

PUBLIC PERCEPTION AND KNOWLEDGE OF THE
DUST BOWL AS REGION, ERA, AND EVENT

By

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I. INTRODUCTION

The Dust Bowl is simultaneously recognized as a region, era, and event in academic and public spheres. Academicians have defined and refined these concepts over the past seventy years. Divergent perceptions of the three concepts that can collectively be described as the Dust Bowl can be noted in any sample of relevant literature. Published Dust Bowl survivor accounts (Lookingbill 2001; Stallings 2001; Svobida 1986; Wunder, Kaye, and Carstensen 1999; Young 1991) suggest differing understandings of this complex episode of human-environment relations from those who experienced it. These accounts, however, provide only anecdotal evidence regarding the general public's perceptions and knowledge of this unparalleled chapter of American geography and history. Furthermore, these accounts have focused on the perspective of the Dust Bowl survivor, to the neglect of later generations. Therefore, any understanding of the general public's perceptions and knowledge of the Dust Bowl event is based on these idiosyncratic reports and the legacy that lingers, rather than a cross-generational standardized assessment.

Based on the recurrence of the Dust Bowl theme in Great Plains drought literature, Riebsame (1986) declared that "the Dust Bowl is an enduring image in the collective consciousness of Americans." However, only a systematic

appraisal of public perceptions and knowledge could measure the validity of that statement while providing the first comprehensive assessment of public knowledge and perceptions of the Dust Bowl. This study aims to complete such an assessment by the administration of a questionnaire to individuals from four age cohorts in a ninety-three county, five-state study area (Fig.1).



Figure 1. Study Area

Research Questions

The dataset produced by this questionnaire and its subsequent analysis seeks to address four primary research questions.

1. How do study area inhabitants perceive the Dust Bowl as region, era, and event?
2. In what ways do perceptions and knowledge of the Dust Bowl vary by geographic location and demographic characteristics of respondents?
3. Are perceptions and knowledge of the Dust Bowl evolving through time (as evidenced by variation in generational responses)?
4. In what ways does public perception and knowledge mirror and/or contrast the body of published literature regarding the Dust Bowl as region, era, and event?

These research questions provide an organizational focus for this endeavor. Analysis and discussion of the first three questions lends itself to the development of the fourth complementary question.

Relevance

Addressing the four research questions has yielded a unique work that fills a notable void in the body of Dust Bowl research and literature. Dozens of books and peer-reviewed journal articles have been penned on various social, ecological, and political aspects of the Dust Bowl. Worster's Dust Bowl: The Southern Plains in the 1930's (1982) remains the most commonly cited work, although Bonnifield's The Dust Bowl: Men, Dirt, and Depression (1979) and Hurt's The Dust Bowl: An Agricultural and Social History (1985) have also

remained particularly popular to those writing on the topic. A review of these seminal works and the assemblage of Dust Bowl-related literature indicate that no systematic appraisals of public perception and knowledge of the Dust Bowl have been attempted. Chapter Two of this dissertation discusses key works of literature and research on the Dust Bowl.

There are, however, numerous texts and oral history projects that provide idiosyncratic accounts of Dust Bowl experiences (Egan 2006; Sonkin and Todd 1941; Svobida 1986). These narratives can be mined for individual perceptions and knowledge of the Dust Bowl. Unfortunately, these secondary sources cannot provide a uniform body of data for analysis. Furthermore, these sources emphasize the perspectives of survivors of the era to the exclusion of later generations. Thus, the literature provides little measure of the evolution of Dust Bowl perspectives by residents of the region or the degree to which the event has remained in the local ken. Illuminating differences and trends in Dust Bowl knowledge among people of varying generations and locations represents a key contribution of this research.

Beyond the identification and discussion of variation among and between generational and locational sub-samples, this research examines how dominant threads from popular and academic renditions of the Dust Bowl story are reflected in the knowledge-base of questionnaire respondents. For example, do people of the historic Dust Bowl region associate the Great Depression with the Dust Bowl? Do respondents believe the Dust Bowl represents an unprecedented environmental disaster?

The assessment of popular Dust Bowl knowledge presented here underscores the need for enhancement of Dust Bowl thematic education within the region. Participants of this research overwhelmingly support the idea of future educational initiatives. Therefore, this research also provides a baseline for comparison of future generations' knowledge and a tool to help measure the effectiveness of prospective thematic educational endeavors. It is with optimism that this author believes these findings can act as stimuli for the advancement of human-environment educational initiatives within the Great Plains region.

Study Area

Explanation of regional definitions of the Dust Bowl is lacking throughout the germane literature. Most resources on the topic mention only specific locales or sketch generalized boundaries for the region. A typical example is found in Svobida's (1986) first-hand account of farming in the region:

Few people realize that the Dust Bowl in the United States extends from the Canadian line to central west Texas, covering the entire western areas of Oklahoma, Kansas, Nebraska, North Dakota, and South Dakota, with extensive portions of Montana, Wyoming, Colorado and New Mexico (p.358).

While Bonnifield (1979) identified thirty-two counties that he considered the "heartland of the Dust Bowl," he failed to document his rationale for this selection. Donald Worster (1982) offered a significant

improvement to a regional definition when he combined data and maps published by the Soil Conservation Service (Service 1953) and various information collected and submitted to the National Archives by Robert Geiger, the Associated Press reporter who coined the term “Dust Bowl,” (1941) to produce a series of severe wind erosion regions (Fig. 2). The central theme for the construction of these maps was the location of the most severe wind erosion by year (Cunfer 2005; Worster 1982).

Slight variations of the National Archives/Worster maps have proven to be the dominant representation of the Dust Bowl region in subsequent publications. This suggests that researchers have either failed to attempt to craft additional regional boundaries or that Worster’s (1982) delineations are appropriate solutions to the regional question. Support for the latter of these notions is provided by the work of Geoff Cunfer (2005), a geographer who powerfully applied a geographic information system (GIS) to questions of the Dust Bowl. Cunfer’s research employed GIS layers of soil types, crop types, and temperature and precipitation data to establish a strong correlation with Worster’s maps (Cunfer 2005).

Therefore, the study area for this project was the historic Dust Bowl region as defined by Worster (1982) via the National Archives, consisting of ninety-three counties in the states of Colorado, Kansas, New Mexico, Oklahoma, and Texas (Fig. 1). An additional map of the study area provides labeled counties (Fig. 3). Appendix B provides a tabular list of study area

counties, county seats, and the severe wind erosion periods in which they were included on Worster's maps.

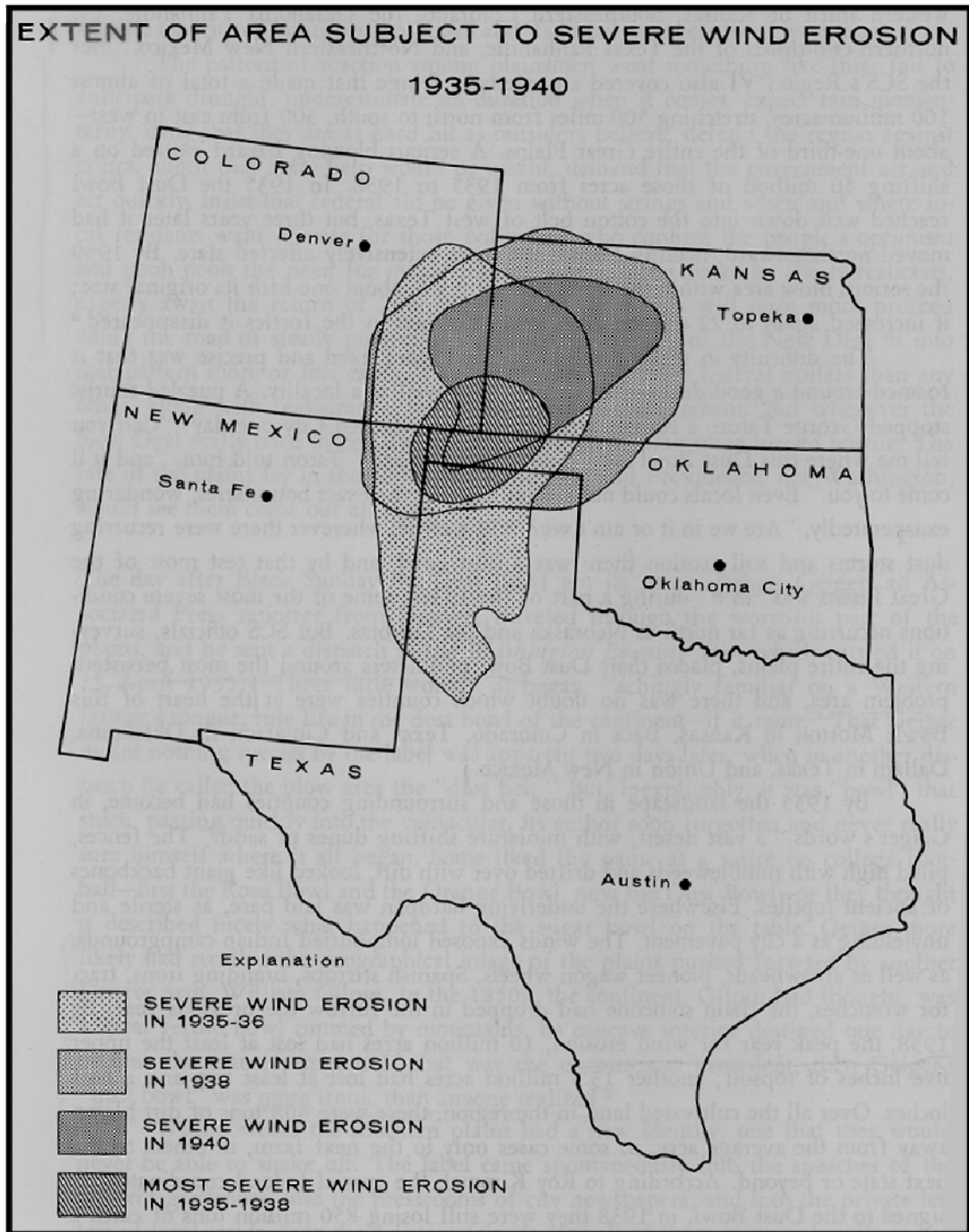


Figure 2. Worster's Map



Figure 3. Study Area Counties

The questionnaire was administered to four legal residents of each designated study area county. The four residents selected represented each of four age cohorts: 20-39, 40-59, 60-79, 80 and older. Data from these respondents were analyzed as the primary source for the research presented here.

A Look Ahead

Chapter Two is a literature review that addresses themes that help form the broad contextual environment for this research. These include the primary facets of the contemporary human-environment relationship on the Great Plains. Climatic variability and drought, population trends including migration, and agricultural adjustment receive detailed treatment as essential elements of the Dust Bowl's back story. Chapter Two concludes with theoretical considerations of the concepts of region, era, and event and environmental perception in geography.

Chapter Three focuses upon methodological considerations of this research. Particular attention is given to the development and rationale of the questionnaire. A detailed description of the study area is provided that includes a comparison of the demographic characteristics of the study area's population with the sample of questionnaire respondents.

Chapters Four and Five examine the concept of the Dust Bowl region. First, how have published accounts defined and delimited the Dust Bowl region?

What variables have been utilized to craft regional definitions? Have authors informed readers as to the arbitrary nature of regional definitions, in general? These are a few of the questions that are addressed in Chapter Four, *The Dust Bowl Region to Date*. These previously-defined regions are then analyzed with the help of a geographic information system to illuminate common ground and disparities. Composite maps illustrate states and counties that have most often been identified as part of the Dust Bowl.

Chapter Five charts a similar analytical path. However, the focus shifts to the three hundred fifty-five maps drawn by questionnaire respondents to represent the Dust Bowl region. Additional geostatistical methods are applied to the respondent regions to uncover various spatial and demographic relationships within the data.

Chapter Six examines the temporal element of the Dust Bowl. Just as it is a subjective task for authors to define boundaries of the Dust Bowl region it can be equally difficult to define a Dust Bowl era. Unlike the convenient maps provided by authors to assess and compare regional definitions of the Dust Bowl, mining published accounts for beginning and ending years of the Dust Bowl era places the burden of subjectivity on this author. Fortunately, most authors do not claim concise commencing and ending dates for the complex Dust Bowl event. Nonetheless, careful study of published accounts can usually provide book-end years for the event for the purposes of comparison with the public response.

Chapter Seven shifts the spotlight to the Dust Bowl event. Dominant themes in the body of Dust Bowl literature are examined. A significant collection of juvenile literature is also reviewed at this point, as it is representative of generalized, less academic notions of the Dust Bowl. Responses to a battery of Likert statements are reported and discussed in light of this Dust Bowl canon. Likert statements allow respondents to express personal levels of agreement or disagreement with the academic consensus regarding the Dust Bowl. Significant generational and locational deviation is present in the results.

Chapter Eight, *Public/Academic Knowledge Association*, focuses analysis on these deviations. Aggregate measures of knowledge association compiled from the suite of Likert statements illustrate which age groups and regions within the study area exhibit the most equivalence with the academic consensus regarding the Dust Bowl. Responses to physical and socioeconomic categories of Likert statements are mapped and discussed. The chapter concludes with a breakdown of respondent context to shed light on the responses. For example, measures of respondent nativity such as places of birth and primary adult residence are examined for explanatory value.

Chapter Nine concludes this document with a summary discussion of the results, as well as a look to the future. The future is addressed by examining the prospects for new Dust Bowl-like events, according to residents of the study area. In the concluding chapter of the text, respondents also weigh in on potential educational initiatives such as a Dust Bowl museum and an interactive

web site. A brief discussion of future research directions outlines the ongoing nature of this project.

Several appendices follow the list of references. Appendix A, the map appendix, includes over thirty additional original maps related to this document. Appendix B is a tabular presentation of the study area counties, Appendix C is the *Dust Bowl Knowledge and Perceptions* questionnaire, Appendix D is a list of sources utilized for the previously-defined Dust Bowl regions and Appendix E is the Institutional Review Board protocol and approval.

II. LITERATURE REVIEW

A contextual background for the four research questions is provided by a thorough review of relevant thematic literature. Analysis, discussion, and findings from the questionnaire are presented with respective geographical and historical thematic literature in mind. Specifically Great Plains climate and drought are discussed followed by insight into the human experience on the Plains. This includes themes such as historic population migration trends, the aspects of agricultural restructuring, and contemporary populations and economies of the region. An introduction to Dust Bowl literature concludes the review of thematic literature. As for theory, an introduction to the concept of the region in geography provides the reader with a primer to one of geography's central themes and the most geographic theoretical component of this research. The concepts of event and era, while not unique to geography, are discussed. Environmental perception in geography theory is briefly addressed as well.

Thematic

This thematic literature review seeks to introduce the reader to the key themes of human-environment dynamics on the Great Plains. Often times, the

prosperity and poverty on the Plains have been associated with periods of relatively abundant rainfall or severe droughts. In fact, nothing has so dominated life on the Plains as rain or the lack of it (Fite 1979). As a result, every year can present a new and different land to many Great Plains residents.

How have humans responded to such a dynamic natural environment? Kraenzel commented that "the basic problem in the settlement and permanent occupation of the Plains has been the determination of the nature of the fundamental harmony between climate and civilization" (1955, 254). Many would not refer to the modern relationship between nature and humans on the Plains as harmonious as evidenced by some accounts of the Dust Bowl (Worster 1982; Johnson 1947). Nonetheless, variations in Great Plains climate would appear to be having a decreasing effect on human populations over time. While these populations have historically ebbed and flowed across the Plains in correspondence to periods of increasing and decreasing precipitation, this phenomenon has become less pronounced in recent years.

Instead, discussions of human migration and population change focus upon the effects of agricultural mechanization and agglomeration. Over the last century, these factors have emerged to supplant the dominant role of climate in influencing the patterns and trends of humans in the region. With the continuous interaction of environmental and cultural realms in space and time, life and settlement on the Great Plains is perpetually redefined.

Therefore key themes of this overview of human-environment relations on the Plains include climatic variability and drought, population and migration, agricultural adjustment, and the changing demographics and economies of the region. These themes are interdependent and cannot be wholly separated.

Climatic Variability and Drought

Great Plains climate is distinguished by characteristic cycles of precipitation, which shape both natural and anthropogenic features. These cycles have brought the Plains extremes of precipitation on temporal scales ranging from seasonal to millennial. Bond and Showers (1997) have recently demonstrated that a 1470-year climate cycle is a pervasive component of Earth's climate system and could potentially be a pacemaker of rapid climate change. Evidence gleaned from North Atlantic sea cores revealed that abrupt shifts punctuated what is thought to have been a stable Holocene climate. When this cycle is projected forward, it predicts a warming trend over the next few centuries (Bond and Showers 1997).

Additional cycles have been identified in both winter and summer rainfall of twenty-one to twenty-two years that are linked to the sunspot cycle (Thurmond and Thurmond 2001). Fye, Stahle, and Cook (2003) focused on decadal extremes that have punctuated the twentieth-century climate over the central and western US. Such decadal changes are important for enabling

westward expansion of agricultural practices. These decadal moisture regimes raise interesting questions about the degree of historical precedent in the paleoclimatic record. Attempting to answer such questions, tree-ring evidence has been studied extensively in North America (Mock 2000). It should be noted, however, that dendroclimatic evidence provides reconstructions of climate on a year-to-year basis at best. Additionally, because of a lack of suitable sample trees in the Plains reconstructions primarily come from sites located along the periphery of the Plains (Mock 2000).

Beyond the temporal climatic variability witnessed with cyclical events, a second characteristic is evident when analyzing historical climate patterns on the Plains: high frequency seasonal/intra-seasonal extremes. These extremes deal with particular months or seasons with abnormally high or low precipitation. Tree-ring data has been utilized in these instances, as well. Extreme seasonal and/or decadal events can be particularly important for climatic perceptions. Distinct events, such as the wet summers of 1884 and 1885 in the central Plains, were highly publicized by settlers. This likely contributed to the surge of boomer and historical literature of the era (Mock 2000).

Yet another climatic consideration on the Great Plains is that of contemporary climate change. These changes may be tied to anthropogenic degradation of the Earth's atmosphere. Manifestation of these changes may occur in temperature and/or precipitation regimes. A review of rainfall patterns in Roger Mills County in western Oklahoma mirrors the state trend of

increasing average annual rainfall during the twentieth century (Thurmond and Thurmond 2001). Beyond this increase in average annual values, the temporal patterns of precipitation have changed notably. Less frequent precipitation in the form of torrential events has increasingly been the rule in contrast to the more evenly distributed annual rainfall of the past. Thurmond and Thurmond (2001) have described this as a “feast or famine” pattern. In spite of above average annual precipitation, declining forage production in Roger Mills County from 1997-2000 can be attributed to the pattern (Thurmond and Thurmond 2001). Another change that Thurmond and Thurmond (2001) note is that rainfall events of greater than two inches are twice as common since 1995 as they were in the period 1950-1995.

Drought has been the most significant element of climate in the southern Great Plains. Population flows have been intimately linked to the major droughts that have occurred rhythmically during the period of instrumental record. Borchert (1971) identified the midpoints of four major droughts in the Great Plains as 1892, 1912, 1934, and 1953. The Dust Bowl drought of the 1930's was the most severe drought to impact the central and western US during the period of instrumental observation. Based on dendrochronologies, the drought was also the worst in terms of duration, intensity, and coverage since at least 1700. Only the sixteenth-century mega-drought, extending over eighteen years from 1570 to 1587, appears to have equaled or exceeded the magnitude and duration of the Dust Bowl drought (Fye, Stahle, and Cook 2003). On an annual scale, the drought of 1934 may

have only been exceeded by the drought of 1580 over the last 500 years (Fye, Stahle, and Cook 2003). Considerable conjecture exists that major droughts affecting the Northern Hemisphere have tended to occur with an approximately twenty-two year periodicity; however, the rhythm is much less apparent when the focus shifts to sub-regional, state, and local areas (Fye, Stahle, and Cook 2003; Warrick and Bowden 1981).

The idea of the Dust Bowl and sixteenth-century droughts as unparalleled in terms of spatial scale is an important distinction to make since many severe droughts have been relatively localized geographically (Warrick and Bowden 1981). Since significant differences in spatial and temporal continuity and severity exist between individual drought periods, different communities have been affected to different degrees. Smaller drought-affected areas are often the scales that strategies relating to agriculture, water supply and development, patterns of migration, federal farm and welfare are developed (Colin 2003). These drought coping strategies are important to those who live in affected communities in order to maintain a viable human presence on the Plains, a human presence that is perpetually redefined.

Humans on the Great Plains

For the past 11,500 years, there is a record of continuous habitation on the Great Plains (Wood 1998). A significant decrease in human activity in the

region correlates with the Altithermal, a period (7,000 to 4,000 BP) of higher aridity and temperatures. During this period large parts of the Great Plains likely experienced diminished vegetative cover (Wedel 1979).

The rise of cultivation that emerged during the eight or ninth-century A.D. roughly paralleled the time of the Neo-Atlantic climatic episode, a period when moist tropical air is thought to have flowed into the Great Plains. The prairie and corn cultures were able to spread west at the expense of the steppe (Wedel 1979). This Early Village period ended around A.D. 1250-1275, perhaps on account of deteriorating climate conditions that made maize cultivation increasingly difficult. The terminal dates are near the approximate end of the Neo-Atlantic and the start of the Pacific I climatic episode. The Pacific I brought cool, dry westerly air into the Plains, resulting in lower temperatures and decreased precipitation (Wedel 1979).

Moving forward to a nineteenth-century example, Bamforth (1988) has demonstrated that during the period of 1850-1860, more complex societies were found in regions where environmental conditions favored human aggregations. For example, comparing tree-ring widths with records of Kiowa tribal aggregations and Sun Dances has shown that the tribe remained dispersed in extremely dry years (Bamforth 1988). This may explain why groups of the same era who were living on the edges of the southern Plains did not expand far into the short-grassed steppe. Maintaining social order would have been more difficult on the margins of the less climatically predictable and more arid southern parts of the Great Plains.

The Plains have experienced extraordinary change over the last century and a half as the original grasslands have been transformed by human activities and settlements. This transformation has taken place at the hands of dryland and irrigated agriculture and livestock grazing and as population and development have ebbed and flowed with the region's economic tides. Land-use patterns have been influenced by a variety of climatic, economic, social and policy factors.

Due to early agricultural failures, the Great Plains was not considered an attractive frontier. However, the railroads that traversed the Plains and the people who inhabited them had a vested interest in encouraging others to join them. Railroads, state and local governments, and independent boosters promised the prospective immigrant that the Plains had the potential for unlimited westward expansion of agriculture with no need for irrigation. They continued that the Great Plains was not a desert, but rather a place where rainfall was abundant and constantly increasing (Baltensperger, Blouet, and Luebke 1979).

This theory of the rain following the plow catered to the American sense of superiority over nature and it helped assuage prospective immigrants concerns. The rhythmic slogan of "the rain follows the plow" was the single most important promotional device to come out of the boomers' frontier (Emmons 1971). The idea was that the plow, symbol of the American farmer, was to give life to the Plains by breaking them and subsequently producing conditions that would lead to increased rainfall (Emmons 1971). Settlers

believed that increased plowing and tree-planting allowed for greater absorption of moisture into the soil. This would lead to increased evaporation of moisture into the atmosphere, thereby resulting in permanent increases in precipitation (Mock 2000).

Whether the Boomer literature distributed by the railroads or a period of above average rainfall was more responsible for settlers' perceptions of the Great Plains remains a matter of debate. Nonetheless, the predominant image of the Plains had been radically transformed to that of an area well-suited to agricultural development (Baltensperger, Blouet, and Luebke 1979). Expectations of the Plains shaped settlers' behavior for some time after relocation. Only after their understanding of the environment had been modified by experience did behavior change to take account of the complex realities of the region. Not surprisingly, behavioral change occurred more quickly and extensively in the most arid areas (Baltensperger, Blouet, and Luebke 1979). As the 1930's Dust Bowl is testament, inadequate behavioral adjustment exacerbated the economic and environmental impact of the epic drought.

New Deal agencies and programs spent more than two billion dollars during the 1930's to keep farmers in business. These programs represented a significant shift in responsibility away from the individual as the government provided a new safety net that encouraged farmers to take unsound risks (Worster 1999). Following the Dust Bowl years, federal relief was combined with adequate rainfall, wartime prices, and expanded output. This made it

easy to forget the “dirty thirties” as many farmers in the 1940’s experienced prosperity unlike anything they had known.

Severe drought struck again on large portions of the Plains between 1953 and 1956 and again in the mid-1970’s. However, farmers were in a better position to persevere through the later droughts due to improved methods of cultivation, larger farms, increased irrigation, and most importantly, continued assistance from the federal government (Fite 1979). These adjustments and this assistance enabled many farmers to remain on the Plains when similar circumstances in the past would have stimulated migration. Subsequently, population declines witnessed in rural communities with some earlier droughts did not occur with later ones.

Population and Migration

While human population movements into the Great Plains were timed by superior rainfall and good crops, their retreat coincided with drought and crop failure (Clements 1938). Settlement of the Plains was increasing markedly in the early 1870’s and early 1890’s when droughts hit. Many areas lost between half and three-quarters of their population in the 1890’s while several counties sustained near total depopulation (Warrick and Bowden 1981). Following steady population gain during the decade of the 1900’s, another exodus occurred in the 1910’s. The expansion of agricultural settlement and wheat production on the Great Plains during the decade of World War I marked yet

another boom period that ended in a bust. Rather than returning East, as settlers did in the 1890's, thousands of farmers migrated westward (Fite 1979).

The next cycle occurred in the midst of the Great Depression. The usual mass movement eastward did not materialize as aid allowed one group of Plains inhabitants to persevere and a second to migrate in a predominantly westward flow (Clements 1938). Counter-intuitively, the Dust Bowl migrations of the 1930's produced population declines in hard-hit areas that were notably less than those of earlier droughts. When one considers that the earlier droughts were of lesser magnitude, the 1930's population declines suggest a reduction in vulnerability to drought. By the 1950's, drought associated population declines were barely detectable as the level of rural depopulation was virtually indistinguishable from that of the wetter decades of the 1940's and 1960's (Warrick and Bowden 1981).

This change can be largely attributed to the agricultural restructuring that took place in the wake of the Dust Bowl. The array of federal relief and subsidy programs allowed farmers to weather the droughts. The Dust Bowl image of caravans of destitute farmers fleeing bankrupt farms and broken bank accounts was replaced by the scenario of the farmer who takes advantage of federal disaster loan programs and collects on his Federal Crop Insurance (Warrick and Bowden 1981).

Agricultural Adjustment

Agricultural adjustment in the form of government subsidies and aid has been an ongoing theme of the Great Plains since the Dust Bowl. The farm-subsidy program was designed to keep farmers solvent during years when crops fail or commodity prices plummet. In the past forty years, the federal government has doled out more than \$350 billion in commodity-support subsidies to farmers (Colin 2003). Only farmers who grow a program crop such as grains, rice, and cotton are eligible. Because commodity subsidies are tied to production, farmers who plant more crops get larger payments. Therefore the bulk of subsidies coming into the Great Plains are collected by large agribusiness operations. Rewarding the largest farmers, however, may contribute to contemporary Plains depopulation (Colin 2003).

Long-term productivity increases in agriculture, and more recently in mining, have caused these industries to require fewer workers over time. This is reflected in employment declines and six decades of almost continuous population loss (Cromartie 1998). Because improvements in technology have reduced the need for agricultural labor by dramatically increasing the amount of land that one person can work, farm size on the Plains has ballooned while the number of farm-related jobs has declined (Colin 2003). Beale (1993) reported that agricultural output per hour of farm work rose 1,300 percent between 1940 and 1989 while productivity per acre more than doubled over the same period.

In Gutmann's (2000) analysis of Great Plains migration from 1930 to 1990, the most important determinant of migration was the extent to which a county has an agricultural economy. Areas more heavily dependent upon agricultural employment experienced more net out-migration during the 1950's and became the natural decline areas of the 1970's (Pursell 1981). More than half of the continuously declining counties in the region had at least thirty-eight percent of their total employment based in agriculture. In contrast, only two percent of the counties with that level of agricultural employment consistently grew since 1950. On the other hand, more than three-quarters of continuous growth counties had an agricultural employment base under sixteen percent (Rathge and Highman 1998). Thus, contemporary natural population decrease on the Great Plains originated from the area's concentration in agricultural employment.

Changing Demographics

Rathge (2003) pointed out that contemporary Great Plains population dynamics have been much more complex than the dominant theme of rural to urban migration has suggested. For example, out-migration due to agricultural restructuring has left a distorted age structure. Residents who leave for employment reasons tend to be in their early or mid-career stages. This form of selective migration distorts the age structure of a county by decreasing the number of young adults and enlarging the proportion of elderly. For the period

1950-1996, nearly half of continuously declining Great Plains counties had a median age above thirty-five. In contrast, the median age in more than two-thirds of the continuous growth counties was under twenty-nine years (Rathge and Highman 1998). In the decade from 1990 to 2000, some rural counties lost up to fifty percent of their residents from ages 20-34 (Colin 2003). A deficit of young adults has important ramifications for a county's ability to grow. The loss of young families results in a corresponding reduction in children, leading to a natural decrease in population.

Agricultural restructuring has not only led to out-migration and an inverted age structure, but also has redistributed population within the Great Plains. Data indicates sustained population growth when the Great Plains are viewed from a regional or state perspective. All twelve Great Plains states increased their population over the period 1990-2000, and the region as a whole expanded by seventeen percent (Rathge 2003). However, these large-scale snapshots obscure the complexities of Great Plains population dynamics.

The region's population is increasingly concentrated in the largest metropolitan areas. Subsequently, the region's few counties with large urban centers have grown while the majority of counties, mostly rural, have declined since the 1920's and 30's. Over eighty-five percent of the region's population growth occurred in the metropolitan counties of the Plains, which account for only fourteen percent of the counties (Rathge 2003). For example, the town of Fargo, North Dakota witnessed a twenty-two percent increase from 1990 to 2000 (Colin 2003). Places like Fargo may be capturing some of the migrants

from smaller rural communities who do not want to leave the region as well as returnees to the region who left for economic opportunities elsewhere.

On the other hand, hundreds of counties peaked in population in the early twentieth century and have been declining ever since. In the last twenty years, many counties that are rural or are home to small communities have seen their populations decline by forty percent or more. Today, some 261 Great Plains counties, an area larger than France and Germany combined, hold fewer than six people per square mile (Colin 2003).

Calvin Beale of the Economic Research Service of the US Department of Agriculture has devised a categorization that is particularly useful in analyzing population trends on the Plains. The Beale codes divide non-metropolitan counties into three subcategories. “Urban” non-metropolitan counties have a city of at least 20,000 people, “less urban” non-metropolitan counties have a city between 2,500 and 20,000 people, and “rural” counties do not have a city with more than 2,500 people (Rathge 2003). More than one-third of Great Plains counties are considered rural under this classification scheme. Since 1950, metropolitan counties expanded by one hundred eighty-two percent while urban counties grew fifty-two percent, less urban counties grew fourteen percent and rural counties declined by twenty-one percent. Because rural and less urban counties make up the majority of Great Plains counties, 553 of 1,009 counties had a smaller population in 2000 than 1950 (Rathge 2003), thus confirming that aggregate population totals and trends are often misleading.

Rathge (2003) has also examined Plains population data by grouping counties together by their growth history. One in five Plains counties exhibited continuous population decline from 1950 to 2000. Not one of these 193 continuous-decline counties were metropolitan or urban (city greater than 20,000). Therefore every continuous-decline county in the Great Plains was less urban or rural. When one removes the less urban and rural counties along the foothills of the Rockies that are full of scenic opportunities, the preponderance of continuous-decline less urban and rural counties is even more striking.

The Dust Bowl

A wide range of literature is available regarding the Dust Bowl. A brief introduction to the range of Dust Bowl literature is provided here followed by a more exhaustive review of relevant themes within Chapters Four, Five, and Seven. Buckley's (1999) Dust Bowl bibliography, which has no peer, identified over 400 directly and indirectly related sources. Sources range from technical bulletins produced by the Works Progress Administration (Works Progress Administration 1937) during the height of the disaster to ongoing interdisciplinary, global-scale, and climate research (Donarummo, Ram, and Stoermer 2003; Reed 2003). The topic remains salient and writers continue to publish. For example, Egan's award-winning The Worst Hard Time (2006) is,

by this author's opinion, the most compelling account of the dramatic human experience of the Dust Bowl.

Attempts at explanation began as early as 1937 (Stephens), reached a peak in the late 1970's and early 1980's (Bonnifield 1979; Hurt 1985; Worster 1982) and continue to this day (Cunfer 2002, 2004; Egan 2006). Early Dust Bowl research was ecologically oriented (Bennett 1938; Clements 1938; Lackey 1937; Leighton 1938; Stephens 1937; van Royen 1937; Visher 1935) before shifting to social perspectives (Baltensperger, Blouet, and Luebke 1979; Bonnifield 1979; Geddes 1954; Hewes 1963, 1973; Hurt 1981; Pursell 1981; Sewell, Kates, and Phillips 1968; Sims and Saarinen 1969; Worster 1982) on the event in more recent times. One exception to this appears to be an increase in climatological studies (Arbogast and Johnson 1998; Bond and Showers 1997; Brown 1993; Maxson and Walby 1998; Muhs 1985).

Both academic and popular literature will be critically reviewed to distill published notions of the region, era, and event concepts. The Dust Bowl is such a complex event that it is virtually impossible to remove the human story from the physical one and vice-versa. However, several dominant themes emerge in a review of Dust Bowl literature and are discussed in detail in Chapter Seven. These include causation, humans versus nature, and migration.

The influence of popular culture is an associated theme that has recently garnered the attention of several academics. Works that have viewed the popular culture slice of Dust Bowl literature include Affolder (1997), Dorrill (1998), O'Connor (1988), and Shindo (1992, 1997). Collectively, these texts

examine the impact that artists and authors have had on public perception of the Dust Bowl. Shindo's (1992, 1997) thesis that individuals such as author John Steinbeck, singer Woody Guthrie, and photographer Dorothea Lange have had a much more significant impact on the public memory than academic historians is particularly noteworthy.

Personal narratives of Dust Bowl experiences continue to be published as well. These texts provide straight-forward insights into the human toll of the event. The theme of personal narratives yields numerous results in a generic Dust Bowl literature query. Authors such as Stallings (2001) have compiled interviews with Dust Bowl survivors. Sometimes the focus was on a particular event such as the notorious dust storm of April 14, 1935 known as Black Sunday. Others have focused on particular segments of the population, such as the children of the era. Children of the Dust Bowl: The True Story of the School at Weedpatch Camp, by Jerry Stanley (1992) interviewed former teachers and pupils from one of the migrant camp schools in California. Individual diaries have been published as well. The most notable is that of Lawrence Svobida (1986). Svobida's decade-long account of farming in Meade County, Kansas shed insight on agricultural techniques of the day and puts a face on the remarkable hardships encountered (1986).

Theory

The Region in Geography

The National Geography Standards, published by the National Council for Geographic Education (NCGE), describe a region as...

a concept that is used to identify and organize areas of Earth's surface for various purposes. A region has certain characteristics that give it a measure of cohesiveness and distinctiveness that set it apart from other regions. As worlds within worlds, regions can be used to simplify the whole by organizing Earth's surface on the basis of the presence or absence of selected physical and human characteristics. As a result, regions are human constructs whose boundaries and characteristics are derived from sets of specific criteria. They can vary in scale from local to global; overlap or be mutually exclusive; exhaustively partition the entire world or capture only selected portions of it. They can nest within one another, forming a multilevel mosaic. Understanding the idea of region and the process of regionalization is fundamental to being geographically informed (National Council for Geographic Education 2005).

The concept of region has been central to the discipline of geography since its rebirth in the middle 19th century. At this time, scholars such as Richthofen, Schluter, and Vidal de la Blache incorporated regional concepts into the "new geography" that was making its way into French and German

universities. The ideas of these prominent scholars maintain their relevance and are echoed in this research.

Richthofen applied the term chorology to the method of developing general concepts regarding the world distribution of phenomenon in order to shed light on causal interrelations among diverse things in particular areas. In an approach later developed more completely by Hettner, Richthofen's study of humans' relationships to the physical earth combined with biotic features' associations with the physical earth became a model for geography studies (Martin and Preston 1993).

Paul Vidal de la Blache, leading the introduction of the "new geography" in France, believed that geographers should focus their attention on the relationships between humans and their immediate surroundings that he referred to as the "milieu" by studying small homogenous areas he called "pays." He also introduced the term "genre de vie" to express a concept of total culture that bridged social and spatial identities (Martin and Preston 1993).

Schluter refined these early concepts of region a step further by emphasizing landscape study (*landschaftskunde*). Using methods of historical geography, Schluter attempted to identify the *urlandschaft*, the landscape that existed before major changes were introduced by human activities. He then traced sequences of change whereby the *urlandschaft* became the *kulturlandschaft*, or cultural landscape. Tracing these landscape changes was a major goal of geography according to Schluter (Martin and Preston 1993).

Sauer built upon Schluter's work in the realm of landscape studies. Sauer believed geography was concerned with the study of things associated in area and with differences from place to place, both physical and cultural (Martin and Preston 1993). By performing work on the physical and biotic characteristics of their natural surroundings, humans create the cultural landscape. Geography as chorology, or the study of the associations and interconnections of things in areas or regions, was the essence of the discipline according to Sauer (Martin and Preston 1993).

Most geography texts describe three types of regions: formal, functional, and vernacular/perceptual/popular. A formal region is an area characterized by a common human or physical trait such as a type of religion or vegetation. Functional regions are found around an organizing point. A county with its county seat and a shopping region centered on a mall represent examples of functional regions. A perceptual or vernacular or popular region is one defined by people's shared subjective feelings about a place. The borders are rarely precise and the characteristics that define the region may not be commonly accepted or agreed upon. Examples of this type of region would include Dixie in the southern US or Green Country in Oklahoma.

Jordan (1978) and Shortridge (1984, 1985, 1987) have been leaders within the discipline of geography in the study of vernacular regions. Jordan (1978) classified vernacular regions in his assessment of Texas into political, political-historical, promotional, and environmental regions. Combining two types of Jordan's vernacular regions the Dust Bowl could be considered a

historical-environmental vernacular region. Jordan described the term “Dust Bowl” as a derogatory environmental region (1978).

Shortridge’s work was noteworthy because he identified the process of change within assigning vernacular labels. His work on regional labels within the US demonstrated that evolving regional definitions by generation can be identified (Shortridge 1987). Also significant to this research, Shortridge described how academic perceptions of a region can vary from popular perceptions (1985). Findings that corroborate both of these points are presented below.

The methods used in defining vernacular regions can vary from literary analysis (Shortridge 1984) to questionnaires (Zelinsky 1980) to analysis of business names by place (Shortridge 1985) to esoteric datasets such as warranty cards (Shortridge 1987). Undoubtedly, these disparate methods produce results with significant variation. Regional definition of the Dust Bowl as performed by questionnaire respondents participating in this research involved drawing a map of the region.

This evaluation of the Dust Bowl region applies most to the concept of a vernacular region. However, academics have defined the Dust Bowl as a formal region based on traits such as drought or wind erosion. Even the functional label could marginally be applied in reference to land parcels acquired by the federal government to halt cultivation on lands most susceptible to erosion.

The Era in Geography

Era can be defined as a period of time marked by distinctive character or events (*American Heritage Dictionary of the English Language, Fourth Edition* 2000). By this approach the Dust Bowl era could be defined according to a variety of Dust Bowl characteristics with temporal associations. These include physical variables such as frequency of dust storms, drought duration for a particular locale, high temperature records, and peak soil erosion rates. On the other hand, human attributes such as period of peak federal relief, migration rates, crop yields, or association with another era (e.g. the Great Depression) could be utilized to yield a temporal definition. When questionnaire respondents involved in this study were asked to define the Dust Bowl era, they likely utilized some personal amalgamation of these attributes to formulate a beginning and an end, and thus an era for their Dust Bowl event.

The element of time has always been a significant component of geography scholarship. H.C. Darby once said that all geography is historical geography (2002). Indeed, it is difficult to develop and explain any holistic geographic enterprise without reference to the past. Historical geography could be generally described as the study of human settlement on the land from the perspective of time. Halford Mackinder insisted that “the geographer should attempt to re-create past geographies and show how sequences of change have led to the presently observable features of an area” (Martin and Preston 1993, 222). By explicitly adding time to geographic study, the process

of change becomes a natural focal point. While the research instrument to be employed in this study only dedicates two questions to the era concept, this idea of change is inherent to the study as a whole. Respondents are being asked to provide their perceptions and knowledge about something (an event) that presented conditions that are clearly quite different than those that preceded and followed it.

The Event in Geography

An event can be defined as: something that takes place, an occurrence; or a significant occurrence or happening; or the final result or outcome (*American Heritage Dictionary of the English Language, Fourth Edition 2000*). A physicist might describe it as something that occurs at a certain point and place in time which can be distinguished because the state of the world changed (*American Heritage Dictionary of the English Language, Fourth Edition 2000*). All of the preceding definitions could be applied to the Dust Bowl and all of these interpretations could be examined from a geographic perspective. The Dust Bowl was something that took place and few would argue its significance. Likewise, the Dust Bowl produced an outcome or final result that many have studied. And finally, many would agree with the notion that the world had changed as a result of the Dust Bowl. At what point along the space-time continuum that occurred, however, is subject to debate.

Geography as a science is particularly well-suited to examining the event concept. Naturally, any event must occur within some spatial context and is a candidate for geographic analysis. From a broader disciplinary perspective, however, geographers have proven to be adept at illuminating, processing, and making sense of the diverse and disparate variables that come together to provide the milieu within which an event takes place. This complex association of cultural and physical variables forms the human-environment system, a system that is assigned order by identifying trends, discrepancies, and similarities within these disparate elements. Identifying order within the complex association of variables that lead to an event presents exciting opportunities for the geographer. These include the ability to draw “the big picture” for the uninformed and the chance to develop regional definitions based on interpretations of the spatial attributes of and relationship between variables.

Environmental Perception in Geography

While this research will note individual perceptions, explanation of response variation is aimed at geographic and demographic variation rather than the myriad of additional variables that can influence a given individual’s perception of the environment. Findings and subsequent discussion of this research does not delve into traditional notions of environmental perception and the overlapping realms of cognitive and behavioral geography.

Nonetheless, a very brief explanation of environmental perception is warranted by the title of this project and the possibility that further study may incorporate this subfield of geography.

The study of environmental perception became a more prominent movement within geography in the 1960's (Martin and Preston 1993). In short, environmental perception is concerned with the mental images and models that are formed from our experiences. During their formation and reformation, these images are shaped by our attitudes, values, and beliefs. The Environmental Perception and Behavioral Geography specialty group of the Association of American Geographers provides a more detailed description:

Environmental perception and behavior geography is a broad sub-area within human geography that takes a disaggregate approach to the study of human activity, culture, and society. It is concerned with a diverse set of issues about human behavior, perception, attitudes, beliefs, memory, language, intentions, reasoning and problem-solving involving space and place (*Environmental Perception and Behavioral Geography Specialty Group Homepage*).

For a more thorough look at this area of geography, one might examine seminal works on the subject by David Lowenthal (1967) or Yi-Fu Tuan (1974). Tuan's *Topophilia: A Study of Environmental Perceptions, Attitude, and Values* (1974) examined the bond between people and their environments at the species, group, and individual level. From a broader sense, however, he

described how perceptions and values are formed as a result of human-environment interaction (Tuan 1974).

Lowenthal (1967) divided geographical study into three realms: the nature of the environment, what we think and feel about the environment, and how we behave in and alter the environment. Focusing on the second of these realms, Lowenthal described how we interact with the environment through “the medium of a personally apprehended milieu” (Lowenthal 1967). He continues, “this milieu differs for each of us according to our personal history... and also varies with mood, purpose and attentiveness” (Lowenthal 1967). To truly understand one’s perception of the environment, these individual facets must be studied (Lowenthal 1967).

Since becoming a more prominent player within geography, environmental perception has shown an affinity for interdisciplinary projects where geographers have teamed with researchers who study the human mind (Martin and Preston 1993). The Environmental Perception Laboratory at the University of Arizona provides a good example of the research being completed in this field. Researchers there seek to “address theoretical questions in environmental perception and environmental valuation and contribute to the solution of practical problems of integrating human dimensions into natural resources and environmental management and policy” (Daniel and Hill 1997). Examples of recent projects include “Perceived Fire Hazard in Northern Forests” and “Eco Aesthetics of Prairies” (Daniel and Hill 1997).

Two works related to environmental perception and the Dust Bowl region are provided by Heathcote (1980) and Bader (1988). Bader's work deals with the collective self-perception of the state of Kansas. Bader describes the image of Kansas as largely negative by non-natives and natives alike. Bader traces the evolution of the Kansas image from the 1890's through the late 20th century. In an entire chapter dedicated to the 1930's, Bader details this as a decade of precipitous decline in the state's reputation. The climatological conditions, however, are credited no more than "repressive and reactionary" legislation, public scandals, and economic depression as sources for the negative perception of the state (Bader 1988, 72-73).

Heathcote's analysis of the perception of desertification includes a lengthy chapter regarding the southern Great Plains. While the emphasis is on the perception of soil erosion in the region, Heathcote illustrates how perception of environmental variables in the region can vary widely among groups (1980). He concludes that conflicting perceptions of soil erosion, in this case by farmers and policy makers, enhances the threat of land degradation in the region.

III. METHODOLOGY

Research Plan

The research plan (Fig. 4) displays the sequence of key steps involved in completion of the work presented here. The four primary research questions are color coded to illustrate their roles in guiding the progression of the plan. Development of the questionnaire (Appendix C) with the approval of the author's advisor and Oklahoma State University's Institutional Review Board was the first step. Eleven trips to the study area beginning on July 12, 2006 and ending on December 5, 2006 were required to complete administration of the questionnaire. Beyond collecting the primary data for this research, these trips provided many opportunities to better familiarize the author with the people, places, landscapes, and intangible characteristics of the study area.

As responses were collected, the completed questionnaires were processed by digitization of respondents' regional definition of the Dust Bowl and entry of responses into a Microsoft Access database. Basic descriptive statistical analysis was completed on the data utilizing Access and Microsoft Excel.

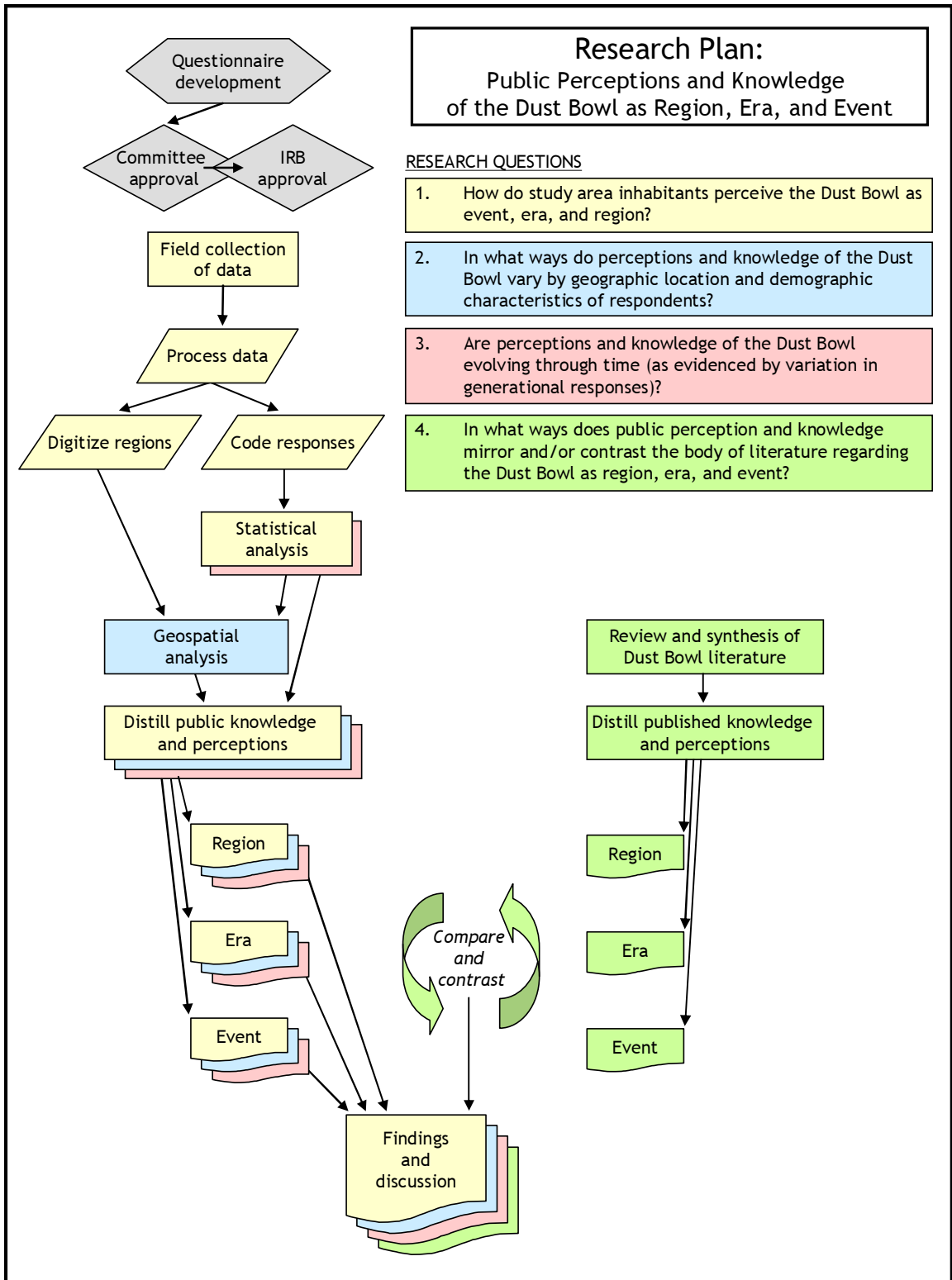


Figure 4. Research Plan

The data, along with the digitized regions, underwent geospatial analysis through the application of tools contained in ArcGIS 9.2 geographic information system software. Results of qualitative, statistical, and geospatial analysis are reported and discussed in following chapters dedicated to the region, era, and event.

Analysis of the Dust Bowl's Written Record

As discussed above, Buckley's (1999) extensive Dust Bowl bibliography identified over 400 sources related to the Dust Bowl. That number continues to grow. The majority of these sources are peripheral, with only marginal association to the event. Relevant Dust Bowl literature was reviewed to illuminate what has been written about the three dominant conceptual threads of this work: region, era, and event. These works provide a contextual background upon which to report the findings of the questionnaire. In other words, for each concept the written record will be discussed before progressing to the inhabitants of the region.

This portion of the research expands the Dust Bowl literature review presented above regarding the definitions of region, era, and event. For example, early Dust Bowl literature slanted the event toward a human-caused environmental disaster. This New Deal version of the story supported the call for dramatic government reform. As time passed, the rains returned, the region returned to producing wheat on a grand scale and the story evolved. Better scientific data pointed to the severity of the Dust Bowl era drought as a

primary culprit. Researchers more readily acknowledged that the Dust Bowl was just the latest episode of dirt blowing on the Great Plains, resulting in more balanced narratives. Indeed, the drought was epic *and* the rise of industrial agriculture exacerbated an acute situation.

Variation can also be noted for the temporal and spatial foci of this research. For example, some early reports of the Dust Bowl suggest an affected area farther north than Worster's dust regions and fix an earlier starting point to the disaster (The Dust Bowl Area 1936). The drought did begin on the northern Great Plains before moving south and gaining intensity as the decade of the 1930's began (Skaggs 1975). Studying the literature identifies what adjustments and refinements to both era and regional definitions were made as the event unfolded and as researchers gained more and improved data and invaluable hindsight.

Dust Bowl Knowledge and Perception Questionnaire

A questionnaire was developed as the primary tool of this research. This questionnaire (Appendix C), titled *Dust Bowl Knowledge and Perception*, included thirty-three items related to the Dust Bowl as region, era, and event as well as an additional nine items that gather demographic data. The main body of the questionnaire was printed on 11" x 17" paper with an attached 8.5" x 11" sheet for the demographic questions. The voluntary and anonymous questionnaire was classified as exempt by the Oklahoma State University

Institutional Review Board on July 6, 2006 and the protocol for administration of the questionnaire expired July 5, 2007 (Appendix E).

Dust Bowl: The Region

The region portion of the questionnaire consists of three items. First, respondents were asked to draw a closed line around the Dust Bowl region on a map of the contiguous United States (item A-1). State labels are included on the map. The second item (A-2) asked “What single state do you most strongly associate with the Dust Bowl?” The last item (A-3) of the section asked “What other states do you associate with the Dust Bowl?” One would expect there to be a strong association with the responses to items A-2 and A-3 with A-1. However, respondents’ spatial awareness of the region as a whole and the states they associated with the Dust Bowl are not always mirror images. This author’s supposition that respondents would disproportionately identify their state of residence or Oklahoma as the primary Dust Bowl state was examined at length and is discussed below.

Dust Bowl: The Era

This portion of the questionnaire contains two questions. First, item B-1 asked respondents to “Define the Dust Bowl era by marking the beginning and end of the Dust Bowl era” on a timeline. The timeline labels decades and has

tick marks every five years. It includes the reference events World War I, the Great Depression, World War II, the Korean War, and the Vietnam War. Most researchers fix the beginning of the 1930's Dust Bowl somewhere between 1929 and 1932 and the end between 1937 and 1940. Item B-2 asked "What year represents the peak of the Dust Bowl?" This question was designed primarily to illuminate variability within the study area and generational groups. The spring of 1935 is generally considered the worst year for dust storms in much of the region. An additional consideration for these questions was whether all respondents assumed this research referred to the 1930's Dust Bowl. Drought in the 1950's and 1970's also spawned notable dust storms.

Dust Bowl: The Event

The event portion of the questionnaire begins with an open-ended question: "In your words, what was the Dust Bowl?" Responses were categorized into definitions that contain region, era, and event components. Fourteen Likert-scale statements were utilized in this portion of the questionnaire. The Likert scale is a commonly-used scale in questionnaires that provides respondents with an opportunity to express their level of agreement to a statement. Five choices are presented for each statement: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree.

The first pair (C-2 and C-3) of Likert statements nudged respondents to make a choice in their assessment of what caused the Dust Bowl: agricultural

mismanagement or drought. The next pair (C-4 and C-5) sought to determine if respondents perceived a causal relationship between the Great Depression and the Dust Bowl. C-6 states “The Dust Bowl was the worst prolonged environmental disaster in the history of the United States.” This is an assertion that researchers such as Worster (1982) have made, but what did those who lived through it have to say? The creation of National Grasslands is the topic of C-7. Did contemporary inhabitants view this federal program with favor or disdain? The next statement pair (C-8 and C-9) measured respondents’ beliefs that a Dust Bowl-like event could and will happen again in or near its historic location.

The final six Likert-scale statements of this section (C-10 thru C-15) utilize Geoff Cunfer’s (2004) defining characteristics of the Dust Bowl to measure respondents knowledge of the Dust Bowl event in relation to the academic consensus. According to Cunfer, the Dust Bowl was defined by a combination of extended severe drought and unusually high temperatures; by episodic regional dust storms and routine localized wind erosion; by agricultural failure, including both cropland and livestock operations; by the collapse of the rural economy, affecting farmers, rural businesses, and local governments; by an aggressive reform movement by the federal government; and finally, by migration from rural to urban areas and migration out of the region (2004). Indices that incorporate responses to these six questions and measure respondents’ academic knowledge association are discussed in Chapter Eight.

Dust Bowl: Personal Exposure

The penultimate portion of the questionnaire collected information regarding respondents' first-hand experience with the topic along with their assessment of the Dust Bowl as an educational priority. Item D-1 asked respondents what the first thing to come mind is when they hear the term Dust Bowl. While this item resembles C-1, it was designed to ascertain direct word or image association with the Dust Bowl rather than a description or definition of the event.

Items D-2 and D-2a are critical to the educational theme of this project and future work that will build on this research. These questions asked respondents if and at what level they were taught about the Dust Bowl in the course of their education. Items D-5 through D-10 followed up with a series of questions relating to the importance of Dust Bowl education and the development of new or expanded educational resources. These questions were important to determine if inhabitants of the region embrace their recent history or shun it. The other four items in this section (D-3 through D-4b) gathered information regarding Dust Bowl survivors and their stories.

Demographic Data

Demographic data were collected for descriptive purposes of the sample. Data were collected on a voluntary basis regarding location of current residence, gender, age, race/ethnicity, educational attainment, annual

household income, place of birth, places of residence throughout life, and vocation. Descriptive statistics were calculated and are displayed below in a comparison with the study area's demographic characteristics.

Administration of Questionnaire

The questionnaire was administered to one respondent in each of four age groups (20-39, 40-59, 60-79, 80+) in each of the ninety-three counties in the study area that is based on Worster's dust regions. This equates to 372 respondents completing the questionnaire. Respondents were voluntary participants obtained from within each county. To participate in the study, respondents were required to be a current resident of the county. Respondents were given the choice of completing the questionnaire by hand or by completing the questionnaire orally. This accommodation was included for the high percentage of aged respondents who have experienced some visual loss. Previous experience had also shown that this accommodation can be helpful in obtaining volunteers who feel as though they can keep working while they answer the questions. The only portion of the questionnaire that required the respondent's hand is the drawing of the Dust Bowl region. In a few exceptional cases, the researcher had to draw the region based upon a detailed description provided by the respondent. In accordance with the approved Institutional Review Board's protocol, respondents were presented with an

information sheet providing a brief summary of the research and contact information for the researcher and the researcher's advisor.

The following sites were utilized to obtain volunteers: county courthouses, municipal offices, public libraries, churches, public parks, retail establishments, restaurants, private homes, and assisted living centers/nursing homes. County courthouses were utilized most often and represented the starting point for data collection in each county. Fifty-five percent of questionnaire respondents were obtained from the premises of the county courthouses. The county courthouse was chosen as the initial collection point because these are located in the county seats of study area counties.

In most cases, the county seat was the most significant community in the county. This can be an important consideration in study area counties with very low populations such as Cimarron, Oklahoma (pop. 2,807), Armstrong, Texas (pop. 2,120), Kiowa, Colorado (pop. 1,413), Greeley, Kansas (pop. 1,331), or Harding, New Mexico (pop. 716) (United States Census Bureau 2002). The courthouse was also a gathering place for a wide cross-section of the community as they tended to a variety of administrative and civic responsibilities. And finally, the employees of the county governments were often able to identify and refer members of the community that fit the age requirements of the questionnaire when volunteers could not be secured at the courthouse.

The second most utilized site (nineteen percent) was retirement/assisted living/nursing centers. Most county seats contained a

long-term care facility. In these centers, resident volunteers were usually willing to complete the questionnaire and discuss the Dust Bowl at length. Long-term care administrators and personnel were also agreeable respondents at times.

Analysis of Questionnaire Data

Data collected from the questionnaires presented analytical opportunities for qualitative assessment, descriptive statistical measures, and geospatial analysis via the application of GIS. Prior to these analytical processes taking place, the data were processed and coded as necessary. Qualitative analysis of questionnaire data includes a focus on open-ended questions, as well as the incorporation of ancillary information provided by respondents prior to, during, and concluding administration of the questionnaire. Characterization of Likert-scale responses in light of demographic and locational variables was a primary focus of descriptive statistics. ArcView geographic information software was employed extensively in the analysis of questionnaire data, particularly in regard to the Dust Bowl region. Regional definitions provided by respondents (hand-drawn polygons) were digitized and subjected to a variety of geospatial analysis that is discussed at length in Chapters Four and Five.

Defining and Describing the Study Area

The study area consists of ninety-three counties in a five state area (Colorado, Kansas, New Mexico, Oklahoma, and Texas) that represent the union of areas of severe wind erosion by year as documented in the National Archives and presented more widely in Donald Worster's (1982) seminal text (Fig. 2, Fig. 3, Fig. 5, and Fig. 6). The union function in GIS refers to a topological overlay of two or more polygon spatial datasets that preserves the features that fall within the spatial extent of either input dataset (Wade and Sommer 2006). In this case, the boundaries of the three severe erosion areas, also called dust regions in Worster's text, have been overlain and the resulting perimeter utilized to define the study area. Any county with greater than fifty percent of its area within the unioned polygon was included as a study county (Fig. 6).

The ninety-three county study area had a 2000 population of 1,195,677 (United States Census Bureau 2002). Considering the two largest metropolitan areas (Lubbock, Texas and Amarillo, Texas) combine for a population of more than 400,000 it is reasonable to say that most of the study area is rural and sparsely populated. The land area of the study area is 265,613 km². The population density is approximately 4.5/km². However, most counties in the study area have a population density markedly lower than this number (Fig. 7).

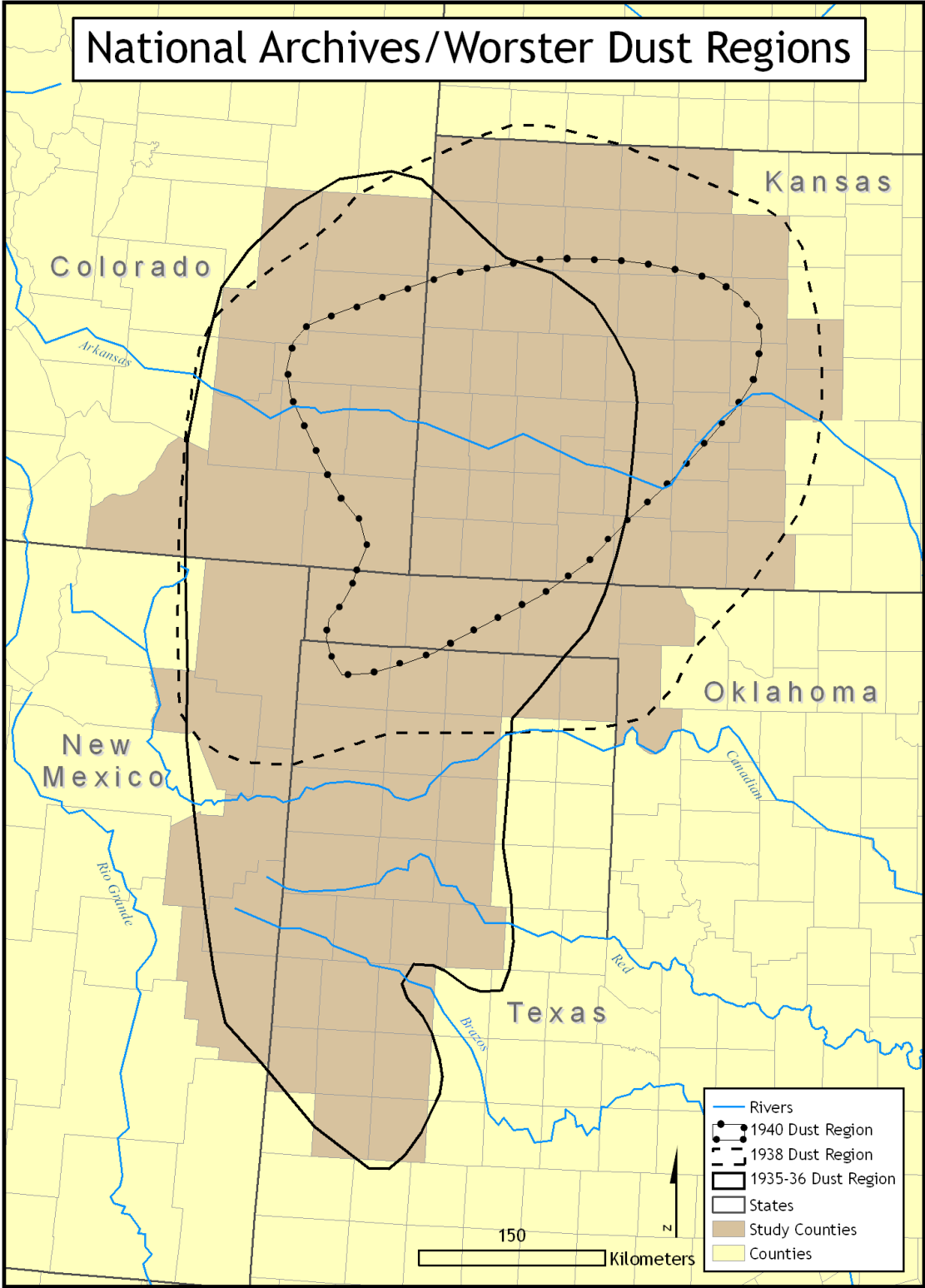


Figure 5. National Archives/Worster Dust Regions by Year

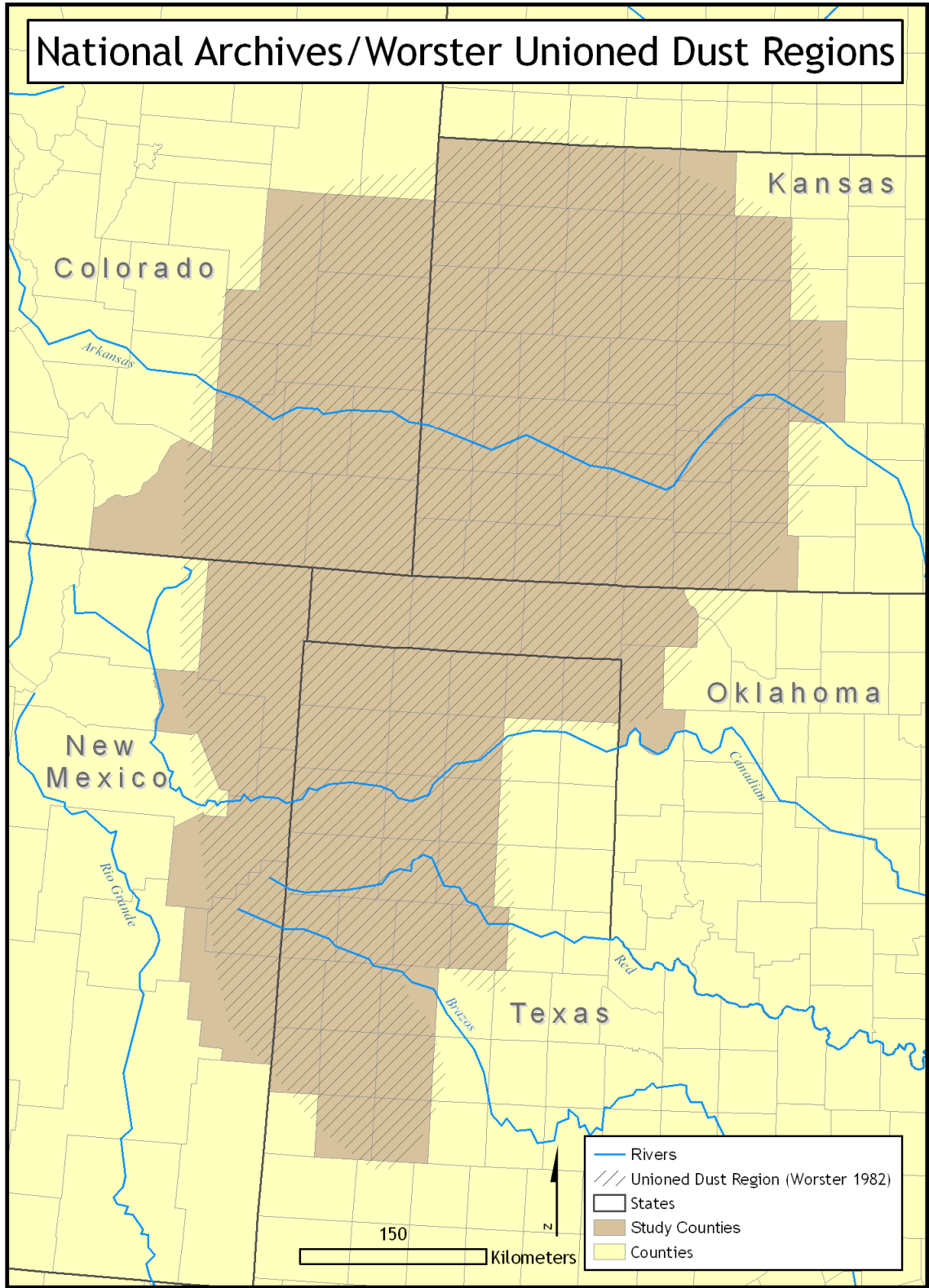


Figure 6. National Archives/Worster Unioned Dust Regions

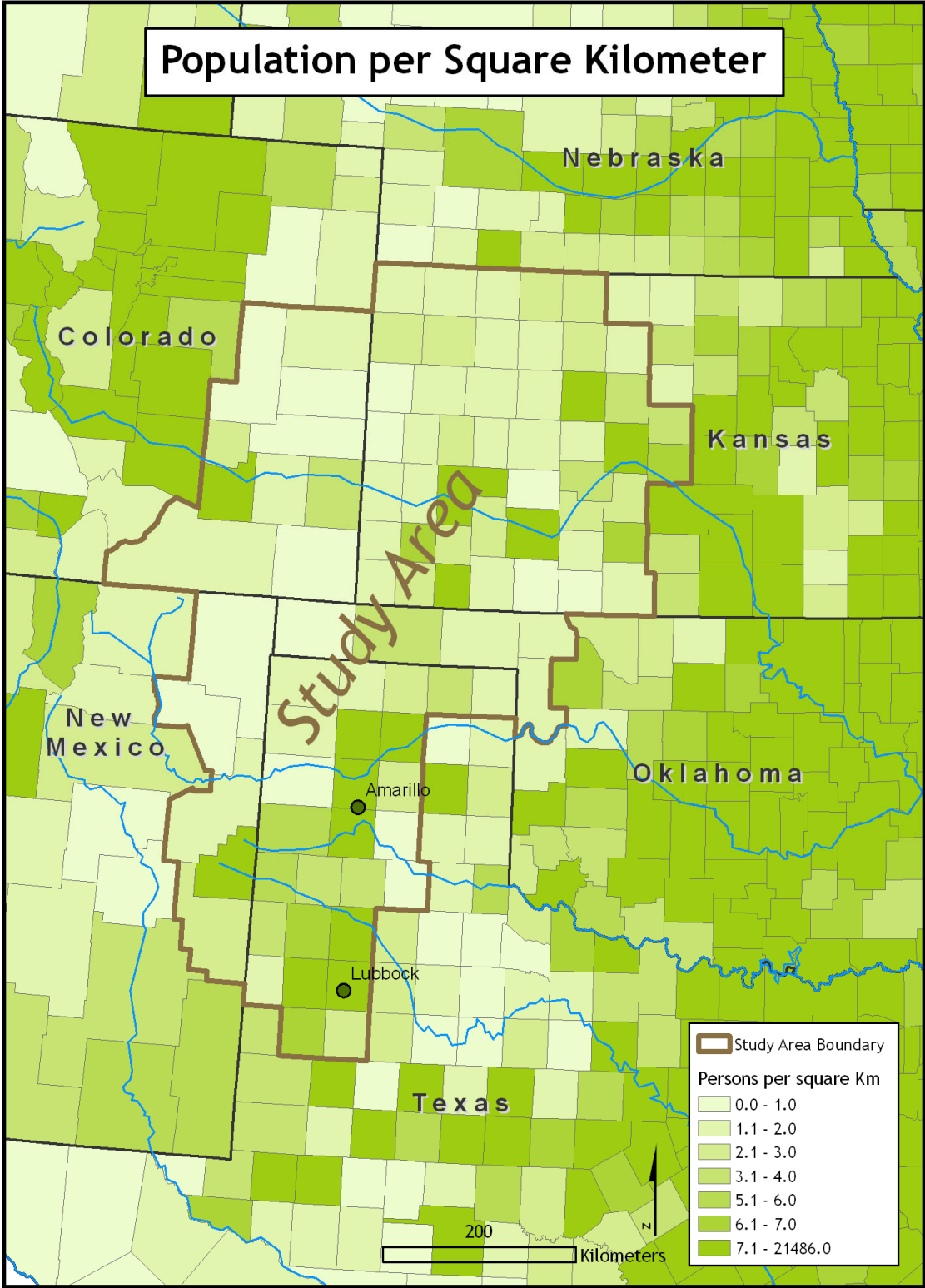


Figure 7. Population Density of Study Area

Men (595,066) were slightly outnumbered by women (600,611) in the study area in 2000, but they both represent fifty percent of the population (United States Census Bureau 2002). The age distribution of the study area is presented in Figure 8. More than thirteen percent of the study area's population is older than sixty-four years of age, slightly more than the nation's average of slightly more than twelve percent. (United States Census Bureau 2002).

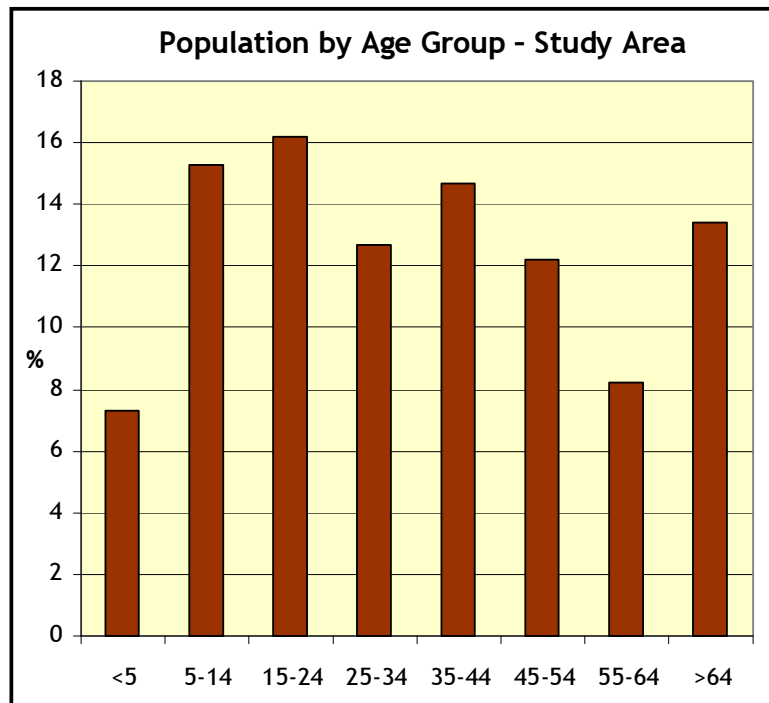


Figure 8. Population by Age Group, Study Area

The racial make-up of the study area follows in Figure 9 (United States Census Bureau 2002). More than two of three residents of the study area are white. Hispanics are the second highest ethnic population group, followed distantly by black and Asian groups. American Indians represent less than one percent of the population of the study area.

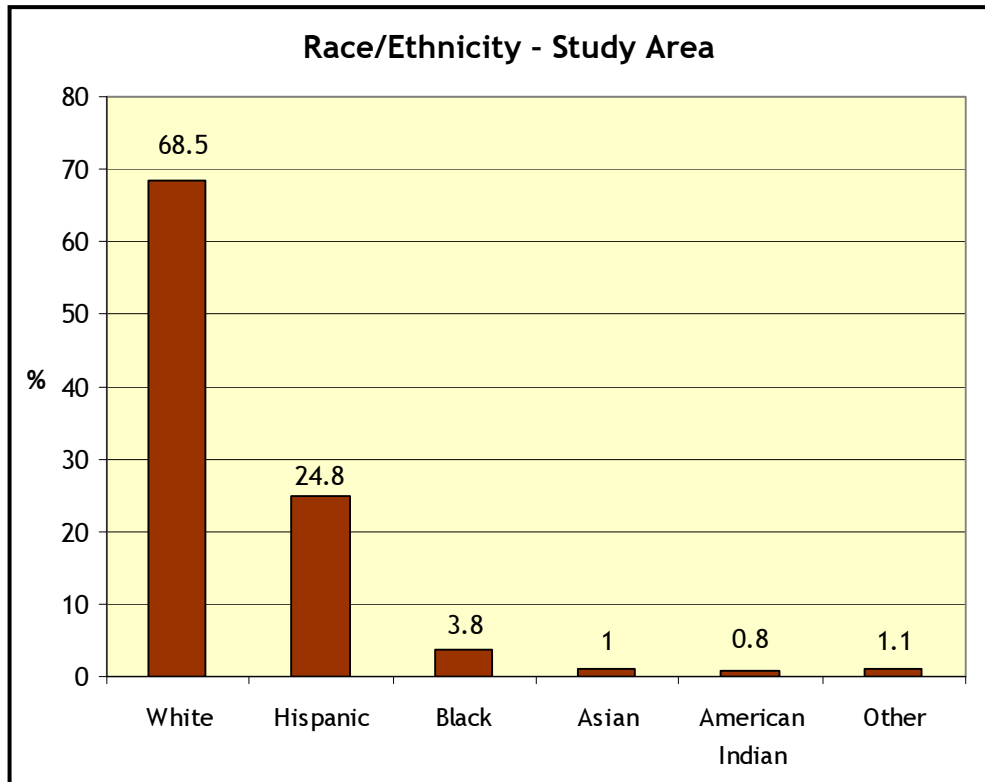


Figure 9. Race/Ethnicity, Study Area

Mean household income for the study area was reported in the 2000 US Census as \$43,782 while median household income was \$33,358. By comparison US mean household income was \$58,371 in 2000 while median household income was \$41,994 (United States Census Bureau 2002). Besides the lower mean and median values noted for the study area, the smaller difference between the mean and median values suggests more evenly distributed income than found in the US population as a whole.

Educational attainment in the study area lags behind values for the US (Fig. 10). Seventy-five percent of study area residents over the age of twenty-five have completed high school compared to the national average of eighty percent. The gap is more substantial in terms of higher education. Twenty-

four percent of US citizens possess a bachelors degree or higher whereas seventeen percent of study area residents possess that level of educational attainment.

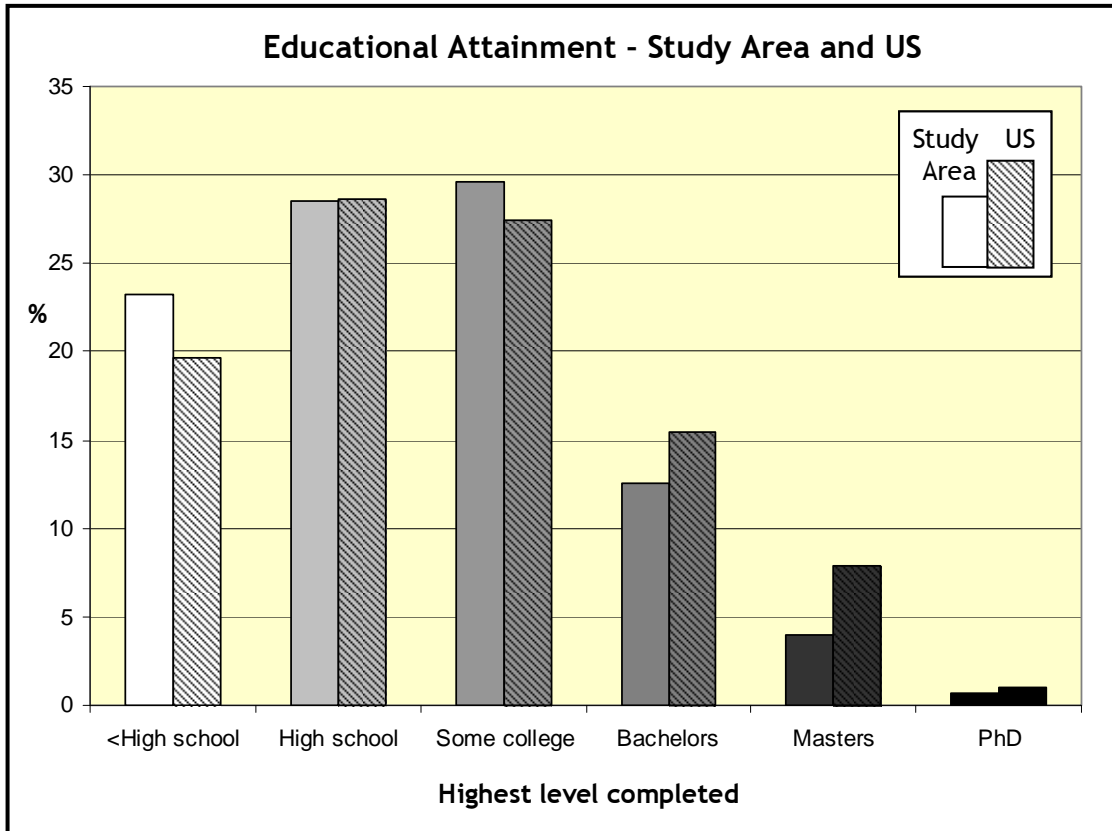


Figure 10. Educational Attainment, Study Area

The Sample

The sample of study area residents utilized for this research consisted of 372 persons from ninety-three counties. Sixty-one percent of respondents were female and thirty-nine percent were male. This unequal proportion is explained by the fact that women were generally more receptive to participating as well as the disproportionately high number of females

employed in county courthouses. Of the more than eight county courthouses and countless offices within those courthouses, this researcher estimates that more than eighty percent of courthouse employees contacted were female. The notable exception within the courthouse was often the county sheriff's office. Nearly eighty-nine percent of respondents were White (Fig. 11). The second highest race-ethnicity group was Hispanic at eight percent.

The sample was slanted towards the older inhabitants of the study area due to its age requirements. No one under the age of twenty was included and half of respondents were over the age of fifty-nine. The older cohorts of the region are whiter just as the younger cohorts have the highest percentages of Hispanic persons. In other words, the race/ethnicity discrepancy suggested by comparison of Figure 9 and Figure 11 is not as noteworthy as it may appear at first glance.

A number of respondents chose not to respond to the household income question and several others expressed confusion as to what household income represents upon completion of the questionnaire. As a result, Figure 12 should be viewed with some skepticism. It is difficult to compare the study area's household mean and median incomes to the sample. Nonetheless, the mode of the sample (\$40,000-\$59,000) distribution is a range that includes the mean household income value (\$43,782) for the study area. Figure 12 suggests however, that the study sample likely has a substantially higher median income than the study area. This is based on the assumption that those respondents

who declined to provide this information possessed a similar distribution of household incomes.

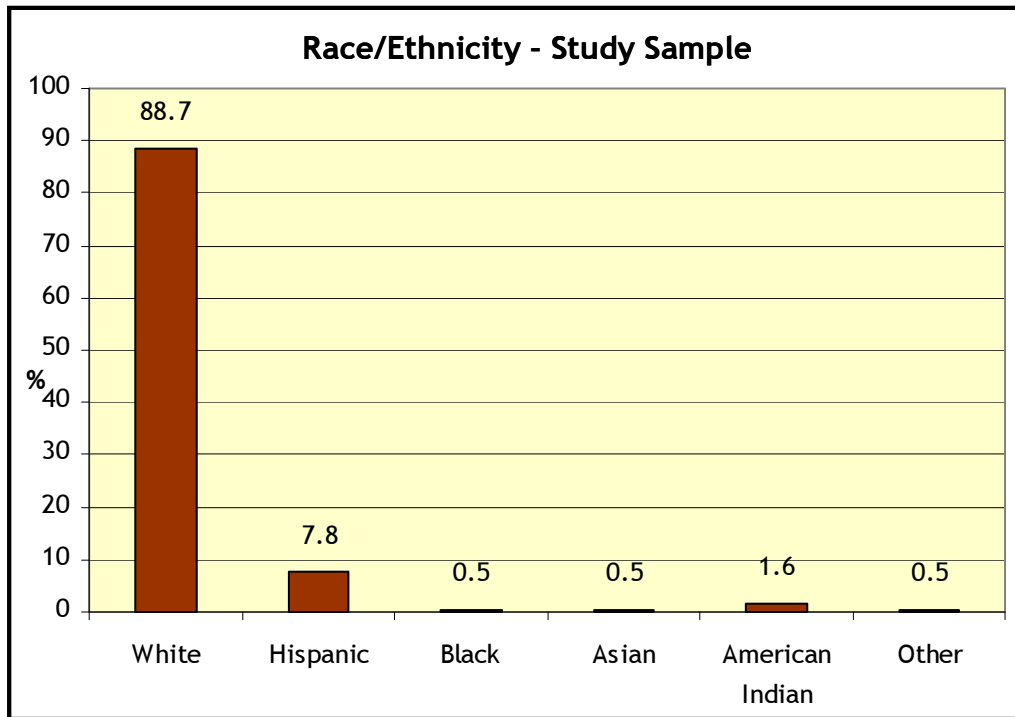


Figure 11. Race/Ethnicity, Study Sample

The study sample's comparatively higher income levels can be partially explained by the high number of courthouse employees who responded to the questionnaire. Recall that a majority of these professionals were women. Therefore, it is reasonable to suspect that a significant percentage of these women contribute to a dual income household that would likely exceed the study area average.

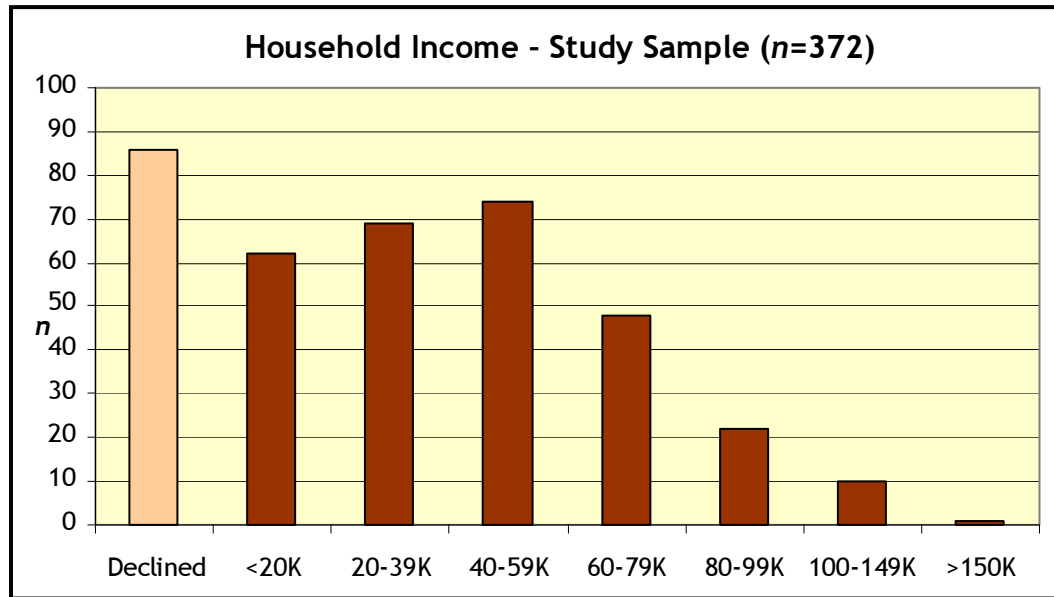


Figure 12. Household Income, Study Sample

Looking at the study sample's distribution of educational attainment (Fig. 13) it is important to remember that respondents as young as twenty are included whereas the national and study area statistics apply to persons at least twenty-five years of age. In spite of this fact, the study sample exhibits higher educational levels than the study area and the US. Ninety-four percent of respondents indicated that they had obtained a high school diploma compared to seventy-five percent in the study area. Nineteen percent of study sample respondents had obtained a higher education degree. This figure is slightly higher than the study area figure of seventeen percent, but lower than the national figure of twenty-four percent.

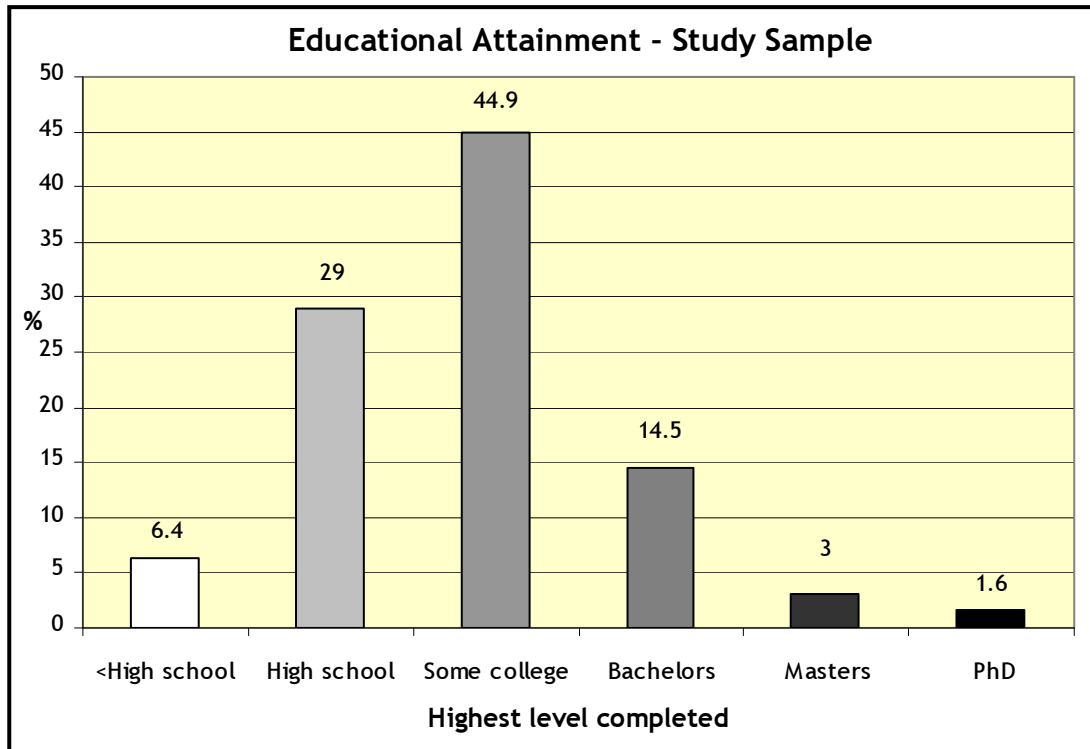


Figure 13. Educational Attainment, Study Sample

Methodological Shortcomings

Hindsight provides the opportunity to comment on several methodological shortcomings of the research presented here. Discrepancies between the sample and the study area demographics could be considered a shortcoming by some. In summary, the sample has a higher proportion of females, is better educated, has a higher proportion of White persons, and a higher level of income than the study area.

A more consequential methodological shortcoming lies in the decision not to include “don’t know” along with “neither agree nor disagree” as a response choice to Likert statements. Numerous respondents reported that

they did not know rather than not having an opinion. On the other hand, numerous respondents would discuss a Likert statement and determine they had ambiguous feelings or knowledge and respond with “neither agree nor disagree.” Based upon commentary and discussions with questionnaire respondents, the researcher has a grasp for the statements for which this was most problematic. Nonetheless, it would have been better if these two types of responses were calculated separately.

The final issue played a role in illuminating the previous problem. A number of the Likert statements could have been split into individual components. This was recognized as a potential issue when developing the questionnaire. However, in the interest of limited space, keeping the questionnaire length reasonable, and utilizing Cunfer’s (2004) statements verbatim, the decision was made to proceed with the questionnaire as designed and approved. The problem was most prevalent with item C-10, “The Dust Bowl was defined by a combination of extended severe drought and unusually high temperatures.” Respondents commented that they were certain there was a drought, but not sure about the high temperatures. In these cases, some respondents marked “agree” instead of “strongly agree” or more often marked “neither agree nor disagree” because of the one part of the statement about which they were unsure. Other items that may have been particularly affected by this problem include C-11, C-12, C-13, and C-15.

IV. THE DUST BOWL REGION TO DATE

Where Was the Dust Bowl?

“No one during the late 1930’s or since has agreed on the actual boundary that determined when a person or region was in the Dust Bowl” (Bonnifield 1979, 2).

Should Bonnifield’s declaration regarding the Dust Bowl region be accepted or rejected? Is there really no agreement in academic or popular circles regarding the delineation of this complex historical environmental region? These questions are intimately related to research questions one and four (Fig. 4). Citizens of the Dust Bowl region, as defined by Worster (1982), provided their solutions to the regional question by drawing maps that are analyzed and discussed in the following chapter. While McDean (1986) describes the geographic boundaries as the most basic characteristic of the Dust Bowl and Heathcote stated in 1980 that “cartographic definitions of the limits have been relatively few” (1980, 3), subsequent decades have produced numerous and varied maps of the region. This chapter describes and discusses these previously-defined Dust Bowl regions that have informed the public.

At times, both popular and academic Dust Bowl literature has failed to explicitly delimit the Dust Bowl region. Problematic descriptions include those

that are merely generalized descriptions of the Great Plains environment (DeAngelis and DeAngelis 2002; Shindo 1997) or are tied to a specific location with limited regional context (Low 1984). For example, DeAngelis and DeAngelis inform their young readers that the Dust Bowl included “drought-stricken Texas, Kansas, Oklahoma, and neighboring states” (2002, 18).

In academic literature that does offer a regional definition, the most common representations are wholly or largely derived from wind erosion maps found in the National Archives that were the basis for Worster’s (1982) seminal map. These readily apparent common regional boundaries refute Bonnifield’s claim. In fairness to Bonnifield, this predominant Dust Bowl region became more evident in the years that followed his pronouncement. Nonetheless, a review of Dust Bowl literature reveals that other representations of the region have been utilized as well. The patterns that can be witnessed in the range of regional depictions are addressed in this chapter through the collection, digitization, and analysis of maps depicting the Dust Bowl that have been published to date.

The Challenge of Defining the Dust Bowl Region

The difficulty of locating the Dust Bowl precisely on a map has been acknowledged explicitly by too few Dust Bowl authors (Bonnifield 1979; Cooper 2004; Hansen and Libecap 2004; Worster 1982). Worster (1982, 29) relates the transient and convoluted nature of the Dust Bowl region through statistics and

anecdotes alike, before concluding that “wherever there were dust storms and soil erosion there was a Dust Bowl, and by that test most of the Great Plains was ‘in it’ during a part of the 1930’s.” These tangible elements of soil erosion and dust storms can be joined by others such as migration and agricultural productivity to represent mappable elements of the event. Therefore, the Dust Bowl is like other geographic regions, a complicated and fluid real world space that must be analyzed and simplified to be delineated.

Perhaps this explains the relative dearth of mapped regional definitions in relevant literature. Most resources on the topic mention only specific locales or, as is the case most often, sketch a generalized description of the region. Even when more explicit descriptions are presented, it is difficult to delineate a Dust Bowl region without the aid of a map. For example, where does “southwest Kansas” end and “central Kansas” begin? For this reason, the evaluation of regional definitions to date is focused upon sources that include a map of the Dust Bowl.

In cases where the source does provide a map, challenges to interpreting depictions of the Dust Bowl region remain. The development of formal regions requires a rational assessment of what variables are best suited to the objective. In the case of defining the Dust Bowl region, the soil erosion maps in the National Archives have been disproportionately influential in shaping regional identity in relevant literature. However, while soil erosion is well-suited as a variable for delineating a formal Dust Bowl region, not all soil erosion maps tell the same story. For example, Hansen and Libecap (2004)

include a Soil Conservation Service map of 1934 erosion adapted from the “General Distribution of Erosion” that portrays widespread moderate to severe erosion stretching from the North Dakota-Canadian border in the north to the Midland-Odessa area in the south. The east-west extent is also impressive as areas from the Wisconsin-Minnesota border in the east to the Arizona-New Mexico border in the west are included in the most eroded lands category.

Have other variables been included in the formulation of varying Dust Bowl regions? Unfortunately, this question cannot be answered conclusively following a careful analysis of published Dust Bowl maps. Variation is evident, but explanation for regional boundaries is conspicuously absent in nearly every case. Notable exceptions include the seminal works of Bonnifield (1979), Hurt (1981), and Worster (1982) as well as the more recent work of Cunfer (2005). For example, Bonnifield informed the reader of the variables responsible for his concept of the Dust Bowl heartland: “In terms of wind erosion, national publicity, federal relief, and common history, the heartland of the Dust Bowl consisted of...” (1979, 15).

Cunfer’s (2005) unparalleled geographic analysis of the Dust Bowl utilized geographic information systems to evaluate the role of key variables that affected 280 counties in the greater Dust Bowl region. Soil type, percent cropland, percent difference from average rainfall, five-year average rainfall, average March temperatures by year, and difference from average temperature by year are causal factors studied and mapped by Cunfer. Considered alone, all of these variables portray slightly different Dust Bowl regions.

In the balance of works, rationalization for map boundaries is lacking and it is common practice for there to be no reference to source material or variables considered for developing the map (Babb, Babb, and Wixon 2007; Carlile 1999; Connell 2004; Cooper 2004; Egan 2006; King 1997; Lauber 1958; Lookingbill 2001; Meltzer 2000). For example, Shindo's (1997) fascinating examination of the ways Dust Bowl migrants have been portrayed by American popular culture provides a woefully inadequate spatial context for the source area of the migrants. Instead of a map, the text merely describes the source area as "from the Southwestern United States - especially the states of Oklahoma, Arkansas, Missouri, and Texas" (Shindo 1997, 1).

Formal, Functional, or Vernacular Dust Bowl?

Challenges associated with defining the region may also reside in the idea that the Dust Bowl can be considered a formal, vernacular, or even functional region. This ambiguity echoes the common conceptual ground of region, era, and event that the Dust Bowl occupies. The seminal regional maps (Cunfer 2005; Hurt 1981; Worster 1982) view the Dust Bowl as a formal region, defined largely on the basis of wind erosion. Additional constructions of the region along formal lines can be attempted using physical attributes such as drought, wind, and soil type (Bonnifield 1979; Hurt 1981), and/or human/cultural variables such as migration, health (e.g. dust pneumonia), religion (Lookingbill 1994), and economic (Riney-Kehrberg 1994).

Functional definitions of the region are less likely, but can be applied as well. For example, soil conservation districts created in 1936-37 delineate a functional Dust Bowl region (Hurt 1985; Worster 1982). However, this research seeks to shed light on what can best be considered the vernacular Dust Bowl region, particularly from the perspective of contemporary inhabitants of the historic Dust Bowl region as defined by Worster (1982). It should be noted, however, that the vernacular Dust Bowl region may well consist of more tangible and subsequently mappable formal and functional attributes than one might find in a *Bible Belt*, *Green Country*, *Midwest*, or other vernacular region.

As stated in Chapter Two, Jordan (1978) provides the only research on vernacular regions that has included the Dust Bowl. In his work on the perceptual regions of Texas, Jordan categorized “Dust Bowl” as an environmental response along with “Tornado Alley” and obviously facetious terms such as “Barren Wasteland.” All of the aforementioned terms were classified as derogatory by Jordan (1978). This researcher’s experience in the region suggests that the Dust Bowl event cannot be solely ascribed as an environmental region and is not necessarily a derogatory term.

Previously-defined Dust Bowl Regions

Fifty sources including academic texts, juvenile texts, Internet sites, and literature with a Dust Bowl focus were reviewed for their portrayal of the Dust Bowl region. Twenty-nine of these sources included some form of map

portraying the boundaries of the Dust Bowl. These maps varied widely in terms of thematic content, explicit purpose, Dust Bowl terminology, sources cited, projection employed, image resolution, and cartographic merit.

Two examples of this diversity include Mantin (1997) and Connell (2004), displayed in Figure 14. In this case, different map projections and perspectives complicate direct comparison of areas included in the Dust Bowl region. Another common problem relates to terminology employed by the respective authors. Mantin's map refers to three distinct Dust Bowl zones: heart of the Dust Bowl, other areas severely affected by dust storms, and areas of wind-blown dirt. The author's last category, shown as a wedge-shaped zone of wind-blown dust emanating from the "heart of the Dust Bowl," is peculiar and not readily comparable to other Dust Bowl maps.

The second map portrays an exceptionally large "Dust Bowl area" covering much of the Great Plains and central Rockies, for that matter. An inner zone is defined as the area with severest damage. In this case, it would seem most appropriate to group the inner zones and the outer zones of the maps for comparative purposes. Problems arise when more maps are incorporated into the comparative analysis that utilize one zone or three or more zones. For this reason this examination of previously-defined Dust Bowl regions utilizes only the outermost region for analytical purposes.

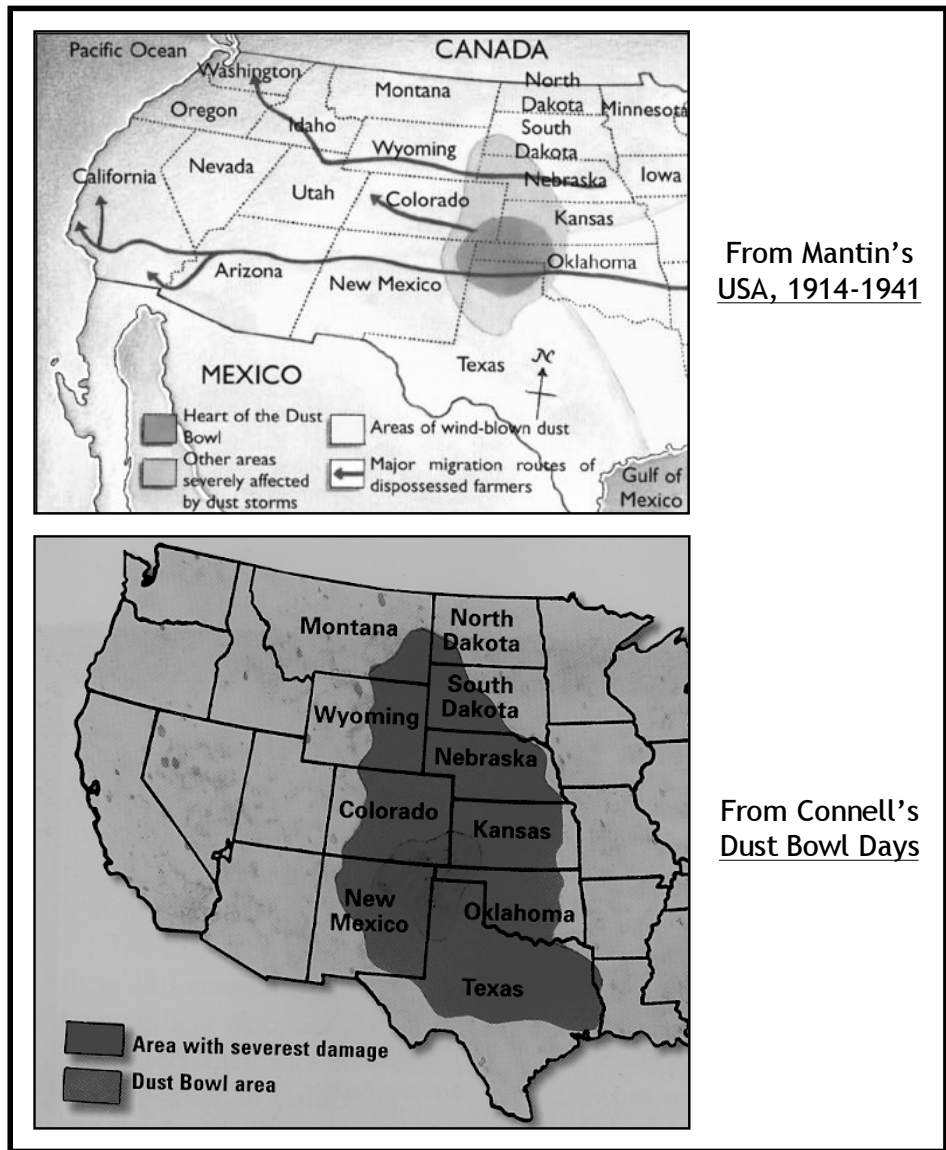


Figure 14. Comparative Dust Bowl Regional Depictions

Figure 15 illustrates a compilation of forty-seven Dust Bowl-related regions that were culled from twenty-eight sources that are listed in Appendix D. This was accomplished by scanning the maps into a digital format. These scanned images were then displayed in ArcView GIS 9.2 and georeferenced to a US map in the Albers Equal Area projection. Each previously-defined region was then on-screen digitized (a tracing procedure that creates new digital

features in the GIS that can be further analyzed). This figure illustrates some clear commonalities between the maps. The most readily apparent is the high number of polygons that exhibit nearly exact boundaries in the vicinity of the Texas and Oklahoma panhandles, southeastern Colorado, and western Kansas. These regions are those that have been based on the National Archives/Worster maps of the Dust Bowl. Beyond this grouping of polygons, another similarity can be noted. The western sides of the polygons display more correspondence than the eastern sides. The mean region size is 547,544 km² with the largest region provided by Katzin's (2002) *area damaged by dust storms* at 1,882,231 km². For comparison the area of the state of Oklahoma is 181,035 km².

This is not the first research endeavor to layer different definitions of the Dust Bowl region for comparative purposes. Heathcote (1980) illustrated five overlapping Dust Bowl regions in his work on the perceptions of desertification. Unfortunately, Heathcote does not afford the reader a key to the five regions presented. Two of the regions can be tied to previous sources (Floyd 1950; Joel 1937) by their unique boundaries, one represents the entirety of the Great Plains, and the remaining two could not be identified.

**Digitized Previously-defined Dust Bowl Regions
47 regions, 28 sources**

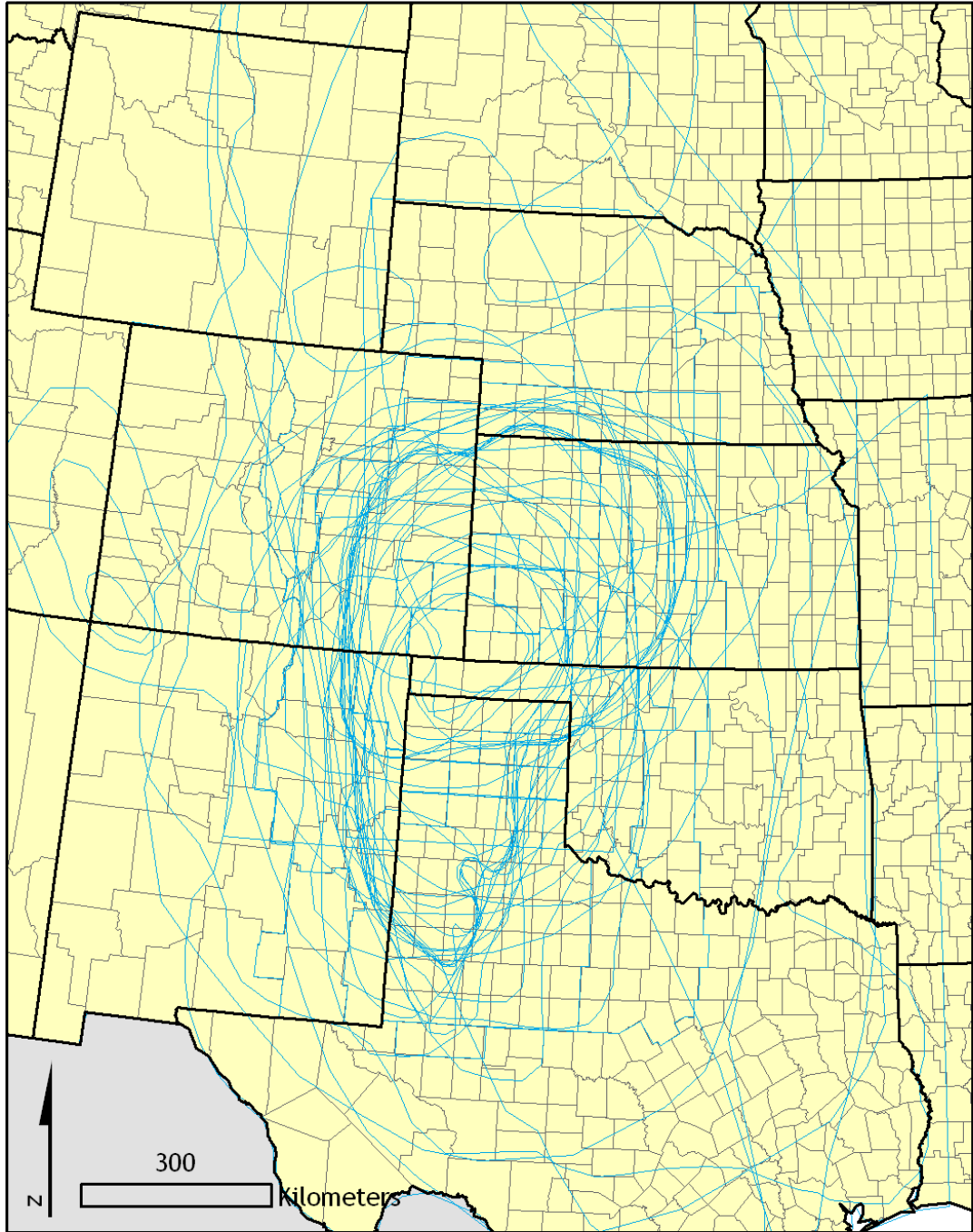


Figure 15. Previously-defined Dust Bowl Regions

Characterizing the Previously-defined Dust Bowl Regions

McDean (1986) has documented that writers have placed the Dust Bowl in general agreement with the Great Plains, in states outside the Plains, or anywhere dust blew in the 1930's. This last association occurs when writers correlate all 1930's drought with the Dust Bowl. McDean claims that a major problem in locating the Dust Bowl has been this tendency of historians to fail to distinguish the Dust Bowl from other areas of drought (1986). This may well explain some of the larger Dust Bowl regions portrayed in figure 15. These larger regions can also be explained by associating the Dust Bowl region with larger physiographic features such as the Great Plains or High Plains. Although he does not provide a map, Svobida (1986, 35) describes the Dust Bowl as "coextensive with the region known as the Great Plains." Heinrichs' label placement of the Great Plains combined with the Dust Bowl regional boundary implies that the entire Great Plains was synonymous with the Dust Bowl (2005). A similar situation in regard to the High Plains can be found on at least two maps (Babb, Babb, and Wixon 2007; Cooper 2004).

In some cases, particular locations disproportionately influence the portrayal of the Dust Bowl region. For example, many people associate Oklahoma with the Dust Bowl because of Steinbeck's famous novel, The Grapes of Wrath (McDean 1986). In that novel, the Joad family hails from Salisaw, Oklahoma and travels west along Route 66 to California. Right or wrong, these two features, a city and a road, permanently entered the Dust Bowl regional lexicon as a result of the success of the novel. Other novels have focused on

Dust Bowl locations such as Cimarron County, Oklahoma (Babb 2004; Carlile 1999; Hesse 1999; Raven and Essley 1997) and the community of Jetmore in Hodgeman County, Kansas (Carlile 1999). Maps included in these texts focus on more local contexts. For example, Carlile's novel maps the greater Dust Bowl region but then includes a second map that highlights the communities of southwest Kansas. Text from the novel further delineates this perspective on the region: "From (Jetmore) east the dust had been bad, but not like it was west into Colorado. Seems like (Jetmore) was sitting on a line where it blew the worst and where it started easing up" (Carlile 1999, 133). A final literary reference places the Dust Bowl outside its traditional area. Slade's (2003) novel occurs in Horshoe, Saskatchewan, a fictional Dust Bowl farm town.

Another category of Dust Bowl regional concepts comes from the collection of memoirs that have been published. Focal points for these sources include southeastern North Dakota (Low 1984), Meade County, Kansas (Svobida 1986), Eva, Oklahoma (Henderson 2001), Okemah, Oklahoma (Rutland 1995), and Dumas, Texas (Davidson 1998). These sources provide a variety of textual and graphic descriptions of the Dust Bowl region. Despite living in widely distributed locales, the respective authors' unanimously recollect being "in" the Dust Bowl region at the time of the event.

The most dominant representation of the Dust Bowl region is based on the maps published by Worster (1982) derived from materials in the National Archives such as Soil Conservation Service wind erosion maps and reports from Associate Press reporter Robert Geiger (Fig. 2). This is the most persistent

portrayal of the Dust Bowl region as evidenced by its replication in numerous texts. Exact, or nearly exact replications (due to differing map projections) of these maps can be seen in the works of Bonnifield (1979), Cunfer (2005), Egan (2006), Henderson (2001), and Hurt (1981). Meltzer (2000) provides a map that is very similar, but expanded further east into Kansas and north into Nebraska.

Associations with political boundaries for Dust Bowl study areas have been provided by at least two authors (Henderson 2001; Riney-Kehrberg 1994). For example, Riney-Kehrberg states, “I chose these counties because they form a contiguous area of very severe drought and dust activity in the southwestern corner of Kansas. These people were quite literally in the heart of the Dust Bowl” (Riney-Kehrberg 1994, 197). She backs this assessment by citing details of a Works Progress Administration research bulletin. Perhaps the most peculiar regions are those that have a symmetrical presentation. These include circles (Meltzer 2000; Wunder, Kaye, and Carstensen 1999) and an ellipse (Cooper 2004).

As stated above, the majority of Dust Bowl region maps do not provide the rationale for their respective portrayals. Even many of the replica maps of the wind erosion do not cite their sources or basis for constructing their maps. A number of Dust Bowl texts provide maps that diverge from the National Archives/Worster template but still offer no explanation for the region that is portrayed. Some seem to be plausible delineations that can even be applauded as is the case of Carlile’s (1999) use of a faded border to indicate decreasing severity. Yet others have some inappropriate inclusions, such as significant

portions of the Rocky Mountains (Connell 2004; Katzin 2002; King 1997; Lauber 1958; Lookingbill 2001) or Midwestern states such as Iowa (Heinrichs 2005; Katzin 2002; King 1997).

Two final portrayals of the Dust Bowl region worth noting include the *Map of the Nation's Business* as published by the US Chamber of Commerce and reproduced by Riney-Kehrberg (1994). This map, produced in March 1935, classified the forty-eight contiguous states into areas of good, fair, and quiet business conditions. While the vast majority of the country is exhibiting fair or good conditions, the map portrays an area that mirrors many of the Dust Bowl representations. The “quiet” conditions of the Dust Bowl region represent the dominant feature of the map. Finally, Geoff Cunfer’s (2005) series of singly-mapped, physical causal factors that are included in his ground-breaking text applying GIS to the Dust Bowl event merit special attention. More so than any work on the Dust Bowl, Cunfer demonstrates how a myriad of factors go into understanding and defining a region as unique.

Many of the previously-defined Dust Bowl regions contain multiple delineations of the region in an attempt to address either annual variations or overall severity of the event. The National Archives/Worster maps do both by providing yearly accounts of where the worst erosion was taking place in 1935-36, 1938, and 1940 and also noting a core area within a larger affected area. The map labels this core area as worst erosion, 1935-38. In his text Worster refines this bulls-eye further by reporting “SCS officials, surveying the entire plains, placed their Dust Bowl perimeters around the most persistent problem

area, and there was no doubt which counties were at the heart of this Bowl: Morton in Kansas, Baca in Colorado, Texas and Cimarron in Oklahoma, Dallam in Texas, and Union in New Mexico” (Worster 1982, 29).

Other authors use a variety of terminology to distinguish their wider and core areas such as Great Plains/Dust Bowl (Cooper 2004; Henderson 2001), Dust Bowl area/area with severest damage (Connell 2004), areas of wind blown dust/other areas severely affected by dust storms/heart of the Dust Bowl (Mantin 1997), Dust Bowl/heartland of the Dust Bowl (Bonnifield 1979), additional wind erosion/wind erosion by year (World Maps Online 2007), other areas damaged/most severe damage (Heinrichs 2005), larger areas affected by dust storms/Dust Bowl (King 1997), light dust/moderate dust/severe dust (Lauber 1958), states affected/core area (Lookingbill 2001), and Dust Bowl region/worst hit-area (Meltzer 2000).

While there is little terminology agreement for the Dust Bowl region(s), authors on the topic have also named a number of localities as the focal point of the Dust Bowl event. For example, Durbin refers to Cimarron county, Oklahoma as the “epicenter of the Dust Bowl” (2002, 153) while Raven and Essley name Guymon, Oklahoma, as “the heart of the dust storms” (1997). In one of the earlier accounts of the Dust Bowl, Johnson (1947, 249) claims Morton County, Kansas was the “very center of the worst part of the Dust Bowl.”

Previously-defined Dust Bowl Regions by Type

The collection of previously-defined Dust Bowl regions includes four maps from the Internet (Mantin 1997; Public Broadcasting Service 1998; United States Department of Agriculture Wind Erosion Research Unit 1999; World Maps Online 2007), two from literature (Carlile 1999; Henderson 2001), one from an historic Chamber of Commerce publication (Riney-Kehrberg 1994), twelve from academic texts (Babb, Babb, and Wixon 2007; Bonnifield 1979; Cunfer 2005; Egan 2006; Floyd 1950; Hurt 1981, 1985; Joel 1937; Lookingbill 2001; Riney-Kehrberg 1994; Worster 1982; Wunder, Kaye, and Carstensen 1999), and nine from juvenile texts (Connell 2004; Cooper 2004; Farris 1989; Heinrichs 2005; Katzin 2002; King 1997; Lauber 1958; Meltzer 2000; Stanley 1992). Figure 16 illustrates the categorical assignment of previously-defined regions.

This collection of Dust Bowl maps is not exhaustive, but it does present the majority of maps that are readily available. Furthermore, if an interested person were to seek out a map of the Dust Bowl region at the library or on the Internet, they would most likely find one of the maps that have been included in this sample of previously-defined Dust Bowl regions.

Figure 16 illustrates general variation between the source groups. In this figure, only the largest or most inclusive region for each source was included. The academic maps exhibit the most correspondence and are generally the smallest Dust Bowl regions. The juvenile texts have been separated from the remaining literary sources and Internet maps because they are generally less similar and often much larger.

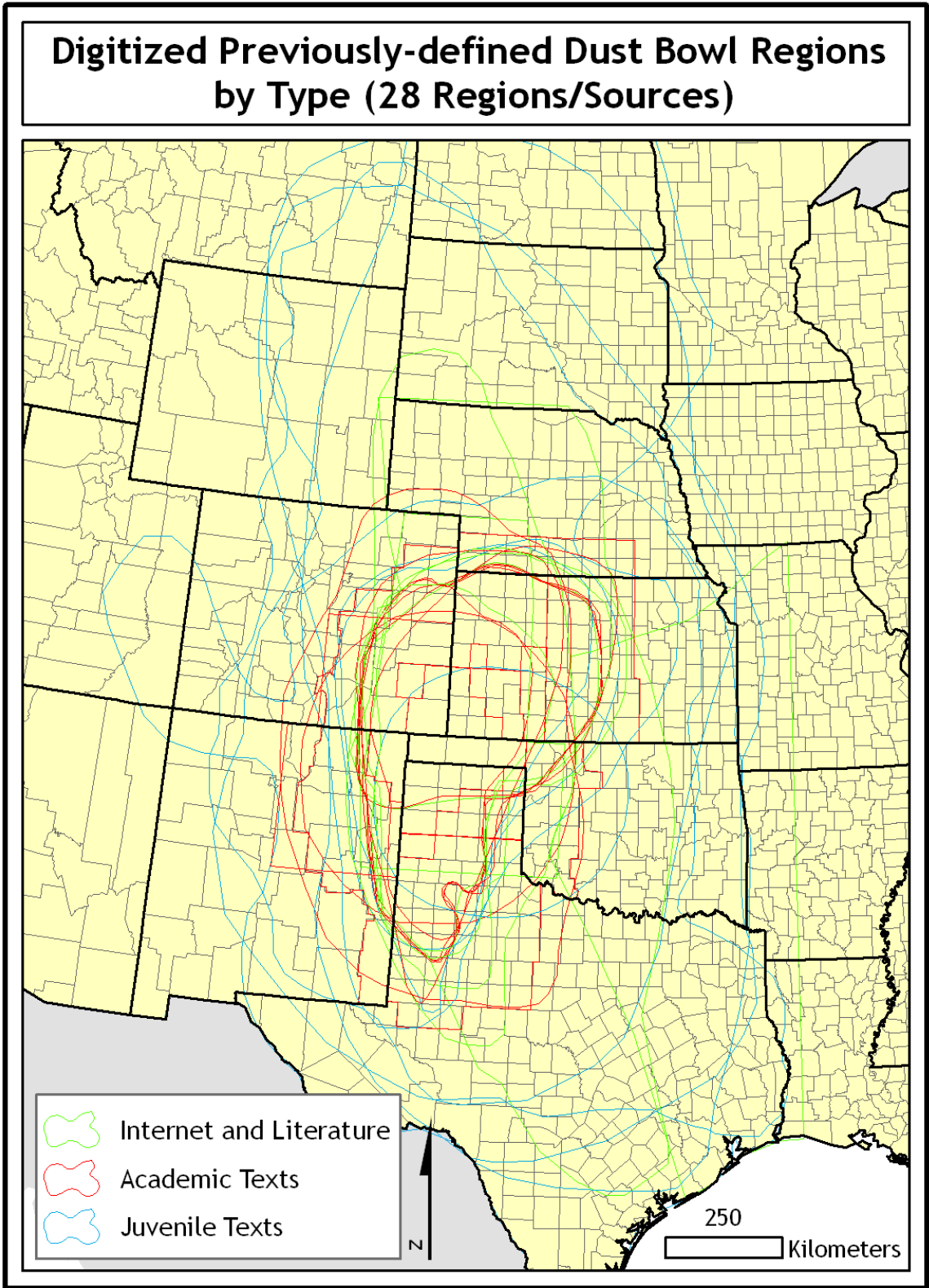


Figure 16. Previously-defined Dust Bowl Regions by Type

Because only the largest region from each source is included on this map, the “heartlands” of the Dust Bowl that are drawn inside many of the larger juvenile text regions are not included. Nonetheless, writers of juvenile texts have been far less discerning in delineating their Dust Bowl boundaries. This may be attributable to the phenomena addressed by McDean (1986) whereby authors generalize any and all drought areas of the era with the Dust Bowl.

GIS Analysis of Previously-defined Dust Bowl Regions

Figure 17 portrays Dust Bowl states as derived from the previously-defined Dust Bowl regions. ArcGIS software was utilized to intersect a map of the contiguous United States with each previously-defined Dust Bowl region map. Only the outermost region from each source was utilized. A new map for each of the twenty-eight source maps was created that included all of the states that were partially or wholly included in the source maps. States were included in the new maps if any portion of a respective state fell inside the respective source map’s regional portrayal of the Dust Bowl. Therefore, a state that had only one county inside the source map’s Dust Bowl polygon would be included. This method was chosen so more nuanced regional maps would not be excluded in the final tabulations. For example, a source map polygon that included only the Oklahoma panhandle counties would be included with this methodology. If the analysis technique required the entire state, or

greater than 50% of a state to be included inside the polygon, Oklahoma would not be included in the aforementioned example. The frequency tool in ArcInfo was then utilized to provide a list of the unique occurrences and their frequency for the list of states.

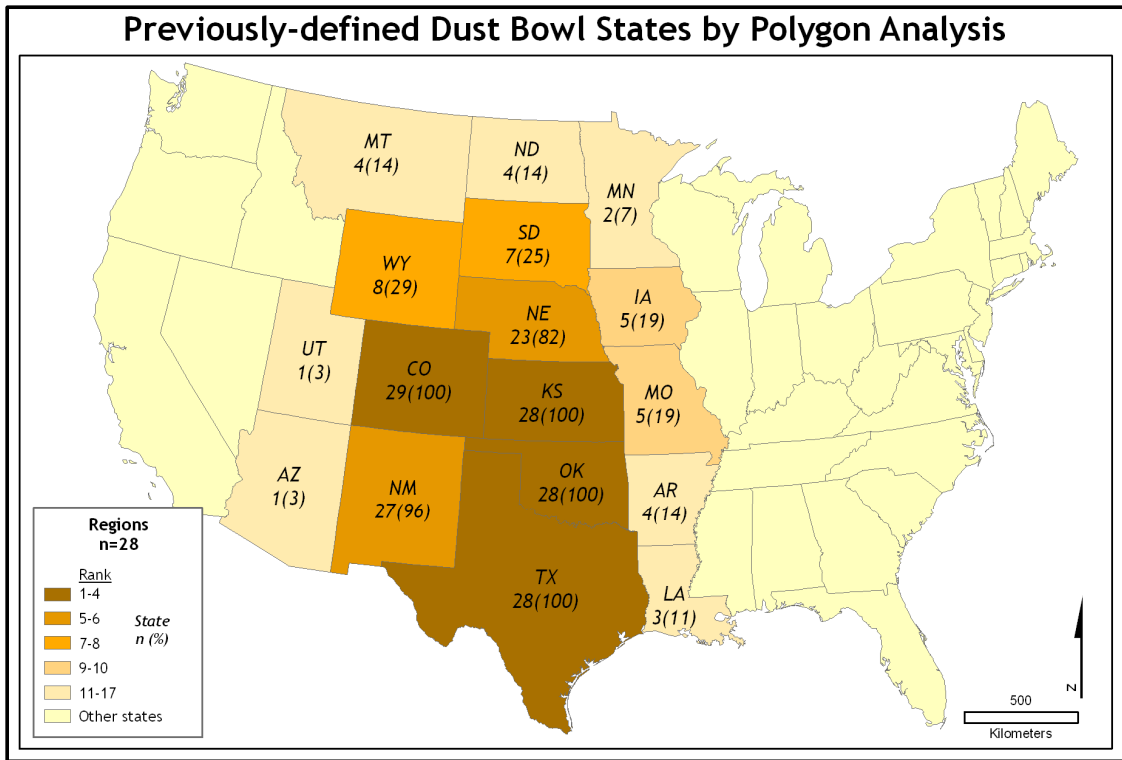


Figure 17. Previously-defined Dust Bowl States by Polygon Analysis

Figures 17 and 18 illustrate that within the sample of twenty-eight previously-defined Dust Bowl regional maps, the states of Colorado, Kansas, Oklahoma, and Texas are unanimously included. Part of New Mexico was included on twenty-seven of the twenty-eight maps. Nebraska is also included in the overwhelming majority of maps (82%). The bar chart (Fig. 18) of previously-defined Dust Bowl states by polygon analysis shows the precipitous decline from Nebraska to the next most popular states, Wyoming and South

Dakota. Portions of these two states were included in approximately one-quarter of the source maps. In all, seventeen states were at least partially included in a published or Internet portrayal of the Dust Bowl region. This included states west of the Rocky Mountains (Utah and Arizona) and the Bayou state of Louisiana.

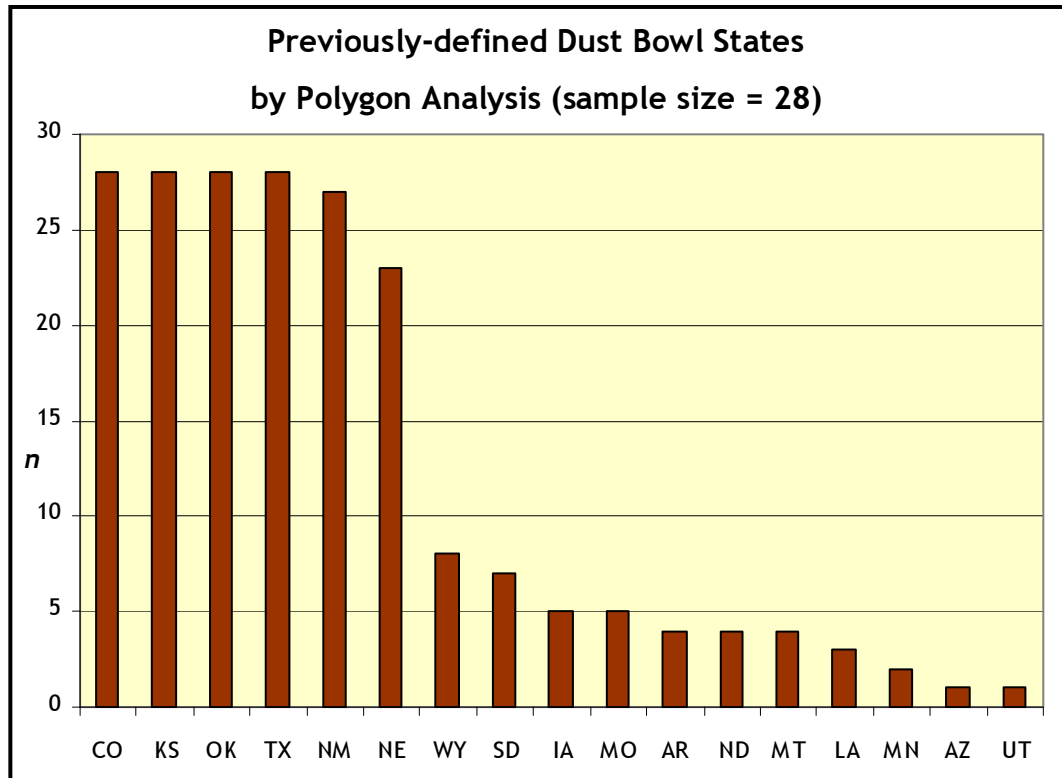


Figure 18. Previously-defined Dust Bowl States by Polygon Analysis

Performing a similar polygon analysis of the previously-defined regions at the county-level produces a series of more nuanced maps. The equal interval classification of counties that fall wholly or partially inside the twenty-eight previously-defined regions illustrates the strong influence of the National Archives/Worster map (Fig. 19). In comparison to the unioned National Archives/Worster dust region map (Fig. 6), the counties that were included in

greater than seventy-nine percent of responses exhibit a similar distribution. The unioned dust region map contains twenty-seven counties that were not included in the highest class of the equal interval map. These counties were concentrated in the far south and northwest of the region. All of the unioned dust region counties that were not in the highest class were, however, included in the next highest class (60-79%).

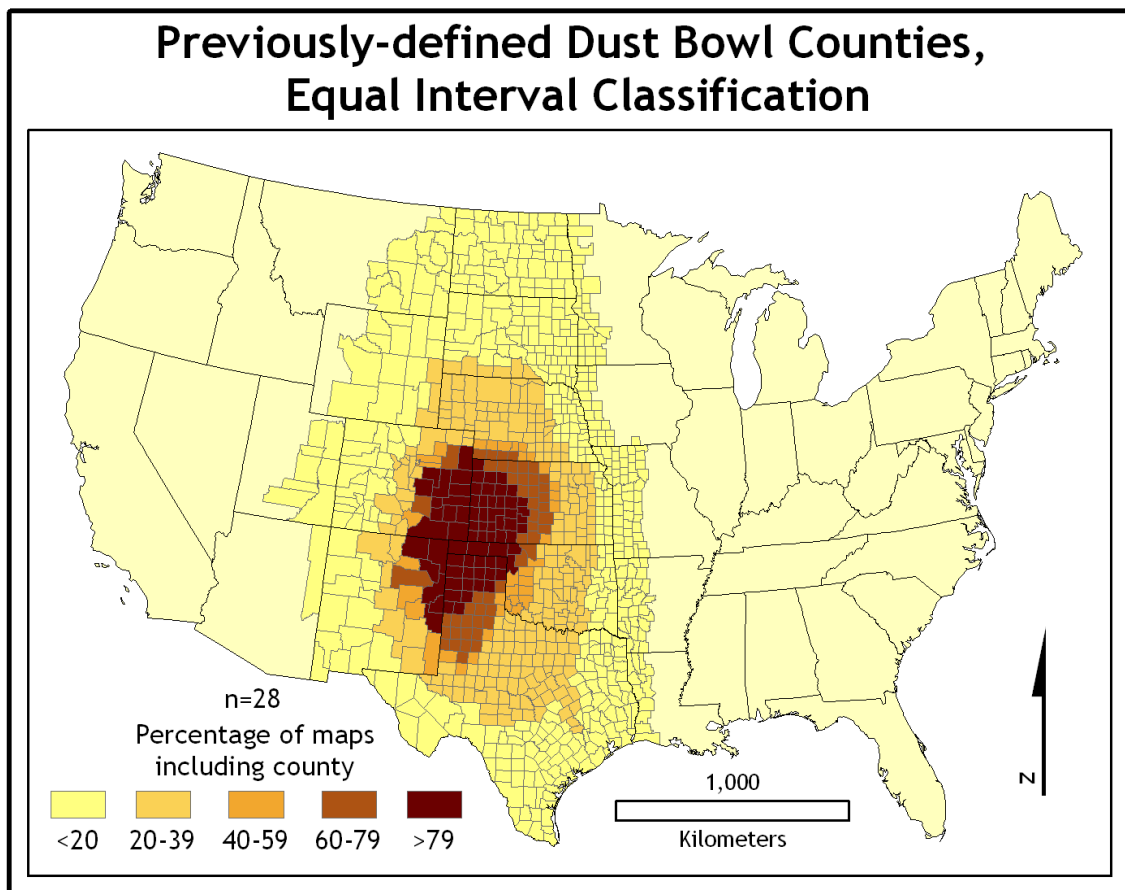


Figure 19. Previously-defined Dust Bowl Counties, Equal Interval Classification

Meanwhile seven counties were included in the highest class of equal interval classification that are *not* unioned dust region counties. These include El Paso, Elbert, and Yuma counties in Colorado and Colfax County in New

Mexico on the western edge of the region. On the southeastern perimeter of the region Gray, Hemphill, and Roberts counties in Texas were included on more than seventy-nine percent of the previously-defined maps, but are not included in the unioned National Archives/Worster map. Therefore, the consensus of previously-defined maps paints a picture of the Dust bowl region that is slightly more compact, shifted to the west, and with a more limited southern extent than the National Archives/Worster map.

The consensus region as portrayed by the county-level equal interval classification also shows that the western and northern gradients of the region are notably steeper than the southern and eastern sides. This indicates that there is more agreement among the maps regarding the placement of western and northern boundaries and more disparity regarding southern and eastern boundaries. Interestingly, the northern boundary correlates with the political boundary of the Nebraska/Kansas state line. On the other hand, the steeper western gradient can be associated with the Rocky Mountains.

The quintile classification of counties (Fig. 20) presents a similar overall pattern. The western edge of the region remains more pronounced than the east while the hard edge of the north is softened in comparison to the previous map. Nonetheless some relationship with political boundaries as Dust Bowl delineators is still suggested by the class breaks along both the northern and southern Nebraska boundaries. It is also noteworthy that several maps extend their Dust Bowl regions across the Rocky Mountains as well as all the way to the Gulf Coast.

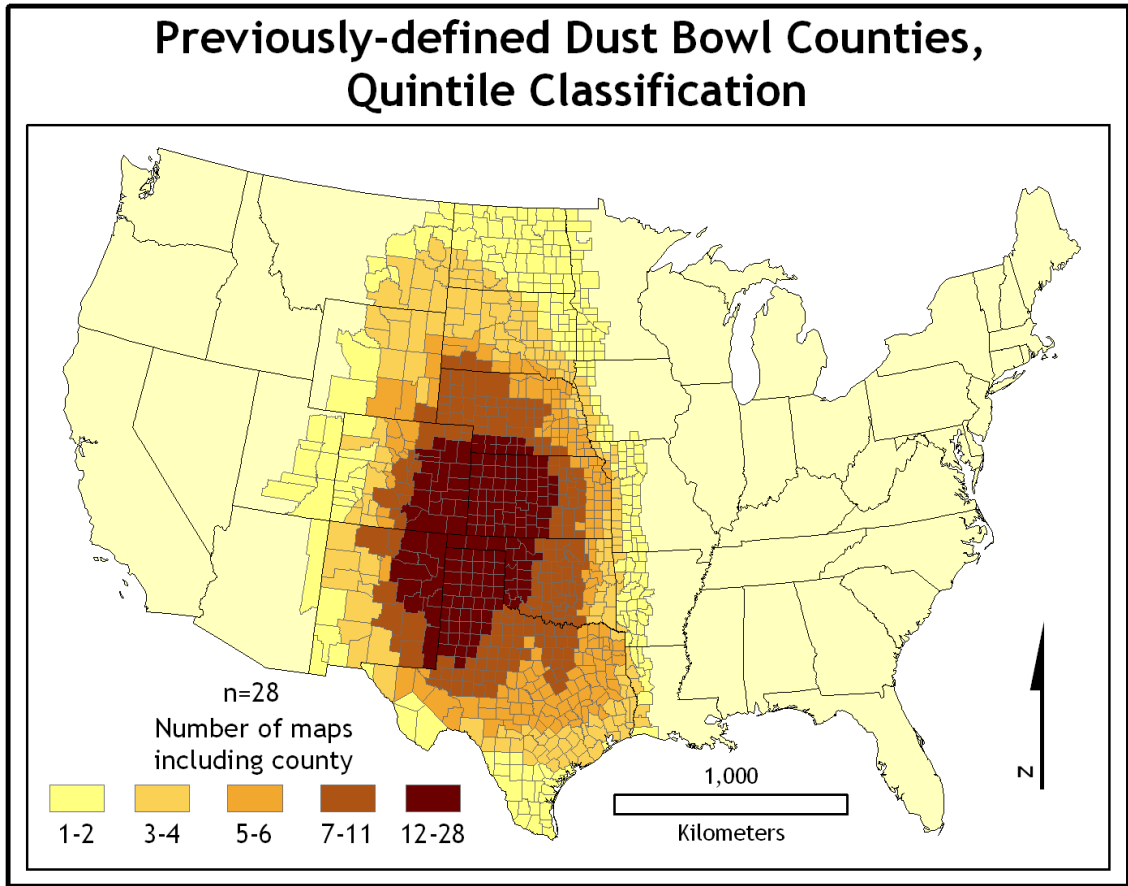


Figure 20. Previously-defined Dust Bowl Counties, Quintile Classification

When the frequency tables are examined for the preceding maps, the most-included counties in the region can be identified (Fig. 21). Parts or all of Meade County, Kansas and Beaver County, Oklahoma were included within all twenty-eight previously-defined Dust Bowl regions. Twenty-five counties in the states Colorado, Kansas, New Mexico, Oklahoma, and Texas were respectively included in twenty-seven of twenty-eight previously-defined regions.

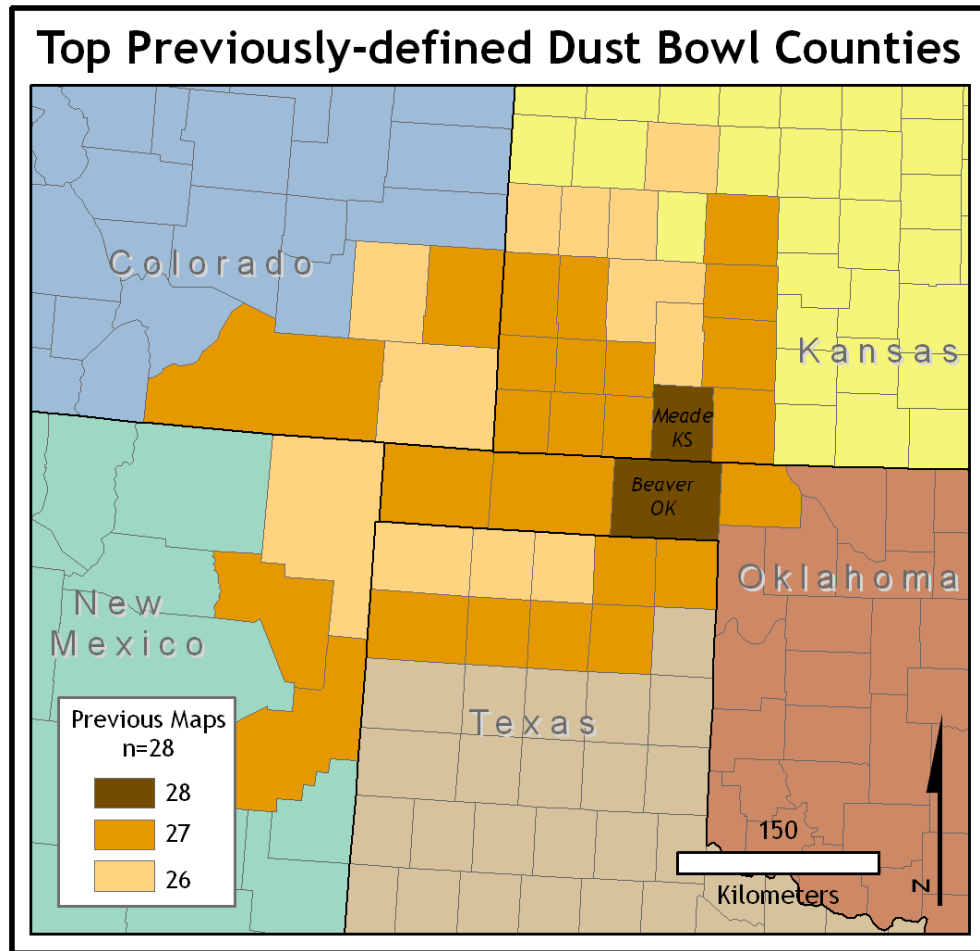


Figure 21. Top Previously-defined Dust Bowl Counties.

Centroids of previously-defined Dust Bowl regions can be calculated and displayed to illustrate the distribution of the respective regions on a point-basis (Fig. 22). A centroid is the geometric center of a feature (Wade and Sommer 2006) and is calculated in ArcGIS via the *feature to point* tool. Centroids of previously-defined regions are clustered in southwest Kansas and the panhandle of Oklahoma. Twenty-two of twenty-eight centroids are located within 150 kilometers of the centroid of the unioned National Archives/Worster dust regions.

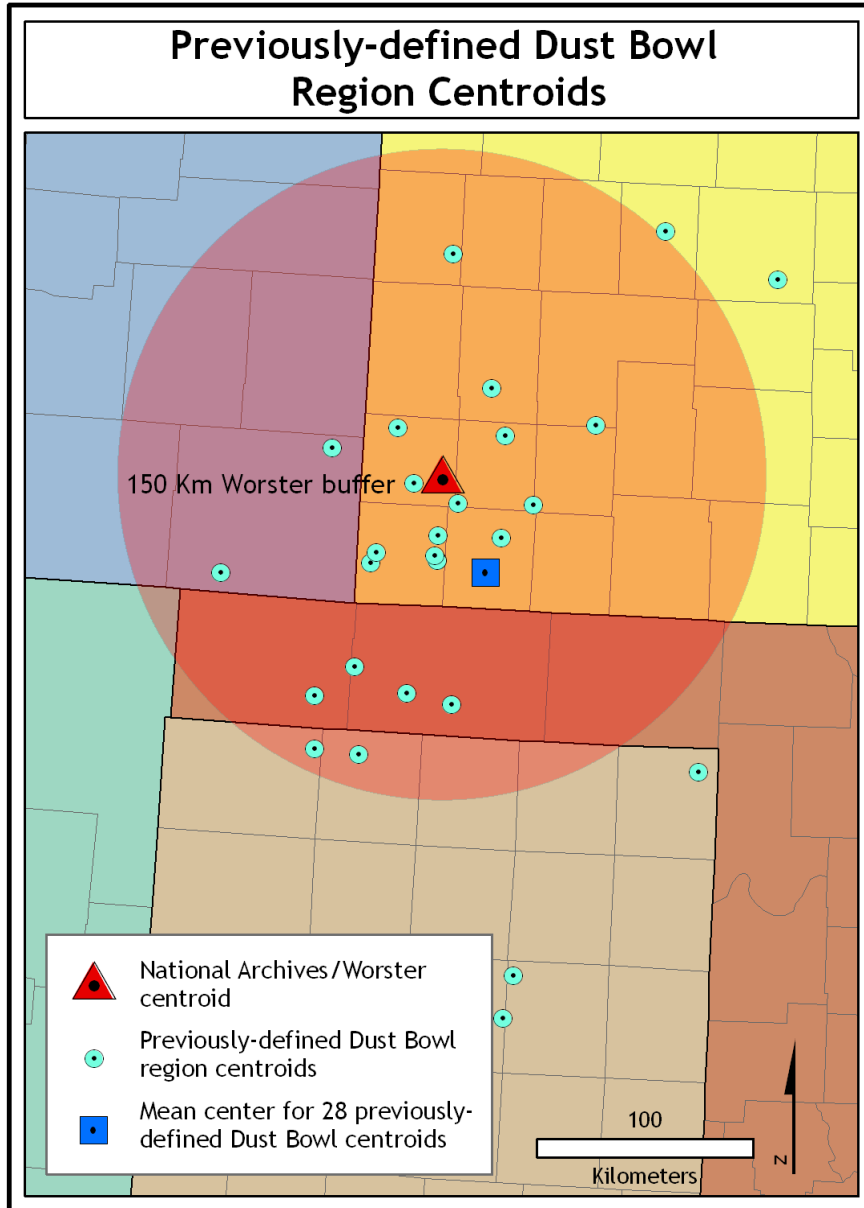


Figure 22. Previously-defined Dust Bowl Region Centroids

The mean center of the previously-defined regions can also be calculated (Fig. 22). The mean center is calculated by summing the x-coordinate values and dividing the total by the number of features, and then doing the same for the y-coordinate values (Fig. 23). The resulting x, y coordinate pair is the location of the mean center (Mitchell 2005).

$$\bar{X} = \frac{\sum_i X_i}{n} \quad \bar{Y} = \frac{\sum_i Y_i}{n}$$

Figure 23. Mean Center Calculation

The mean center of the twenty-eight centroids is located in Stevens County, Kansas approximately forty-five kilometers from the National Archives/Worster centroid. The mean center for the previously-defined region centroids would be even closer to the National Archives/Worster centroid if it had not been disproportionately influenced by a handful of southern and eastern outliers.

Discussion

The challenges of providing a spatial reference for the Dust Bowl event have been addressed in a variety of ways. While some authors provide concentric nuanced zones of severity, others have opted for symmetrical portrayals. Floyd's (1950, 11) dissertation, *A History of the Dust Bowl*, provided no map of the region and relied on Alfred Sears' definition to provide a symmetrical concept of "forty counties within a radius of 160 miles of Guymon, Oklahoma" for the region.

A problem inherent to many of the portrayals is a lack of communication by authors in regard to the difficulties of spatially portraying the Dust Bowl. Additionally, there is generally very little explanation as to the variables considered for constructing their respective maps. For these reasons it is

difficult to complete comparative and summary geostatistical analysis on the previously-defined maps because they are largely “apples and oranges” in terms of purpose, title, audience, and cartographic representation. Therefore, when it comes to previously-defined Dust Bowl regions, it is likely best to emphasize qualitative analysis and interpret the maps on a case-by-case basis.

For example, researchers have identified a dust storm deposit in the Greenland Ice Sheet Project Two ice core that most likely originated from the Great Plains region of the United States during the 1930's. These results indicate that the central US can be a significant source of dust to the Greenland ice sheet (Donarummo, Ram, and Stoermer 2003). By this measure, one could conceivably craft a Dust Bowl region based on areas affected by central US aeolian materials that includes Greenland, thus illustrating the ambiguity that can be applied to crafting a Dust bowl regional definition.

The previously defined maps, particularly in regard to the National Archives/Worster map, are compared with aggregate respondent maps to some extent in the following chapter. Respondent-defined Dust Bowl regions are more readily subjected to geospatial analysis. Their common base map and drafting methodology assists in this regard. Additionally, the spontaneous circumstance of questionnaire administration steers respondents to quickly construct and portray their holistic concept of the Dust Bowl region on the questionnaire. While there is no way of knowing and/or measuring the range of variables used by respondents to create their mental concept of the region,

the common methodology provides a set of comparable maps more suitable to geospatial analysis.

V. THE DUST BOWL REGION BY ITS INHABITANTS

This portion of the research documents and discusses the Dust Bowl region as defined by questionnaire respondents. It examines how location and demographic variables influence respondents' placement of the Dust Bowl region. Responses to the regional question are analyzed and mapped via the application of geostatistical techniques.

Methodology

Regional information was collected on the questionnaire in two ways: by question and by hand-drawn maps. Questionnaire item A-2 asked respondents "What single state do you most strongly associate with the Dust Bowl?" and was followed by item A-3 asking "What other state(s) do you associate with the Dust Bowl?" Item C-1, "In your words, what was the Dust Bowl?" was also analyzed for general or explicit regional references. Responses to these questions were tabulated and entered into the project database where they could be compared to respondents' demographic and locational characteristics.

Item A-1 asked respondents to "Draw a closed line around the Dust Bowl region on the map below." The map was 7" x 10" and displayed the contiguous United States at a scale of 1:20,000,000. All states were labeled and major

rivers were shown, but not labeled. The North American Albers Equal Area Conic projection was utilized with the central meridian located at 96° west longitude and standard parallels at 20° and 60° north latitude. This projection utilizes the North American Datum of 1983 (NAD 1983).

Maps were completed by 355 of 372 respondents. The remaining seventeen respondents were not familiar with the Dust Bowl and subsequently could not portray it on a map. Respondent maps were scanned at a resolution of 200 dots per inch to create a digital image that could be utilized with ArcMap GIS software. Scanned images were subsequently georeferenced, a process completed in ArcMap that aligned these images to a known geographic coordinate system (NAD 1983) to facilitate viewing and analysis (Wade and Sommer 2006). Following georeferencing, respondent polygons were on-screen digitized. In this process, respondents' polygons were displayed on a computer monitor and traced by mouse to create a digital version of the polygon to be used for subsequent geospatial analysis and display. Figure 24 illustrates the central US along with the digitized polygons.

Digitized Respondent-defined Dust Bowl Regions (n=355)

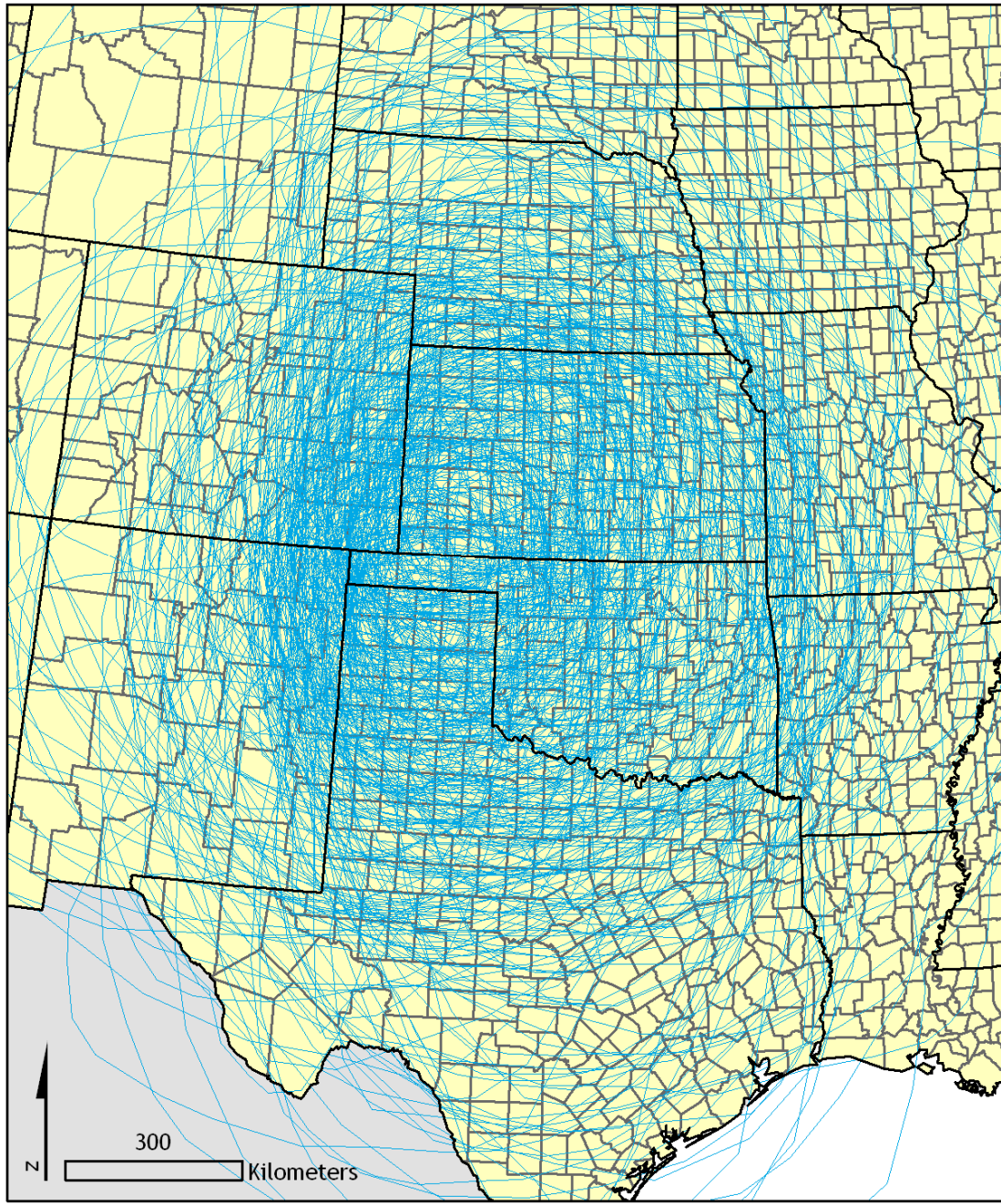


Figure 24. Digitized Respondent-defined Dust Bowl Regions

Dust Bowl States

Naming the Dust Bowl States

The maps illustrating respondent-defined Dust Bowl states, by state by question (Fig. 25), suggest that Oklahoma may have a more prominent position in the minds of people of the region. This supports the author's presupposition that questionnaire respondents would disproportionately associate Oklahoma with the Dust Bowl in comparison to other core Dust Bowl states. This map series displays the rank of states and percentage of respondents for each state that named the respective Dust Bowl states on questions A-2 and A-3 of the questionnaire. The series is broken into a map for each state in which questionnaires were administered.

Regional bias is evident in this series. For example, the non-study area state of Nebraska was named as a Dust Bowl state by thirty-six percent of respondents from Kansas versus six percent from Texas. Within the study area, one hundred percent of respondents from Colorado named their home state as a Dust Bowl state while only fifteen percent of Texans described Colorado with that term. Conversely, nineteen percent of Coloradoans ascribed the label to Texas compared to ninety-four percent of Texans deeming their home state a Dust Bowl state.

Oklahoma is not immune to the regional bias with all twenty respondents naming Oklahoma a Dust Bowl state. Interestingly, Oklahoma's popularity in

this category extends to respondents from all of the states. Oklahoma is ranked first or second for each state group. Its lowest percentage (64%) comes from the Colorado respondents, but still ranks second among states for that sub-sample. Excluding New Mexico, where Oklahoma ranks first, the dominant pattern is for a respondent's home state to be ranked first and Oklahoma to be ranked second.

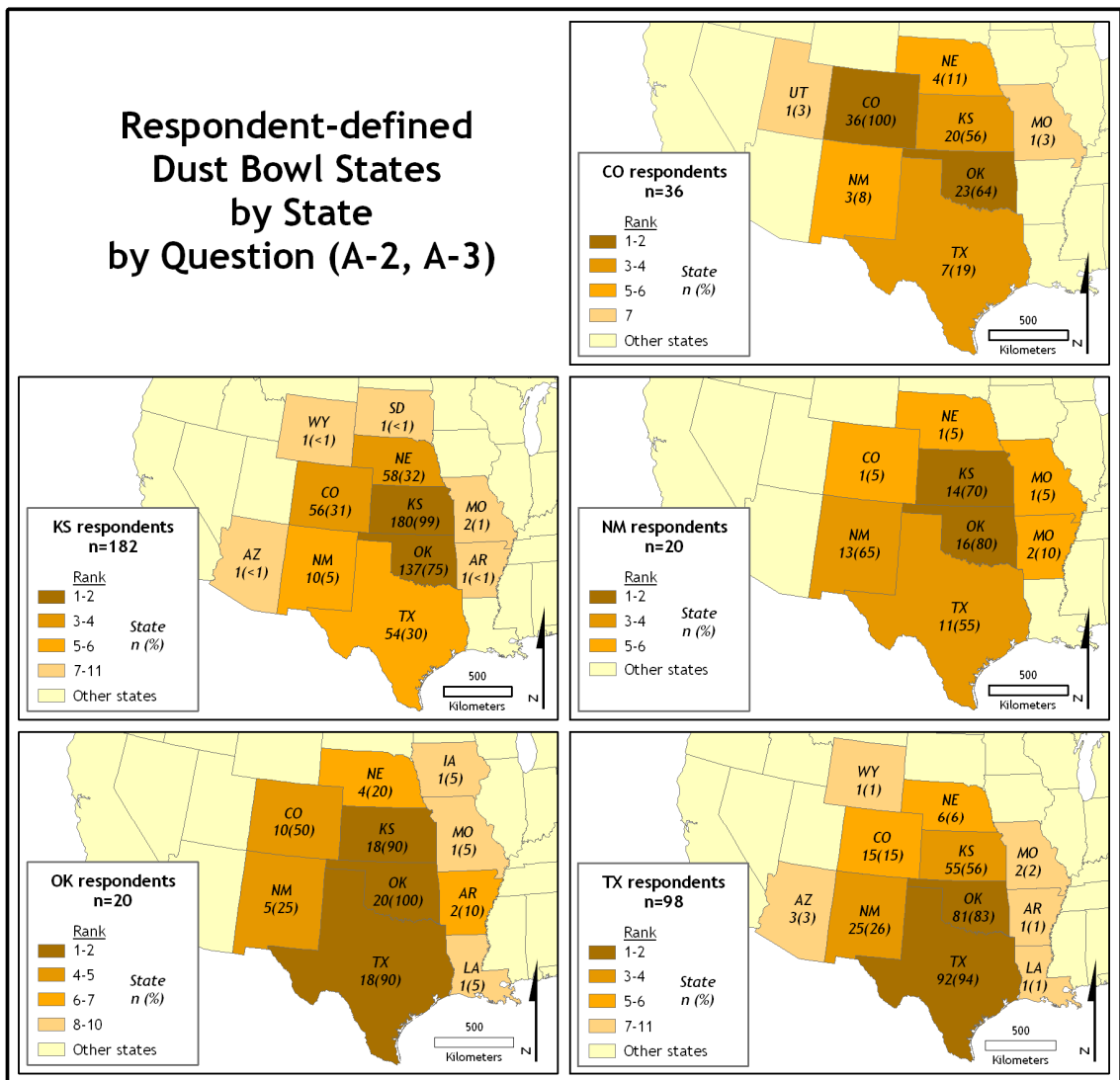


Figure 25. Respondent-defined Dust Bowl States by State by Question

Dust Bowl States by GIS Analysis

The next series of maps (Fig. 26) portrays the Dust Bowl states as derived from the regional maps that respondents created for item A-1. ArcGIS software was utilized to intersect a map of the contiguous US with each respondent's Dust Bowl map. This provided a new map for each of the 355 respondent maps consisting of states that were partially or wholly included in the respondent-defined maps. Therefore, a state that had only one county inside the respondent's polygon would be included. Again, this method was chosen so more nuanced regional maps would not be excluded in the final tabulations. The frequency tool in ArcInfo was then utilized to provide a list of the unique state occurrences and their frequency by various groups (e.g. by state respondent group).

This data portrays the spatial disconnect between respondents' lists of Dust Bowl states by question and by drawing the Dust Bowl region. Hand-drawn Dust Bowl regions (item A-1) often include many more states than were included in question responses (items A-2 and A-3). Kansas and Oklahoma remain the dominant Dust Bowl states. New Mexico, while mentioned much less by respondents on the questions, garners much more attention on these maps.

Regional bias is still evident, but is muted by the inclusion of more states in each respondent's Dust Bowl region. For comparative purposes with the previous map series, Nebraska is included in sixty-nine percent of Kansans' Dust Bowl maps versus thirty percent of Texans' maps. While Colorado remains

a unanimous choice for Coloradans, the percentage of Texans including Colorado in the Dust Bowl rises to seventy-four percent. Conversely, the number of Coloradans ascribing the label to Texas rises to seventy-two percent, while all Texans included their state in their respective Dust Bowl region maps.

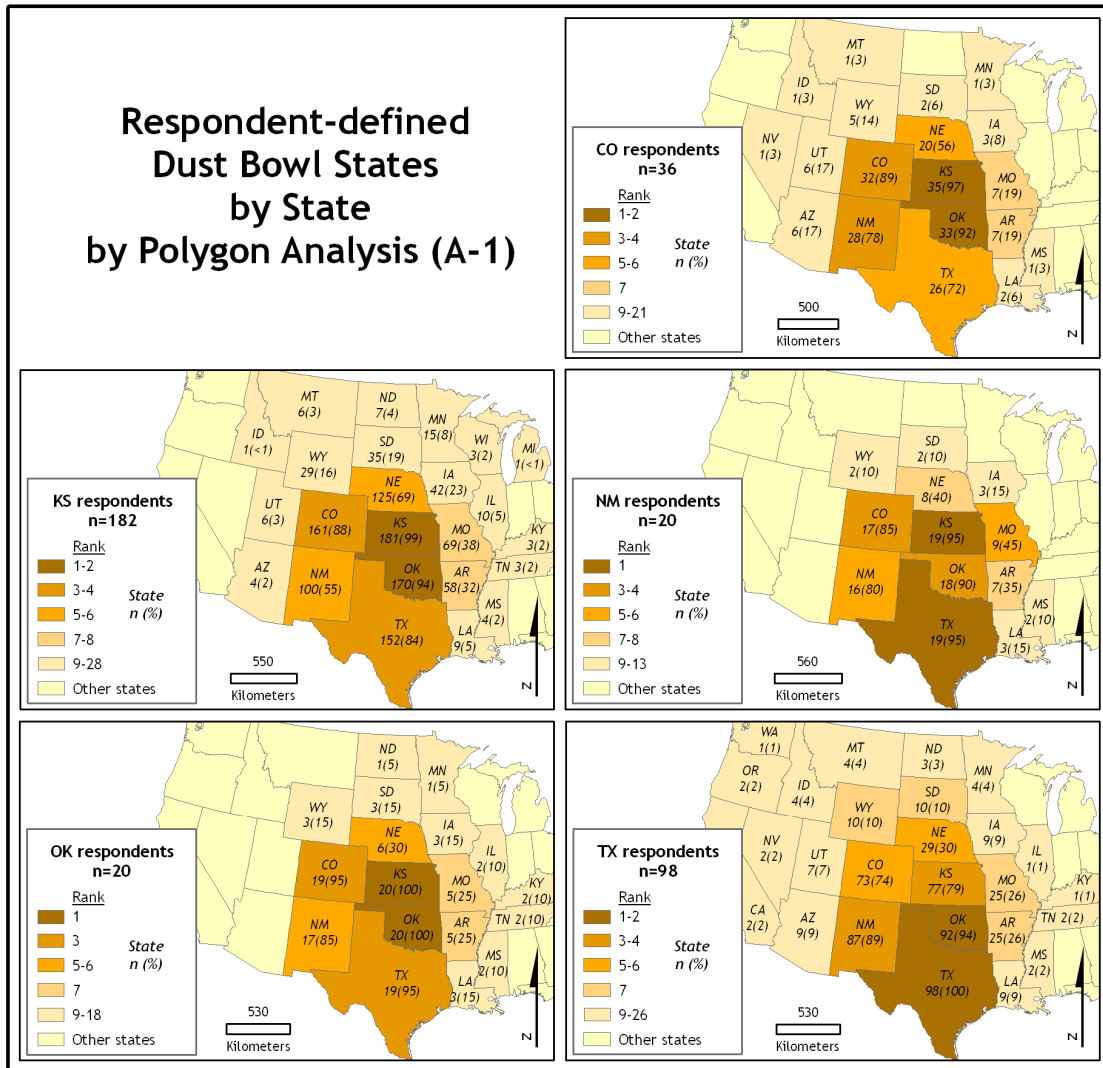


Figure 26. Respondent-defined Dust Bowl States by State by Polygon Analysis

Additional regional bias is evident by examining shifts in ranked states on a state by state case. Comparing Texas and Colorado again, one can see the

western shift of the region for Coloradoans in their top four states of Kansas, Colorado, Oklahoma, and New Mexico. On the other hand, Texans go with Texas, Oklahoma, New Mexico, and Kansas for a more southern conception of the region. This series of maps also highlights differences in respondent-defined region size. Some respondents from Texas, for example, included west coast states in regions that were often larger than their counterparts from other states.

Examining the cumulative state frequencies and percentages (Fig. 27 and Fig. 28) for respondent-defined Dust Bowl states by question illustrates the dominance of Oklahoma (78%) and Kansas (81%) in questionnaire responses. Remembering the propensity for state bias, the figures for Oklahoma are impressive. There were twenty respondents from Oklahoma compared to 182 from Kansas. Fig. 29 provides a measure of response proportionality by state. The number of responses that mentioned each state was divided by the number of respondents from each state. In this representation of Dust Bowl states, Oklahoma has a higher value than the next highest state by a factor of five. This figure supports the presupposition that Oklahoma would be most strongly associated with the Dust Bowl.

A majority of respondents identified Kansas, Oklahoma, and Texas as Dust Bowl states. Colorado, Nebraska, and New Mexico represent a second group of states with some Dust Bowl notoriety to respondents. Nebraska is the only state in this group that falls outside the study area for this research. Its position as the fifth-most popular response can be at least partially explained

by its proximity to Kansas and the large number of Kansas respondents that may exhibit a regional bias toward their neighbor to the north. If this were the only factor in play, one would expect to see larger numbers associated with other adjacent states such as Missouri or Texas' neighbor Louisiana. A second look at the state by state responses (Fig. 28) to questions A-2 and A-3 show that Nebraska did receive marginally more recognition from all of the other study states as evidenced by its fifth (CO) and sixth place (OK, NM, TX) rankings among states. It was the third most popular response from Kansans.

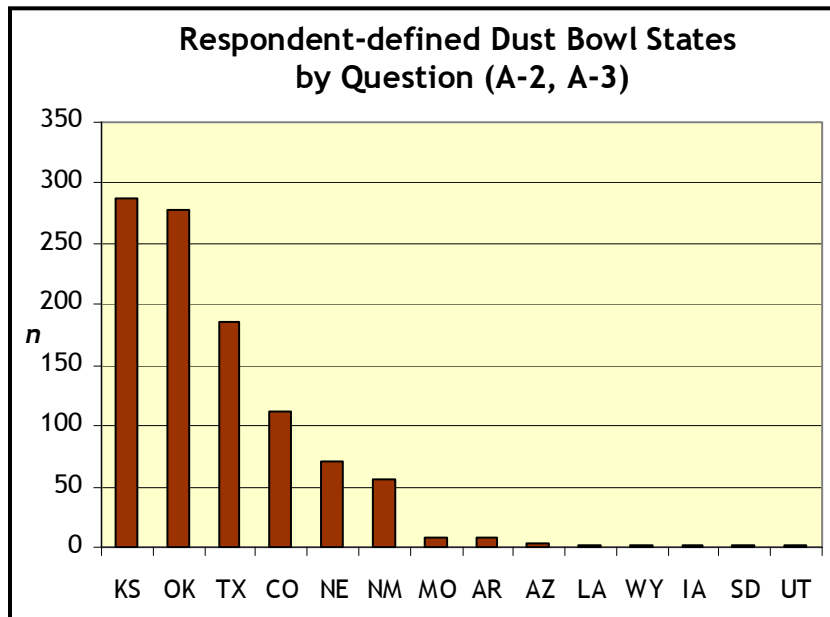


Figure 27. Respondent-defined Dust Bowl States by Question

The cumulative map for polygon analysis (Fig. 30) from question A-1 displays a doubling of Dust Bowl states to twenty-eight versus fourteen named on questions A-2 and A-3. The substantial gap that Oklahoma and Kansas held over the other states is narrowed as Texas and Colorado are increasingly

included in respondents' spatial portrayal of the Dust Bowl (Fig. 30 and Fig. 31). A tier of states to the north and east of the top six states garner inclusion rates of fourteen percent or more. These include Missouri (32%), Arkansas (29%), Iowa (17%), South Dakota (15%), and Wyoming (14%). While this expanded notion of the region may or may not be justifiable, respondents rarely (less than seven percent) jump the Rocky Mountain states to expand the region to the next tier of states west.

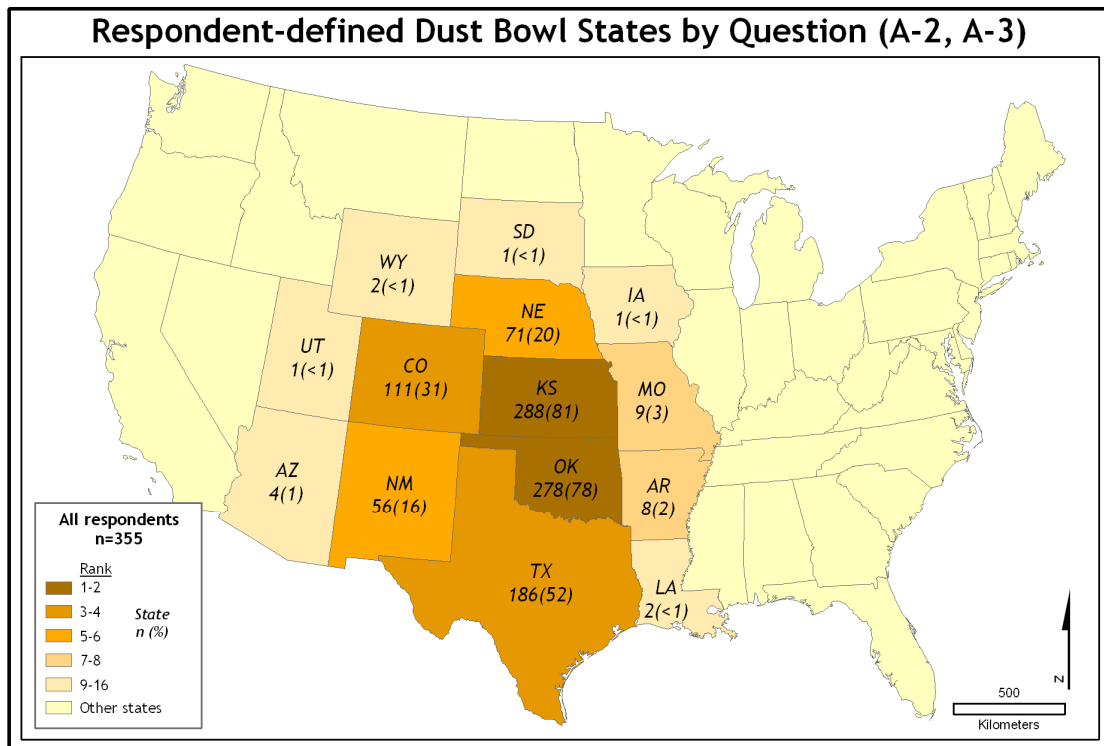


Figure 28. Map of Respondent-defined Dust Bowl States by Question

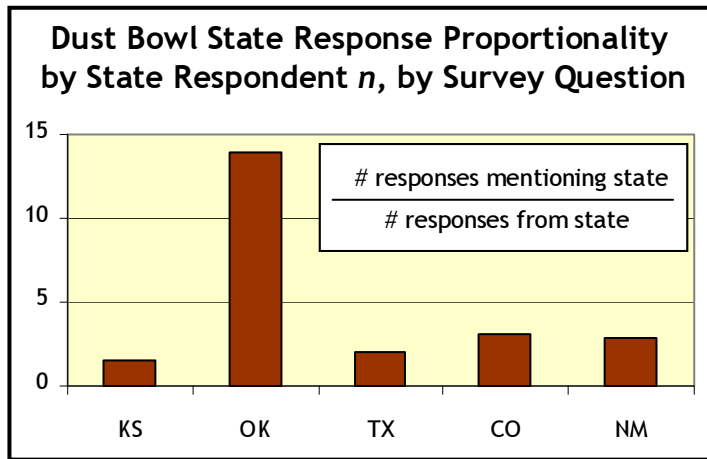


Figure 29. Dust Bowl State Response Proportionality by State Respondent *n*, by Question

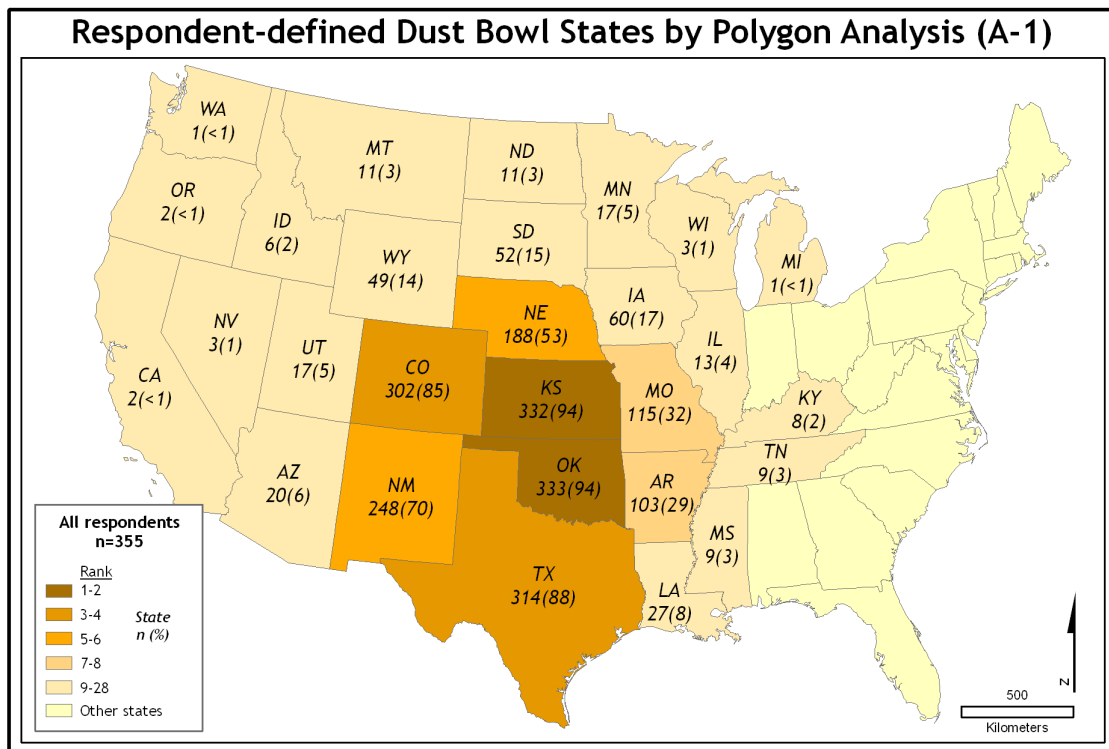


Figure 30. Map of respondent-defined Dust Bowl States by Polygon Analysis

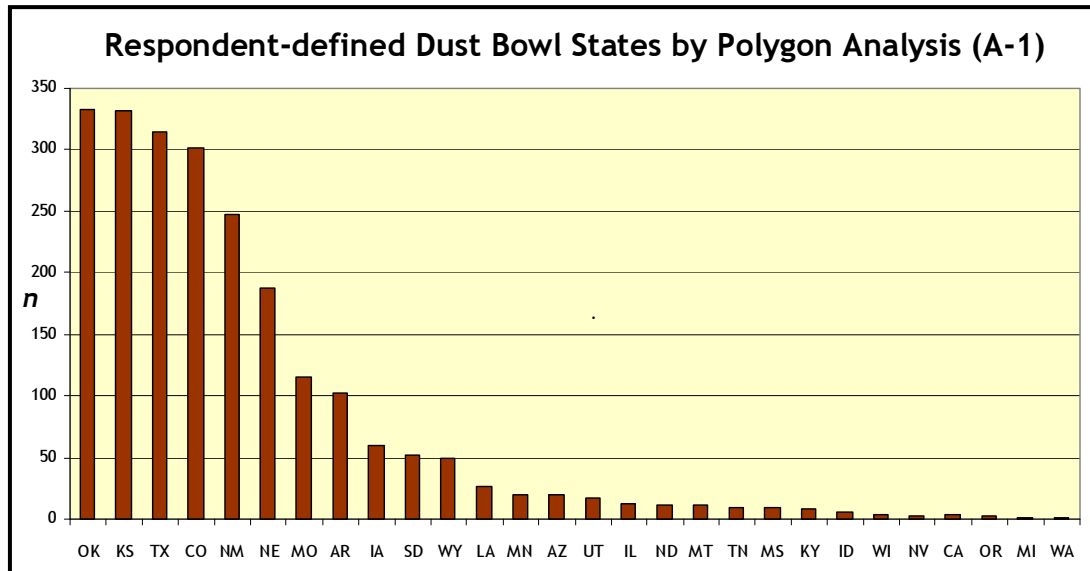


Figure 31. Respondent-defined Dust Bowl States by Polygon Analysis

Comparing the Techniques

Comparing the polygon analysis and question maps (Fig. 32) produces a donut pattern that is explained by the high frequencies for Kansas (81%) and Oklahoma (78%) in question responses (A-2 and A-3). There was little room for the numbers to grow. On the other hand, states peripheral to those two highest ranking states show dramatic gains. Colorado and New Mexico both exhibit fifty-four percent gains. This means that 111 of 355 (31%) respondents identified Colorado as a Dust Bowl state on item A-2 or A-3. But when asked to draw the Dust Bowl region, 302 of 355 (85%) respondents at least partially included Colorado in their polygon. New Mexico's frequency jumps from 56 (16%) to 248 (70%). The polygon delineation of the Dust Bowl states adds most to the recognition of the two western-most study area states in comparison to the questionnaire.

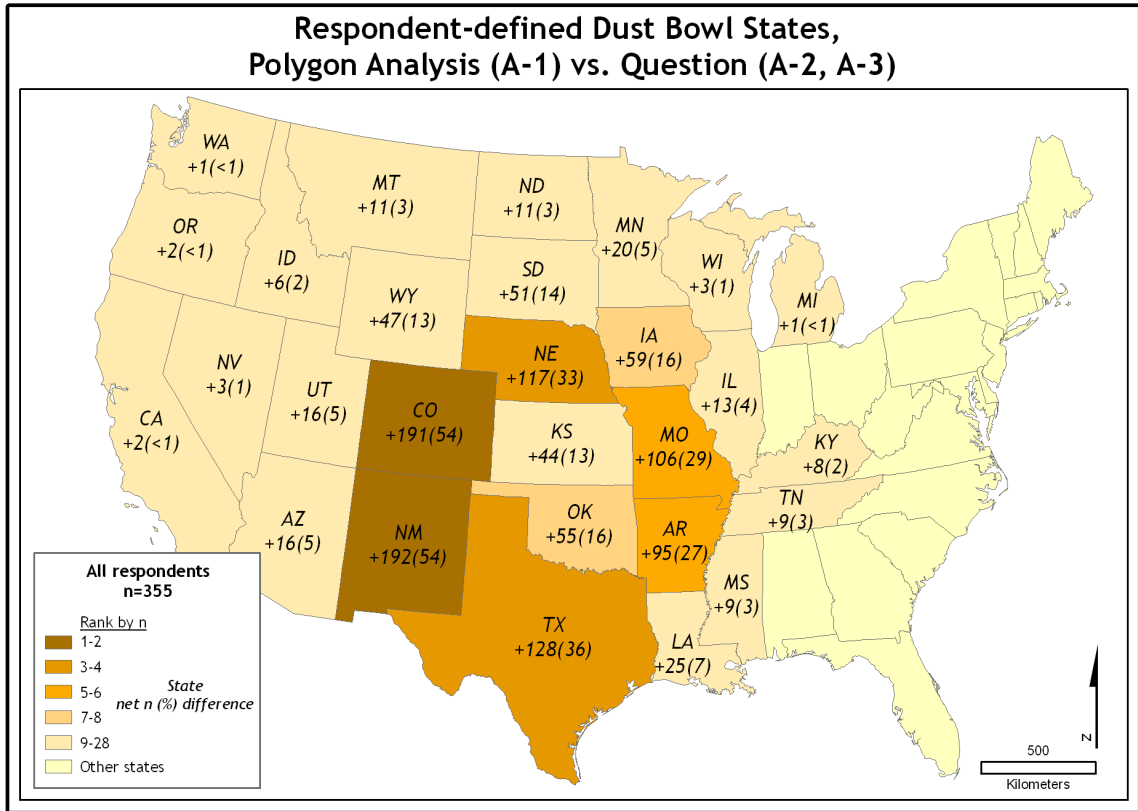


Figure 32. Respondent-defined Dust Bowl States, Polygon Analysis vs. Question

All states exhibit a gain on item A-1 from what was reported on items A-2 and A-3. Some of these gains are to be credited to the geospatial analytical method that was employed. Figures for Missouri and Arkansas may have benefited disproportionately in this regard. Referring back to the respondent-defined Dust Bowl regions (Fig. 24), it is evident that many of the hand-drawn polygons place their eastern extent roughly along the Oklahoma-Arkansas and Kansas-Missouri state lines. This suggests that many respondents are creating their Dust Bowl regions based on association with political boundaries. In the case of Missouri and Arkansas, respondents' polygons are concentrated in the westernmost tiers of boundaries. Perhaps some, if not many, respondents were

merely circling the core Dust Bowl states of Oklahoma and Kansas and slightly extended their polygons into adjacent states. This would help explain the significant boosts in all of the states peripheral to Oklahoma and Kansas and would explain the marked presence of these two states (Missouri and Arkansas) that are not commonly associated with the Dust Bowl.

Defining the Dust Bowl Region: Generational Variation

When Dust Bowl states are analyzed by age group the regional biases become muted (Fig. 33). They still exist to some degree because of the much larger sub-samples of Kansas and Texas compared to Colorado, Oklahoma, and New Mexico. For example, the percentage of respondents naming Kansas as a Dust Bowl state is relatively constant (78, 82, 82, 80) for the four age classes while the percentages for Oklahoma creep upward (66, 79, 81, 87) with age. Kansas' status as a Dust Bowl state, with its large number of questionnaire respondents (approximately half of the sample), is less likely to fluctuate dramatically when one considers the regional bias factor.

Oklahoma's figure of sixty-six percent for the 20-39 year-old respondents does not support the notion that Oklahoma is disproportionately associated with the Dust Bowl. It is, however, still the second-highest state for the group and a closer look reveals that most of the numbers are down for study area states. Interestingly, Oklahoma's status as a Dust Bowl state rebounds for the

80 and older group at eighty-one percent. This is a substantial seven percent more than the next highest state, Kansas.

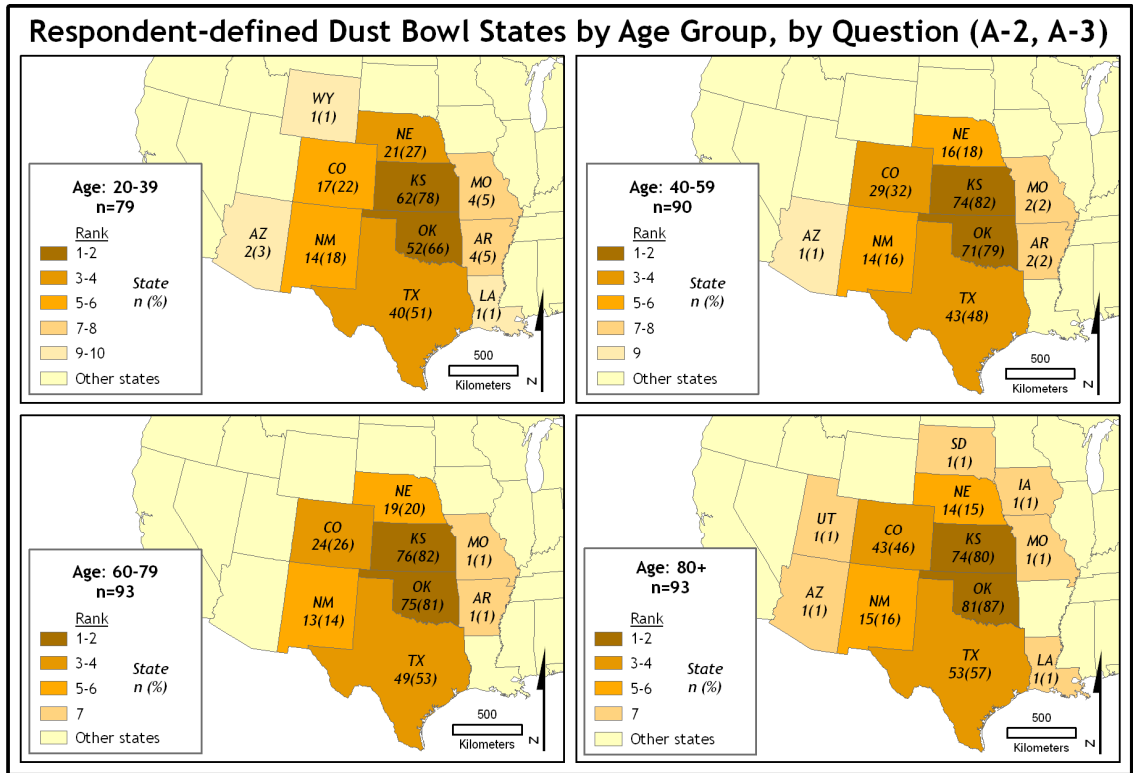


Figure 33. Respondent-defined Dust Bowl States by Age Group, by Question

Continuing with the 80-plus group, they were the most likely to name Colorado as a Dust Bowl state (forty-six percent). This is a sizable twenty percent gain over the 60-79 year-old group and represents the single largest percentage jump for any state from one age group to another. In fact, the only other double-digit swing (13%) occurred between the 20-39 and 40-59 groups regarding Oklahoma. The 80-plus group did name a few states (AZ, IA, LA, MO, SD, UT) outside the study area states, but no state other than Nebraska was mentioned more than once. Compare this to the 20-39 group where Missouri

and Arkansas were both cited four times as well as Arizona twice and a single mention of Wyoming and Louisiana. The youngest group also made Nebraska the fourth most popular choice for the group.

Like the question analysis of age groups, Oklahoma and Kansas rank first or second in all age groups for polygon analysis, as well. Polygon analysis for the four age groups provides remarkably similar rankings for the top eight states found in each groups' polygons. Oklahoma and Kansas are always first or second, Texas and Colorado are always third and fourth, New Mexico and Nebraska always rank fifth and sixth, and Missouri and Arkansas are always seventh and eighth.

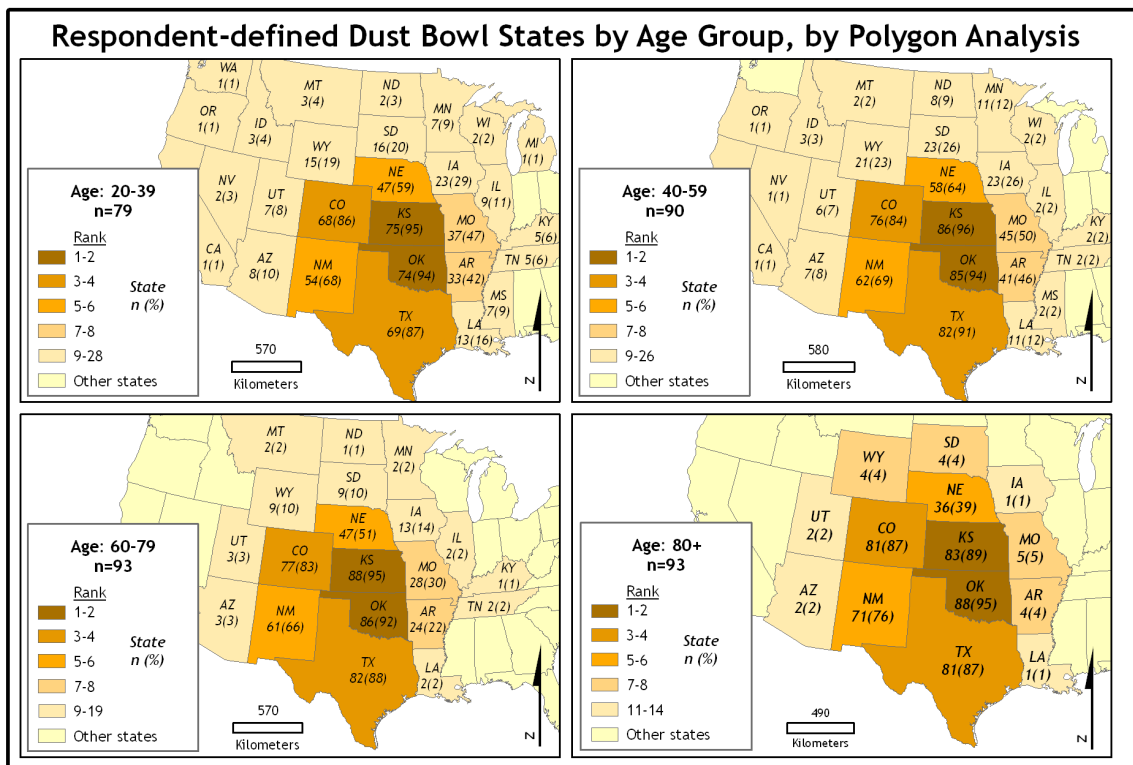


Figure 34. Respondent-defined Dust Bowl States by Age Group, by Polygon Analysis

The most notable differences between groups relate to the increasing exclusion of Nebraska, Missouri, and Arkansas by successively older respondents and the related phenomenon of shrinking polygons with age. Roughly fifty percent of polygons from the 20-39 and 40-59 groups included Missouri and Arkansas in their respective polygons, while only five percent of 80-plus year-olds included parts of these states in their Dust Bowl regions. However, if one refers back to respondent-defined Dust Bowl states by question, only three percent of the two younger groups included these states. Once again, the variation between stated (A-2 and A-3) and drawn (A-1) spatial conceptions of the Dust Bowl is noteworthy. Results of this research suggest that the spatial disconnect is greater in younger people.

Defining the Dust Bowl Region: Spatial Variation

State and/or regional bias has been evident in the results discussed thus far. These local preferences to questions of Dust Bowl location can be further illuminated via portrayal of Dust Bowl state association by county. The following map series (Fig. 35) displays the number of respondents in each of the ninety-three study counties that named the respective study area states plus Nebraska on item A-2 or A-3. A quick study of the maps illustrates a key finding regarding regional perceptions: respondents are most likely to name their own state as a Dust Bowl state. To Kansans the Dust Bowl was a Kansas event. This is the case for Texans and Coloradoans, as well.

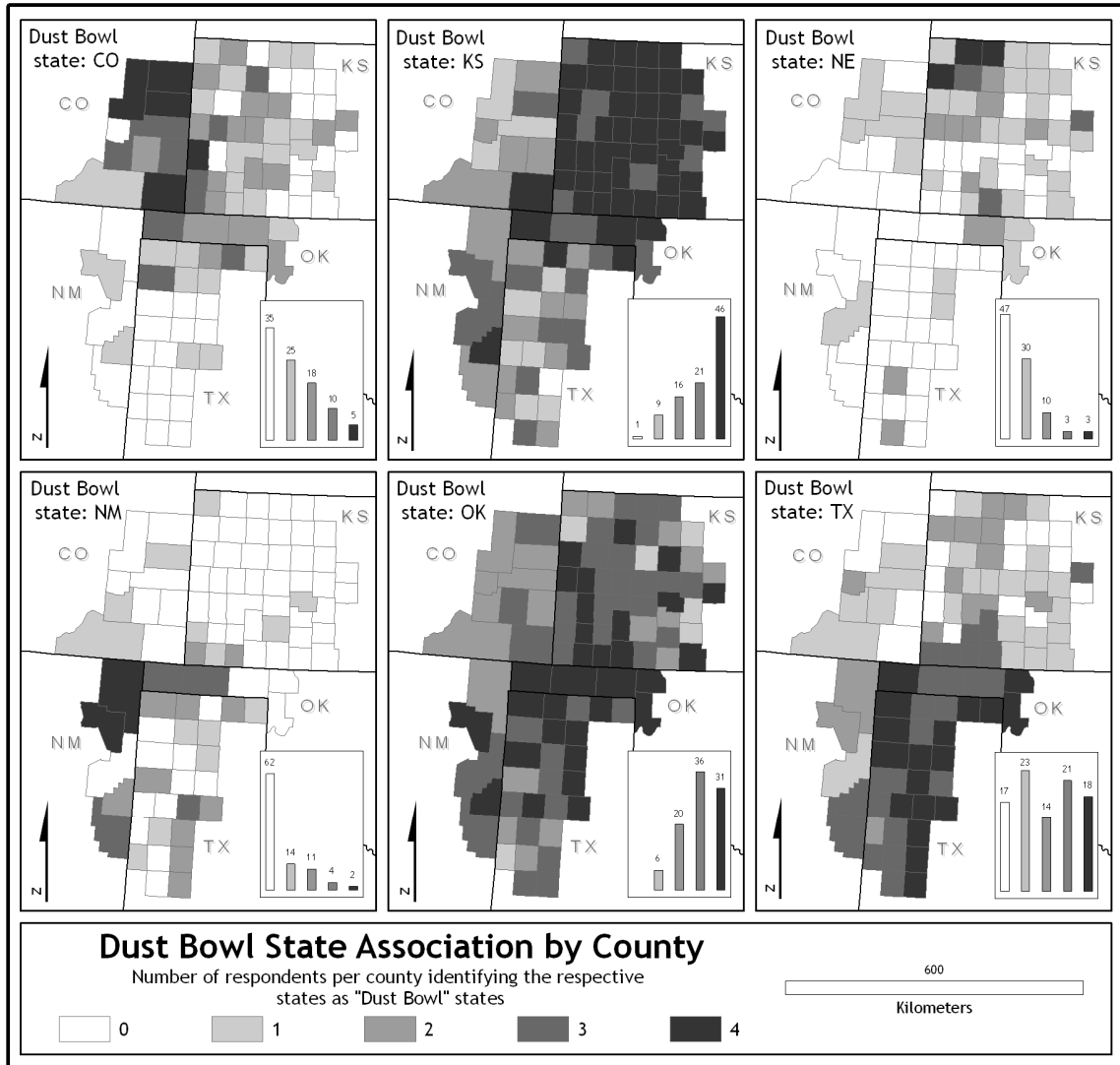


Figure 35. Dust Bowl State Association by County

Oklahoma's map provides more support for the idea that questionnaire respondents will disproportionately associate Oklahoma with the Dust Bowl in comparison to other study area states. Oklahoma garners the most widespread support of any of the study area states, as demonstrated by three and four respondents per county naming the state. Texas, New Mexico, and Colorado have very regionalized distributions of support by comparison. Kansas also has

widespread Dust Bowl notoriety, but it does not collect as many three and four per county rankings outside its home territory. It should be noted that Oklahoma's central position in the Dust Bowl region could boost citations as it would accrue the regional bias support of all of the study states.

Regional bias is particularly evident along political borders. Note the support for Nebraska along the northern Kansas border, the decreasing notoriety of Colorado by Kansans from west to east and Texans from north to south, and the recognition of New Mexico from respondents located primarily below 37° north latitude (the New Mexico-Colorado border). This pattern is less evident in the Oklahoma map. Oklahoma is also the only state that received mention in every study county. It was named by three or four respondents in all but six counties.

Figure 36 illustrates each respondent's choice as the state they most strongly associate with the Dust Bowl (item A-2). Three-quarters (73.9%) of respondents named their own state for A-2, thus illustrating the strong local identity people have with the Dust Bowl. By group, there was notable variation with the oldest age group most likely to name their own state (80.7%) followed by 40-59 year-olds (76.7%), 20-39 year-olds (72.2%), and 60-79 year-olds (65.4%). The particularly high number for the oldest respondents is not surprising as they would likely have a very strong association with the locality at which they experienced the Dust Bowl event. The notable increase in respondents in the 60-79 group identifying a state other than their own is a more difficult result to explain. Seventeen of the thirty-two responses from

this age group that did not choose their home states named Oklahoma. The other age groups disproportionately named Oklahoma as well: thirteen of twenty-two for the 20-39 year-olds, fifteen of twenty-one for the 40-59 year-olds, and twelve of eighteen for the 80 and older group.

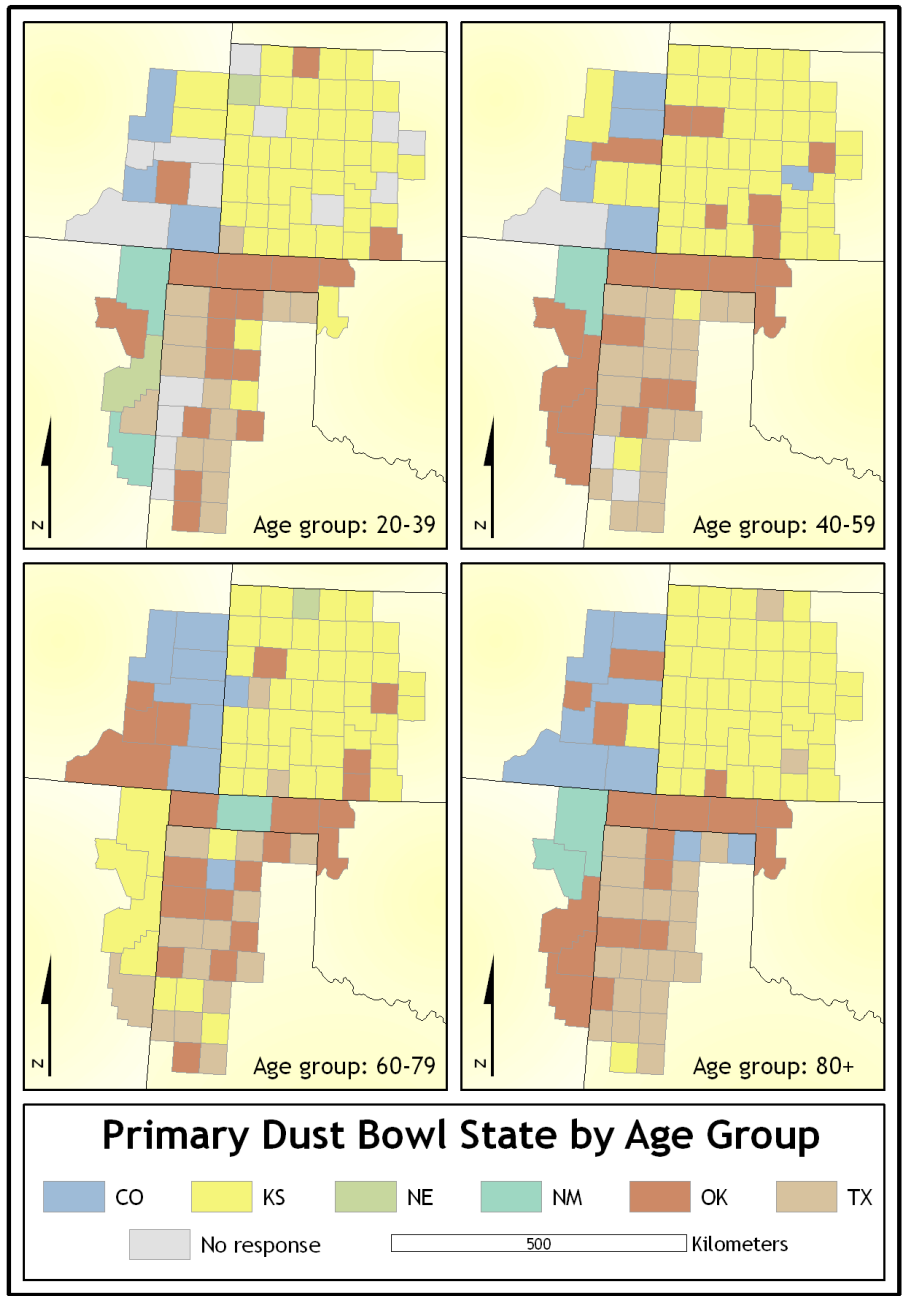


Figure 36. Primary Dust Bowl State by Age Group

Geostatistical Analysis of the Dust Bowl Polygons

Mean Area

When respondents' Dust Bowl region polygons are grouped by age or state, similarities are evident. Figure 37 shows the variation between groups' mean polygon size. The mean size for all polygons is 506,377 km². Hurt (1981) reports that the Dust Bowl reached its greatest extent from 1935 to 1936 when it covered about 202,000 km². By comparison, the area for the unioned Worster (1982) polygons is approximately 392,000 km².

For state respondent groups, Colorado exhibited the smallest mean polygon at 466,308 km², followed by Oklahoma (495,327 km²), Kansas (503,654 km²), Texas (545,629 km²), and New Mexico (579,828 km²). Comparison of the largest sub-samples reveals that Texas polygons averaged eight percent larger than Kansas polygons. This is a possible manifestation of the popular notion that "everything in Texas is bigger."

A clear relationship between respondent age and polygon size can also be seen in Figure 37. Polygons drawn by 20 to 39 year-olds average 734,961 km² in comparison to 677,323 km² for 40 to 59 year-olds, 415,511 km² for the 60-79 group, and 272,010 km² for the 80 and older respondents. Why are the youngest respondents Dust Bowl regions nearly three times the size of the oldest respondents? A quick study of the respective group polygons shows that a typical 20-39 polygon is a generalized oval that encompasses much of the

central United States. By comparison, the typical 80-plus polygon is more detailed as evidenced by diminished regional symmetry.

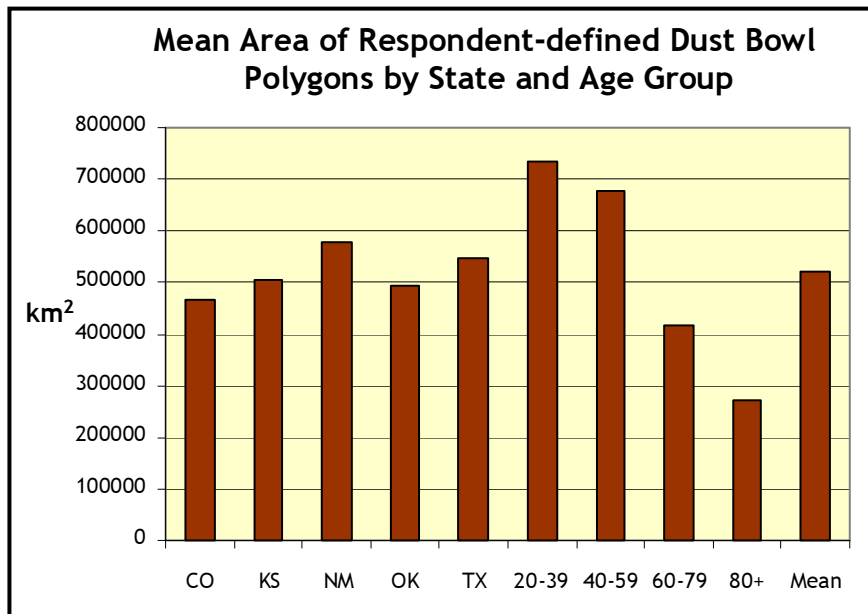


Figure 37. Mean Area of Respondent-defined Dust Bowl Polygons by State and Age Group

Centroids

While size is one way to get a feel for the public's conception of the Dust Bowl region, the placement of those polygons is the next facet to examine. Placement of polygons has been examined from an analysis of the center point (centroids) of each polygon as well as the spatial relationship of the centroids when grouped into state and age categories.

The centroids were calculated for all 355 respondent polygons. Figure 38 displays color-coded centroids by state. Patterns are readily evident before further geostatistical analysis proceeds. Again the state biases are reflected by the strong association between respondents' centroids and their home states.



Figure 38. Respondent Centroids, Mean Centers, Standard Distances, and Standard Deviational Ellipses by State Group

This is most apparent in regard to Kansas. Those centroids that lie outside the political boundaries of Kansas can largely be found in the parts of states that are immediately adjacent (e.g. northern Oklahoma and southern Nebraska). This phenomenon is still present, but does not manifest itself within respective state boundaries to the same degree when other state groups are studied. For example, Colorado respondents generally provided the westernmost centroids although many actually fall within the westernmost counties of Kansas. Likewise Texans' centroids are the most southern, but many occur inside the boundaries of Oklahoma. The small sub-sample from New Mexico appears more dispersed than the other states while Oklahoma's appears to be the most clustered.

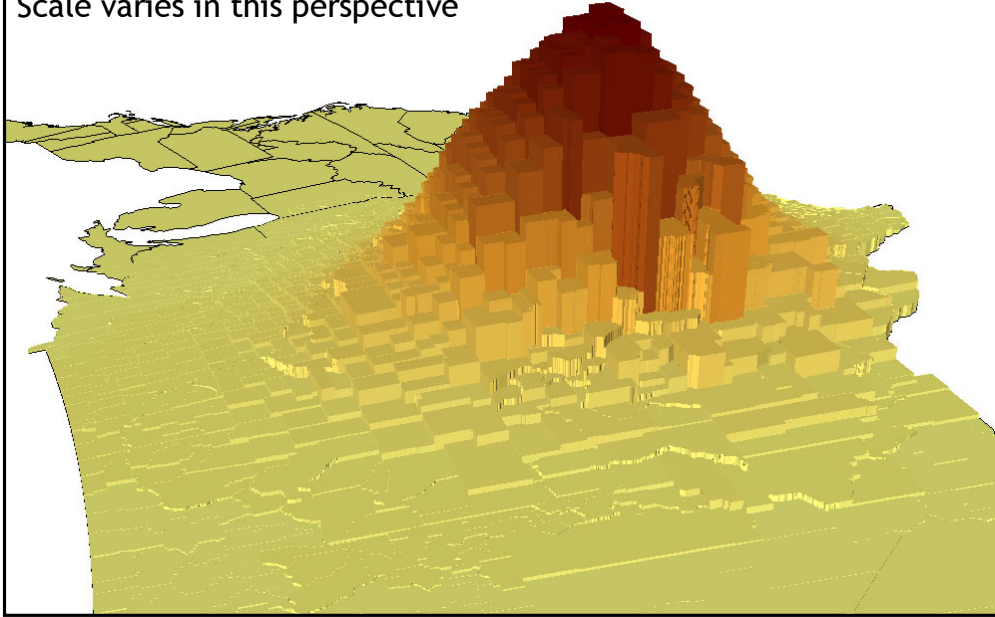
In the case of collective centroid distribution (Fig. 40), a "harder" north edge can be witnessed with a sharp decline in centroids north of 39° north (the Kansas-Nebraska border is located at 40° north). This "edge" is partially a result of the large number of responses from Kansas, which are generally the farthest north of any group and also exhibit more homogeneity. There is also some relationship between respondent-defined regional boundaries and the political boundary between Kansas and Nebraska that influences this harder northern edge to the respondent-defined region. The disparity in New Mexico and Texas responses largely contributes to the "softer" southern edge of the region. There is also not a convenient political border or physical feature upon which to affix the southern boundary of the region.

Longitudinal distribution exhibits a similarly skewed distribution of centroids. In this case, the distribution is skewed to the east. The hard edge in the west can be explained by the presence of a physical feature rather than a political boundary. The Rocky Mountains provide a western barrier that most respondents heeded in drawing their regional boundaries. The softer eastern edge is appropriate as it mirrors the slowly diminishing effects the dust storms of the region had upon locations to the east.

The hard western and soft eastern boundaries can be seen in a three-dimensional portrayal of the respondent-defined region. Figure 39 was created in ArcScene GIS software by extruding counties based on the frequency that respective counties were all or partially included inside respondents' Dust Bowl polygons. The view from the northwest illustrates significant changes in frequency for counties as the respondent-defined region steps up steeply from this perspective. On the other hand, the view from the southeast shows a gently sloping Dust Bowl region as the increases in frequency for adjacent counties are more subtle. Part of this can be attributed, however, to the generally smaller size of counties on the eastern side of the region in comparison to the western side.

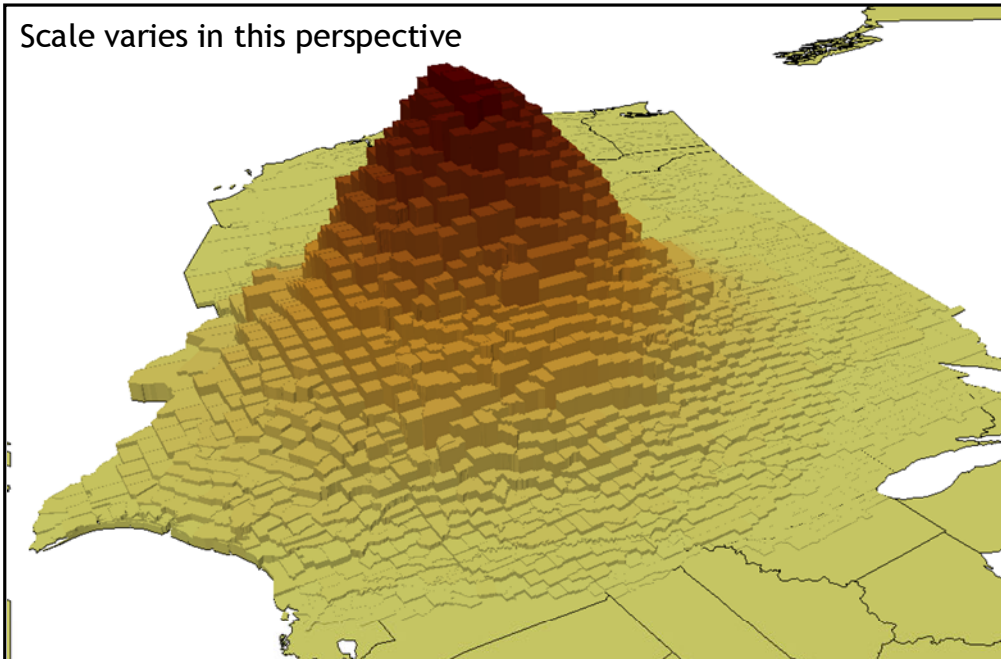
3-D Views of the Respondent-defined Dust Bowl Region

Scale varies in this perspective



View from the northwest (above the Pacific coast)

Scale varies in this perspective



View from the southeast (above Florida)

Figure 39. 3-D Views of the Respondent-defined Dust Bowl Region

Mean Center

The mean state centers result when the calculation for mean center is applied to the state centroid groups (Fig. 38). In this comparison, the average center point for all Kansas respondents was 37.79°N , 99.7°W . This is near the town of Spearville in Ford County, Kansas. This is the northernmost and easternmost state mean center of the state groups. Resident locations of Kansas respondents were generally more northerly and often more easterly than respondents from other study states.

The westernmost state mean center was created from the centroids of Colorado respondents at 37.31°N , 101.45°W . The nearest town is Hugoton in Stevens County, Kansas. Texas respondents delivered the southernmost state mean center at 35.85°N , 101.00°W , near Miami, Texas in Roberts County. This mean center falls outside the study area of this project. In other words, the mean center point of all the Texas polygons does not fall within the area most commonly cited as the Dust Bowl. This is also the case for the New Mexico mean state center found in Hemphill County, Texas at 35.93°N , 100.19°W , near the town of Canadian. In the case of New Mexico, the mean center for the small sub-sample of twenty respondents was affected dramatically by a few extreme outlier values. The two eastern centroids located near Pawnee, Oklahoma and Denton, Texas influenced the mean center disproportionately by pulling it farther east than the majority of New Mexico centroids. Thus it is

important to remember that the mean center is the average location rather than a typical location (McGrew and Monroe 2000).

Not surprisingly, the Oklahoma state mean center is the most centrally located of the five at 36.64° N, 100.60° W. This point is near the town of Balko in Beaver County, Oklahoma. This state mean center is an apropos reference to the tendency respondents have to associate the Dust Bowl with their state considering the fact that Oklahoma respondents managed to center their Dust Bowl regions on the thirty-four mile tall strip of the Oklahoma panhandle. The study area, by contrast, stretches more than 400 miles from north to south.

Standard Distance and Standard Deviation Ellipse

McGrew and Monroe (2000, 56) point out that “just as the mean center serves as a locational analogue to the mean, standard distance is the equivalent of standard deviation.” Standard distance measures the compactness or dispersion of a point distribution with the value plotted as a circle around the mean center. The circle has a radius equal to the distance value.

The calculation of standard distance (Fig. 40) can be tedious and error prone (Earickson and Harlin 1994). Fortunately, ArcGIS can calculate the standard distance by averaging the distance between the points (respondent centroids) and the mean center of the distribution (mean state centers). This is accomplished by subtracting the value of the mean x-coordinate from the x-

coordinate value for each point and squaring the difference to make the result positive. The same process is applied to the y-coordinates. The differences from the mean are then summed and divided by the number of points in the set. The two resulting values are summed and the square root is determined to return the values to the original distance units. The resulting value is the standard distance (Barber 1988; Mitchell 2005).

$$SD = \sqrt{\frac{\sum_i (X_i - \bar{X})^2}{n} + \frac{\sum_i (Y_i - \bar{Y})^2}{n}}$$

Figure 40. Standard Distance Calculation

The greater the standard distance value, the more the distances vary from the average, and the more widely dispersed the features around the center. When the standard distance circle is drawn, some points will be inside the circle and some outside. The points that are inside the circle vary less than the standard distance from the mean and the points outside the circle vary more. In the case of respondent centroids that are distributed regularly around the mean, the standard distance provides a good measure of the compactness of respondent centroids (Mitchell 2005). However, standard distance can be strongly influenced by peripheral locations because distances from the mean center are squared. This can lead to atypical points having a disproportionate impact on the magnitude of the standard distance (McGrew and Monroe 2000).

State Group Analysis. Standard distance was calculated for the various state groups. Texas exhibited the largest standard distance at 252 kilometers and Oklahoma the smallest at 158 kilometers. This means that respondents'

centroids from Texas had the least agreement or most variation of the state groups whereas Oklahoman's centroids exhibited the most homogeneity of state groups. The standard distances are represented on Figure 38 by solid-lined circles. The center of these standard distance circles are the mean state centers discussed above. The large standard distance value of Texas has been influenced by the dispersed nature of Texas centroids in comparison to other state groups. The map illustrates that a number of Texas centroids are located more than 150 kilometers outside the standard distance circle. On the other hand, there is a high level of consensus that can be observed with the Oklahoma centroids. If not for the four outliers in the Oklahoma distribution, the standard distance would be significantly smaller. The Kansans' consensus is also noteworthy. By far the largest sub-sample, Kansans exhibit the second-lowest standard distance figure because only a handful of centroids occur farther than two standard deviations away from the mean state center.

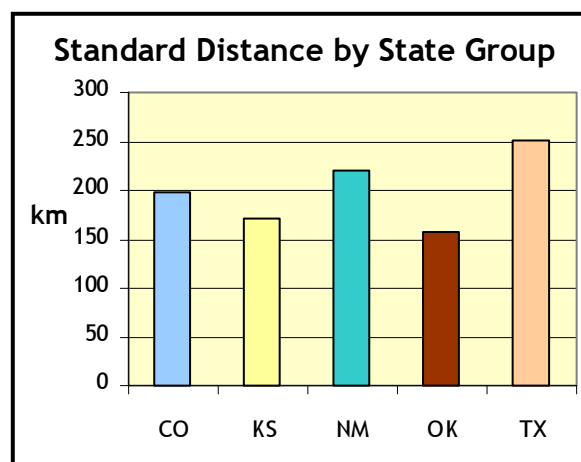


Figure 41. Standard Distance by State Group

Standard distance does not take into account the possibility that the dispersion of points around the mean center may not be circular but rather elliptical. The standard deviational ellipse (Fig. 42) measures both compactness and orientation and subsequently allows for the abstraction of spatial trends in the distribution of points. The standard deviational ellipse yields an elliptical standard distance via separate calculation of the x and y axes (Earickson and Harlin 1994). The orientation of the ellipse is determined by ArcGIS to minimize the sum of the squares of the distance and the axes. The ellipse is then rotated by this angle to minimize the distance of the centroids to the axes (Mitchell 2005).

$$SD_x = \sqrt{\frac{\sum_i (X_i - \bar{X})^2}{n}} \quad SD_y = \sqrt{\frac{\sum_i (Y_i - \bar{Y})^2}{n}}$$

Figure 42. Standard Deviational Ellipse Calculation

In the case of state centroid groups, directional trends are indeed evident. Standard deviational ellipses are represented by dashed-line ellipses in Figure 38. The state groups with the largest discrepancies between x and y axes are Colorado and Texas (Fig. 43). New Mexico and Kansas, on the other hand, display standard deviational ellipses that are only slightly distinguishable from their standard distance circles. This implies that north-south and east-west variation in the location of centroids is quite similar in these two states. Oklahoma lies between the two extreme classes.

Colorado and Texas' variations manifest themselves in ellipses that are visibly elongated. In the case of Colorado, the x-axis standard distance is more

than twice the y-axis. In other words there is twice as much average variation in the location of points relative to the east-west axis as the north-south. This centroid pattern creates an ellipse that stretches from southeast Colorado into the Oklahoma panhandle once the ellipse is rotated to its best fit for the centroids (127° from north). This correlates with questionnaire items A-2 and A-3 where Colorado respondents named Colorado and Oklahoma as the states they most strongly associate with the Dust Bowl. The northwest-southeast orientation of the ellipse, does however, trend in the opposite direction of prevailing academic orientations of the region.

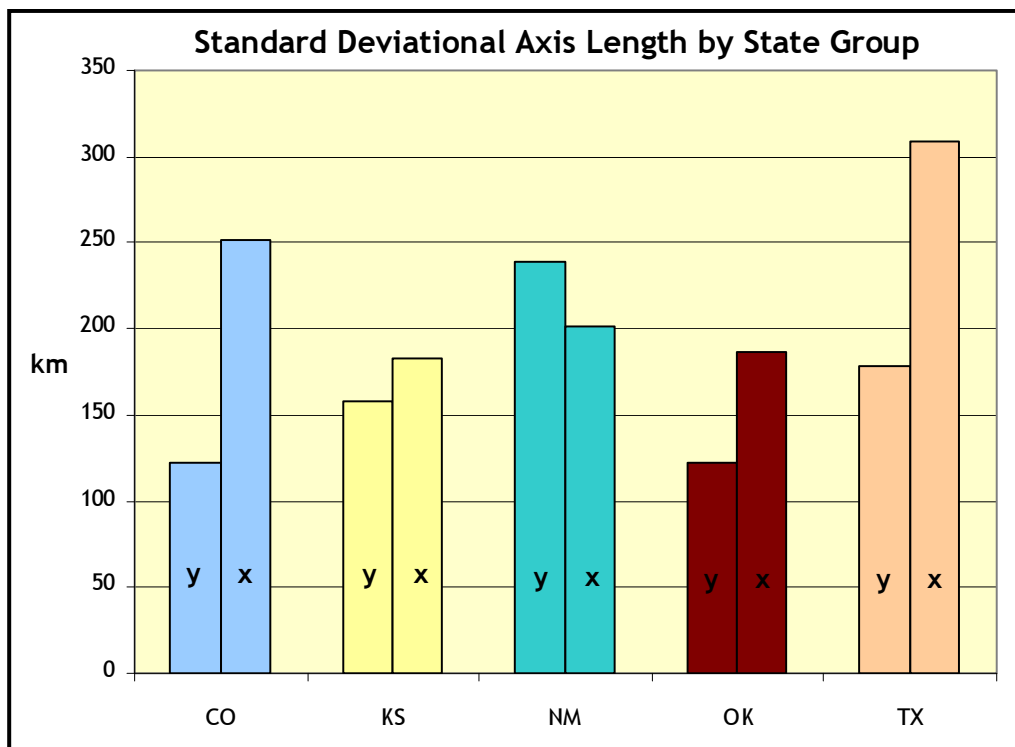


Figure 43. Standard Deviation Axis Length by State Group

The Texas and Oklahoma ellipses are interesting in that they somewhat orient themselves to the respective panhandles of each state. Keeping in mind

that respondents strongly associate the Dust Bowl with their respective states, this map suggests that some respondents from Texas and Oklahoma may have oriented their Dust Bowl regions to match the north-south axis of the Texas panhandle or the east-west axis of the Oklahoma panhandle depending on their home state.

Age Group Analysis. Utilizing the same geostatistical techniques on the centroids sorted by age group provides evidence of a relationship between age and conception of the Dust Bowl region. The Dust Bowl region becomes more refined and more westward with increasing age. The standard distance steadily decreases with successively older respondent groups (Fig. 44), indicating less variation in polygon placement with increasing age. Not only do the standard distances decrease significantly by age, they also migrate west. The age group mean centers (Fig. 45), which are also the center of the standard distance circles illustrate this track, with the greatest westward movement occurring between the two oldest groups.

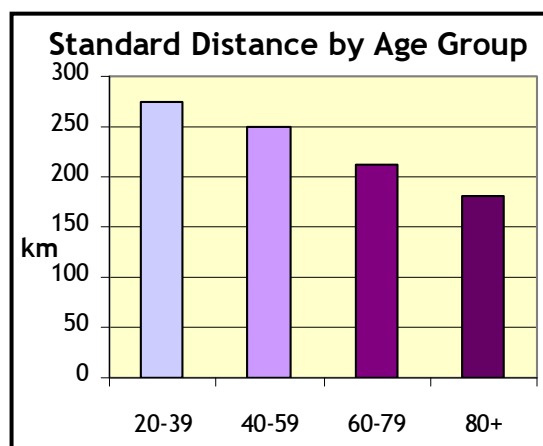


Figure 44. Standard Distance by Age Group

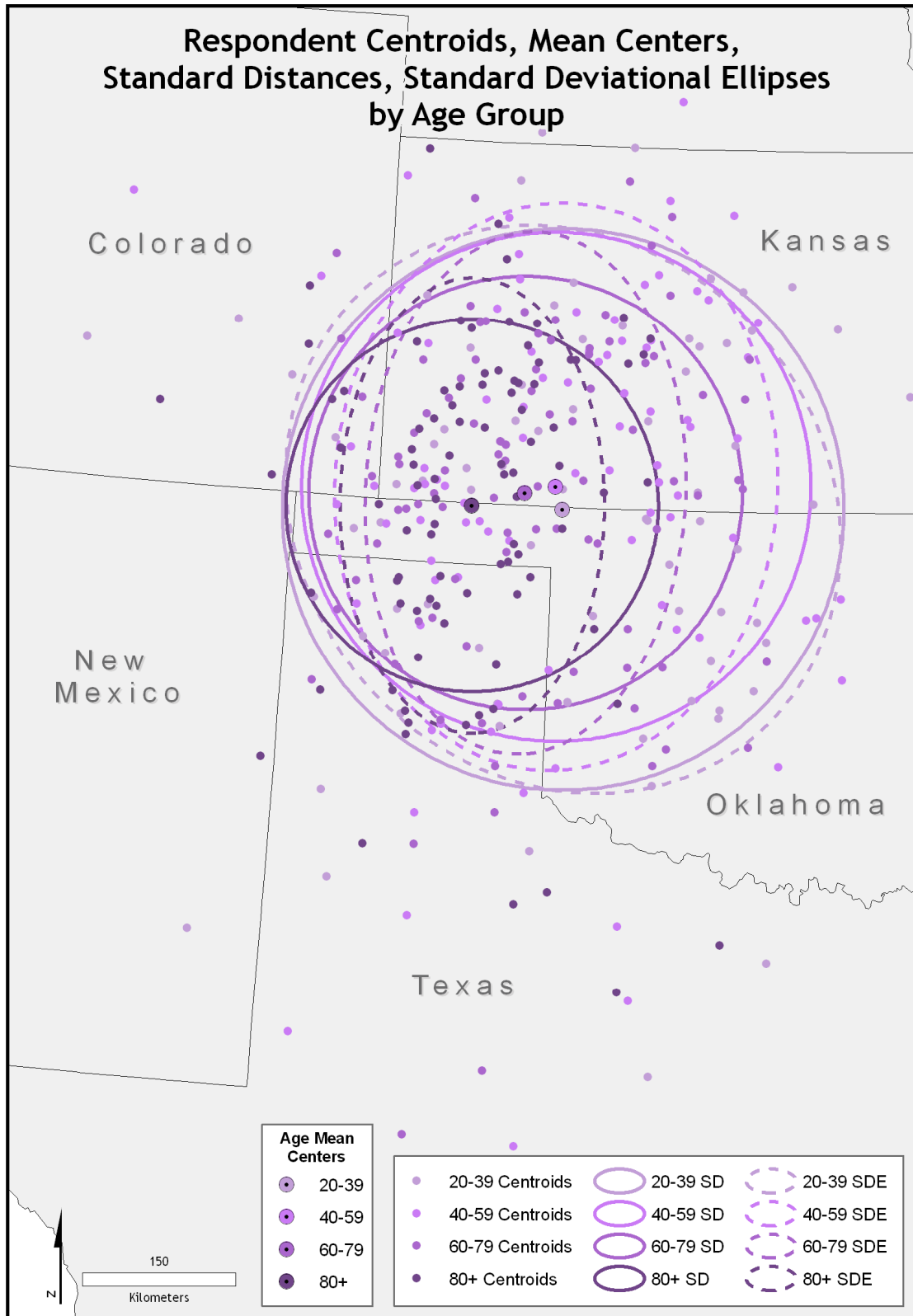


Figure 45. Respondent Centroids, Mean Centers, Standard Distances, Standard Deviational Ellipses by Age Group

Standard deviational ellipses illustrate the westward movement as well, but also reflect the transition from nearly circular to elliptical for age group centroid distribution. State bias is neutralized when the centroids are grouped by age. The emergence of a north-south axis for point distribution (Fig. 46) with increasing age is an exceptional reflection of more nuanced knowledge about the Dust Bowl by older respondents. Younger respondents are more likely to draw a generalized circle for their Dust Bowl region, while older respondents attempt to specify more western locales on an elongated north/south axis. Perhaps these respondents associate the region with the High Plains, short-grass prairie, or a more arid zone in their concept of the region. Not coincidentally, there is increasing association with age to the academic consensus of a regional definition.

Academic-group association in terms of regional placement is illustrated by the inclusion of the mean center for the National Archives/Worster (1982) wind erosion maps in Figure 47. This point is west of any of the group mean centers, and north of all but the Kansas respondents' mean center. From a group perspective, Colorado and 80 and older respondents came closest to placing the center of their Dust Bowl regions to Worster's.

Southern Meade County, Kansas is home to the mean center for the aggregate of the 355 questionnaire respondents. This point is very close to the mean center for the 60-79 group. Meade, Kansas is the nearest community. The 80-plus mean center is located very near the confluence of Seward County, Kansas with Texas and Beaver counties in Oklahoma. Liberal, Kansas is just a

few kilometers away. The 20-39 group mean center is also located just inside Oklahoma in Harper County near the town of Englewood, Kansas. The remaining group mean center, representing the mean location of respondents 40 to 59 years of age is located in Clark County, Kansas not far from the town of Ashland.

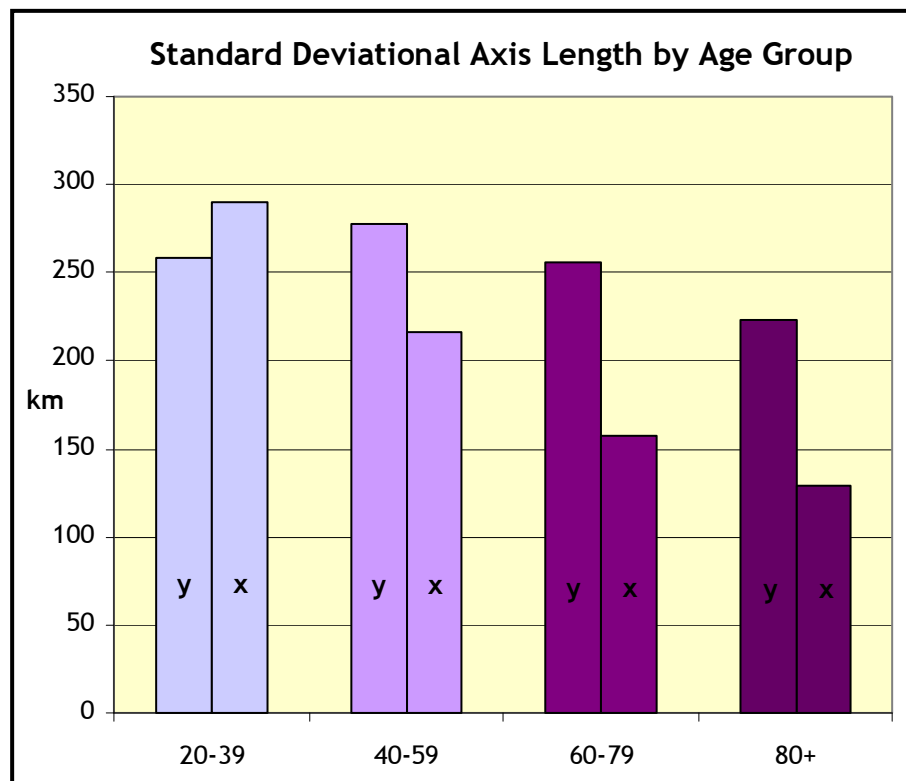


Figure 46. Standard Deviation Axis Length by Age Group

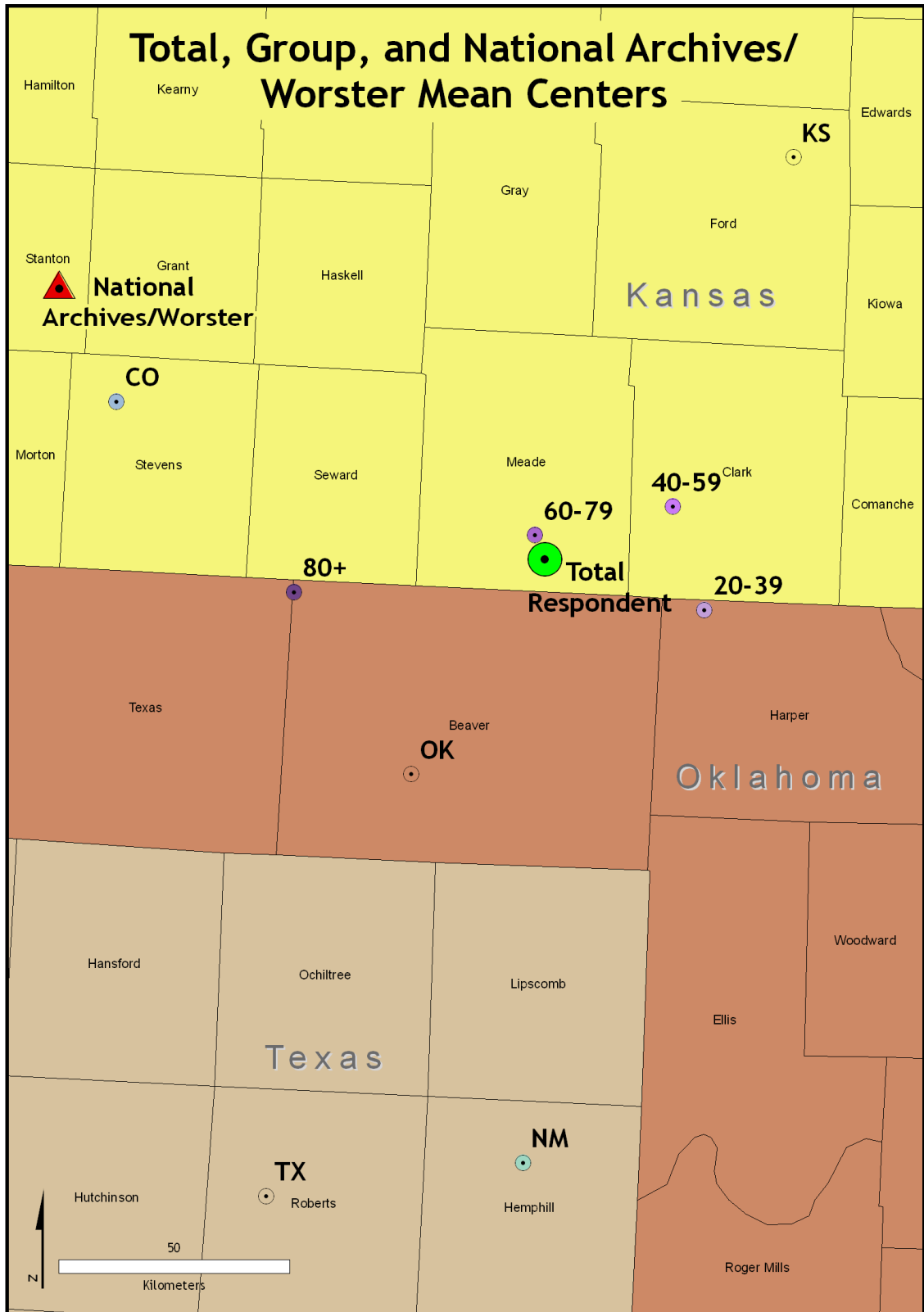


Figure 47. Total, Group, and National Archives/Worster Mean Centers

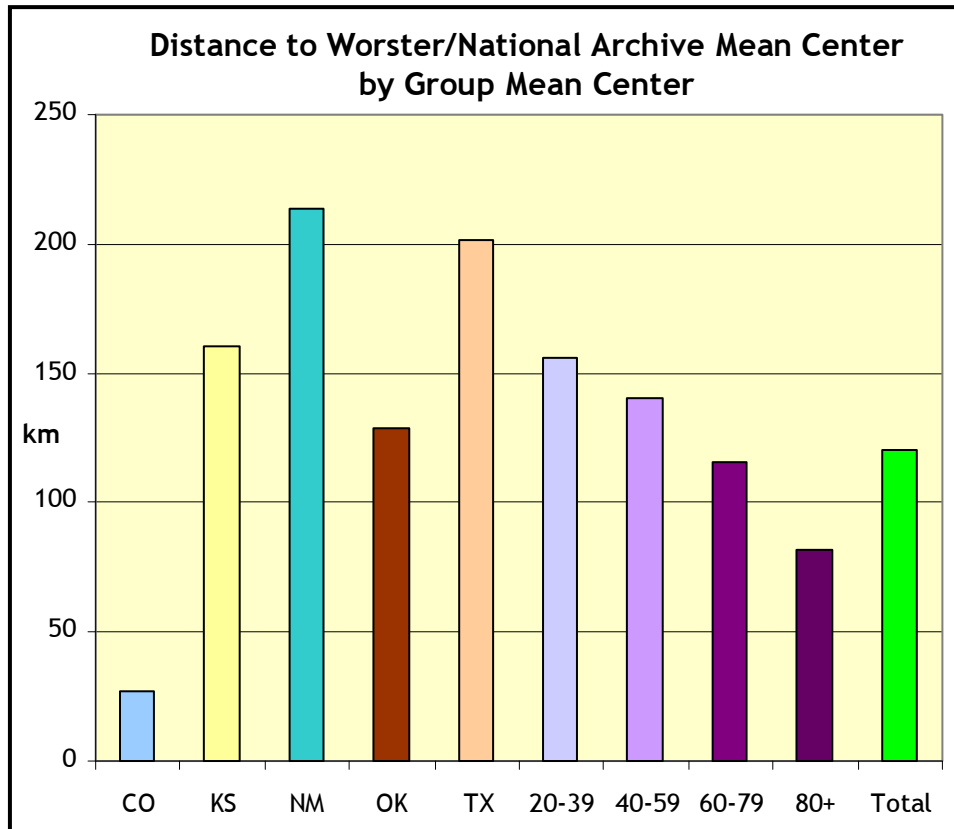


Figure 48. Distance to National Archives/Worster Mean Center by Group Mean Center

The Respondent-defined Dust Bowl Region

The data for portrayals of respondent-defined Dust Bowl regions was obtained in the same fashion as for the maps depicting Dust Bowl states described above. This time, however, ArcGIS software was utilized to intersect a map of US counties with each respondent's Dust Bowl region. This provided a new map for each of the 355 respondent maps from which the attribute data was queried to provide a list of counties that were partially or wholly included in the respondent-defined maps. Counties were included in the frequency

counts for the polygon analysis if any portion of a respective county fell inside the respective respondent's regional map. The frequency tool in ArcInfo was then utilized to provide a list of the unique occurrences and their frequency for the list of counties as a whole and by various groups (e.g. by state respondent group).

Three classification types are presented to illustrate the respondent-defined Dust Bowl region (Fig. 49). The equal interval heartland presents the best approximation of the National Archives/Worster map and is most effective at illustrating the eastern skew of the region. With the equal interval technique, the range of values is divided into equal-sized sub-ranges, with the map-maker specifying the number of classes. In this case, the map displays counties included in respondent maps at twenty percentage-point intervals. The darkest brown highlights the counties that were included in greater than seventy-nine percent of the Dust Bowl regions. On the eastern edge of the region the forty to fifty-nine percent and sixty to seventy-nine percent classes typically include three or four counties, while on the western edge these classes contain one county. Granted, the western counties are generally larger but the eastern slope of the region is clearly gentler.

The natural breaks classification bases its classes on natural groupings inherent in the data. ArcMap identifies break points by picking the class breaks that best group similar values and maximize the differences between classes. The features are divided into classes whose boundaries are set where there are relatively large jumps in the data values (ESRI 2006). This technique yields a

respondent Dust Bowl heartland that also is a reasonable approximation of the prevailing academic literature, albeit slightly too expansive to the east.

It is easy to see why Oklahoma and Kansas were named the top Dust Bowl states after glancing at the quintile classification of respondent polygons. In this technique each class contains an equal number of features. In this case, all but one county in Kansas and Oklahoma respectively, are included in the top class of greater than eighty-six respondents.

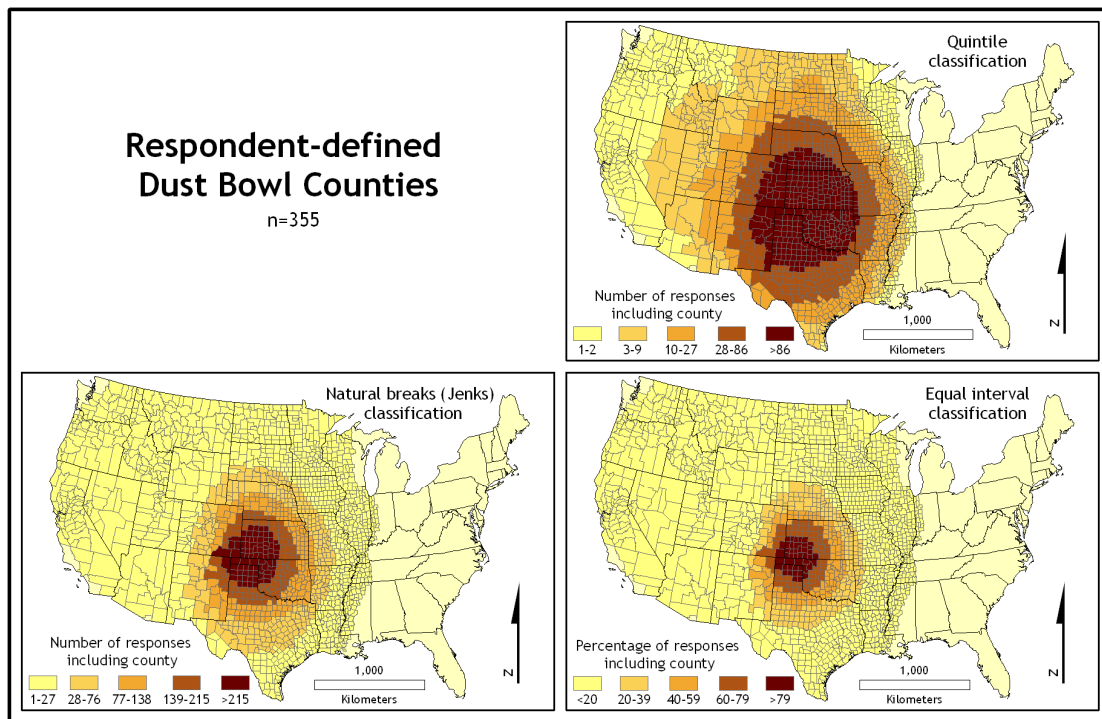


Figure 49. Respondent-defined Dust Bowl Counties

The quintile classification by age (Fig. 50) illustrates that the harder western edge is much less evident in the youngest group. This suggests that younger respondents produced more symmetrical polygons centered on Oklahoma and Texas than the other groups. It also suggests that the youngest

respondents do not account for the physical barrier of the Rocky Mountains that mark a logical geographic boundary to the western edge of the region.

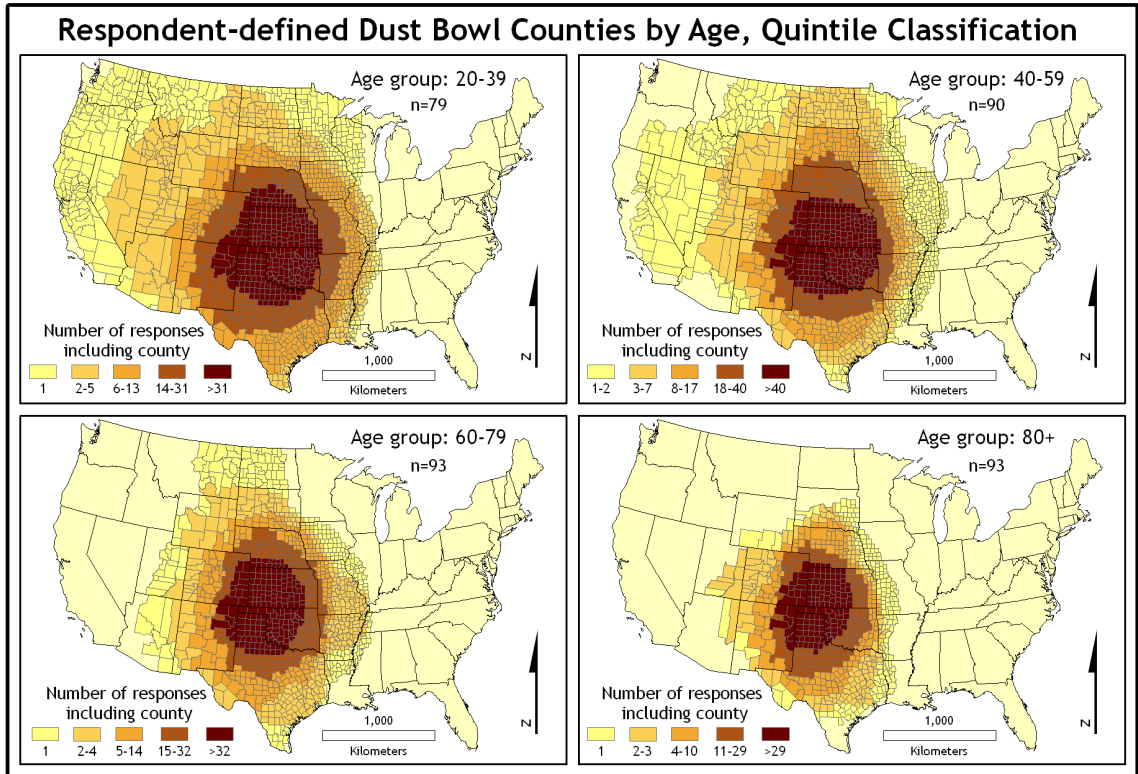


Figure 50. Respondent-defined Dust Bowl Counties by Age, Quintile Classification

Quintiles are largest in the youngest group and decrease with age. The top quintile in the 20-39 year-old group includes all but two Oklahoma counties and seven Kansas counties. Locations such as Joplin Missouri, Las Vegas New Mexico, North Platte Nebraska, and the Dallas-Fort Worth Metroplex are included in this representation of the heart of the Dust Bowl. The 40-59 group contracts the top quintile from the north and south while the 60-79 and particularly the 80-plus group make dramatic strides in contracting the eastern edge of the heartland.

The size of the quintiles in this classification can be greatly affected by one response that includes many more counties than the next largest response. This will subsequently adjust all of the quintile sizes upward. For this reason it is important to note the number of responses in each quintile. In this case, the 20-39 quintiles are indeed much larger than the 80-plus quintiles as a result of one particularly large polygon. By looking at the number of responses included in each quintile, however, the general discrepancy in polygon size between the two groups can be seen. For example, more than forty percent of 20 to 39 year-old respondents partially included an Oklahoma county that bordered Arkansas in their polygon. By comparison, only three 80-plus respondents extended their polygons into Arkansas.

Equal interval classification of responses (Fig. 51) is most effective at illustrating the eastern skew of responses. This technique and the classes utilized also provide more refined Dust Bowl heartlands. The linear nature of the 80-plus heartland that is centered on the Oklahoma panhandle suggests a relationship between this political feature and the Dust Bowl region in the minds of the oldest respondents. However, this may merely represent the intersecting region of biased Kansas and Texas responses. This group is the only one to include Union County, New Mexico in their highest class. This county is routinely cited by academics as one of the most severely affected (Bonnifield 1979; Hurt 1985; Worster 1982).

Although the oldest respondents moved the region farther west than the other groups, they still delineated a very hard western edge. In fact, several

times classes are skipped in the western step down in frequency from the western edge. Moving to the north side of the region, there is a steep gradient that runs parallel to the Kansas-Nebraska border. Interestingly, this political boundary is evident in all four of the maps, albeit for different classes. This suggests that many respondents “turned the corner” on their region when they reached the Kansas-Nebraska border. A similar situation appears along the eastern Kansas and Oklahoma borders.

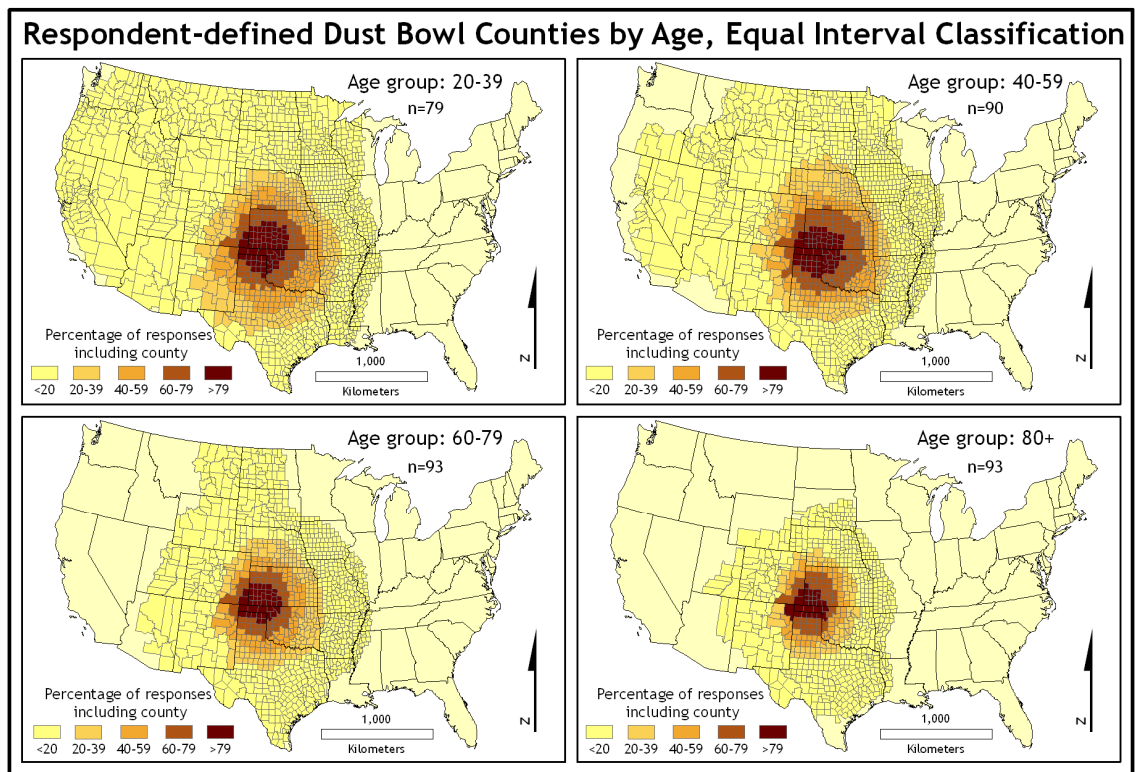


Figure 51. Respondent-defined Dust Bowl Counties by Age, Equal Interval Classification

Turning to the state groups, the regional and/or state bias discussed above is evident (Fig. 52). Texas’ region is farthest south, Colorado’s farthest west, while Oklahomans present a region that bears the strongest resemblance to the Worster (1982) region. The regional axes that were highlighted by the

standard deviational ellipses are visible. Colorado is oriented northwest to southeast, Kansas is more elongated to the north and south, and Oklahoma, Texas, and New Mexico are oriented in a southwest to northeast fashion.

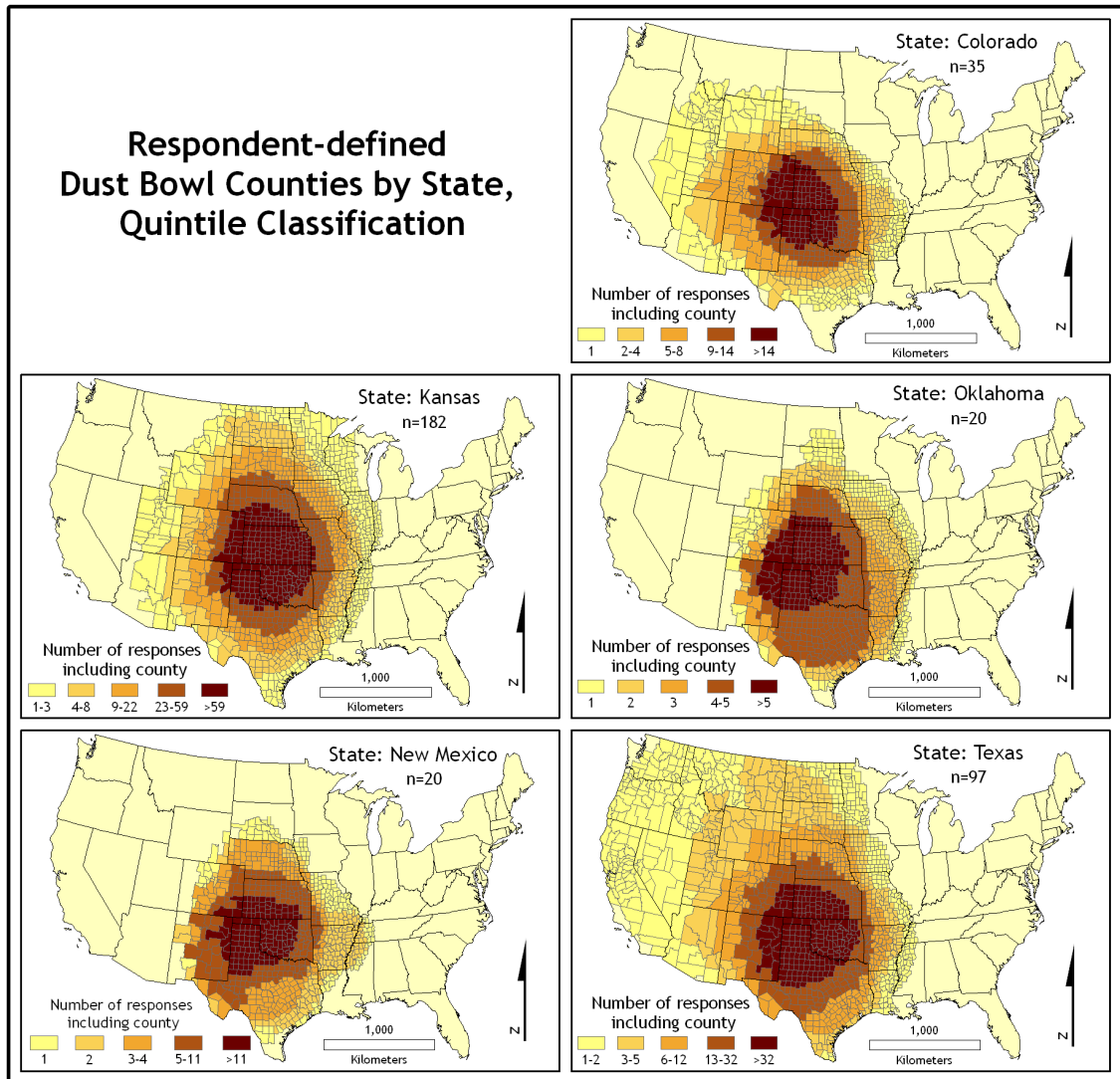


Figure 52. Respondent-defined Dust Bowl Counties by State, Quintile Classification

Like the equal interval classification of age groups, the same technique applied to state groups (Fig. 53) yields a more idiosyncratic collection of maps than the quintile classification. Broader trends that were suggested by the

standard deviational ellipses are illuminated by the heartland delineation (greater than eighty percent of respondents identifying a county as a Dust Bowl county). Coloradans stitch their state to Oklahoma, Kansas, and New Mexico in a region centered on Baca County, Colorado. Kansans overwhelmingly identify the Dust Bowl phenomena with their state. Their heartland is the largest of any state because of the high level of consensus among respondents.

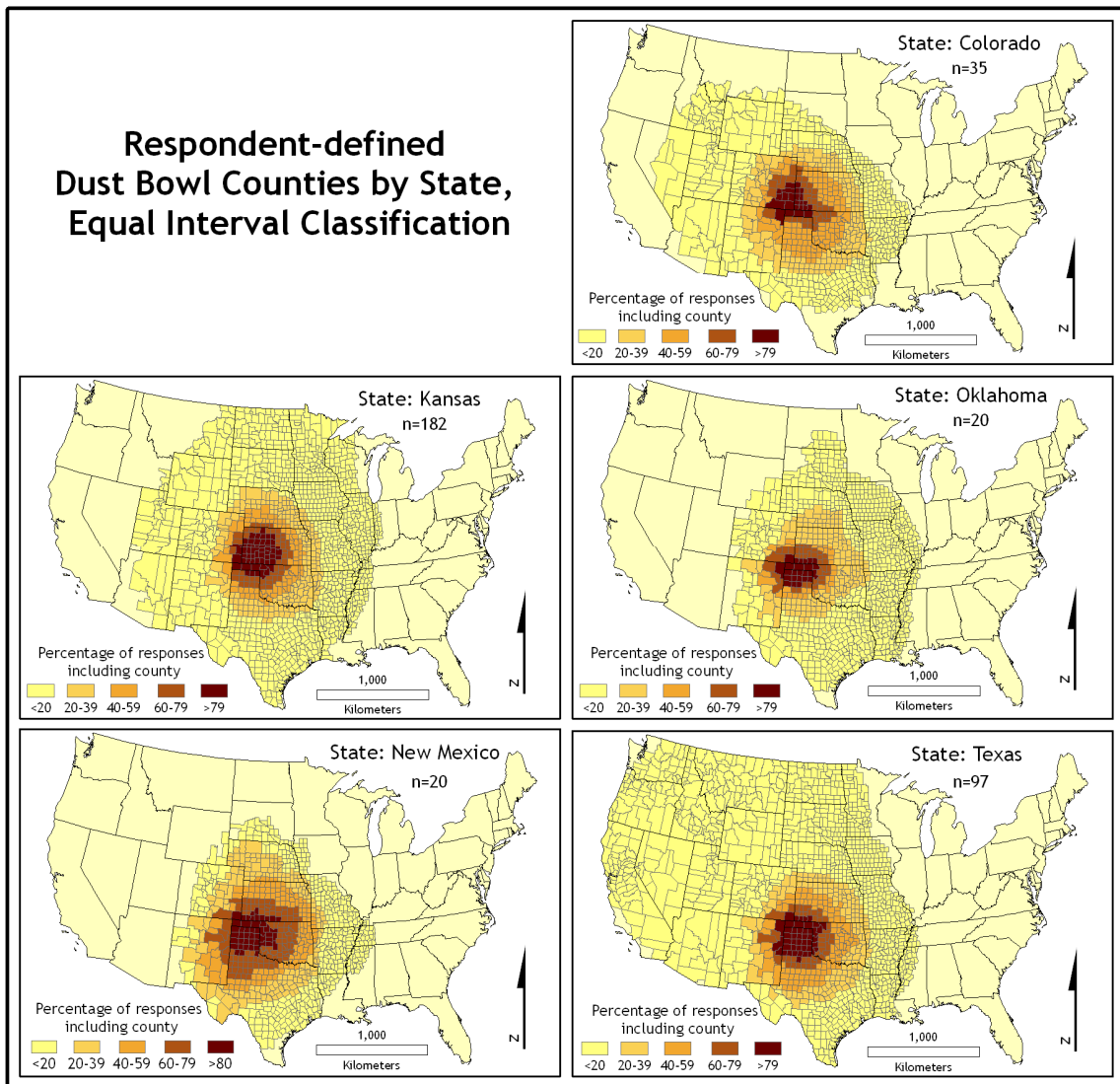


Figure 53. Respondent-defined Dust Bowl Counties by State, Equal Interval Classification

The Oklahoma heartland is centered on the Oklahoma panhandle and also displays an elongated east-west axis. Like their neighbors to the north, Texans strongly associate the Dust Bowl with their own panhandle as well as the Oklahoma panhandle. New Mexico's responses were more erratic, as a result of the smaller sub-sample.

Top Counties

Figure 54 highlights the top counties for each state respondent group. The top ranked county or counties in the case of ties, for each study state are listed along with the county seat. These counties are generally found near the center of the heartland regions defined in Figure 55. Close-up maps of the top counties (Fig. 55) illustrate state/regional bias.

Top-ranked Counties by State Group	
<u>State Group</u>	<u>County (County seat)</u>
Colorado	Baca, CO (Springfield)
Kansas	Ford, KS (Dodge City)
Oklahoma	Beaver, OK (Beaver); Texas, OK (Guymon); Seward, KS (Liberal); Meade, KS (Meade)
New Mexico	Moore, TX (Dumas)
Texas	Hansford, TX (Spearman)

Figure 54. Top-ranked Counties by State Group

A similar map portraying top respondent-defined Dust Bowl counties by age (Fig. 57) once again reduces the state and regional bias and concentrates the top counties in or adjacent to the Oklahoma panhandle. More specifically, the top counties for all age groups are the Oklahoma counties of Beaver or

Texas or counties adjacent to these. This is interesting in light of the significant regional discrepancies that have been detailed by age group. Therefore the placement by younger people of the region is not too erroneous; it's just that the regions are disproportionately large. The top ranked county or counties in the case of ties, for each age group are listed along with the county seat.

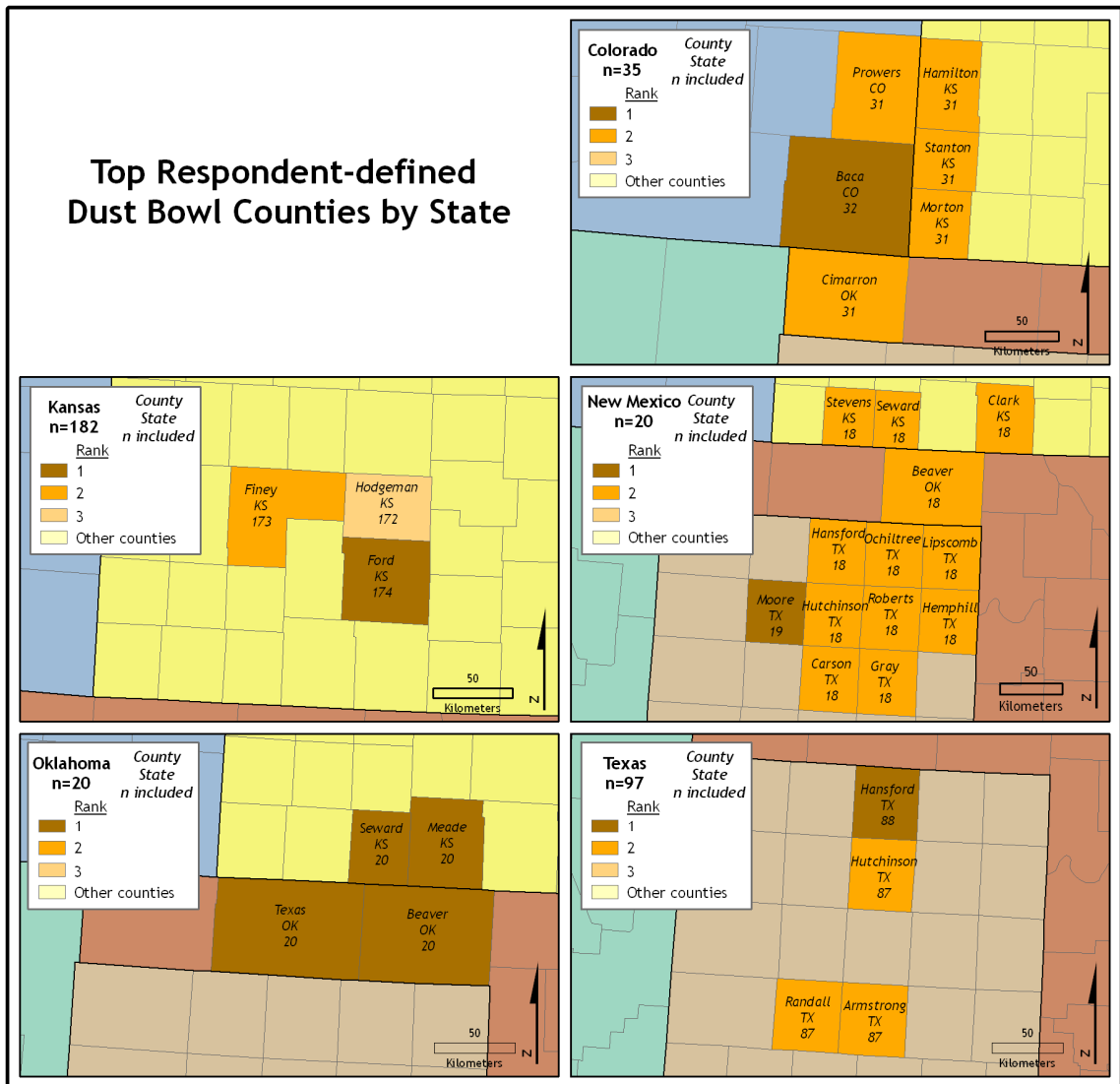


Figure 55. Top Respondent-defined Dust Bowl Counties by State

Top-ranked Counties by Age Group	
Age Group	County (County seat)
20-39	Clark, KS (Ashland)
40-59	Texas, OK (Guymon)
60-79	Beaver, OK (Beaver)
80+	Beaver, OK (Beaver); Texas, OK (Guymon)

Figure 56. Top-ranked Counties by Age Group

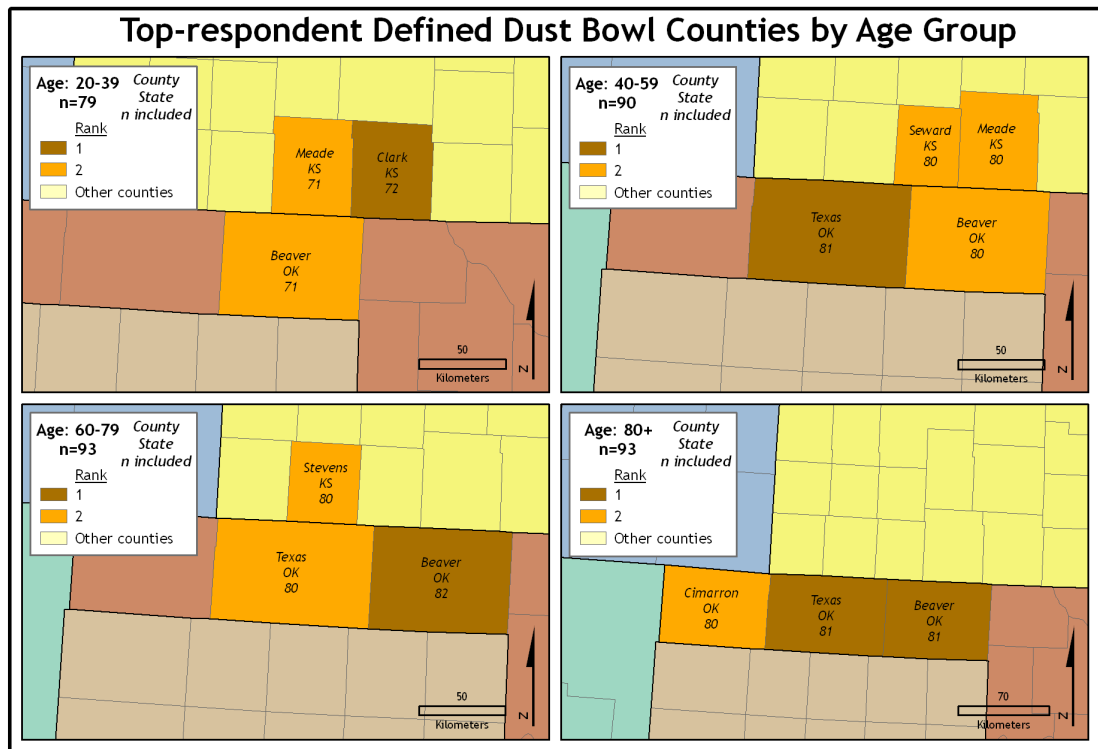


Figure 57. Top Respondent-defined Dust Bowl Counties by Age Group

One final illustration on the topic displays the total top respondent-defined Dust Bowl counties (Fig. 58). Eleven of the fourteen highest-ranked counties are in the Oklahoma panhandle or immediately adjacent. The county included more than any other in Dust Bowl polygons was Beaver, Oklahoma.

More than eighty-eight percent of questionnaire respondents included Beaver County in their Dust Bowl region.

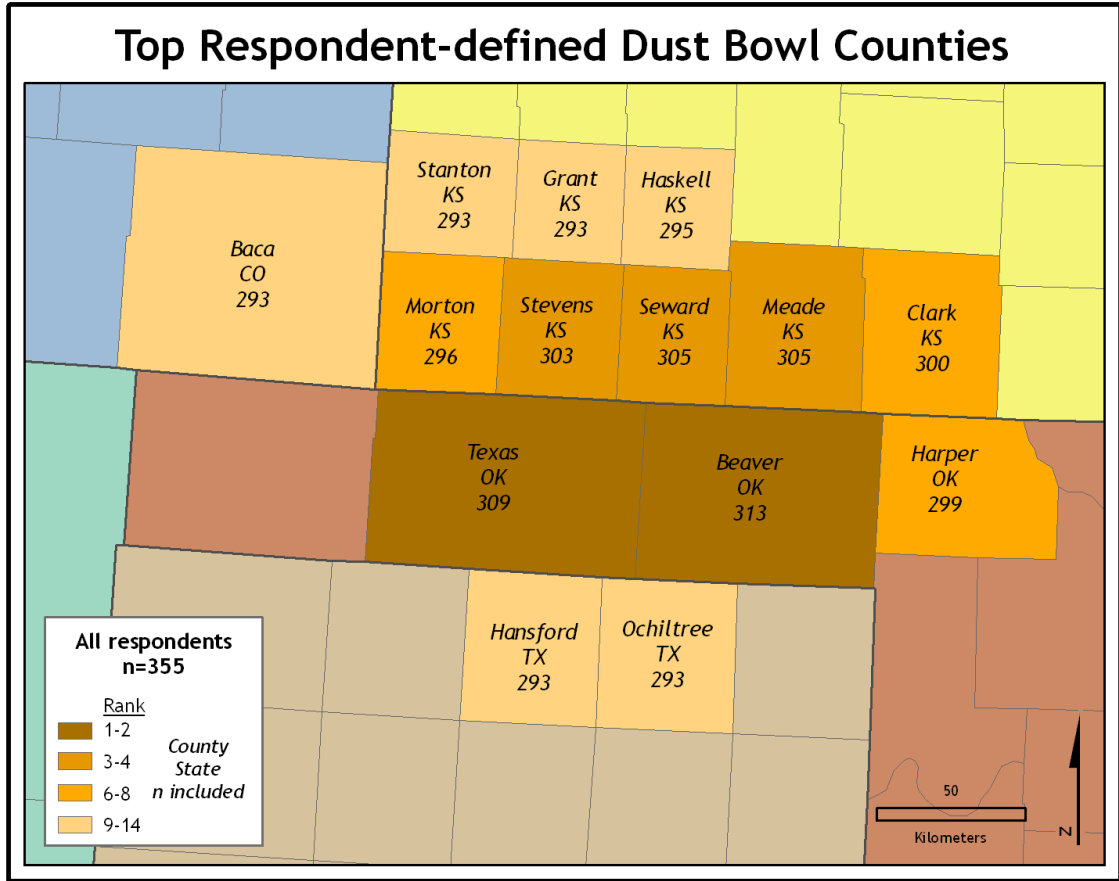


Figure 58. Top Respondent-defined Dust Bowl Counties

Spatial References in Explanation of the Dust Bowl

Item C-1 was also examined to determine if respondents included either general or explicit references to a Dust Bowl region in their explanation of the Dust Bowl. An example of a general regional reference might refer to “the Dust Bowl as an area that experienced severe drought in the 1930’s.” Whereas an explicit reference might explain that “the Dust Bowl was a region in the

Oklahoma and Texas panhandles with a wind erosion problem.” Explicit regional references were rare on item C-1 of the questionnaire. Only twenty-one of the completed questionnaires contained such a reference. These were evenly distributed within age groups and no spatial pattern was present.

More respondents were likely to include a general spatial reference in their definition of the Dust Bowl. However, the thirty-three respondents account for less than ten percent of questionnaires completed by those who were familiar with the term. Older respondents were more likely to include a general spatial reference. The number increased from six in the 20-39 age group to seven for the 40-59 group, eight for the 60-79 group, and twelve for the 80 and older group. The distribution of these responses did not exhibit spatial similarities.

Discussion

"Ask most people about the Dust Bowl and they can place it in the Middle West, though in the imagination it wanders widely, from the Rocky Mountains, through the Great Plains, to Illinois and Indiana." (Cunfer 2004, 1)

This research has validated Cunfer's statement. Indeed the Dust Bowl wanders widely in the imagination. However, when 355 residents of the study area were queried, consensus emerges. This consensus can be noted at the sub-sample age and state levels, as well. This research has shown that with

increasing age, study area residents have more nuanced and refined spatial understandings of the Dust Bowl region. There is also a stronger relationship with the National Archives/Worster maps demonstrated with increasing age.

Significant variation was noted among the state groups, as well. Each state's respondents view their respective state as part of the Dust Bowl region. The maps illustrating respondent-defined Dust Bowl states by state by question (Fig. 25) and Dust Bowl state association by county (Fig. 35) highlight this finding. Personal state association with a vernacular region has been documented previously by Shortridge (1985) in his work on the vernacular Midwest. It would be interesting to expand this study outside the study area for this project to see at what point Oklahoma, Kansas or another state moves in front of the home states to be the first choice.

Staying with the Dust Bowl state association by county map, it is surprising to see the high number of study county respondents that fail to name New Mexico or Colorado as Dust Bowl states. Knowing the land use history and contemporary landscapes of the region, Union County, New Mexico and Baca County, Colorado feel like the heart of the Dust Bowl to this researcher. Perhaps respondents think of Colorado and New Mexico as western mountain states and are not familiar with the High Plains grasslands of the eastern parts of these states. The failure of respondents to identify these counties as part of the Dust Bowl not only indicates limited knowledge of the spatial characteristics of the Dust Bowl, but also a limited knowledge and/or capacity

to consider and synthesize basic geographic characteristics of the greater Dust Bowl region such as topography, soil types, precipitation regimes, and land use.

Nonetheless, when viewed collectively the sample was rather accurate in its assessment of the Dust Bowl region location, if not its size. The fact that the maps of top counties (Fig. 55, Fig. 57, and Fig. 58) “missed” the heart of the Dust Bowl by being slightly too far east should not necessarily be considered a failure by residents of the study area to identify the epicenter of the Dust Bowl. What most researchers would consider the heart of the Dust Bowl is not equidistant from its larger regional boundaries, but rather much closer to the western edge. The methodology of calculating centroids from respondent polygons does not account for this issue.

Several fundamental questions related to regional inquiry unfortunately remain unanswered. What were respondents’ regional boundaries designed to convey? What anthropogenic and physical variables were respondents utilizing in constructing their Dust Bowl region? Issues such as these are inherent to regional studies and should be accepted as a necessary shortcoming of this type of inquiry.

As it is impossible to know what variables respondents utilized to construct their respective Dust Bowl regions, it is also impractical to know what sources have informed their knowledge base on the topic. This research considers thematic Dust Bowl education, relationships with survivors, and regional nativity below. Any number of popular and academic sources has additionally contributed to the formation of Dust Bowl concepts in the minds of

respondents. An example of how the regional concepts of the Dust Bowl could be influenced by outside sources includes Woody Guthrie's folk music (Fig. 59).



Figure 59. Woody Guthrie's Black Sunday

Guthrie was a noteworthy voice of the Dust Bowl era and his 1940 album, *Dust Bowl Ballads*, chronicles the hardships of the time. One song on that album is titled *The Great Dust Storm* and it tells the story of the April 14, 1935 Black Sunday dust storm. In this song Guthrie ticks off the geographic dimensions of the epic storm, beginning with the line “From Oklahoma City to the Arizona line...” (1940). Figure 59 illustrates the geographic features mentioned in the song.

Another example also deals with the Black Sunday dust storm, which maintains a significant role in Dust Bowl lore. Numerous respondents mentioned the storm in the course of completing the questionnaire. Stallings’ (2001) collection of first-hand accounts from the storm represents another take on Black Sunday that could inform the general public’s spatial understanding of the region. Figure 60 illustrates the sources used for his text. If this were a readers’ only exposure to Dust Bowl knowledge, that person would likely disproportionately associate Black Sunday, if not the Dust Bowl event as a whole, with the Texas panhandle.

By comparison, a person basing their Dust Bowl knowledge on Guthrie’s song would tie the event(s) to the Great Plains, whereas a person basing their spatial concept of the Dust Bowl on Steinbeck’s book would disproportionately associate Salisaw, Oklahoma or Route 66 to the event. In all likelihood, respondents’ spatial understanding is not based solely on one book or song or one classroom lesson, but rather an amalgamation of numerous sources.

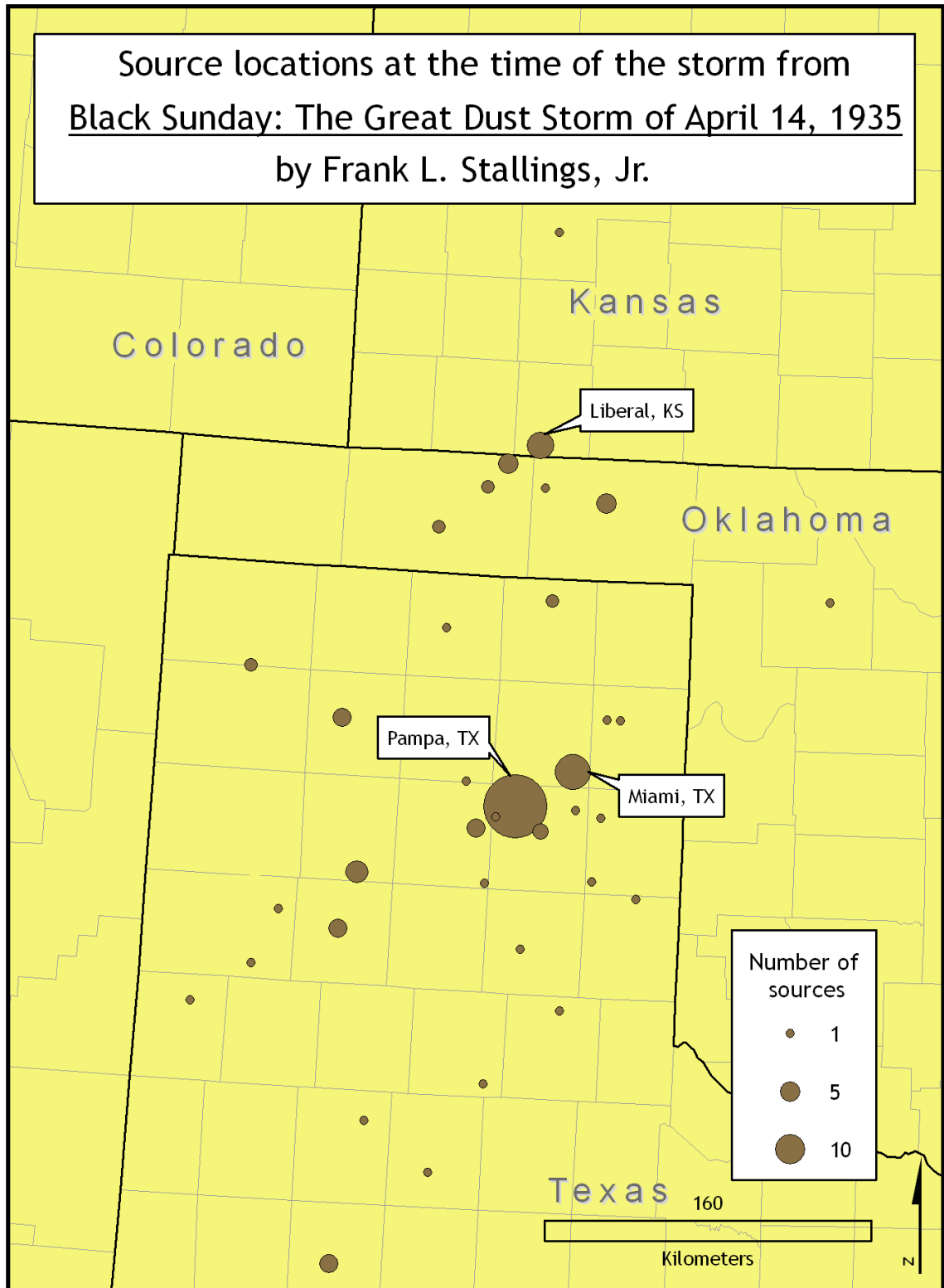


Figure 60. Frank Stallings' Black Sunday

VI. THE DUST BOWL ERA

Previously-defined Dust Bowl Eras

Moving to the next concept, how have texts handled the question of a Dust Bowl era? Compared to the concise regional boundaries that can be subjected to some measure of quantitative comparison, the remaining era and event concepts are much more ambiguous, as evidenced by King's vague comment on the temporal component of the Dust Bowl, "The Dust Bowl was a term used to describe both a region and a moment of history in the mid-1930's" (1997, 5).

As for the notion of a Dust Bowl era, it is difficult to attach definitive start and end years to such a complex event. Depending upon the writer's perspective and emphasis, there can be numerous "right" answers to the question of defining an appropriate temporal frame for the Dust Bowl. For example, some writers have focused on the Great Depression and the associated economic hardships as essential elements of the Dust Bowl story (DeAngelis and DeAngelis 2002; Johnson 1947; King 1997) while others have emphasized the changes in and applications of agricultural technologies (Connell 2004; Cooper 2004; Floyd 1950; Meltzer 2000) or the success or failure of crops (Heinrichs 2005; Henderson 2001; Raven and Essley 1997).

Two examples tied to the success of crops include Low, who laments “1927 was the last of the good years in southeastern North Dakota” (1984, 1) while the protagonist of Hesse’s novel states, “We haven’t had a good crop in three years, not since the bounty of ‘31” (1999, 16). The frequency of dust storms has also been a factor in framing the Dust Bowl era. For example, Raven and Essley (1997) provide annual figures for dust storms in Guymon, Oklahoma between 1933 and 1937. A monumental dust storm is responsible for the one date that shows up more than any other within the Dust Bowl literature. Virtually every text references April 14, 1935, also known as Black Sunday. On this day, the most significant dust storm of the era swept across the Dust Bowl region and into surrounding states. As Stallings reports “The date would become memorable to the extent that people in that region still like to recall exactly where they were and what they were doing and pass on that experience to following generations” (Stallings 2001, 1-2). He concludes that the storm “has remained the symbol of the era” (Stallings 2001, 6).

Others look beyond the dust storms to the broader concept of drought (Bonnifield 1979; Cunfer 2005; Stanley 1992) as the keystone characteristic denoting the beginning or end of the era. Durbin (2002) book-ends the Dust Bowl by the start and end of the drought. “The first sign of an impending ecological disaster came in the summer of 1931” (Durbin 2002, 152) is followed by “the drought lingered until the fall of 1939, when rains finally returned” (157).

Questions of when the Depression started, the farmers moved from horse power to horsepower, and the rains ceased have numerous valid answers that are difficult to arbitrarily assign to a single year. Even in the case of drought, one can define meteorological, hydrological, and agricultural variations. Furthermore, all of these elements can exhibit significant spatial variation. For example, the drought moved around from year to year and the hardships of the Great Depression actually arrived in the Dust Bowl region much later than the majority of the US (Riney-Kehrberg 1994). Where Durbin (2002) ends the era in 1939, Turner and Barrett claim “The terrible drought didn’t end until the rains came after 1941” (1995, 64).

Therefore, comparing beginning and end years of the Dust Bowl from a sample of Dust Bowl literature is a challenging proposition, at best. With that said, Figure 61 illustrates previously-defined Dust Bowl eras. This illustration lists start and end years for twenty-eight sources of Dust Bowl information. This list largely overlaps with the sources that were included in the analysis of previously-defined Dust Bowl regions. Eight sources (DeAngelis and DeAngelis 2002; Hesse 1999; Johnson 1947; Low 1984; Raven and Essley 1997; Stallings 2001; Svobida 1986; Turner and Barrett 1995) that are included here were not included in Figure 15 and Appendix D, the map of previously-defined Dust Bowl regions because they do not include maps of the Dust Bowl region within their texts. Likewise, eight sources (Babb, Babb, and Wixon 2007; Hurt 1985; Joel 1937; Mantin 1997; Public Broadcasting Service 1998; United States Department of Agriculture Wind Erosion Research Unit 1999; World Maps Online 2007;

Wunder, Kaye, and Carstensen 1999) from Figure 15 are not included in the previously-defined eras figure because they did not include enough information to extract generalized start and end years. The reader should not imply that these twenty-eight sources provide tidy temporal windows in which the drama of the Dust Bowl unfolded. Rather the dates ascribed to these sources are generalized to a single year based upon the best judgment of this author following careful review of each source. Once again, the goal is to establish a comparative context for questionnaire respondents.

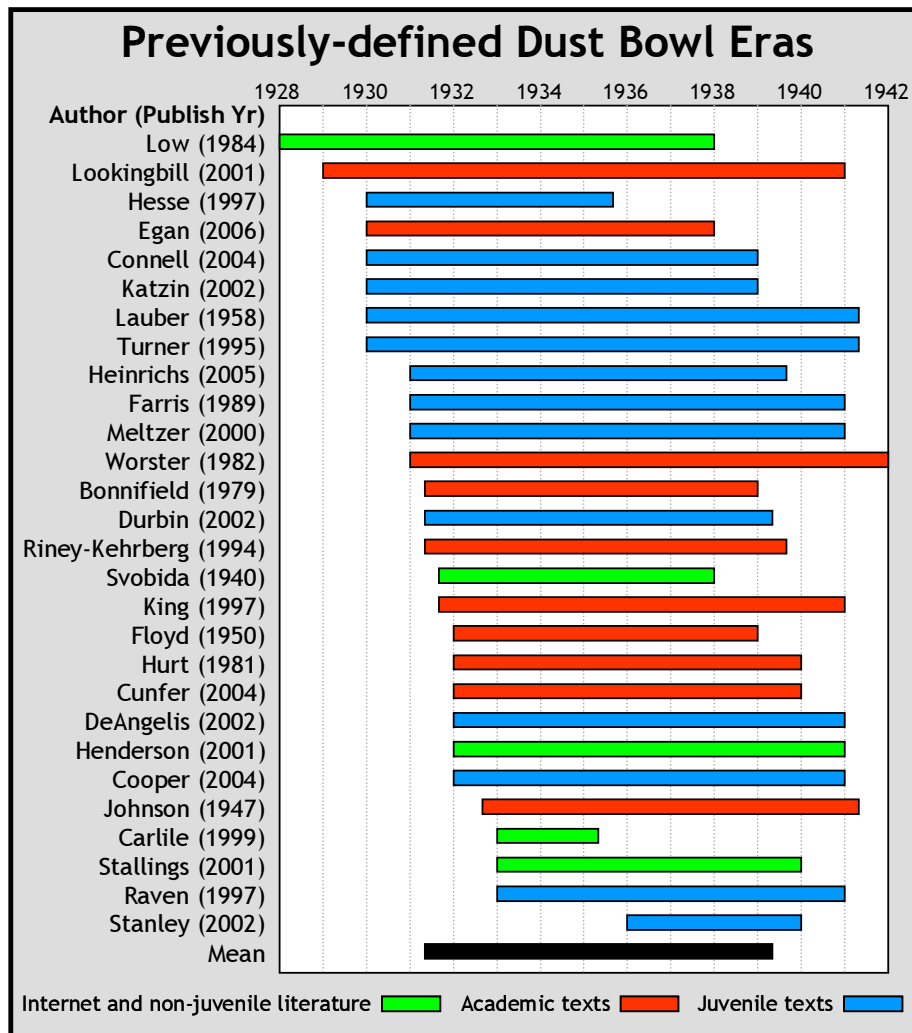


Figure 61. Previously-defined Dust Bowl Eras

For the sample of twenty-eight sources, start years range from 1928 to 1936 while end years range from 1935 to 1942. The mean start year for this selection of Dust Bowl sources is 1931 and the mean end year is 1939. The juvenile texts stand out for generally portraying the Dust Bowl era as longer than most academic texts. Additionally, five juvenile texts (Connell 2004; Hesse 1999; Katzin 2002; Lauber 1958; Turner and Barrett 1995) seem to generalize the Dust Bowl era with the 1930's decade and begin the Dust Bowl event in 1930. However, most locations in the Dust Bowl region did not experience the drought until 1931 (Bonnifield 1979; Worster 1982). In fact, the 1930 wheat harvest was a bumper crop (Cunfer 2005; Hurt 1981). The consensus of academic texts places the start of the Dust Bowl in 1931 or later.

Dust Bowl Era by the People

In some regards, analysis of questionnaire responses to the temporal frame of the Dust Bowl is even more challenging than a review of previously-published work. The reader can usually ascertain what factors are contributing to the respective authors providing an important date or set of dates to mark the opening or closing of the era whereas each respondent may utilize any factor or combination of factors to determine and record a beginning and end year. Nonetheless, the standardized collection of dates and the requirement that respondents simplify their era response to three years, a beginning, an

end, and a peak creates the opportunity for more uniform comparative analysis than the assessment of previously-published texts.

Beginning, End, and Peak Years

Item B-1 (Fig. 62) of the questionnaire asked respondents to “Define the Dust Bowl era by marking the beginning and end of the Dust Bowl era on the timeline below.” The reference events of World War I, the Great Depression, World War II, the Korean War, and the Vietnam War were included on the timeline. Marks made by respondents were interpreted by the author and ascribed to a year. Many respondents wrote the start and stop years above their marks, including several that were earlier or later than the dates presented on the timeline.

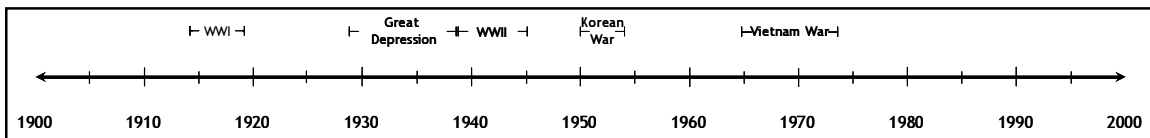


Figure 62. Timeline from Item B-1

Figure 63 illustrates the cumulative responses to item B-1. Starting years ranged from 1830 to 2004. The mean was 1929.64 and the standard deviation was 9.98 years. The overwhelming choice for the beginning year was 1930. The distribution is skewed to the right with the second and third most popular choices 1931 and 1932. The fourth most popular choice is 1928. This may have been a more popular choice than 1929 as a result of some

respondents association of the start of the Great Depression as synonymous with the start of the Dust Bowl.

Ending years ranged from 1860 to 2006. The mean ending year was 1938.43 with a standard deviation of 9.11. The most popular choice for end year was 1939 followed by 1937 and 1938 respectively. Therefore, the distribution is skewed to the left. The opposite skew creates distinct bookends for the Dust Bowl era according to the sample. While variation in regard to the beginning and end of the Dust Bowl is evident, that variation is largely confined to the period 1930-1939.

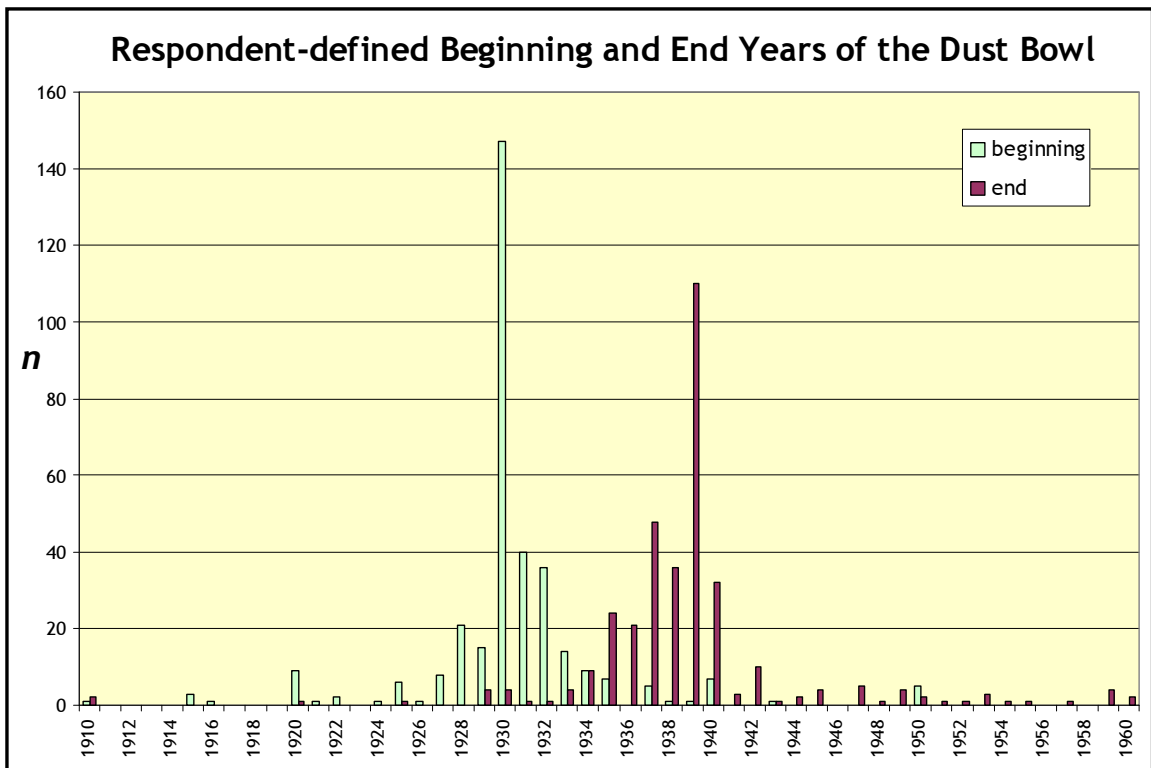


Figure 63. Respondent-defined Beginning and End Years of the Dust Bowl

The disproportionate selection of 1930 and 1939 as beginning and end years suggests that many respondents generalize the Dust Bowl to a decade-

long event that corresponds with the 1930's. In fact, the "dirty thirties" is a popular title for the decade that was heard numerous times in the author's discussions with residents of the study area. The notion of generalization to a decade-long concept of the Dust Bowl is also supported by the overwhelming number of responses that selected 1930 as the beginning year of the Dust Bowl. As discussed above, most locations in the Dust Bowl region did not experience the drought until 1931.

The clear favorite for the concluding year is 1939, but by a lesser margin than 1930 was selected as the starting year. It is interesting to see the spread of responses for ending years that stretch through the following decades of the 1950's and 60's. This could suggest that respondents were tying personal experiences of drought and dust to their reported end years. Very few respondents could relate personal experiences that predated 1930 whereas the 1950's and/or 1960's were experienced by respondents in the 60-79 and 80 and older age groups.

Item B-2 asked respondents "What year represents the peak of the Dust Bowl?" A remarkable number of respondents did not respond or provided responses such as a question mark or "not sure." One hundred thirty-five responses fell into this category. In these cases, the middle year of the respondents' range created by the beginning and end years was utilized for the peak year. These are referred to as derived responses. For example, if a respondent provided 1930 and 1934 as beginning and end years, then 1932 was entered as a derived value. In cases where the range was an even number of

years, such as 1930-39, half of the derived responses were assigned the value of 1934 and half were assigned the value of 1935.

Figure 64 illustrates the distribution of peak years with and without these derived responses. The distributions have similar shapes that are skewed to the left. The most popular response is 1935 followed by 1934, 1933, 1932, and 1936. The greatest divergence between the distributions that do and do not include derived responses regards the disproportionate increase in frequency for 1934 and 1935 when the derived responses are included. This illustrates the fact that many of the respondents who generalized the Dust Bowl era to the entire 1930's decade were more likely to be those respondents who could not identify a peak year for the era.

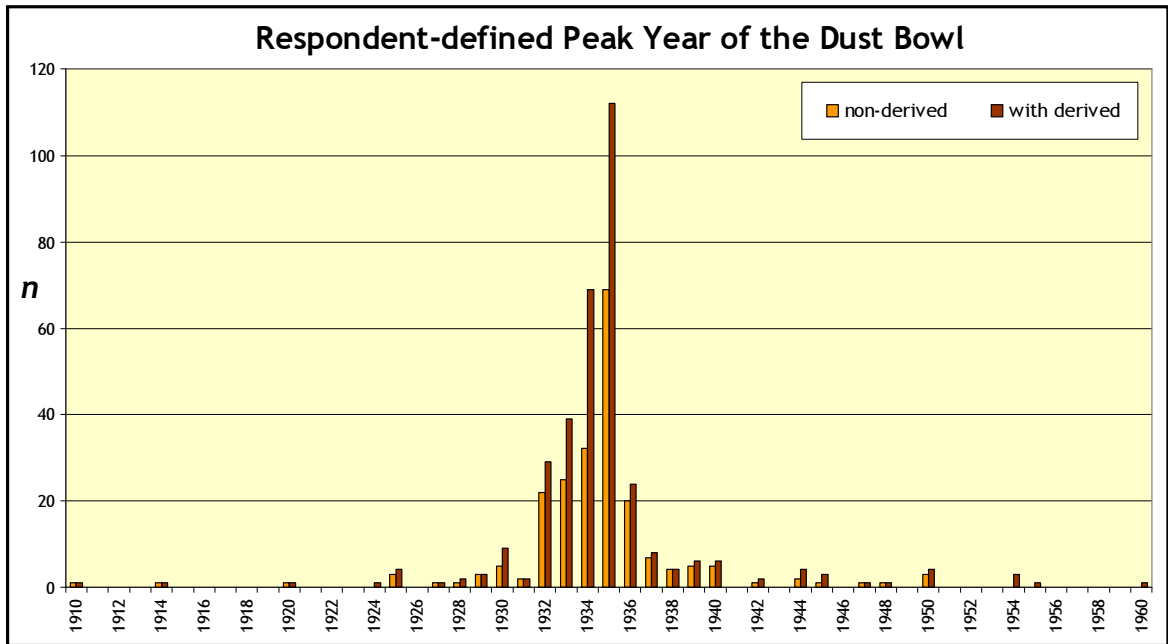


Figure 64. Respondent-defined Peak Year of the Dust Bowl

Era Responses by Age and State Group

The next two figures (Fig. 65 and Fig. 66) illustrate individual responses to items B-1 and B-2. Responses are broken into state groups by age group. Individual lines represent the span of each respondent's Dust Bowl era. Triangles within each line represent the peak year provided by respondents or derived from beginning and ending years. Italicized dates at the bottom of each chart represent responses within each state group that are partially or wholly off the respective charts.

Comparison between the age groups shows that the range of responses progressively narrows with age. The 20-39 age group chart illustrates that thirty-seven of seventy-six responses are partially or wholly outside the 1930 to 1940 time frame. On the other hand, the 80 and older chart exhibits twelve responses of ninety-three that partially fall outside the same eleven year window. All of the responses on the 80 and older chart are at least partially in the 1930's. It is also noticeable that the lines are shorter, indicating a briefer Dust Bowl era, as one progresses through the charts from young to old.

When the attention turns to state groups, significant variation can also be noted. Kansas, without question, exhibits the most homogeneity within responses to items B-1 and B-2. With only a handful of exceptions, the uniformity in the Kansas responses across age groups is striking. Texas, on the other hand, exhibits noteworthy variation in beginning years, end years, and peak years.

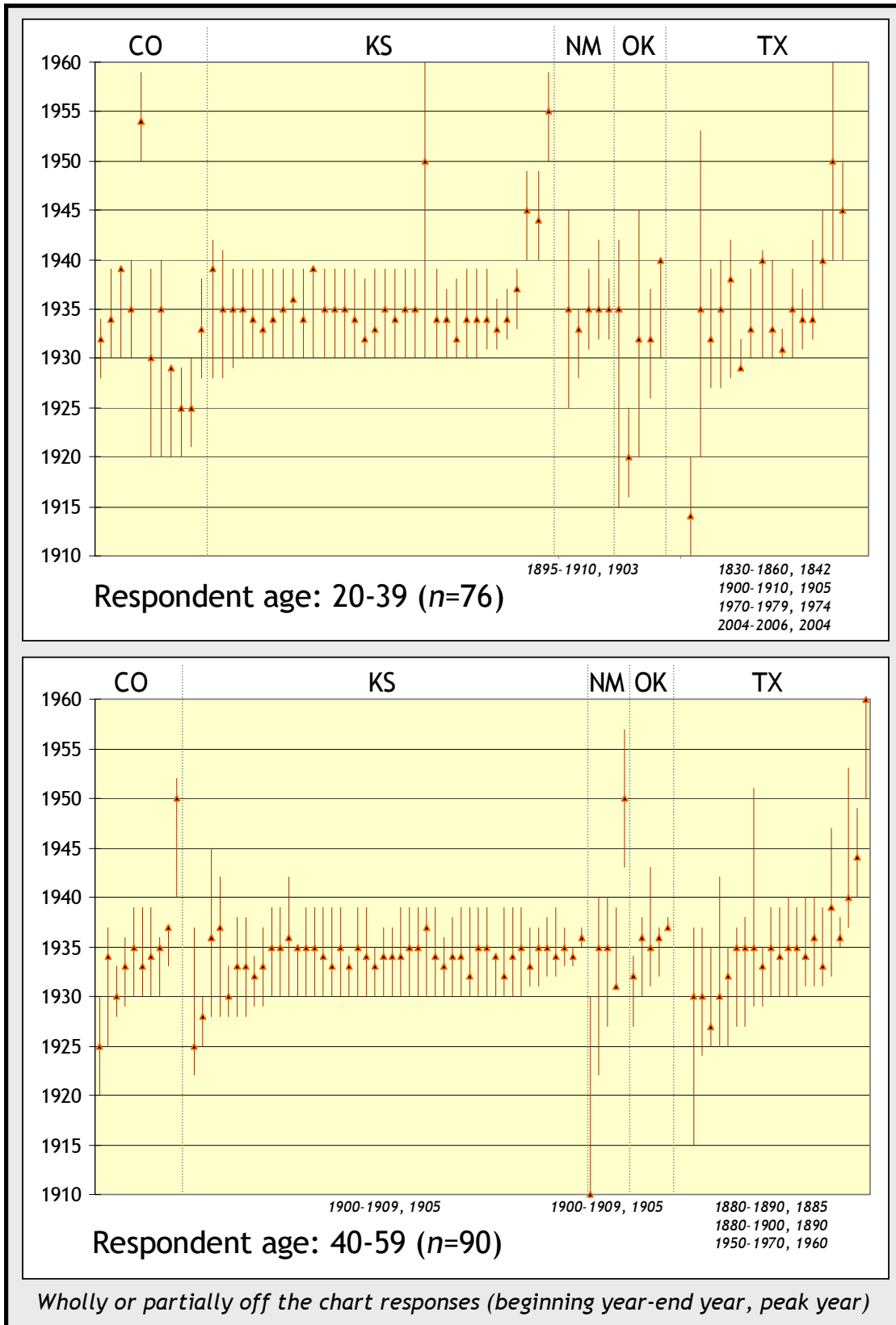


Figure 65. Respondent-defined Dust Bowl Eras, Age Groups 20-39 and 40-59

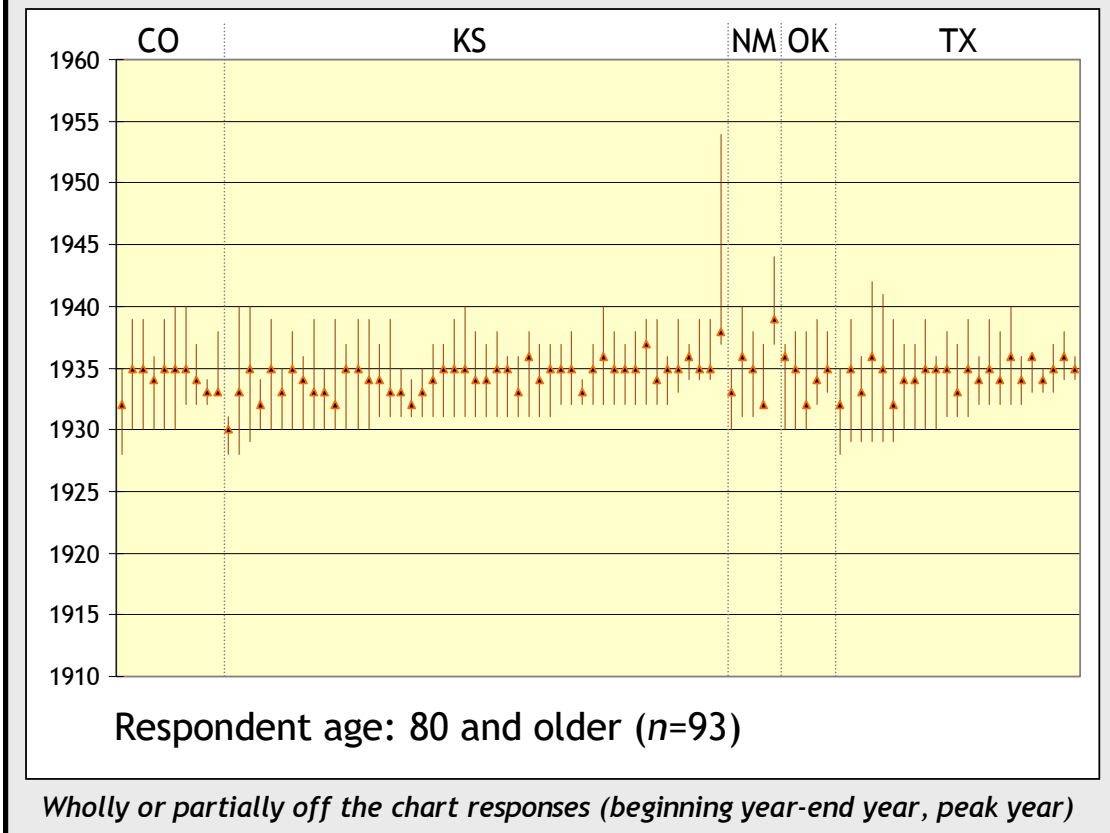
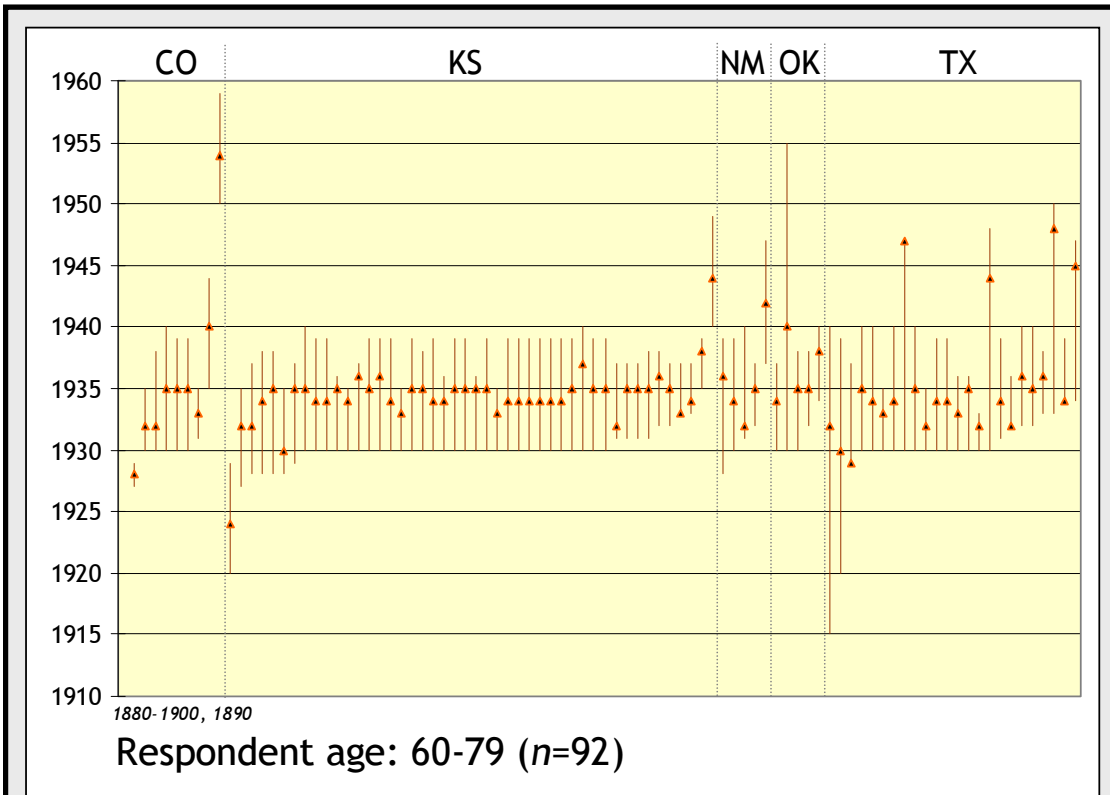


Figure 66. Respondent-defined Dust Bowl Eras, Age Groups 60-79 and 80+

A final observation relates to the relationship between beginning year and duration. In general, respondents that provided later start years provided shorter eras for the Dust Bowl. It could be that these responses are from respondents with more knowledge regarding the Dust Bowl event. If a respondent does not assign a start date of 1930, they are less likely to extend the Dust Bowl era all the way to 1939 or 1940. Providing a beginning date that follows 1930 suggests a more detailed understanding of the Dust Bowl. Such an understanding may lead to these respondents providing an end date that correlates to improvements in local conditions or a specific Dust Bowl component.

Figure 67 maps responses to item B-2, the peak year of the Dust Bowl. Patterns that were evident in the preceding figures can be seen here, as well. These include increasing uniformity in responses with age. Whereas the twenty-two black or white counties indicating pre-1931 and post-1939 responses respectively are peppered across the 20 to 39 year-old map, only two responses on the 80 and older map were in the earliest or latest class. Among the age groups, the mean peak year (Fig. 68) is surprisingly constant with three of the four groups providing mean peak years in the latter half of 1934. The extreme responses in the youngest class effectively cancel each other out. The 40 to 59 group is the lone exception with a mean date approximately one and one half years earlier. The disproportionate number of responses in the earliest class is responsible for this result, but it is difficult to know why this group deviates from the other three.

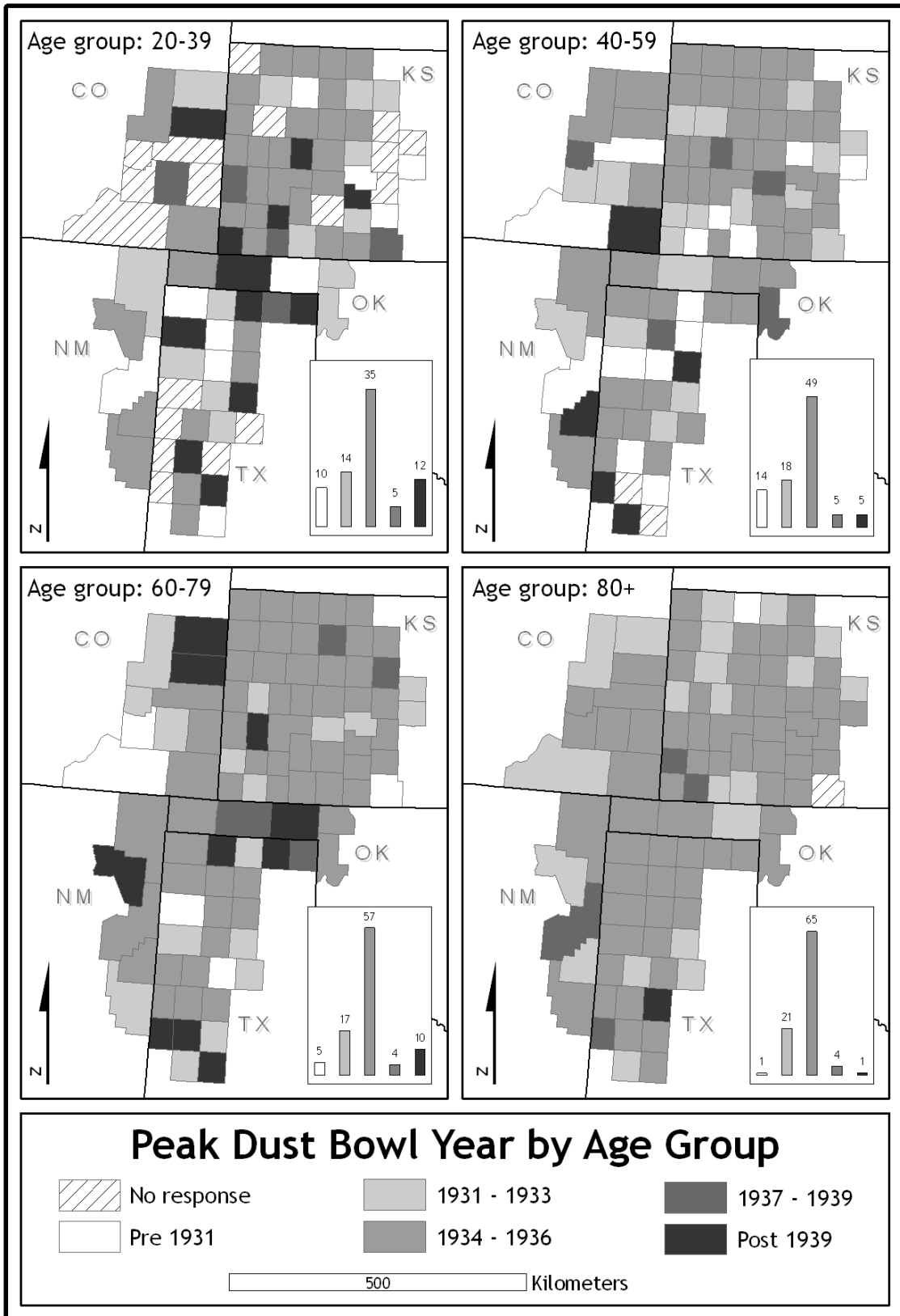


Figure 67. Peak Dust Bowl Year by Age Group (Map)

Among state groups (Fig. 69), there is remarkable agreement as well. All of the states excluding New Mexico had mean peak years in the first half of 1934. New Mexico responses provided a peak year that was more than a full year earlier than any of the other states. Because of the small New Mexico sample of twenty respondents, two extreme outliers had a disproportionate effect on the mean for the state.

Aggregating the responses by county further illustrates the aforementioned homogeneity of Kansas and the heterogeneity of Texas responses, but does not suggest any larger patterns in the data. The cluster of four counties in west Texas at the southern extent of the study area does not jibe with established facts of the relative location of the most severe drought areas by year (Cunfer 2005). This cluster of counties (Cochran, Hockley, Lamb, Terry) experienced their hottest and driest conditions in the early part of the decade. This map should also be viewed cautiously because extreme responses can drastically affect a mean calculated from only four responses.

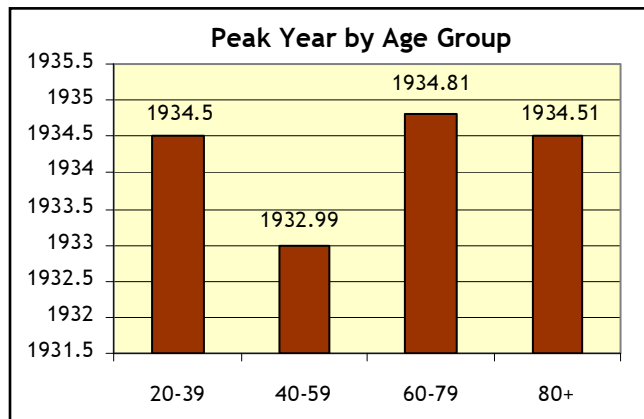


Figure 68. Peak Dust Bowl Year by Age Group (Chart)

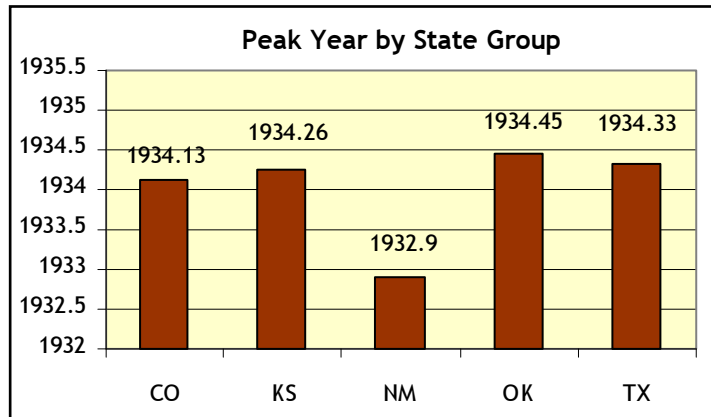


Figure 69. Peak Dust Bowl Year by State Group (Chart)

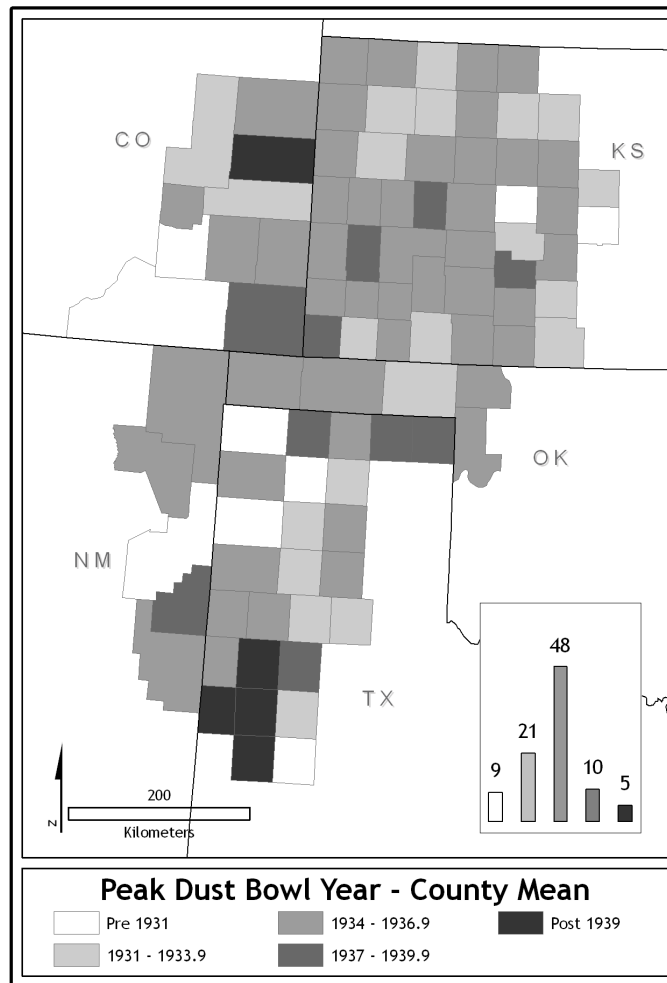


Figure 70. Peak Dust Bowl Year - County Mean

Duration of the Dust Bowl

Older respondents generally provided shorter durations for the Dust Bowl era than their younger counterparts. This is best seen by examining the shifting inset bar charts within each age group map (Fig. 71). For example, six of seventy-six respondents (8%) in the 20 to 39 year-old group provided an era of four to six years for the Dust Bowl era while thirty-eight of ninety-three (41%) responses in the 80 and older age group can be assigned to that class. Responses indicating a Dust Bowl era of more than sixteen years exhibited an inverse pattern to the previous example. Nine respondents in both the 20 to 39 and 40 to 59 groups indicated that the duration of the Dust Bowl exceeded sixteen years. On the other hand, only one person's response in the 80 and older age group could be placed in that longest class.

These examples are reflected in the figures for mean Dust Bowl duration by age group (Fig. 72). The mean duration by age group steadily decreases from a high of 10.84 years for the 20 to 39 age group to a low of 6.66 years for the 80 and older age group. Comparatively, the state groups (Fig. 73) vary from a low of 7.98 years for Kansas to a high of 10.76 for New Mexico. The small sample sizes for New Mexico and Oklahoma of twenty respondents each makes them vulnerable to excessive influence from outliers. Comparing the two largest samples, Kansas and Texas, yields an interesting discrepancy of nearly two full years. For some reason, Texans reported that the Dust Bowl was approximately twenty percent longer than their neighbors to the north.

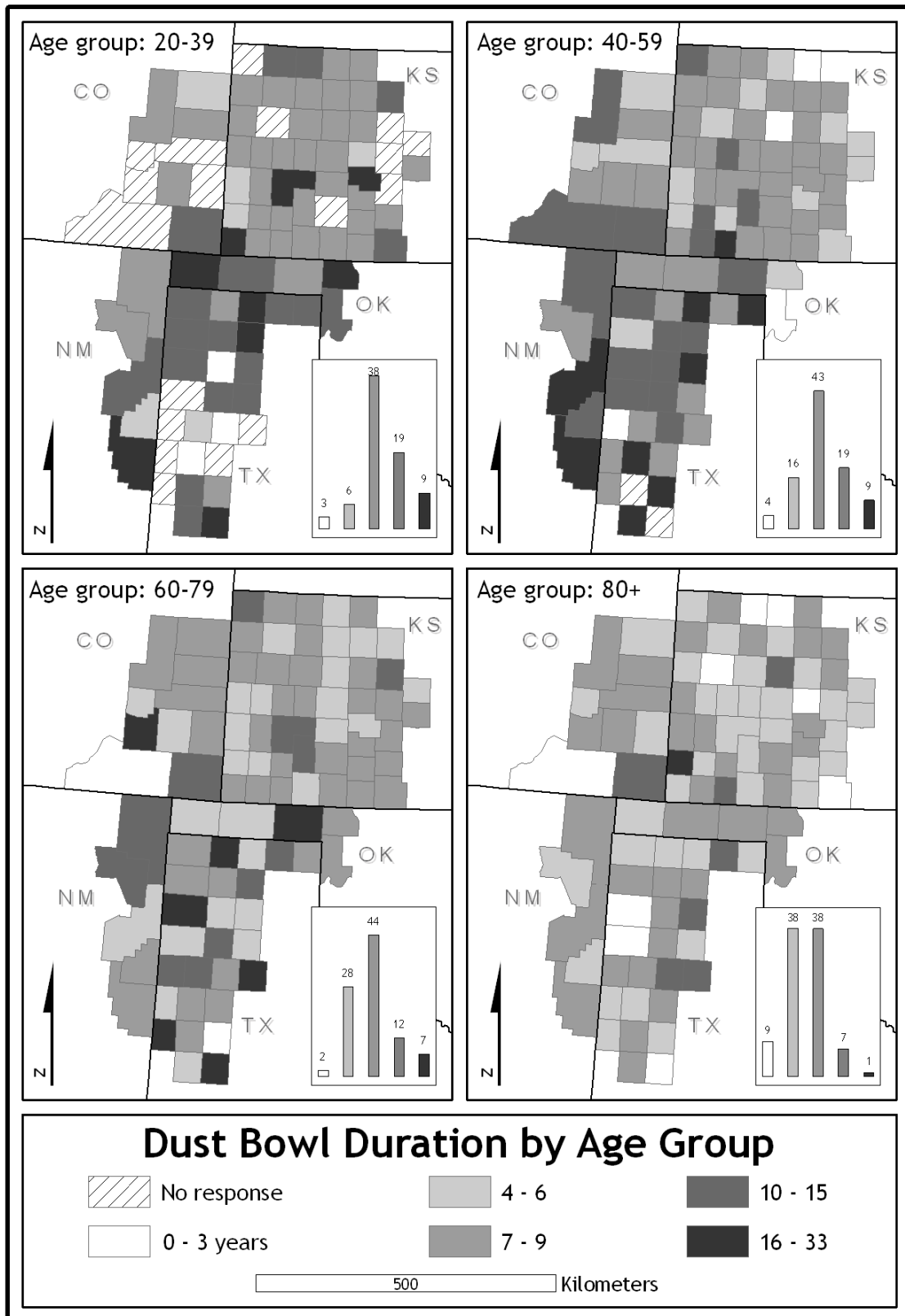


Figure 71. Dust Bowl Duration by Age Group

The three southern Dust Bowl states collectively reported the Dust Bowl as a ten-year era while the two northern states attached a mean figure of eight years to the era. This is particularly curious in light of the fact that the Dust Bowl drought was most persistent in the northern half of the region (Cunfer 2005). This pattern can be seen on the map of mean county responses for the era duration (Fig. 74).

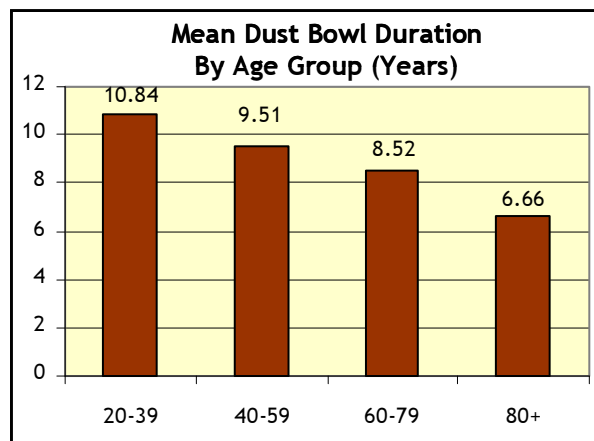


Figure 72. Mean Dust Bowl Duration by Age Group

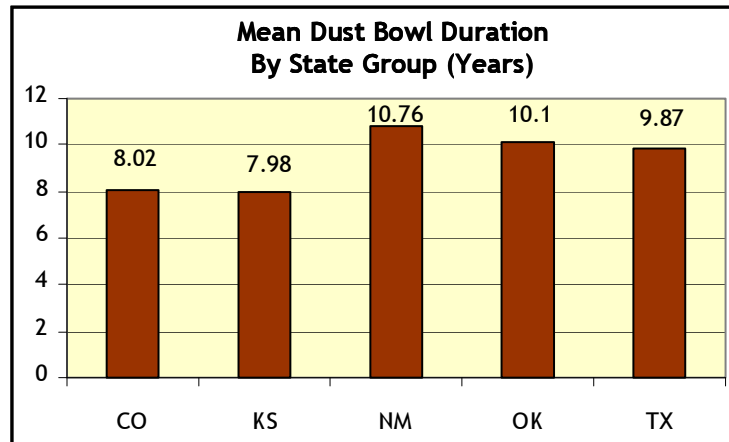


Figure 73. Mean Dust Bowl Duration by State Group

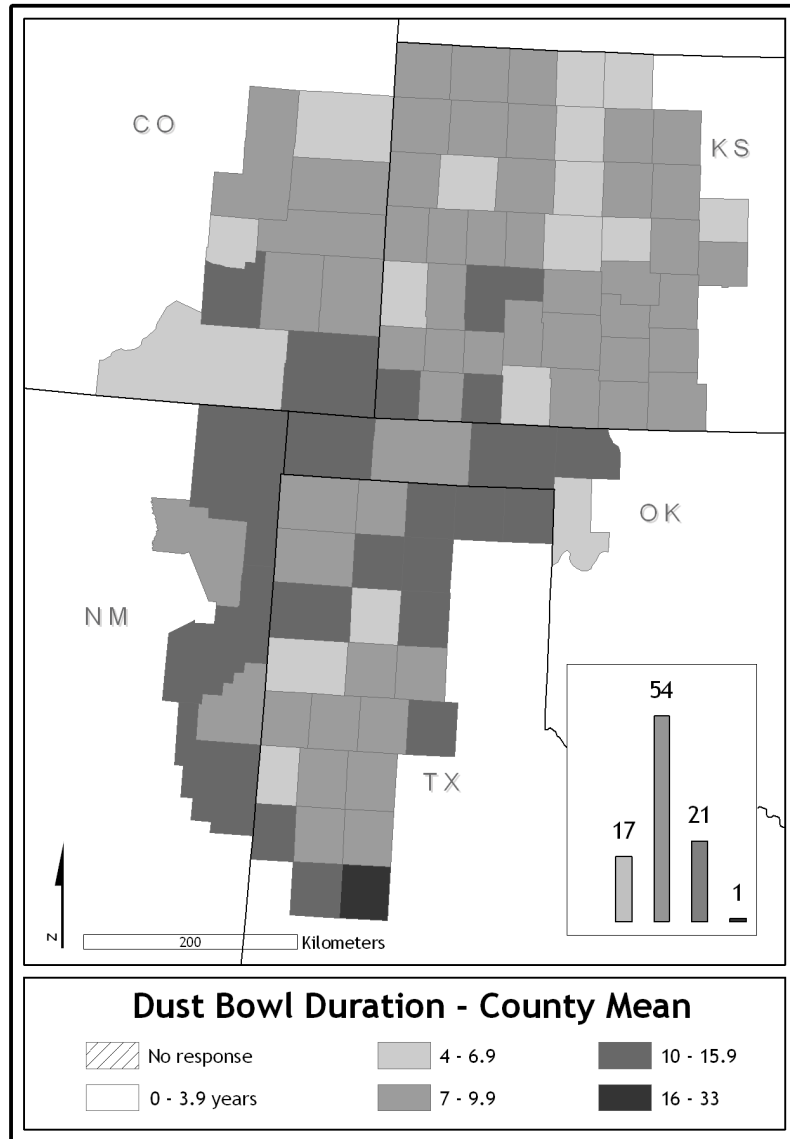


Figure 74. Dust Bowl Duration - County Mean

Discussion

Once again, older respondents demonstrate a higher level of knowledge regarding a Dust Bowl concept. Whereas many respondents in the 80 and older age group provided specific (to the month in many cases) beginning, end, and peak years, it was common for younger respondents to generalize the Dust

Bowl era to the entire 1930's decade. A number of juvenile texts also affix the start of the era to 1930, demonstrating that this overgeneralization of time to decadal breaks is unfortunately supported by published works.

Beyond specific years associated with the Dust Bowl era, there were also noteworthy differences reported regarding the duration of the era. A direct relationship between age and duration of the Dust Bowl showed the era steadily gaining in duration with successively younger respondents. While this is likely a reflection of the overgeneralization to the 1930's discussed above, it could also suggest that Dust Bowl mythology has steadily inflated the characteristics of the event in those who are less familiar with it. Similarly, the longer duration mean for Texas respondents appears to be another manifestation of "everything's bigger in Texas" just as Chapter Five illustrated Texans' disproportionately large Dust Bowl regions. Kansans, on the other hand, continue to display their grasp of Dust Bowl knowledge by providing a mean duration that more closely jibes with the academic consensus.

Despite the lengthy and less accurate temporal frames provided by younger respondents, questionnaire data suggest that young people are more likely to identify the Dust Bowl as a temporal concept than their older counterparts. Respondents in the 20-39 age group were more than twice as likely to describe the Dust Bowl with a general or explicit temporal reference in their response to item C-1, "In your words, what was the Dust Bowl?" An example of a general temporal reference is "the Dust Bowl was a time when..."

while an example of an explicit temporal reference is “the Dust Bowl was a period between 1931 and 1938 when...”

Forty-nine percent of respondents in the youngest age group utilized a temporal reference in their explanation of the Dust Bowl. By comparison thirty-two percent of 40 to 59 year-olds, twenty-three percent of 60 to 79 year-olds and nineteen percent of respondents 80 and older included a reference to the temporal Dust Bowl concept. Maps A-4 and A-5 in Appendix A display these results. A disproportionate number of young people incorporated the term “dirty thirties” in their explanation of the Dust Bowl. In fact, several responses to item C-1 consisted solely of that short phrase. Therefore, it may be this synonym that is responsible for the increased association with the Dust Bowl era concept for younger respondents.

VII. THE DUST BOWL EVENT

One Event, Many Stories

The Dust Bowl event has been portrayed in a variety of ways by a great number of voices. Academics, popular writers, and artists have all contributed their perspective on this unique chapter of American history. As was the case with the review of Dust Bowl texts in regard to the era concept of the phenomenon, it must be reiterated that every source may exhibit significant variation in its objectives, its component emphasis, and for that matter, its agenda. The purpose, therefore, of examining a sizable sample of Dust Bowl texts is to provide a comparative context against which to report the findings of the original research contained herein. Three works are noteworthy for their compilation and/or assessment of the range of sources that have contributed to the modern Dust Bowl concept.

Buckley (1999) provides the most comprehensive bibliography of the Dust Bowl to date. Over four hundred directly and indirectly-related sources are provided. Topics ranging from government policy to agricultural history to cultural identities of the region are included. McDean's (1986) *Dust Bowl Historiography* describes the Dust Bowl's "schizophrenic history" as he outlines differences between the seminal works of Bonnifield (1979), Hurt (1985), and

Worster (1982) among other lesser-known texts. McDean's work conveys the exceptional range in topical material, writer approaches, and conclusions of texts that address the Dust Bowl.

McDean's survey and analysis of these seminal works should be read with caution, however, as his work is tainted by his bias toward a human causal explanation. He succinctly states that many writers have missed "the most important point" - that "the Dust Bowl was not a natural disaster; it was a disaster caused by what people did to nature" (McDean 1986, 369). McDean's anthropogenic bias is particularly ironic in that he attributes the uneven nature of Dust Bowl narratives to "the bias of some Dust Bowl historians" that "has helped create misperception in the minds of the textbook writers" (McDean 1986, 371).

William Cronon's Explanation of Polar Dust Bowl Narratives

Cronon's (1992) discussion of the divergent Dust Bowl narratives with a focus on Bonnifield (1979) and Worster (1982) deftly explains the variation that McDean (1986) identifies. Cronon provides unparalleled insight into how multiple sources working with essentially the same data can produce dramatically different narratives of the Dust Bowl. Upward sweeping narratives, like Bonnifield, present the Dust Bowl as a natural disaster that is overcome by the perseverance of individuals and communities alike. Technology, as best represented by Webb (1959), is the primary tool that helps

humans overcome the natural challenges of the Great Plains environment. This story of improvement and accomplishment can be referred to as the triumph narrative.

On the other hand, the tragedy narrative is embraced by authors such as Worster (1982). With their genesis in the New Deal account of what transpired in the Great Plains in the 1930's, these stories of the Dust Bowl emphasize the human failure to adapt to the constraints of nature and conclude with endings that are more negative. These stories emphasize the expansion of settlement and agriculture during wetter periods only to fail miserably when drought inevitably returns. New Deal authors emphasized that the notion of humans triumphing over nature was not only false, but was the underlying cause of the Dust Bowl disaster. Cronon describes this narrative of Great Plains history as "a tale of self-deluding hubris and refusal to accept reality" (1992, 1357).

Both variants of the Dust Bowl story, as Cronon (1992, 1348) points out, are "inextricably bound to [their] conclusion, and the historical analysis derives much of its force from the upward or downward sweep of the plot." For authors like Webb and James Malin (Malin and Swierenga 1984), who penned more ecologically-themed works on the region, human ingenuity and determination were capable of mastering the harsh Plains environment. By comparison, proponents of the tragedy narrative believed the natural environment was not only challenging, but fundamentally unchangeable (Cronon 1992). Cronon points out that the tragedy narrative is not wholly

tragic in many accounts as adaptation by Plains inhabitants in response to outside planners and regional coordinators can lead to a sustainable existence.

Cronon's analysis and conclusions can be applied to any comparative endeavor within the body of Dust Bowl texts. Indeed many works subscribe to the tragedy or triumph perspective. Cronon explains that this occurs so the plot and its changing scene flow toward an ultimate ending and resultant landscape that is either garden or wasteland. This allows for a moral to be obtained from the story. These morals often address the perceived causal mechanisms of the Dust Bowl. For example, Cronon notes that dust storms have occurred on the Great Plains for millennia, "yet the ones we really care about - those we now narrate under the title "Dust Bowl" - are the ones we can most easily transform into stories in which people become the heroes or victims or villains" (1992, 1369).

So who or what is responsible for those dust storms? Because actions and consequences can be valued in so many different ways by agents, narrators, and audiences, Cronon reiterates that is possible to narrate the same evidence in "radically different ways" (1992, 1370). Despite the tendency for authors to attach to a dominant narrative strain and any associated causal mechanism, most texts address a catalog of key themes in their treatment of the Dust Bowl. Therefore, a brief discussion of causation and the dominant themes of Dust Bowl narratives provide a contextual introduction to the peoples understanding of the Dust Bowl event.

Key Themes in Dust Bowl Texts

Several themes stand out in a review of Dust Bowl texts: drought, the humans versus nature dynamic, and migration. The overarching theme of causation often colors the discussion of the aforementioned themes. Many authors have crafted Dust Bowl narratives that come with unapologetic biases toward anthropogenic causal factors associated with the tragedy narrative while others favor environmental explanations of the Dust Bowl phenomena that are often tied to the triumph narrative. Few authors present wholly balanced accounts of the complex interaction of human and physical factors that contributed to the creation of the Dust Bowl. A sample of Dust Bowl literature provides a taste of the biases that permeate the causation discussion.

Causation

One can imagine a Dust Bowl causation spectrum with an overly human explanation on one side and an overly climatological explanation (drought) on the other. All Dust Bowl authors have had to determine where to place their story on this hypothetical spectrum of Dust Bowl causation. Of course, no author on the topic can adequately tell the story without both the climatological and anthropogenic components. However, many texts on the Dust Bowl exude a bias toward one explanatory pole or the other.

Figure 75 was drafted to provide a very general assessment of where the sample texts fall on a hypothetical spectrum of causation. Indeed, an assessment by another author would produce a figure with some deviation because of the subjective nature of such an assessment. In the only comparable work on assessment of causation, Riebsame's (1986, 132) evaluation of articles on Great Plains drought found that thirty percent of articles expressing an explicit cause of the drought-related problems assigned the blame to physical components such as climate. On the other hand, sixty-six percent blamed human factors such as farming techniques as the culprit.

In this case, there has been an attempt to ascertain the overall tone of causation when the text is viewed as a whole. Cherry-picking of quotes from any of the texts would allow most of the sample texts to be placed anywhere on the causation spectrum. For example, McDean (1986, 374) selects a passage from Bonnifield stating "it was necessary to develop techniques and technology aimed specifically at wind erosion" to support his thesis that "the Dust Bowl was created by people not wind." After reading Bonnifield's account from cover to cover, this author assigns the book a score of one on the spectrum of causation. This indicates that Bonnifield's work is one of the most drought-centered explanations of any available. In fact, Bonnifield (1979, viii) states that "Ultimately the story of the heartland of the Dust Bowl is the chronicle of hard-working, stouthearted folks who withstood the onslaught of nature at its worst."

If one is judicious in the selection of quotations or passages, epilogues or author's notes, particularly in the juvenile literature, are helpful sources that provide a one or two-page synopsis of the Dust Bowl. These brief descriptions of the facets and causes of the Dust Bowl event give insight into the perspective that informs respective authors' literary accounts of the event, era, and region. Examples include Durbin (2002), Raven and Essley (1997), and Turner and Barrett (1995). This "show of the author's hand" usually mirrored this author's subjective assessment of the text in its entirety.

Juvenile texts are addressed separately from the remaining Internet and literature popular sources. This distinction was made with an eye toward educational implications discussed below. Furthermore, analysis completed above regarding previously-defined Dust Bowl regions and eras has demonstrated that the juvenile texts have provided overly-generalized and at times inaccurate information regarding the Dust Bowl in comparison to other popular sources and the academic body of literature.

Within the selected texts that were examined for this study, no generalizations regarding causation can be made by source type. In terms of publication date, there is a slight pattern that mirrors the evolving Dust Bowl narrative as addressed to varying degrees by Cronon (1992), Cunfer (2004), Hurt (1981), and McDean (1986). This evolving narrative refers to the transition from earlier accounts that lean toward anthropogenic explanations to later accounts that incorporate more precise climatological data to underscore the severity of the drought event. Again, it bears repeating that this sample of

Dust Bowl texts incorporates a variety of types ranging from fiction to juvenile texts designed for elementary classrooms. The objectives of the sample texts also varied widely. Therefore, the causation comparison is kept very general and should be viewed with these facts in mind.

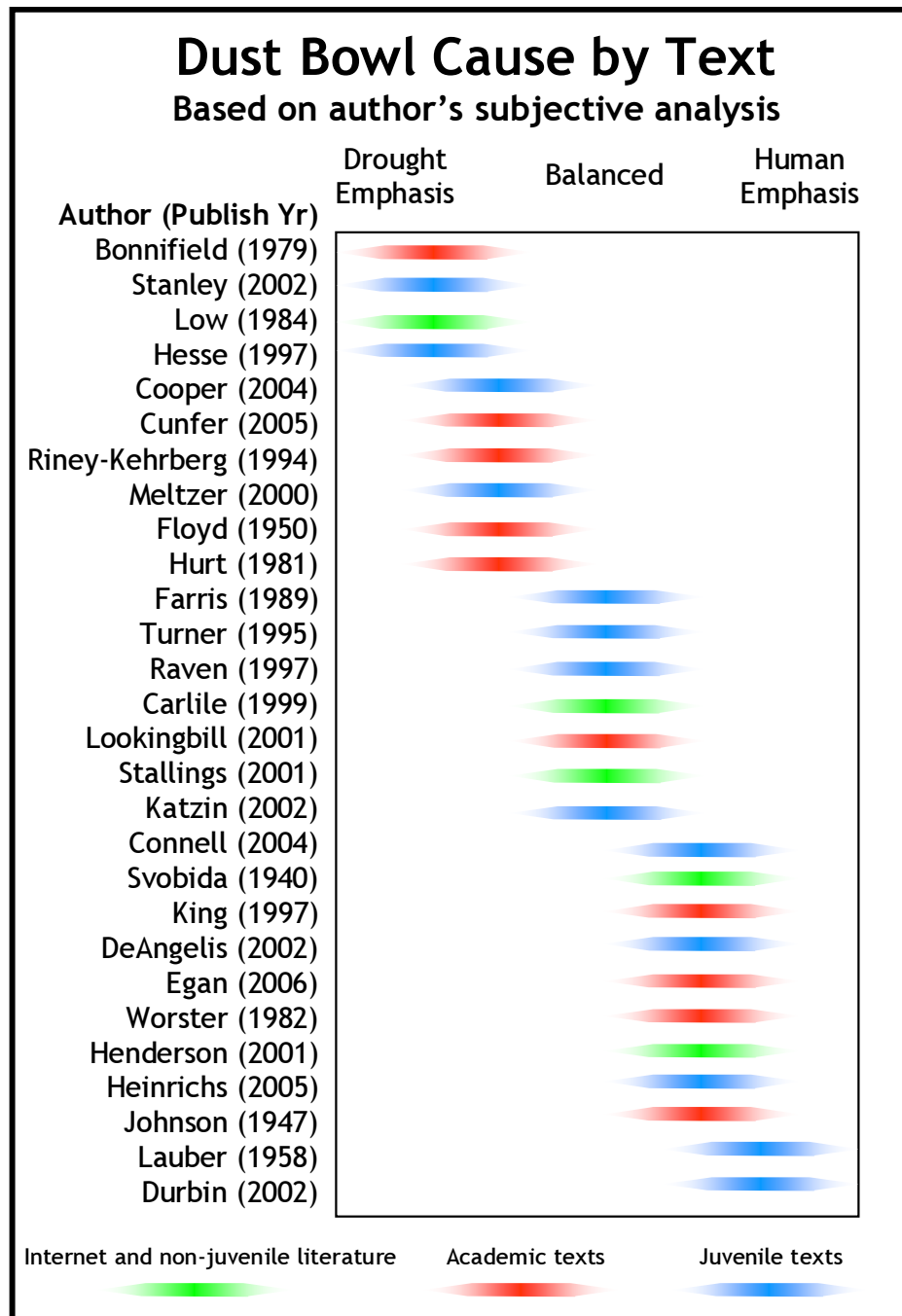


Figure 75. Dust Bowl Cause by Text

Two texts are worthy of some additional commentary. Hurt's (1981) history of the event is noteworthy in that it is the most-balanced account of the Dust Bowl event. His explanation of the contributing factors does not come with any discernible agenda. He is not an apologist for the mistakes of agriculturalists of the time, nor does he characterize the significant federal reforms of the era as a panacea. The drought's severity is detailed, but not without first enlightening the reader to the commonplace nature of such events on the Great Plains. Unlike many of the texts that seek to assign blame to either the ignorant farmers, the heartless government bureaucrats, or unforgiving Mother Nature, Hurt weaves together the contributory agents and circumstances to produce a balanced causal matrix. The reader is left with the impression that the Dust Bowl would not have happened if not for a unique intersection of diverse time and space elements.

Cunfer's (2005) analysis is the second work notable for its balanced assessment of the Dust Bowl. His GIS-based methodology contributed greatly in this regard. Cunfer sought to evaluate land use and climatological components of the Dust Bowl within the more objective analytical environment of GIS. In spite of the objective tool, Cunfer's analysis suggested that drought and high temperatures played a greater role in creating the Dust Bowl than most authors have reported (2005). Therefore, Cunfer's empirically validated position on the causal spectrum is shifted toward the drought emphasis. Texts that were judged to be less balanced in terms of causal explanation should not necessarily be disregarded. For example, Worster's (1982) text inarguably falls

to the more anthropogenic side of the causation spectrum. Nonetheless, it too is a valid and essential text in the Dust Bowl discourse.

From the standpoint of the written word, an extremely wide range of viewpoints has likely informed the knowledge-base and perception of study area residents. Before attempting to gauge the regional knowledge-base and perceptions, a brief discussion of the sample of literature with an emphasis on the themes of the humans versus nature dynamic and migration is provided.

Drought

Drought is the most universal component of Dust Bowl texts. Virtually every author provides some descriptive measure of the severe drought the Dust Bowl region endured in the 1930's. Most academic accounts emphasize the cyclical nature of drought on the Great Plains and provide historical analogs to the Dust Bowl drought. This point of emphasis is disproportionately underscored by authors such as Bonnifield (1979) and Malin (Malin and Swierenga 1984) who emphasize the triumph narrative discussed above. Henderson (2001) defends Malin's and Webb's assessment of the arid nature of the Great Plains and the notion that dust storms should be considered a normal part of life. Her experience "supported Webb's estimates that Great Plains farmers would suffer crop failures at least one year out of four" (Henderson 2001, 10).

It is also common for the seminal academic texts to provide spatial and temporal detail for the Dust Bowl drought that exceeds the descriptions found in the juvenile texts. However, McDean (1986) discusses the problem of historians who have written about the Dust Bowl that have failed to distinguish the Dust Bowl from other areas of drought. Subsequently, a number of Dust Bowl narratives are diluted by the association with all the problems, issues, policies, and programs applicable to drought anywhere in the US in the 1930's. McDean documents a number of scholarly articles in which the distinctive nature of the Dust Bowl has been blurred by this generalization (1986).

Humans Versus Nature

As discussed above, Dust Bowl writers have often aligned themselves with the triumph or tragedy narrative and their associated causal explanations centered on nature and humans respectively. As Figure 75 illustrates, however, relevant texts can be placed along a spectrum of explanation. A sample of representative quotations from within these texts highlights a few of the nuances along this continuum of causal assignment as well as the overall humans versus nature tension that is evident in many descriptions of the Dust Bowl event.

Worster (1982, 24) describes the Dust Bowl as “The most severe environmental catastrophe in the entire history of the white man on this continent” as a result of capitalism’s impact on the soil of the Great Plains. It

“was the inevitable outcome of a culture that deliberately, self-consciously, set itself to the task of dominating and exploiting the land for all it was worth” (4). The Great Plains, according to Worster (3) “have become our cultural boneyard, where the evidences of bad judgment and misplaced schemes lie strewn about like bleached skulls.”

While Worster’s text is a classic for environmental historians and those with a serious interest in the Dust Bowl, the vast majority of the general public has likely developed its perception of the Dust Bowl event via texts that are less comprehensive. In this manner, succinct statements, summaries, and introductions of the Dust Bowl event have helped shape people’s understanding of the human-environment dynamic of the era. Take for example, this quote from the introduction of The Dirty Plate Trail, a compilation of Sanora Babb’s writings about Dust Bowl migrants. “Ecological disasters occurring on the High Plains are associated in Babb’s writings with broken dreams and human tragedies brought about by false expectations, speculation, and the restless demand for land” (Babb, Babb, and Wixon 2007, 4). For someone with limited knowledge of the Dust Bowl event, a statement such as this could conceivably shift their understanding of the event and its causality toward the human end of the spectrum.

This applies to historical references to the human versus nature theme, as well. For example, Svobida’s personal account of farm life on the Plains during the Dust Bowl leads him to conclude that nature has won the battle. “My own humble opinion is that, with the exception of a few favored localities,

the whole Great Plains region is already a desert that cannot be reclaimed through the plans and labors of men” (Svobida 1986, 255). A visit to the region today would likely lead most people to conclude otherwise.

Another example that underscores the need to be aware of the temporal context of a text’s writing is provided by Johnson (1947). Heaven’s Tableland was the first comprehensive academic text dealing with the Dust Bowl. Johnson’s discussion relies heavily on the government document The Future of the Great Plains (Great Plains Committee 1936) which pointed to too much land being plowed up, cash crop farming, and wrong agricultural methods as the causes of the Dust Bowl. Johnson added unwise homesteading policies of the federal government, indebted farmers because of the costs of increased mechanization, land speculation, and the “mass attitude of the mind” that “men could conquer nature” as other contributory factors (Johnson 1947, 207). Falling in the tragedy narrative camp, Johnson speaks of “the steps to rescue the Plains” that were taking form in 1937 via the federal government. To Johnson, the Dust Bowl was a people problem to be solved wholly by the people.

While the influence of New Deal voices waned in subsequent decades, the tragedy narrative continues to contribute to present-day works. Egan’s The Worst Hard Time (2006) is, by this author’s account, the single most compelling text in terms of the human drama of the Dust Bowl. The New Deal narrative comes through more strongly, however, than in other recent works. “The Plains never fully recovered from the Dust Bowl” and only government-

sponsored conservation “saved the land” from further dust storms, Egan concludes (2006, 309).

Interestingly, this permeating theme of humans battling a resistant natural environment to ultimately conquer or fail is downplayed in the two texts that provide the most balanced analytical approaches to the Dust Bowl. Cunfer’s (2004) use of GIS as an analytical tool leads him to conclude that the New Deal story of decline and environmental mismanagement as cause of the Dust Bowl discounted the fact that the Plains have been home to dust storms for millennia. These storms had a been a routine part of life on the Plains in recent history as documented by Malin (Malin and Swierenga 1984). Cunfer states that “drought and high temperatures explain the location of dust storms better than land use” (2004, 156). Subsequently, the location of the worst erosion followed the location of the drought. Viewed in union these causal factors underscore the importance of physical factors over human factors in creating the areas of worst wind erosion as defined by the National Archives and Worster. Cunfer finds that land use patterns have remained remarkably stable for the past century, thereby challenging both the stories of ecological disaster and agricultural triumph (2005). While Cunfer’s conclusions provide a drought-centered explanation for the Dust Bowl, his unbiased methodology and matter of fact presentation largely removes the humans versus nature theme from his text.

Hurt's account, more comprehensive in its study of the topic than Cunfer's, provides a concluding paragraph to the opening chapter that succinctly addresses the dust storms and their causes:

In retrospect, dust storms in the southern Great Plains, and indeed, in the Plains as a whole, were not unique to the 1930's. Droughts, lack of vegetation, and wind have caused the dust to move since the formation of the Plains. The elimination of any one causal element, though, will significantly reduce or eliminate dust storms. When all three elements are present, however, the dust blows. During the early nineteenth century and before, when buffalo were the primary occupants of the Plains, drought and prairie fires destroyed the native grass and exposed the soil to wind erosion. Later in the nineteenth and early twentieth centuries, however, other factors contributed to dust storms - notably human inhabitation of the southern Plains and the adoption of a new agricultural technology (Hurt 1981, 15).

An additional text that addresses a corollary theme to the human-environment equation should be noted, as well. Beinart and Coates (1995) use a comparative and multidisciplinary approach to illustrate similarities between the impacts of European expansion on agro-ecosystems in two former British colonies. This is one of several Dust Bowl works that compares the crisis in the United States with a similar situation that occurred on the African continent in the 1930's (Anderson 1984; Beinart and Coates 1995; Phillips 1999; Stebbing 1938).

Juvenile Literature

The large number of texts that have been written for juvenile readers may provide a better reflection of the general public's knowledge and perception regarding the Dust Bowl event. These texts have often been penned by authors who are not experts on the subject and generally tell the Dust Bowl story in less complex, more succinct terms. As discussed above, there has been a tendency of these authors to over-generalize the topic. The juvenile literature mirrors the academic texts in that a wide range of explanations along the causation spectrum are explored. Despite this range, there is a consensus in the juvenile texts of describing the Dust Bowl as an unparalleled event in American, and by Durbin's (2002) account, global history. He calls the Dust Bowl the "greatest ecological disaster in the history of the planet... [as] farmers of the Plains sought to maximize profits without regard to the long term consequences of their actions" (Durbin 2002, 150-151).

Other authors of this genre echo Durbin's anthropocentric perspective. DeAngelis and DeAngelis (2002, 49) ultimately lay the blame for the "greatest agricultural disaster the United States had ever seen" on human actions. Without economic factors such as the Depression and excessive agricultural expansion in the preceding decade, the drought would have been "considered a normal or perhaps slightly worse than average dry spell" (DeAngelis and DeAngelis 2002, 49). Lauber (1958, 10,20) in an early text that channels the New Deal planners tells "how men changed the Plains, and how these changes created the Dust Bowl...in less than sixty years." She reports that fortunately

scientists were teamed with farmers to seek ways to “tame the Plains through understanding” (Lauber 1958, 10).

This condescending tone toward farmers of the region can be picked up in several other juvenile texts. “These storms happened...because there was hardly any rain...the soil was fine...and farmers did not know how to plow their fields” (Turner and Barrett 1995, 64). Katzin accounts for other primary factors before implicating the farmers: “Dry and extreme weather conditions, poor soil conservation practices, and decades of overgrazing by farmers led to the Dust Bowl” (Katzin 2002, 1). “It was the activity of farmers and ranchers over several decades that provided the recipe for disaster,” states King (1997, 9). As discussed elsewhere in this text, one should always regard cherry-picked quotations with caution. While this author has strived to select representative quotations that capture the essence of the respective works, one can usually mine these texts for contradictory remarks. For example, King precedes his condemnation of farmers by proclaiming that “Drought turned the land into a dreary desert, incapable of supporting the homesteading families who had settled the region” (1997, 5).

A final juvenile text worth noting is Farris’ (1989, 51) narrative that emphasizes the pre-Columbian pristine myth of perfect harmony between humans and nature before the arrival of white settlers. He concludes his book with “Neither the extremes of weather, the vast herds of grazing buffaloes, nor the nations of predatory Indians could disturb the grassland’s complex ecology...Decades of over-plowing and overgrazing have permanently altered

the ecological balance...When future droughts descend on the region accompanied by windstorms, we can expect this destructive combination to produce more dust.” Of course, there have been subsequent droughts that have lacked dust storms with the severity and frequency of the Dust Bowl. Many academic authors would also dispute Farris’ notion of previously undisturbed or “unspoiled” grasslands (Butzer 1992).

The Prominence of Migration

The Dust Bowl migration narrative is a central theme to most Dust Bowl accounts. Not unlike the dueling tragedy and triumph narratives that Cronon (1992) identifies, the treatment of migration often exhibits an incongruent tone as well. Many Dust Bowl texts embrace either a story of abandonment or a story of sticking it out. There is considerable correlation between the abandonment and tragedy narratives as well as the sticking it out and triumph narratives. A flaw that is found in numerous texts, particularly juvenile literature, is to generalize the numerous migratory flows that occurred in the 1930’s as a result of drought and/or economic depression into “the Dust Bowl migration.”

The most common story told regarding the “Dust Bowl migration” and the one that most Americans are familiar with is the story as told by Steinbeck (1939). However, as many authors have definitively illustrated (Baltensperger, Blouet, and Luebke 1979; Bonnifield 1979; Clements 1938; Colin 2003; Egan

2006; Gregory 1991; Hurt 1981; Larson 1940; Porter 2004; Pursell 1981; Rathge and Highman 1998; Rathge 2003; Riney-Kehrberg 1991, 1994; Skaggs 1978; Worster 1982), while many people of the Dust Bowl region did abandon their homes, the story of Dust Bowl era migration was a complex issue that had many more examples than the stereotypical Joad family following Route 66 to California.

In fact, many families persevered in their homes or stayed in the immediate region by migrating into nearby cities. As Riney-Kehrberg (1994) explains, much less has been told of the ways in which individuals and families adapted to the challenges of the 1930's. Therefore, she sought to tell "the history of the individuals, families, and communities that survived the economic and environmental crisis" by staying in the Dust Bowl region (Riney-Kehrberg 1994, 3). The non-migration story may not be as romantic to some readers and certainly has not been as popular a theme in the body of Dust Bowl-related literature. However, the treatment of this component of the Dust Bowl population can have a powerful influence on one's perception of the Dust Bowl event (Gregory 1991).

The Popular Story - Widespread Migration to California

Shindo's (1997) study documents the ways public memory of the Dust Bowl migration has been dominated by a few artists and reformers rather than academic historians. He claims that it is the Dust Bowl of Steinbeck, folk

singer Woody Guthrie, *Atlantic Monthly* columnist Caroline Henderson, and photographer Dorothea Lange that is used for contemporary reference rather than the historical Dust Bowl as documented by academics. This perspective may well explain why so many of the non-academic Dust Bowl texts include a disproportionate amount of material on migrants headed west to California.

Shindo documents that the migration to California did not begin during the Great Depression. Rather, there was a change in the mechanism during this era that makes it distinctive. Prior to 1930, the “pull” factors of California’s temperate climate and economic opportunity dominated. After 1930, migration was driven by “push” factors elsewhere in the country that included “agricultural modernization, failing crops, foreclosures, and economic depression” (Shindo 1997, 16).

The phrase “Dust bowl migration” is actually a misnomer since the majority of the Depression-era migrants did not come from the areas of the impacted by the dust storms of the 1930’s. Gregory (1991, 7) adds “confusing drought with dust, and assuming that the dramatic dust storms must have had something to do with the large number of cars from Oklahoma and Texas seen crossing the California border in the mid-1930’s, the press created the dramatic but misleading association between the Dust Bowl and the southwestern migration.”

Statistics of the migration demonstrate that more California-bound migrants came from cities and towns than farms. City migrants were more likely to be blue collar rather than white collar workers just as migrating

farmers were more likely to be tenants than owners. Shindo concludes his statistical analysis by emphasizing the point that “Dust Bowl refugees or migrants made up only a portion of the total migrant population from the Southwest, and therefore an even smaller proportion of the total population of migrants during the Great Depression” (Shindo 1997, 17)

Sticking It Out

Those texts identified as comprehensive academic inquiries (Bonnifield 1979; Cunfer 2005; Floyd 1950; Hurt 1981; Johnson 1947; Riney-Kehrberg 1994; Ware 1977; Worster 1982) into the Dust Bowl event have generally approached the migration issue with the due diligence that has been lacking from popular sources. The two earliest sources are the exception as Johnson (1947) provides very little discussion on migration. He believed an accurate count of the people he called “Dust Bowl refugees” was impossible. He does, however, note that “many more than left the southern Plains, perhaps, moved in with relatives in towns” (Johnson 1947, 190). Floyd also has minimal discussion of what he repeatedly terms the “exodus” from the region, perhaps as a result of limited demographic data available at the time. Even with improved demographic data, population figures in the region can appear deceptively static because figures are often based on census data recorded at ten-year intervals, thus missing the steep gains and losses that occur in a decade’s time.

Several decades later when the works of Bonnifield (1979), Hurt (1981), and Worster (1982) were published, the theme of hanging on through those hard times had taken root in the academic literature. Bonnifield, the most vocal proponent of the triumph narrative, enthusiastically documents the perseverance of the people. He claims that absolute poverty and mass emigration from the Dust Bowl is a myth. “Economic activities in the heartland were no worse, and in many respects better, than in other areas of the nation” (Bonnifield 1979, 105). Post offices closed, he says, because of changes in technology, not because of the local economic conditions. He claims not a single farming community school in the Oklahoma panhandle closed during the Dust Bowl and that no symptoms of mass migration were evident in terms of agri-business. According to Bonnifield all of the grain elevators survived, as well (1979).

Worster (1982), on the other hand, paints a Dust Bowl migration picture that includes many detailed statistics, but ends up reinforcing popular notions. In his narrative he portrays the statistical reality of the situation. For example, he cites that “only two or three percent of Oklahoma’s total net migration loss of 500,000 were from the westernmost part of the state, where the black blizzards were” (Worster 1982, 61). Nonetheless, he plays up the notion of a Dust Bowl migration simply from the space devoted to California-bound migrants departing a failed landscape. The emphasis on migrants headed to California leaves little room for discussing the migrants that moved to the nearest urban center.

As for the two work's that this author finds to be the most even-handed and accurate in their analysis of the Dust Bowl, the migration component is outside the scope of Cunfer's (2004) research while Hurt (1981) emphasizes that farmers did not leave the Dust Bowl en masse. He makes a clear distinction between the Dust Bowl farmers and the tenant cotton farmers to the east that is lacking in many texts. Hurt also addresses the rural to urban nuance that is similarly neglected. "Many of the Panhandle farmers moved, but not to California. Instead they fled to the nearest town where they could be closer to the employment and relief offices" (Hurt 1981, 98).

Riney-Kehrberg's (1994) analysis of population dynamics in southwest Kansas during the Dust Bowl is one of the most detailed available. In her account that emphasizes those who chose to stay, she concludes "that three-quarters of the population hung on through the decade seems remarkable" (Riney-Kehrberg 1994, 21). Additionally, the text deftly illustrates the uneven nature of Dust Bowl population dynamics as well as discussing rarely mentioned cultural variables that affected population trends of the time such as the back-to-the-land movement of the early 1930's.

Three final texts worthy of brief mention are Walter Stein's California and the Dust Bowl Migration, James Gregory's American Exodus: The Dust Bowl Migration and Okie Culture in California and Timothy Egan's The Worst Hard Time. Stein (1973) merits attention because his text explicitly focuses on the Dust Bowl migration. This author agrees with a fundamental flaw that McDean (1986) illuminates in his criticism of Stein. That is Stein not only fails to

adequately define the region from which Dust Bowl migrants were emanating, but fails to distinguish these people from migrant flows emanating from adjacent areas.

Gregory's (2003) study of Dust Bowl era migration moves beyond the explanation of the migration and examines the impact of the migrants on social and political aspects of California's culture (2003) while also sufficiently delineating source areas of migrants. Egan's compelling text emphasizes that "Most people living in the center of the Dust Bowl...never left during that hard decade" (Egan 2006, 10). His book is an interesting hybrid of the tragedy and triumph narratives as he emphasizes those who stuck it out while also alluding to the New Deal narrative of the event that lays blame on the inhabitants of the region.

Juvenile Literature - Embracing the California-bound Migrant

The large body of juvenile literature embraces a perspective on Dust Bowl era migration that more closely aligns with the popular presentation as described by Shindo (1997) above. Questionable statistics and statements related to California-bound migrants fill the pages of juvenile texts. A few examples include: Durbin's described epicenter of the Dust Bowl that lost forty percent of its population to migration during the 1930's (2002); Connell's (2004) National Geographic Society juvenile publication that implies that the majority of families in the region abandoned their farms; Meltzer's claim that

“By 1940, a million people had fled the Dust Bowl region to migrate toward the Pacific coast” (2000, 58); and Katzin’s statement that “Millions of people from the area migrated west” (2002, 1).

The study area’s population has only recently surpassed one million people and never approached “millions of people.” These bold statements are utilized to set the scene for the formula found in many juvenile texts on the Dust Bowl. A background on the Great Plains and farming in the region, is followed by a discussion of the ensuing drought, and concluded with the mass migration to California. King explains “By 1935, more than half the farm families in the hardest-hit areas had been hailed-out, grasshoppered-out, dusted-out, and finally tractored-out by the banks” (1997, 36). Families then became migrants, with the largest numbers going to California (King 1997). As Farris sees it, “Southern Plains farmers defeated by the dust storms were certain that they would find work in California” (1989, 36).

Perhaps the most popular youth literature book on the Dust Bowl based on an informal survey of library holdings and Amazon.com sales figures is Children of the Dust Bowl: The True Story of the School at Weedpatch Camp by Jerry Stanley. This text emphasizes the Dust Bowl migration with very limited explanation about the source areas of migrants or the push factors occurring in those areas (Stanley 1992). Once again the Dust Bowl and a mass migration to California are portrayed as inseparable entities.

Not all juvenile texts are negligent in their treatment of alternatives to the dominant migration story. For example, Cooper (2004) emphasizes the

western migrants but also recognizes that many Dust Bowl residents migrated locally, to the larger cities of the region like Denver and Oklahoma City while DeAngelis and DeAngelis (2002) discuss how most migrants came from areas that were not in the proper Dust Bowl. Heinrichs (2005) implies that many left the region, but that others were too broke or just too stubborn to leave and later mentions that three out of four stayed.

A series of divergent narratives regarding the Dust Bowl's causes, its manifestation as a battle between humans and nature, and its impacts on migratory flows of the 1930's have been identified and discussed. Which of these narrative threads of the event resonate with questionnaire respondents? Now the focus shifts to the inhabitants of the study area.

People of the Region Characterize the Dust Bowl Event

The Farmer or the Drought (or Both)

The first Likert statements regarding the event address the basic causal dichotomy of the Dust Bowl. Why did the Dust Bowl happen? Was it the farmers or the weather? Statements addressing the causal dichotomy were paired together in an attempt to ascertain which polar Dust Bowl narrative resonates most strongly with residents of the region. Summary and individual results (Fig. 76, Fig. 77, Fig. 78, and Fig. 79) illustrate that the two statements were not considered mutually exclusive by survey respondents. Beginning with

summary Likert scores, all four age groups produced mean scores that fell between agreement and a neutral response to the statement “The Dust Bowl was a result of land mismanagement by farmers.” Stronger agreement to this statement was observed with successively older respondents. Curiously, the oldest age group actually had the fewest number of respondents who strongly agreed with this statement. They fall farthest left (stronger agreement) because their age group had the lowest number of neutral responses.

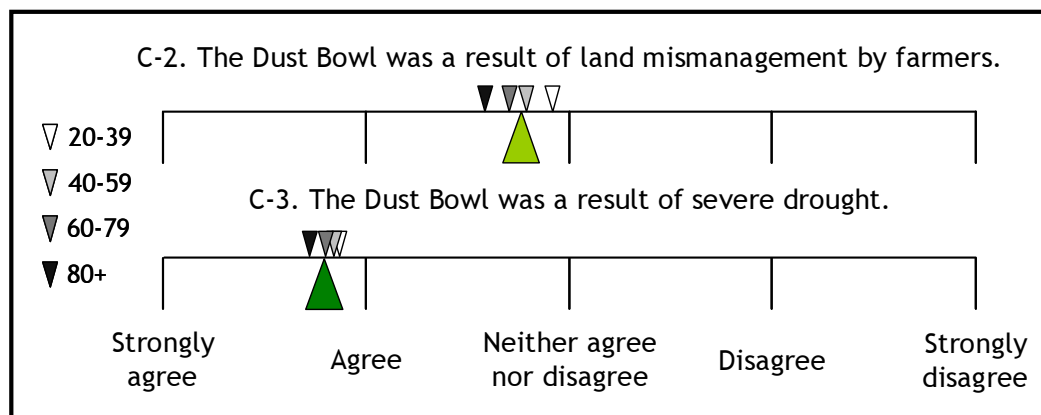


Figure 76. Items C-2, C-3 Mean Likert Responses by Age

The summary map for item C-2 (Fig. 78) illustrates stronger disagreement to this statement on the eastern edge of the study area. This is also the less arid portion of the study area. Perhaps this suggests that respondents in environments that may be comparatively less vulnerable to wind erosion events are less likely to assign blame to land-use practices. Counter-intuitively, a higher proportion of respondents (3.33:1) who lived in counties where a majority of respondents had been involved in agriculture at some point in their lives were more likely to agree with this statement than the ratio (2.55:1) for all of the sample counties, regardless of agricultural vocation.

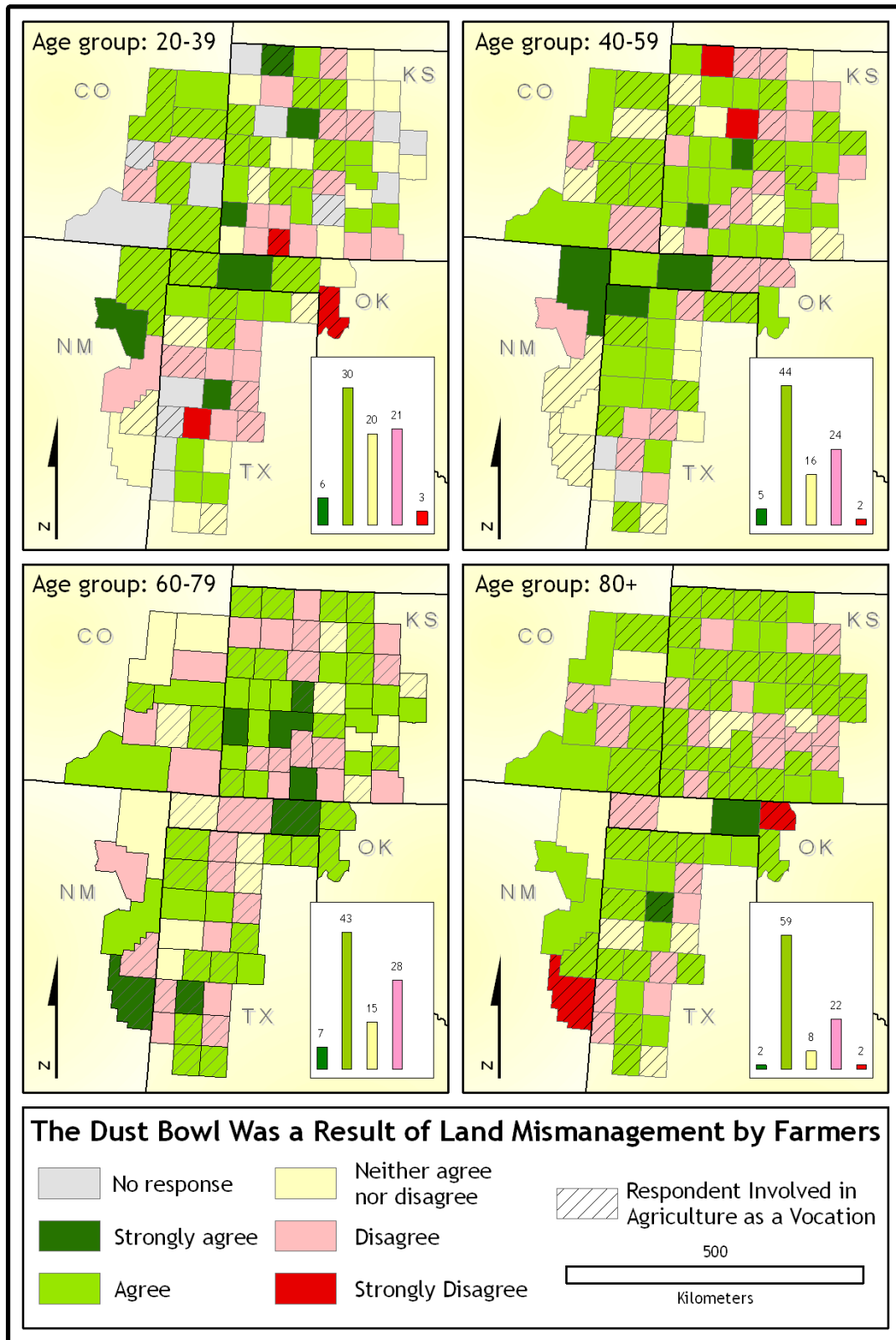


Figure 77. Item C-2 Likert Responses by Age

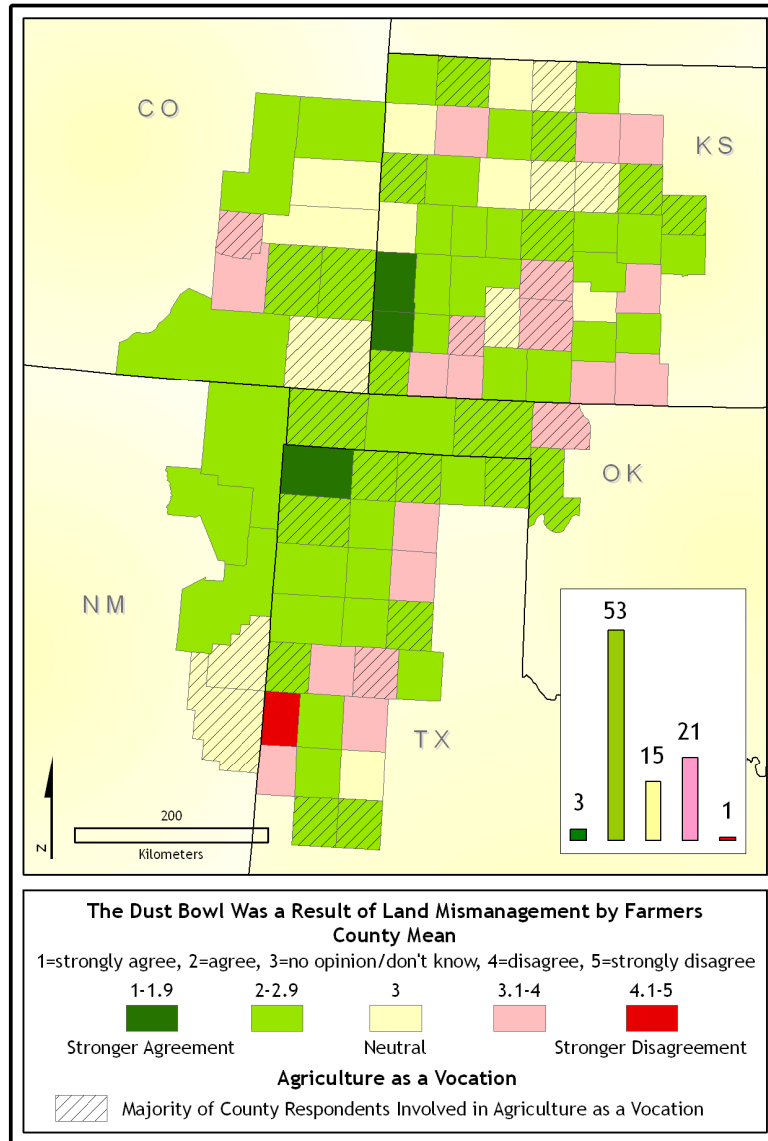


Figure 78. Item C-2 Likert County Mean

Respondents assigned the lowest mean value (strongest agreement) of any Likert statement to item C-3, assigning Dust Bowl causation to circumstances of severe drought (Fig. 79). As was the case with item C-2, the 80 and older age group expressed strongest agreement followed by successively younger groups. Nonetheless, there was widespread agreement for this statement, from both generational and location perspectives.

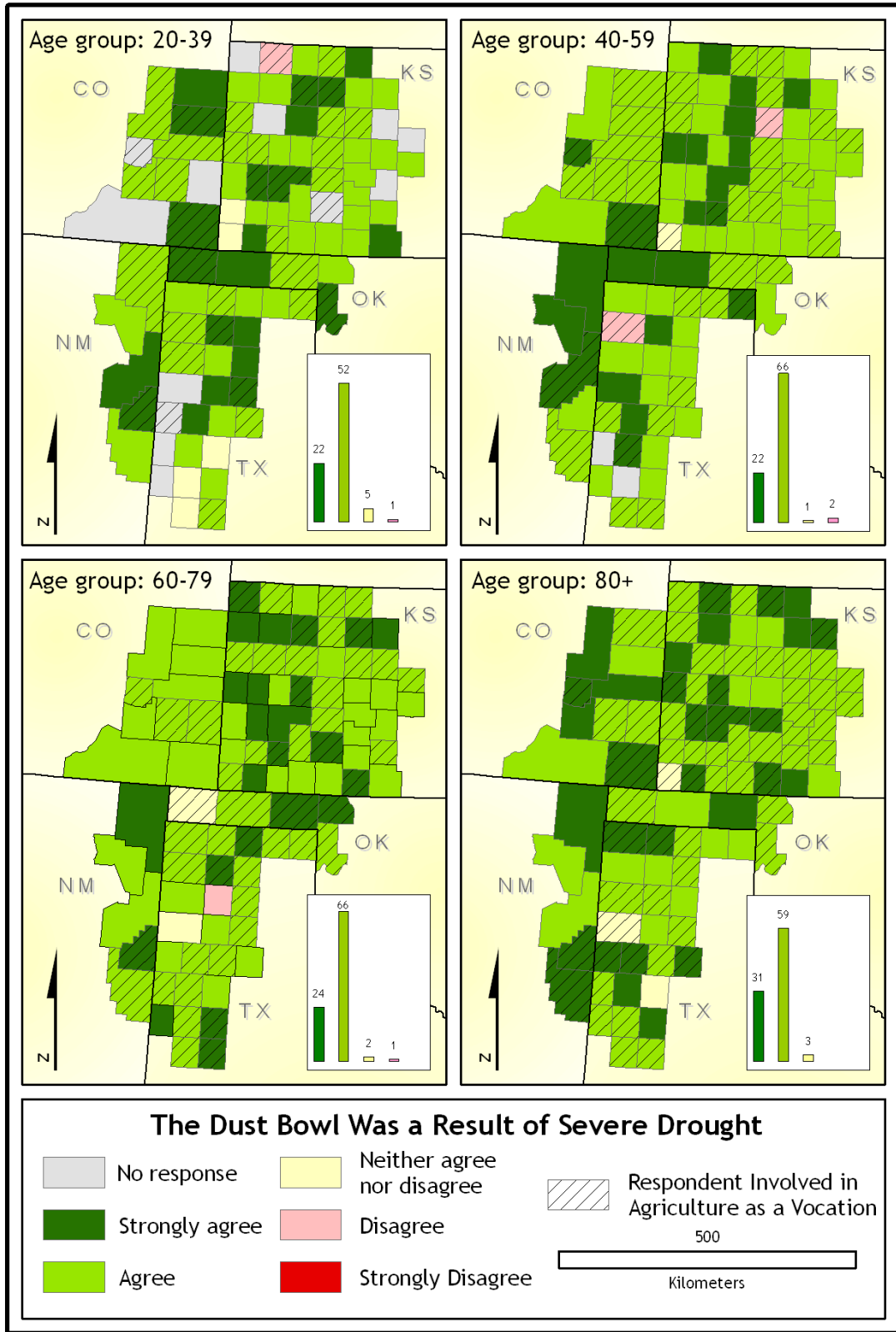


Figure 79. Item C-3 Likert Responses by Age

Defining Characteristics of the Dust Bowl Event

Geoff Cunfer (2004) provides a series of six defining characteristics of the Dust Bowl. These statements would not be considered controversial by most authorities on the topic as they jibe with the academic consensus. Figure 82 illustrates the mean responses by age group to the defining Dust Bowl characteristics. Of the six statements, the strongest agreement by all respondents was recorded for item C-11 while the lowest level of agreement occurred with item C-14; although the mean was still categorized as agree.

Item C-10, “The Dust Bowl was defined by a combination of extended severe drought and unusually high temperatures” had a mean score of 2.36, and exhibited considerable differentiation between the youngest age group and the three older groups. The youngest age group agreed more strongly with this statement. Many respondents either commented verbally or wrote comments on the questionnaire in regard to the second half of this statement. Respondents often recalled the extended severe drought but were unsure of the “unusually high temperatures.” It is impossible to know to what degree this problem affected the responses to this question. It is possible that this was not as significant a problem for the 20-39 group because of their more generalized understanding of the Dust Bowl and the perception that drought and heat often go hand in hand. By contrast the older respondents could not explicitly recall in their experience or knowledge the temperature component of the event and thus were reluctant to agree with the statement. This also helps explain the particularly high number of light yellow counties (neither

agree nor disagree) representing nearly a third of responses on the 40-59, 60-79, and 80 and older maps in Figure 81.

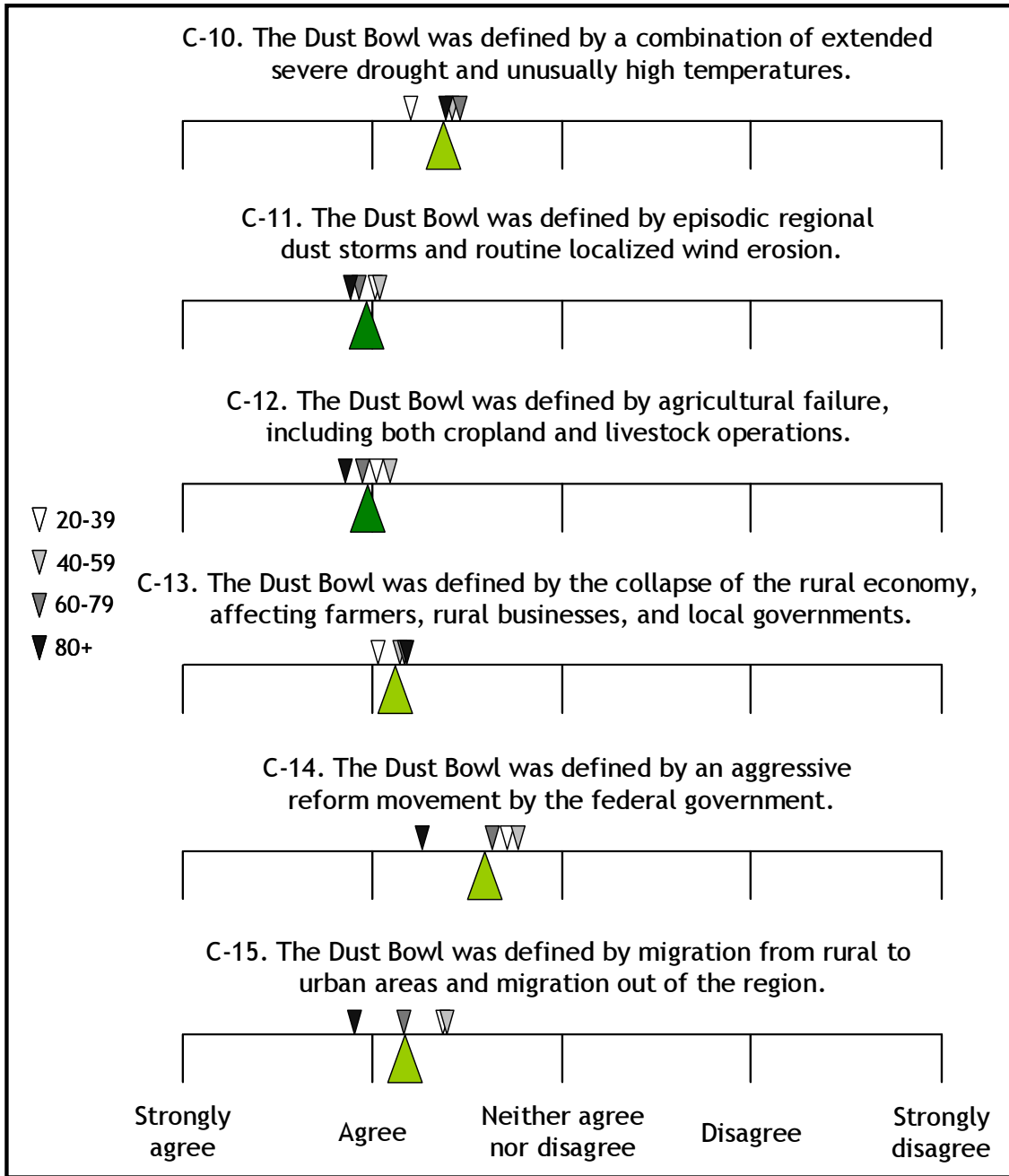


Figure 80. Items C-10, C-11, C-12, C-13, C-14, C-15 Mean Likert Responses by Age

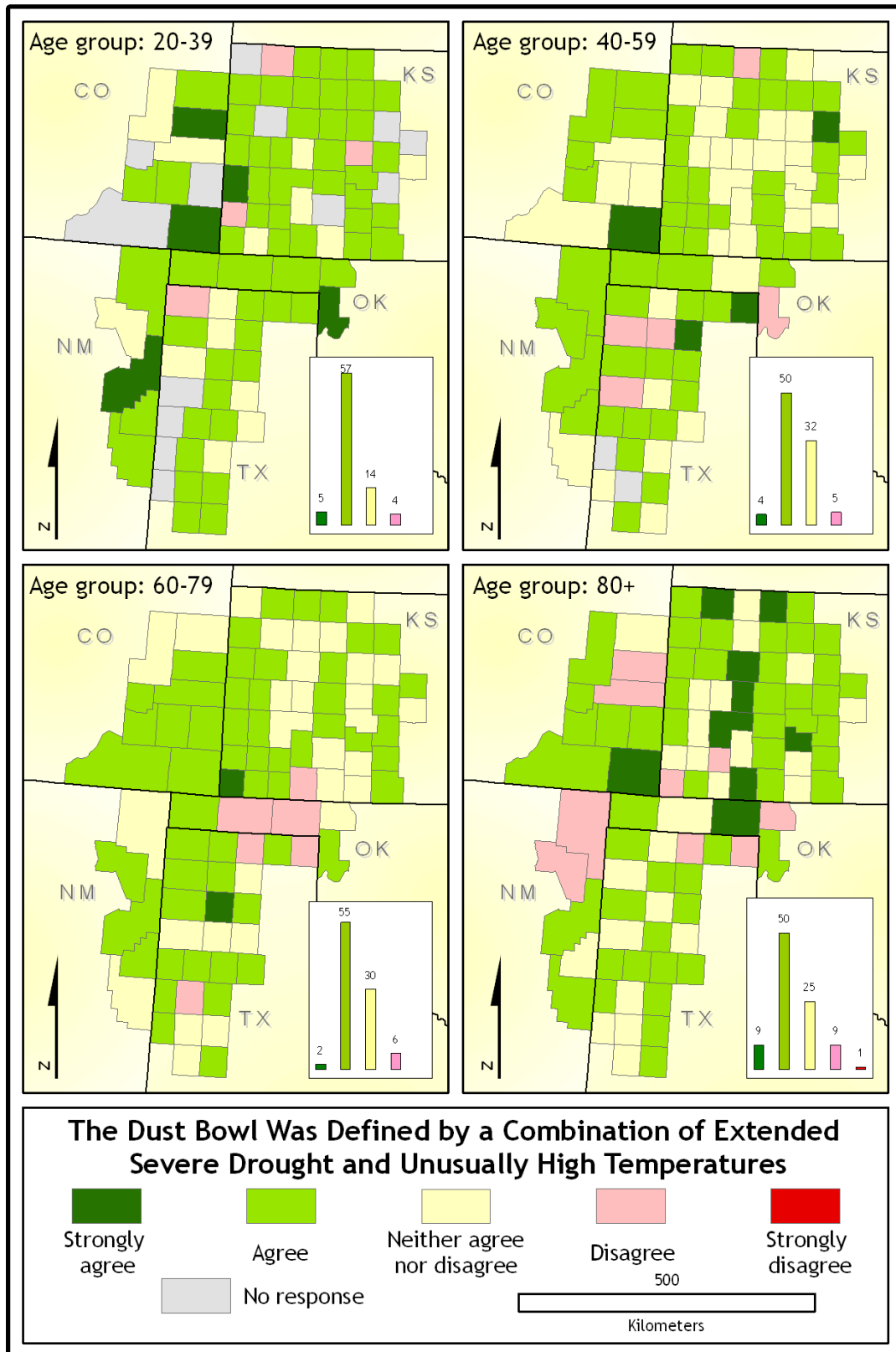


Figure 81. Item C-10 Likert Responses by Age

Further evidence that a problem is inherent to this question is the ten responses in the oldest group that disagreed or strongly disagreed with this statement. For four of the six defining Dust Bowl statements, the 80 and older group displayed the highest level of agreement. Based on these generally higher levels of association between the academic consensus and the oldest respondents, it is more likely that these disagreeing responses are tied to the issue of the dual components of the statement.

“The Dust Bowl was defined by episodic regional dust storms and routine localized wind erosion” is the statement attached to item C-11. This statement resonated with all age groups resulting in the second-strongest support (1.99) for any one Likert item on the questionnaire as well as the narrowest spread among age groups for any Likert item. The two oldest age groups voiced the strongest support for this statement. The dust storms are one of the most dramatic and emblematic features of the Dust Bowl event. This may explain the high level of support across groups. Comparison of age group responses (Fig. 82) shows that the only noticeable difference between groups is the proportionally higher number of neutral responses in the 20-39 age group.

Agreement with item C-12, “The Dust Bowl was defined by agricultural failure, including both cropland and livestock operations” was highest (1.95) of the six defining characteristics. The pattern among age groups for the previous statement regarding dust storms was repeated here. The oldest groups offered stronger agreement in comparison with the two younger age groups. The mean

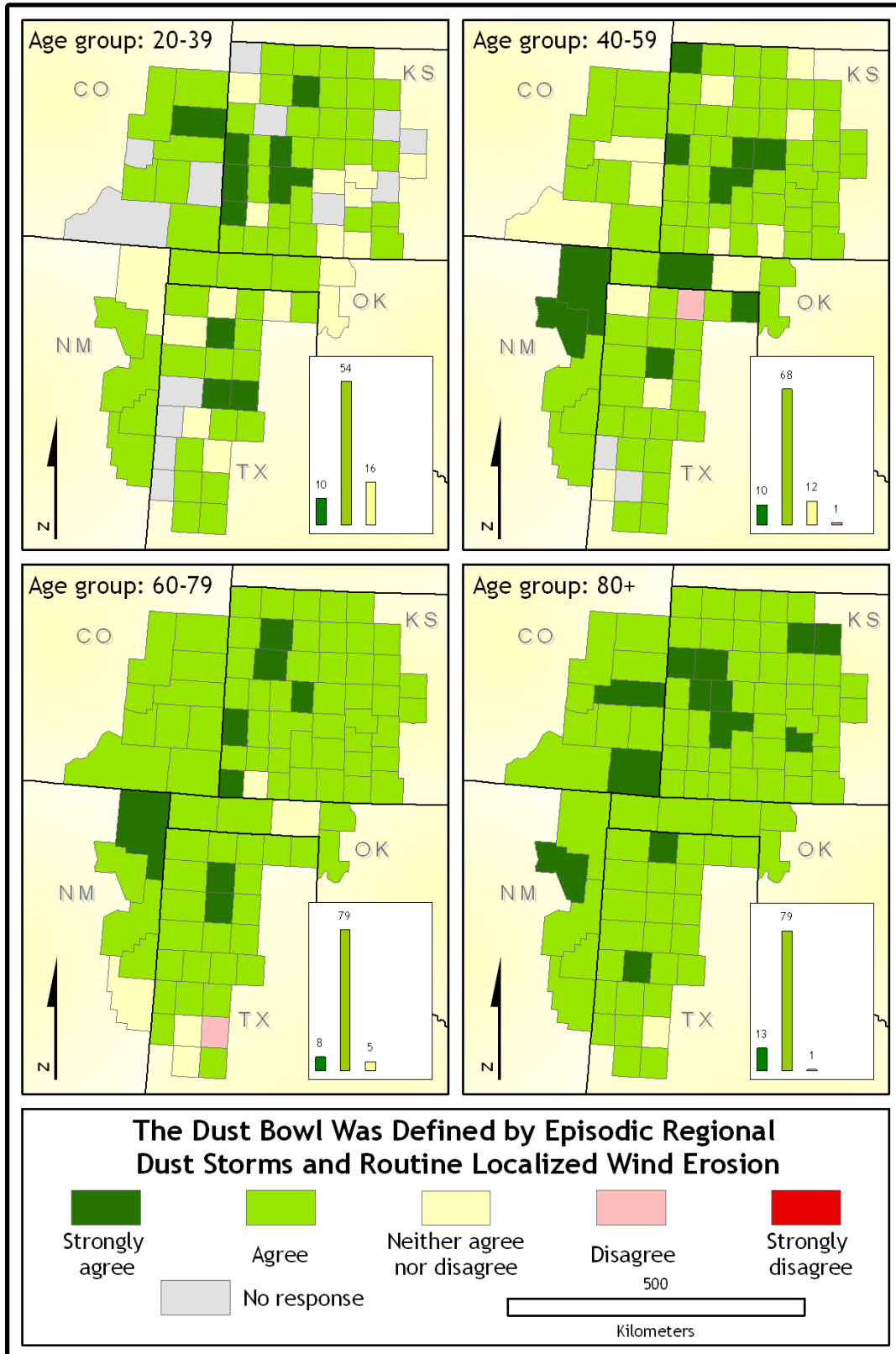


Figure 82. Item C-11 Likert Responses by Age

value for the 80 and older group (1.86) was the highest for any age group for any statement. The number of strongly agree responses increased incrementally with each age group (Fig. 83).

When the four age groups are averaged to produce a county mean (Fig. 84), overall agreement with the statement is evident. Nonetheless, an interesting pattern of less strong agreement emerges in the area that many would consider the “heart” of the Dust Bowl. In discussions with respondents, several bristled at this particular statement and provided anecdotal evidence that agriculture had not “failed” at that time or any other.

The general association between older respondents and stronger agreement evident in the preceding two statements is reversed on item C-13. Younger residents of the region expressed slightly more unanimity in agreeing with the Dust Bowl being “defined by the collapse of the rural economy, affecting farmers, rural businesses, and local governments.” The mean for all age groups of 2.12 combined with minimal variation between age groups still indicates relatively strong agreement for the statement. Another distinguishing characteristic of the responses among age groups (Fig. 83) is the dearth of strongly agree responses in spite of the overwhelming agreement.

Item C-14, “The Dust Bowl was defined by an aggressive reform movement by the federal government” elicited the lowest level of agreement (2.59) of the six defining characteristics. This statement also was responsible for producing the widest gaps among age groups. In this case, the 80 and older age group voiced agreement in line with the previous four statements while the

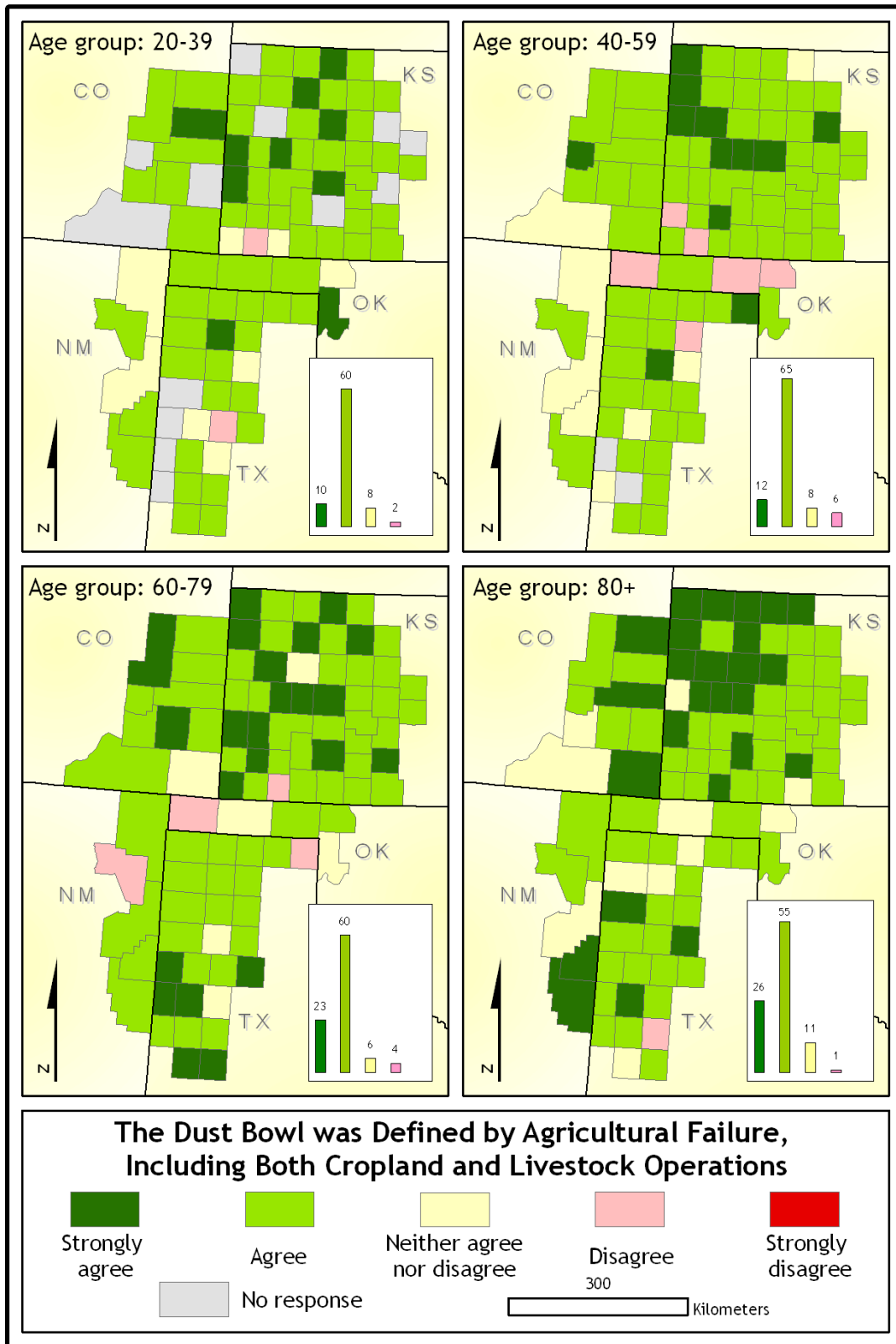


Figure 83. Item C-12 Likert Responses by Age

other age groups produced mean responses that were closer to neutral on the Likert scale. The resultant map series (Fig. 86) is unique in the aberrant nature of the 80 and older group.

The frequency of “neither agree nor disagree” responses among the three other groups regarding item C-14 is noteworthy. Some respondents wanted to clarify that they didn’t know about a federal reform movement rather than not having an opinion about it. The frequency of agree responses more than doubles between the 40-59 and 80 and older group.

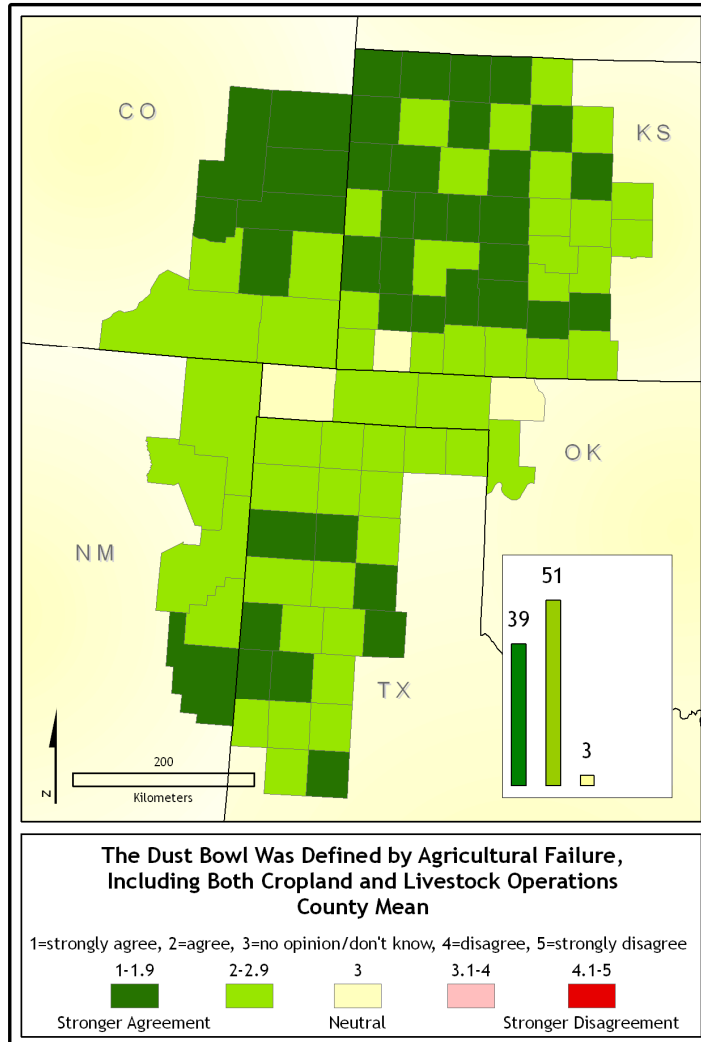


Figure 84. Item C-12 Likert County Mean

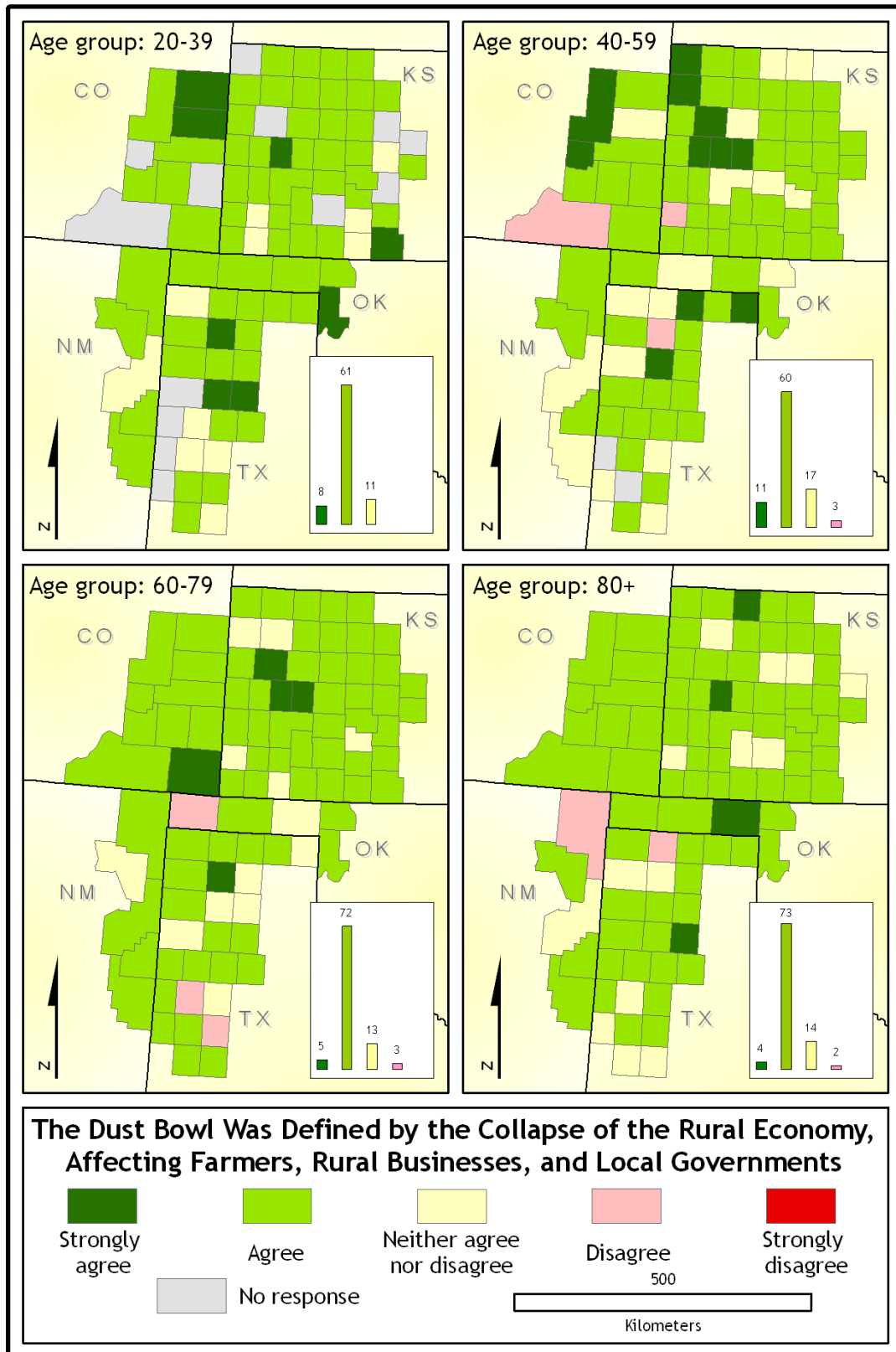


Figure 85. Item C-13 Likert Responses by Age

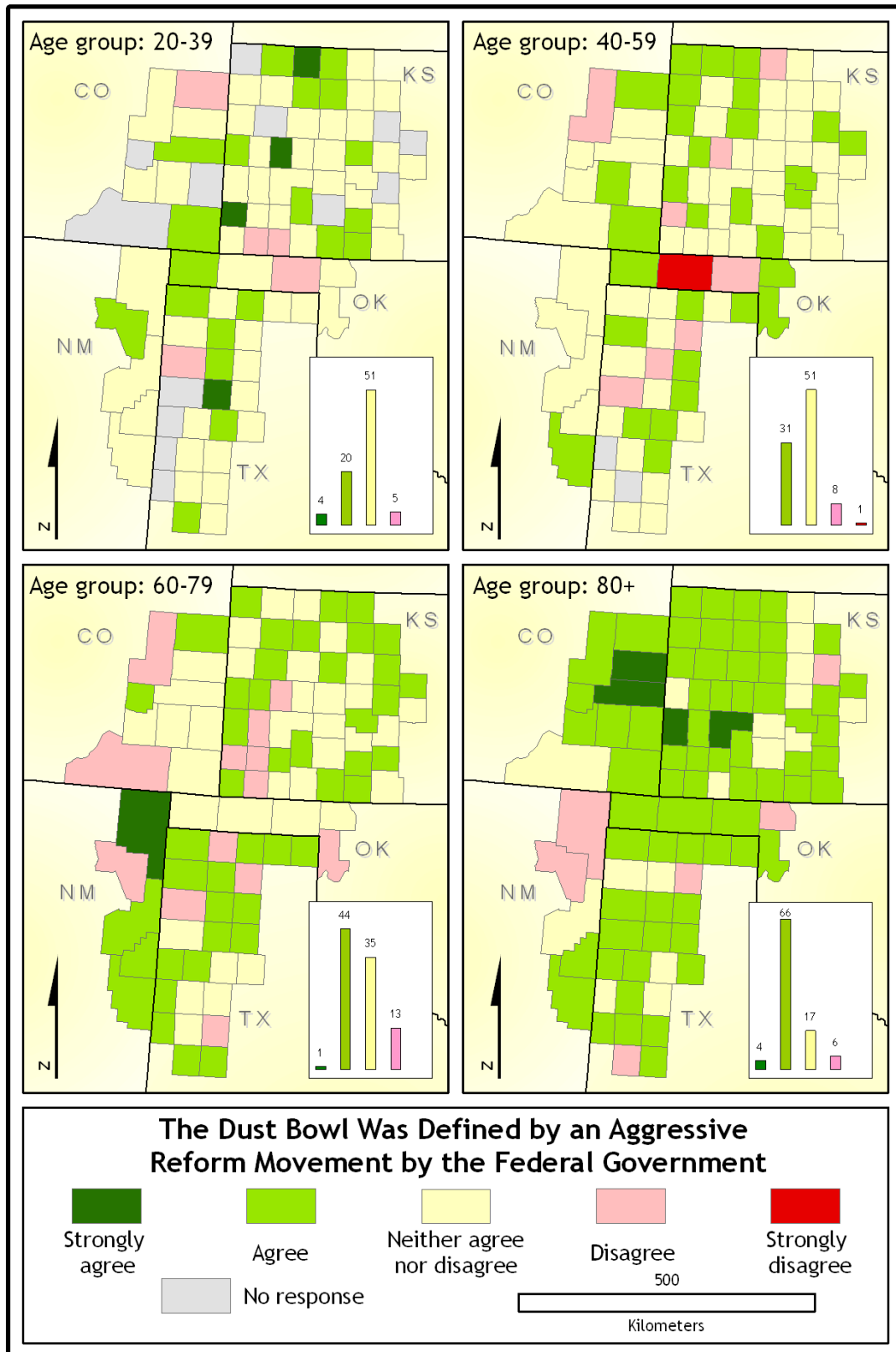


Figure 86. Item C-14 Likert Responses by Age

What explains this notable discrepancy between the age groups? One thing that distinguishes this statement from the other five is the more general nature of this defining characteristic combined with the subjective term “aggressive.” To someone not familiar with the dramatic changes that were taking place in the federal government, particularly in regard to agricultural programs, the terms reform and aggressive could be particularly confusing. This likely explains the high number of “neither agree nor disagree” responses. Within these responses there are likely a number of persons who don’t know because of the general and subjective nature of the statement.

Nonetheless, this statement did resonate with the oldest respondents. The significant decrease in neutral responses and increase in “agree” responses for the 80 and older group speaks to the lived experience of the older respondents. These people witnessed the creation of New Deal agencies such as the Work Progress Administration and legislation such as the Agricultural Adjustment Act that directly impacted their lives.

Item C-15, dealing with migration, presents a similar distribution of mean age group values in comparison to item C-14 (fig. 87). Again, older respondents displayed the strongest agreement with this defining characteristic. In fact, the 80 and older mean value was the second-highest value for any age group for any statement. The twenty-five “strongly agree” responses were second only to the twenty-six associated with the 80 and older group for item C-12. This statement suffers from the same problem of dual statements described for C-10. Several respondents commented that they

were not sure how to respond because they did not agree with the statement that people left the region but they did agree that migration from rural areas into the cities of the region was common during the Dust Bowl era.

In summary, questionnaire respondents largely agreed with the six defining characteristics of the Dust Bowl as presented by Cunfer (2004). All six statements returned Likert means on the agreement side of the response spectrum. Strongest agreement for the sample as a whole occurred with items C-11 and C-12, pertaining to dust storm, wind erosion, and agricultural failure characteristics of the event. Among age groups, the strongest agreement to statements was provided by the 80 and older respondents for four of the six statements. A general pattern of stronger agreement with increasing age was also witnessed with the same four statements (C-11, C-12, C-14, C-15). This is most evident with items C-14 and C-15, tied to federal reform and migration respectively.

From the locational perspective, some response patterns suggest stronger support in the northern portion of the study area. This pattern is discussed in the following chapter. The central portion of the study area indicated less agreement with item C-12, related to agricultural failure. Several respondents remarked that the region had never experienced any sort of “failure” in spite of outside perceptions.

Item C-14 displayed the lowest mean level of support for the defining characteristics. The vague nature of this statement likely played a role in the disproportionate number of neutral responses. Problems with the dualities of

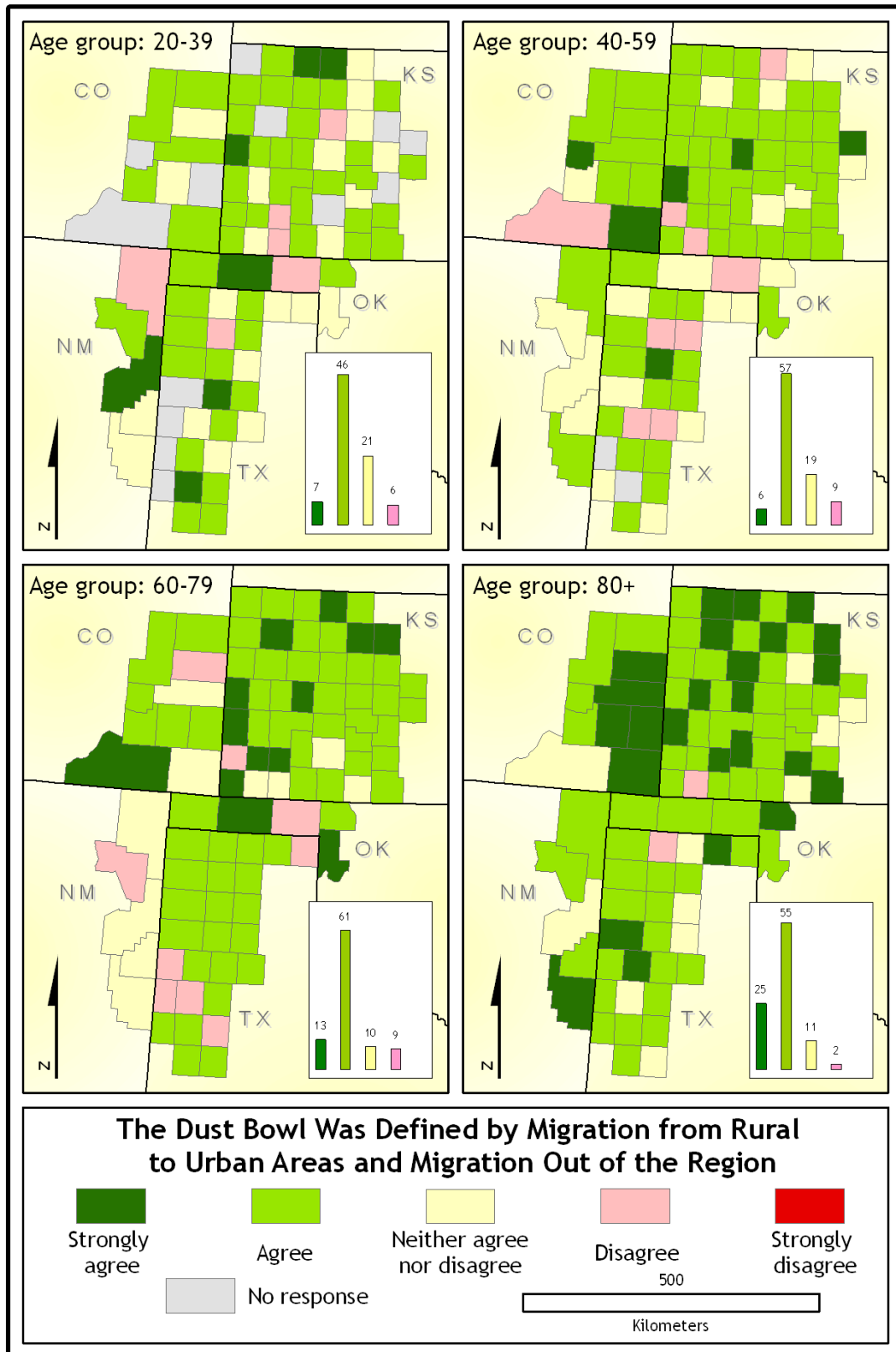


Figure 87. Item C-15 Likert Responses by Age

all items, excluding C-14, were an additional influential factor for respondents. This appears to have been particularly problematic with item C-10. Many respondents were certain there had been a severe drought but had no knowledge of unusually high temperatures. As a result, some respondents selected the neutral response, thus lowering the mean agreement with the statement.

The Dust Bowl and the Big Picture

How do people of the Dust Bowl region perceive the Dust Bowl in relation to parallel events, subsequent developments, and its place in the annals of environmental history? The Great Depression and the National Grasslands are corollary components of the Dust Bowl story while many Americans' concept of an environmental disaster has recently been refocused in the mind's eye vis-à-vis Hurricane Katrina. Items C-4 through C-7 provide a measure of how regional residents view the Dust Bowl in broader contexts.

The Great Depression

Item C-4, "The Dust Bowl contributed to the severity of the Great Depression" presented one of the most uniform generational and spatial responses (Maps A-15 and A-16 in Appendix A) from the questionnaire. There was widespread agreement to this statement. The two younger age groups

agreed with the statement slightly more than the two older age groups (Fig. 88). No spatial patterns were identifiable in the responses by age group or when the county responses were averaged.

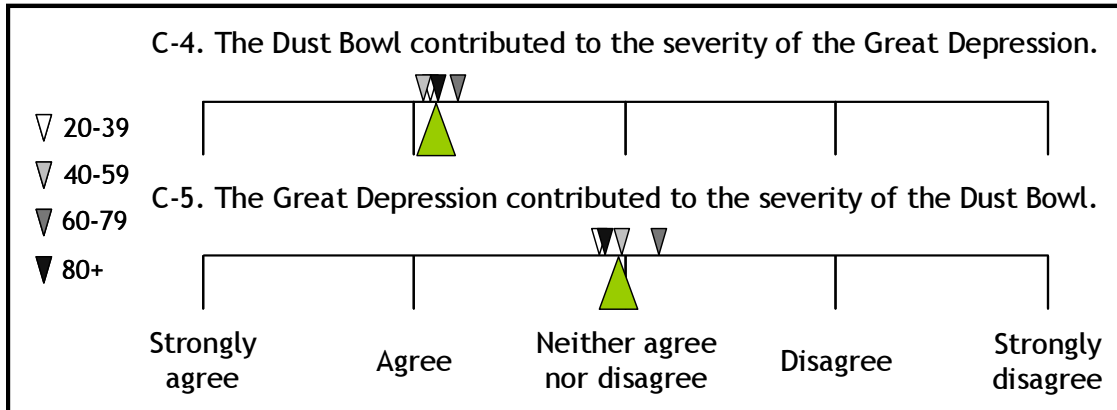


Figure 88. Items C-4, C-5 Mean Likert Responses by Age

When the statement was reversed for item C-5 the consensus agreement evaporated. In fact, all four groups had mean scores that were close to neutral. The 60 to 79 year-old group produced a mean score on the disagreement side of the spectrum. Figure 89 illustrates the increased inter-age group variation that is evident with item C-5 in comparison to item C-4. The 80 and older age group exhibits the most deviation with a higher proportion of respondents who agreed with this statement. In spite of the highest number of respondents agreeing with the statement, only one person in this age group strongly agreed with the statement.

When the groups are averaged by county (Fig. 90), a spatial pattern emerges. Respondents in the heart of the study area were more likely to support this statement than in peripheral counties. This researcher supports

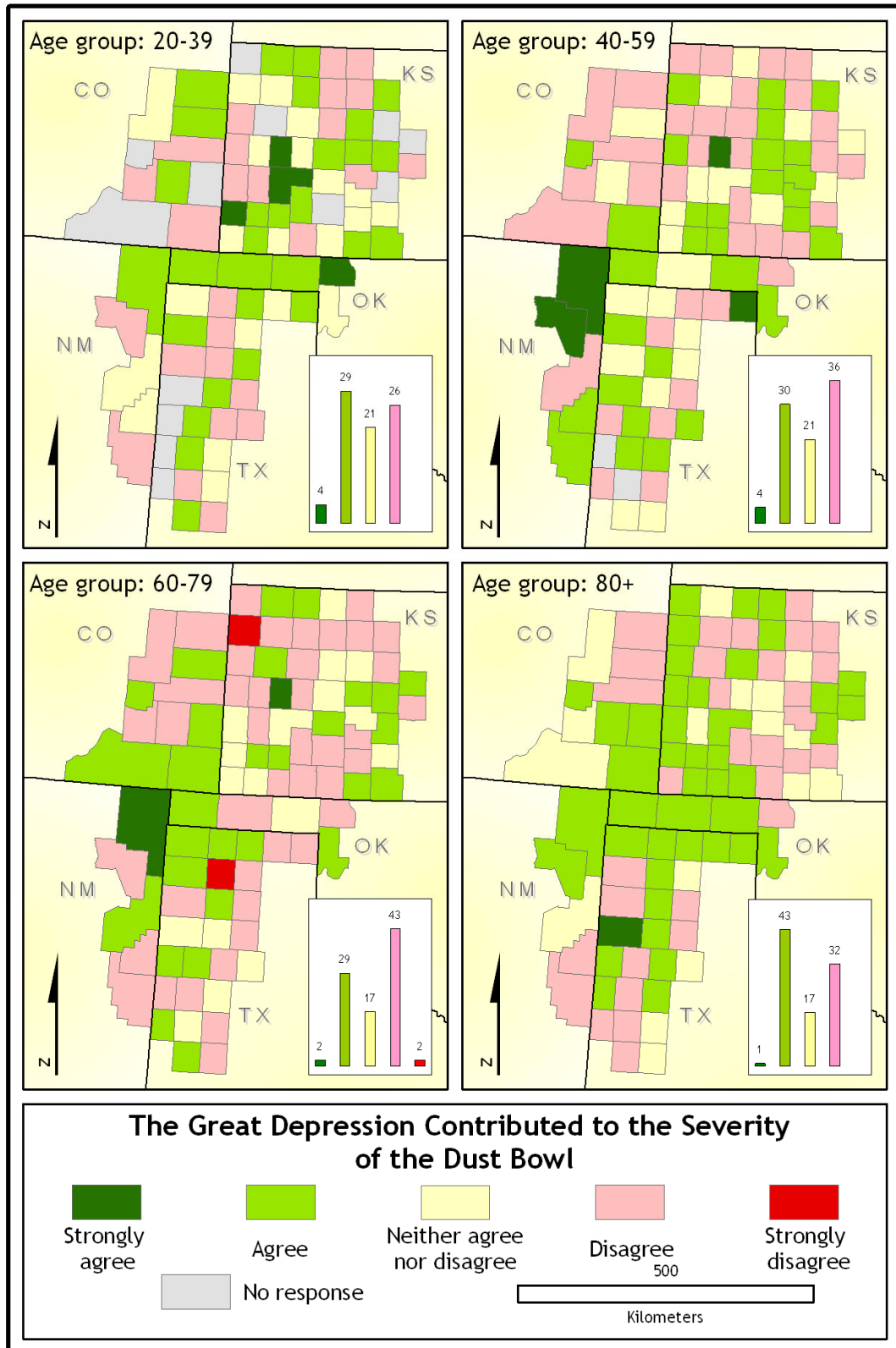


Figure 89. Item C-5 Likert Responses by Age

the notion that the Dust Bowl and the Great Depression were interrelated and contributed to the severity of each other. However, too much should not be read into these results based on very simple statements of very complex phenomena. Each participant in this research could have interpreted these statements in countless ways. It is interesting that respondents from the worst-hit areas were more likely to come to this conclusion. Did the severity of the Dust Bowl in these locations provide some deeper insight into the interrelated nature of social and environmental conditions?

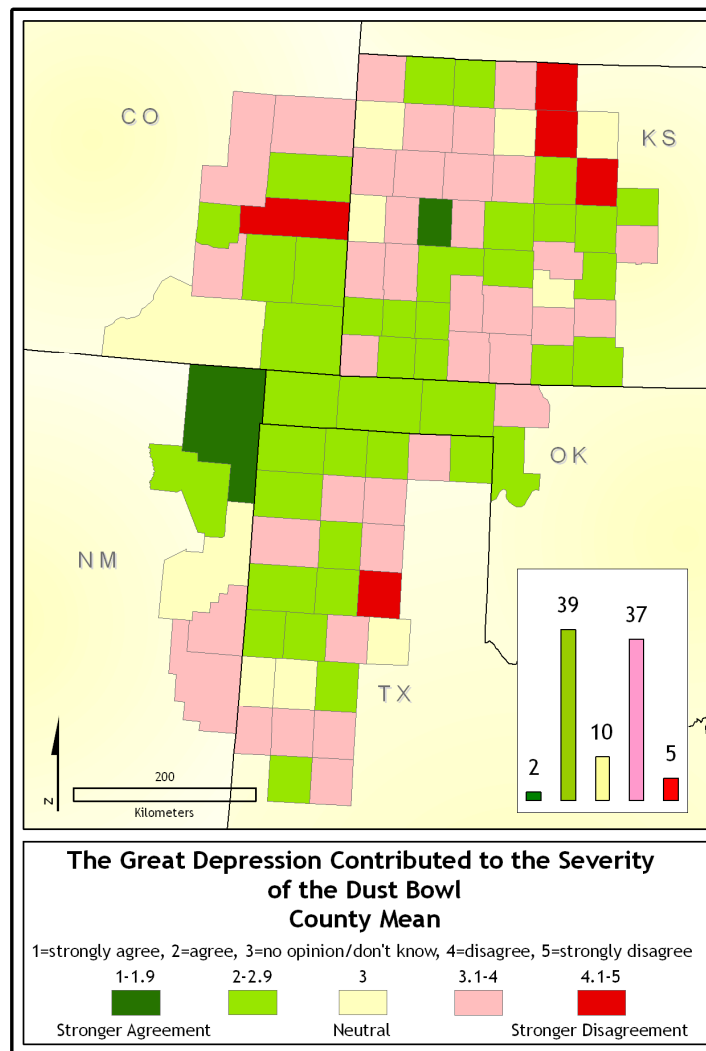


Figure 90. Item C-5 Likert County Mean

The National Grasslands

Four National Grasslands were created within the study area in 1960. These were four of nineteen National Grasslands that were created from land utilization projects in western states (Hurt 1985). The land utilization projects had been a part of the soil conservation program that had its inception under Roosevelt in the 1930's. This program was designed to combat severe wind erosion that was taking place at the time in areas such as the Dust Bowl. Hurt describes the development of the land utilization projects in the Dust Bowl as “the supreme test of the federal government to achieve [soil stabilization, an end to the dust storms, and a return of the land to a grazing economy]” (1985, 245-246).

The creation and implementation of the projects operated under the premise that the needs of greater society superseded those of the individual. Although eminent domain was not used in the acquisition of highly erodible lands by the federal government, opponents of the program complained that farmers were being driven from the region via these acquisitions (Hurt 1985). Therefore farmers were sometimes joined in their opposition to the projects by local merchants who feared any decline in local populations while some local politicians worried about eroding tax bases. Nonetheless, Hurt claims “most residents of the southern Great Plains supported the federal government’s program while the dust was blowing (1985, 253).

With a polarized history of support for the National Grasslands and an oft-voiced resentment of outside control of the region by federal programs, a

measure of support or non-support for this legacy of the Dust Bowl was sought by this research. Respondents in all four age groups indicated agreement with item C-7 (Fig. 91). Strongest agreement occurred with the 40-59 age group, followed by the 60-79 age group. The youngest and oldest age groups were noteworthy for their high number of “neither agree nor disagree” responses. Nearly forty percent of the youngest respondents provided the neutral response along with thirty-four percent of the oldest respondents. By comparison, fifteen percent of 40 to 59 year-olds and twenty-three percent of 60 to 79 year-old persons responded this way.

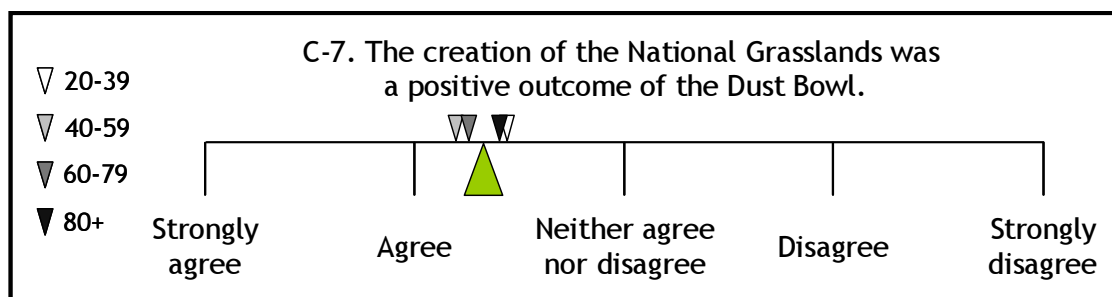


Figure 91. Item C-7 Mean Likert Responses by Age

In discussions with questionnaire respondents, many young people expressed that they were not familiar with the National Grasslands or that they had heard of them, but didn’t know what they were. Unfortunately, the questionnaire was not designed to differentiate between responses indicating non-familiarity with a topic from those indicating a neutral position. In this case, the neutral response captured a number of responses that were actually expressing non-familiarity. Comments from respondents suggest item C-7 had a higher degree of this response ambiguity.

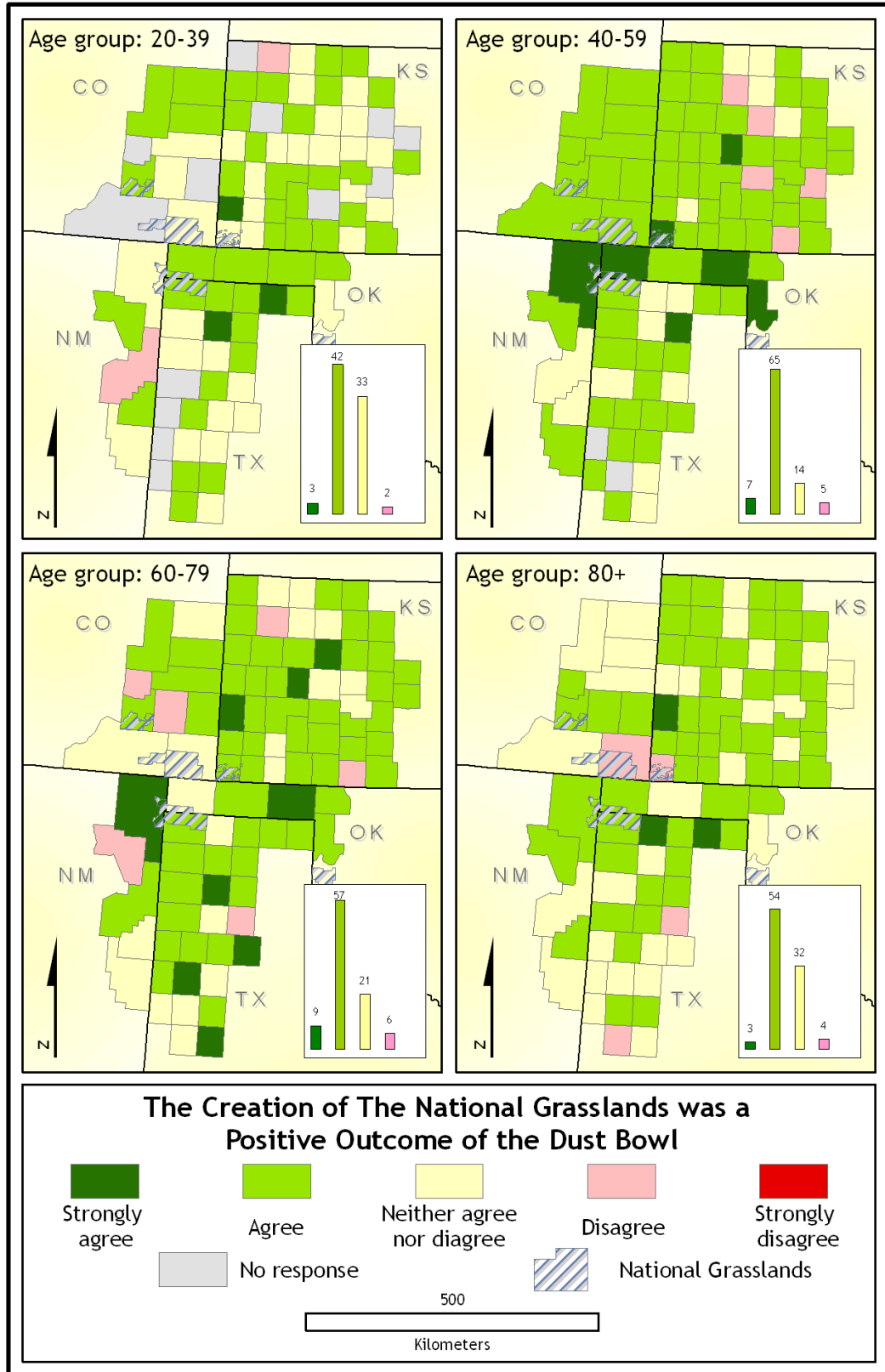


Figure 92. Item C-7 Likert Responses by Age

While the neutral responses for the youngest group indicated non-familiarity with this topic, the neutral responses from the 80 and older respondents were more likely to indicate ambivalence toward the National Grassland program. Several older respondents voiced objections to federal intervention regarding land use in the region, but then followed up with a statement such as, “...but those federal lands don’t blow anymore, no matter how dry it gets.”

Map A-17 in Appendix A suggests clustering of responses with the strongest agreement in a region near the core of the study area. Five of the six counties with county means that qualified for strongest agreement are counties that have a boundary within sixty miles of a National Grassland. The exception is Union County, New Mexico, home to Kiowa National Grassland. It is interesting that the counties expressing strongest support for the creation of the National Grasslands are those that are close enough to see and perhaps gain from the benefits of such a designation, but not actually host the additional layer of land management managed at the federal level.

The Dust Bowl as Environmental Disaster

Agreement to item C-6, “The Dust Bowl was the worst prolonged environmental disaster in the history of the United States” was indicated by all group mean responses (Fig. 93). However, the 20 to 39 year-old respondents mean response was notably closer to neutral and represents one of the larger

inter-question gaps between age groups. This age group had the highest percentage of neutral responses at twenty-nine percent. With this statement, it is possible that response ambiguity has again played a large role for the 20 to 39 year-olds. They may not know rather than not have an opinion. However, this age group also had the highest number of disagree and strongly disagree responses, suggesting that response ambiguity was not likely the problem here to the degree that it was with item C-7, for example. Within this age group, the north/south divide re-emerges. Beyond the northernmost tier of Texas counties, only three of seventeen Texas' respondents in this age group agreed or strongly agreed with this statement. Unlike other questionnaire items that produced this pattern, the divide is not evident in the other age groups' responses and thus an aggregate pattern does not emerge on Map A-18 in Appendix A.

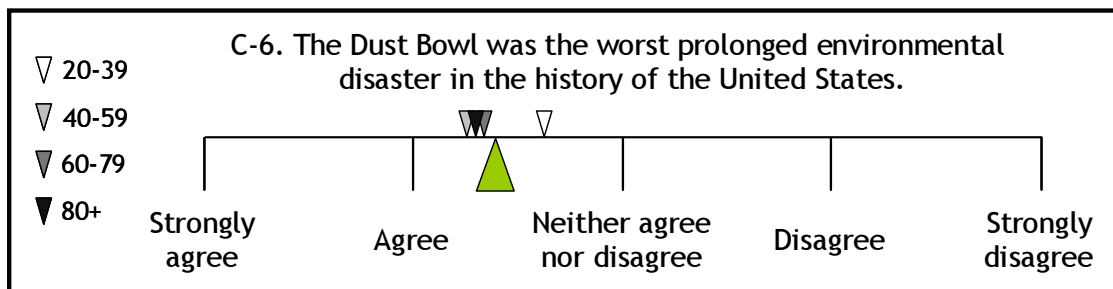


Figure 93. Item C-6 Mean Likert Responses by Age

Several respondents mentioned Hurricane Katrina, the 2005 storm that devastated New Orleans, Louisiana when they reached this point in the questionnaire. That storm was the costliest and one of the most deadly in the

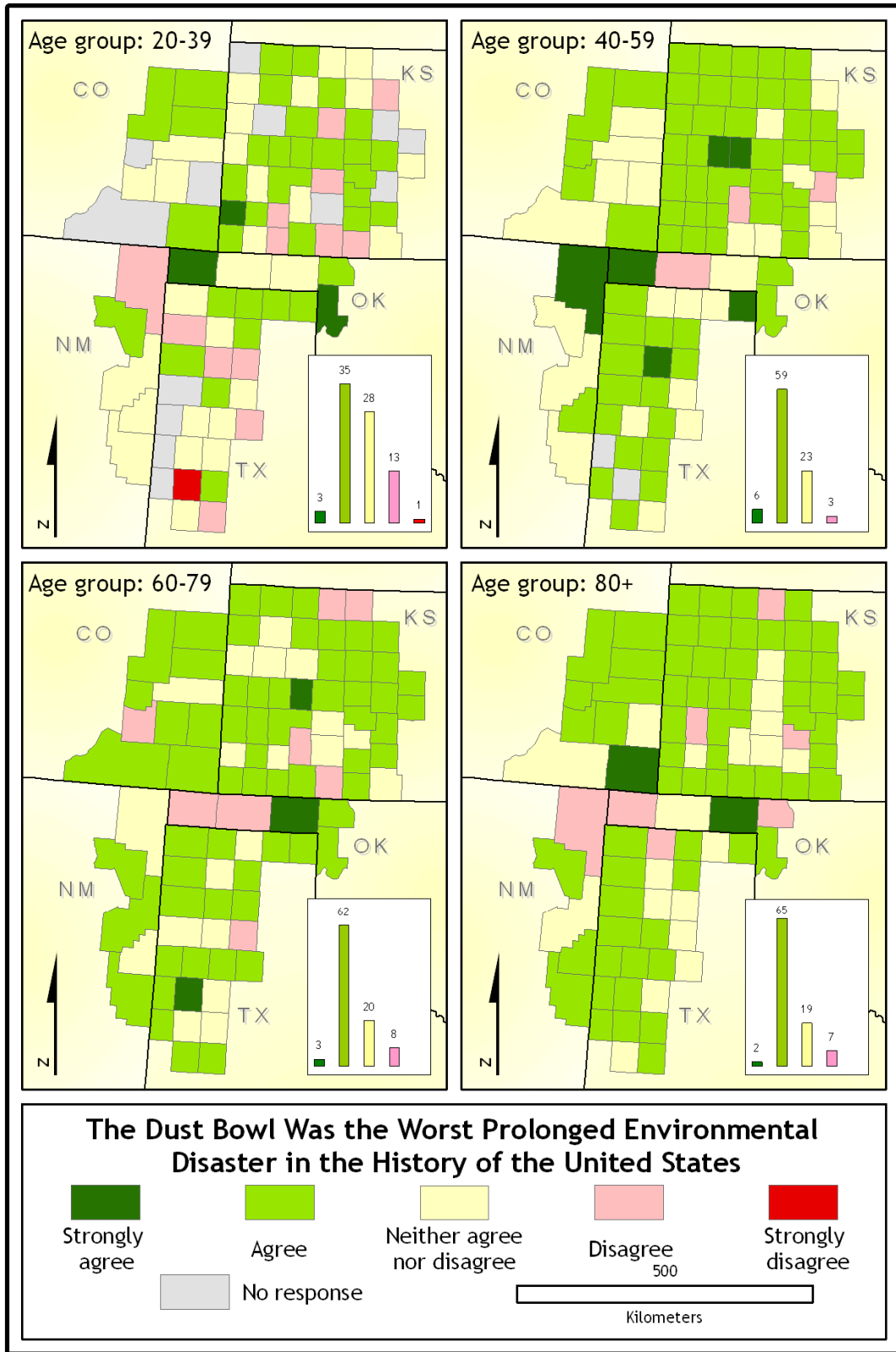


Figure 94. Item C-6 Likert Responses by Age

history of the United States and had occurred approximately one year prior to administration of the questionnaire (National Oceanic and Atmospheric Administration 2007). While this event may have influenced some responses to this statement, it cannot be determined why or if a disproportionate impact occurred with the youngest age group. Perhaps more limited life experience and shorter historical reference spans further dramatized the Hurricane Katrina event. In any case, this author would argue against classifying Hurricane Katrina as a *prolonged* environmental disaster in favor of describing it as an *acute* environmental disaster with prolonged consequences.

Discussion

“The stories we write, in other words, are judged not as narratives, but as nonfictions. We construct them knowing that scholars will evaluate their accuracy, and knowing too that many other people and communities - those who have a present stake in the way the past is described - will also judge the fairness and truth of what we say. Because our readers have the skill to know what is not in a text as well as what is in it, we cannot afford to be arbitrary in deciding whether a fact does or does not belong in our stories” (Cronon 1992, 1373).

Cronon’s words regarding the challenges inherent to constructing any environmental history narrative speak to the primary reason this research was conceived and constructed in this fashion. A representative sample of regional

inhabitants evaluating the “nonfiction” of the Dust Bowl event provides an opportunity to assess the state of Dust Bowl knowledge at face value.

The discrete influences that have impacted the development of the Dust Bowl image in the minds of respondents are myriad. They include the primary factor discussed above, the written record of the Dust Bowl. While both academic and popular sources have contributed to molding the Dust Bowl image in the American mind via the written word, it is the popular sources that have disproportionately influenced Dust Bowl perceptions and understanding, according to Shindo (1997). Popular sources move beyond the written word of Steinbeck’s Grapes of Wrath to include the music of Woody Guthrie, and the photographs of Dorothea Lange and Arthur Rothstein. The most obvious example of the thematic divergence between academic and popular sources relates to the California migration. This theme is disproportionately emphasized in the popular sources and juvenile literature where most Dust Bowl stories end in a journey and resettlement to California.

Beyond the influence of the words and pictures of academics and artists alike are the real-world experiences of the residents of the region. Factors to be discussed in the following chapter include measures of respondent nativity, education, and association with Dust bowl survivors. This matrix of influences has fashioned a different Dust Bowl reality for every respondent, just as it is possible for qualified academic voices to profess very different Dust Bowl narratives. The value comes from looking at the responses as a whole to illuminate popular consensus and trends within age and location groups.

VIII. PUBLIC/ACADEMIC KNOWLEDGE ASSOCIATION

Testing the Academic Consensus

The six statements presented by Cunfer (2004) considered to be “common knowledge” within the Dust Bowl academic community represent a reasonable comparative suite to determine the degree to which the general public’s knowledge of the Dust Bowl relates. Items C-10 through C-12 address physical attributes of the Dust Bowl such as drought, dust storms, and crop failures. Aggregation of responses for Items C-10 through C-12 provides a general correlative measure for physical characteristics of the Dust Bowl that is illustrated in Figure 95. Spatial patterns are evident within individual age groups and across age groups as confirmed by Figure 96. There is generally greater association or more collective agreement with the three physical Likert items in the northern part of the study region. In particular, respondents from northwest Kansas were more likely to express stronger agreement with these items. Only five of twenty-three respondents who exhibited an association score in the highest class were not from Kansas. Meanwhile, respondents in the southern half of the study area were likely to agree with the battery of statements, but generally did so less emphatically. In fact, the mean score

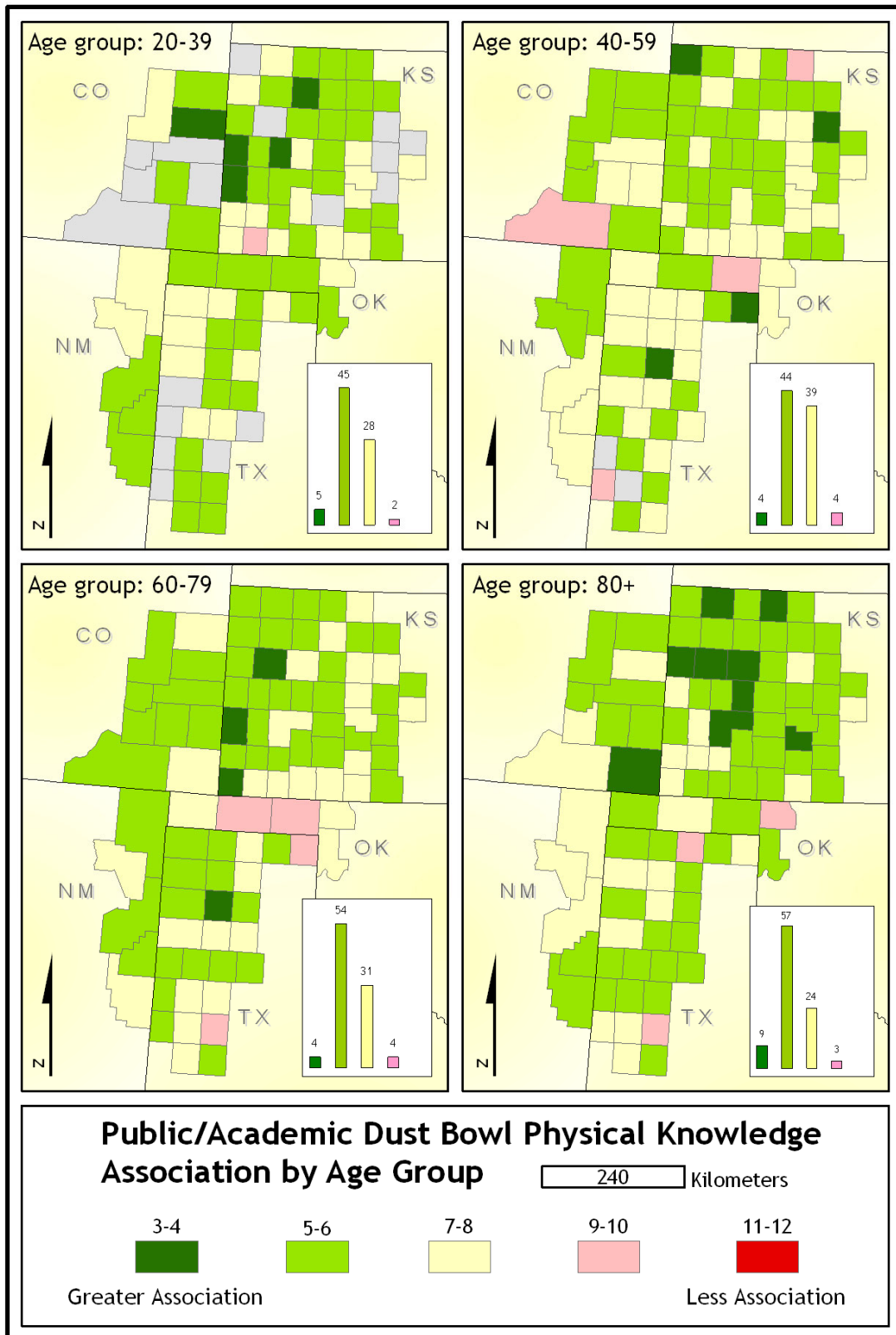


Figure 95. Public/Academic Dust Bowl Physical Knowledge Association by Age Group

illustration shows that fifteen of nineteen counties included in the middle or neutral class were below or adjacent to the 37th parallel (the southern Kansas and Colorado borders).

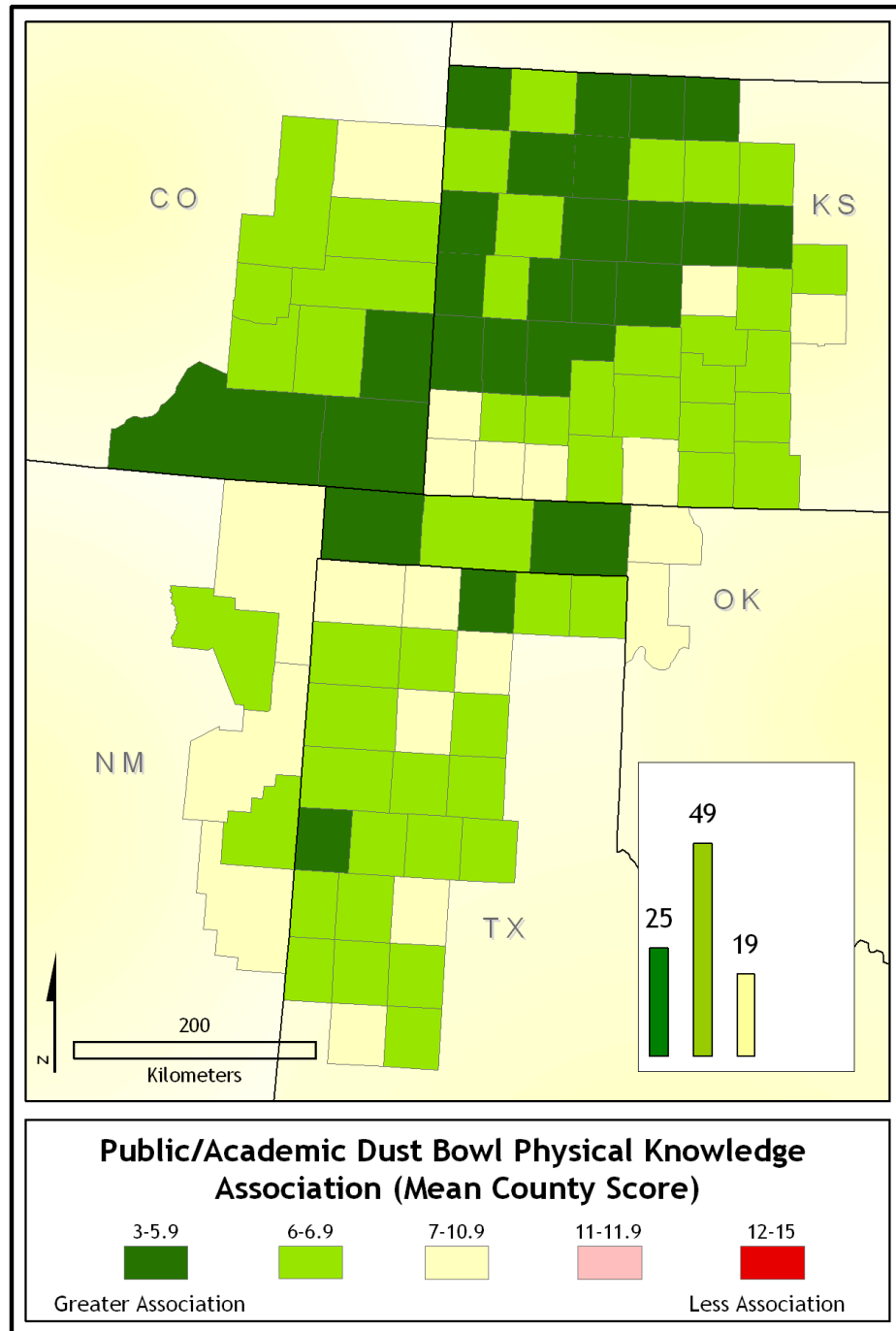


Figure 96. Public/Academic Dust Bowl Physical Knowledge Association - County Mean

Examining the generational map, the spatial patterns described above can be seen, as well as notable variation among the respondent age groups. The most prominent aberration between the age groups is the surge in neutral responses within the 40-59 year-old respondents. The spatial pattern holds steady, however, with the greatest association to academic responses occurring in northwest Kansas. Of the four age groups, the oldest respondents expressed the strongest agreement with the three physical statements and hence have the strongest association with the academic consensus. Within the oldest age group, nine respondents were classified in the greatest association class, compared to five, four, and four for the other age groups. These nine responses were also concentrated in the northwest Kansas region.

Socioeconomic facets of the Dust Bowl event such as economic conditions, government reform, and migration are addressed in items C-13 through C-15. From a spatial perspective, the patterns that were evident for the physical items of the questionnaire do not present here as clearly. Map A-19 in Appendix A, the mean county score for socioeconomic knowledge association, verifies that no discernible pattern is present with an aggregate measure, as well. The responses classified into the highest association class are, however, clustered in the northwest Kansas vicinity.

From an age group perspective (Fig. 97), a similar pattern as was witnessed with the physical group of statements can be seen here. There is a general trend toward stronger agreement/association with increasing age.



Figure 97. Public/Academic Dust Bowl Socioeconomic Knowledge Association by Age Group

The 40-59 age group presents an exception to the general trend with the highest number of respondents classified as neutral, as well as the highest number of responses classified into the two classes designated for less agreement/association. There is a significant shift toward greater association between the 60-79 group and the 80 and older group. The aforementioned pattern of strongest association occurring above and adjacent to the 37th parallel reemerges.

Comparing Figure 95 and Figure 97, there is a notable discrepancy in the overall appearance of the two map groups. It is readily apparent that respondents demonstrated more agreement/association with the statements related to physical knowledge of the Dust Bowl compared to socioeconomic knowledge. With the 80 and older age group an exception, what is responsible for the generally lower association scores for the socioeconomic statements?

Despite the broad and uncontroversial nature of all six Likert statements, the physical statements involve less interjection of personal values than the assessment of socioeconomic statements. Consensus is more likely to be reached by any sample of people regarding characteristics of the weather over government policy. A drought is a drought to most people, whereas government reform to one may be government boondoggle to another.

Compiling the responses (Fig. 98) for all six Likert statements provided by Cunfer (2004) reflects muted forms of the patterns discussed above. Northwest Kansas continues to present responses with the highest association scores. This is seen most readily in the map of mean county score for public/

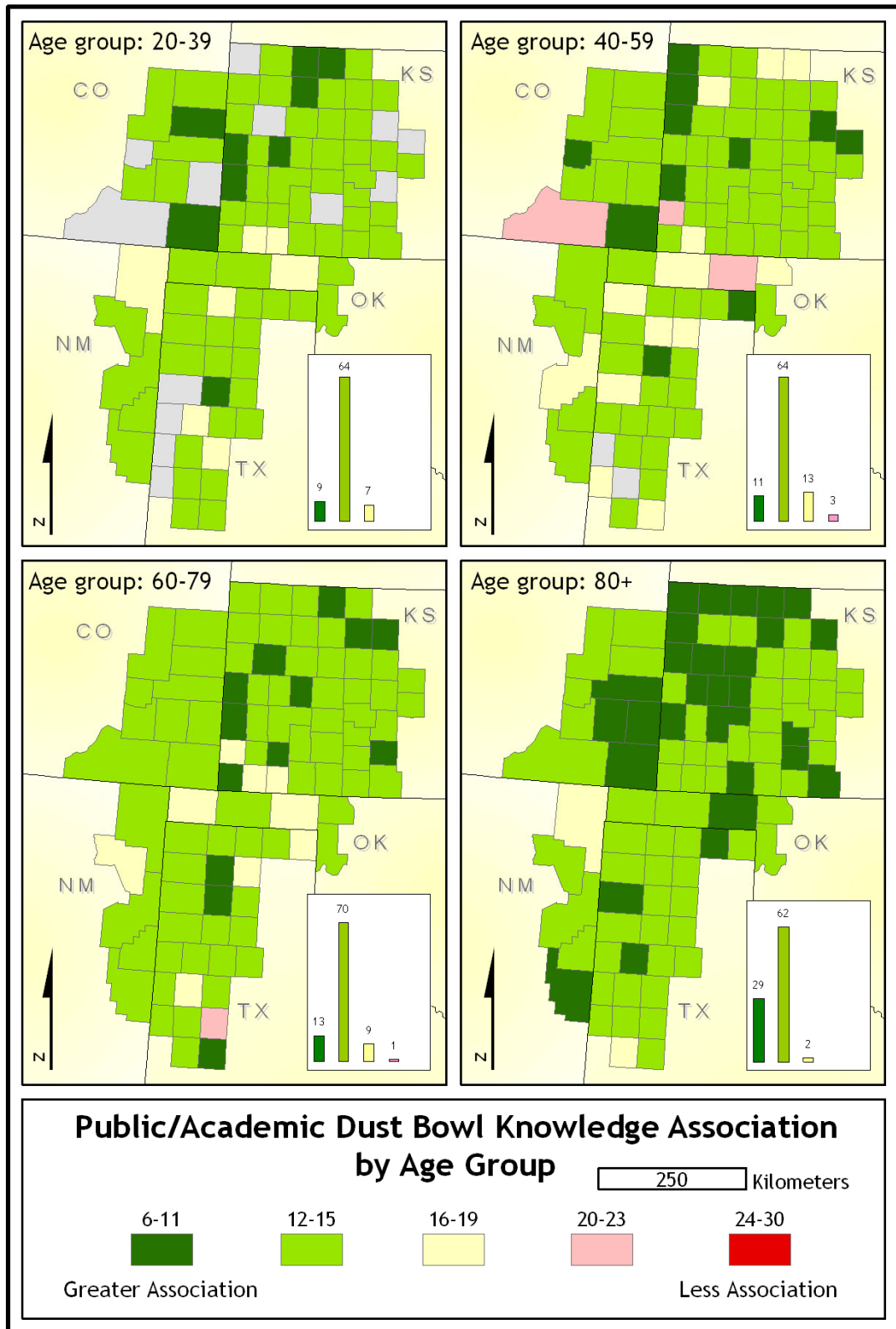


Figure 98. Public/Academic Dust Bowl Knowledge Association by Age Group

academic Dust Bowl knowledge association (Fig. 99). Twelve of fifteen counties with a mean county score less than twelve are located in the northwest half of the Kansas counties included in the study area.

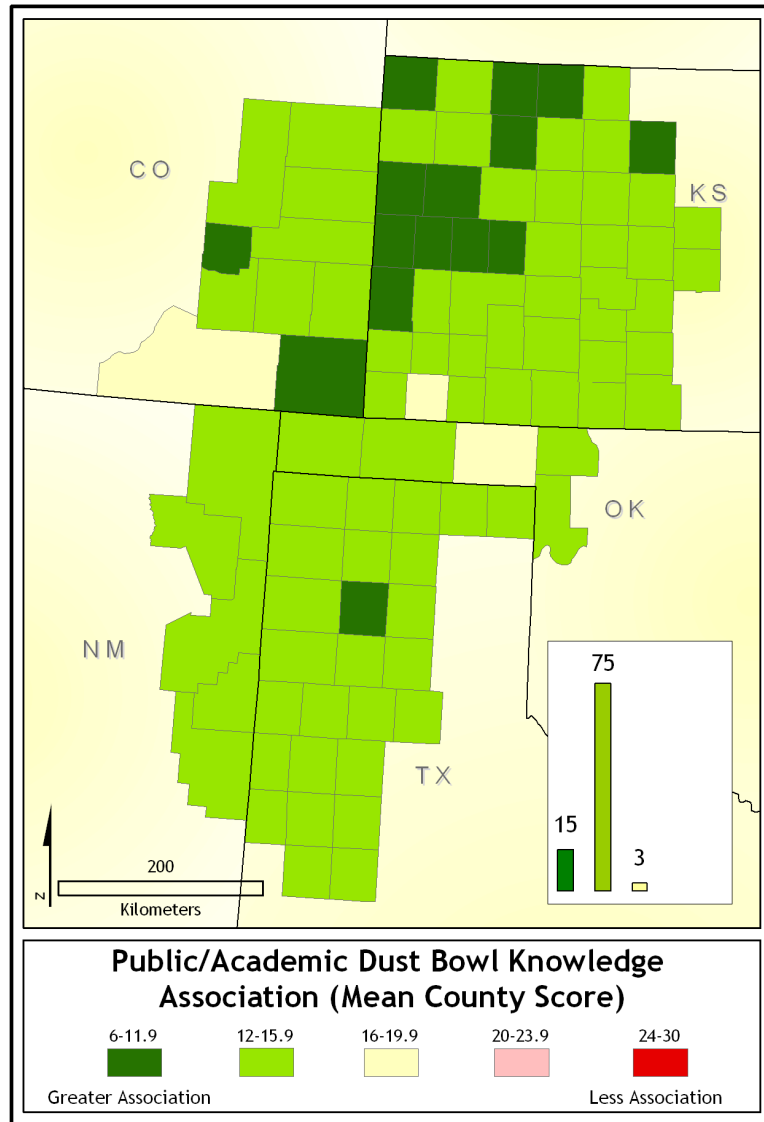


Figure 99. Public/Academic Dust Bowl Knowledge Association - County Mean

Increasing association with age is apparent on the public/academic association by age maps, as well. Again, the 40-59 age group is aberrant, exhibiting the highest count of neutral and less correlative responses. These

responses remain concentrated in the southern portion of the study area. The most significant jump in association between groups is again witnessed from the 60-79 to 80 and older age groups. The number of respondents placed in the greatest association class is twenty-nine for the oldest respondents in comparison to nine, eleven, and thirteen for the three preceding groups.

In summary, respondents were increasingly likely to agree with the statements provided by Cunfer (2004) as they increased in age. The 40 to 59 year-old age group exhibited more ambivalence than the other three age groups. Respondents in all age groups expressed stronger agreement with the three statements pertaining to physical characteristics of the Dust Bowl than for the three statements dealing with socioeconomic characteristics of the Dust Bowl. There was more agreement with Cunfer's statements in roughly the northern-half of the study area. In particular, respondents from northwest Kansas agreed with the academic consensus, as reported by Cunfer, in higher numbers than any other region within the study area.

While administering the questionnaire in northwest Kansas, respondents repeatedly referenced a film that had recently been produced locally and broadcast on public television. This film, *Stories from the Dust Bowl*, consisted of numerous interviews with residents of the region. Upon viewing the film, one could quickly develop a basic knowledge of the Dust Bowl event. By this author's judgment, there was nothing in the film that would invalidate or discount the six statements utilized in the questionnaire. This suggests that the publicity associated with the development of the film and its subsequent

broadcasts may have influenced the responses in the coverage area of the local public television station. The antenna and cable reception coverage area of Smoky Hills Public Television includes all but three (Barber, Comanche, Pratt) of the Kansas study area counties (Smoky Hills Public Television 2007).

In terms of the divide between the physical and socioeconomic suites of statements, an existing factor at the time of the questionnaire's administration should be discussed. Much of the study area was in a drought over the course of the questionnaire's administration. From July 12, 2006 through December 5, 2006 most portions of the study area ranged from abnormally dry (D0) to exceptional drought (D4) according to the US Department of Agriculture's (USDA) drought severity index. The notable exception is that much of the Texas panhandle had emerged from droughty conditions by late October of 2006. However, the majority of Texas counties were visited earlier in the administration phase, when the region was still in drought ranging from moderate drought (D1) to extreme drought (D3) according to the USDA (2007). Furthermore, nearly the entire region had been affected by even drier conditions in the preceding months. The drought situation during the time of questionnaire administration was actually an improvement in most locations compared with the previous three months.

Figure 100 illustrates the drought situation as of July 25, 2006 when field administration of the questionnaire was at its height. Many respondents commented on just how dry it was in their respective area at the time the questionnaire was administered. In fact, numerous older respondents

commented that it was the worst drought they had witnessed since the 1950's. Therefore, the droughty situation at the time of questionnaire administration may have made respondents more aware of the physical characteristics that are associated with the Dust Bowl.

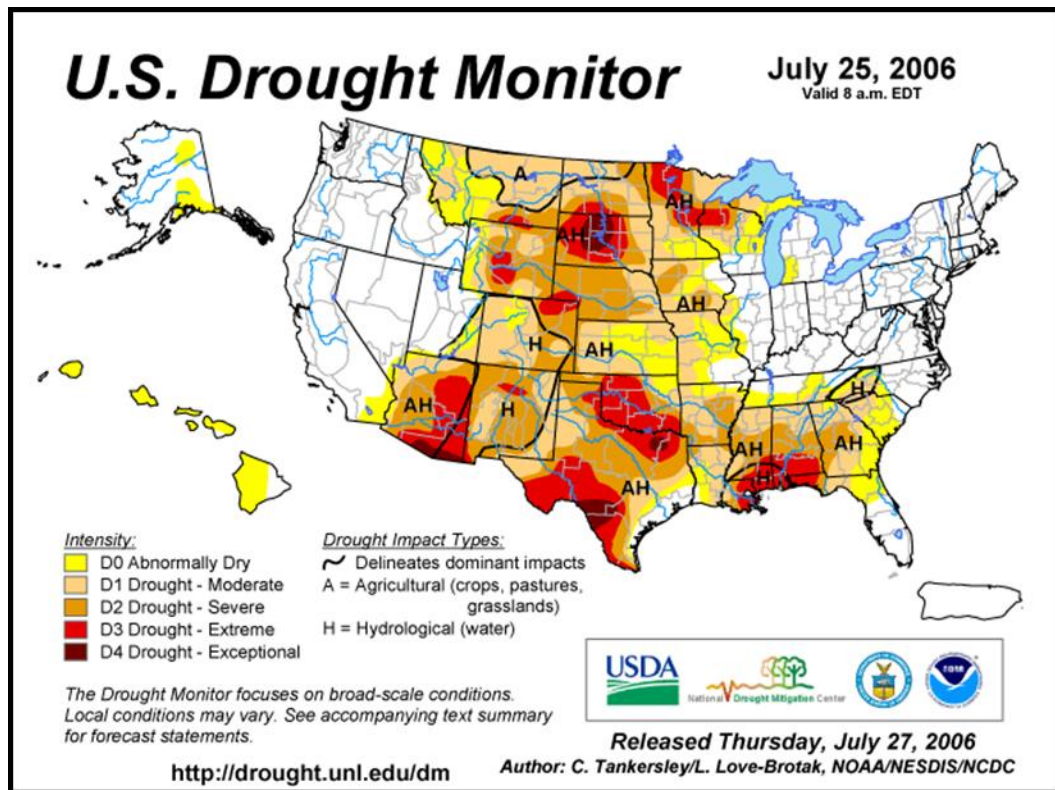


Figure 100. Drought Situation at time of Questionnaire Administration

Respondent Context

Location

In an attempt to determine why Kansans, and particularly northwest Kansans, as well as older respondents possessed knowledge of the Dust Bowl

that more closely correlates with the academic record, locational influences were mapped. These include whether respondents' place of birth was within the study area, whether they attended school within the study area, and whether or not they lived inside the study area for the majority of their adult life. A composite measure of these components was also calculated.

When respondent place of birth (Map A-20 in Appendix A) is examined, age groups present similar numerical and spatial distributions. Sixty-eight percent of 20 to 39 year-old respondents were born in the region compared to sixty-nine percent of the 40-59 group and sixty-two percent of the 60 to 79 year-old age group. The eighty and older group had the lowest percentage of respondents born in the study area at fifty-five percent. This reflects the fact, as evidenced by questionnaire documentation, that many people in the oldest age group represent first-generation settlers to the region that were born at locations that are most often to the east of the study area.

From the state perspective, Figure 101 illustrates the county aggregate regarding respondents' place of birth. Kansas has relatively higher numbers of counties where all four respondents were born within the study area, while Texas has relatively fewer. Differentiation within Kansas is difficult to discern. Thirty-one percent of Kansas respondents were not native to the study area compared to the forty-nine percent of Texas respondents that were not born in the study area. Colorado, New Mexico, and Oklahoma respondents were thirty-three, forty-five, and thirty percent non-native to the study area, respectively. Because of the high figures for New Mexico and Texas, the southern half of the

study area, as defined by the counties that sit below the 37th parallel, has a non-native born percentage of forty-six percent compared to thirty-one percent for the northern half. This difference is attention-grabbing in light of the aforementioned discrepancies between north and south regarding public/academic Dust Bowl knowledge association.

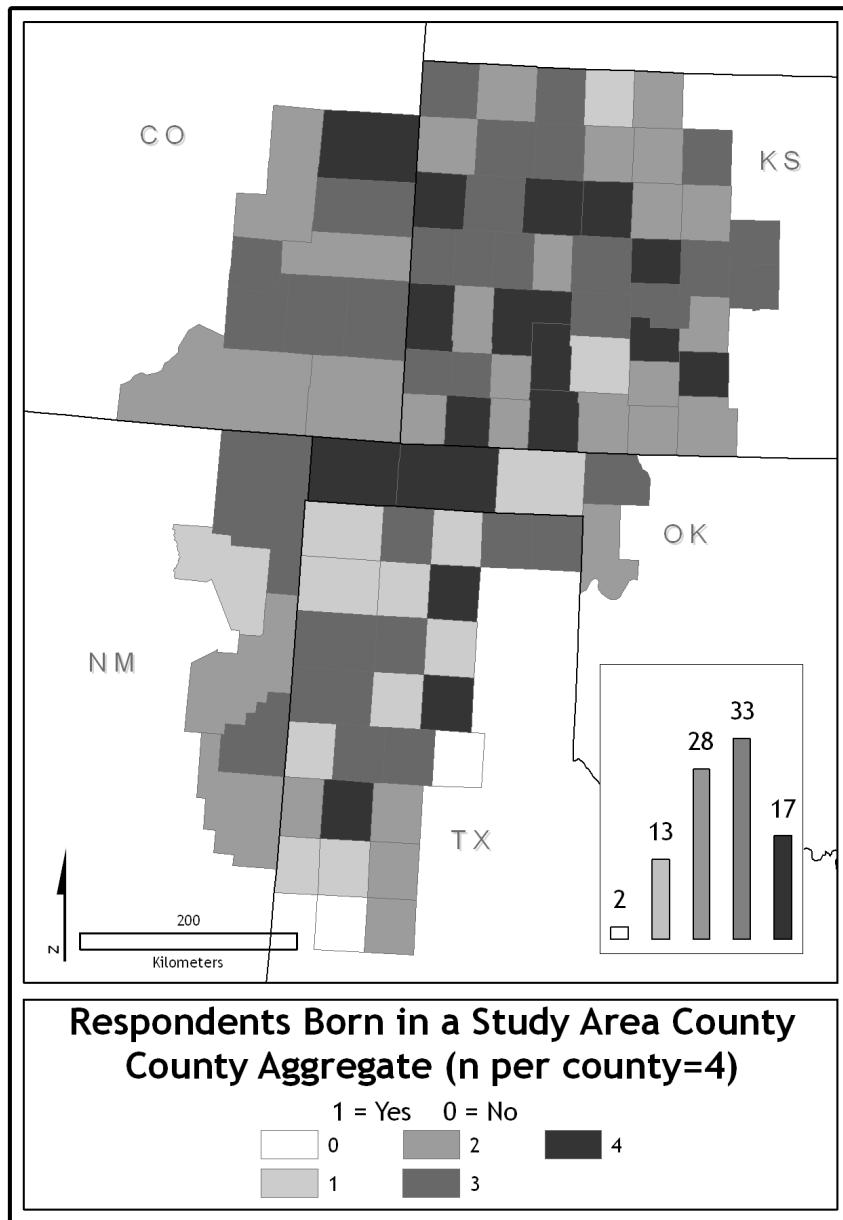


Figure 101. Respondent Place of Birth - County Aggregate

Respondent residence during school age years was recorded and mapped (Map A-21 and Map A-22 in Appendix A) to see if education location could help explain the patterns of public/academic knowledge association. It seems likely that schools within the study area would be more likely to address the Dust Bowl event than schools outside the region. Therefore, it would not be unreasonable to expect persons who obtained their schooling in the study area to express knowledge of the Dust Bowl that was more in line with the academic consensus.

The distribution of respondents who were educated in the study area, however, exhibited no difference between the northern and southern halves of the region. Both sub-samples had seventy-five percent of respondents who spent the majority of their school-age years in the study area. The highest percentage of respondents in a single age category who did attend school in the region was the seventy-five of the 40-59 age group. Recall that this is the age group that displayed the most deviation from the academic record in their responses to the Likert questions. However, this group had only minimally more Dust Bowl-centric educations. The other groups ranged from seventy-three for the 60-79 group to sixty-seven for both the youngest and oldest groups.

The next locational measure assessed was whether or not respondents had spent the majority of their adult life in the region. These maps illustrated minimal variation among age groups. Three of the four age groups had eight of ninety-three respondents report that they had not lived in a study area county

for the majority of their adult life. The other age group, representing respondents 40 to 59 years of age had five such respondents. From a spatial perspective no discernible patterns were evident in either of the maps (Map A-23 and Map A-24 in Appendix A) of the measure.

The final pair of maps is a composite of the place of birth, place of education, and location of adult residence to create a Dust Bowl nativity index. Someone who was born, attended school, and lived the majority of their adult life in the study area is indicated by a “yes” on this measure, whereas a respondent who did not meet this criteria in any regard receives a “no.” As was the case in previous measures, the 40 to 59 year-old age group illustrates the highest nativity percentage at sixty-nine percent. The next highest group was 20-39 at sixty-three percent followed by the 60-79 group at fifty-six percent and the 80 and older group at fifty-three percent. Therefore, as a whole these figures do not suggest that nativity is the most essential explanatory factor for public/academic knowledge association in terms of age (Fig. 98 and Fig. 102).

When looked at from a state perspective (Fig. 103), however, a slightly different story emerges. For the nativity index by county, the “yes” responses were aggregated into a single map with a possible total of zero (lowest nativity) to four (highest nativity). When these counts are divided by the number of respondents for each state, a rough measure of nativity by state is created. Kansan respondents received a score of .77 on the nativity index compared to Texans’ .67 for the measure. For states with smaller respondent

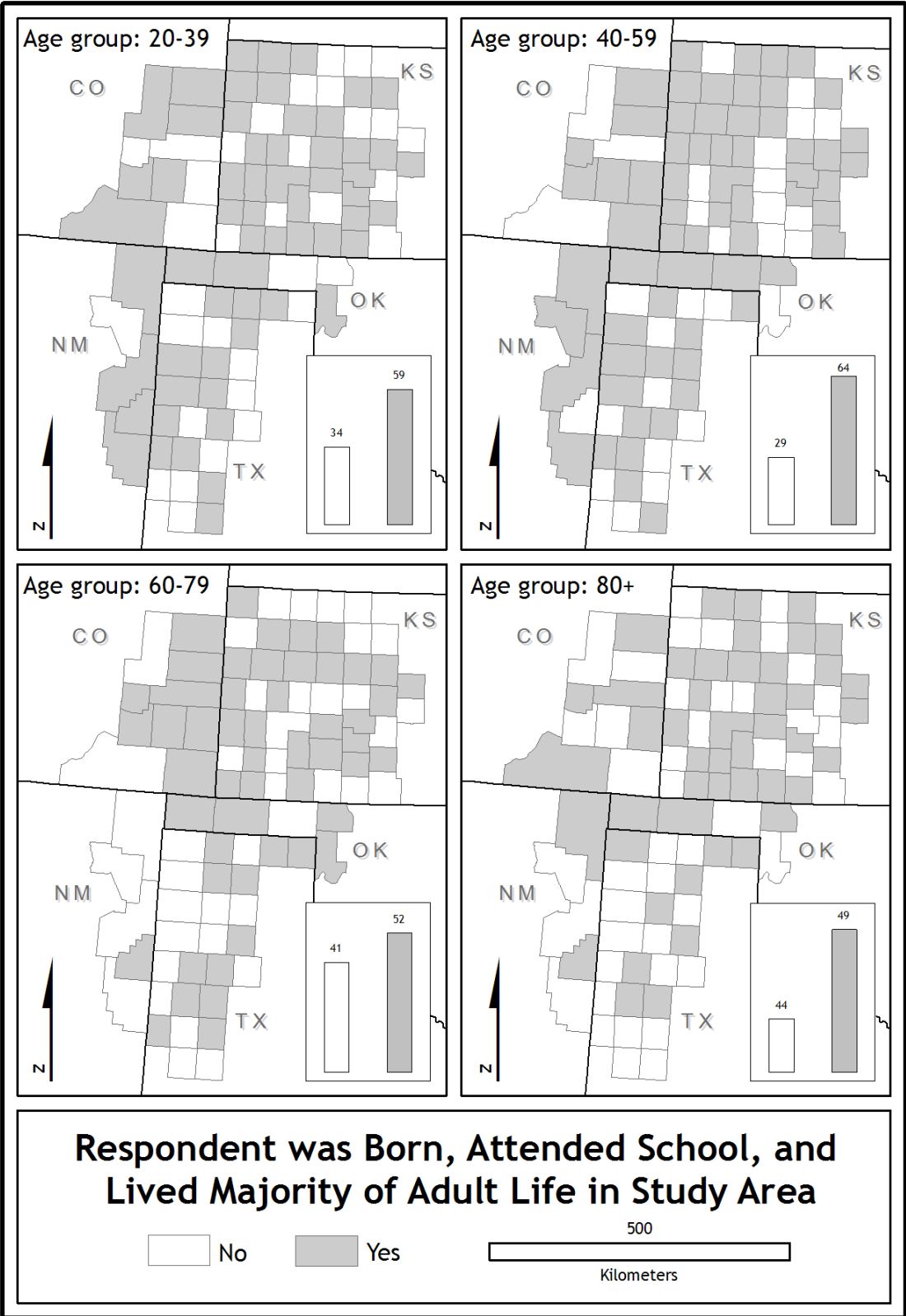


Figure 102. Respondent Nativity by Age

sample sizes, Oklahoma had the highest score at .85 followed by Colorado at .75, and New Mexico at .55.

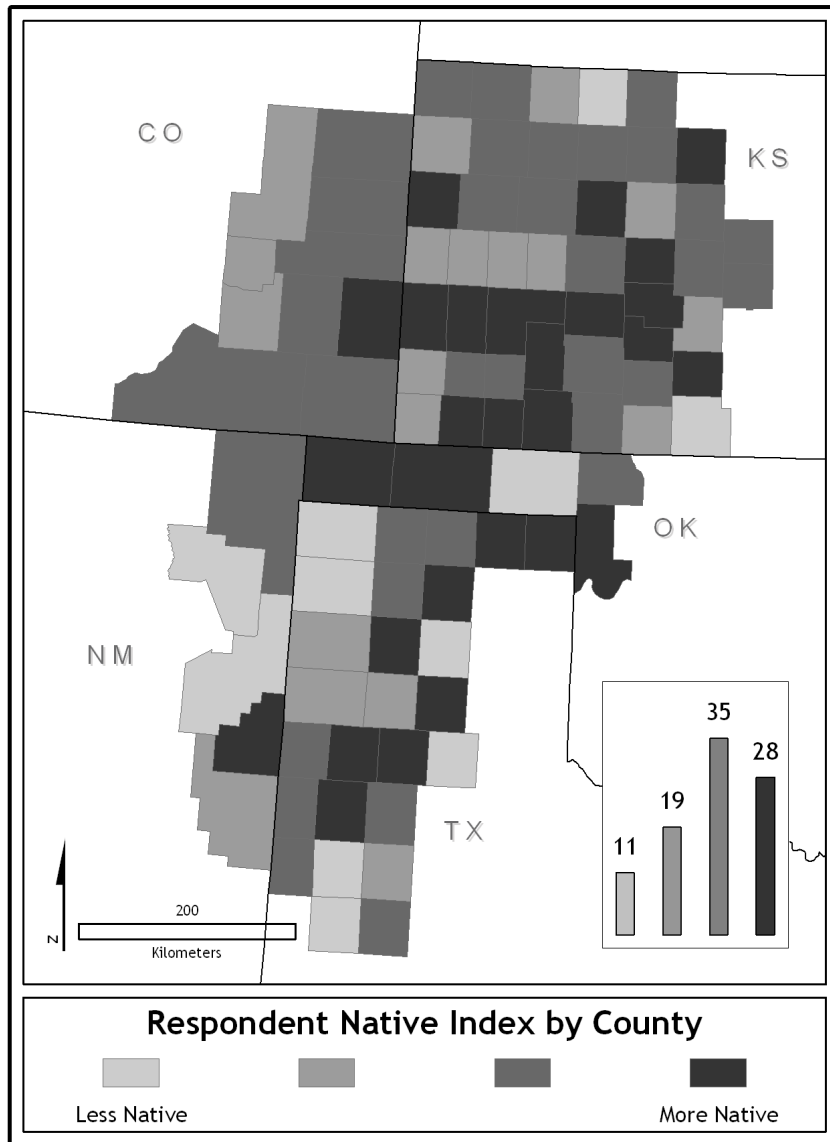


Figure 103. Respondent Native Index by County

When the states are combined into the northern and southern study area groups, a pattern that is related to the public/academic knowledge association scores is evident. The northern nativity score is .76 compared to the southern score of .68. Does this explain the similar discrepancy in knowledge scores? It

is not likely that this is a chief explanatory factor because of the lack of association between the age group knowledge variation and their nativity scores. Rather the most important contributory component of this nativity score, place of birth, has such a strong association with knowledge association that it is influencing the nativity score. Place of birth is likely the most important component of nativity because it indicates that a respondent is more likely to have parents, and subsequently grandparents from the immediate region. The value of this consideration is discussed below in regard to item D-4.

Beyond Nativity

Factors beyond respondents' residence in the study area that were looked at for explanatory value in the assessment of public/academic knowledge association included Dust Bowl-specific education, acquaintance with Dust Bowl survivors, and direct personal experience with the Dust Bowl event. Questionnaire item D-2 asked respondents "Were you ever taught about the Dust Bowl during the course of your education?" The youngest generation had the highest percentage of respondents answering yes to this question at sixty-two percent. The numbers steadily decreased in the next two older age groups at fifty-one and thirty-eight percent respectively.

The oldest age group, however, had only five respondents (5.3%) who reported being taught about the Dust Bowl. This figure is explainable by the

fact that many of the respondents in the oldest age group were contemporaries of the experience. The Dust Bowl experience had not yet developed a historical narrative to be incorporated into curricula. Members of the oldest age group also had the lowest levels of educational attainment among the age groups. Thus they had fewer opportunities to be exposed to Dust Bowl thematic education, particularly at post-secondary levels. Finally, most of the 80 year-old and older respondents' academic careers concluded more than sixty years ago. Many respondents, regardless of age, commented that they could not remember what they had or had not discussed during their schooling. It would stand to reason that the youngest respondents would have the best recollection of school topics, followed by successively older age groups. This would largely explain the map-to-map pattern of Figure 104. It is also possible that Dust Bowl education has waxed and waned over the years in relation to drought.

The aggregate map illustrates several interesting patterns (Fig. 105). First, all five Oklahoma counties have an aggregate sum of three. Because the remaining eighty-eight study counties account for only an additional twelve counties with a sum count of three or four, Oklahoma has a disproportionately higher number of respondents who reported learning about the Dust Bowl in school. Is this because Oklahoma has done more to incorporate Dust Bowl history in its curriculum over the years? It is impracticable to know without a much larger sample and extensive further research on the history of Dust Bowl curriculum and education. However, this could be another result of Oklahoma



Figure 104. Formal Dust Bowl Education for Respondents

occupying the central role in the Dust Bowl's dramatic narratives such as The Grapes of Wrath. As a consequence, perhaps Oklahomans attach to the Dust Bowl and possess some ownership of the event that is reflected in ways such as a greater emphasis within its schools. Beyond this possible symbolic attachment to Dust Bowl education, another pattern is suggested by the aggregate map. Other than the Oklahoma panhandle, the northern edge of the Texas panhandle and southwest Kansas exhibit higher numbers of respondents who reported learning about the Dust Bowl. This core part of the study area was home to some of the most severe and prolonged effects of the Dust Bowl. This map may suggest that Dust Bowl education is more prevalent in those areas.

Figure 106 displays responses to item D-4: "Do you or have you ever known a survivor of the Dust Bowl?" Beginning with the 80 and older respondents, only three people reported that they did not know a survivor of the Dust Bowl. Two of these persons had recently moved to the area from non-study area states. Ninety-four percent of 60 to 79 year-old respondents reported knowing Dust Bowl survivors while the number dropped slightly to eighty-nine percent for 40 to 69 year-olds. However, only fifty-nine percent of 20 to 39 year-old respondents claimed they had known a Dust Bowl survivor. This marked decrease reflects the generational separation between Dust Bowl contemporaries and younger inhabitants of the region that will continue to increase with subsequent generations.

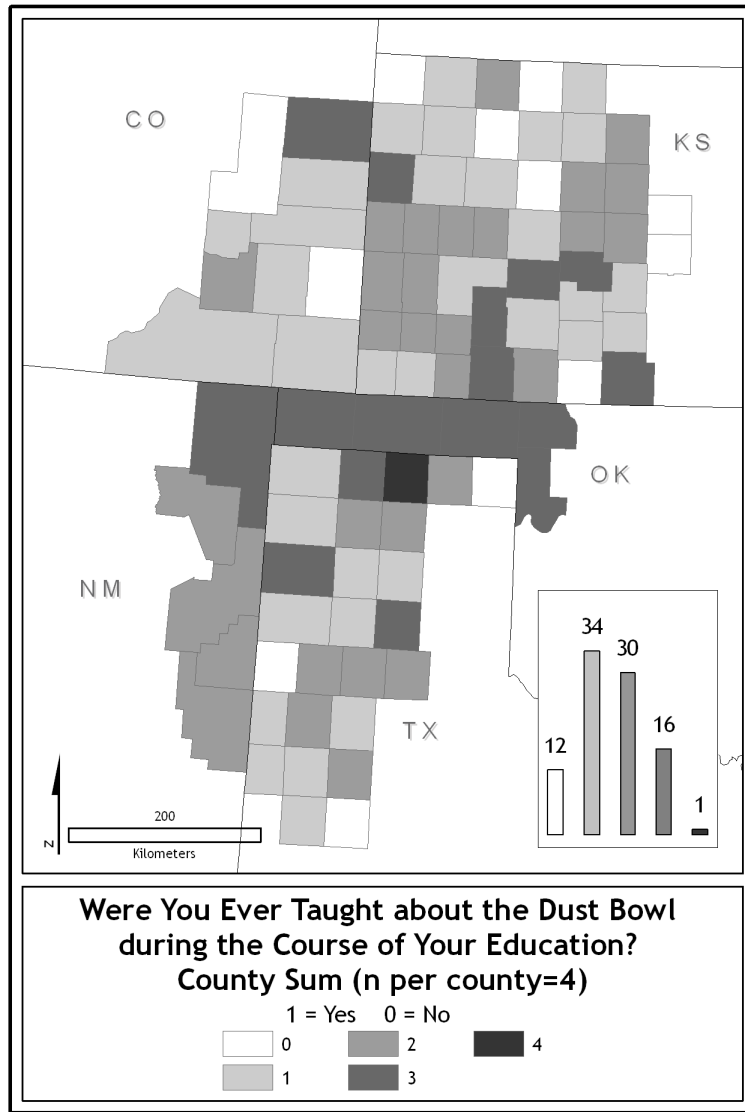


Figure 105. Formal Dust Bowl Education for Respondents - County Mean

While the oldest respondents in the 20-39 group could conceivably have parents who lived through the Dust Bowl experience, it is much more likely that the persons referred to by these respondents are grandparents and great-grandparents. Therefore, the 20-39 age group is likely the last generation that will have significant contact with survivors of the Dust Bowl. As the next generation matures on the Great Plains, they will not have living references to

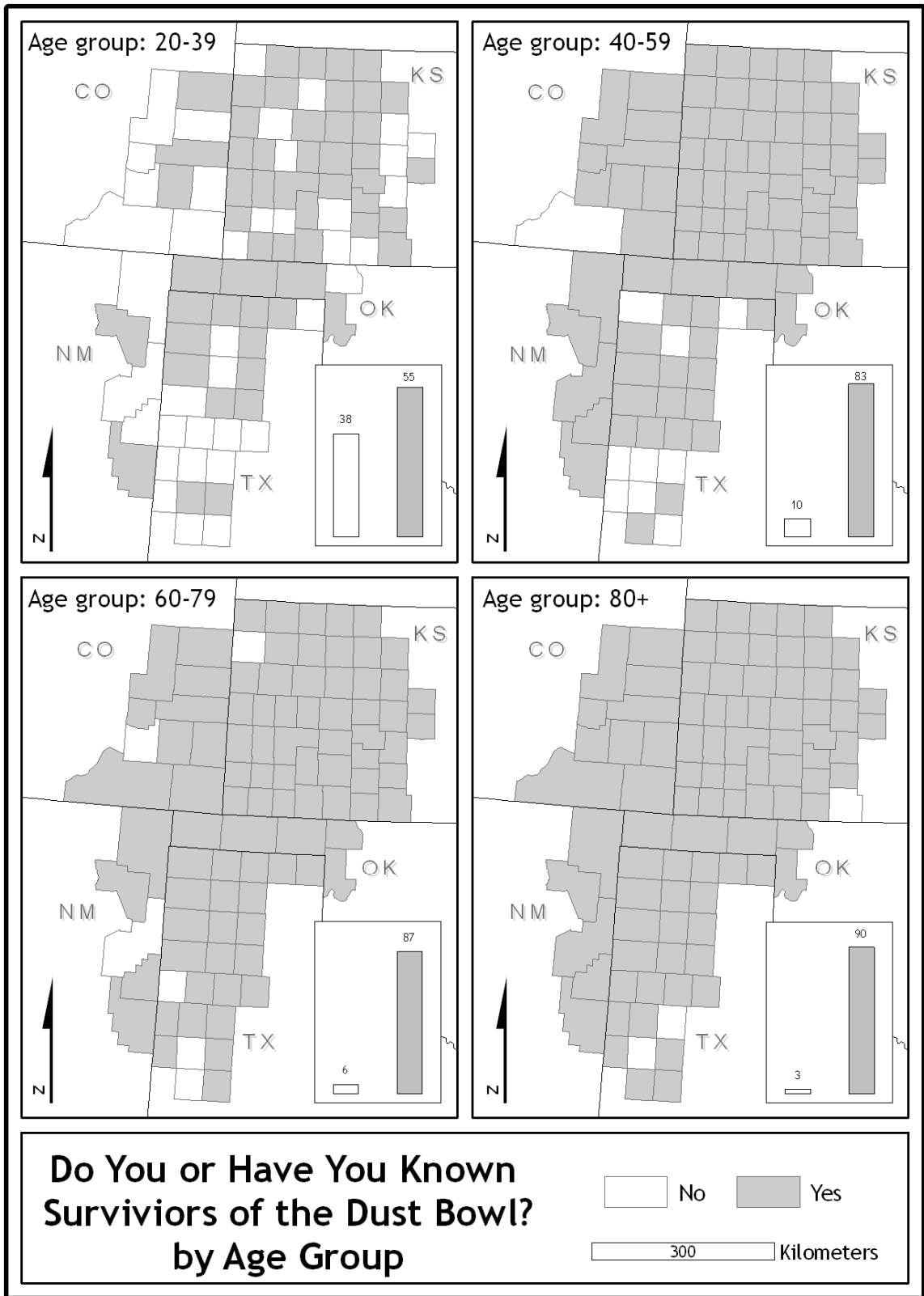


Figure 106. Respondent Acquainted with Dust Bowl Survivor(s)

the Dust Bowl era. The decreased contact with Dust Bowl survivors that is already evident with the youngest participants of this research is noteworthy in light of the assessment of public/academic knowledge association. The age group that demonstrated the lowest level of knowledge association is the age group that has had the least amount of exposure to the Dust Bowl from the perspective of those who experienced it.

The aggregate map of this questionnaire item also suggests that this formative element of the Dust Bowl knowledge base is important (Fig. 107). Again the north/south divide is evident, particularly when the states of Kansas and Texas are compared. Whereas more than ninety-one percent of Kansas respondents knew a Dust Bowl survivor, the figure dropped to seventy-four percent for Texans. Recall that Kansas respondents were more likely to have been born in their state than Texas respondents, thus making it more likely that they would know a Dust Bowl survivor. From a state-based perspective, Kansans' public/academic knowledge association mean score was 12.31 compared to 13.35 for Texas. A lower number indicates more agreement with Cunfer's six statements.

The final component that may provide some explanation for levels of Dust Bowl knowledge is whether or not respondents experienced the Dust Bowl on a firsthand basis. The questionnaire did not include any items that addressed this explicitly. Therefore, a proxy measure was obtained by examining responses to questionnaire item C-1. For this item, respondents were asked, "In your words, what was the Dust Bowl?" A surprising number of

responses included some personal reference such as “that was when I ate dust for breakfast for three years” or “it was the worst time of my life.” Figure 108 illustrates that there were no such responses in the two younger age groups. Seven of ninety-three respondents in the 60-79 age group provided a personal reaction while twenty-four of ninety-three responses in the oldest age group suggested that the respondent had personally experienced the event.

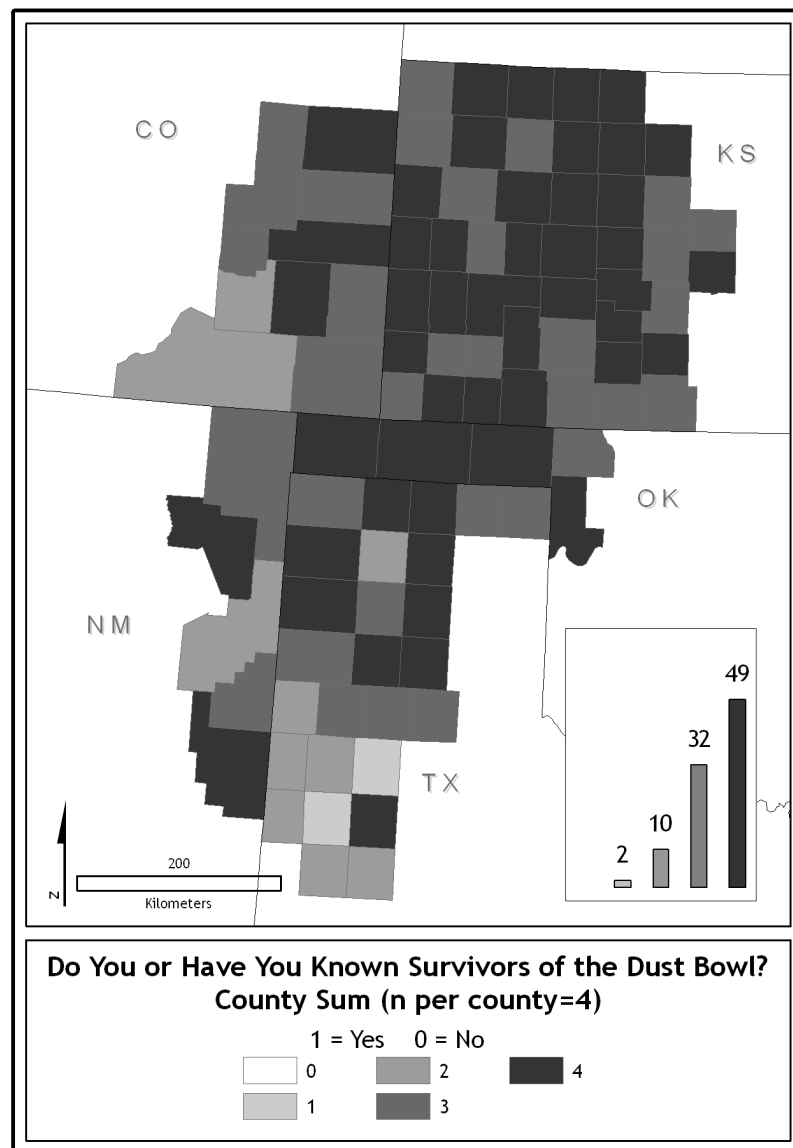


Figure 107. Respondent Acquainted with Dust Bowl Survivor(s) - County Sum



Figure 108. Personal Experience with the Dust Bowl

This measure merely verifies that many of the oldest respondents of the questionnaire recall direct experience with the Dust Bowl event, likely influencing their responses. Perhaps this experience equates to knowledge of the Dust Bowl that is more closely associated with the academic consensus.

Summary

An exploration of the degree to which academic and public knowledge of the Dust Bowl event parallels each other has revealed a strong relationship. In general, respondents to the questionnaire indicated agreement to the six Likert statements that represent academic consensus on the topic. Nonetheless, significant variation was noted within the sample of study area residents. As a whole, respondents expressed stronger agreement with the academic consensus on the three physical statements than the socioeconomic statements. This may be explained by the pervasive drought conditions affecting the study area at the time of questionnaire administration and/or the less value-laden nature of the physical statements in comparison to the socioeconomic statements.

Respondents were generally more likely to express stronger agreement with both physical and socioeconomic statements with increasing age just as respondents from the northern half of the study area were more likely to express stronger agreement than respondents from the southern half of the

study area. Locational association appears to be related to at least two interrelated variables: place of birth and acquaintance with Dust Bowl survivors. The region of the study area that exhibits the highest levels of public/academic knowledge association coincides with the region that reported the highest percentages of persons who were born within the study area and persons that knew a Dust Bowl survivor. As stated above, if a person was born in the study area they are more likely to have relatives from the area that could qualify as Dust Bowl survivors.

The study area can be roughly divided into northern and southern halves along the 37th parallel of latitude. Generally, the northern half exhibited higher levels of knowledge association along with more study-area born respondents who reported knowing Dust Bowl survivors. These characteristics were enhanced in the northwestern half of Kansas study area counties.

IX. CONCLUSIONS AND FUTURE DIRECTIONS

This research has shown that residents of the historic Dust Bowl region collectively maintain a high level of knowledge about the Dust Bowl event. Nonetheless, an erosion of that knowledge is currently taking place. As the most informed group of residents passes away in coming years, they are replaced with young people who do not possess a comparable understanding of the complex region, era, and event. As a result, the Dust Bowl becomes increasingly generalized in the minds of the people of the region. In more and more cases, young people will not be familiar with the term.

This is a concern because the Dust Bowl was not the first major aeolian event to impact the region and it is unlikely that it will be the last. The region is perpetually on the cusp of significant human ecological disturbances. When one considers the rapidly changing climate of the 21st century and the diminishing groundwater resources of the region, the relevance of an in-depth understanding of the human-environment relationship in the Great Plains is underscored.

Knowledge and consensus of knowledge regarding land use and management have been shown to be key elements to mitigate or avoid undesirable human ecological outcomes on the Plains (Heathcote 1980; Riebsame 1986). This research has shown that the highest levels of knowledge

and consensus are found with the residents of the region who are nearing the end of their lives. This research has also shown that one of the most important factors contributing to higher levels of Dust Bowl knowledge is the personal relationships that respondents have with Dust Bowl survivors. This accentuates the need for the development of educational resources that will serve to replace the invaluable words and experiences of a fading generation. Maintaining the knowledge-base regarding this touchstone event of human-environment dynamics in the Great Plains can help allay human contributions to future undesirable ecological events.

The usefulness of developing Dust Bowl educational resources is supported by an additional finding of this research related to the spatial distribution of Dust Bowl knowledge. The northwestern half of the study area within Kansas exhibited higher levels of Dust Bowl knowledge, as demonstrated by public/academic association and discussions in the field with respondents. While this area did possess a higher percentage of respondents born within the study area, and subsequently a higher number of persons who know or have known Dust Bowl survivors, it was also home to a much publicized locally-produced Dust Bowl documentary that had been broadcast and rebroadcast locally in the months prior to administration of the questionnaire. Numerous respondents in northwest Kansas discussed this film during the course of questionnaire administration. This suggests that the film played a role in the higher relative levels of Dust Bowl knowledge.

Before returning to this theme of Dust Bowl educational development, a brief summary of key findings for the region, event, and era concepts is provided. A few words on the prospects of a future Dust Bowl-like event lead to the assessment of the demand for educational resources in the form of a Dust Bowl-specific museum and educational interactive website. Potential research initiatives that build on those inquiries are discussed before concluding remarks address the Dust Bowl's competing persistent and fleeting essences.

Summary of Findings

The Dust Bowl Region

Though the concept of defining a Dust Bowl region through the delineation of regional boundaries is a difficult and subjective task, a number of academic sources have attempted to do so, including this one. While this dissertation catalogs and compares the Dust Bowl region as it has been presented in previously published sources, it also presents the Dust Bowl region from a fresh and heretofore unexplored perspective. That perspective is provided by a systematic sampling of the residents of the study area or region that has most-often been referred to as the historic Dust Bowl. Their ideas of a Dust Bowl region both parallel and diverge from academic norms.

Those academic norms are anchored to the maps published by Worster (1982) that were based on materials in the National Archives, with significant contributions from Robert Geiger, the AP reporter who coined the term “Dust Bowl.” The National Archives/Worster maps emphasize wind erosion to define areas of most severe wind erosion or “dust regions”. Unfortunately, the vast majority of published regional delineations provide neither the variable(s) that were considered to create the regional definition nor source materials. It is a rare exception to find Dust Bowl maps such as those provided by Cunfer (2005) that explicitly define variables such as soil type, mean precipitation, and mean temperature employed for the creation of varied Dust Bowl delineations. Because many subsequent Dust Bowl texts have “borrowed” the National Archives/Worster maps, there is a strong consensus among academic texts as to the area generally defined as the Dust Bowl. Nonetheless, some deviation within the academic texts can be noted.

The variety of Dust Bowl regional depictions expands when popular literature, juvenile texts, and Internet sources are included in the sample. These sources present Dust Bowl regions that are striking for their size, as some stretch to the west of the Rocky Mountains and to both the northern and southern borders of the US. Considering that these sources play a complementary role in some cases and likely supplant the academic sources in others, the Dust Bowl region could quickly become convoluted in the eye of the general public.

So what exactly does the eye of the general public identify as the Dust Bowl region? This research has shown that the public at large closely identifies with the academic consensus in terms of the spatial characteristics of the Dust Bowl. Despite this general agreement, significant locational and generational variation was revealed, as well. Additionally, state and regional biases were routinely exhibited by respondents.

One of the earliest findings from this research centered on the notable discrepancy between the state's respondents defined as "Dust Bowl states" on the questionnaire and their hand-drawn Dust Bowl regional maps. Why respondents would typically identify two or three states as Dust Bowl states and then draw a Dust Bowl region that typically included six or more states remains unexplained. The significant incongruity was witnessed across age groups, but to a greater degree with younger age groups.

In general, the younger the respondent, the larger and more generalized their hand-drawn Dust Bowl region. Many respondents identified the Dust Bowl region as being synonymous with the Great Plains and subsequently drew large symmetrical ovals over the central US for their regional delineation. On the other hand, respondents from the 80 and older group often completed nuanced non-symmetrical maps that were typically much smaller than the younger groups. In fact, the average size of 80 and older respondent regions was approximately one-third that of 20 to 39 year-olds. Responses on other items from the oldest age group suggested more localized perceptions of the event that could lead to delineation of smaller Dust Bowl regions.

These smaller regions provided by the oldest respondents were actually smaller on average than the unioned dust regions of the National Archives/Worster maps. Beyond providing regional area estimates that are more readily justifiable in comparison to the academic record, the mean center for 80 and older respondents is the closest to the National Archives/Worster mean center among age groups. The 80 and older mean center is fifty to one hundred kilometers farther west than the other age groups.

From a state group perspective, the Colorado mean center is closest to the National Archives/Worster mean center. Were Coloradoans more knowledgeable about the location of the Dust Bowl or did they just benefit from their north-westernmost location of study area states? The answer is the latter, as state and regional bias is evident throughout the analysis of regional definition. Texans' regions are farthest south while Kansans' regions are pulled north and east. Not surprisingly, Oklahoma's regions are the most centrally located. This suggests that people associate the Dust Bowl with the location to which they have the strongest sense of attachment to place. In other words, the Dust Bowl happened where you live. This is interesting in light of the comments that other researchers have made about the overwhelmingly negative connotation of the Dust Bowl (Bader 1988; Jordan 1978; Riney-Kehrberg 1994). From a spatial perspective, respondents did not hesitate to associate their respective homelands with this inauspicious event. Rather, as indicated elsewhere in this research, many respondents wore the Dust Bowl

historical experience as a badge of their respective community's perseverance and steadfastness.

Beyond these regional biases, variation among state respondents was evidenced. Apparently, everything is bigger in Texas, including their respondent-defined Dust Bowl regions. Texans' regions averaged more than 40,000 km² larger than their counterparts from Kansas and nearly 100,000 km² larger than Colorado respondents. Persons from the two southernmost study area states provided polygons which varied much more than those provided by their northern counterparts. The collection of Kansas regions displayed the most uniformity, in spite of it being the largest sub-sample of respondents.

Therefore, the Kansas and the 80 and older groups provided Dust Bowl regions that were judged to be the most appropriate in terms of the established academic consensus. As a whole, the sample identified a Dust Bowl region that was centered on southern Meade County, Kansas near the border with Beaver County, Oklahoma. Beaver County, Oklahoma was wholly or partially included in 313 of 355 hand-drawn Dust Bowl regions, making it the Dust Bowl capital of residents of the region. Texas County, Oklahoma was second-most popular, followed by a host of Kansas counties along the Oklahoma state line.

Viewing the respondent-defined region as a whole, several interesting patterns emerge. First, the western edge of the region is much "harder" than the eastern edge. This indicates that respondents exhibited much more agreement regarding the western edge of the Dust Bowl region. This suggests

that a physical feature, in this case the Rocky Mountains, acted as a gelling point for public geographic knowledge on the event. Respondents may not have been able to define an exact western boundary, but they probably were able to recognize that the event did not expand over the Rockies. On the opposite of the respondent-defined region, support for an eastern boundary is much more ambiguous. The inclusion of counties in the region fades slowly with increasing distance east. This distance decay is an appropriate reflection of the region and this researcher would argue a better way of representing the region than most “in or out” representations. Wind erosion, dust storms, and drought were experienced with decreasing severity as one moved eastward.

Examining the northern and southern edge of the respondent-defined region presents a similar dichotomy. In this case, the northern edge is the “harder” boundary. Instead of associating the Dust Bowl boundary with a physical feature, however, many respondents appear to have tied the distinction to the political boundary between Nebraska and Kansas. In this situation, Nebraska is “out of it” and Kansas is “in it.” The southern edge of the boundary fades more gently into central and southern Texas. While the respondents can be applauded for their distinctions regarding the east-west extent of the region, no such commendation can be applied to utilization of the political boundary. Nonetheless, it does provide an interesting example of the different ways people can attach environmental meaning to both physical and cultural landscape elements.

The Dust Bowl Era

Defining the Dust Bowl era also proves to be a challenging and largely subjective endeavor in terms of evaluating previous sources. The focus of Dust Bowl writers' can influence the temporal frame of reference provided by authors. For example, a source emphasizing socioeconomic aspects of the event may merge the Great Depression and its associated starting year of 1929 to the Dust Bowl. On the other hand, sources that focus upon the climatological considerations of the event would most likely utilize 1931 as a beginning year, as it represents the start of the drought for most study area locations.

For the twenty-eight sources analyzed here, the mean beginning year was 1931 and the mean ending year was 1939. Within the body of reviewed works, the subset of juvenile literature ascribed earlier beginning years and later ending years that resulted in an overgeneralization of the Dust Bowl era to the whole of the 1930's decade.

This same phenomenon was noted in the youngest age group of questionnaire respondents. This group's mean duration for the era was 10.84 years. By comparison, the 80 and older respondents defined the Dust Bowl as a period with a mean duration of 6.66 years. Variation in the mean duration was also noted among state groups. Texans' mean duration of 9.87 was nearly two years longer than Kansans' 7.98.

Beyond providing a longer mean duration, Texans' provided a much wider range of responses for beginning and ending years than their Kansas

counterparts. The uniformity of responses regarding the Dust Bowl era from Kansans is striking. A similar situation occurs within the age groups, as responses become increasingly homogeneous with age. Older respondents were particularly adept at identifying the start year as 1931 or later rather than 1930. Regardless of age if a respondent selected a year after 1930 as the beginning year, that person was more likely to select an ending year prior to 1940. When additional responses to the questionnaire are reviewed, the 1931 and later response is a good indicator of a more in-depth knowledge of the Dust Bowl.

The Dust Bowl Event

Varied sources have dealt with the Dust Bowl unevenly, portraying divergent narrative arcs and emphasizing different themes in their treatment of the event. Cronon (1992) provides essential insight into the contradictory triumph and tragedy versions of the Dust Bowl story that so many sources embrace. Paralleling this duality are conflicting takes on the topics of causation and migration. The triumph narrative, with a focus on humans' abilities to overcome the challenges of the Plains, is often associated with explanations that highlight the role of climate in causing the Dust Bowl event. These sources also tend to call attention to those persons who persevered on the Plains and did not emigrate westward. On the other hand, sources that embrace the tragedy narrative of humans failing to adapt to the Plains

environment often overly accentuate the role that agriculturalists played in the disaster. These sources usually emphasize those people of the region who chose to migrate west to California.

Not all Dust Bowl sources are slanted toward one narrative and its associated causal and migration components. Hurt (1981) and Cunfer (2005) are two prime examples of even-handed approaches that consider the complex matrix of both human and physical variables that contributed to the extraordinary event. Not all sources of Dust Bowl information for the general public are academic in nature, either. While John Steinbeck's Grapes of Wrath (1939) remains the most well-known non-academic Dust Bowl text, other popular authors and artists such as Woody Guthrie, Dorothea Lange, and Carolyn Henderson have played important, and perhaps disproportionate roles in informing and influencing the general public's knowledge and perceptions of the Dust Bowl event (Shindo 1997).

In regard to public perception of the event, land management and drought were both considered causal factors of the event. However, results of this research indicated that the drought is perceived as a stronger contributory factor. In general, agreement with both primary causes strengthened with increasing age of respondents. This pattern of widespread agreement that increases with age held for most of the Likert statements utilized to represent the academic consensus. Greatest agreement to Likert statements was voiced by respondents in reference to physical elements of the Dust Bowl, particularly those characterizing the event by dust storms, wind erosion, and agricultural

failure. Socioeconomic descriptions of the event were also approved by respondents to a lesser degree. The discrepancy between physical and socioeconomic responses likely relates to the more value-laden nature of the socioeconomic statements employed. For example, respondents are more likely to agree on the issue of drought than the government's appropriate response. Additionally, much of the region was in moderate to severe drought at the time of questionnaire administration. This may have made respondents more aware of the physical characteristics of the Dust Bowl.

As for Dust Bowl corollaries, respondents believe that the Dust Bowl contributed to the severity of the Great Depression, though not necessarily the other way around. They expressed support for the National Grasslands program, particularly those respondents who lived in counties adjacent to National Grasslands. And in retrospect people of the region describe the Dust Bowl as the worst prolonged environmental disaster in the history of the US. Once again, however, older respondents expressed stronger agreement than their younger counterparts.

From a spatial perspective, patterns to responses were evident, particularly when responses to the physical and socioeconomic statement suites were aggregated. In summation, the northern part of the study area (adjacent to and above the 37th parallel of latitude), and particularly the northwestern half of the Kansas portion of the study area exhibited higher levels of knowledge association with the academic consensus. The Kansas results may be partially explained by a locally-produced Dust Bowl documentary film that

was airing in the region on public television before and during the time of questionnaire administration.

Beyond the film, several elements of respondent context may have contributed to these areas demonstration of enhanced knowledge on the region, era, and event. Higher percentages of respondents in these areas were native to the study area. This meant that they were more likely to answer that they had an acquaintance with a Dust Bowl survivor. The distribution of these two closely-related factors strongly mirrors the areas with higher levels of knowledge. Data from this research suggests that being native-born and knowing survivors who told stories about the Dust Bowl has been more important than a formal education to develop and express a comprehensive understanding of the event.

The native-born advantage in terms of Dust Bowl knowledge will continue to fade as living links to the Dust Bowl event diminish. Therefore, Dust Bowl knowledge will need to be increasingly supplemented by outside sources such as museums, educational web sites, and traditional school curriculum. But is Dust Bowl education a priority to residents of the study area? A suite of Likert statements addressed this question by first seeking to gauge the degree to which respondents believed that young people in and outside the region should be taught about the Dust Bowl. Potential museum and web site components were then assessed to measure the demand for specific Dust Bowl educational resources.

Documenting the Desire for Enhanced Dust Bowl Educational Resources

Dust Bowl education was addressed as an explanatory variable in Chapter Eight. Do people of the region, however, view this topic as an important component of local curriculum? Beyond the Dust Bowl being taught within the perceived historic Dust Bowl region, do local residents believe that the Dust Bowl should be a component of education in non-Dust Bowl states? Items D-5 and D-6 addressed these questions (Fig. 109). Strong support was demonstrated for both statements regarding Dust Bowl education in schools. Slightly stronger support for education in Dust Bowl states compared to outside Dust Bowl states was reported. The only notable deviation was the marginally lower support for teaching about the Dust Bowl outside the region voiced by respondents age 20 to 39. One comment that epitomized several discussions with younger respondents following administration of the questionnaire was “Why should someone who doesn’t live here need to know about the Dust Bowl?” These comments speak to the need for enhanced geography education to convey the interrelated nature of persons, places, and complex event such as the Dust Bowl. These remarks were disproportionately made by younger respondents, suggesting that effective geography education has waned through the generations and/or older individuals have an understanding of the Dust Bowl that permits them to see the value in educating students outside the region about this event.

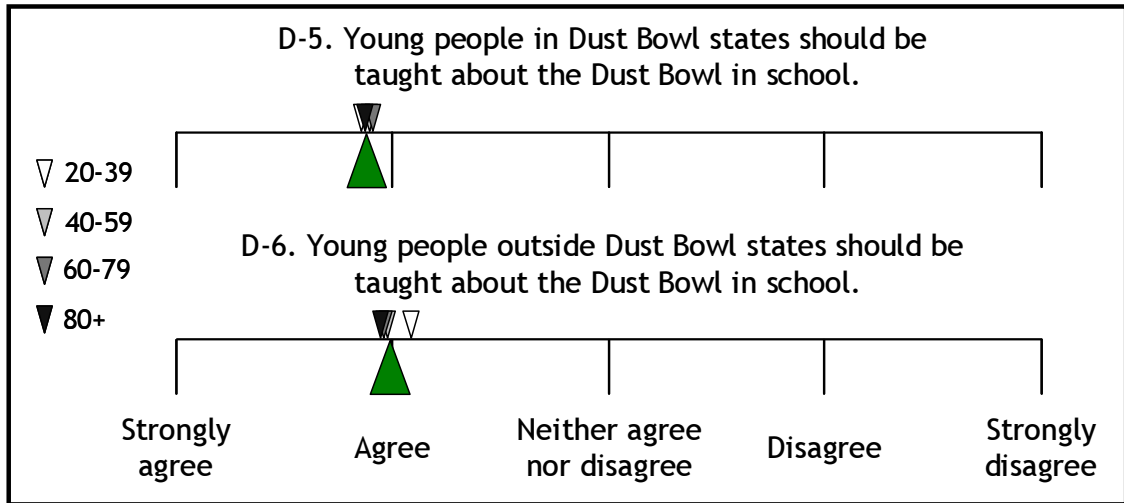


Figure 109. Item D-5, D-6 Mean Likert Responses by Age

The unanimity among groups supporting Dust Bowl education within the region is evidenced by Figure 110, the item D-5 county mean. The only composite or mean map with more counties in the highest level of agreement was for item C-3, “The Dust Bowl was a Result of Severe Drought.” Despite the consensus of respondents who agreed or strongly agreed with item D-5, there is some spatial variation to the responses. There are more counties in the western part of the study area whose respondents expressed strong agreement with the idea that “Young people in Dust Bowl states should be taught about the Dust Bowl in school.” Because the counties in the western part of the study area are generally more arid than eastern counterparts and most of the region was experiencing drought at the time of survey administration, it is possible that Dust Bowl scenarios remain more pertinent and subsequently a higher educational priority to respondents in the western part of the study area. The same pattern is evident with Map A-27 in Appendix A.

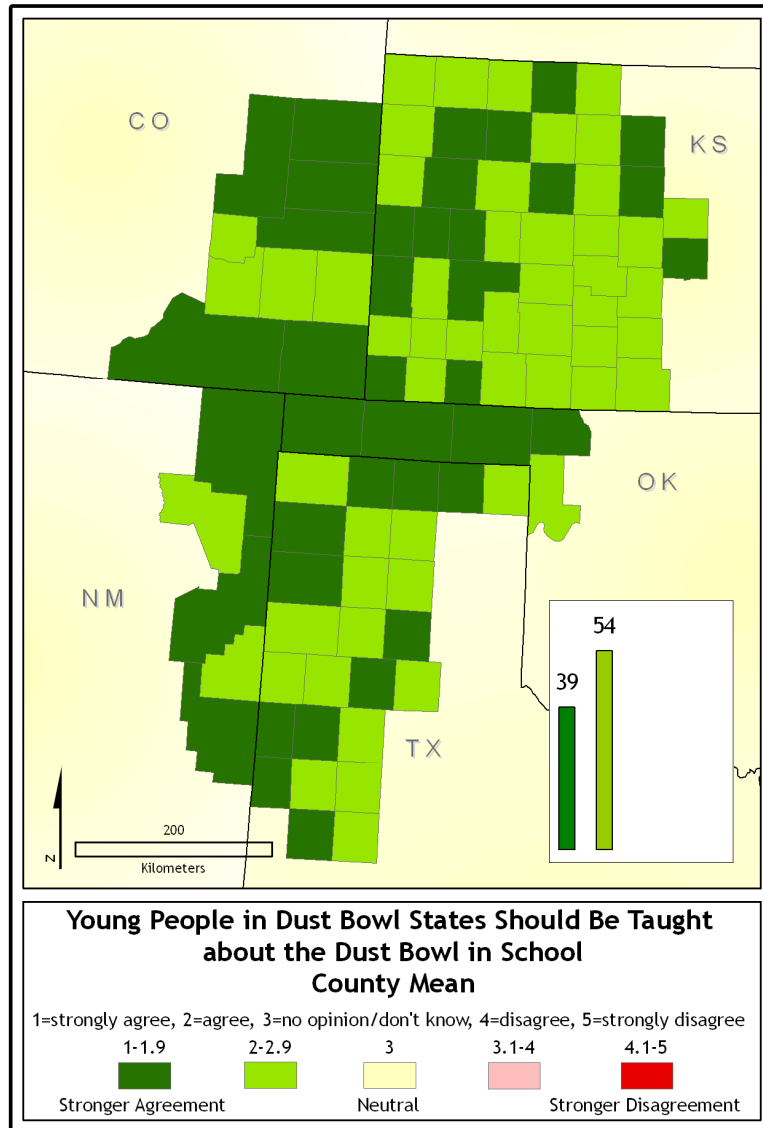


Figure 110. Item D-5 Likert County Mean

Respondents' strong support for Dust Bowl education indicates the desire for younger generations to learn about the event. Do these same respondents' possess a desire to enhance their own Dust Bowl knowledge? Two Likert statement groups address this question. The first pair addressed the idea of a Dust Bowl museum. Many museums and historical centers throughout the study area contain photographs, artifacts, and even small exhibits that speak to the

Dust Bowl. However, there is no comprehensive collection of materials that seek to tell the complex Dust Bowl story. Figure 111 illustrates that the majority of respondents indicated that a museum is needed. It is significant that all age groups agreed with this statement because this suggests that support for such an endeavor would not wane as older persons died. In fact, the strongest support for a museum was provided by the two youngest age groups. The distribution of responses across the Likert scale was remarkably similar.

The most notable deviation occurred with the increase of “disagree” responses with the two older age groups. Field notes indicate that several older respondents stated that they don’t know why anyone would want to remember such a horrible time and thus they did not support the notion of establishing a museum. Other respondents asked what you would put in a Dust Bowl museum besides dust. Despite the increase in negative responses among the older groups, the 80 and older group also presented the highest number of “strongly agree” responses. Upon discussing this proposition with numerous respondents, the oldest respondents disproportionately provided the most emphatic positions regarding the idea of commemorating the Dust Bowl. Some thought the Dust Bowl should be dead and buried while others thought that it was imperative for younger generations to know what happened.

From a spatial perspective, there were a disproportionate number of “neither agree nor disagree” and “disagree” responses in the southern part of the study area (Fig. 112). Map A-28 in Appendix A presents the county means

for this statement. The southernmost quarter of the study area exhibits the lowest levels of support for a museum. It bears repeating that the southern part of the study area demonstrated lower levels of knowledge as defined by the academic consensus. This suggests that people who know the least about the Dust Bowl have the lowest level of interest in learning more about it.

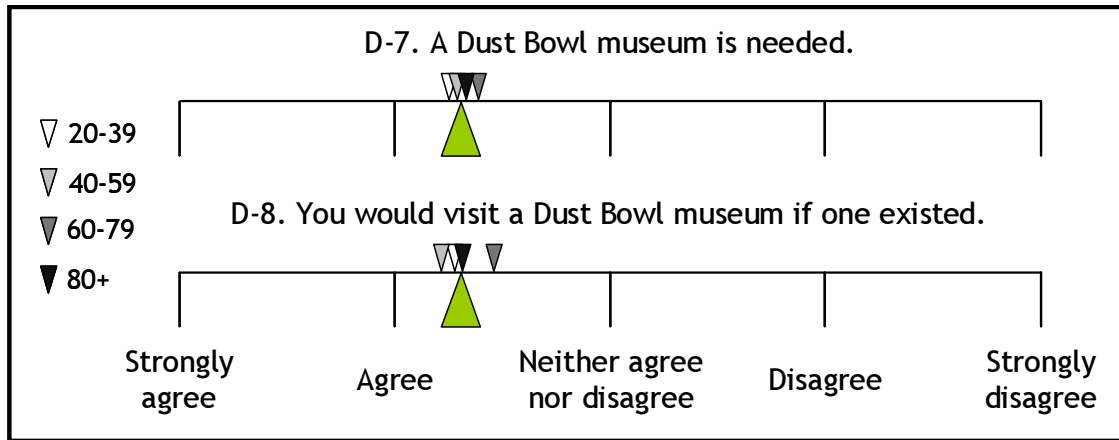


Figure 111. Item D-7, D-8 Mean Likert Responses by Age

Respondents voiced similar opinions in regard to visiting a Dust Bowl museum. All groups produced means that indicate widespread agreement (Map A-29 and Map A-30 in Appendix A). There was slightly more spread among the age groups, with the two youngest groups again expressing slightly stronger support than the two older groups. Less spatial variation between north and south was evident with item D-8 than D-7.

A final pair of Likert statements also speaks to enhancing Dust Bowl educational resources. Items D-9 and D-10 asked respondents if they believed “An educational, interactive website dedicated to the Dust Bowl is needed” and followed up with a statement determining if they would visit such a site.



Figure 112. Item D-7 Likert Responses by Age

Figure 113 shows that all age groups expressed support for a Dust Bowl website, albeit to varying degrees. The two younger groups provided the strongest support, while the two older groups, particularly the 80 and older respondents displayed less unanimity. The primary difference in the distribution of responses for the oldest group was the spike in “neither agree nor disagree” responses.

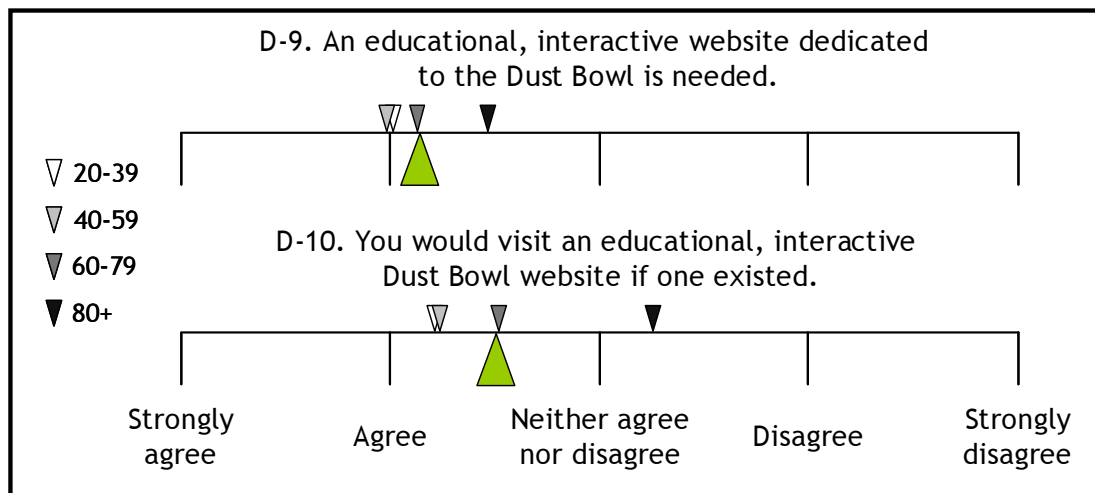


Figure 113. Item D-9, D-10 Mean Likert Responses by Age

Figure 114 displays the county means for item D-9. Northwest Kansas stands out as a cluster of responses with the highest level of agreement. A similar cluster of counties produced the highest rates of public/academic knowledge association. Once again, there appears to be a relationship between informed citizens of the region and the desire for development of educational resources.

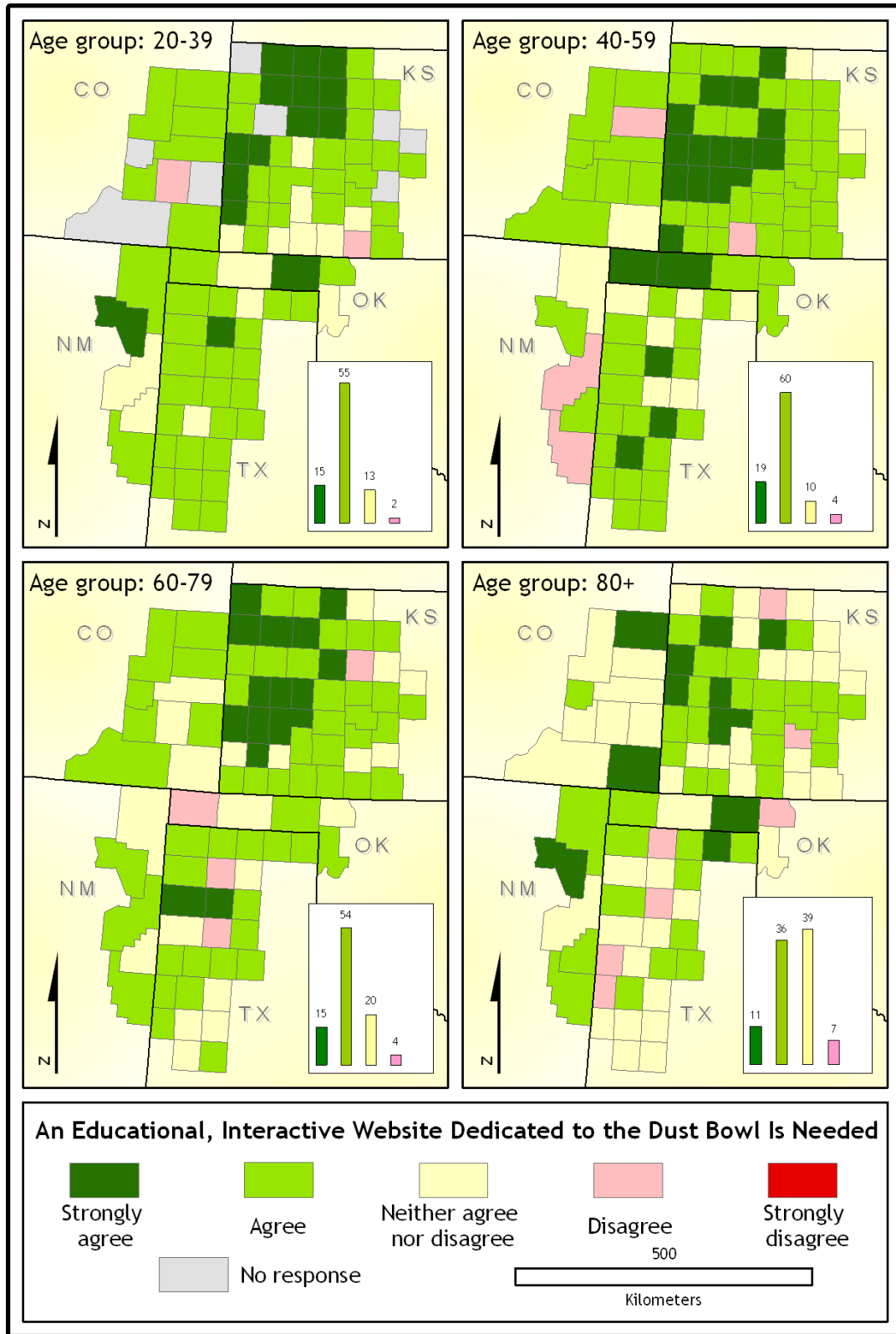


Figure 114. Item D-9 Likert Responses by Age

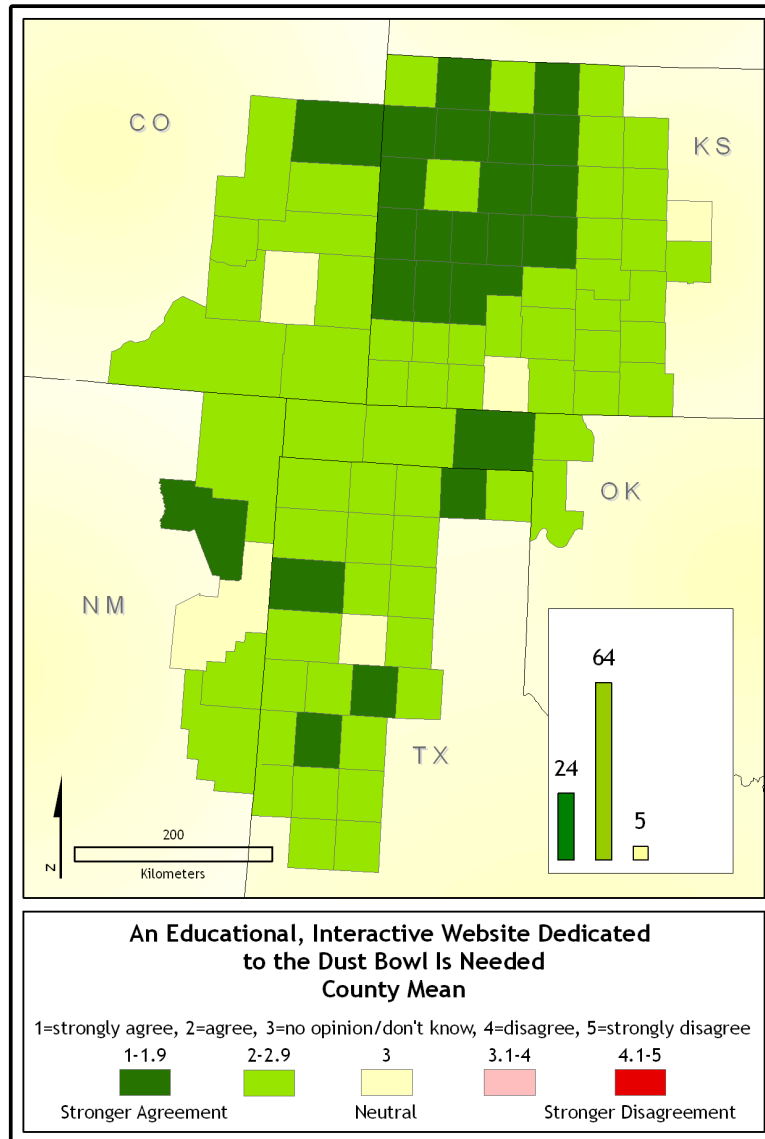


Figure 115. Item D-9 Likert County Mean

Figure 116 provides an interesting generational contrast as it illustrates persons who would visit an educational, interactive website dedicated to the Dust Bowl. A digital divide based on age is evident when comparing Figure 116 with Figure 116. While support for a Dust Bowl website waned slightly with age, the number of persons who would visit a Dust Bowl website plummets with age. While eighty percent of 20 to 39 year-olds would visit a website, only

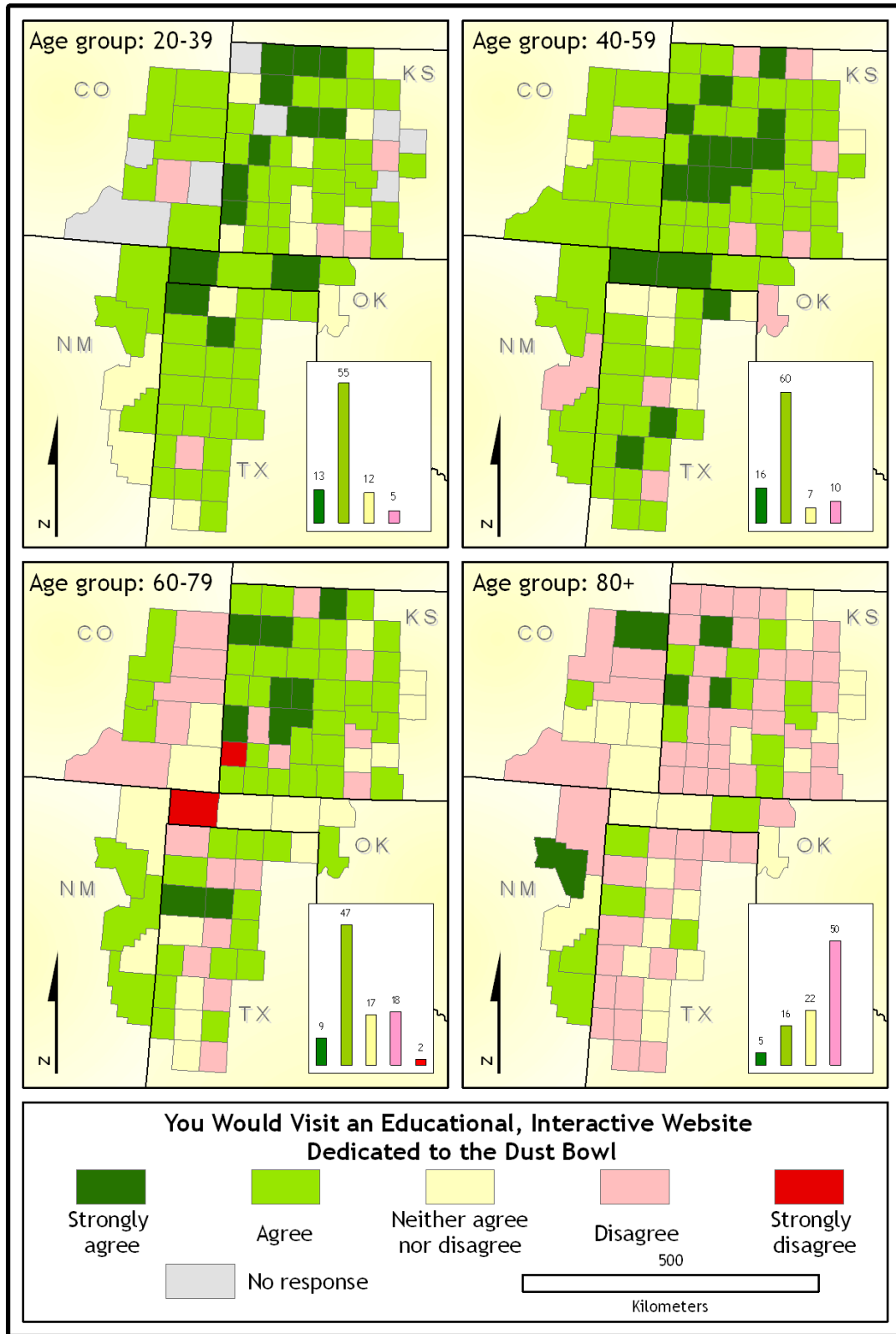


Figure 116. Item D-10 Likert Responses by Age

twenty-three percent of respondents 80 and older would do so. For comparison, eighty-two percent of the youngest group believed a website was a good idea compared to fifty-one percent for people in the oldest age group. In other words, ninety-eight percent of 20 to 39 year-olds who endorsed the website idea would visit it compared to forty-five percent for persons 80 and older. While this figure is related to the adoption levels of technology among the oldest respondents of the questionnaire, it is likely also tied to the notion that some of the oldest respondents lived through the very difficult times of the Dust Bowl and do not seek to relive the experience in a museum, online, or otherwise. The spatial distribution of responses for item D-10 is similar to that for item D-9. The concentration of strongly agree responses is still evident in northwest Kansas, although the cluster is not as dense.

A Dusty Future?

With the desire for enhanced educational resources documented above, one is left to wonder what motivates the people of the region to support these initiatives. Over the course of this research people of the region expressed the importance of remembering lessons in conservation that were learned, honoring the hardships and sacrifices of previous generations, and reminding the rest of the country that “we’re still out here” as reasons to promote Dust Bowl education. An additional element that was an undercurrent in many of

the conversations associated with this research was the ongoing drought and the possibility that *it* could happen again.

A pair of Likert statements addressed the prospects of a Dust Bowl-like event occurring in the future. Item C-8 ascertained whether or not respondents thought an event like the Dust Bowl could happen again and item C-9 followed up with a more definitive prognostication. The mean responses are plotted in Figure 117 while Figures 118 and 119 portray the spatial distribution to these statements. The 20 to 39 year-old respondents were most likely to agree to item C-8 and least likely to disagree with item C-9. Both item C-8 and C-9 displayed a general relationship with age as respondents were less likely to agree with C-8 with increasing age and were also more likely to disagree with item C-9 with increasing age.

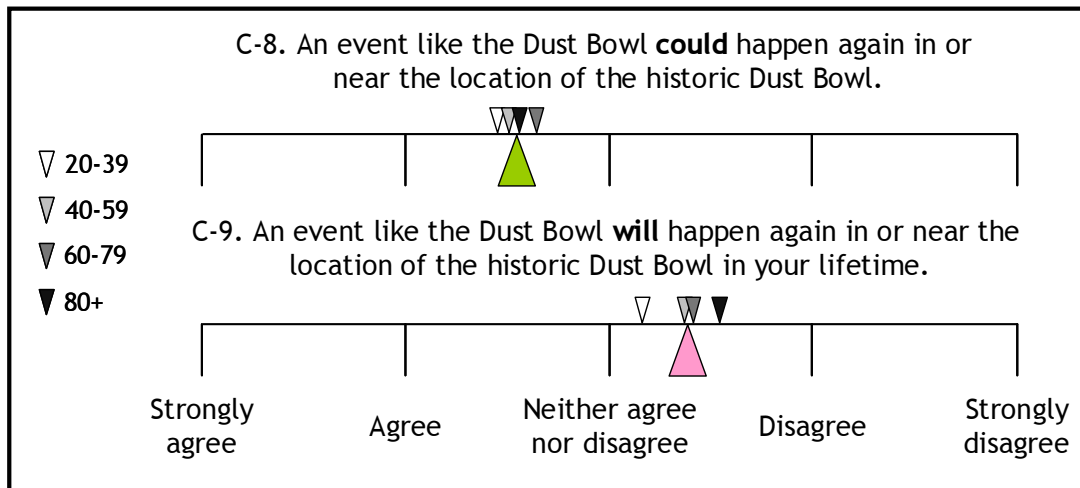


Figure 117. Item C-8, C-9 Mean Likert Responses by Age

Numerous respondents commented when they reached item C-9 on the questionnaire. Typical comments included, “I don’t predict the future,” and “that’s God’s business to know, not mine.” Most of these people subsequently

selected “neither agree nor disagree” for their response to item C-9. Figure 118 utilizes the same color scheme as previous figures to illustrate responses to item C-8. Diagonal and hatched lines indicate respondents who agreed or strongly agreed with item C-9 and are overlaid on Figure 120. As one would expect, those that agreed or strongly agreed with the notion that a Dust Bowl-like event could happen again were most likely to agree or strongly agree that such an event will happen again.

Figure 119 displays the county mean for item C-8 as well as the counties with the mean strongest agreement or disagreement regarding item C-9. The oft-discussed north/south divide does not materialize for this pair of questions. However, northwest Kansas once again is a focal point for discussion. This part of the study area has been identified as the area with the highest Dust Bowl knowledge association between questionnaire respondents and the academic consensus. With Figure 119, this same region lacks consensus as to whether a Dust Bowl-like event could and/or will happen in the future. The area is home to the primary cluster of respondents who strongly agree with the idea that it could happen again as well as the primary cluster of responses that disagree with this proposition. This suggests that these respondents have developed stronger opinions about the future of the region based upon an understanding of the Dust Bowl event that could be judged as superior to other parts of the study area.

By this author’s judgment, this underscores the value of enhancing educational resources on the topic. This research has shown that there is a

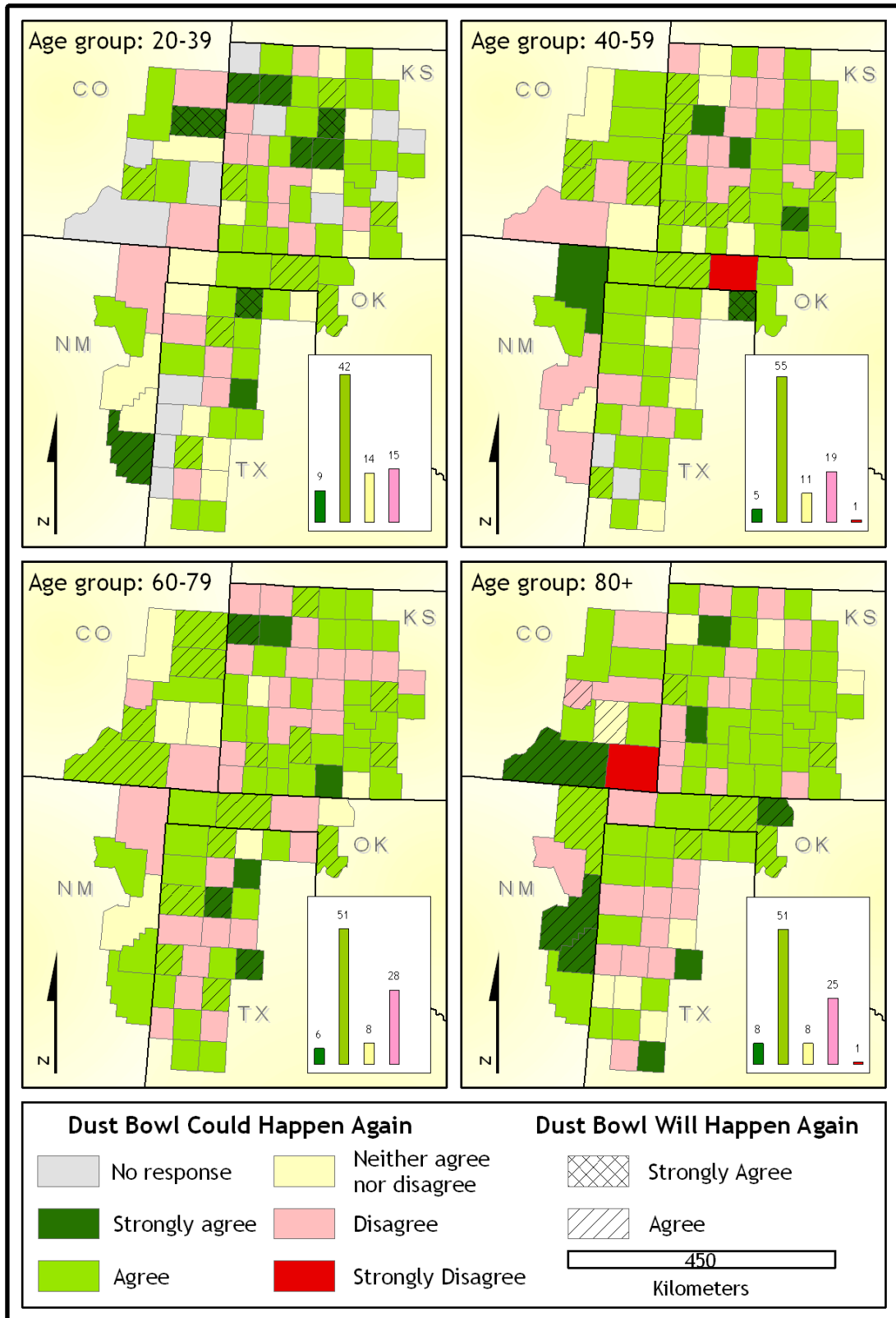


Figure 118. Item C-8, C-9 Likert Responses by Age

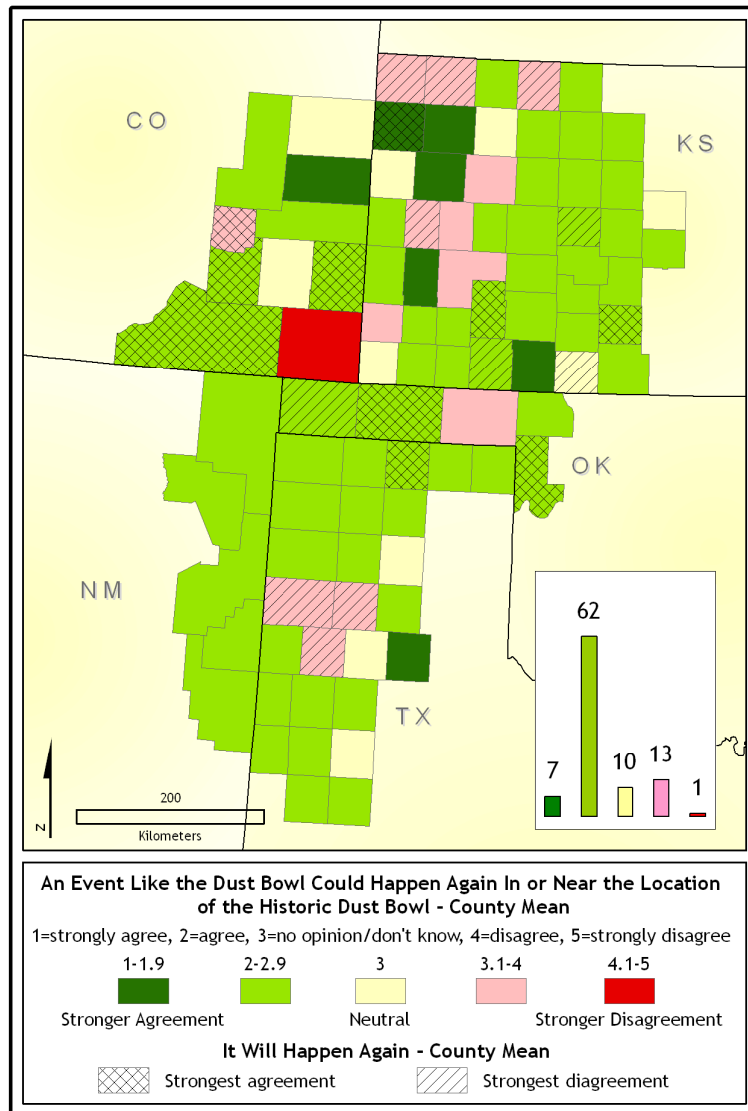


Figure 119. Items C-8, C-9 Likert County Mean

continuum of viewpoints, narratives, and understandings regarding this complex event. While consensus in the academic voices can be charted, there remain a number of divergent, yet relevant contributory voices to the Dust Bowl story. The wide-ranging responses from the most knowledgeable body of questionnaire respondents regarding the prospects of a future Dust Bowl event

validate those divergent voices. The demonstration of strong, informed opinions by the most knowledgeable respondents also demonstrates the relevance of the further development of Dust Bowl educational resources. Developing educational resources represents a central theme of future work to be spawned from this research.

Future Directions

The successful conclusion of this research plan presents an exciting launching pad for an assortment of closely related projects to pursue as time and funding permit. Additional plans focus upon three themes: evaluating and enhancing Dust Bowl education, expanding the questionnaire study area, and conducting relevant physio-geographical research in the region.

Dust Bowl Educational Interactive Website

The research completed here has produced a unique data set, interpretations of that data set, and an assortment of maps that augment the existing Dust Bowl literature. This material could provide a foundation for the establishment of an interactive, educational website dedicated to the Dust Bowl. Beyond integration, analysis, and display of questionnaire data, a website titled the Digital Dust Bowl could contain GIS data layers, general and

thematic maps of the region, virtual tours of Dust Bowl landmarks, and links to relevant historical, social, and ecological information.

Heritage Tourism Route

Products of this research may eventually contribute to historical environmental education through the installment and/or enhancement of Dust Bowl exhibits in regional museums, such as the Cimarron Heritage Center in Boise City, Oklahoma and the No Man's Land Museum in Goodwell, Oklahoma. These exhibits could represent destinations on a hypothetical *Dust Bowl Tour*. The *Dust Bowl Tour* could include stops that are icons of the event (Fig. 120). Other points of interest could examine comparative soil profiles, varied agricultural landscapes, entrenched stream channels, sand dunes, or other representative features that could help the general public gain a new perspective on the Dust Bowl while underscoring the historical significance of the region. The *Dust Bowl Tour* could provide participants with a rich geographic experience and education while potentially enhancing the economic profile of the region through tourism.



Figure 120. Coble Farmstead through Time

Evaluation of Survey Textbooks and State-based Educational Standards

A final education-related theme would evaluate and address a shortcoming identified by McDean (1986). “Those who write survey textbooks in American history fail to grasp even the most elementary facts about the Dust Bowl” (368). McDean continues that most textbook writers are ignorant of the conclusions of most specialists in Dust Bowl history.

A review of contemporary and historic American and state history textbooks would assess and track the treatment of the topic within textbooks. This process would be paired with an evaluation of state-based educational standards through time in the Dust Bowl region for a systematic appraisal of how the Dust Bowl has been addressed by educators in the region through the years. Results of this future endeavor could be compared with results from the research presented here to further develop an understanding of the contributory factors to regional perceptions and knowledge of the Dust Bowl.

Expansion of Questionnaire Sample

One avenue of future research will focus on an expansion of the project to include comparative samples from regions of the country far-removed from the historic Dust Bowl. This would serve to gain a better understanding of knowledge-levels and perceptions from a national perspective. It would also be desirable to expand the study area around its periphery to illuminate distance-decay for knowledge of the region, era, and event. As discussed

above, it is suspected that the eastern edge of the region is much “softer” than the western edge due to topographic features (Rocky Mountains).

An additional area of interest for the development of future research is the topic of international analogs. For example, South Africa experienced a Dust Bowl of its own at roughly the same time as the North American event (Beinart and Coates 1995). Completing a questionnaire of South African residents’ perspectives for this analogous event could illuminate interesting contrasts and/or parallels.

Physical Geographical Research

Studies of the Great Plains suggest droughts and aeolian events similar to the Dust Bowl have occurred in recent centuries (Muhs 1985; Muhs and Holliday 1995; Woodhouse 2003). Radical changes in alluvial and aeolian systems of the region have occurred in relatively short periods of time (Cordova and Porter 2005; Wilson 1972). The 1930’s Dust Bowl was just the latest significant event in a long line of dramatic environmental episodes. Touring the region and talking with local inhabitants today always leads to the same topic: the recent drought. In recent years it has been drier and hotter in the historic Dust Bowl region today than most people can remember. Is the region headed into yet another remarkable environmental event? It’s impossible to know at this point, but the ever-present possibility renders research such as this perpetually salient.

In a time of rapidly changing climate, it becomes increasingly important to understand the linkages between various elements of the physical world. Continued enhancement of the understanding of the confluence of physical and human variables that conspired to create the Dust Bowl and previous Dust Bowls will contribute in this regard. Tailoring and applying this information to future environmental scenarios could be academically and economically beneficial.

For example, much of western Oklahoma is underlain by significant deposits of aeolian and fluvial sand. In the recent past, these rather large sand surfaces have mobilized. Needless to say, the impact of large-scale sand mobilization to modern agriculture and transportation would be significant. Therefore, establishing the climatological parameters of past mobilization events could help regional residents and governments prepare for and mitigate future events.

Concluding Remarks

A baseline of public knowledge of a complex historical environmental event, explanation in variations of the public definition of three distinct Dust Bowl concepts, the documentation of the erosion of Dust Bowl knowledge through time, the subsequent need and demand for enhancing educational resources: these are the unique contributions presented by this research. This is the product of nearly four hundred questionnaire administrations and

conversations in the courthouses, diners, and homes of the Great Plains followed by extensive geospatial analysis and mapping via GIS. The results of this work, when juxtaposed with the sizable samples of academic and popular works on the subject, contribute a distinctive voice to the literature. This voice represents the collective knowledge and perceptions of the residents of the historic Dust Bowl region; heretofore largely undocumented.

By painting public understandings of the Dust Bowl concepts as fluid through time and space, one can begin to illuminate the factors that impact these understandings. While the Dust Bowl has been, as Riebsame (1986, 127) describes, “an enduring image in the collective consciousness of Americans,” this research illustrates that demographic realities are making it less so today. With increasingly generalized understandings of the Dust Bowl concepts, and increasing numbers of persons who have no familiarity with the term, the need for enhancing educational resources dedicated to the Dust Bowl is evident. Fortunately, this research also shows widespread support for educational initiatives such as a Dust Bowl museum or interactive website. Therefore, exciting opportunities await for those who would seek to augment Dust Bowl education and help preserve the historical legacy of this unprecedented region, era, and event.

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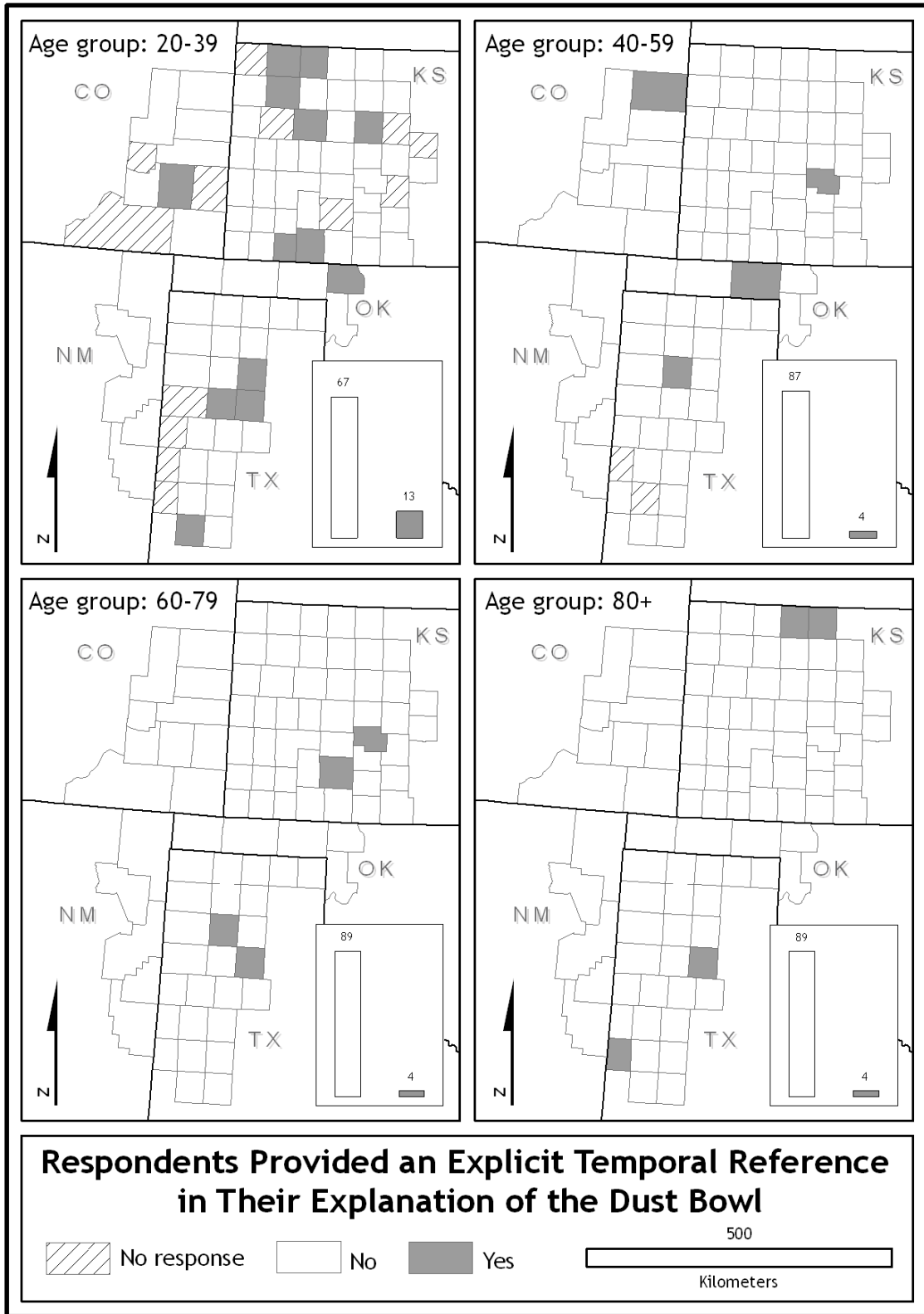
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APPENDICES

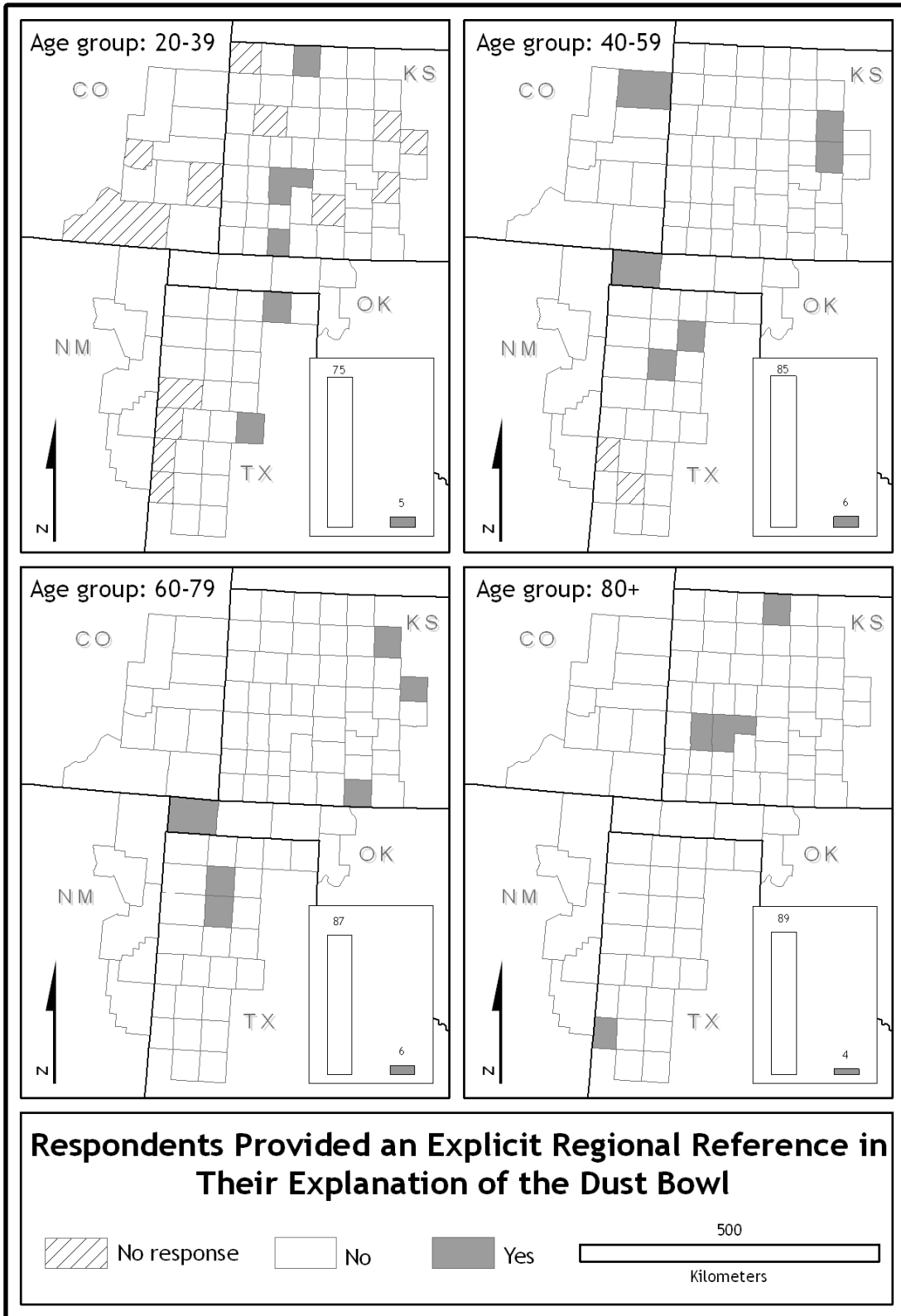
APPENDIX A - ADDITIONAL MAPS



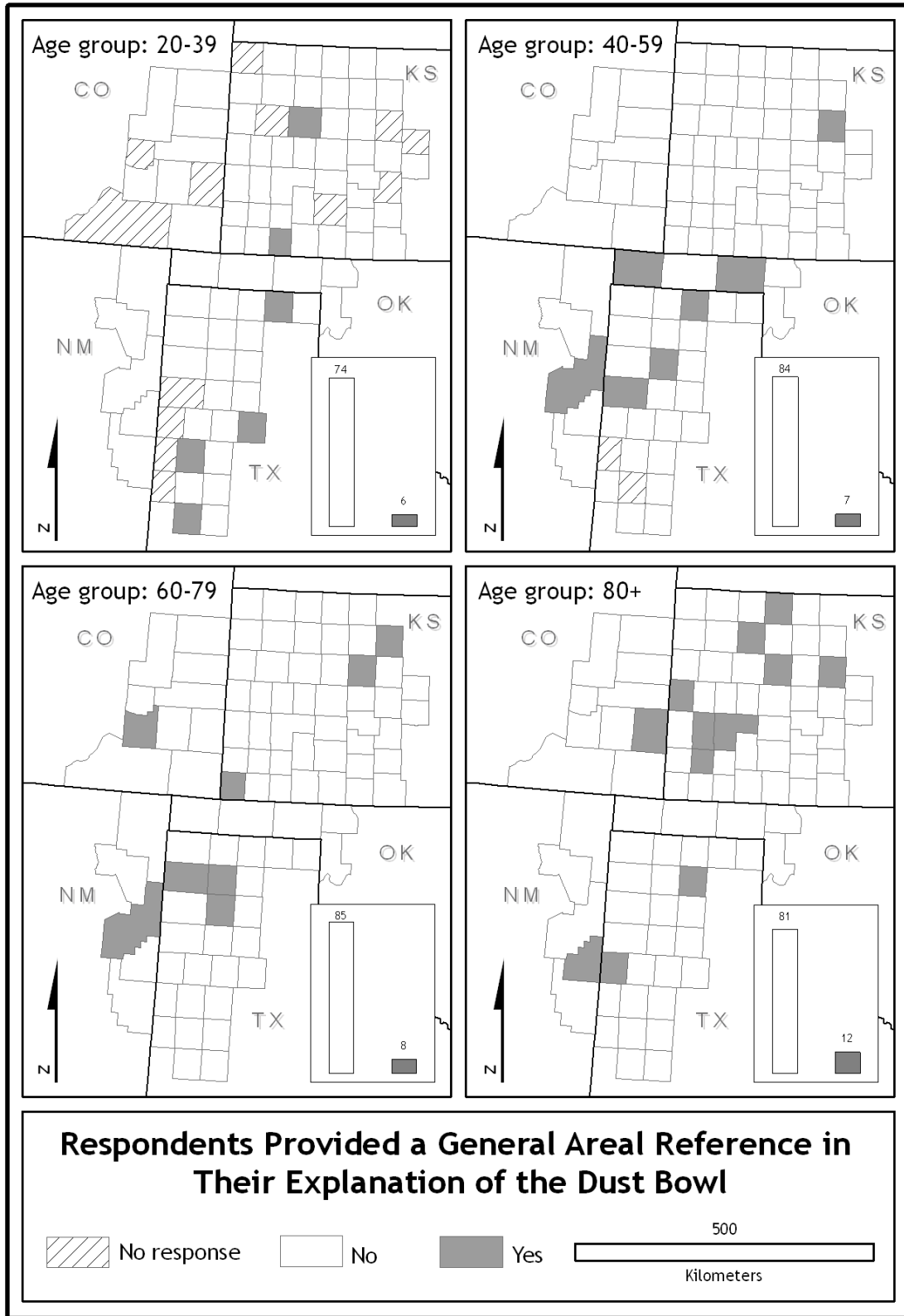
Map A-3. Explicit Temporal Reference in Explanation



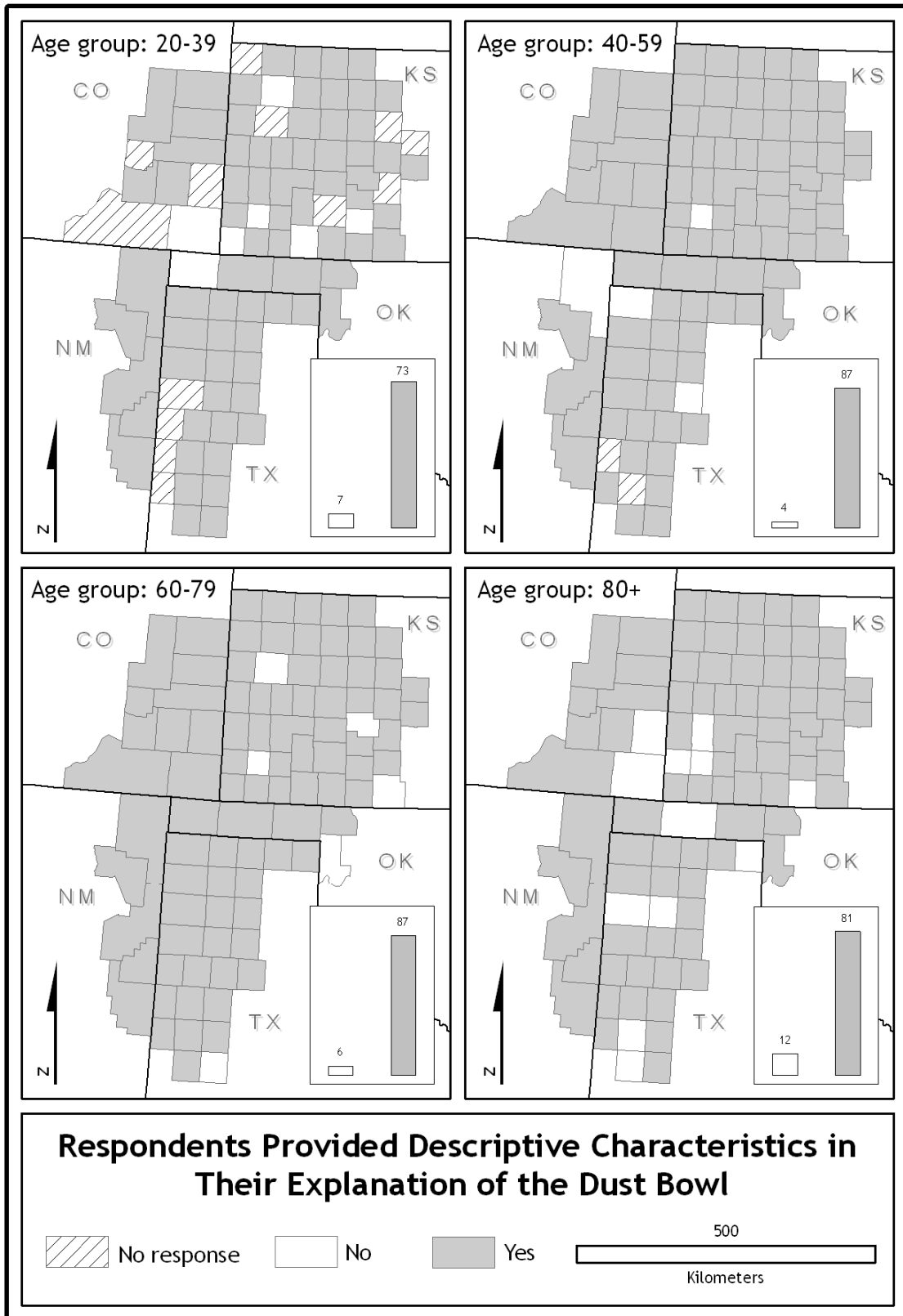
Map A-4. General Temporal Reference in Explanation



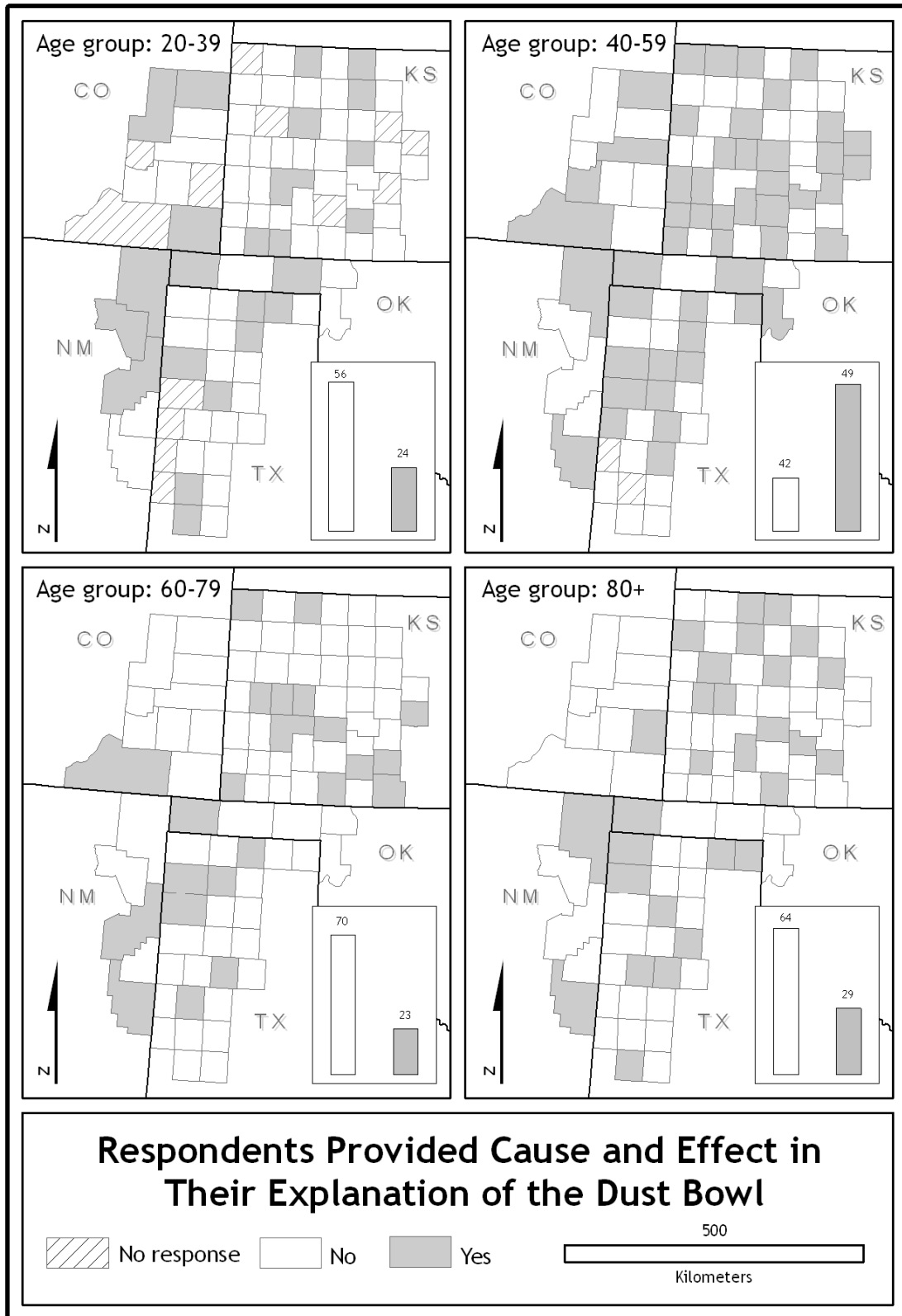
Map A-5. Explicit Regional Reference in Explanation



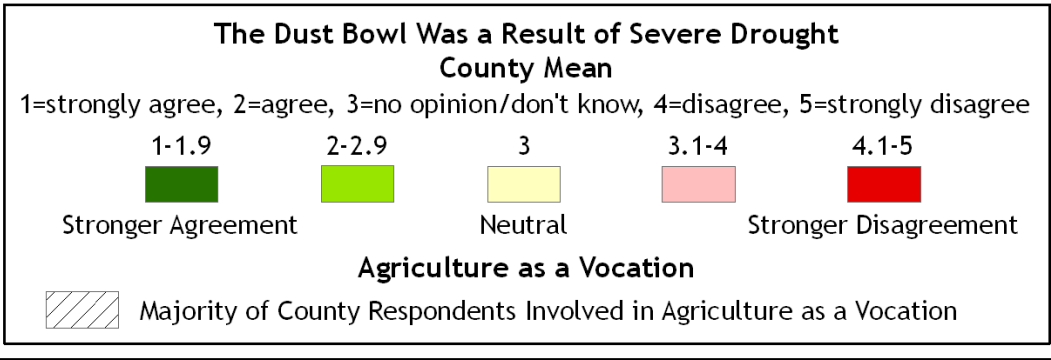
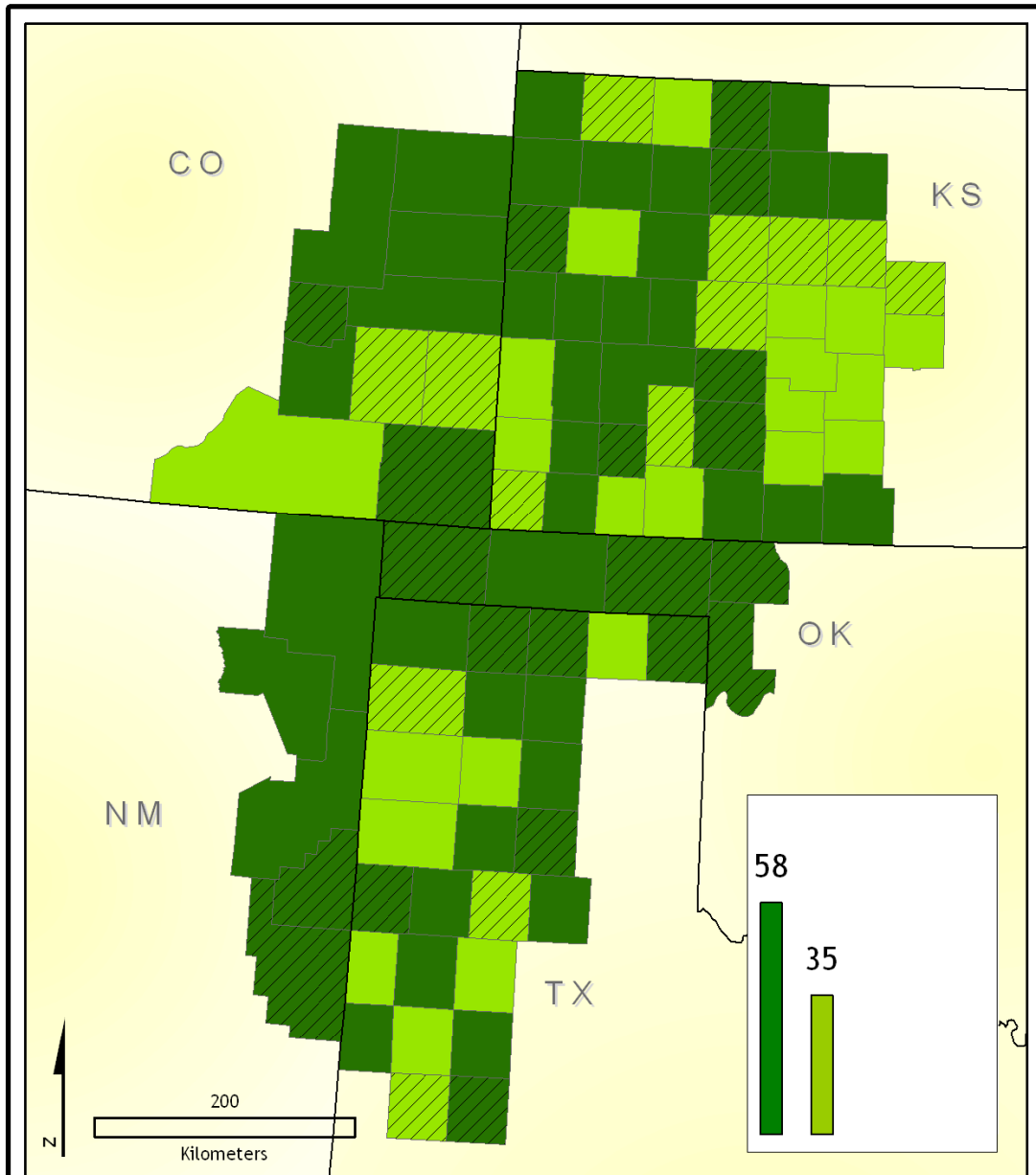
Map A-6. General Areal Reference in Explanation



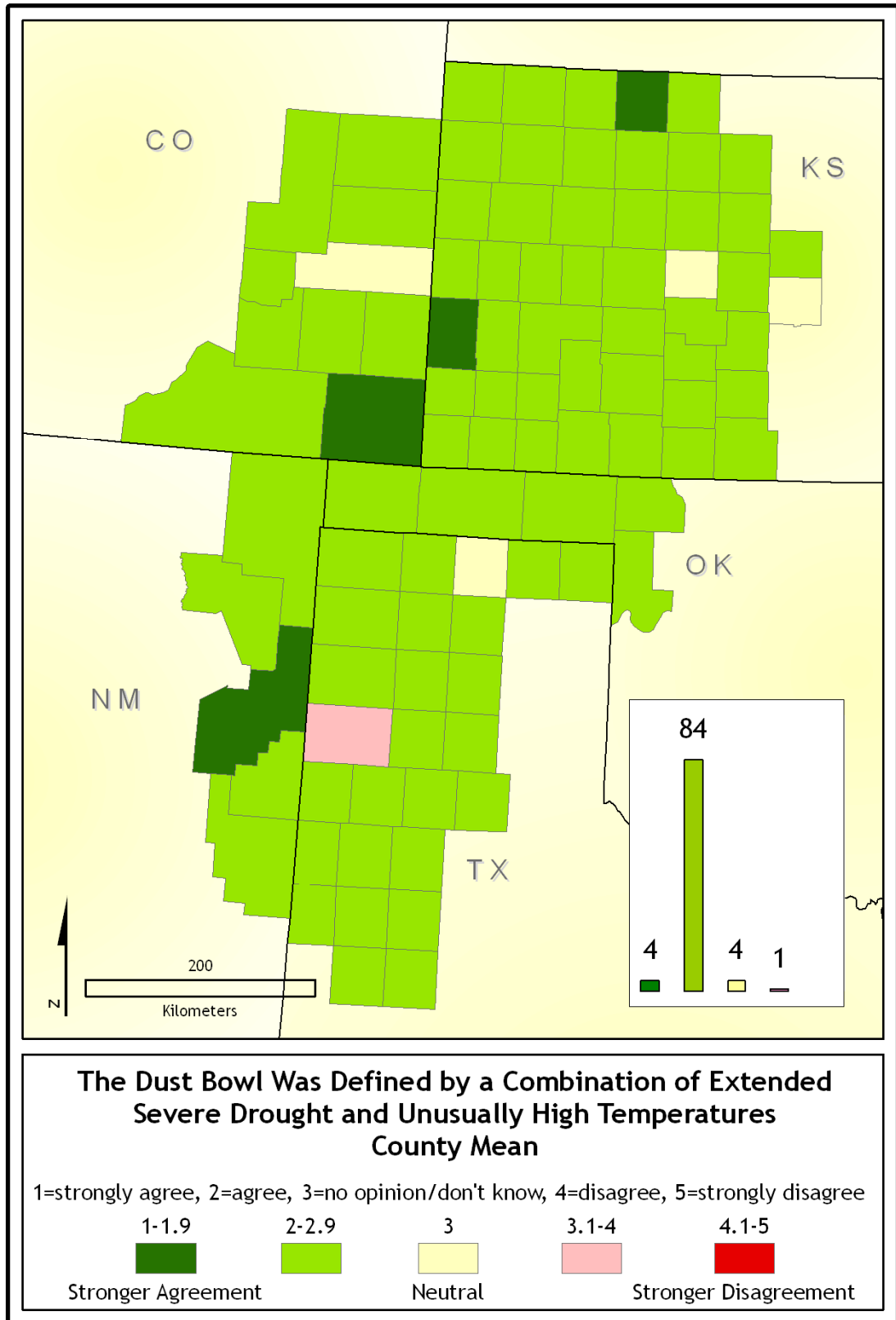
Map A-7. Descriptive Characteristics in Explanation



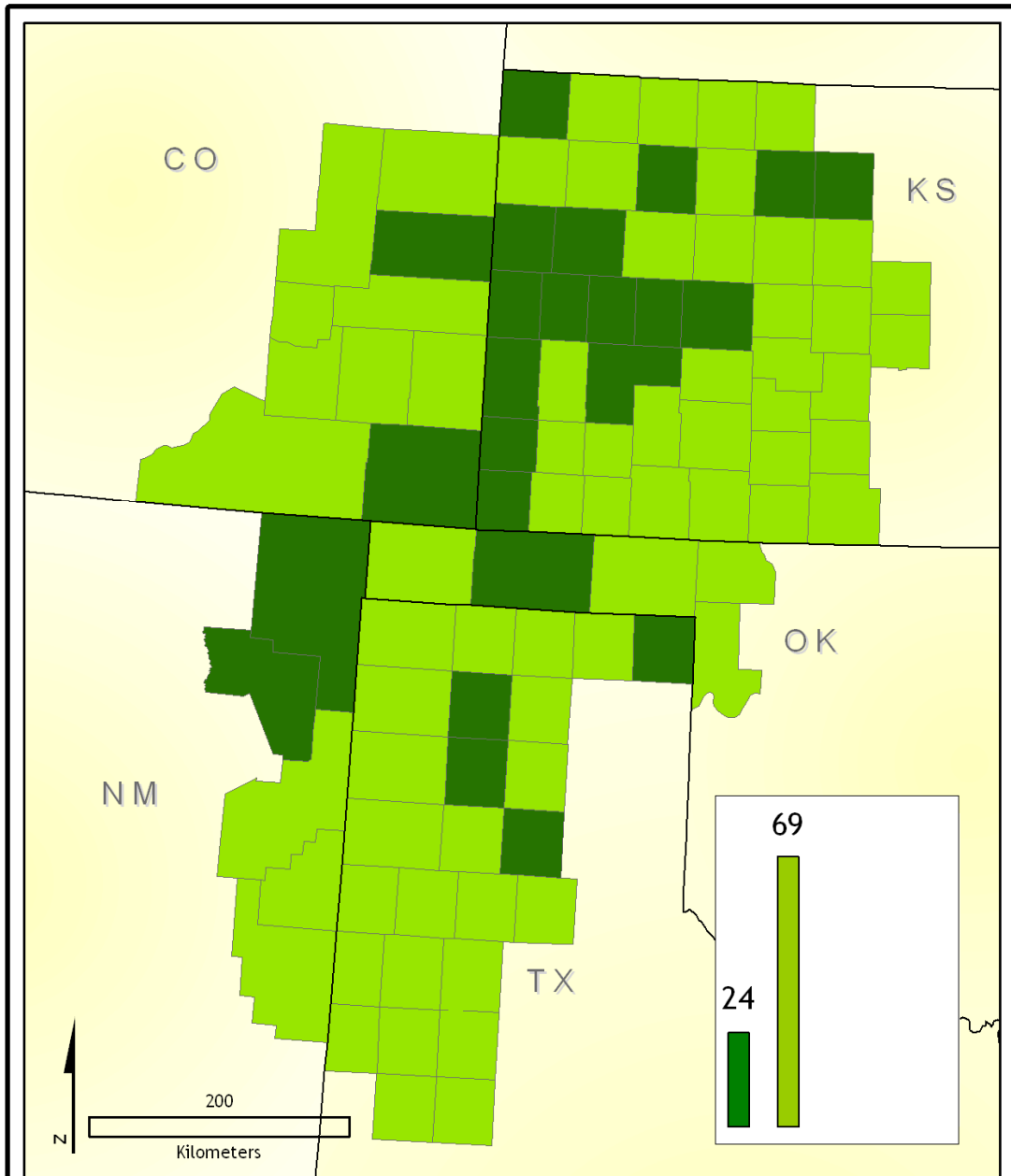
Map A-8. Cause and Effect in Explanation



Map A-9. Dust Bowl Result of Severe Drought - County Mean

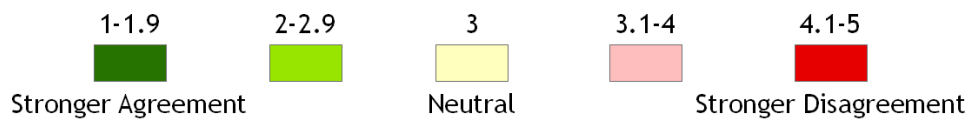


Map A-10. Dust Bowl Defined by Drought and High Temperatures - County Mean

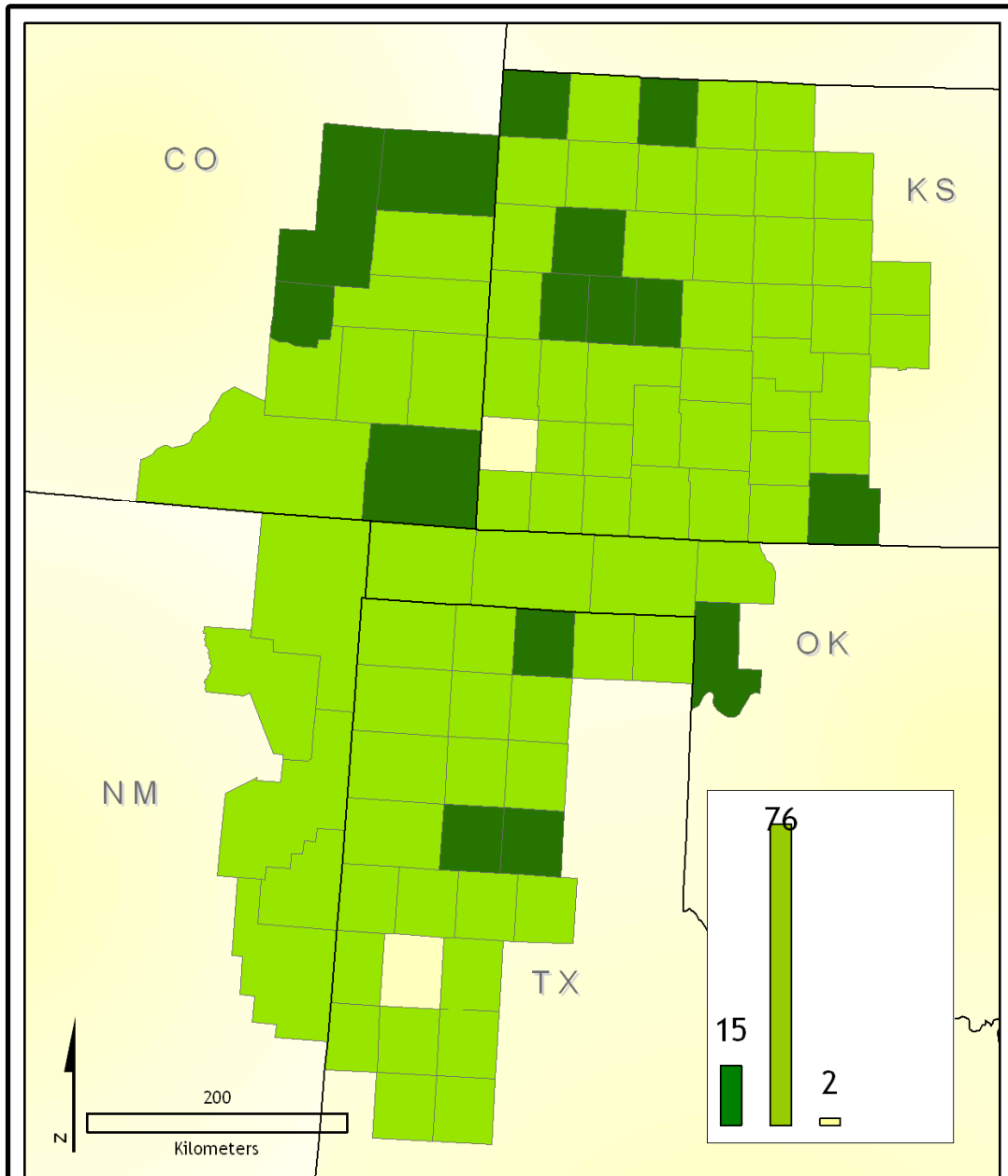


**The Dust Bowl Was Defined by Episodic Regional Dust Storms and Routine Localized Wind Erosion
County Mean**

1=strongly agree, 2=agree, 3=no opinion/don't know, 4=disagree, 5=strongly disagree

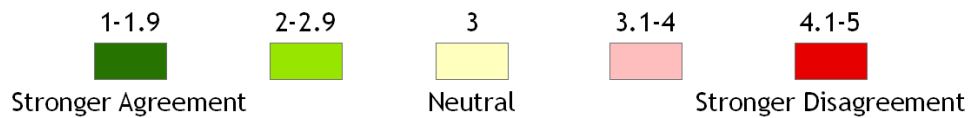


Map A-11. Dust Bowl Defined by Dust Storms and Wind Erosion - County Mean

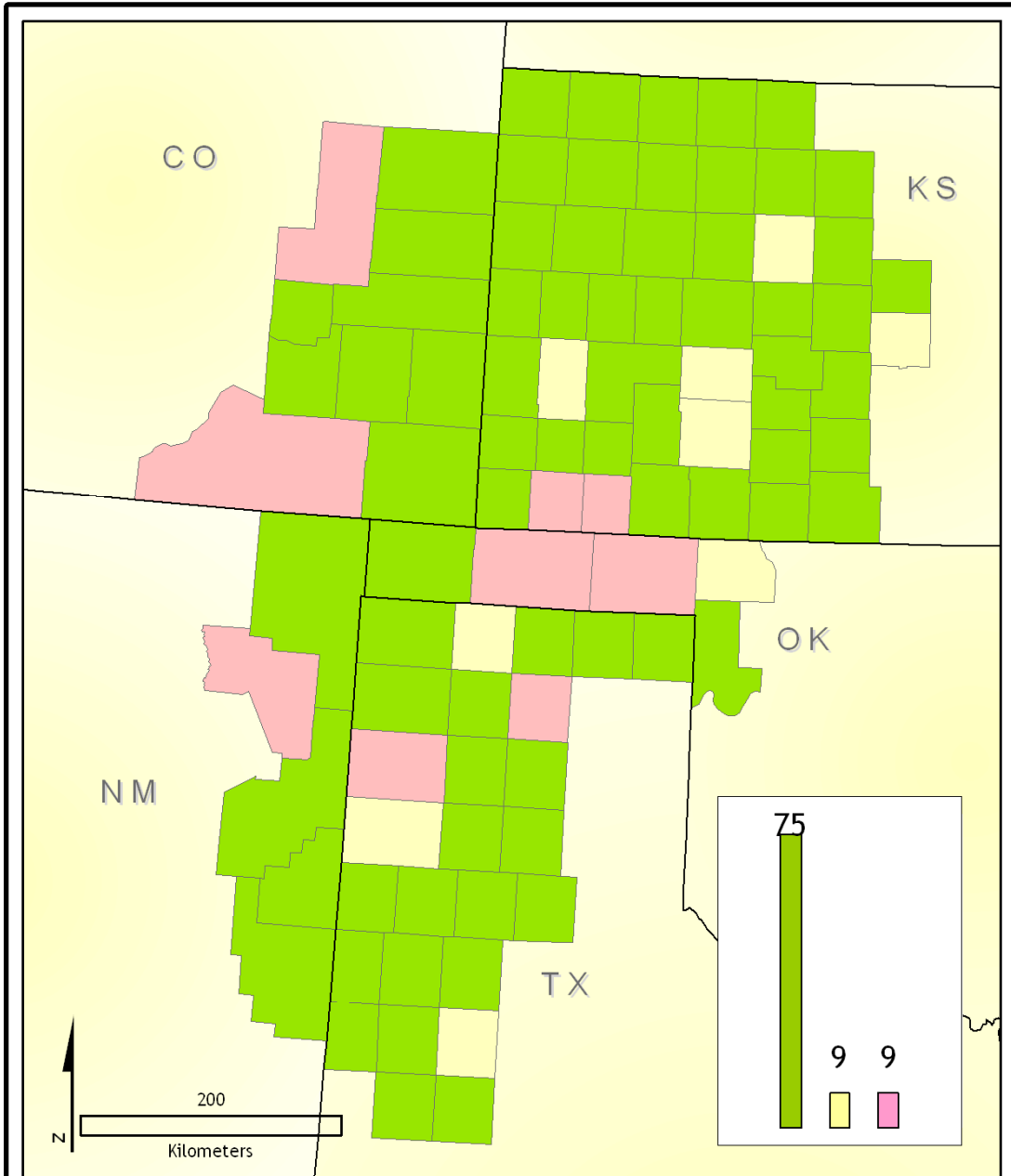


The Dust Bowl Was Defined by the Collapse of the Rural Economy, Affecting Farmers, Rural Businesses, and Local Governments
County Mean

1=strongly agree, 2=agree, 3=no opinion/don't know, 4=disagree, 5=strongly disagree

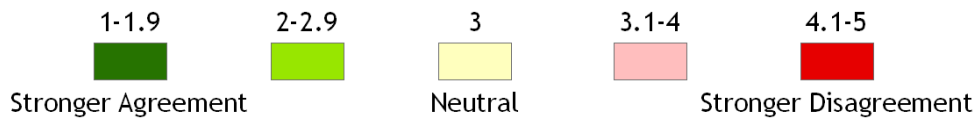


Map A-12. Dust Bowl Defined by Collapse of the Rural Economy - County Mean

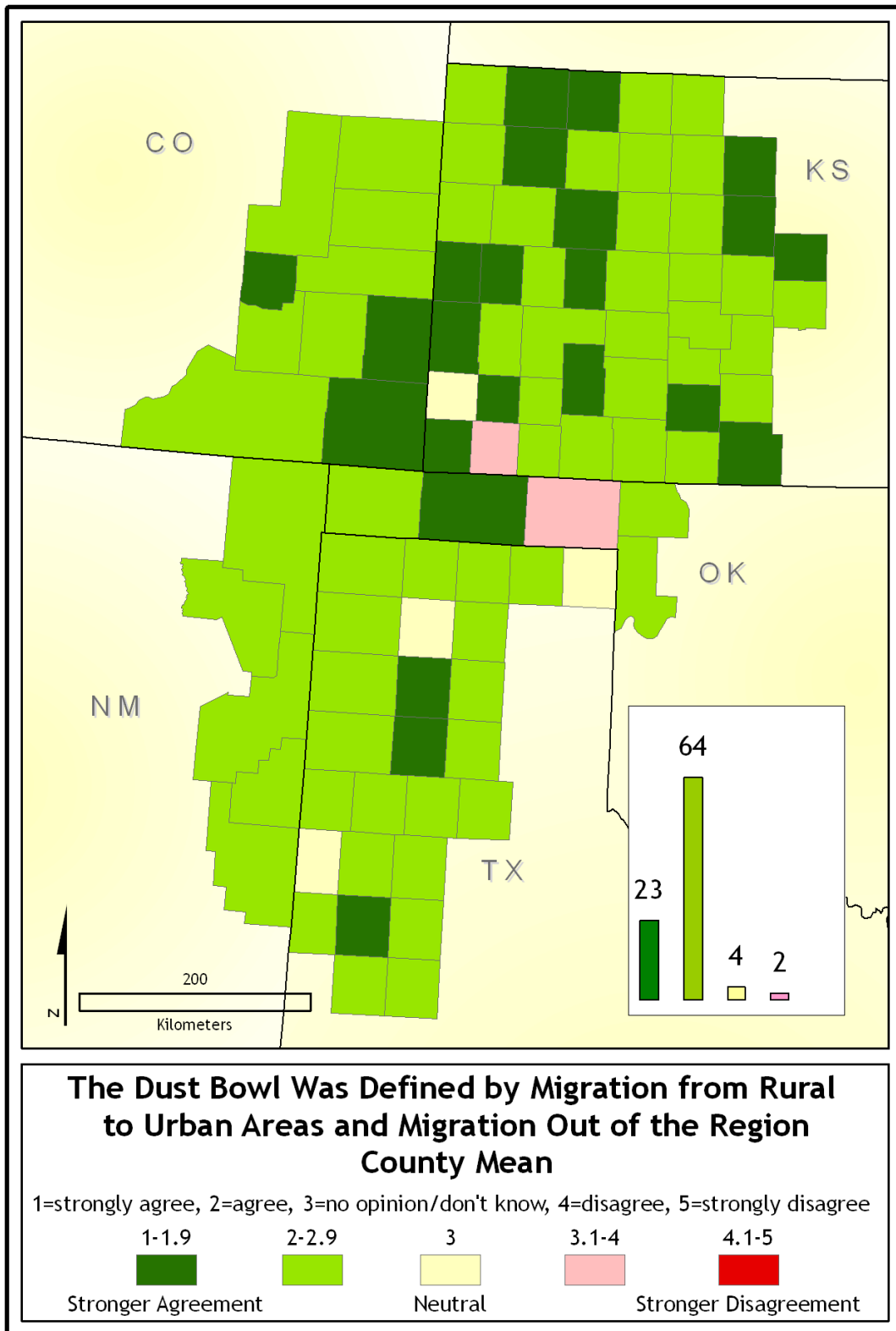


**The Dust Bowl Was Defined by an Aggressive Reform Movement by the Federal Government
County Mean**

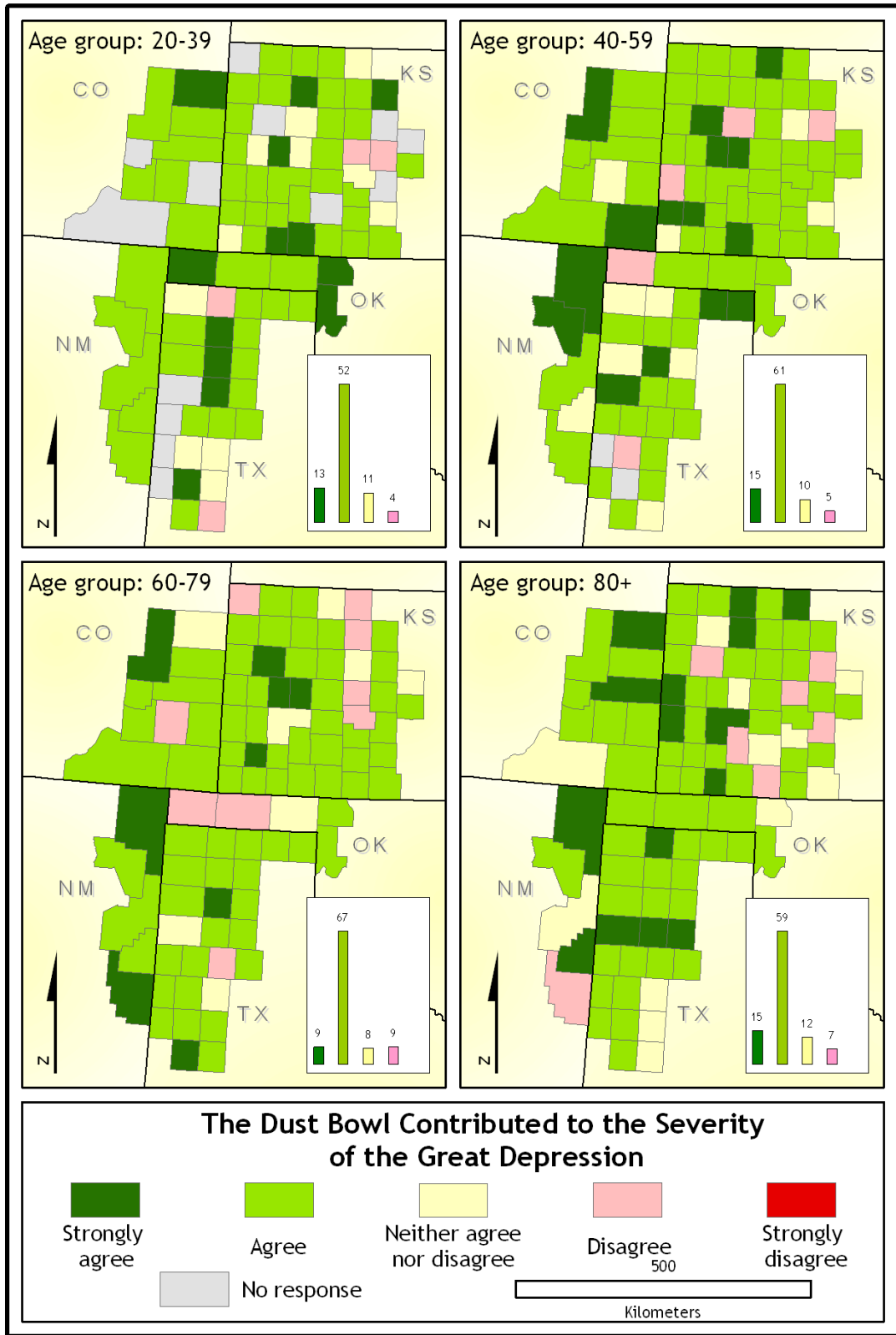
1=strongly agree, 2=agree, 3=no opinion/don't know, 4=disagree, 5=strongly disagree



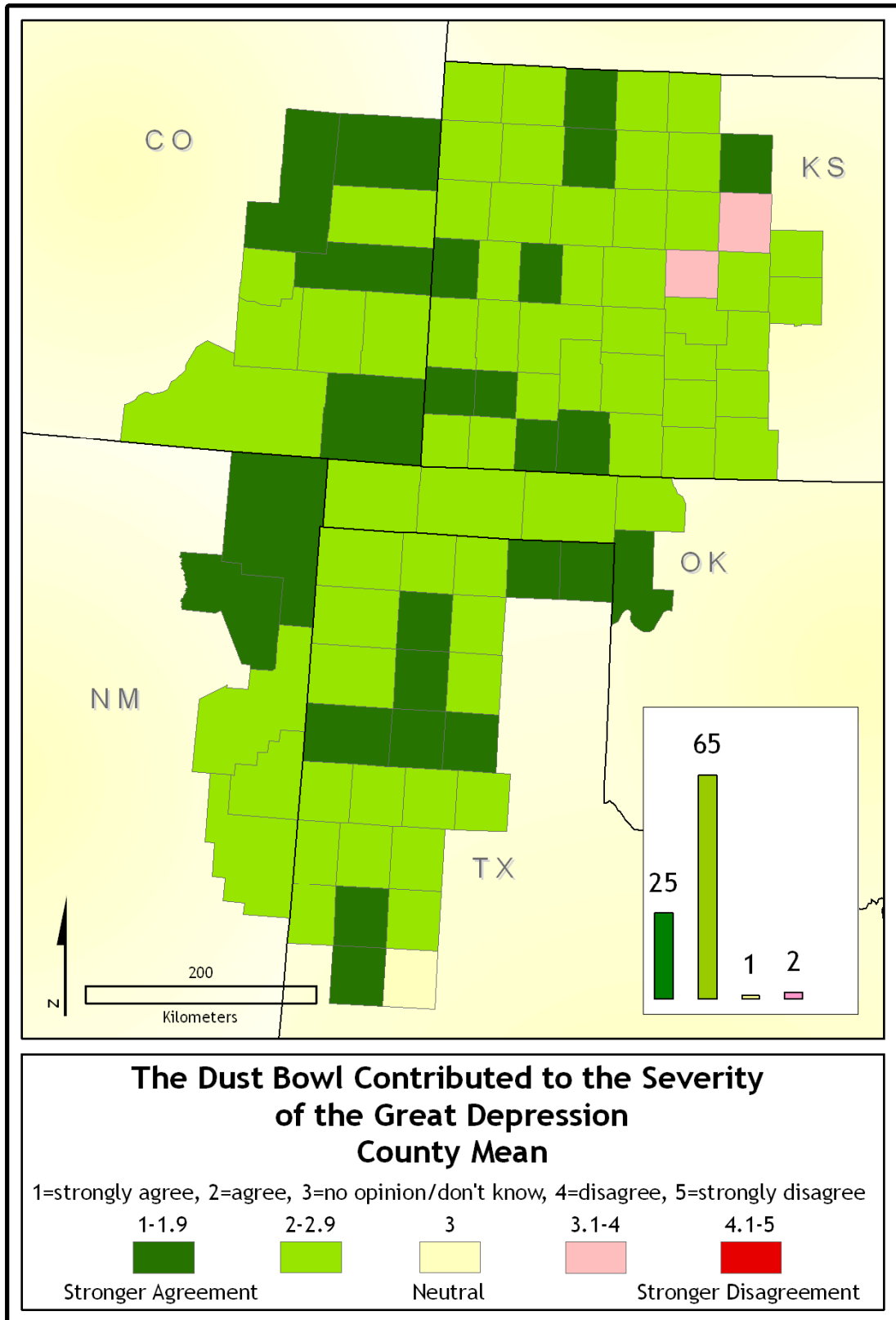
Map A-13. Dust Bowl Defined by Reform Movement by the Federal Government - County Mean

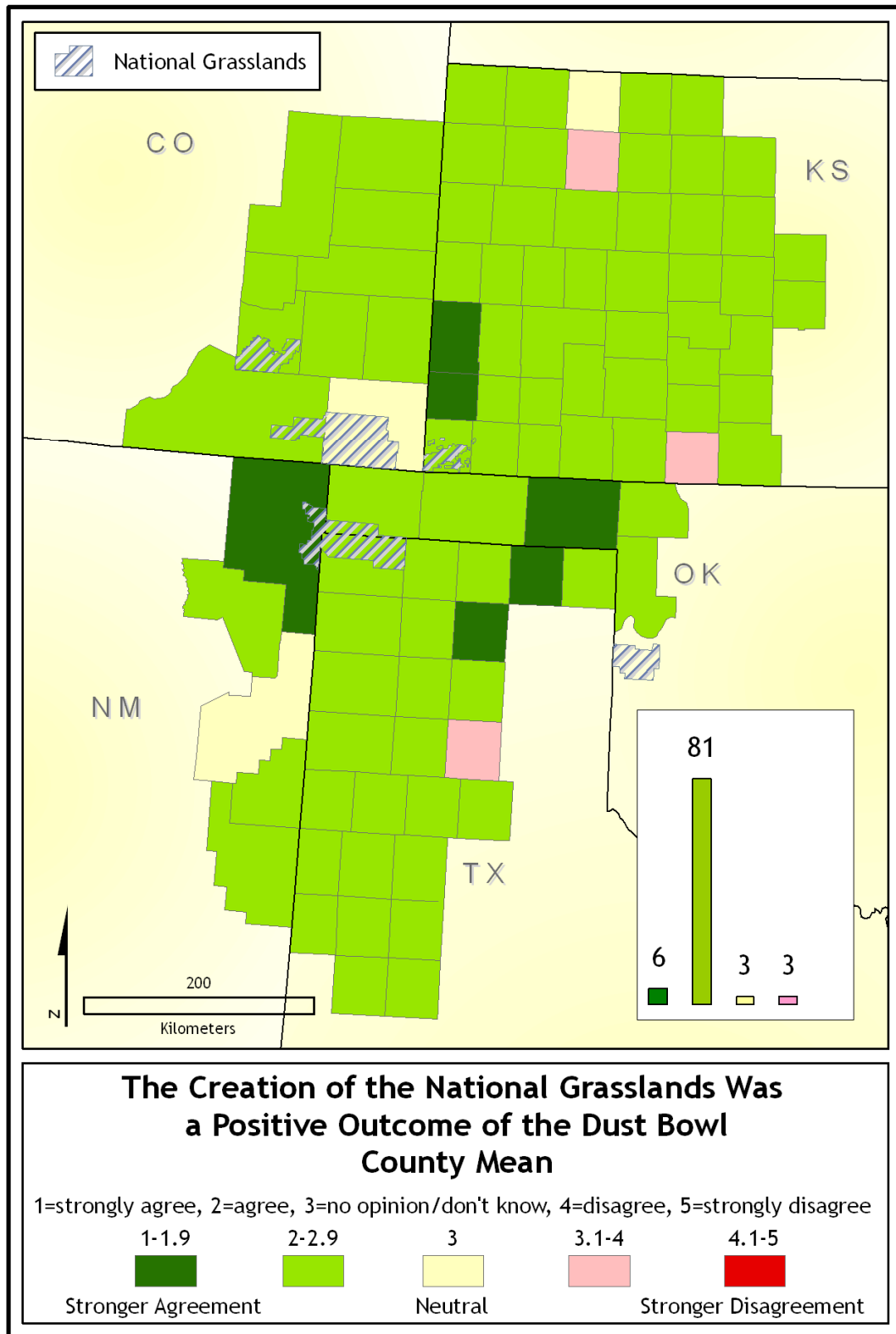


Map A-14. Dust Bowl Defined by Migration - County Mean

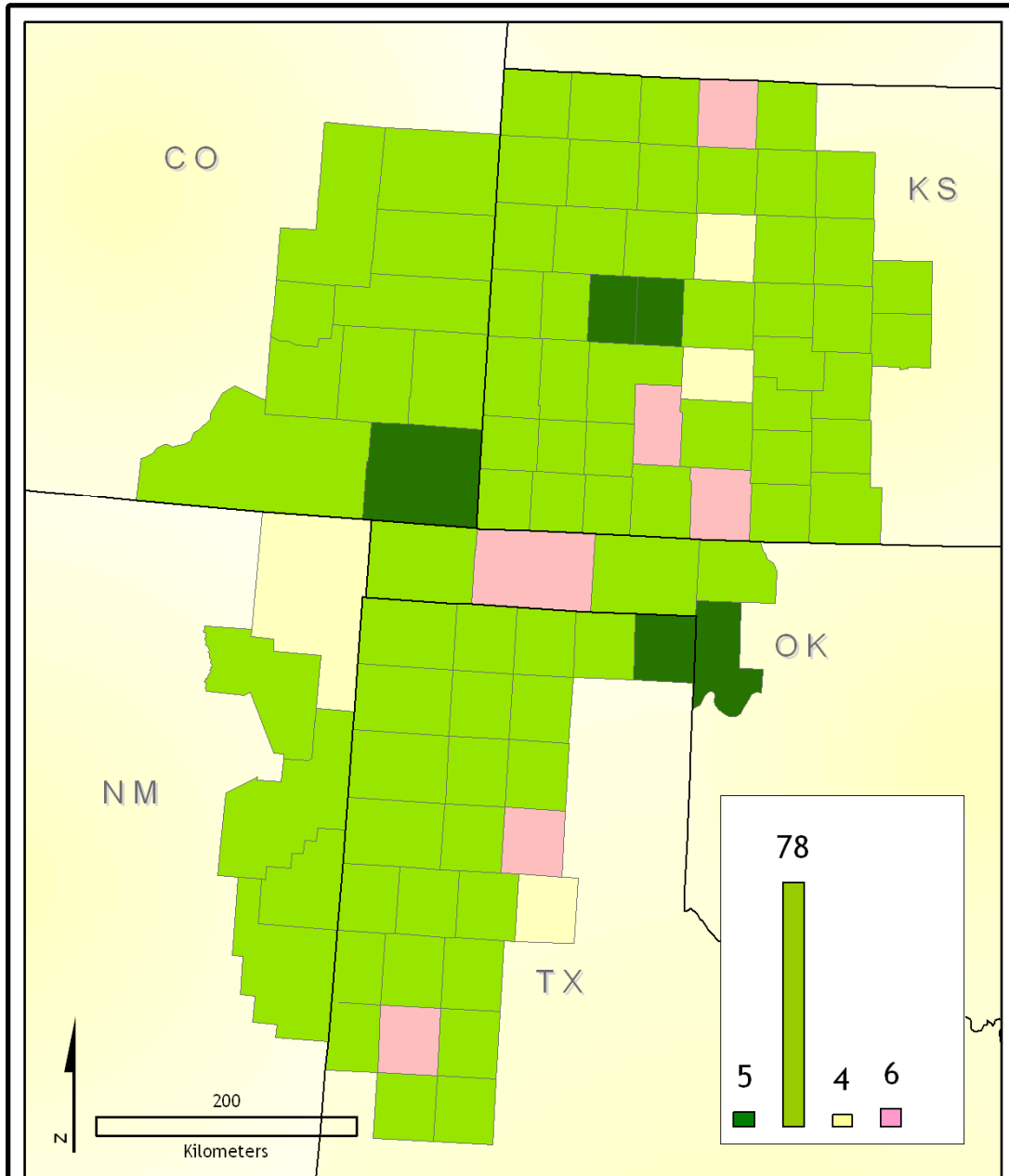


Map A-15. Dust Bowl Contributed to Severity of the Great Depression





Map A-17. Creation of the National Grasslands a Positive Outcome - County Mean



**The Dust Bowl Was the Worst Prolonged Environmental Disaster in the History of the United States
County Average**

1=strongly agree, 2=agree, 3=no opinion/don't know, 4=disagree, 5=strongly disagree

1-1.9

2-2.9

3

3.1-4

4.1-5

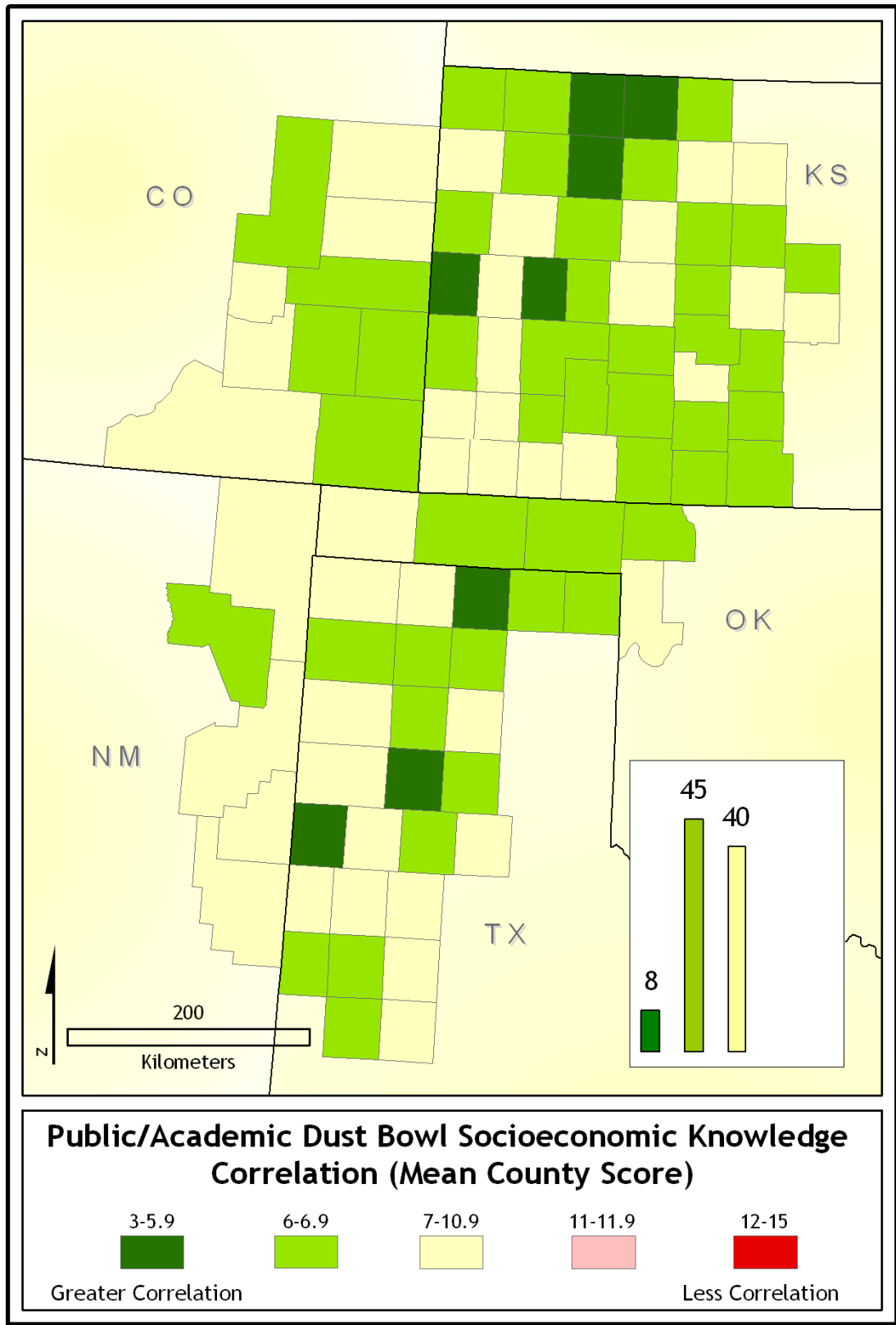


Stronger Agreement

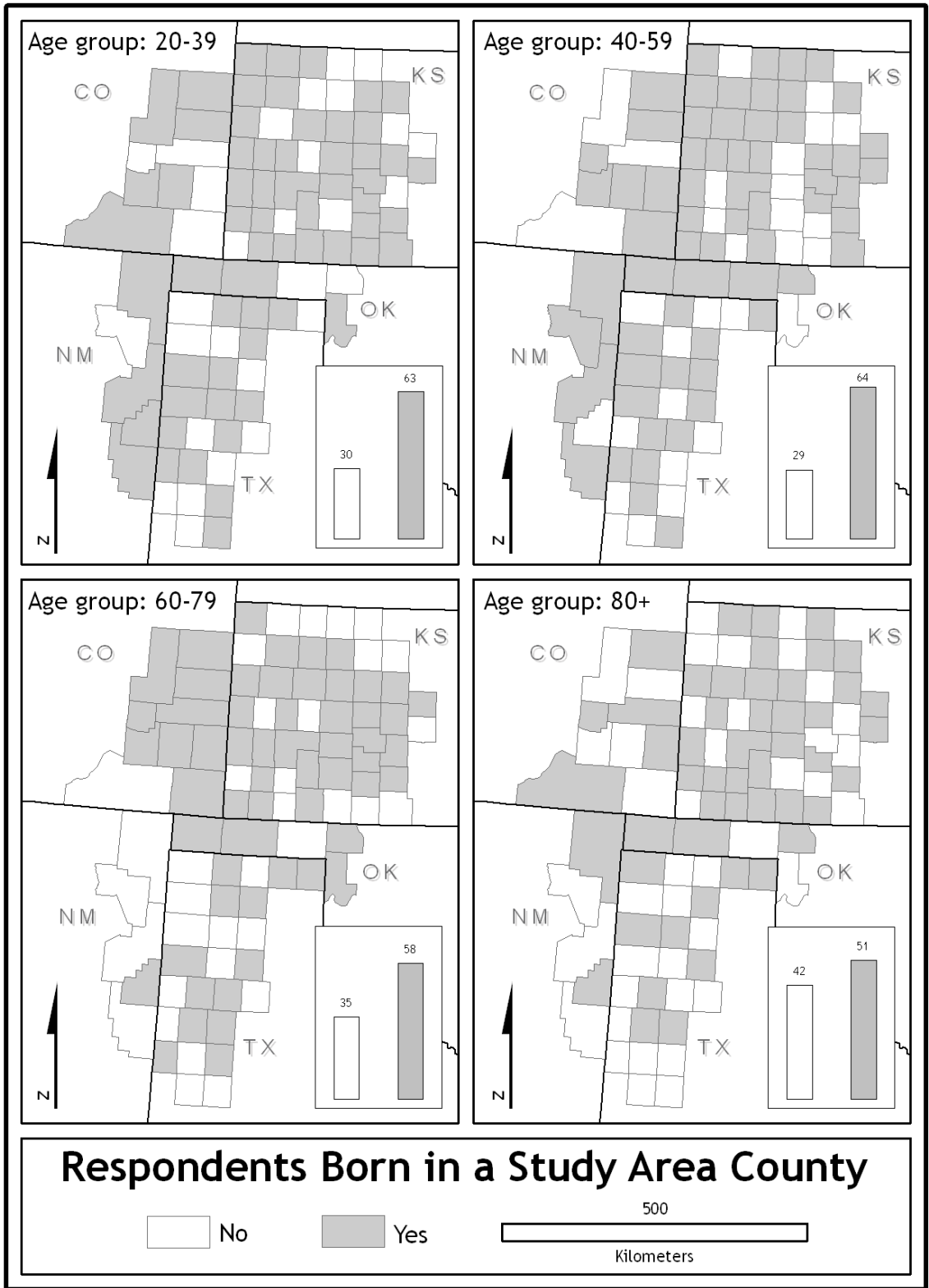
Neutral

Stronger Disagreement

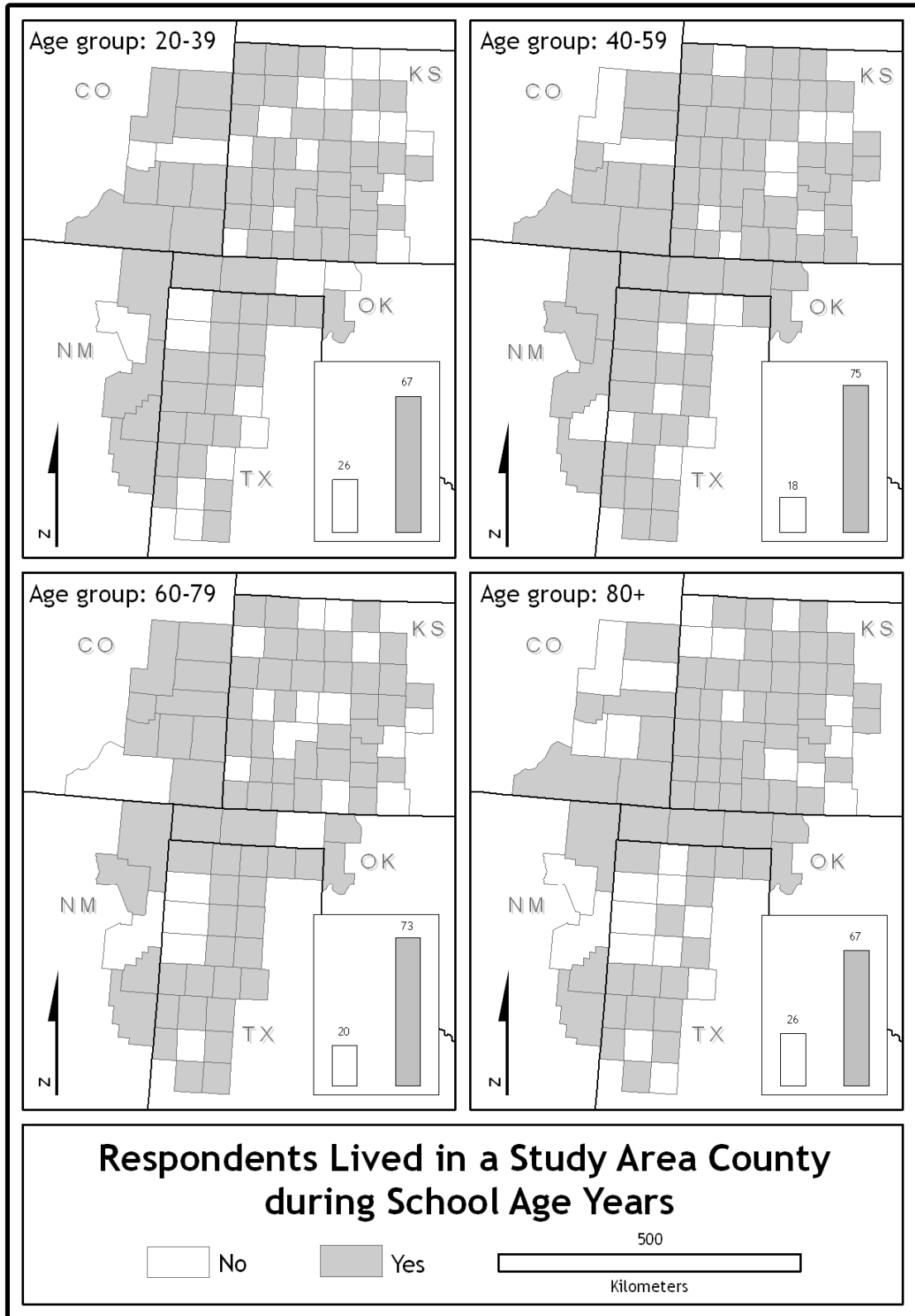
Map A-18. Dust Bowl Worst Prolonged Environmental Disaster - County Mean



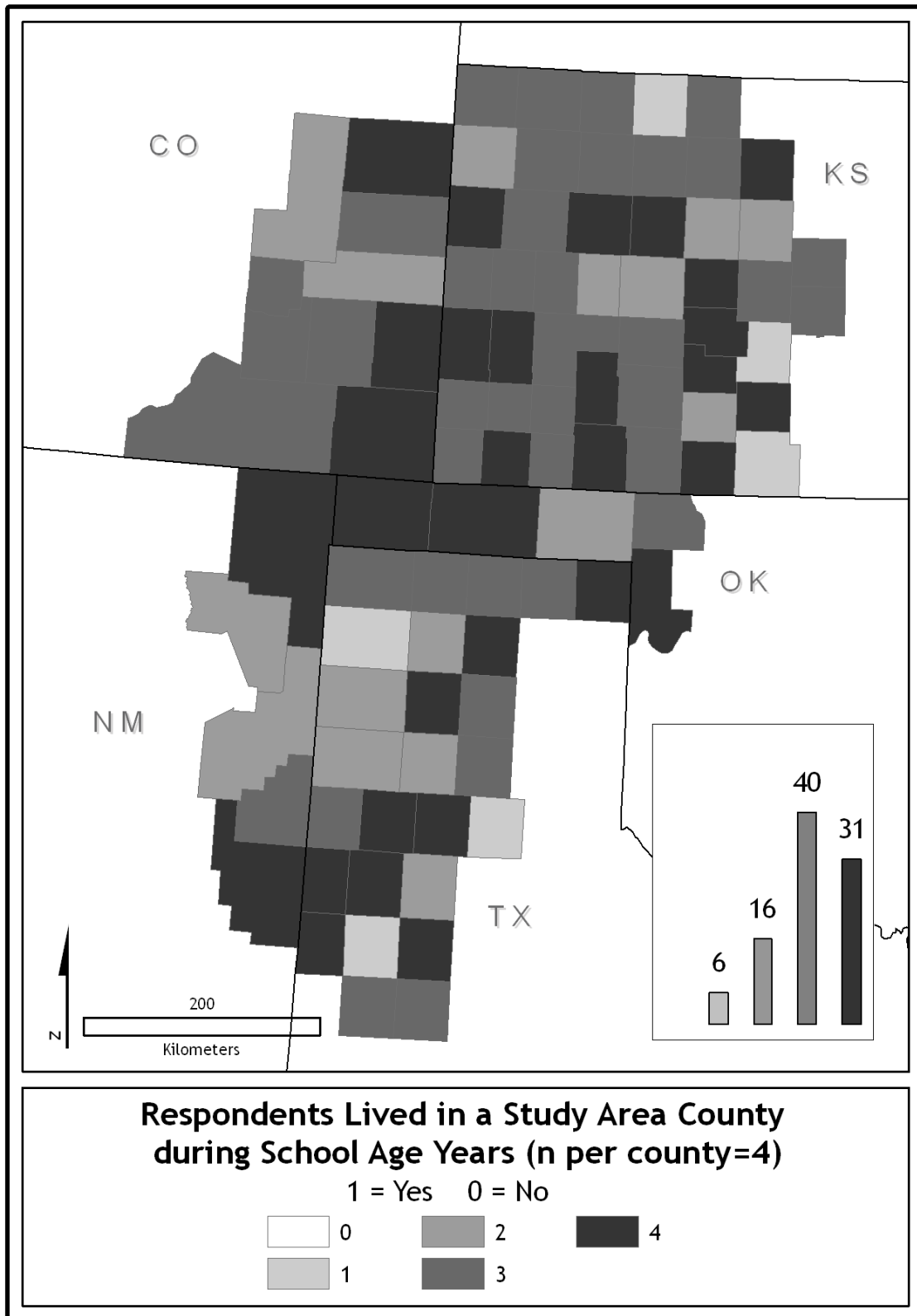
Map A-19. Socioeconomic Knowledge Association - County Mean



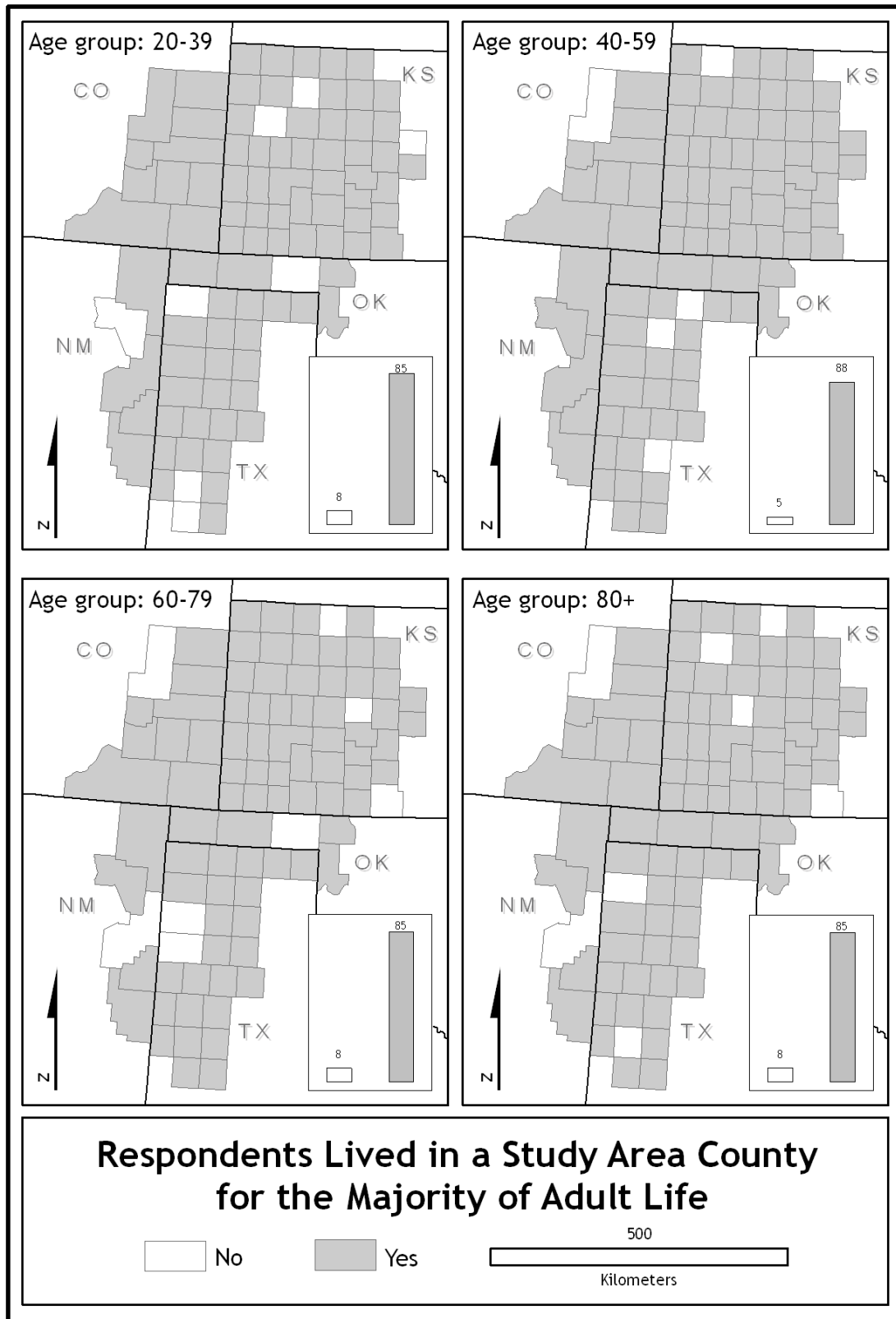
Map A-20. Born in a Study Area County



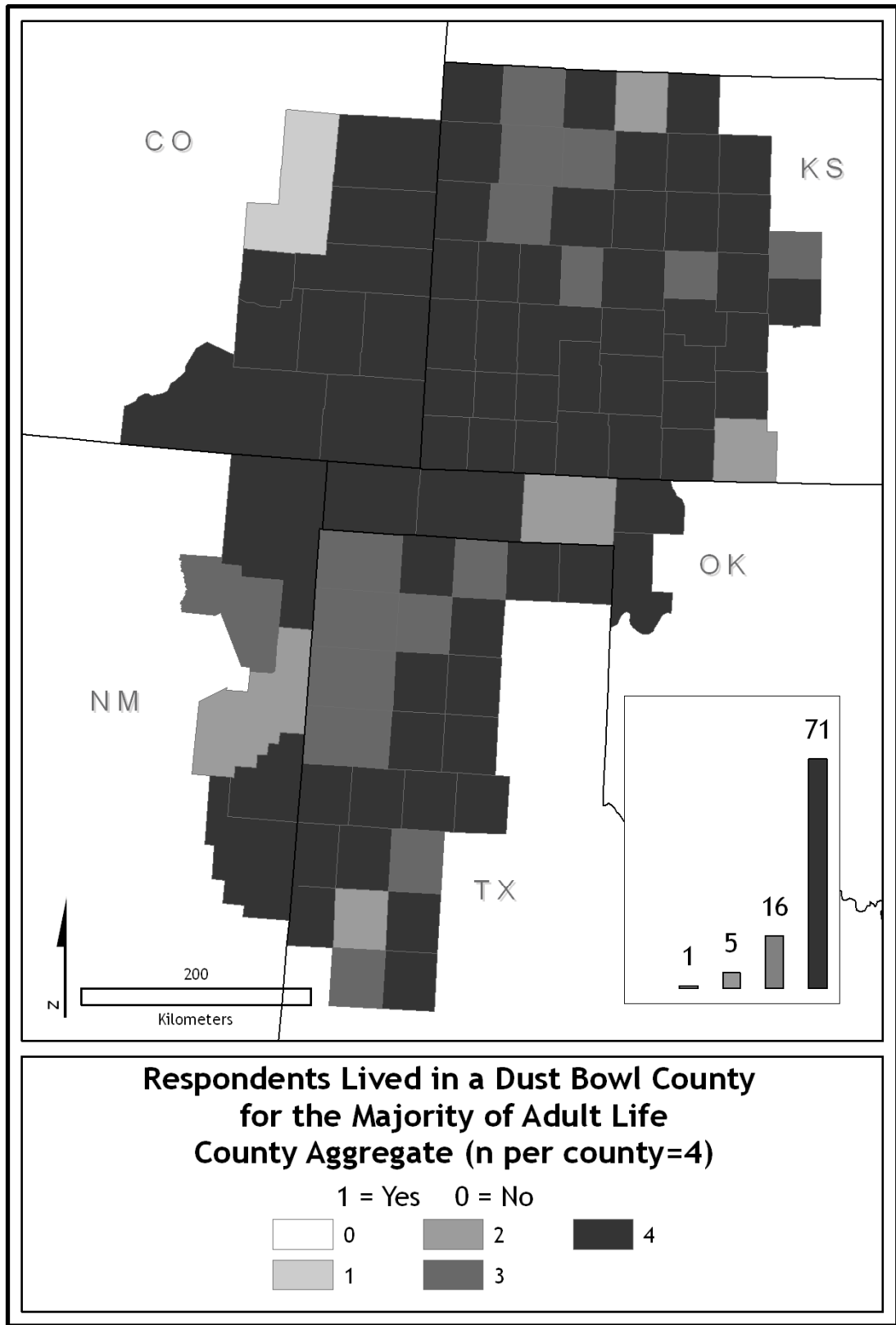
Map A-21. Lived in a Study Area County during School Age Years



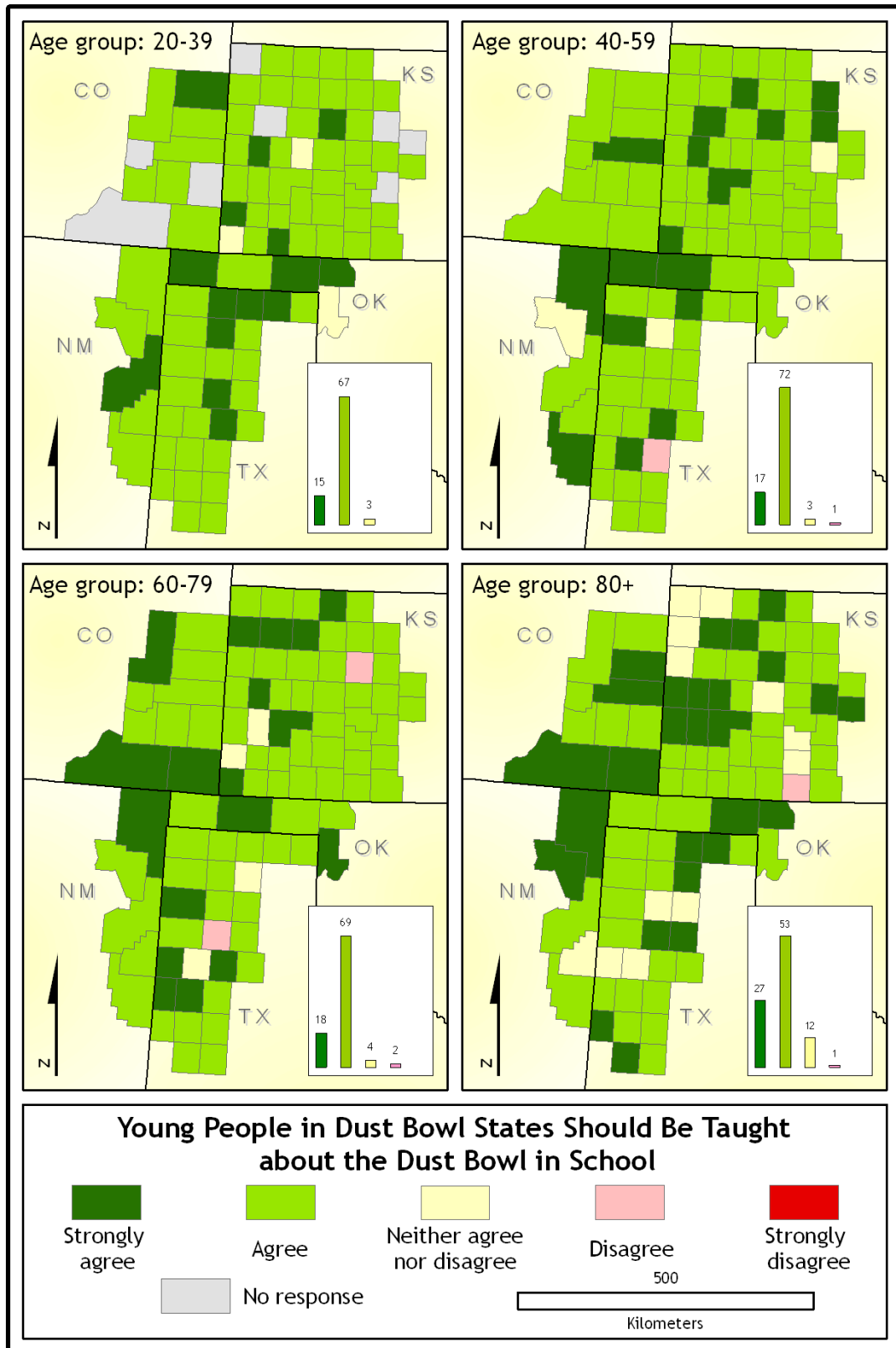
Map A-22. Lived in a Study Area County during School Age Years - County Mean



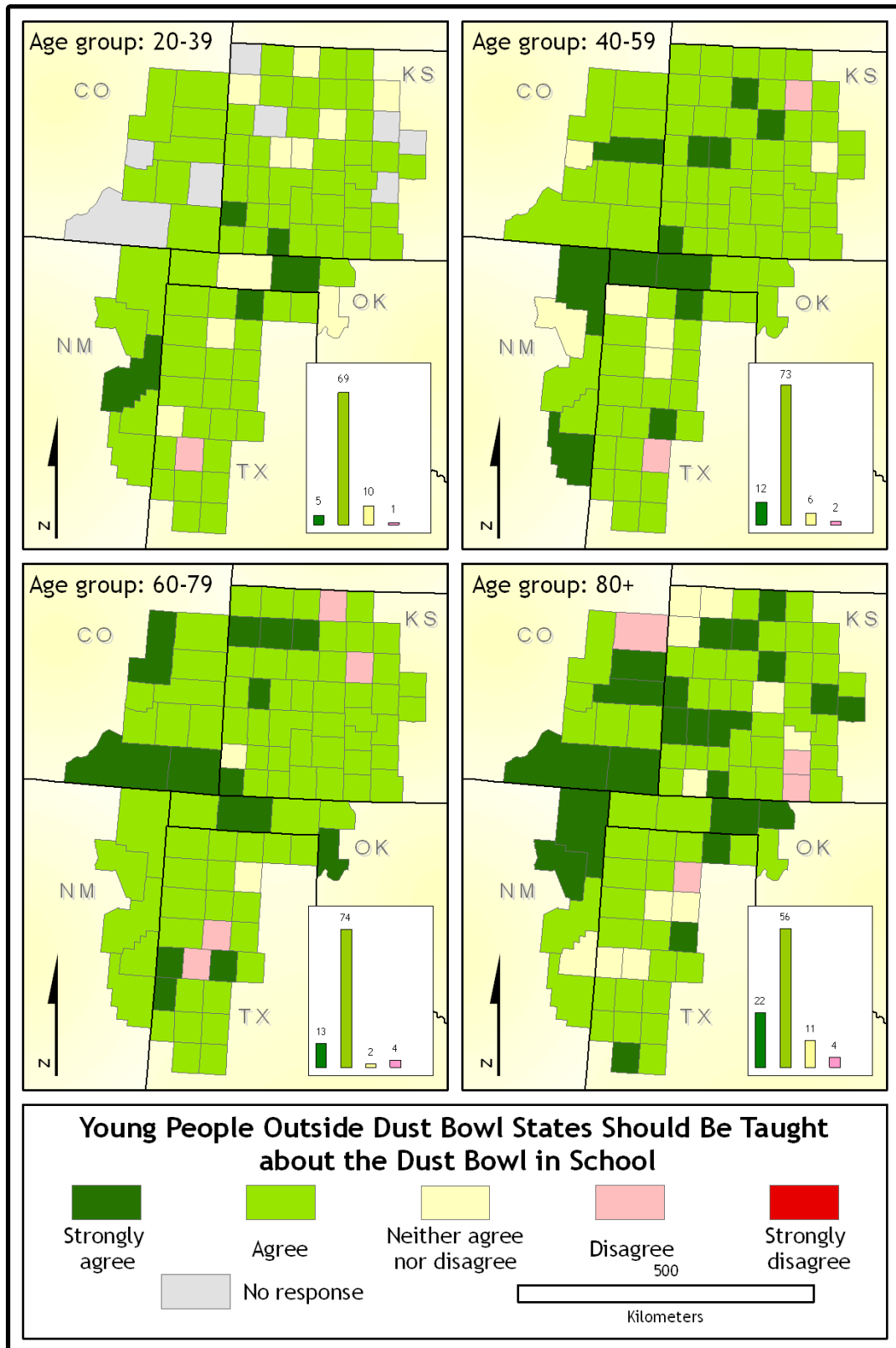
Map A-23. Lived in a Study Area County Majority of Adult Life



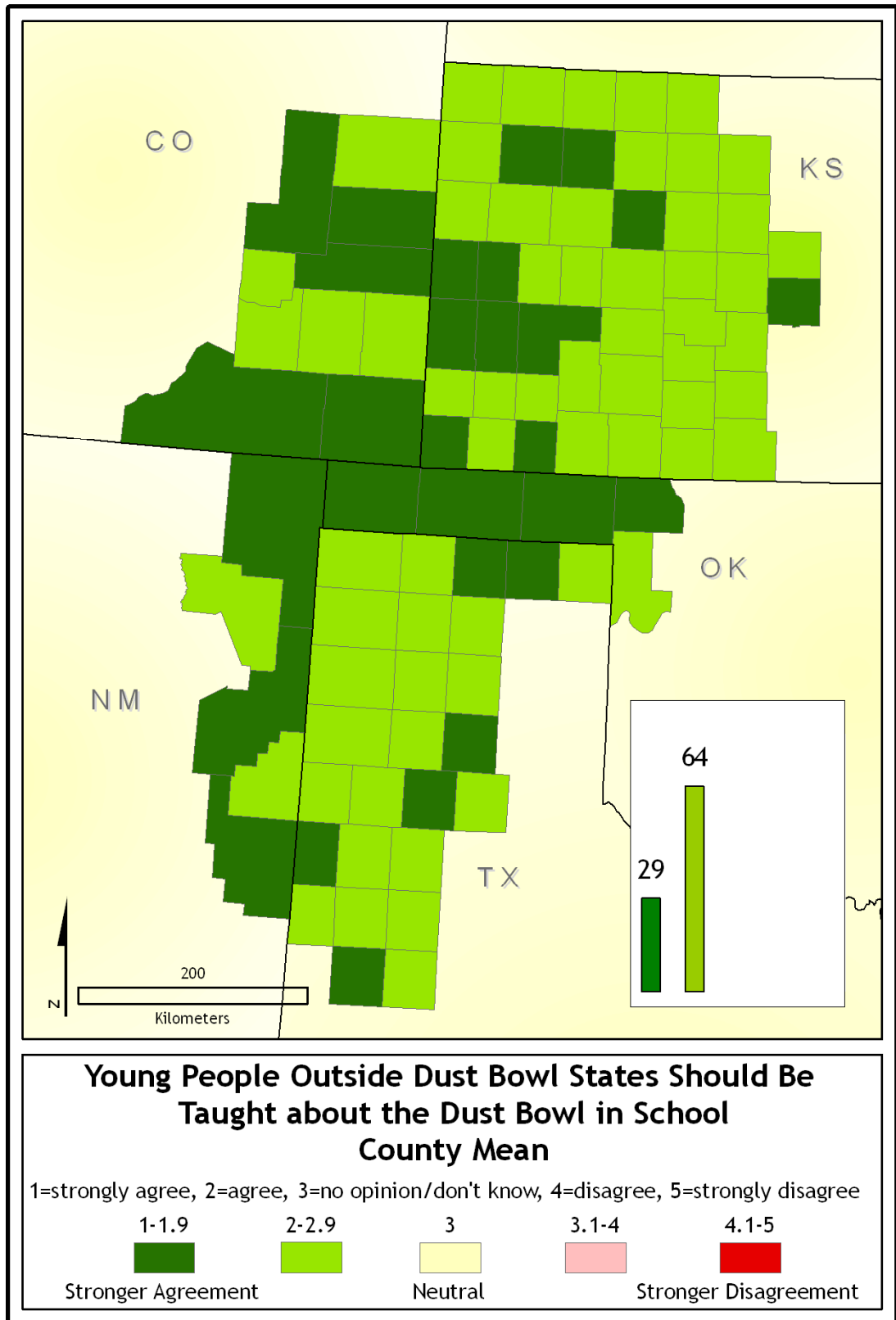
Map A-24. Lived in a Study Area County Majority of Adult Life - County Aggregate



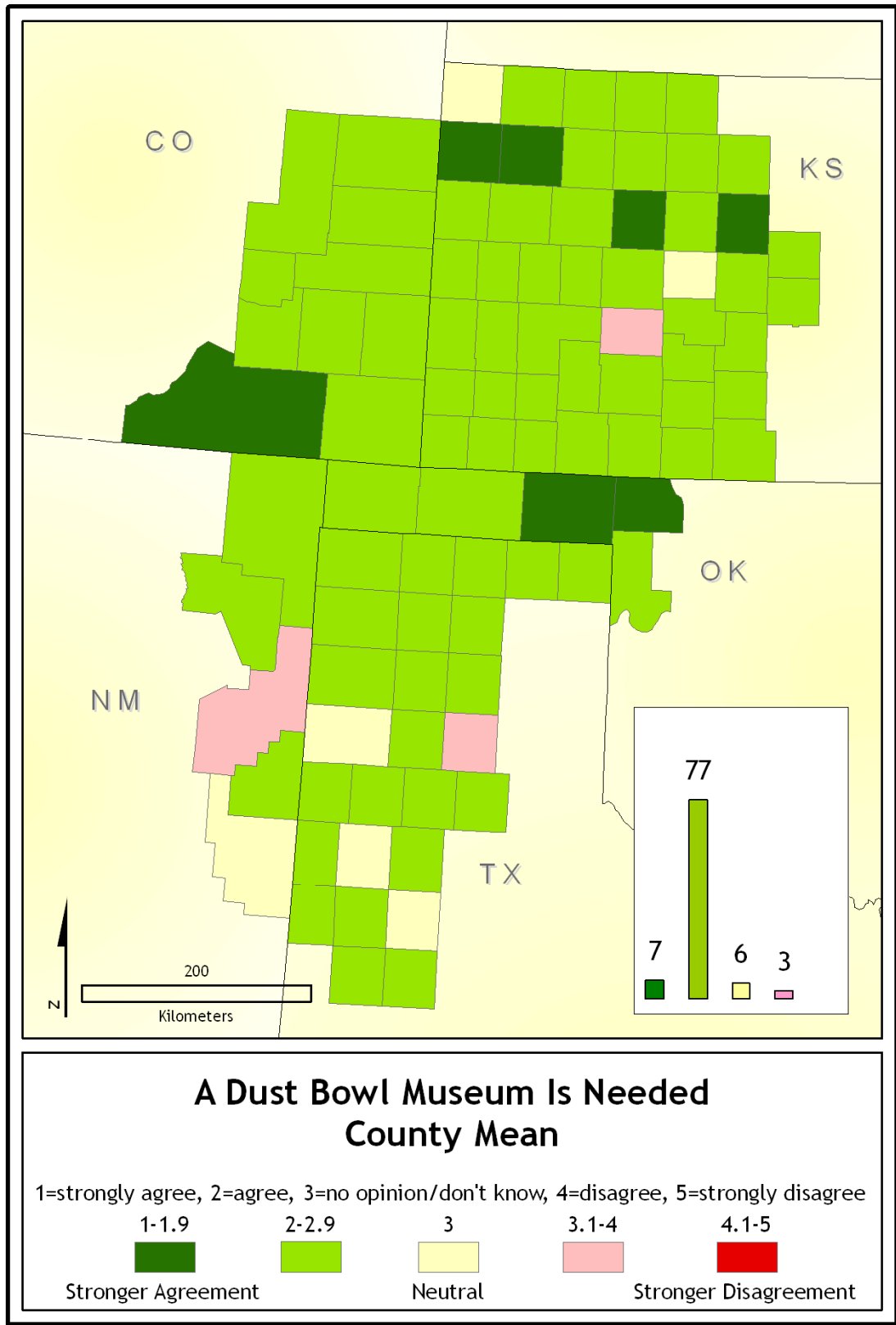
Map A-25. Young People in Dust Bowl States Should Be Taught



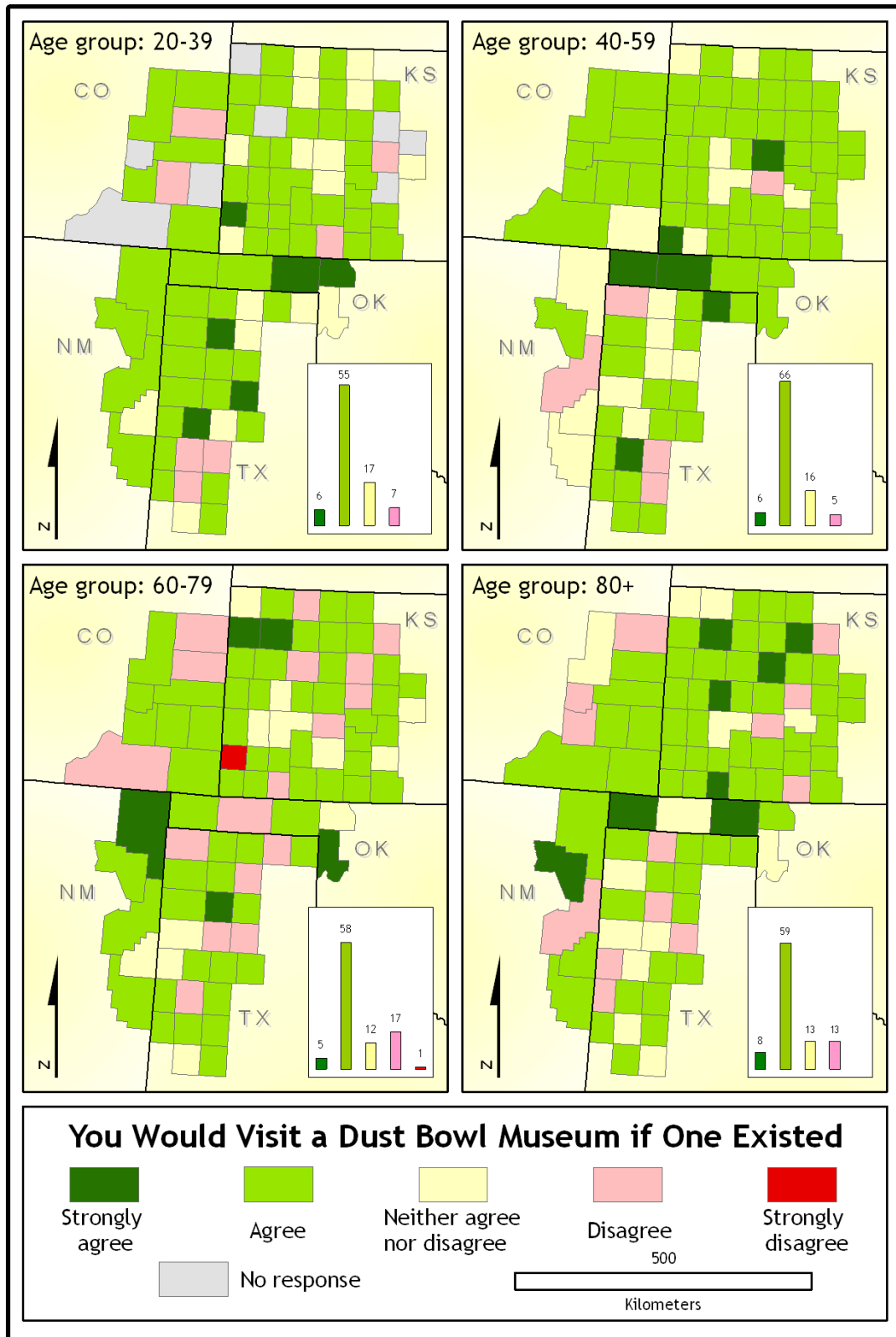
Map A-26. Young People outside Dust Bowl States Should Be Taught



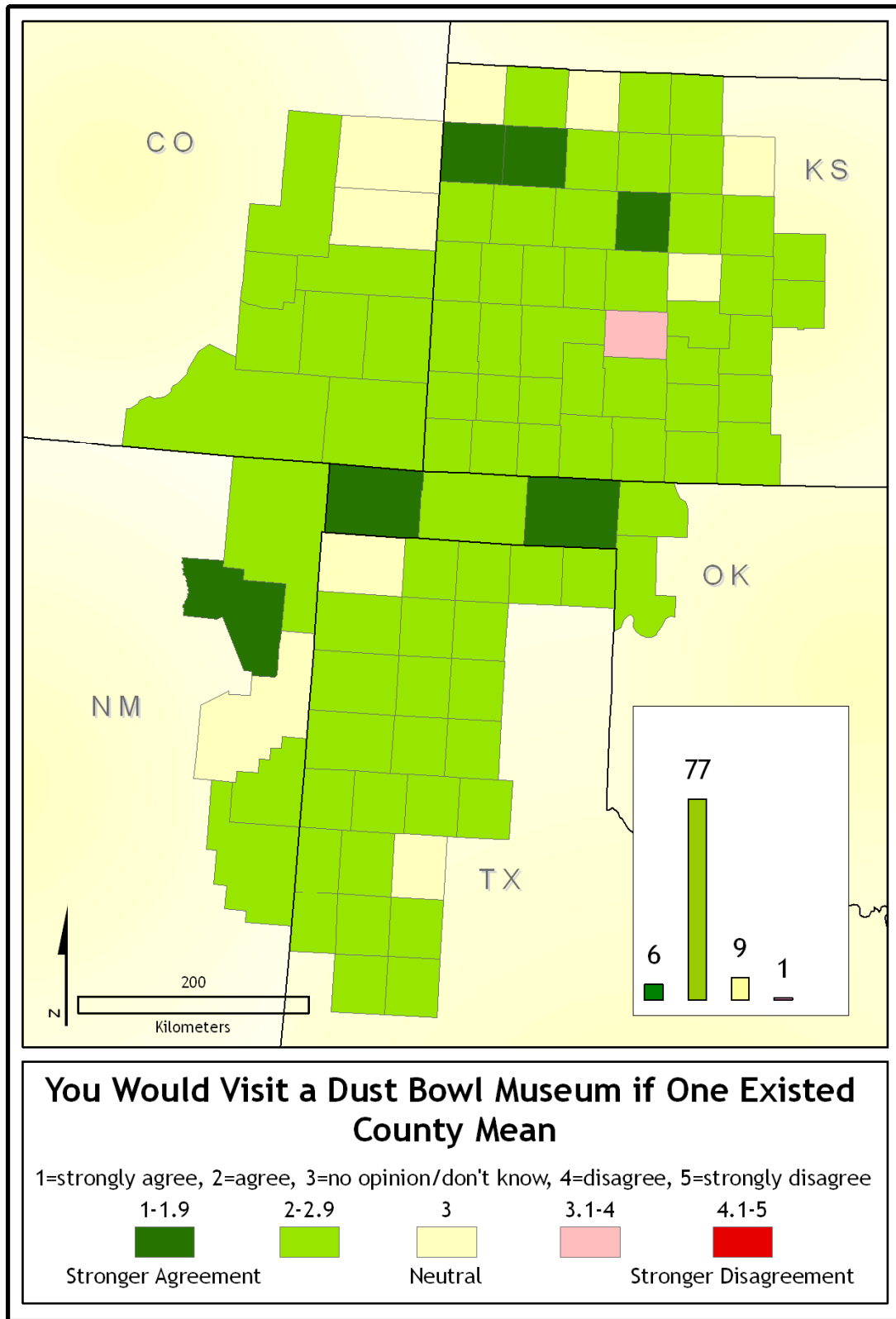
Map A-27. Young People Outside Dust Bowl States Should Be Taught - County Mean



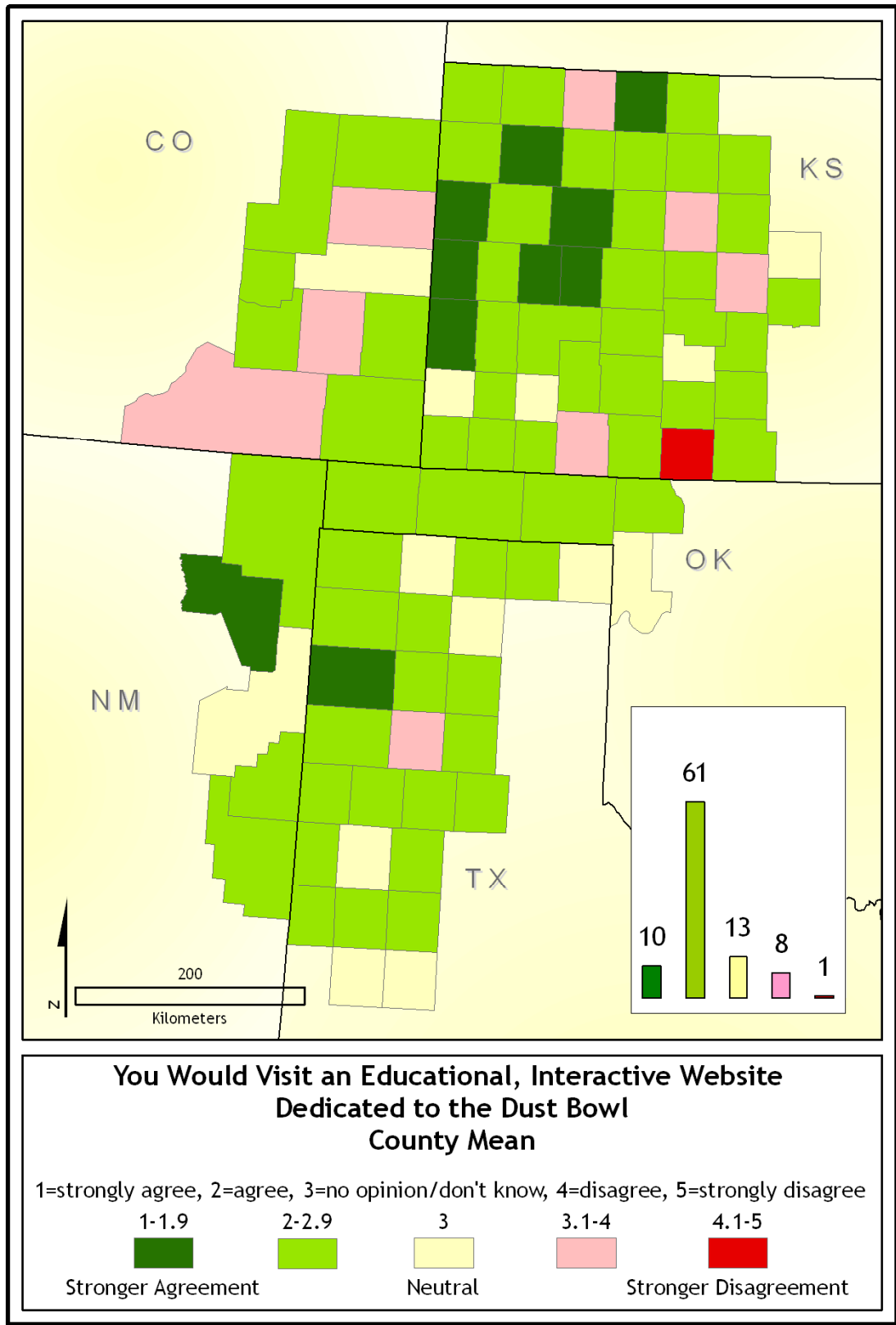
Map A-28. A Dust Bowl Museum Is Needed - County Mean



Map A-29. You Would Visit a Dust Bowl Museum



Map A-30. You Would Visit a Dust Bowl Museum - County Mean



Map A-31. You Would Visit a Website - County Mean

APPENDIX B - STUDY COUNTIES

Dust Region					
State	County	Seat	1935-36	1938	1940
CO	Baca	Springfield	Yes	Yes	Yes
CO	Bent	Las Animas	Yes	Yes	Yes
CO	Cheyenne	Cheyenne Wells	Yes	Yes	Yes
CO	Crowley	Ordway	Yes	Yes	
CO	Kiowa	Eads	Yes	Yes	Yes
CO	Kit Carson	Burlington	Yes	Yes	
CO	Las Animas	Trinidad	Yes	Yes	
CO	Lincoln	Hugo	Yes	Yes	
CO	Otero	La Junta	Yes	Yes	
CO	Prowers	Lamar	Yes	Yes	Yes
KS	Barber	Medicine Lodge		Yes	
KS	Barton	Great Bend		Yes	
KS	Cheyenne	St. Francis		Yes	
KS	Clark	Ashland		Yes	
KS	Comanche	Coldwater		Yes	
KS	Decatur	Oberlin		Yes	
KS	Edwards	Kinsley		Yes	
KS	Ellis	Hays		Yes	Yes
KS	Ellsworth	Ellsworth		Yes	
KS	Finney	Garden City	Yes	Yes	Yes
KS	Ford	Dodge City		Yes	Yes
KS	Gove	Gove		Yes	Yes
KS	Graham	Hill City		Yes	
KS	Grant	Ulysses	Yes	Yes	Yes
KS	Gray	Cimarron	Yes	Yes	Yes
KS	Greeley	Tribune	Yes	Yes	Yes
KS	Hamilton	Syracuse	Yes	Yes	Yes
KS	Haskell	Sublette	Yes	Yes	Yes
KS	Hodgeman	Jetmore		Yes	Yes
KS	Kearny	Lakin	Yes	Yes	Yes
KS	Kiowa	Greensburg		Yes	
KS	Lane	Dighton	Yes	Yes	Yes
KS	Logan	Oakley	Yes	Yes	Yes
KS	Meade	Meade	Yes	Yes	Yes
KS	Morton	Elkhart	Yes	Yes	Yes
KS	Ness	Ness City		Yes	Yes
KS	Norton	Norton		Yes	
KS	Osborne	Osborne		Yes	
KS	Pawnee	Larned		Yes	Yes
KS	Phillips	Phillipsburg		Yes	
KS	Pratt	Pratt		Yes	
KS	Rawlins	Atwood		Yes	
KS	Rice	Lyons		Yes	
KS	Rooks	Stockton		Yes	
KS	Rush	La Crosse		Yes	Yes
KS	Russell	Russell		Yes	
KS	Scott	Scott City	Yes	Yes	Yes

Dust Region					
State	County	Seat	1935-36	1938	1940
KS	Seward	Liberal	Yes	Yes	Yes
KS	Sheridan	Hoxie		Yes	
KS	Sherman	Goodland	Yes	Yes	
KS	Stafford	Saint John		Yes	
KS	Stanton	Johnson	Yes	Yes	Yes
KS	Stevens	Hugoton	Yes	Yes	Yes
KS	Thomas	Colby		Yes	
KS	Trego	WaKeeney		Yes	Yes
KS	Wallace	Sharon Springs	Yes	Yes	Yes
KS	Wichita	Leoti	Yes	Yes	Yes
NM	Curry	Clovis	Yes		
NM	Harding	Mosquero	Yes	Yes	
NM	Quay	Tucumcari	Yes		
NM	Roosevelt	Portales	Yes		
NM	Union	Clayton	Yes	Yes	
OK	Beaver	Beaver	Yes	Yes	
OK	Cimarron	Boise City	Yes	Yes	Yes
OK	Ellis	Arnett		Yes	
OK	Harper	Buffalo		Yes	
OK	Texas	Guymon	Yes	Yes	Yes
TX	Armstrong	Claude	Yes		
TX	Bailey	Muleshoe	Yes		
TX	Briscoe	Silverton	Yes		
TX	Carson	Panhandle	Yes		
TX	Castro	Dimmitt	Yes		
TX	Cochran	Morton	Yes		
TX	Dallam	Dalhart	Yes	Yes	
TX	Deaf Smith	Hereford	Yes		
TX	Hale	Plainview	Yes		
TX	Hansford	Spearman	Yes	Yes	
TX	Hartley	Channing	Yes	Yes	
TX	Hockley	Levelland	Yes		
TX	Hutchinson	Stinett	Yes		
TX	Lamb	Littlefield	Yes		
TX	Lipscomb	Lipscomb		Yes	
TX	Lubbock	Lubbock	Yes		
TX	Lynn	Tahoka	Yes		
TX	Moore	Dumas	Yes		
TX	Ochiltree	Perryton		Yes	
TX	Oldham	Vega	Yes		
TX	Parmer	Farwell	Yes		
TX	Potter	Amarillo	Yes		
TX	Randall	Canyon	Yes		
TX	Sherman	Stratford	Yes	Yes	
TX	Swisher	Tulia	Yes		
TX	Terry	Brownfield	Yes		

APPENDIX C - QUESTIONNAIRE

Dust Bowl Knowledge and Perceptions

This questionnaire is gathering information to help gauge knowledge and perceptions of the Dust Bowl and to study how this knowledge and these perceptions are changing over time. Participation in this survey is completely voluntary and anonymous.

Instructions:

This questionnaire asks you to provide information regarding your knowledge and opinions of the Dust Bowl as a region, an era, and an event. There are no incorrect answers so please attempt to answer all of the questions. Your participation is especially important for the success of this study and I thank you for your input.

Dust Bowl: The Region



A-1. Draw a closed line around the Dust Bowl region on the map below:



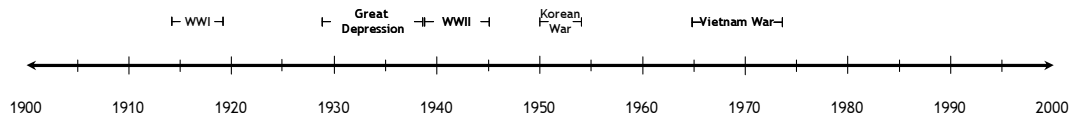
A-2. What single state do you most strongly associate with the Dust Bowl? _____

A-3. What other state(s) do you associate with the Dust Bowl? _____

Dust Bowl: The Era



B-1. Define the Dust Bowl era by marking the beginning and end of the Dust Bowl era on the timeline below:



B-2. What year represents the peak of the Dust Bowl? _____

Dust Bowl: The Event



C-1. In your words, what was the Dust Bowl? _____

Please circle your response to each of the following statements:

C-2. The Dust Bowl was a result of land mismanagement by farmers.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-3. The Dust Bowl was a result of severe drought.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-4. The Dust Bowl contributed to the severity of the Great Depression.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-5. The Great Depression contributed to the severity of the Dust Bowl.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-6. The Dust Bowl was the worst prolonged environmental disaster in the history of the United States.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-7. The creation of the National Grasslands was a positive outcome of the Dust Bowl.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-8. An event like the Dust Bowl could happen again in or near the location of the historic Dust Bowl.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-9. An event like the Dust Bowl will happen again in or near the location of the historic Dust Bowl in your lifetime.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-10. The Dust Bowl was defined by a combination of extended severe drought and unusually high temperatures.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-11. The Dust Bowl was defined by episodic regional dust storms and routine localized wind erosion.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-12. The Dust Bowl was defined by agricultural failure, including both cropland and livestock operations.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-13. The Dust Bowl was defined by the collapse of the rural economy, affecting farmers, rural businesses, and local governments.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-14. The Dust Bowl was defined by an aggressive reform movement by the federal government.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
C-15. The Dust Bowl was defined by migration from rural to urban areas and migration out of the region.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

Dust Bowl: Your Personal Exposure



D-1. When you hear the term *Dust Bowl*, what is the first thing that comes to your mind? _____

D-2. Were you ever taught about the Dust Bowl during the course of your education? _____

D-2a. If yes, at what level(s)? _____

D-3. Have you ever discussed the Dust Bowl in a non-educational setting? For example, with friends or family? _____

D-4. Do you or have you ever known a survivor(s) of the Dust Bowl? _____

D-4a. If yes, do you recollect that person or persons ever telling stories about the Dust Bowl? _____

D-4b. If yes, what were the primary topics of those stories? _____

Please circle your response for each of the following statements:

D-5. Young people in Dust Bowl states should be taught about the Dust Bowl in school.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
D-6. Young people outside Dust Bowl states should be taught about the Dust Bowl in school.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
D-7. A Dust Bowl museum is needed.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
D-8. You would visit a Dust Bowl museum if one existed.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
D-9. An educational, interactive website dedicated to the Dust Bowl is needed.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
D-10. You would visit an educational, interactive Dust Bowl website if one existed.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

A few questions about you. **Your answers are anonymous.**

In what county and state do you currently reside?

Are you male or female? Male Female

What is your age?

- 20 to 39
- 40 to 59
- 60 to 79
- 80+

What is your race/ethnicity?

- Black/African American
- Asian
- White
- American Indian/Alaska Native
- Native Hawaiian or other Pacific Islander
- Spanish, Hispanic, or Latino

What is the highest level of education you have completed?

- No formal schooling
- Elementary school
- Middle school
- High school
- Some college
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctorate

What is your annual household income?

- Less than \$20,000
- \$20,000 to \$39,999
- \$40,000 to \$59,999
- \$60,000 to \$79,999
- \$80,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 or more

Where were you born? (county, state)

Where did you live for the greatest percentage of your school age years? (county, state)

Where have you lived for the greatest percentage of your adult life? (county, state)

Check the classification(s) that best identifies your vocation(s) **throughout** your life? Check as many as apply.

- Agriculture, forestry, fishing, and hunting
- Transportation and warehousing
- Finance and Insurance
- Real Estate and rental and leasing
- Professional, scientific, and technical services
- Management of companies and enterprises
- Administrative and support services
- Waste management and remediation services
- Health care and social assistance
- Arts, entertainment, and recreation
- Accommodation and food services
- Mining
- Utilities
- Construction
- Manufacturing
- Wholesale trade
- Retail trade
- Information
- Educational services
- Other services
- Public administration

For Official Use

Date:

Location:

Notes:

APPENDIX D - PREVIOUSLY-DEFINED REGION SOURCES

Previously-defined Dust Bowl Region Sources

Author	Publish Year
Babb, Babb, Wixon	2007
Bonnifield	1979
Carlile	1999
Connell	2004
Cooper	2004
Cunfer	2005
Durbin	2002
Egan	2006
Farris	1989
Floyd	1950
Heinrichs	2005
Henderson	2001
Hurt	1981
Hurt	1985
Joel, Lewis	1937
Katzin	2002
King	1997
Lookingbill	2001
Lauber	1958
Mantin	1997
Meltzer	2000
Public Broadcasting Service	1998
Riney-Kehrberg	1994
Riney-Kehrberg	1994a
Stanley	1992
Worster	1982
World Maps Online	2007
Wunder, Kaye, Carstensen	1999

APPENDIX E - INSTITUTIONAL REVIEW BOARD APPROVAL

Oklahoma State University Institutional Review Board

Date: Thursday, July 06, 2006
IRB Application No AS06114
Proposal Title: Public Perception and Knowledge of the Dust Bowl as Event, Era and Regiono
Reviewed and Processed as: Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 7/5/2007

Principal Investigator(s)

Jess Porter
401 South Kings Street
Stillwater, OK 74074

Carlos Cordova
225 Scott Hall
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 415 Whitehurst (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Sue C. Jacobs, Chair
Institutional Review Board

VITA

Jess Christian Porter

Candidate for the Degree of

Doctor of Philosophy

Dissertation: PUBLIC PERCEPTION AND KNOWLEDGE OF THE DUST BOWL AS REGION, ERA, AND EVENT

Major Field: Geography

Biographical:

Personal Data: Born in Oklahoma City, Oklahoma, on October 18, 1972.

Education: Graduated from John Marshall High School in Oklahoma City, Oklahoma in May 1991; received Bachelor of Arts degree in Geography and Environmental Studies from the University of Colorado, Colorado Springs, Colorado in December 1996; received Master of Science degree in Geography from Oklahoma State University in Stillwater, Oklahoma in December 2002. Completed the requirements for the Doctor of Philosophy degree with a major in Geography at Oklahoma State University in December 2007.

Experience: Employed by the Department of Geography at Oklahoma State University as a graduate teaching assistant, graduate research assistant, and a graduate teaching associate from 1999 to 2004; employed by the National Science Foundation as a graduate teaching fellow with the *Rural Alliance for Improving Science Education* from 2004 to 2007; appointed by the Department of Geography at Oklahoma State University as Visiting Assistant Professor in August 2007.

Professional Memberships: Association of American Geographers, National Council for Geographic Education

Name: Jess Christian Porter

Date of Degree: December, 2007

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: PUBLIC PERCEPTION AND KNOWLEDGE OF THE DUST BOWL AS REGION, ERA, AND EVENT

Pages in Study: 332

Candidate for the Degree of Doctor of Philosophy

Major Field: Geography

Scope and Method of Study: This dissertation assessed the general public's understanding of the Dust Bowl as a region, era, and event for the purpose of illuminating spatial and demographic variations in the knowledge base. A questionnaire was administered to 372 voluntary participants in 93 counties of an area that has been defined as the Dust Bowl region by academic consensus. Questionnaire responses were analyzed qualitatively and quantitatively via a database and geographic information system. Over 100 maps were produced to document the findings.

Findings and Conclusions: The study found distinctive differences in respondent knowledge and perceptions as a result of spatial and demographic variation. In general, respondents from Kansas, and particularly northwest Kansas, exhibited a depth and breadth of knowledge of the Dust Bowl that exceeded that of respondents from other areas. Responses from this portion of the study area also exhibited the highest level of association with the academic consensus regarding the Dust Bowl. On the other hand, respondents from the southern half of the study area, particularly those from Texas, displayed less association with the academic record. Across the study area, oldest respondents displayed knowledge that was much more nuanced than their younger respondent counterparts. An erosion of knowledge regarding all three Dust Bowl concepts was noted with decreasing age. Factors beyond personal experience that were most indicative of high levels of Dust Bowl knowledge were relationships with Dust Bowl survivors and a place of birth within the study area. With Dust Bowl survivors entering the final years of their lives, and a significant reduction in the number of voices to pass on their experiences with the precarious Plains environment, it is becoming imperative to augment educational resources on the topic. Respondents of all ages expressed support for enhanced Dust Bowl educational resources, such as a dedicated museum or interactive educational website. In a time of rapidly changing climate, diminishing groundwater resources and emigration into the region by persons largely unfamiliar with the history of the human-environment dynamic of the region, greater familiarity with this keystone event of human ecology is essential.

ADVISOR'S APPROVAL: CARLOS E. CORDOVA