. Instead of simply checking the lines that applied to the community, they put a number between 0-6 that best fit. If the community was determined to only be halfway characterized by the statement, then the response would be three, and so forth. This method could be used in further assessments of community capacity since it allowed for a more complete response and has the ability to deal with those statements that only partially applied to the community in question. In future survey design, a Likert scale for the Human and Social Capacity sections is recommended. This would give the respondents a better set of choices since the current form only allows for black and white, when reality is almost always a shade of gray.

Spatial Limitations

Another problem with the community capacity determination is that the community data had to be aggregated and the responses may not necessarily fit all the communities within the aggregation. For instance, Leaburg and Deerhorn are in the same block group and therefore could not be separated. These communities could be much different in theory and one would have to try to average their attributes to respond to the survey as best they could. If one community had twice the population of the other, they may even try to mentally weigh their response to give the higher population community a higher influence. This gets complicated very quickly.

A possible partial remedy would be to survey key informants about the separate communities and use the same socio-economic score for each of the communities within the block group. This would give communities their own community capacity score and therefore a different community well-being score. A boundary line would have to be added to the block group map to depict the split between the communities.

Sample Limitations

The effort to send the surveys out to all key informants recommended is also a concern. It would have been best to approach persons holding the same positions within the communities. Unfortunately, some of the smaller communities do not have the same structure of government as larger places like Lebanon and Sweet Home. There was an attempt to contact all persons suggested by informants during the initial phone conversation. The people recommended were of varying relationships to the community of question. Some were county personnel, others Forest Service and BLM personnel, still others worked in some capacity for the community or general region.

The purpose of this project was to design a process to incorporate both socio-economic data and the community capacity determinations into a GIS. The small sample was a field test for the survey, so users should keep this in mind and view the data with caution. The results themselves should indicate relative strengths and weaknesses of the communities surrounding the Central Cascades AMA, but no inferences should be made about each community's physical infrastructure, human capital, or social capital from the final community capacity or well-being map.

Implications of a GIS as a Social Assessment Tool

A major component of this study was to determine if the GIS technology could be applied effectively and efficiently to the social assessment and monitoring processes. While there were a few constraints discovered with this particular study, the methodology is sound and can be continued with potential rewards. The census is a valuable, regular source of data and the surveys for community capacity can be re-administered with the few suggested changes in protocol.

While not yet demonstrated through this study, providing managers with maps is substantially better than seeing the same data on a chart or graph (J.E. Force, personal communication, Feb. 1997). Maps are easier to visualize and help depict the relative differences of the publics. They allow managers to catch hot spots and to know what areas need immediate attention, or which areas to monitor for future action. For example, Cascadia can be considered a community in need of attention in comparison to the others in the study due to its low scores throughout. It will be easier for managers to demonstrate to community members why an area is targeted with a certain management scheme.

Since this study has not yet been field tested, it is hard to assess the value to those who would benefit most from its information. The maps provided in this study could be

considered experimental baseline data, with many potential directions for managers to pursue. They could direct some efforts toward Cascadia, the lowest ranked in community well-being. But, they could target a larger population which apparently is short in community capacity, such as Lacomb. Some potential ideas include programs for opportunities to work in the forest in various capacities, education and retraining programs, after school programs, workshops for community participation and management cooperation, and community fund-raising using the forest setting and community volunteers. All these programs would be best discussed with targeted communities before implementation to determine needs and set goals. In addition, with future updates, managers will have the ability to monitor changes occurring within their constituent communities.

Summary and Conclusions

The dual purpose of this project was to provide the Central Cascades AMA managers with information about their constituent communities and to test the value of GIS as an aid in the social assessment process. An in-depth look into what is currently being developed in this quickly expanding field of research provides useful contextual information for managers. Replicating the methods and social variables used in SNEP provides an opportunity for further analysis and collaboration.

First, data collection methodology was chosen for its effectiveness and efficiency in accurately displaying communities and quickly ascertaining their community capacity. The method of aggregating the census block groups should emulate real communities rather than vaguely and arbitrarily defined areas of analysis. In an attempt to minimize the overall cost and time to update the monitoring system, a new collection procedure was developed for the community capacity data. The resulting survey should prove to be relatively easy to re-administer and the decennial census will provide an inexpensive, reliable source for the socio-economic data.

Second, it produced two maps, socio-economic status and community capacity, which then combined within the GIS to form a community well-being map. The combination of the primary and secondary social data within the GIS is intended to enable the managers to compare and contrast the scales of the community's socio-economic status and capacity to adapt to changes. These two scales combine to indicate community well-being. The resulting maps will become a baseline of socio-economic and community capacity data from which the Central Cascades AMA can build a social monitoring GIS system.

Third, the project specified some of the benefits and setbacks encountered with the methodology. This project has revealed and detailed some of the technological set-backs and deficiencies encountered establishing this system (i.e., the problems with the disparity of the block group/community), as well as some of attributes and benefits of using a combination of primary and secondary data to portray community well-being (i.e., the potential to assess the changes in community well-being over time). In the attempt to create a system to monitor and assess social variables of the region surrounding the Central Cascades AMA, various research methods were explored for both spatial and methodological suitability for the needs of the managers. Combining SNEP and new methodologies, this project targeted efficient data collection and manipulation at the spatial scale most useful for the Central Cascades AMA managers.

Finally, some of the advantages of GIS and mapping were detailed as well as the potential benefits gained from establishing a GIS social monitoring system. The usefulness of the GIS system can be found in the simplicity, yet intricacy, of a map. Maps can provide an immediate visual picture of the attributes spatially displayed, whereas charts and graphs do not have the spatial capacity and take a little more time to understand the parameters involved. The spatial representation of a social variable can reach the attention of an individual much faster and more effectively than other techniques. Maps are designed to depict a geographic area with a number of variables displayed with lines, points, text, texture, and color. The fewer variables included, the easier the comprehension of the map's theme. Maps for this project were designed to be simple to interpret with boundaries, towns, roads, and a color representation of the specific map variable. Putting these maps into an atlas for the Central Cascades AMA managers will allow a faster and better understanding of the communities than if the data was presented in another form.

Future monitoring can be accomplished by inputting the 2000 census into the same community lines for the socio-economic scale and re-administering the community capacity survey. This step can be repeated every ten years as the census is published. The changes within each community over time will be readily apparent on the maps and useful to managers who need to determine appropriate changes in policies that affect their publics. Additional modifications can be made as the GIS technology is improved and census (and other) data become available in various forms.

The continuation of this project will take both time and effort, but in the long-run, the perpetuation of combining social variables within a GIS should allow the managers a greater understanding and the ability to monitor changes in their constituent communities.

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APPENDICES

Appendix 1 Community Capacity Survey

Name _____ Community Aggregation _____

This survey is designed to quantitatively assess community capacity. Community capacity in its most simple form is the ability of a community to adapt to circumstances of all sorts and to meet the needs of its residents. Capacity is also the ability of a community to meet local needs and expectations; to respond to internal and external stresses; and to take advantage of opportunities of all kinds. It includes the ability to adapt and to respond to changing conditions.

Community capacity can be divided into three broad areas:

Physical infrastructure includes the physical elements of a community and financial capital;

Human capital includes the skills, education, experiences and general abilities of residents; and

Social capital includes the ability and willingness of residents to works together for community goals (more formally defined as including networks, norms and trust that facilitate coordination and cooperation for mutual benefit).

Please fill out this survey to the best of your ability. If there are questions you do not know the answer to please skip them. Space is left between the questions to allow for specific comments if you feel further explanation is necessary.

Physical infrastructure

#1 Water and Sewer System

Please check only one. Throughout this survey, if the community does not exactly match the criteria please approximate as best you can given these guidelines.

1 ____ Non-existent sewer; old well system with poor water quality,

2 ____ All septic, no sewer system; wells sometimes with poor water quality,

3 ____ Mostly septic some sewer OR old sewer in need of repairs; mostly wells and some public water, sometimes has poor water quality,

4 ____ About half and half (both septic / sewer and wells / public), capacity of waste treatment facility meeting only current demand; fair water quality,

5 ____ Mostly sewer, capacity of waste treatment facilities meets current demand few wells; mostly public water with fair water quality,

6 ____ All public sewer, capacity of waste treatment facilities meets current and projected future demand; all public water, with good water quality,

7 ____ Sewer and water system with ample public funds to maintain infrastructure, meets projected future demands; with good water quality.

#2 Parks and Open Space

Please check only one.

1 ____ No public areas designated for recreation, leisure, and open space

2 ____ Citizens can use school yards for recreation after school hours, no other designated parklands,

3 ____ Some urban recreational opportunities available, schools and city parks,

4 ____ Urban and rural recreational opportunities, (some open space with designated trails),

5 ____ Urban, rural, and roaded natural (within 15 minute drive) recreation opportunities,

6 ____ As above, plus semi-primitive (within 15 minute drive) recreation opportunities,

7 ____ As above, plus designated Wilderness Area (within 15 minute drive) recreation opportunities.

#3 Business and Industrial Parks:

Please check only one. (If you check 1 or 2 go on to question #5)

1 ____ None and no zoning for future sites or no available land,

2 ____ None, but land available in areas zoned for business and industry,

3 ____ Very few and very small with no link outside the community,
4 ____ Some small parks, some businesses headquartered outside the community,
5 ____ A good diversity of types of businesses, sizes, and linkages outside,
6 ____ Same as 5, but still more zoned area available and being built,
7 ____ Same as 6, but with businesses waiting to be able to develop - no need for tax incentives to lure businesses into the community.

#4 Types of Business:

Please check only one. Respond only if answered Question #3 from 3-7

Existing businesses are...

1 ____ Heavily resource dependent*, undergoing supply problems, **and** are pollution point sources,
2 ____ Heavily resource dependent, undergoing supply problems, **or** are pollution point sources,
3 ____ Resource dependent, current supply is stable, **and** are pollution point sources,
4 ____ Resource dependent with stable supply, mostly non-polluting,
5 ____ Half and half resource dependent/independent, stable supply, non-polluting,
6 ____ Mostly resource independent, stable supply and projected into the future, non-polluting
7 ____ Resource independent, stable supply and projected in to the future, non-polluting.

(* resource dependency is indicated by the business' reliance on raw materials such as wood fiber, minerals, water, forage)

#5 Transportation Corridors and Proximity to Larger Urban Areas (i.e. Portland, Eugene, Salem):

Please check only one.

1 ____ Isolated by 100+ miles from major urban area and the local roads are poor, not maintained, very poor access,
2 ____ 100+ miles, with adequate local roads, no state highway or county roads, and not on the way to any tourist spots or recreation areas,
3 ____ 50+ miles, has a state highway or county road through it, but no significant traffic (i.e. few people stopping for services and spending money),
4 ____ 50+ miles with adequate local roads, has state highway or county road with traffic to larger populations, tourist spots or recreation areas,

5 ____ 25+ miles with adequate local and county/state roads, has a federal highway or interstate with a fair amount of traffic through,

6 ____ 25+ miles with a good network of well-maintained local and county/state roads, has a federal highway or interstate, with major traffic stopping for services on their way to larger populations, tourist spots, or recreation areas,

7 ____ Less than 25 miles with good network of well-maintained local and county/state roads, OR well connected with transportation network, a combination of trucking, freight, shipping, airport.

#6 Economic Size and Diversity of Businesses:

Please check only one.

1 ____ Community has low diversity in business types and businesses have few capital investments,

2 ____ Employment highly dependent on natural resources, not able to process them locally,

3 ____ Employment highly dependent on natural resources, able to process locally, has a small combination of **farming, government employment, transfer payments to retirees, etc...,

4 ____ Employment less dependent on natural resources, process locally, and has a balance of other business types (**),

5 ____ Community has stable access to natural resources from private lands, process locally, plus many other business types (**),

6 ____ Diverse economy with access, processing, and re-manufacturing capabilities of natural resources, and both large and small business types, non-dependent on natural resources,

7 ____ Community has varied business types, ranging from resource extraction, processing, manufacturing, all from a stable source, to tourism, to large non-resource dependent businesses.

Human Capital

#1 General knowledge of the community and its context in the region

The community being assessed has between 0 and 6 of the following attributes:

Check all the apply.

____ Business and civic leaders have knowledge of the physical environment and take advantage of local strengths with both knowledge of location and the familiarity of what the community possesses locally.

____ Awareness of competitive positioning. Civic and business leaders know who their competitors are and emphasize local loyalty to assist local businesses.

____ Problem-solving approach to providing health care to meet the needs of the community as the community members change. Strategies for health care access vary by community, be it a local doctor, emergency services, or comprehensive hospital-based services.

____ Sophisticated use of information resources. Community leaders know about their communities beyond the knowledge base available in the community. Tied in with the federal, state, or county services available. Have access to technical resources, knowledge about how to recruit business or encourage local entrepreneurs, how to write grants, etc.

____ Realistic appraisal of future opportunities. Community builds on its strengths, minimizes its weaknesses, and does not seem stagnant. Some of the opportunities which could be addressed by the community include: attracting retirees, tourism and recreation, housing, cottage industry, secondary and value added wood products, retail development, services. Also, concentrate on jobs and opportunities for the younger generation.

____ Community has the ability to spread news and information, elicit community opinion, and be in touch with the members.

#2 Strategies for economic diversification

Community has addressed or is planning to address between 0 and 6 of the following strategies. Check all those appropriate.

____ Actually has a strategy or plan for economic development

____ Tourism (including recreational potential, determination of and concentration on *destination* or *pass-through* business, marketing as a part of regional or statewide efforts, greater attention to better quality products, responsive customer service, community image improvements, and revitalization of downtowns, etc.)

____ Home-based and small business development

____ Housing and services to attract retirees and commuters

____ Value-added/secondary wood products

____ Site readiness and recruitment of other types of industry into the area

Social Capital (Civic Responsiveness)

#1 Leadership

The community being assessed has between 0 and 6 of the following characteristics:

Check all that apply.

____ Participatory approach to community decision-making. Community focuses attention on cooperative activities, power-sharing, and consensus building.

____ Deliberate transition of power to a younger generation of leaders. People under 40 hold both civic and business positions.

____ Acceptance and presence of women in leadership roles.

____ Careful use of fiscal resources. Expenditures are made frugally and carefully. Expenditures are seen as investments in the future of the community.

____ Strong presence of traditional institutions that are integral to community life. Community activities are centered around the church, schools, and/or service clubs.

____ Willingness to seek help from outside. Successful at competing for government grants and contracts for economic development, sewer and water systems, recreation, street and sidewalk improvement, and senior citizen programs.

#2 Civic responsibility

The community being assessed has between 0 and 6 of the following characteristics:

Check all that apply.

____ Evidence of community pride. Community is a showplace of community care and attention as well as possessing festivals and events to celebrate their community's history and heritage.

____ Emphasis on quality in business and community life. Facilities are built to last, schools and businesses are built or expanded with attention to design and construction detail.

____ Willingness to invest in the future. Residents invest time and energy in community betterment.

____ Cooperative community spirit with evidence of volunteerism and civic-minded groups. Once common goals are defined then the community groups work together to accomplish them.

1____ 18% and higher
2____ 15% - 18%
3____ 12% - 15%
4____ 9% - 12%
5____ 6% - 9%
6____ 3% - 6%
7____ between 0 and 3%

____ Strong multi-generational family orientation. Family-oriented communities with activities built around family needs and ties. Out-migration slow, in-migration accepted and incorporated.

____ Conviction that in the long run, you have to do it yourself. Community members believe that their destiny is in their own hands. Residents are pro-active in making their community a good place to live.

#6 Financial Capital: (Physical Infrastructure)

Please check only one.

1 ____ Community has no treasury for improvements, events, etc., and no formal nor informal networks exist to form one,

2 ____ Bond rating BBB, *OR* community has treasury system intact but has no ability to tax itself, lack of local funds reserved for major capital improvements, lack of paid local staff for economic development program, not served by county-wide, regional, or volunteer economic development organizations,

3 ____ Bond rating BB, *OR* community is as above, but with the ability to tax citizens, has enough in treasury for small community services or improvements,

4 ____ Bond rating B, *OR* community is as above, with local funds for major capital improvements,

5 ____ Bond rating A, *OR* community is as above, and has both tax revenue and revenue from county, regional, or volunteer economic development organizations,

6 ____ Bond rating AA, *OR* community is as above, with paid local staff for economic development program planning,

7 ____ Bond rating AAA, *OR* community is as above, with the economic development plan intact and being implemented.

The next two human capital consideration are education level and employment. Use census data to get the level.

#3 Education Level (Average Educational Attainment)

1 ____ 9th grade and below

2 ____ 12th grade, no graduate

3 ____ Graduated high school

4 ____ Some college, no graduate

5 ____ Associate degree

6 ____ Bachelors degree

7 ____ Graduate or professional degree

#4 Unemployment

1____ 18% and higher
2____ 15% - 18%
3____ 12% - 15%
4____ 9% - 12%
5____ 6% - 9%
6____ 3% - 6%
7____ between 0 and 3%

Appendix 2 Community Capacity Worksheet from SNEP

The **worksheet** of the SNEP workshop participants is as follows:

Community capacity is the ability of a community (or communities within a single aggregation) to adapt to circumstances of all sorts and to meet the needs of its residents. SNEP is interested in learning about the items/issues that affect community capacity, and about the strengths and weaknesses of communities in the context of capacity.

COMMUNITY AGGREGATION
NAME_____

If this aggregation contains more than one distinct community, please list them.

CAPACITY NARRATIVE
Please identify the critical components of capacity (both positive and negative) for this community aggregation and describe how they are important (please refer to individual communities as appropriate)

The **definition** of capacity presented to the SNEP workshop participants is as follows:

Community capacity in its most simple form is the ability of a community to adapt to circumstances of all sorts and to meet the needs of its residents. SNEP is interested in learning about the components of communities that affect capacity, and about the strengths and weaknesses of communities formed by the idea of capacity.
Further definition:
Capacity is the ability of a community to meet local needs and expectations; to respond to internal and external stresses; and to take advantage of opportunities of all kinds. It includes the ability to adapt and to respond to changing conditions.
Community capacity can be divided into three broad areas:
Physical infrastructure includes the physical elements (e.g., sewer systems, business parks, land available for development, open space, etc.) of a community, and includes financial capital;

Appendix 2 Community Capacity Worksheet from SNEP

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Capacity is the ability of a community to meet local needs and expectations; to respond to internal and external stresses; and to take advantage of opportunities of all kinds. It includes the ability to adapt and to respond to changing conditions.
Community capacity can be divided into three broad areas:
Physical infrastructure includes the physical elements (e.g., sewer systems, business parks, land available for development, open space, etc.) of a community, and includes financial capital;

Human capital includes the skills, education, experiences and general abilities of residents; and

Social capital includes the ability and willingness of residents to works together for community goals (more formally defined as including networks, norms and trust that facilitate coordination and cooperation for mutual benefit).

Appendix 3 Methodology within the GIS

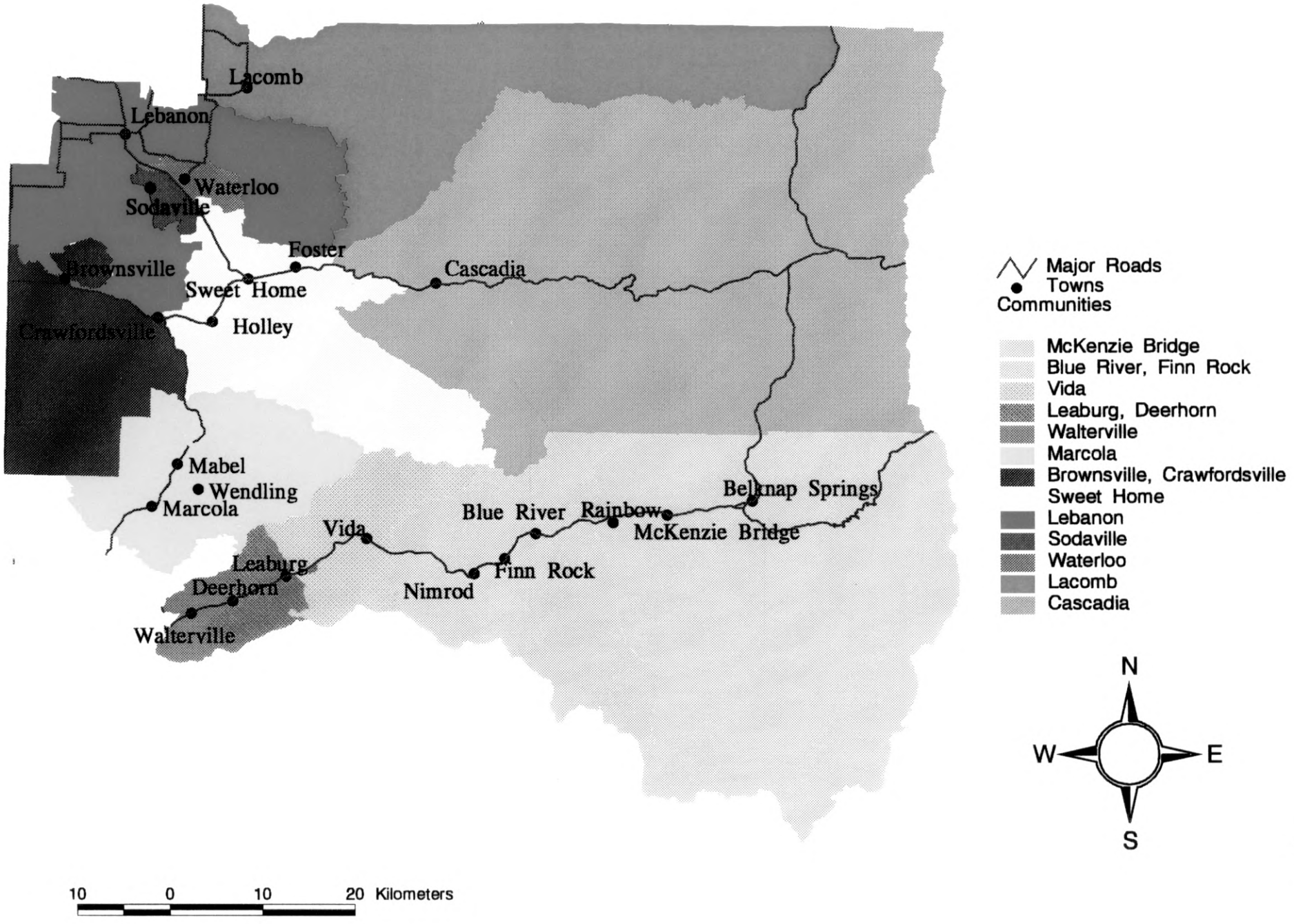
Within the GIS, the separate block-groups were assigned to a community number and then mapped on "community", a specified attribute (within ArcView: sel many, calc comm = 1 - 13). This created a line map which had 13 polygons each representing a community.

The data was exported from the census CD onto the workspace in the Forest Sciences Laboratory (FSL) and the records of interest were extracted for this study. Lane and Linn counties (numbers 039 and 043) were selected as well as summary level "150" to create a new set of data specific to the county and geographic area type (block group) needed for analysis.

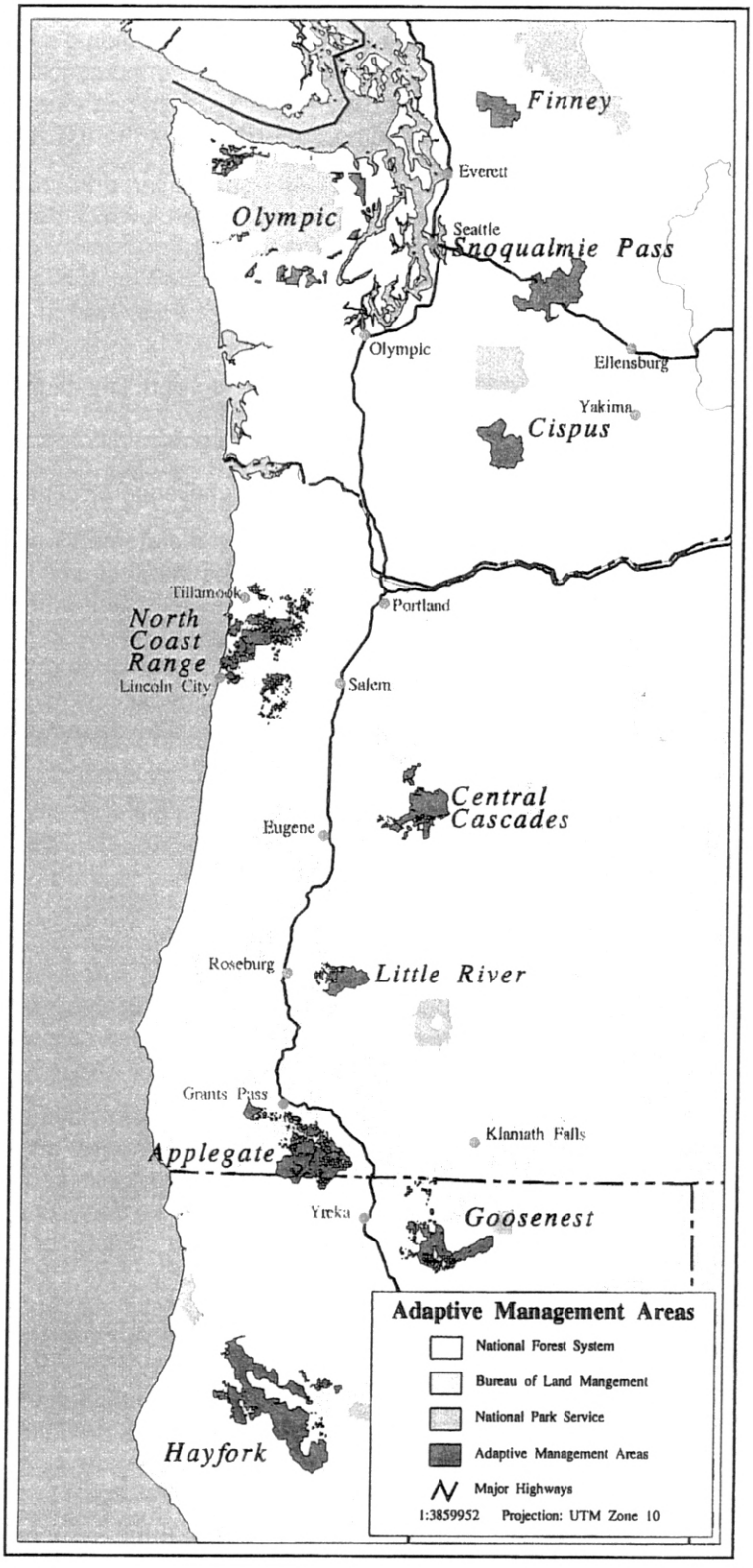
Creating a link between the Constituent Community Map and the census data proved to be a difficult step. A link attribute was created in ArcInfo/Tables from a combination of county and block group numbers for each variable (i.e. links = 043 309011, 043 309012, etc.). Tables were then created using only variables chosen for this study to calculate on a per capita basis as well as to link the data back into the map.

The tables were exported to diskette, selecting only "study" (attribute with distinct numbers), "link", "community", and the specific data and then converted within Paradox from .dbf to .db files to work within Paradox. The tables were queried by the thirteen communities for each variable to determine the population count. (Using a file of a variable, the data were separated out into community and then divided by the population of that community assessed within that certain variable). These data needed a file per variable and exported via diskette to the workspace in FSL. These files were then ready to link to the table associated with the Constituent Community Map and the variable associated with the attribute was chosen to map in ArcView.

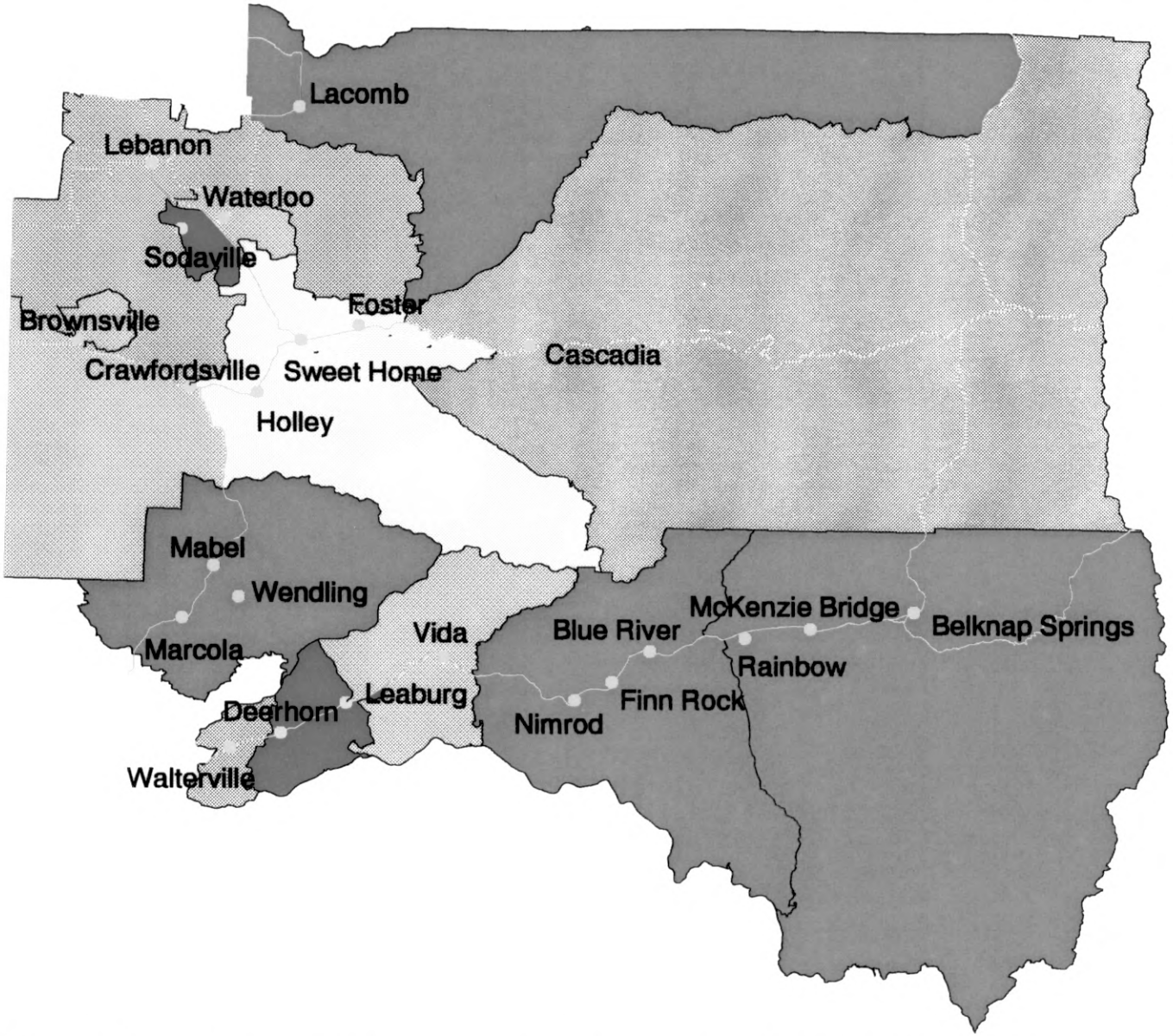
i. Constituent Communities of the CCAMA



ii Regional View of the CCAMA



1. Socio-Economic Status of the Constituent Communities of the CCAMA



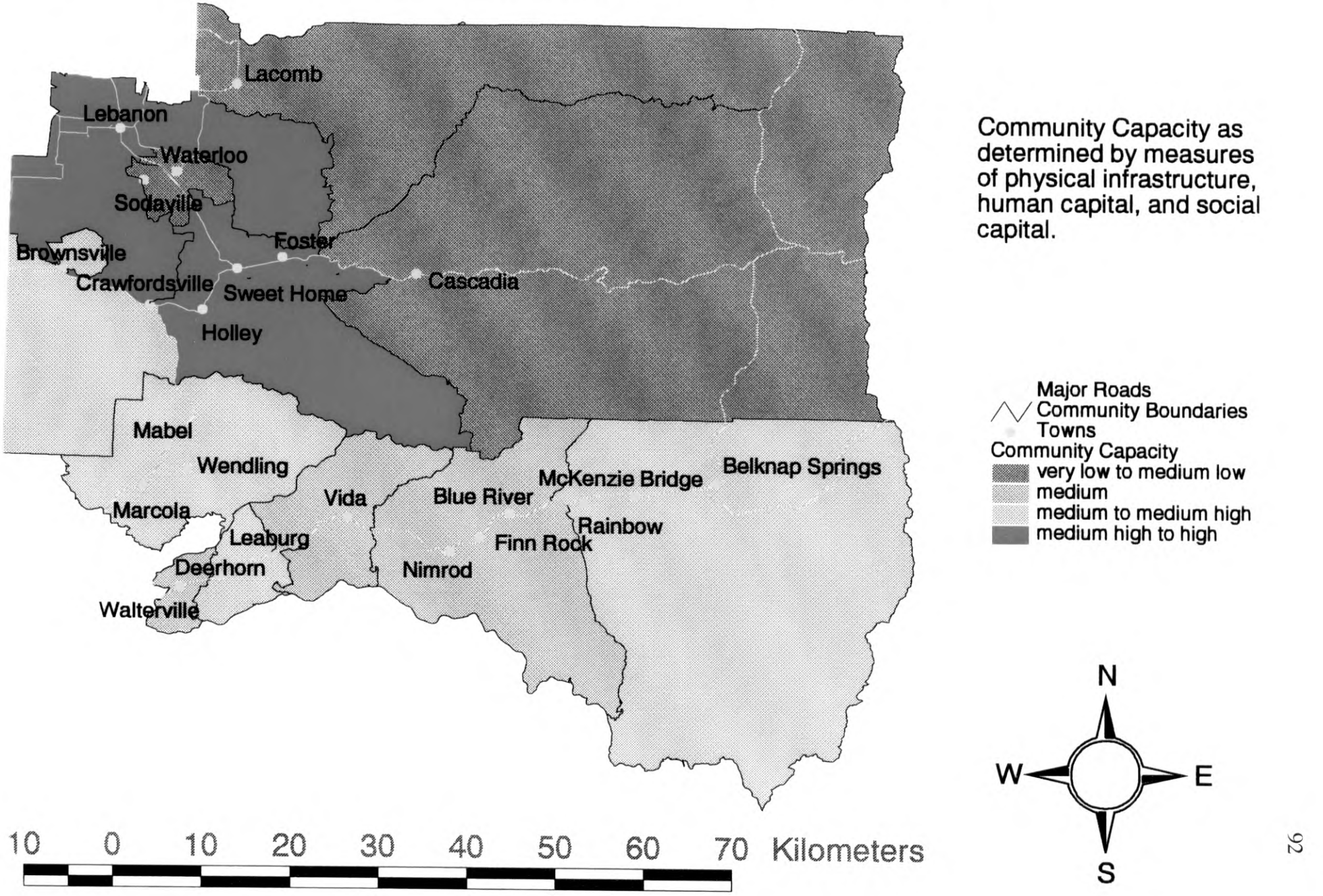
Socio-Economic Status as determined by census measures of educational attainment, home ownership, poverty, public assistance, and unemployment.

Major Roads
Community Boundaries
Towns
Socio-Economic Status
very low
low
medium low
medium
medium high
high

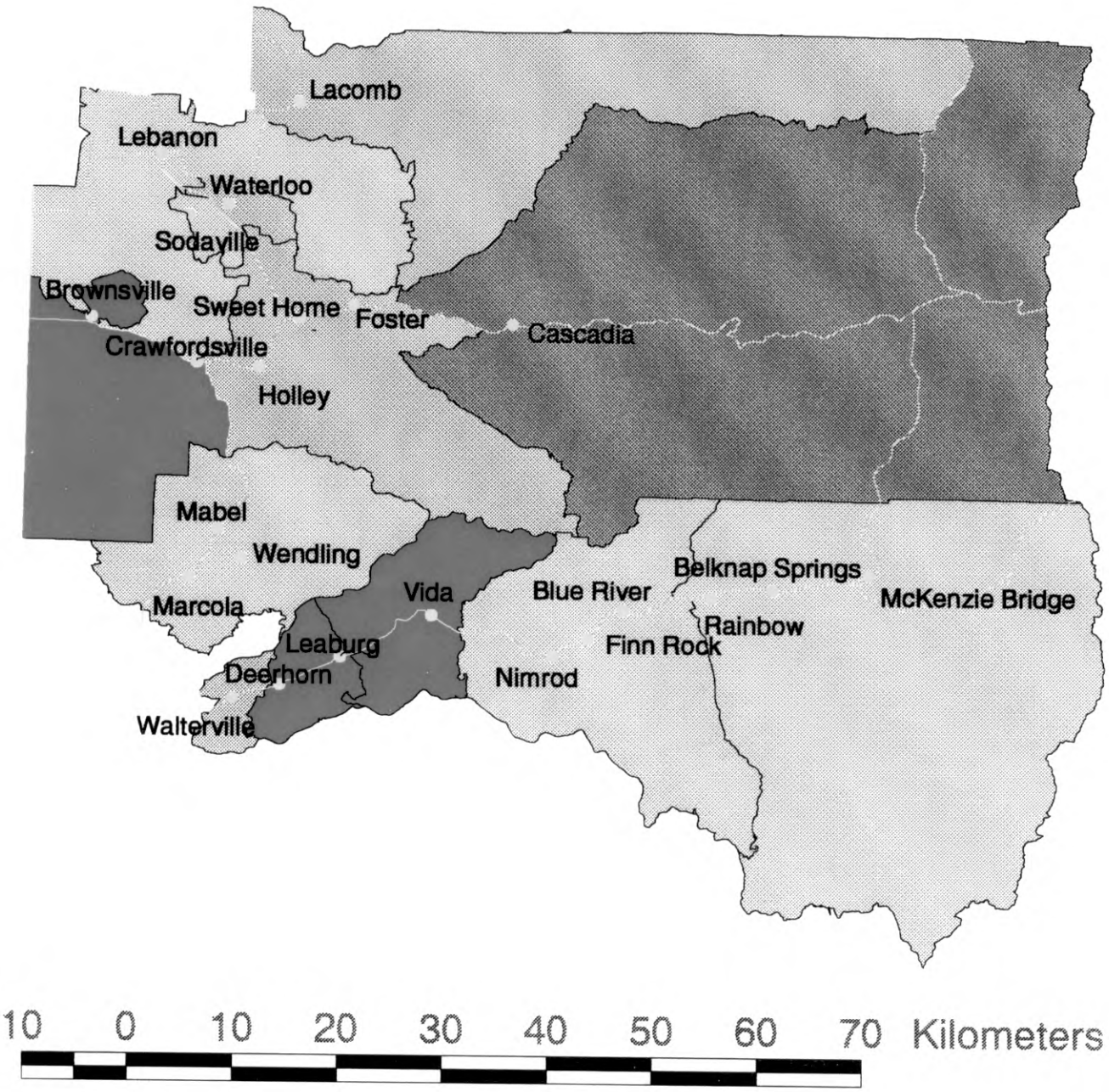
N
W
E
S

10 0 10 20 30 40 50 60 Kilometers

2. Community Capacity for the Constituent Communities of the CCAMA



3. Community Well-Being for the Constituent Communities of the CCAMA



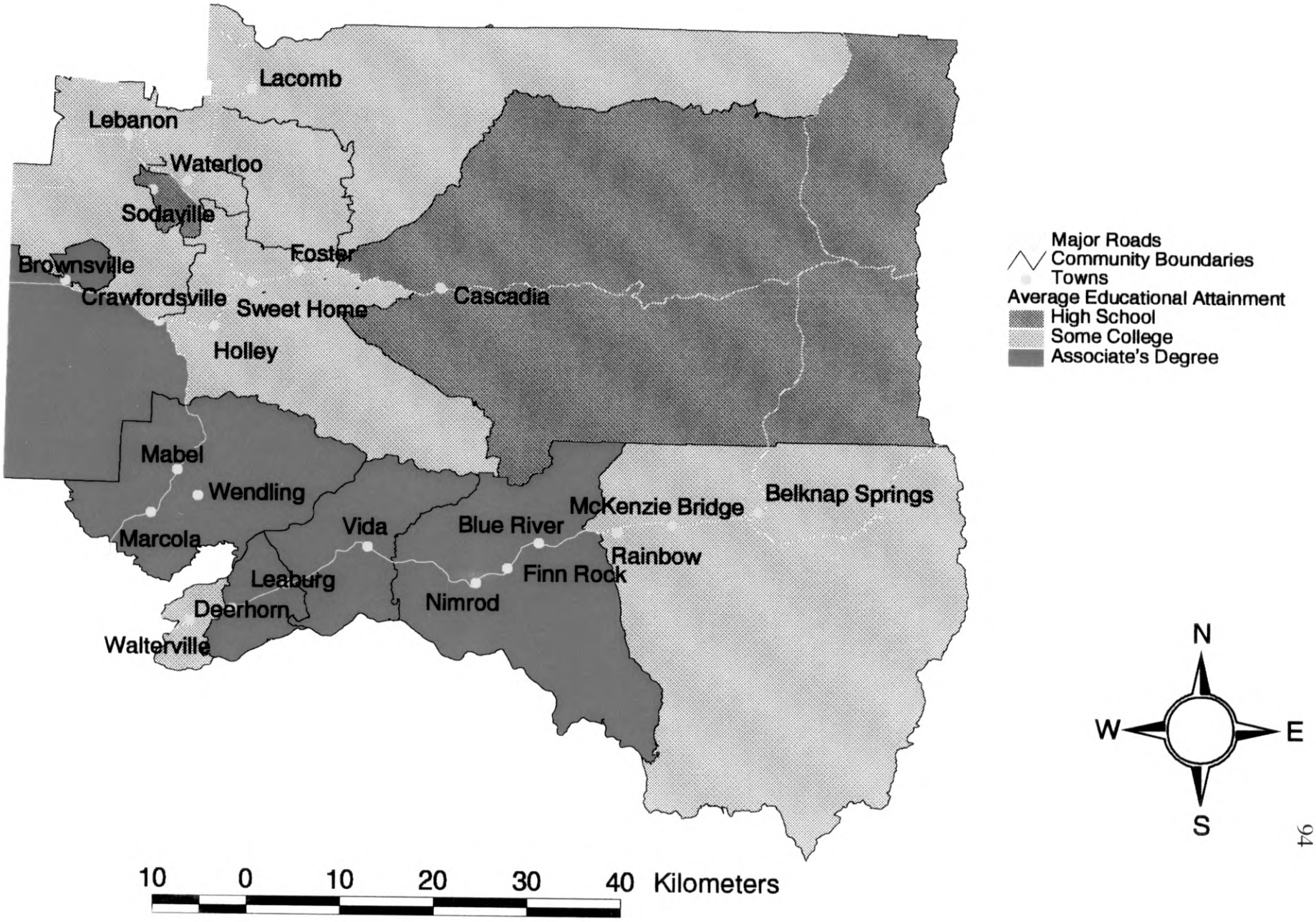
Community Well-Being as determined by a measure of equal weighting of Socio-Economic Status and Community Capacity.

Major Roads
Community Boundaries
Towns

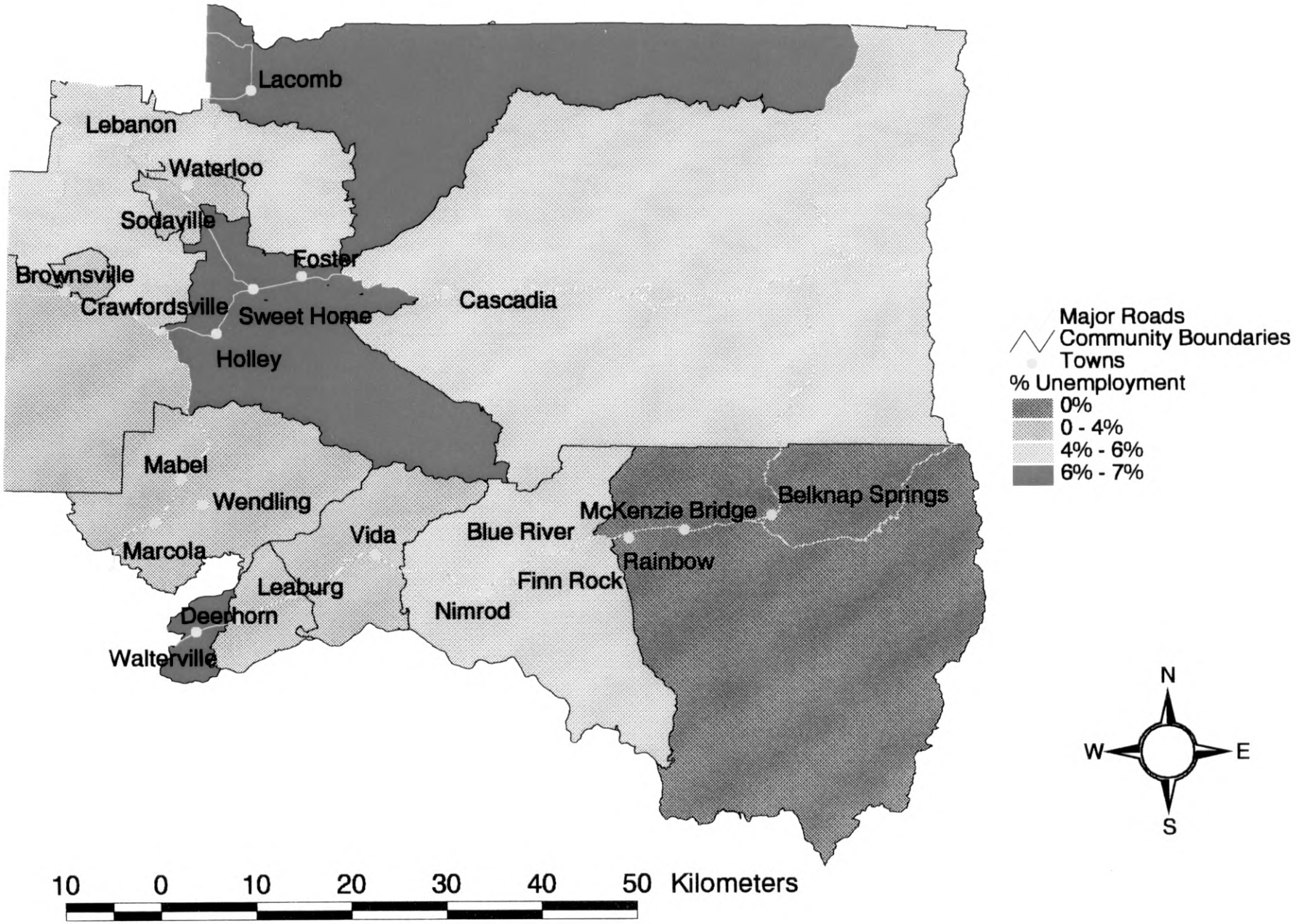
Community Well-Being
- very low to medium low
- medium low to medium
- medium
- medium to high

N
W E
S

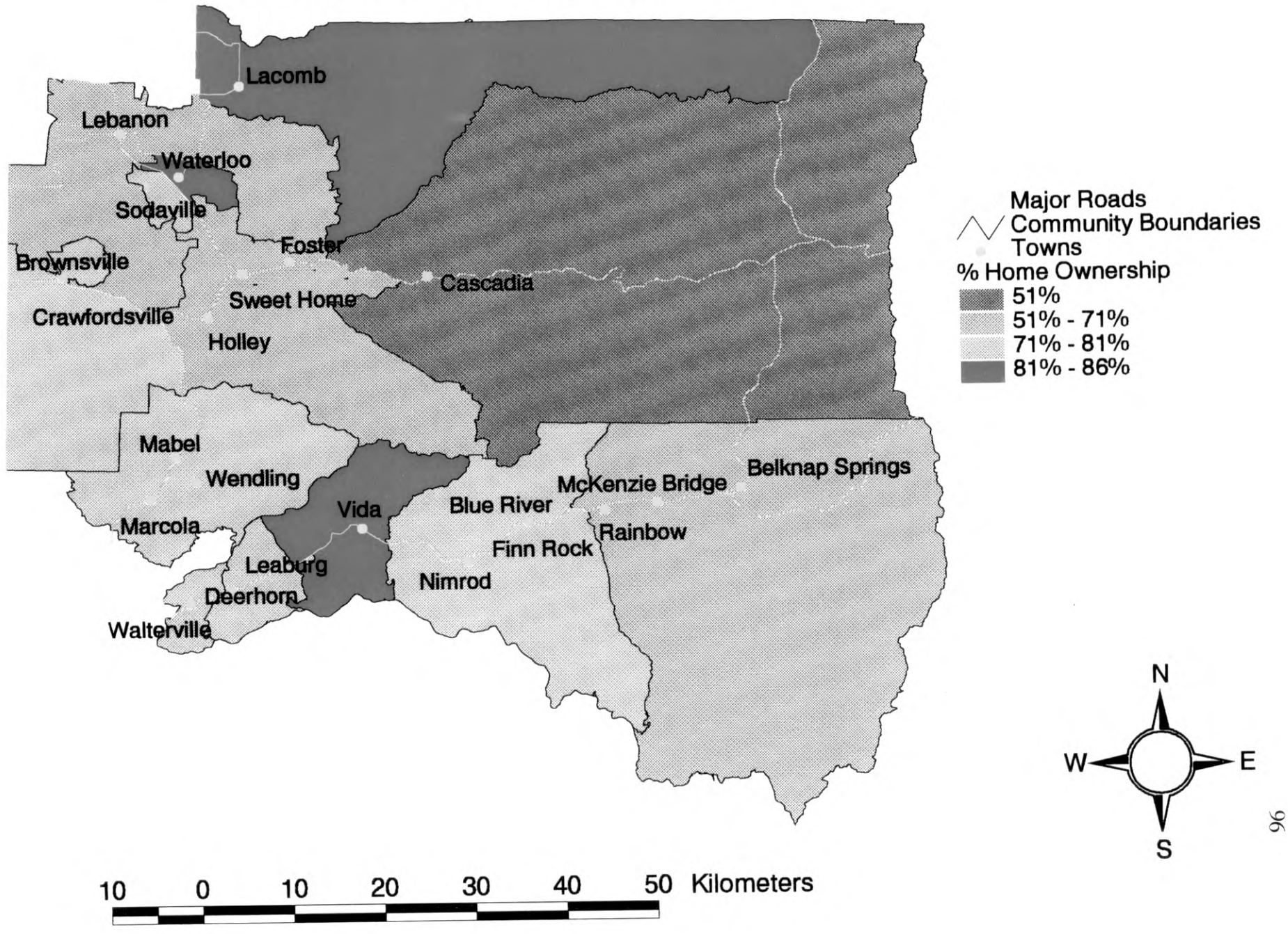
4. Educational Attainment by Community



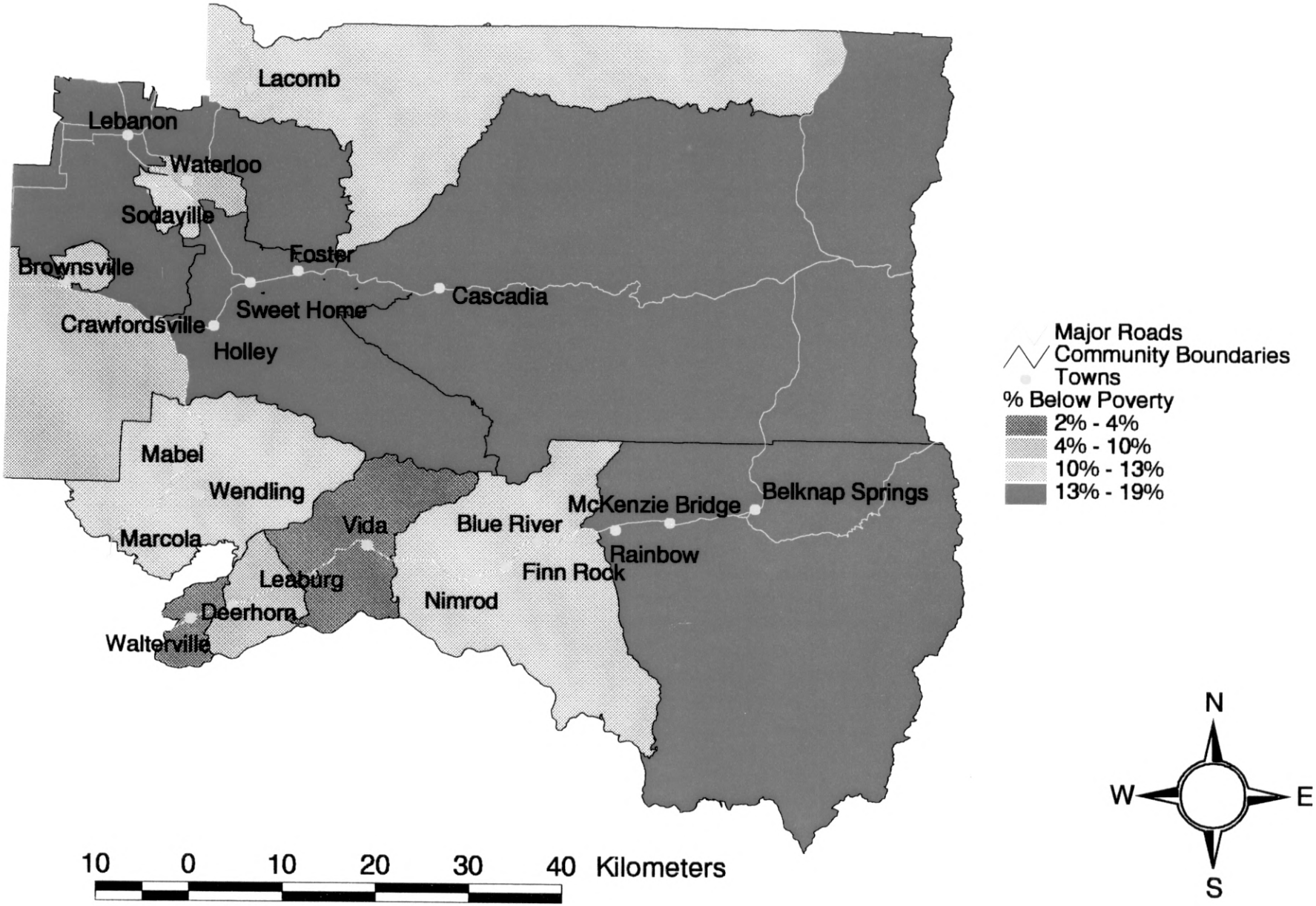
5. Unemployment by Community



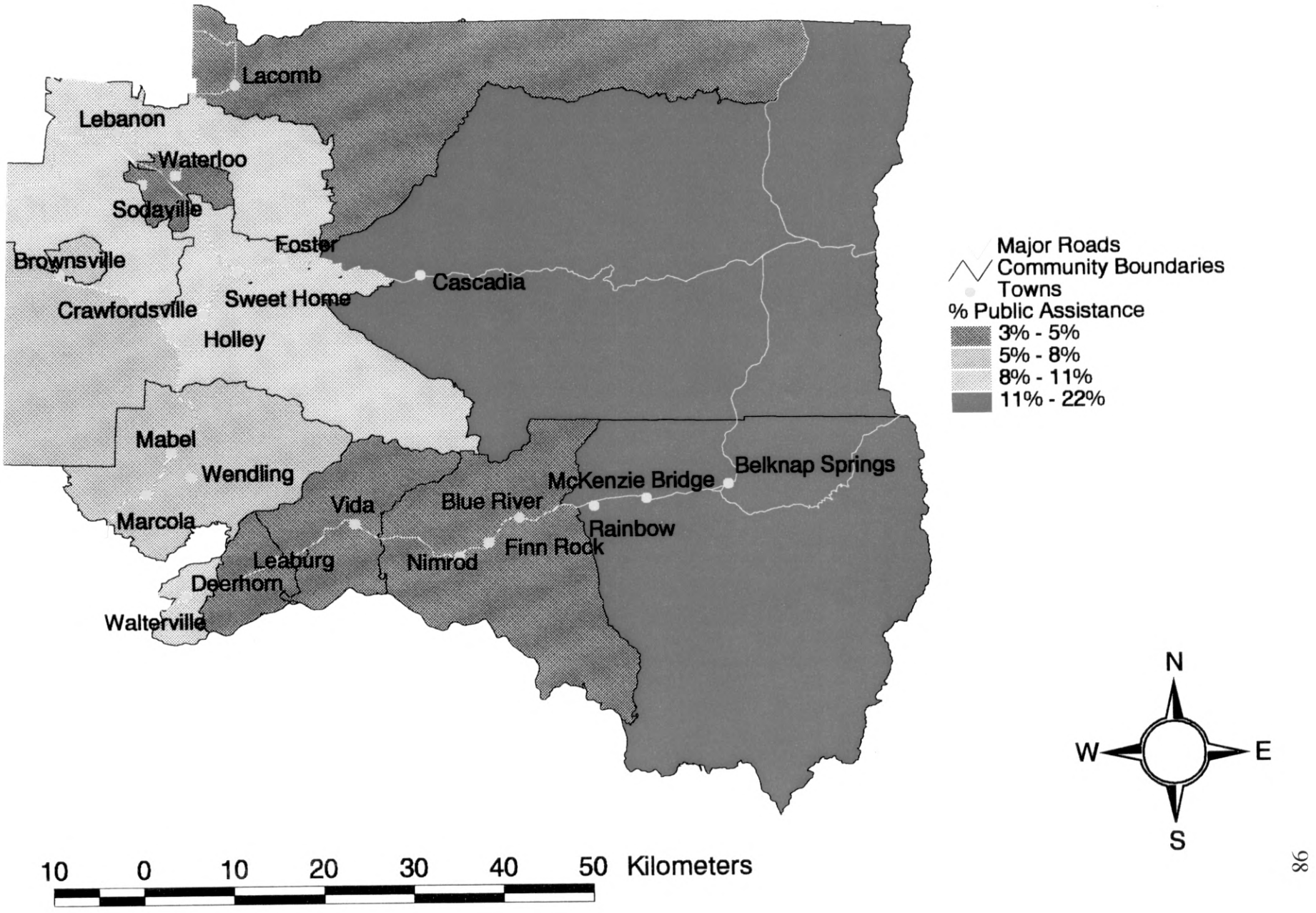
6. Homeownership by Community



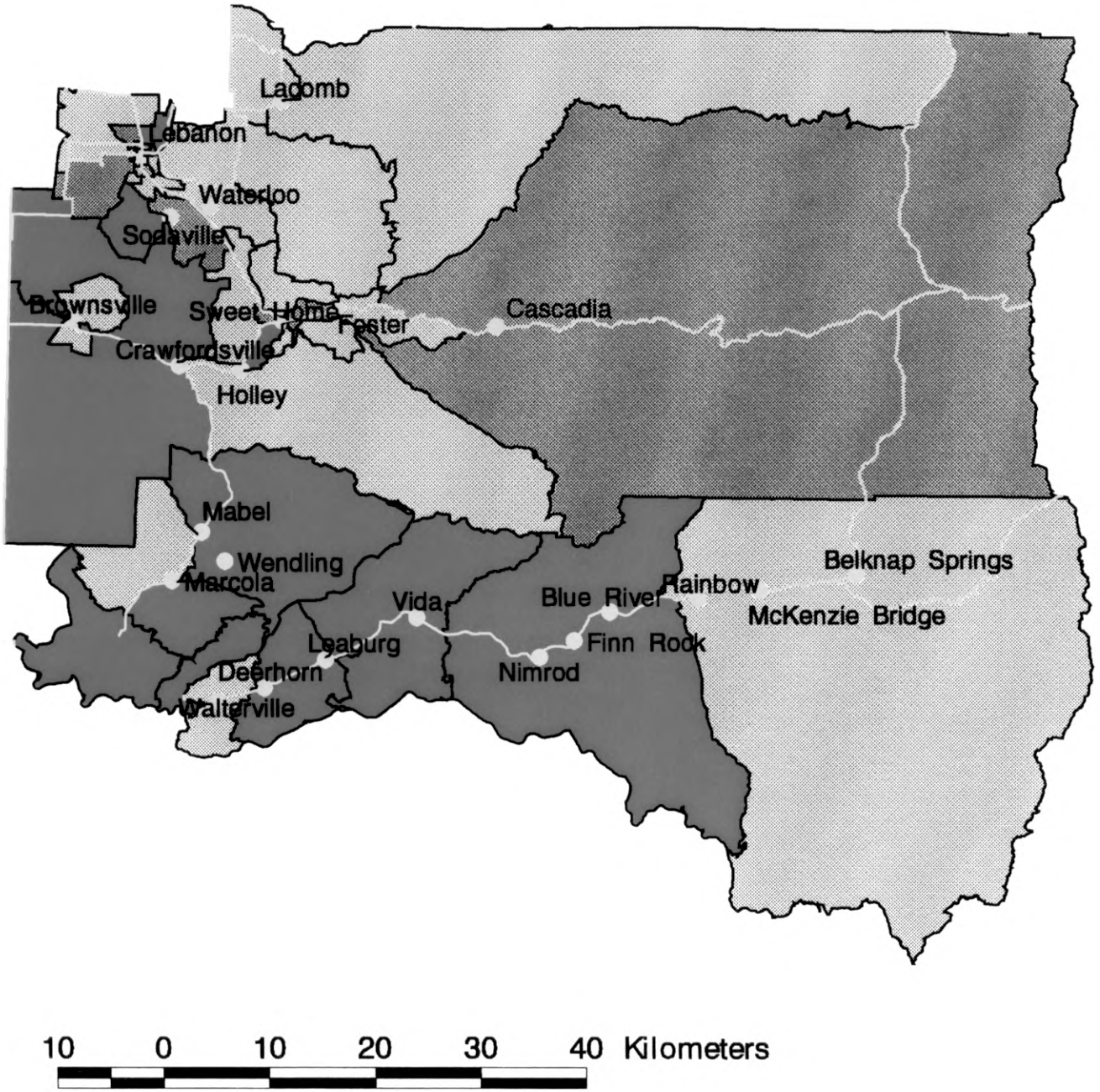
7. Persons Below Poverty Level by Community



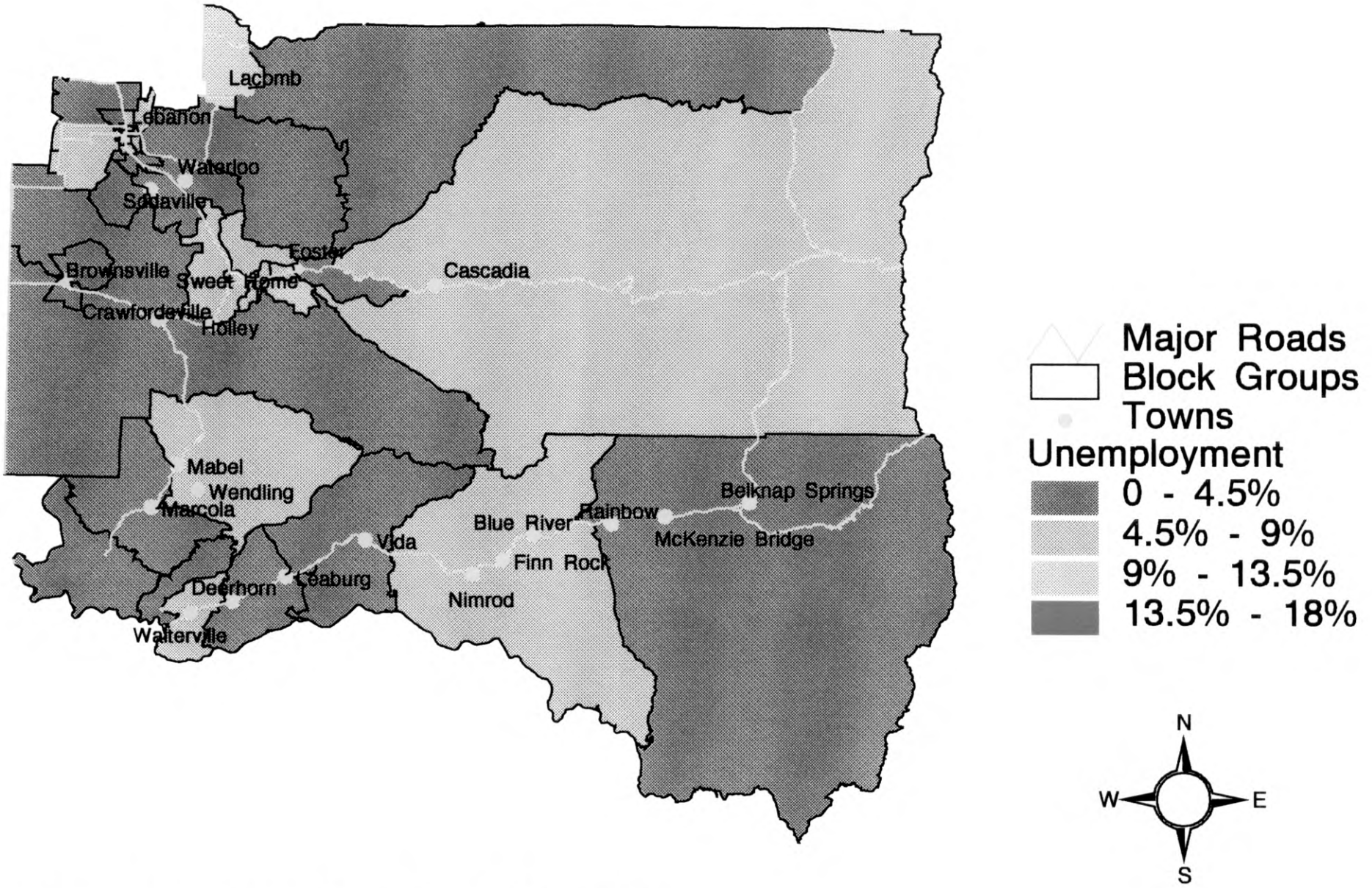
8. Persons Receiving Public Assistance by Community



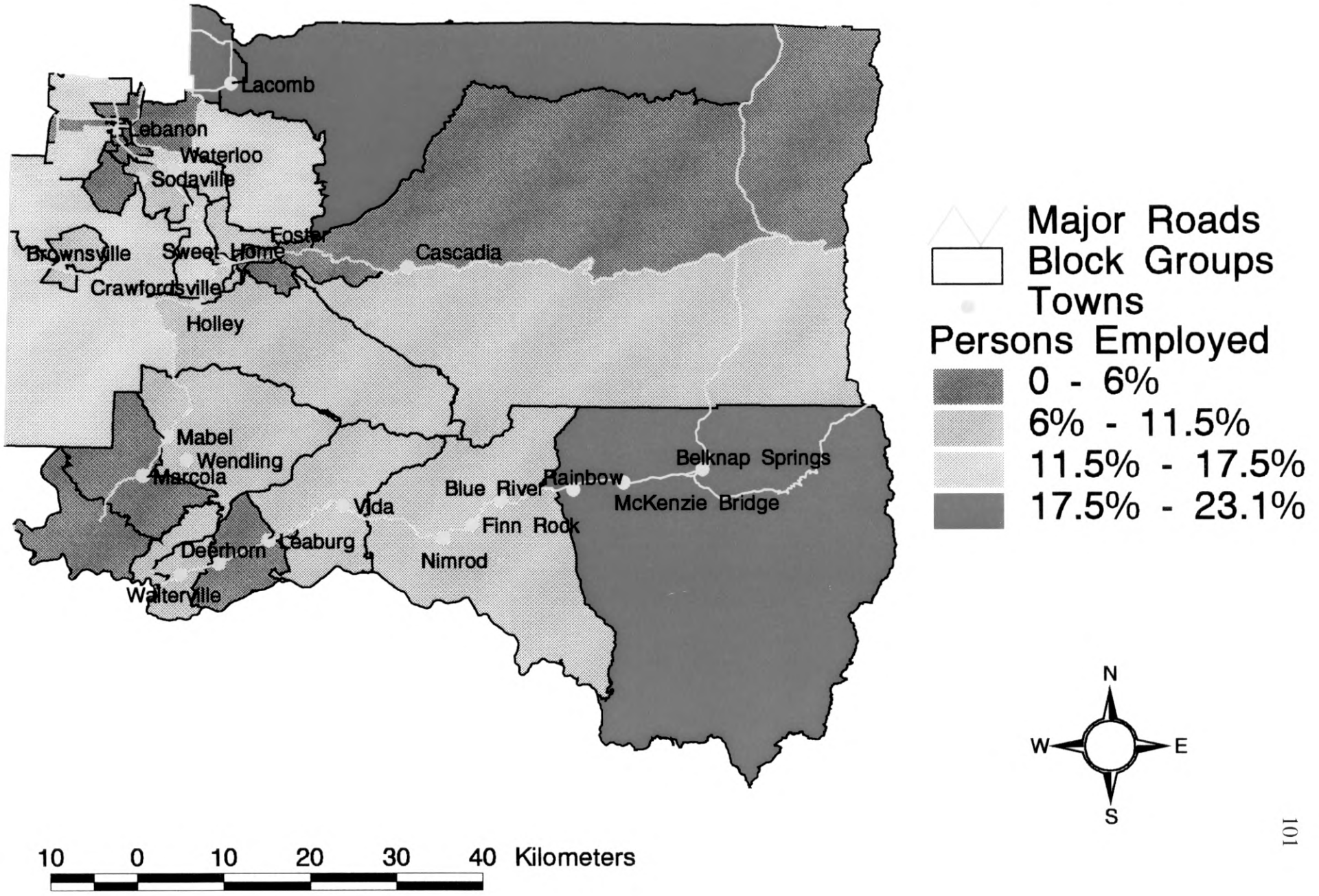
9. Educational Attainment by Block Group



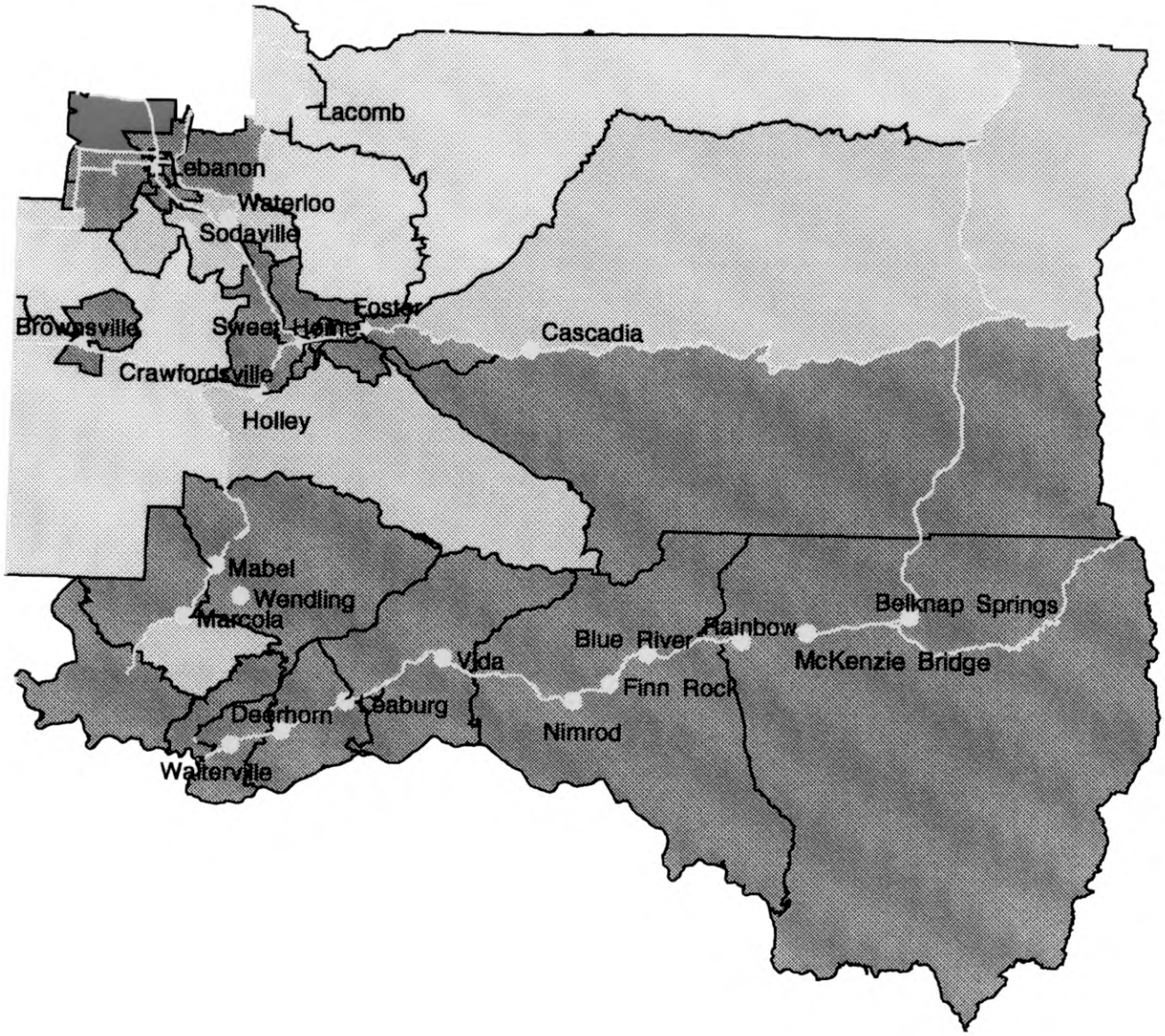
10. Unemployment by Block Group



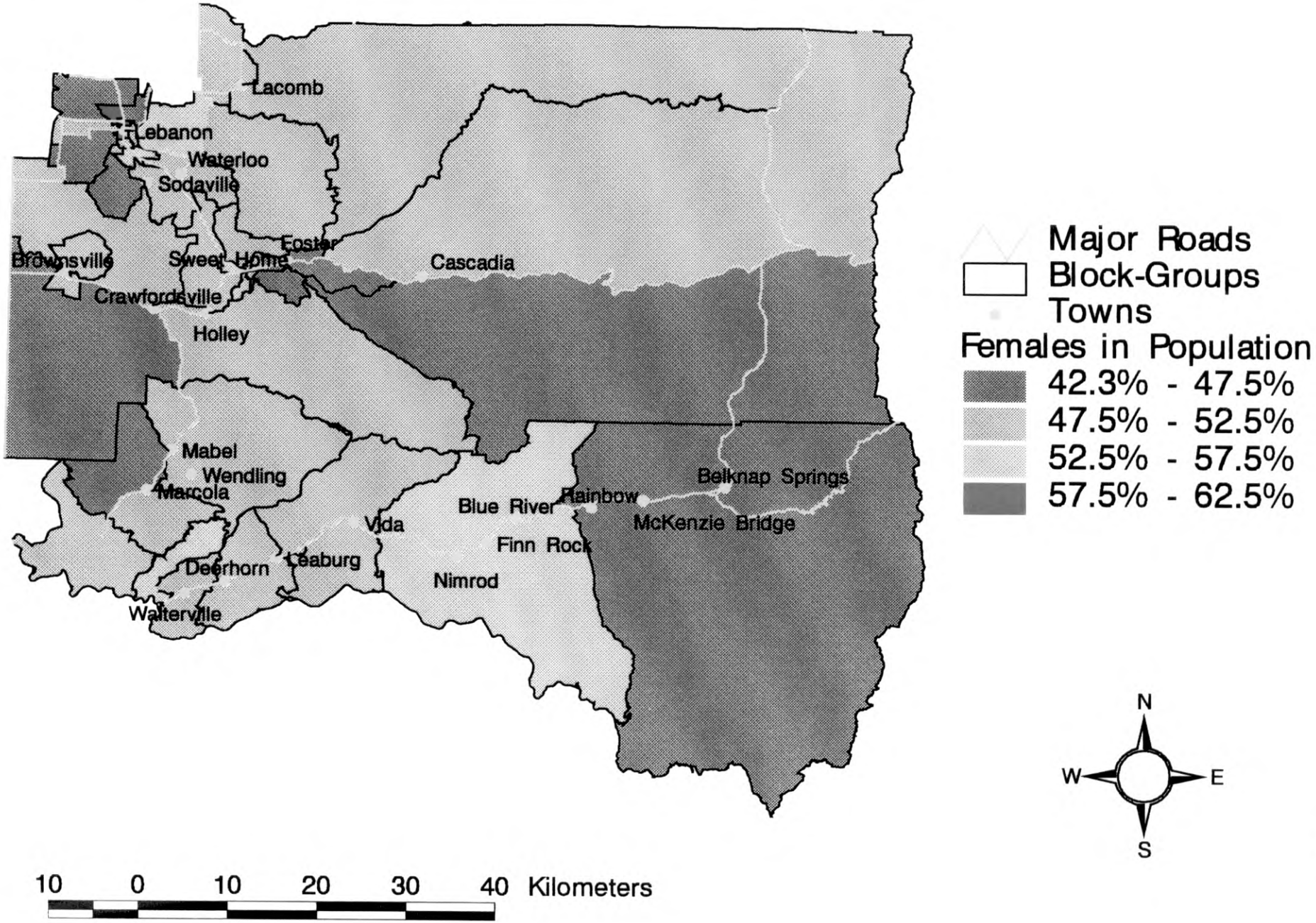
11. Persons Employed in Forestry, Farming, or Fisheries by Block Group



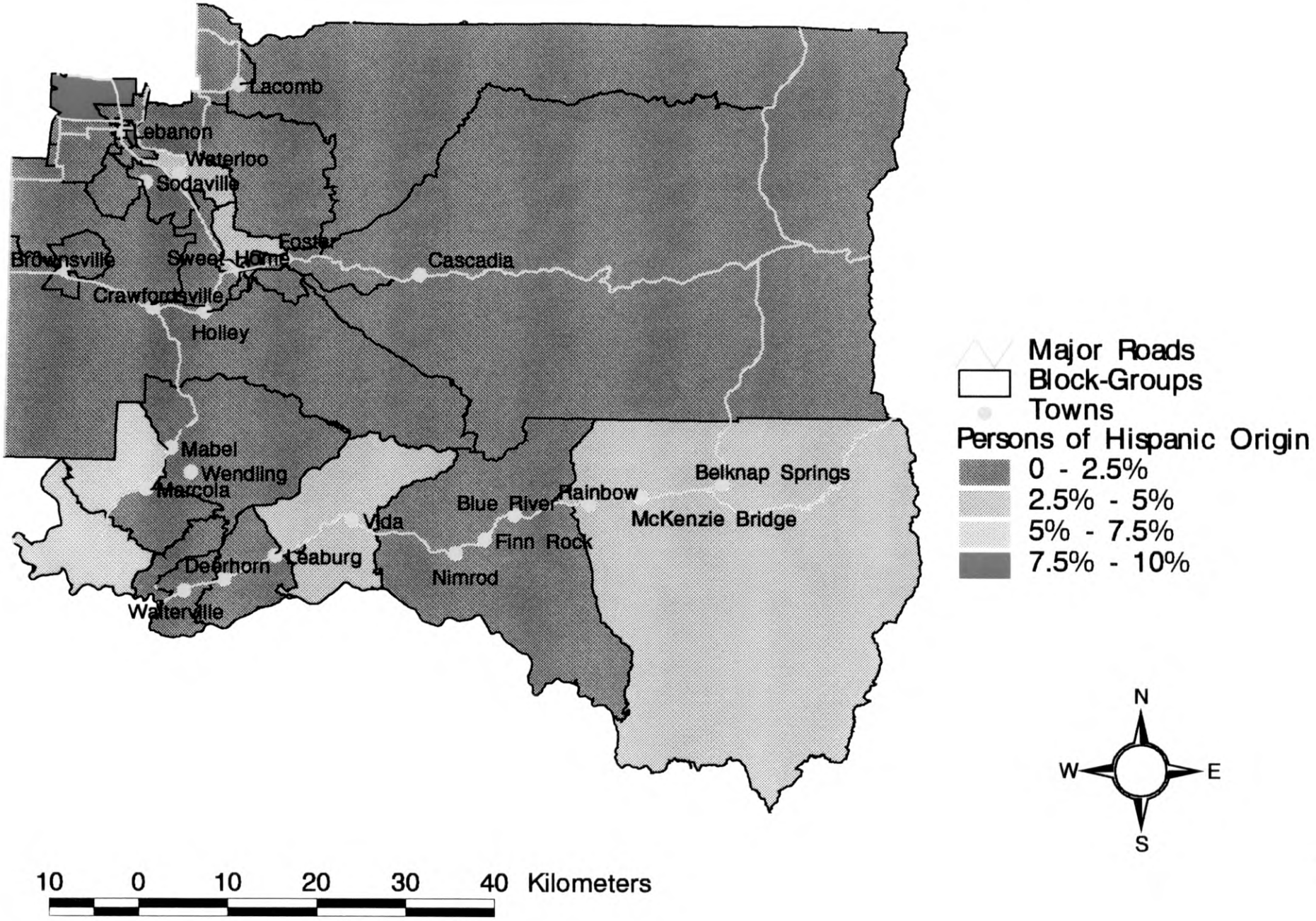
12. Persons on Rural Farms by Block Group



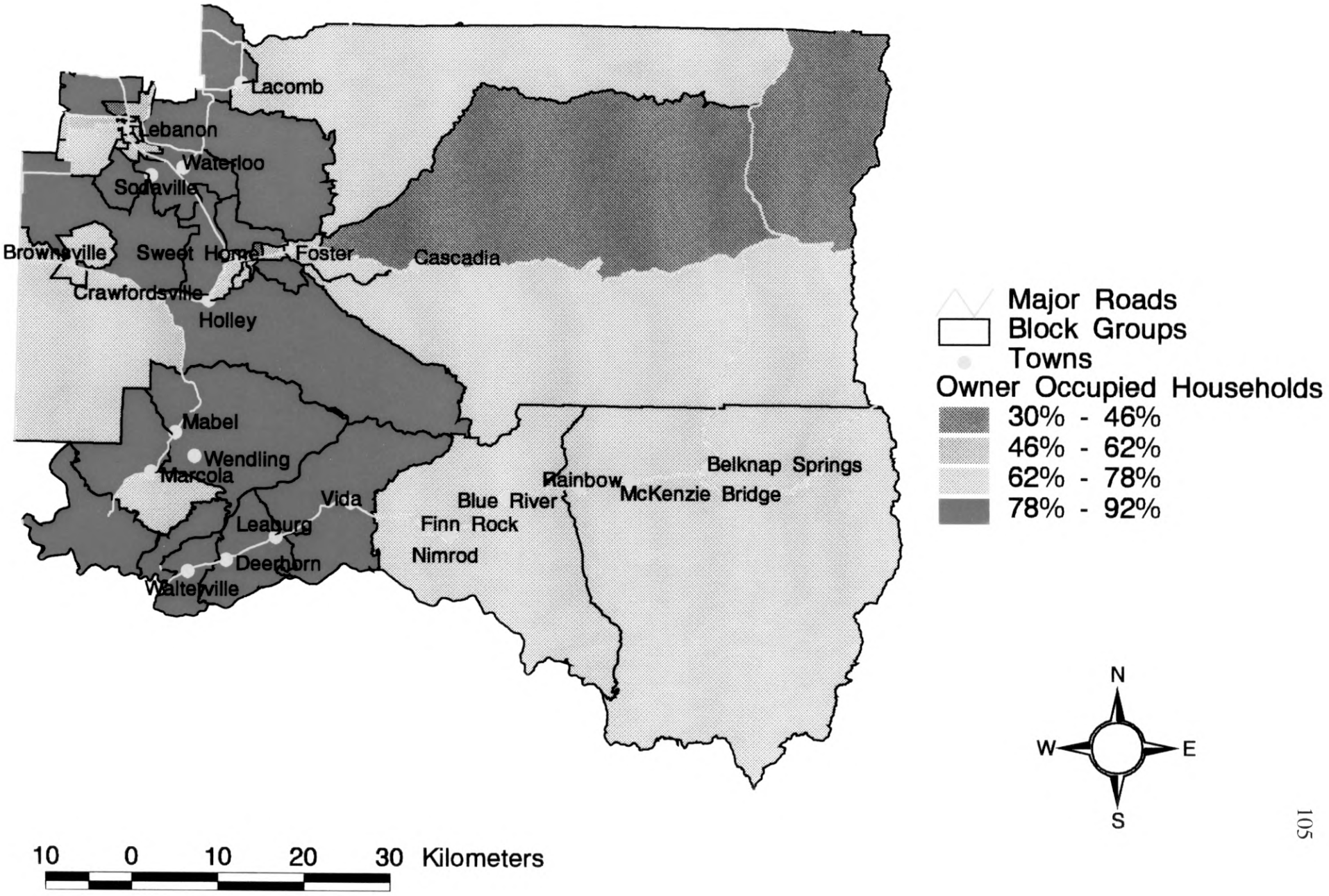
13. Females in Population by Block Group



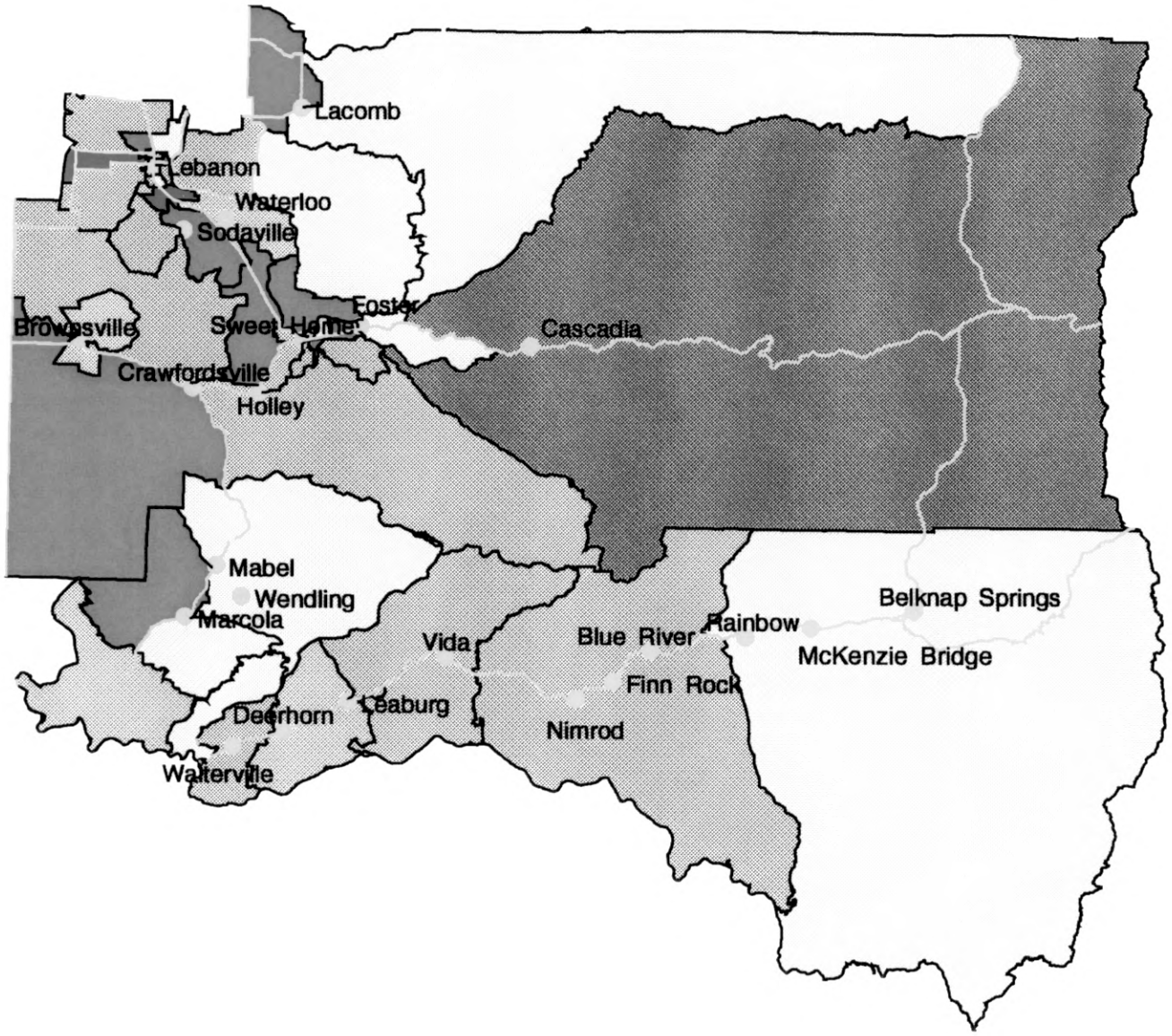
14. Persons of Hispanic Origin by Block Group



15. Homeownership by Block Group



18. Population by Block Group



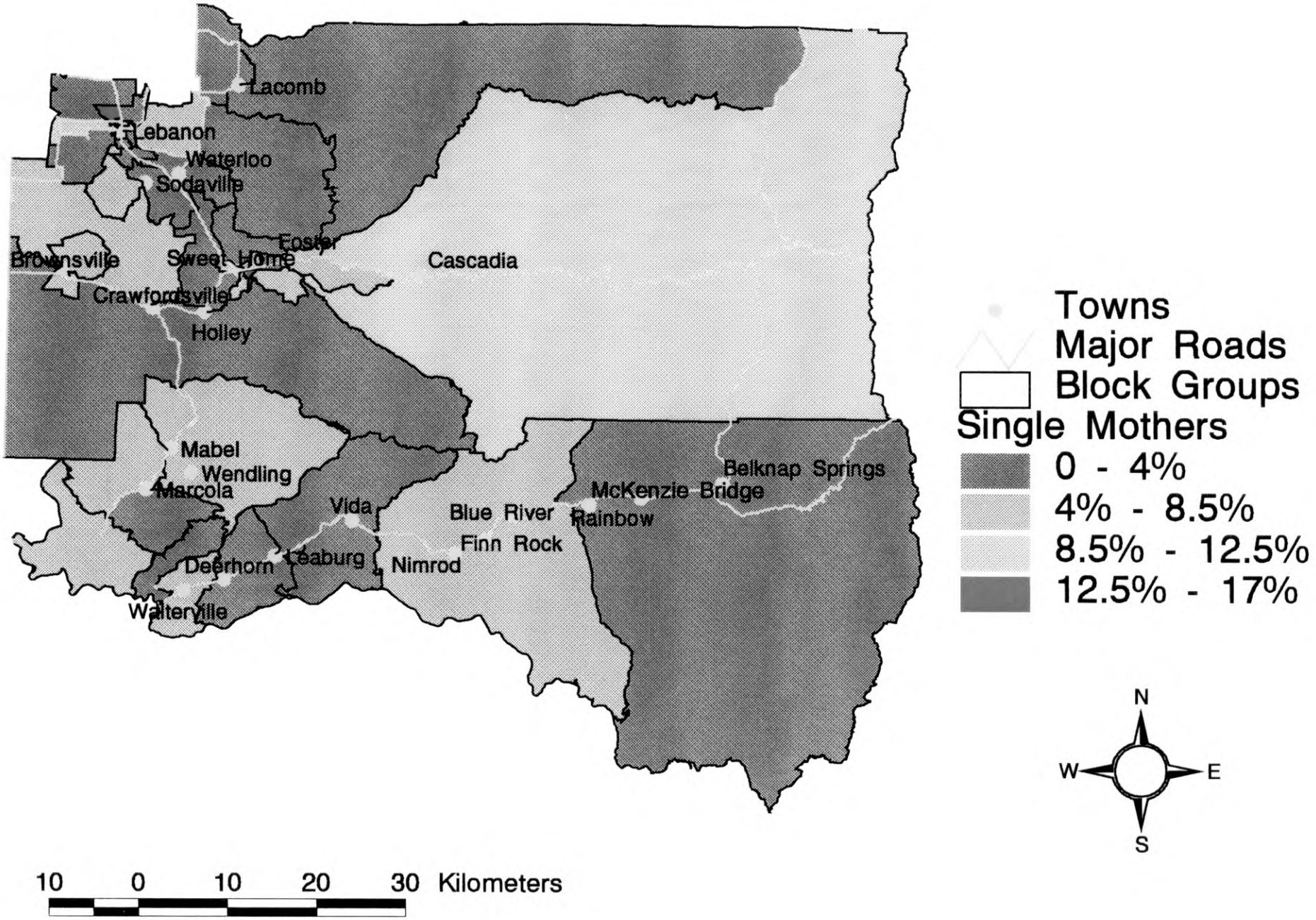
Major Roads
Block-Groups
Towns

Population Count
160 - 450
451 - 735
736 - 1025
1026 - 1315
1316 - 1605
1606 - 1892

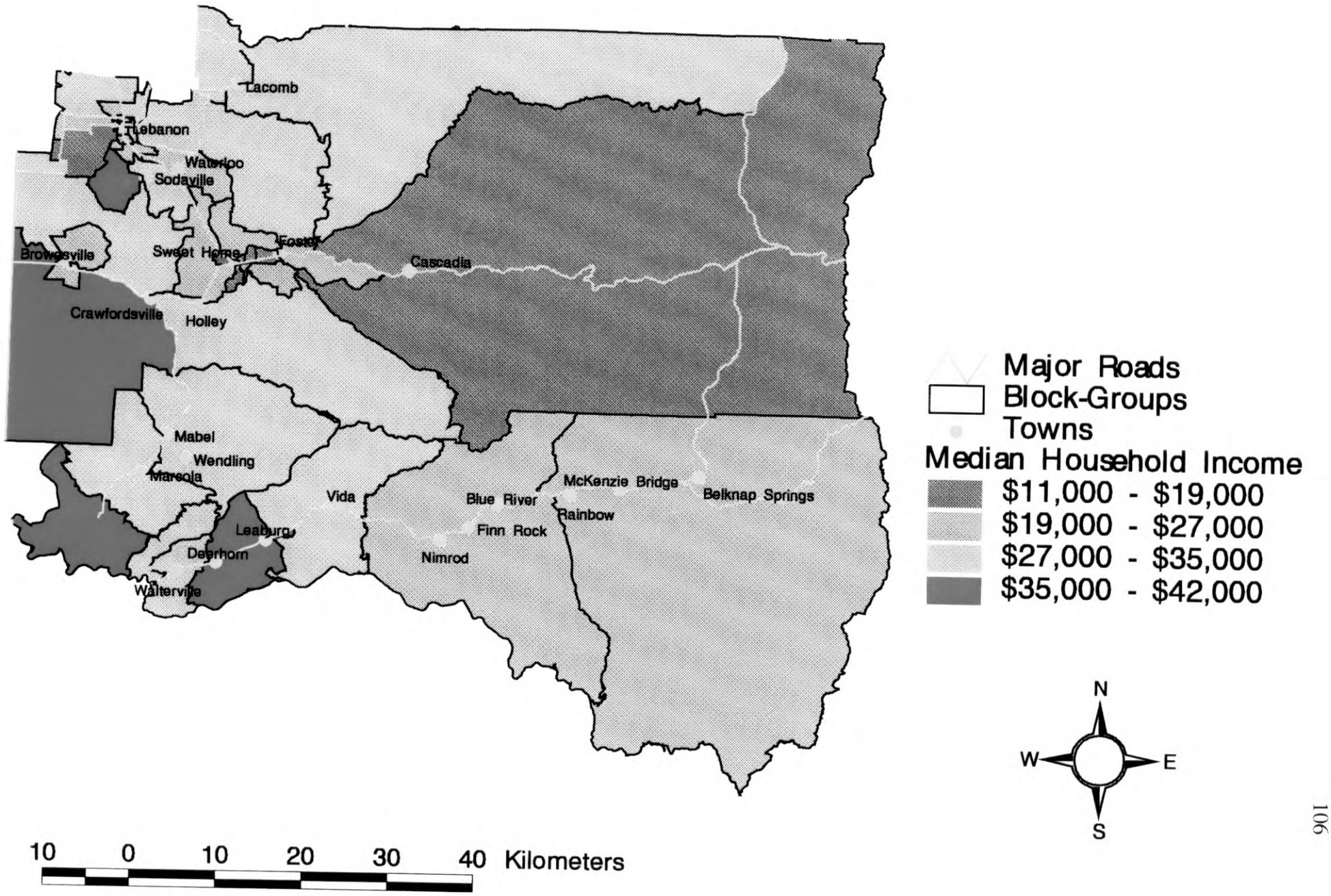
N
W
E
S

10 0 10 20 30 40 Kilometers

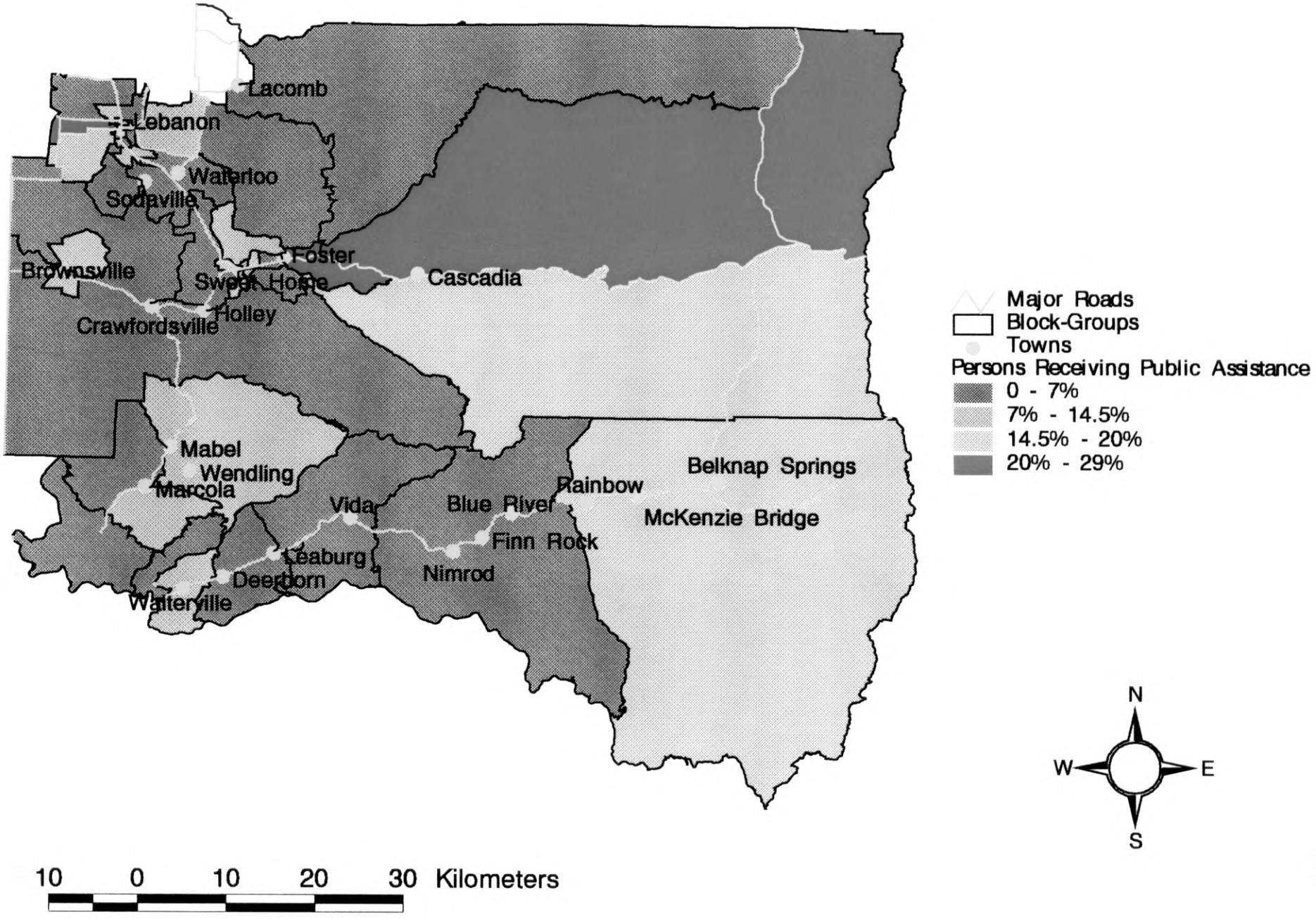
17. Single Mothers by Block Group



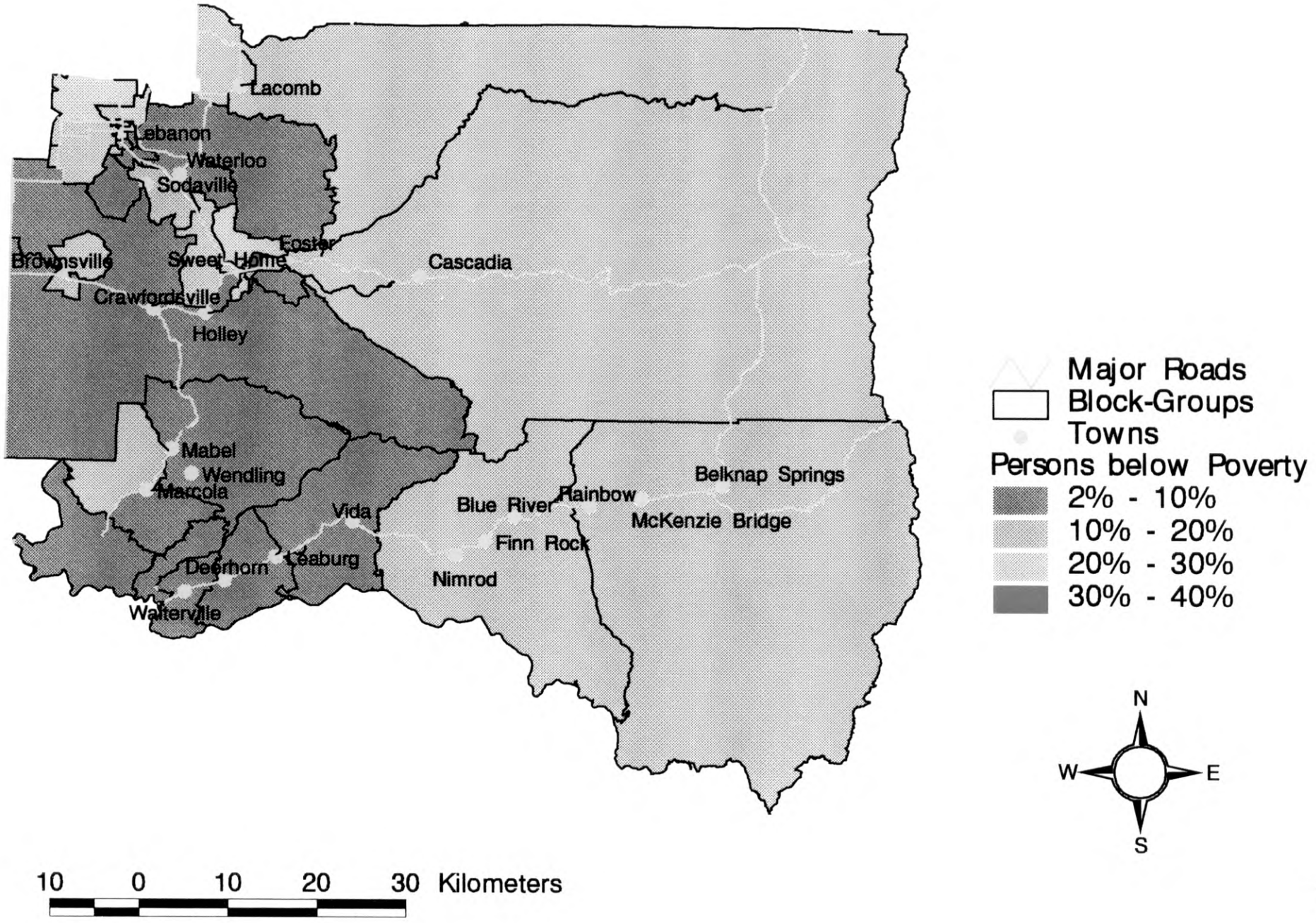
16. Median Household Income by Block Group



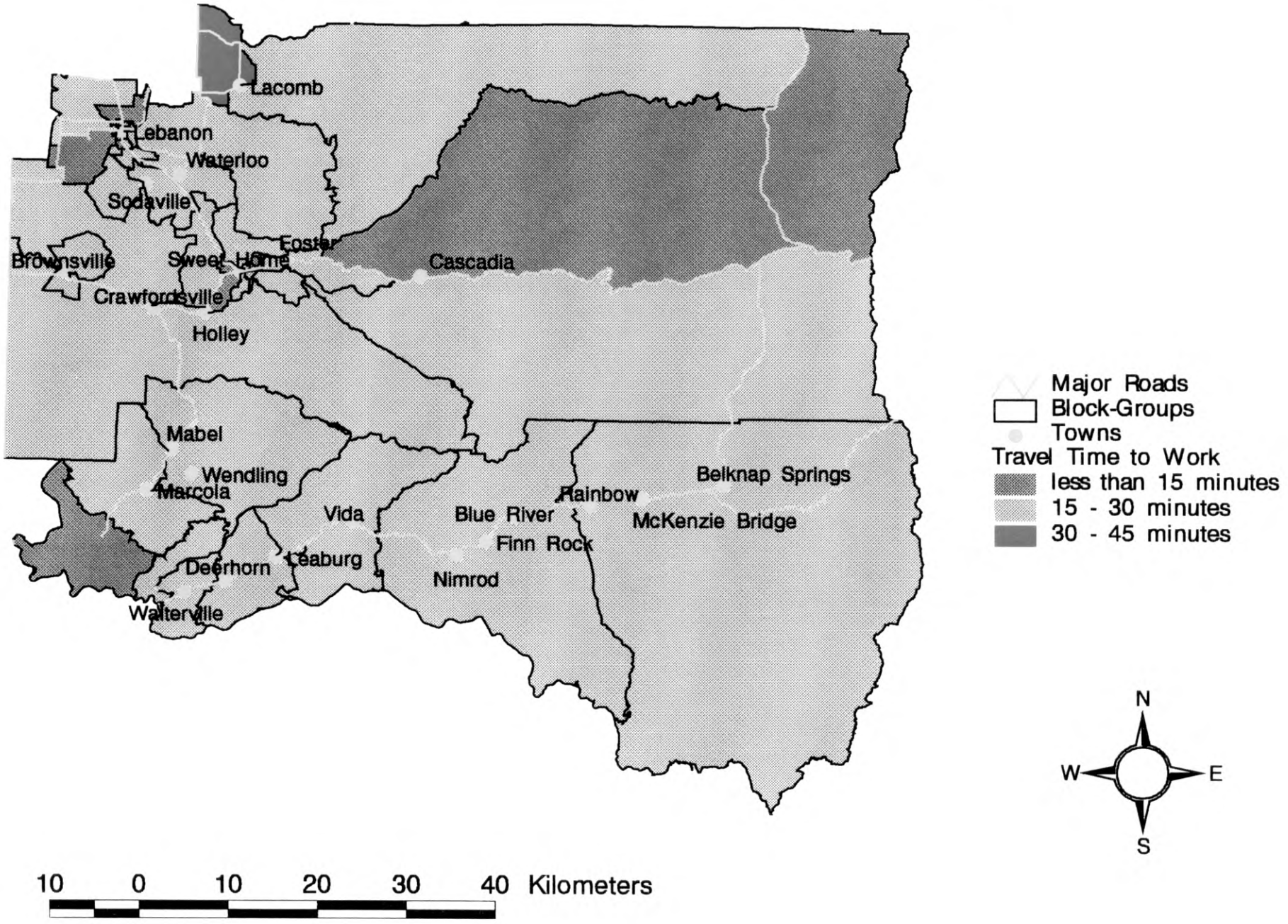
20. Persons Receiving Public Assistance by Block Group



19. Persons Below Poverty by Block Group



22. Average Travel Time to Work by Block Group



21. Households Receiving Retirement Income by Block Group