

The North Carolina Geographer
Volume 19 2012



From the Editor

Dear fellow Geographers:

This volume of *The North Carolina Geographer* includes an historical review of the *World Geography Bowl*. The WGB traces its origins to universities in North Carolina and most especially to Neal Lineback at Appalachian State University. The Bowl has become a major part of our regional Southeastern Division meeting of the Association of American Geographers, as well as the national AAG meetings held each year.

The North Carolina Geographical Society continues to require financial support to pay publishing and distribution costs of this journal. Please renew your membership today if you have not already done so.



On the cover: Major General Nathanael Greene, “the fighting Quaker” of the Revolutionary War, stands sentinel over Guilford Courthouse National Military Park in Greensboro. Image: Michael E. Lewis



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The North Carolina Geographer

Volume 19 2012

Research Articles

Local Government Boundary Change in Brunswick County,
North Carolina: 1990 – 2010

Russell M. Smith and Aaron Fennell, Winston-Salem State University pp 4-19

Assessment of GIS Methods for Mapping Perceptions of Forested
Landscapes in Western North Carolina

Christopher A. Badurek and Eric Frauman, Appalachian State University pp 20-34

Using GIS To Address Food Availability in Durham, North Carolina

Garrett Love, Timothy Mulrooney, and LaDonna Brown

North Carolina Central University pp 35-53

Carolina Landscapes

Sea Breeze to Sherbet Town: An Historic African American
Beach Resort Lost to Affluenza

Elizabeth Hines, University of North Carolina-Wilmington pp 54-66

25th Anniversary of the World Geography Bowl

Neal Lineback, Appalachian State University

Laurence “Bill” Carstensen,

Virginia Polytechnic Institute and State University pp 67-70

NCGS 2012 Educator of the Year Award

Michael Mayfield, Appalachian State University pp 72

Guidelines for Authors

pp 73

Local Government Boundary Change in Brunswick County, North Carolina: 1990 – 2010

Russell M. Smith and Aaron Fennell

Winston-Salem State University

Studies conducted on local government boundary change have tended to focus on only one form of boundary change action (e.g. annexation, incorporation, merger/consolidation, secession and special district formation). However, as Feiock and Carr (2001) discussed a more holistic examination into the interaction between all five forms of local government boundary change is necessary to advance our understanding of these complicated and related urban and political phenomena. As a result, this paper examined local government boundary changes within Brunswick County, NC in an attempt to better understand these diverse forms of boundary change through a case study analysis. Brunswick County, NC was chosen do to its high frequency of local government boundary change action and rapid population growth between 1990 and 2010. Results of this study imply that the completion of one type of local government boundary change often instigate a response in the form of another method of local government boundary change.

Introduction

Local government boundary changes can have major consequences on the urban and political landscape of a community. These changes can impact voting districts and representation, tax structures, school district assignments and public service providers. Boundary change actions can result in the creation of a new city or the addition of a previously unincorporated portion of a county becoming part of an existing municipality. In sum, local government boundary change actions consist of five unique methods for the completion of a local boundary change including: annexation, incorporation, merger/consolidation, secessions and special district formation. While numerous studies have examined these forms of boundary change individually, little scholarly work has been done that examined them in unison (Feiock and Carr 2001). While individual examinations into local government boundary change actions have provided a strong foundation, a more thorough understanding of the relationships between all five methods of

boundary change actions is necessary for the advancement of a complete theory.

Annexations are the most common form of local government boundary change and result in an existing municipality adding territory and potentially population to its city limits (Edwards 2010). Incorporation is the process by which a new local government is formed (Burns 1994). Mergers/consolidations occur when either two municipal governments unite (merger) or a municipal government and a county government combine (consolidation) (Feiock and Carr 2001). Secessions are the least common form of boundary change and result in a part of a territory becoming divorced from the municipality (Purcell 2001). Finally, special district formations occur when a service provider is created to offer a needed public service within a given geography (Foster 1997).

For the last sixty years two groups have debated the positive and negative impacts of local government boundary change actions - public choice proponents and

metropolitan reformers. Public choice proponents believe that competition among local governments will result in a more efficient urban form and will provide the consumer of municipal services with more choices (Tiebout 1956; Ostrom et al 1961). As a result, public choice proponents tend to support incorporation, secession and special district formation as preferred forms of local government boundary change. Meanwhile, metropolitan reformers espouse the benefits of economies of scale and the reduction of duplication of services through annexation and mergers/consolidations of existing local governments (Weiher 1991; Downs 1994; Orfield 1997; Rusk 2003).

The goal of this paper is to provide an overview of local government boundary change actions in Brunswick County, North Carolina. Specifically, this paper will examine annexation, incorporation, merger/consolidation, and secession activity completed in Brunswick County, NC between 1990 and 2010. The analysis will include a quantitative examination into the frequency of each method of local government boundary change. Additionally, supporting content analysis will be provided to place the local government boundary change actions into perspective. The end result of this effort is to develop a better understanding of the relationship that exists between these distinct methods of local government boundary change. Developing a better understanding of the relationship between the forms of local government boundary change is critical because previous research has often alluded to a relationship between the various forms of boundary change activity (Miller 1981; Rigos and Spindler 1991; Burns 1994; Foster 1997; Smith 2011), but limited research has addressed this concern.

Why Brunswick County, North Carolina?

Brunswick County, NC was chosen as the unit of analysis for two reasons. First, Brunswick County witnessed a remarkable amount of local government boundary change

during the study period. As a result, the county provides a fertile ground in which to study local government boundary change actions. While almost all counties within North Carolina experienced annexation activity between 1990 and 2010 and many counties witnessed incorporation activity, it is extremely difficult to find a county that has experienced all five types of local government boundary changes. This is especially true given that secession and mergers are extremely rare phenomena. During the study period only one other North Carolina county witnessed a merger of municipalities (i.e. Yadkin County) (US Census Bureau 2011). However, during the study period Brunswick County experienced all types of local government boundary change with the exception of the formation of a special district. Additionally, at the conclusion of the study period Brunswick County had the most municipalities (19) of any county in the State.

Secondly, Brunswick County experienced a population explosion. Since 1990 Brunswick County, experienced a population increase of 106%, adding approximately 54,241 new residents. Additionally, the County contained six of the top fifteen fastest growing municipalities in the State of North Carolina over the last decade. This robust population growth places extreme pressure on existing local governments and has been linked to local government boundary change actions including annexation, incorporation and special district formations (Rigos and Spindler 1991; Foster 1997; Edwards 2010; Smith 2011). As a result, the population explosion in the County made for an excellent laboratory in which to conduct this case study.

Research on Local Government Boundary Change

Many different scholars from a variety of professional fields have studied the process of local government boundary change. Political scientist, geographers, public administrators, economist, and other

professions have all taken an interest in boundary change, and studied its impact on metropolitan America. The literary review that follows provides a general overview of the major scholarly works completed on the five methods of local government boundary change. A healthy understanding of the previous scholarly work completed on local government boundary change will help develop a better understanding of the events that have shaped the urban and political geography of Brunswick County over the last twenty years.

Annexation is the most common form of local government boundary change. Between 1990 and 2010, North Carolina witnessed more than 14,000 individual annexations (Smith Forthcoming). As previously discussed, annexation is the mechanisms by which an existing municipality can add unincorporated territory to its corporate limits. The process by which an annexation can take place can differ dramatically from state to state (Palmer and Lindsey 2001). For example, some states only allow annexations to be processed after state legislative approval (Rusk 2003). In North Carolina, municipalities have four different methods by which they can complete an annexation: voluntary contiguous, voluntary non-contiguous (satellite), involuntary and legislative (NCGS 2011). Historically, the majority of annexation research has focused on two areas of study: classifying state approaches to annexation (Sengstock 1960; Hill 1978; USACIR 1993; Palmer and Lindsey 2001; and Steinbauer et. al. 2002) and analyses into annexation frequency (Dye 1964; Wheeler 1965; MacManus and Thomas 1979; Galloway and Landis 1986; Liner 1993; Carr and Feiock 2001; Smirnova and Ingalls 2007; Edwards 2010; Smith Forthcoming).

Incorporation is the mechanism through which a previously unincorporated community becomes a municipality. The preponderance of research on municipal incorporation is related to the frequency in which communities incorporate (Stauber 1965; Rigos and Spindler

1991; Burns 1994; Smith 2006 & 2008; Smith and Debbage 2011) or the motivations behind incorporation proceedings (Martin and Wagner 1978; Miller 1981; Hoch 1985; Lazega and Fletcher 1997; Musso 2001; Smith 2011). Since the 1950's incorporation activity has seen a precipitous drop. Interestingly, while overall United States activity has decreased significantly, North Carolina has surged to become one of the most activity states for incorporations over the last twenty years (Smith 2008).

Another form of local government boundary change takes place through the amalgamation of existing government entities. The name given to this form of local government boundary change is a merger or consolidation depending upon the types of local governments coalescing. Mergers between two municipalities are the more common form of boundary change (Feiock and Carr 2001). However, considerable research has been conducted on consolidations given their ability to radical change the urban and political geography of a region. Marando (1979) completed one of the first national examinations into city and county consolidations. Other scholarly efforts have focused on potential economic development gains that may occur through consolidation (Feiock and Carr 1997; Carr and Feiock 1999) and examinations into the level of service satisfaction between fragmented and consolidated metropolitan areas (Lyons and Lowery 1989). Additional scholars have completed case study analysis of consolidation efforts around the country (Durning 1995, Lyons and Scheb 1998).

Secession is a local government boundary change action that involves the separation or retraction of a part of a municipality from the existing city limits to which it belongs. Secession research has primarily focused on the Los Angeles region (Keil 2000; Purcell 2001; Boudreau and Keil 2001; Hogen-Esch 2001; DeFronzo Hasselhoff 2002). The LA secession studies have specifically investigated the efforts of the Valley Voters

Organized Toward Empowerment (Valley Vote) lobby group and the political implications of the San Fernando Valley seceding from the City of Los Angeles.

The final form of local government boundary change is the formation of special district governments. Special district governments are rapidly growing geographic phenomena within the United States (Burns 1994, Foster 1997). These new entities “provide specific services not currently provided by an existing general-purpose government or (seek) to replace service provision by an existing jurisdiction” (Feiock and Carr 2001, 384). Research conducted on special district governments has focused on the spatial distribution of special district governments and the types of state policies that impact their creation and development (Bollens 1986; McCabe 2000). Additionally, Burns (1994) found that many special districts are formed in response to citizen demands for public services. The growth in private or alternative special district governments (e.g. Business Improvement Districts and Community Benefit Districts) have also been examined (Baer and Marando 2001; Baer and Feiock 2005).

Relationship between the Methods of Local Government Boundary Change

Overall, the research linking multiple forms of local government boundary change has been limited. However, some effort has been made to place these diverse forms of boundary change into a more complete theory. Molotch’s (1976) theory of ‘the city as a growth machine’ is applicable to local government boundary change. Molotch viewed cities as more than entities that occupy geographic space but rather saw urban areas as a combination of specific interests including commercial, sentimental and psychological that can influence local government boundary change actions to the benefit of some and detriment of others. More recently, Feiock and Carr (2001) developed a collective action framework from which to

better understand local government boundary change actions. Their framework viewed “boundary decisions as the product of actors’ seeking particular outcomes within a local context of existing governments and established rules governing boundary change” (Feiock and Carr 2001, 401). Overall, scholars have tended to view local government boundary change actions as a battle between individual actions and collective consumption.

A few scholarly studies have specifically discussed the relationship between annexation and other forms of boundary change – principally incorporation. Edwards (2008) discussed the motivations behind annexation including the potential for annexation to be utilized as a tool to combat municipal incorporation efforts. Interestingly, incorporation activity may also spur annexation efforts by existing municipalities that do not wish to be barricaded by a fragmented urban geography (Reynolds 1992; Rusk 2003; Ingalls and Russell 2005; Smirnova and Ingalls 2008). Meanwhile, Smith (2011) empirically analyzed the impact of annexation on municipal incorporation activity in North Carolina and found a limited relationship between the two. Some scholarly work has linked stricter state municipal incorporation laws with a rise in the formation of special district governments (Bollens 1986; Nelson 1990; Carr and Feiock 1999).

Secession efforts can have major implications on other forms of boundary change, specifically incorporation. Often the secession of an area of a community can lead to an effort to subsequently incorporate that area as a new municipality (Purcell 2001). A successful secession effort may also lead to eventual annexation by another nearby municipality or the creation of a special district to provide public services to the once municipal area (Burns 1994; Foster 1997). Finally, mergers/consolidations can be viewed as the ultimate form of annexation and may impact incorporation activity and/or secession efforts by drastically changing the political

landscape (Feiock and Carr 1997; Carr and Feiock 1999). This examination into local government boundary change activity within Brunswick County, NC attempts to advance the understanding of the relationship between local government boundary change actions.

Methodology

The quantitative data included in this study comes primarily from the North Carolina Office of State Budget and Management (NCOSBM), the North Carolina Secretary of State (NCSOS) and the U.S. Census Bureau. Annexation frequencies were collected from an examination of annexation ordinances catalogued by the North Carolina Secretary of State Land Records Management Division. Population annexed and land area annexed figures were obtained from NCOSBM estimates. Municipal incorporation numbers were identified by utilizing the U.S. Census Bureau Boundary and Annexation Survey and cross-checked against the State of North Carolina's Office of State Budget and Management Incorporation Activity inventory. Merger/Consolidation data was collected from the U.S. Census Bureau Boundary and Annexation Survey. Finally, secession figures were developed through an analysis of local media sources, Boundary and Annexation Survey data and North Carolina Office of State Budget and Management information.

The Lexus-Nexis Academic database was utilized to develop the qualitative information on local government boundary change in Brunswick County, NC. This was accomplished by examining newspaper archives from January 1, 1990 until December 31, 2009 for the following search terms: annexation and brunswick county, incorporation and brunswick county, secession and brunswick county, merger and brunswick county and special district and brunswick county. The articles obtained through these searches provided intricate details on the various local government boundary change actions that were

accomplished through the two decade study period.

The Study Area

Brunswick County, NC is located along the southeast coast of North Carolina and is part of the Wilmington Metropolitan Statistical Area. According to the 2010 Census, Brunswick County contains 107,431 residents and ranks as the 25th largest county in North Carolina. The County has the most municipalities of any county in the State of North Carolina with 19 municipal incorporations including: Bald Head Island, Belville, Boiling Springs Lake, Bolivia, Calabash, Carolina Shores, Caswell Beach, Holden Beach, Leland, Navassa, Northwest, Oak Island, Ocean Isle Beach, Saint James, Sandy Creek, Shallotte, Southport, Sunset Beach and Varnamtown.

Over the last twenty years the County has experienced rapid population growth primarily as a result of in-migration. According to NCOSBM figures, Brunswick County added nearly 55,000 residents during the past twenty years. An overall population increase of 106%. Residents are attracted to the area do to Brunswick County's proximity to nearby Wilmington, NC and Myrtle Beach, SC - as well as the coastal lifestyle. Overall, Brunswick County is seen as an affordable retirement destination for people looking for a life near the coast.

Findings: Annexation Activity in Brunswick County

The municipalities located within Brunswick County, NC completed 424 annexations between January 1, 1990 and December 31, 2009. These annexations resulted in the addition of approximately 20,205 residents to the municipalities of the County and added more than 62 square miles of territory to their city limits (Figure 1, Table 1). It should be noted that several municipalities within the County did not complete any annexations including: Bald Head Island, Boiling Spring Lakes, Bolivia,

and Sandy Creek. In particular, Bald Head Island is physically incapable of conducting a tradition contiguous annexation do to its unique physical geography.

The Town of Leland, NC was a leader in annexation activity in Brunswick County. Between 1990 and 2010, Leland annexed more than 11,000 people and 18 square miles of land. In December of 2004, the Town of Leland approved the annexation of 5,000 acres of undeveloped land (McGrath 2004). That single annexation nearly doubled the total land area of the City, and according to the Mayor of Leland at the time was "probably not only one of the biggest voluntary annexations in North Carolina history, but I'd guess one of the top 10 in all of the United States" (McGrath 2004). As a result of Leland's annexation activity, they have been engaged in a heated battle with the neighboring Belville.

These towns have a long history of boundary change conflict that can be traced back to the formation of the Town of Leland in 1989. Leland was incorporated in an attempt to stop Belville's plans to annex much of the present day city limits of Leland (Ives 2002). Since then, the two communities have been in a battle that has seen "a court settlement over the right to a sewer plant, futile attempts to merge, and bills introduced by legislators to stop annexation by either town" (Ives 2002). One of the most significant annexation battles between the towns came in 2001, when they both attempted to annex the areas of Jackeys Creek, Olde Towne, West Bank, Creekside, Croft Pointe, River Croft, Woodridge and a section of Chappell Loop Road. The areas contained approximately 1,500 residents which at the time was approximately five times larger than Belville's population. After months of litigation the City of Leland was able to annex the property, which in essence halted the

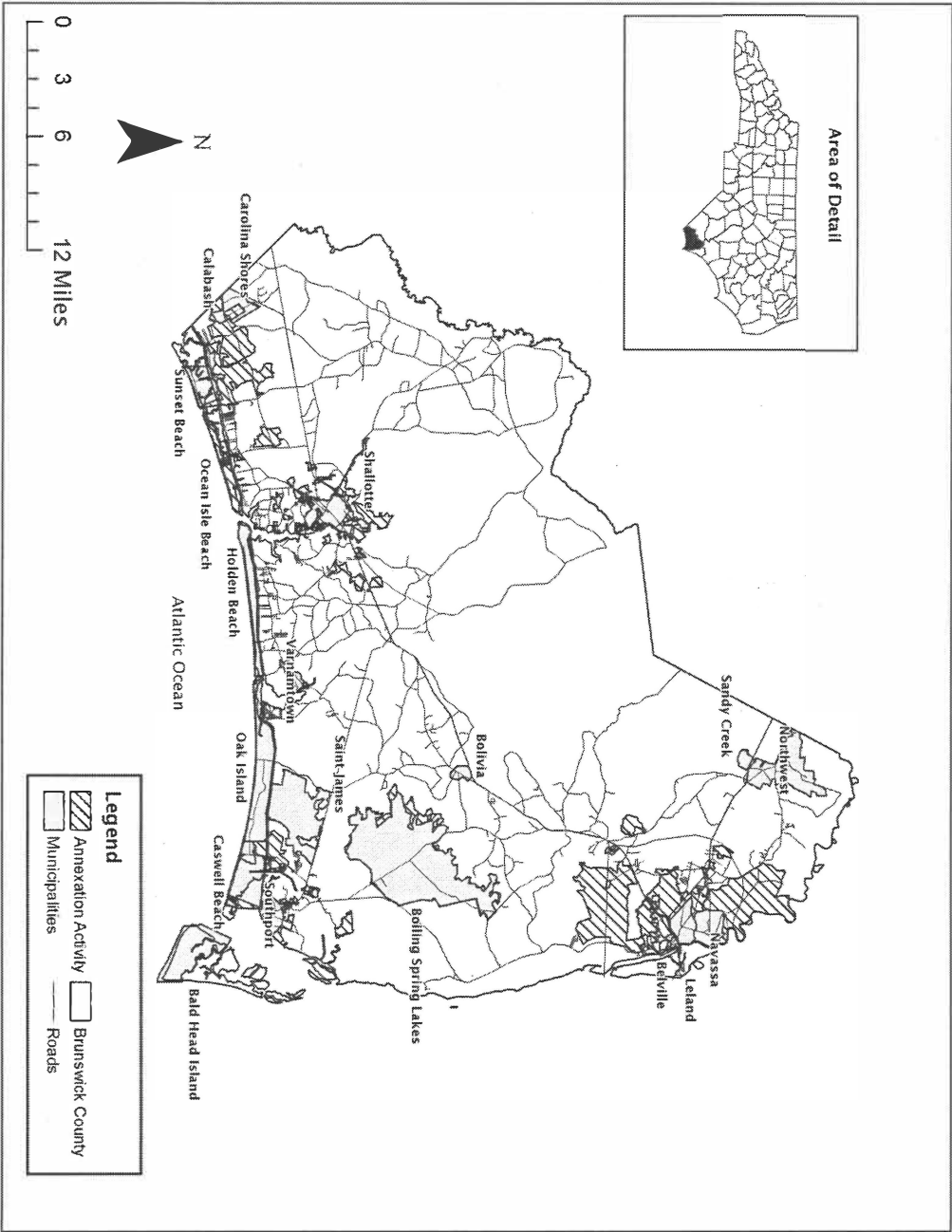
growth of Belville.

Leland and Belville haven't been the only communities in Brunswick County to battle over annexation issues. The Town of Navassa utilized the North Carolina Legislator and doubled their territory through the passage of a local bill in the General Assembly. The local legislation added approximately 500 residents and 8,300 acres to the Town (Holland 2001). However, not everyone was happy. A group of citizen's that were opposed to the annexation believed the Town didn't follow the proper procedures and didn't provide for public hearings or comments by taking the annexation request straight to Raleigh. According to the bill's sponsor, Rep. Thomas Wright, when an annexation is passed by the General Assembly it does not require public hearings and notifications (Holland 2001).

Municipal Incorporation Activity in Brunswick County

The incorporation of a new municipality is a much more difficult local government boundary change action to complete compared with an annexation. With that said, North Carolina was a national leader in municipal incorporation activity during the study period. North Carolina only trailed the State of Texas in total number of new incorporations between 1990 and 2009 (Smith 2008). In particular, Brunswick County witnessed the incorporation of three new municipalities during the 20 year research period (Figure 2, Table 2). Brunswick County contained a cluster of new municipalities with three new municipalities being established within a relatively short period. Compared with other counties in North Carolina during the study period, Brunswick County was the third most active county in the State in terms of municipal incorporation activity behind

Figure 1. Annexation activity, Brunswick County, North Carolina 1990-2010.



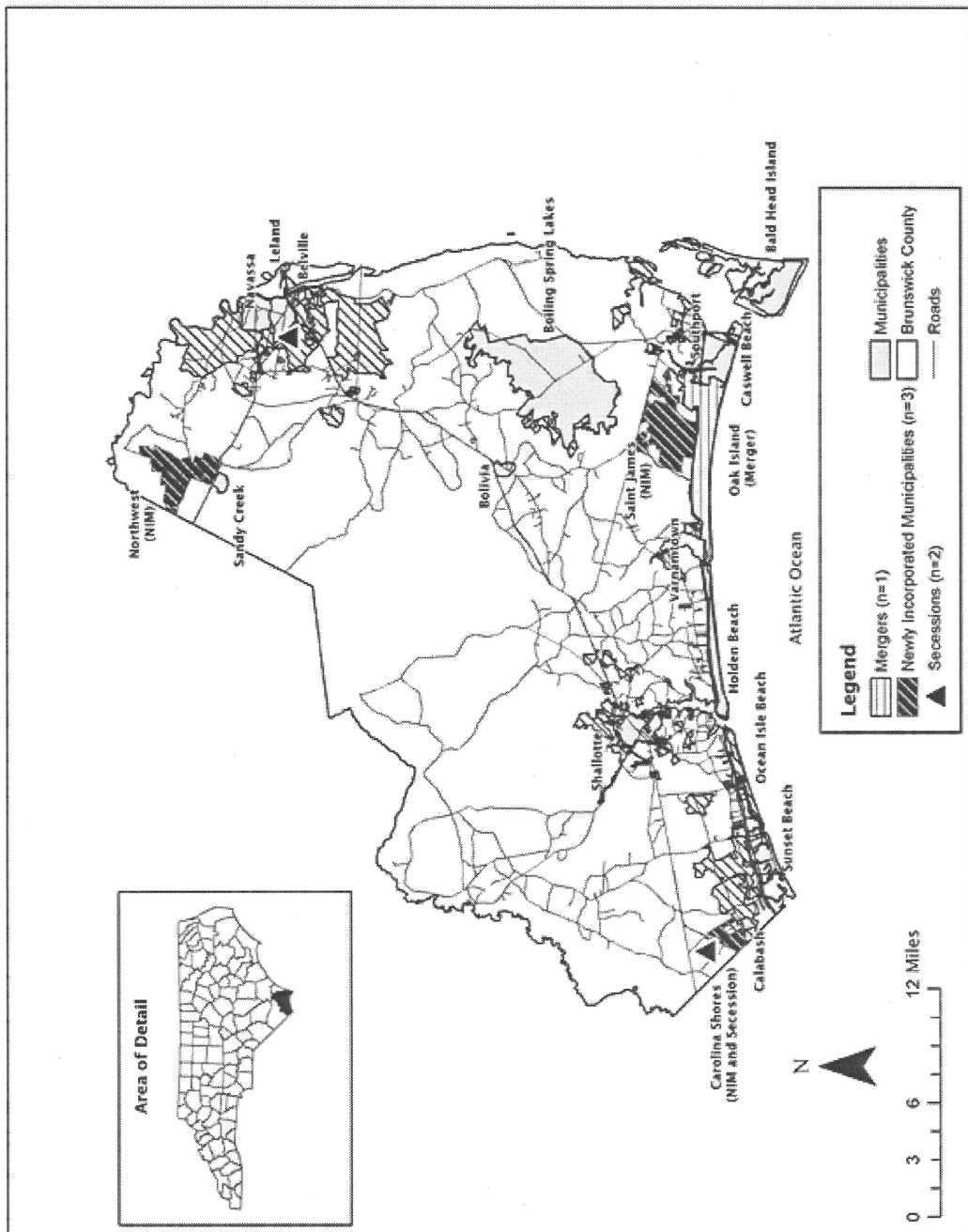


Figure 2. Incorporation, merger, and secession activity, Brunswick County, North Carolina, 1990-2010.

Table 1. Municipal Annexation Activity in Brunswick County, 1990-2010

City	2009 Population	Total # Of Annexations	Population Annexed	Land Area Annexed (Sq. Miles)
Bald Head Island	264	0	0	0
Belville	1,488	29	999	2.25
Boiling Spring Lakes	4,372	0	0	0
Bolivia	177	0	0	0
Calabash	1,831	7	1,580	3.61
Carolina Shores	3,127	9	914	0.91
Caswell Beach	511	1	*	*
Holden Beach	964	1	*	*
Leland	13,408	45	11,270	18.46
Navassa	1,973	2	1,373	11.18
Northwest	882	8	1	0.80
Oak Island	8,594	64	405	8.13
Ocean Isle Beach	520	4	5	1.23
Saint James	3,051	11	227	4.63
Sandy Creek	304	0	0	0
Shallotte	1,998	169	236	5.81
Southport	3,143	39	240	1.09
Sunset Beach	3,434	34	2955	3.76
Varnamtown	611	1	*	*

*Incomplete data.

Source: NCOSBM and NCSOS, 2011

Table 2. Municipal Incorporation Activity in Brunswick County, 1990-2010

Newly Incorporated Municipalities (NIMs)	Year Incorporated	Population
Northwest	1993	611
Carolina Shores	1997	1031
St. James	1999	804

Source: US Census Bureau, 2011

trailing only Union County (6 NIMs) and Guilford County (5 NIMs). Additionally, several of Brunswick County's municipalities incorporated just prior to the study period: Bald Head Island incorporated in 1985, Sandy Creek and Varnamtown incorporated in 1988 and Leland incorporated in 1989 (Brunswick County towns (incorporated) 2005).

One of Brunswick County's newest municipality's is the Town of St. James. St. James was originally developed as a private golf course subdivision with 645 residents. In 1998, 426 residents signed a petition that was given to the North Carolina General Assembly, requesting that the development be incorporated as a new municipality. This request sparked a heated debate between the state congressmen that represented that area. Representative David Redwine from Brunswick County argued that the incorporation would set the precedent for other communities like St. James to do the same. Representative Redwine stated that "there are other gated communities that are in existence now, or being developed, that could make as good a case to incorporate...it's a slippery slope" (Lee 1998). Despite his objection the request was approved and in 1999 the Town of St. James became the nineteenth municipality in Brunswick County. The incorporation of Carolina Shores, another municipality that was incorporated during the study period followed a somewhat different path to becoming a municipality. In 1997, the community of Carolina Shores, which was part of the Town of Calabash, was granted a request by the General Assembly of North Carolina to secede from Calabash and subsequently create their own municipality (Whisnant 1997). This result was unexpected given the fact that Calabash and Carolina Shores had just merged in 1989 after "more than 80 percent of the Carolina Shores voters and a slim majority in Calabash favored the marriage" (Whisnant 1997). However, the marriage was short lived due to complaints about representation on the Town's boards and the overall direction the community was

headed. Other communities in Brunswick County have also tried to incorporate including: Goretown and Sunset Harbor (Rose 1994; Jefferson 2003). However, both of these efforts failed and neither community ever incorporated.

Mergers and Consolidations in Brunswick County

Brunswick County witnessed one merger during the study period and no consolidations (see Figure 2). According to the research conducted in this analysis of Brunswick County local government boundary change, the local governments of Brunswick County have not considered consolidating into a single local government entity. The communities that did merge during the study period were Yaupon Beach and Long Beach in 1999, which resulted in the formation of the Town of Oak Island. Interestingly, these two existing municipalities planned to unite "less than a month after Brunswick County's first municipal divorce" between Calabash and Carolina Shores occurred (Cherrie, 1998).

Prior to the merger of Yaupon Beach and Long Beach, the municipalities sat adjacent to one another on an island off the coast of North Carolina that contained approximately 7,000 citizens. Municipal leaders from both communities agreed that a merger was both practical and necessary for the development of their respective municipalities. Yaupon Beach Mayor Dorothy Kelly stated, "The consolidation will help provide services more efficiently by eliminating duplication and by creating a stronger financial base" (Cherrie 1998). She also stated that the merger would lower taxes and gain a stronger voice in seeking grants and other projects from the state (Cherrie 1998).

The merger has not come without complications, in fact some residents of the municipality formerly known as Yaupon Beach argued for secession in early 2004. The secessionists listed four reasons for supporting a return to the previous municipal conditions: 1) fair treatment for Yaupon each

area development in sewer allocation allowing completion of build-out of available lots, 2) better control of the town's destiny, 3) maintain town resources, especially the Fish Factory Road sewer plant, and 4) electing its own municipal representatives (Jefferson 2004). The newly merged municipality was able to avoid the split proposed by secessionist by adjusting some of the policies to better fit the needs of its residents. Currently, Oak Island is the second largest city in Brunswick County with a 2009 population of 8,594.

Ironically, some of the Brunswick County communities that have antagonized each other with incorporation efforts, secession plans and aggressive annexation tactics have also contemplated merging several times during the study period. The two principal players contemplating merging have been Belville and Leland. However, the Town of Navassa and the North Brunswick Sanitary District have also been part of merger conversations over the last twenty years (Von Kolnitz 2000; Ives 2002; Mack 2005, 2006). Leland's Town Manager David Hewett told the *Star New*, "It's ridiculous to have three towns and a sanitary district you can drive through in four minutes" (Ives 2002). As a result, a plan began to take shape to merge the local governments. Mr. Baldwin, a property developer in the area, also told *Star News* he believes a merger is in the best interest of the north end of Brunswick County. "You have three towns so close to each other, spending so much money on duplicate services" (Ives 2002). Interestingly, the communities of Belville and Leland, who have had many legal disputes over incorporation and annexation activity, may end up merging into a new local government entity. However, at the conclusion of this research the proposed merging had never been achieved.

Secession in Brunswick County

According to Epple and Romer's (1989) study on municipal boundary change, secession or detachments accounted for less than 2% of

boundary changes. As a result, the discovery of two secessions in Brunswick County between 1990 and 2010 was unexpected (see Figure 2). The first secession was conducted in late 2001 when a group of disgruntled property developers in the municipality of Belville began a petition for the secession of their land from Belville (Ives 2001). The secessionists, who included a prominent business member of the community and a former mayor, argued that secession was the only way to resolve the issue between the parties.

The petitioners stated, "the town has shown by the new zoning ordinance that it does not care about property owners' rights or the rights of lower income citizens to live in Belville" (Holland 2001). The petitioners who requested secession also stated that, "the town has failed to provide services and the new zoning ordinance appears to make my property useless to someone who would redevelop it" (Holland 2001). Jim Cain, chairman of the Planning Board argued that "successful secession would have a significant financial impact on Belville. He stated that the town would immediately lose \$15,000 to \$20,000 a year in property tax revenue, and an estimated \$500,000 after it is fully developed (Holland 2001). The lost revenue would be a huge chunk of the towns roughly \$300,000 of annual tax revenues.

After months of litigation and debate, the state legislator granted the secessionists their wish and approved de-annexation of 2,000 acres from Belville's corporate limits. The legislators stated their final decision to support the secession came from the inability of Belville's Board of Commissioners and Planning Board to reach a consensus. In their decision letter, the state legislator stated "the town council is seriously divided on the issue and certain members of the town council have sent us conflicting messages about their position" (Holland 2001b). As a result, the General Assembly of North Carolina voted to allow the secession of this property from Belville (Holland 2001). Subsequently, the

de-annexed property was annexed into neighboring Leland (Ives 2002).

Brunswick County's other secession occurred when Carolina Shores left the municipality of Calabash and became its own municipality (Whisnant 1997). The secession of the Carolina Shores community is interesting due to the relatively short amount of time (less than a decade) they were part of the Town of Calabash. A similar phenomenon also occurred recently when a group of Oak Island residents (a recently merged community comprised of Yaupon Beach residents and Long Beach residents), expressed an interest in seceding (Boyle 2005). The residents interested in seceding have only been part of the newly merged municipality of Oak Island for less than ten years but already would like to return to the previous local government boundary arrangement. The group of Oak Island secessionist has been unable to complete the local government boundary action necessary to remove themselves from the Town of Oak Island as of 2010. These two findings both show that secession efforts may have a time element to their successful implementation. In the case of the Carolina Shores and Oak Island secession efforts both have come on the heels of previously completed local government boundary change actions.

Conclusion and Implications

Local government boundary change analysis revealed complex and interconnected relationships among Brunswick County municipalities during the 20-year study period. In sum, 424 annexations were completed, three new municipalities incorporated, two secessions were successful executed, and two existing municipalities merged. Especially, interesting was the discovery of secession and merger activity, two of the least common forms of local government boundary change. The overall impact of these changes includes: uncertainty regarding local government representation, political and urban fragmentation, and

duplication of services. All of these issues can have detrimental effects on local communities and their citizens.

The causes of the local government boundary change actions were outside the scope of this analysis and were not determined. However, antidotal evidence and an understanding of the previous research completed on local government boundary change suggest that the high level of boundary change may be the result of rapid population growth within the County between 1990 and 2010. As stated earlier, Brunswick County added 54,241 citizens to its population during the study period, a 106% increase in population. Additionally, the examination into the relationship between the different forms of local government boundary change revealed that one boundary change action usually results in a reciprocal action by a nearby municipality or community. For example, the successful secession of property from Belville resulted in the subsequent annexation of that same property by Leland.

The interaction between multiple forms of local government boundary change needs further analysis. Future research will aim to obtain more quantitative data on the various boundary change activities and look to find patterns that may help to explain why they occurred. Additionally, a state or nation examination of local government boundary change that utilizes a more robust statistical analysis and searches for casual agents is planned. This understudied urban and political phenomenon is ripe of further analysis.

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Assessment of GIS Methods for Mapping Perceptions of Forested Landscapes in Western North Carolina

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The Wilson Creek River Corridor is a popular destination for numerous land and water-based recreation activities in western North Carolina. Currently, the USFS is responsible for Wilson Creek's river management plan. While the plan aims to provide direction for forest and recreation management, there are no identified methods to create maps of landscape values from affected local and regional communities. Previous studies have provided participants the opportunity to annotate maps provided in surveys with a point and qualitative landscape value, such as aesthetic, biological, or spiritual. Analysis of survey responses allows creation of "hot spot" maps indicating relative density of mapped landscape values in aggregate as well as by stakeholder subgroup. This study compares and tests stakeholder landscape value mapping methodologies for reliability and replicability. Survey responses are scanned and georeferenced to enable visualization and analysis with ESRI's ArcGIS platform. These surfaces are then used to identify hotspots of specific landscape values and areas of potential conflict. A pilot GoogleEarth application to gather and map this data via the web is also assessed. Results suggest this is an effective approach to collecting landscape values for analysis in support of environmental planning.

Keywords: GIS, environmental planning, Southern Appalachians, Caldwell County, North Carolina, USFS, forested lands, perception, landscape values.

Introduction

The Wilson Creek River Corridor and adjacent lands are a popular destination for numerous land and water-based recreation activities. Currently, the United States Forest Service (USFS 2005) is responsible for implementing the river management plan for Wilson Creek that flows from its headwaters below Grandfather Mountain in Avery County to the confluence with the Johns River in Caldwell County, North Carolina. While the plan is designed to provide direction for trail, fish and wildlife, vegetation, and recreation management, there are no definitive protocols in place to seek input from stakeholder groups, such as recreation users, to help inform and support decision-making for future forest land planning.

Moreover, until the last five years, forest planning processes lacked a standardized method collect more objective

views about the values the general public hold toward various national forests to serve as counter-weight to organized commercial resource interests, such as timber harvesting, ever-present in the planning process. To address this, researchers have turned to methodology that utilizes participatory GIS to gather place-specific landscape value data from local and regional communities affected by forest plans (Brown 2005). These methods are based on surveys in which individuals identify several points on provided maps referring to investigator-defined typology of landscape values as well as user-identified special places and locations negatively impacting their recreational experience.

Previous studies have provided participants the opportunity to annotate each point as a special place, a unique site within the study area, or as an example of a particular landscape value, such as aesthetic, biological,

learning, or spiritual. Analysis of survey responses includes: 1) description of the frequency and type of landscape values and special places, both positive and negative, mapped within the surveyed area, 2) "hot spot" maps indicating relative density of landscape values in aggregate as well as by stakeholder subgroup, and 3) compatibility assessment of stakeholders interests in relation to proposed forest management options. This analysis provides forest planners and tourism development officials information concerning distribution and intensity of forest values and specific areas of potential conflict with existing plans or between user groups in the mapped and surrounding areas.

Previous Work

According to Brown and Reed (2009), national forest planning is a process often marked by conflicting values and ambiguous or contested goals at multiple scales of analysis. The traditional rational-comprehensive forest planning model does not often perform well under these conditions, particularly when such values have no ready means of quantification. The USFS, the agency responsible for developing and implementing forest plans, currently lacks formal protocols to cope with these value-related and often place-based planning issues (USFS 2004). The public participation process for forest planning required under the National Environmental Policy Act (NEPA, 1969) that accompanies the development of forest plans has not been sufficient to mediate the conflict over the multiple values intrinsic to the national forest system. Since inception of the requirement to develop forest management plans under the National Forest Management Act (1976), there has been little, if any, practical advancement in (1) systematic inventory and mapping of place-specific values the public attaches to national forests, or (2) rigorous and replicable quantitative analysis of place-specific value data in spatial modeling to assess forest plan decisions for consistency with public values—much less in

a manner that is helpful to most forest planners and capable of withstanding legal challenges in the NEPA process (p.4). The Wilson Creek River Corridor provides an excellent case study due its relatively undisturbed and picturesque condition, the numerous outdoor recreation activities it provides, and the high potential for conflict by users with incompatible recreation interests such as kayaking and fishing (Figure 1).

Work by Brown and others has demonstrated successful mapping of landscape values and recently the Landscape Values and PPGIS Institute (2010) in Vermont was created to act as a clearinghouse for advancing landscape values research. However, further research demonstrating how to best capture the "voice" of various recreation-based stakeholder groups and analyze the distribution of uses and valuation within an area is clearly needed. In addition, research that better informs how stakeholders perceive the natural environment and how these perceptions may be best represented with GIS are a general research need in GIScience (Slocum et al. 2001, Bishop and Rohrmann 2003). This study therefore focuses on two main goals: 1) better understand how to use the results to assist future forest management and tourism development planning endeavors in the Wilson Creek corridor, and 2) compare and test stakeholder landscape value mapping methodologies for reliability and replicability in other locational and planning contexts.

Methods

This project's survey instrument refers respondents to maps of the area, asking them to make up to five annotated freehand marks indicating preferences and values they place on each. Researchers in landscape values have warned of the potential illegibility and erratic nature of free-hand responses and suggested stickers associated with each landscape value be provided to respondents to better control the spatial distribution of responses in the study area. However, this study aims to

explore methods for effectively capturing diverse recreational uses, often not at one specific point and along trail networks, as these could not be accurately notated with stickers. This research approach also aims to better inform respondents by providing a marked example indicating desired marking styles in order to reduce problems with illegible or overgeneralized identified locations. The keys to this approach are a clean, easy to interpret map design used as a substrate for respondents' markings and clear instructions to mark values. An additional color map with details concerning land ownership, road and trail location, and known recreational locations and access points is also provided with each survey to aid respondents in identifying well-known as well as less-used potential recreational locations while completing the survey.

Survey responses are scanned and geo-referenced to enable visualization and analysis with ESRI's ArcGIS platform. Scanned responses are used to create raster surfaces including the values, uses, and locations indicated by respondents. These surfaces are then used to identify hotspots of specific landscape values, areas of high use according to respondents, and potential contentious areas as indicated by a wide variety of values applied to them. Results from this study will be used to better inform the decision making process of the USFS and local governments as well as to provide additional insight into participatory GIS (PGIS) methods as a means of reliably assessing and reporting stakeholder values on recreational resources.

The Wilson Creek Pilot Study had two primary goals. The first was to determine potential stakeholders and to identify significant valued areas in the study area for effective balancing of recreation tourism and proposed tourism-related commercial development. The second goal was to compare and test for reliable landscape value mapping and survey methods that could be used for a larger scale study currently being

conducted. To address these goals, the survey instrument was composed of four main components: 1) sample maps to direct respondents on how to mark their landscape values on the blank maps provided, 2) landscape value assessment, 3) fold-out paper maps for point placement (to mark up to 5 points), and 4) demographic information on respondents. The survey solicited responses on three primary themes: landscape values such as aesthetic/scenic, spiritual, or biological diversity; development preferences for amenities such as park creation or nearby residential development; and perceptions of places deemed "special" in the sense of identifying strongly with the area or having specific memories associated with the place.

In order to map perceptions of landscape value provided by respondents sample reference and three blank maps covering the study's major themes were provided in the survey. After several iterations of cartographic design of the study area, a design was selected relying on a crisp map using hillshading derived from LiDAR DEMs of the area (Figure 2). A map illustrating how respondents should place their marks on the provided maps was also included (Figure 3). Completed paper surveys were then scanned as TIFFs on an 11 x 17 scanner and input to ArcGIS 9.3 (Figure 4). Manual georeferencing of the TIFFs was then conducted for all the respondent maps using easily identified features to match points. The hand-drawn landscape values placed on each of the maps by respondents were made digital by digitizing and attributing each associated landscape value during the GIS process (Figure 5).

Methodology Assessment

In order to address the first goal of the Wilson Creek Pilot Study, the identification of significant values locations in the study area, the solicited responses were laid over each other on final maps illustrating the surveys' three main themes: Landscape Values Responses (Map 1), Development

Preferences Responses (Map 2), and Recreation Activities Responses (Map 3). Preliminary findings show the majority of the study area was unmarked which is likely due to the eastern study area being comprised of primarily private land. Findings also indicate three specific locations were commonly identified by respondents as having high landscape value: the areas around Roseboro, Little Lost Cove, and the Wilson Creek Visitors Center. These preliminary findings also suggest that recreational stakeholders from very different communities, such as three distinct groups used in this pilot study (e.g., bikers, hikers, and water enthusiasts, respectively) may hold similar landscape values at common locations.

In order to address the second goal of the Wilson Creek Pilot Study, to test the methodology used to elicit responses on landscape values and to determine how to efficiently map these values, a heuristic assessment of the mapping process was conducted as discussed in Gabbard and Hix (1997). The survey design, survey marking process for respondents, and the overall GIS workflow were assessed. The survey design was found to be generally effective in instructing respondents in how to properly mark values on the provided maps, a commonly cited problem in landscape values research. The survey marking process was also reasonably effective as all respondents' maps were generally legible and allowed for easily digitized areal drawing. However, similar to problems with other landscape values studies, some respondents just placed labels at locations and the extent of polygon had to be estimated by the analyst. While the elicitation process worked reasonably well, the GIS process is time consuming and labor intensive for large numbers of surveys. Although adding control points on the survey would make digitizing easier and faster, the time required to manage the data collected may be too much for those without readily available human resources or GIS assistance. For example, respondents to this pilot study

were very careful with marks and just one map could have been used for all three themes. However, this is unlikely to be the case for a large number of respondents with marginal interest in the outcome of the project. Yet, although the process can be time consuming, it does yield a rich array of qualitative data for analysis.

In order to develop a more efficient process for creating digital landscape value data, a Web 2.0 approach was taken based on Google Earth. Proponents of neogeography and Web 2.0 (Turner 2006, Goodchild 2007, Elwood 2008) have suggested that a more sophisticated set of web users is available who are rapidly becoming savvy with web mapping applications. A prototype interface was therefore developed to simulate the original survey conditions such that respondents could digitize their own locations using Google Earth (GE) and then submit the results through a Keyhole Markup Language (KML) file to the survey managers. In this case, a KML file of the delineated study area and points of reference was created replicating the design of the map created in ArcGIS for download by respondents (see Figure 9).

Once opened, a Google API would direct the respondent in how to digitize their landscape value locations using GE tools such as Add Path, Add Polygon, or Add Placemark. The completed KML layers can then be mailed back to the survey managers in a .kmz (zipped KML) file format by using the GE Mail Tool. In this prototype, once the KML files were received, a Python script toolset named Convert KML/GPX to SHP (Klimaszewski-Patterson 2010) provided on ESRI's ArcScripts website was used to convert sample KMLs to shapefiles. This approach was found to be a much more efficient process for creating digital landscape value data as it eliminates the need for the survey manager to georeference the data and also allows the survey to be completed and processed much faster. However, limitations in potential respondents exist not so much in terms of access to the GE platform but in their

ability to complete the marking process as directed through the GE API. However, this approach contains promise and will be examined with a great variety of test subjects.

Conclusions

While efficiency of work flow needs further technical solutions, overall these landscape mapping approaches are effective methods for soliciting recreation stakeholder perceptions and graphical representation of locations with specific values. There is also preliminary evidence of hotspots of recreational areas of high use and landscape value where further raster analysis of the high density of values may yield insight into potential conflicts amongst different categories of recreation users. These findings have implications for recreation planning, tourism development, and land management for agencies such as the USFS Grandfather District in Caldwell County, NC in that the methods are reasonable for a non-GIS specialist community and may increase participation from stakeholders in dialog on decision-making concerning the economic, environmental, and cultural value of natural resources.

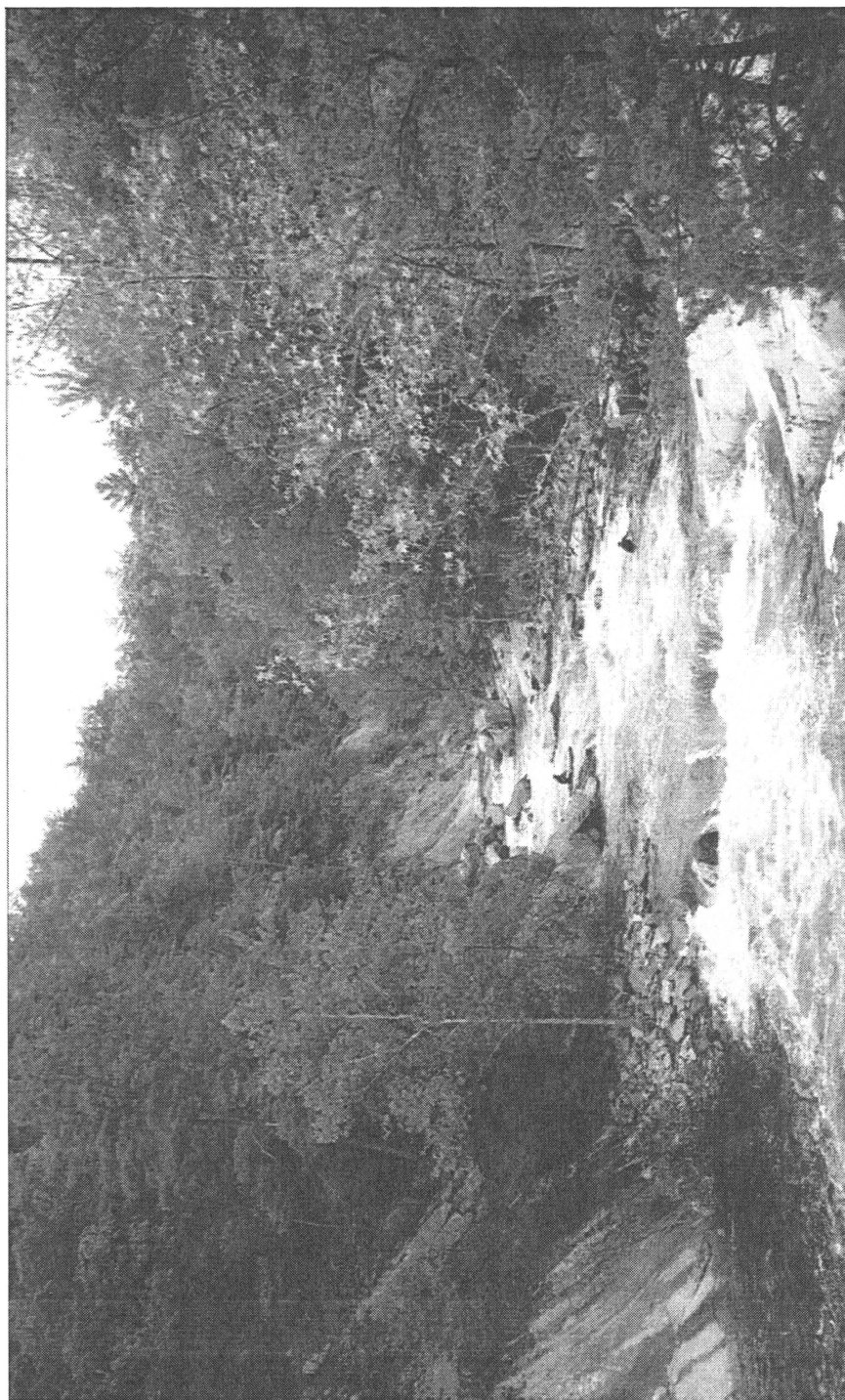


Figure 1. The Wilson Creek Gorge.

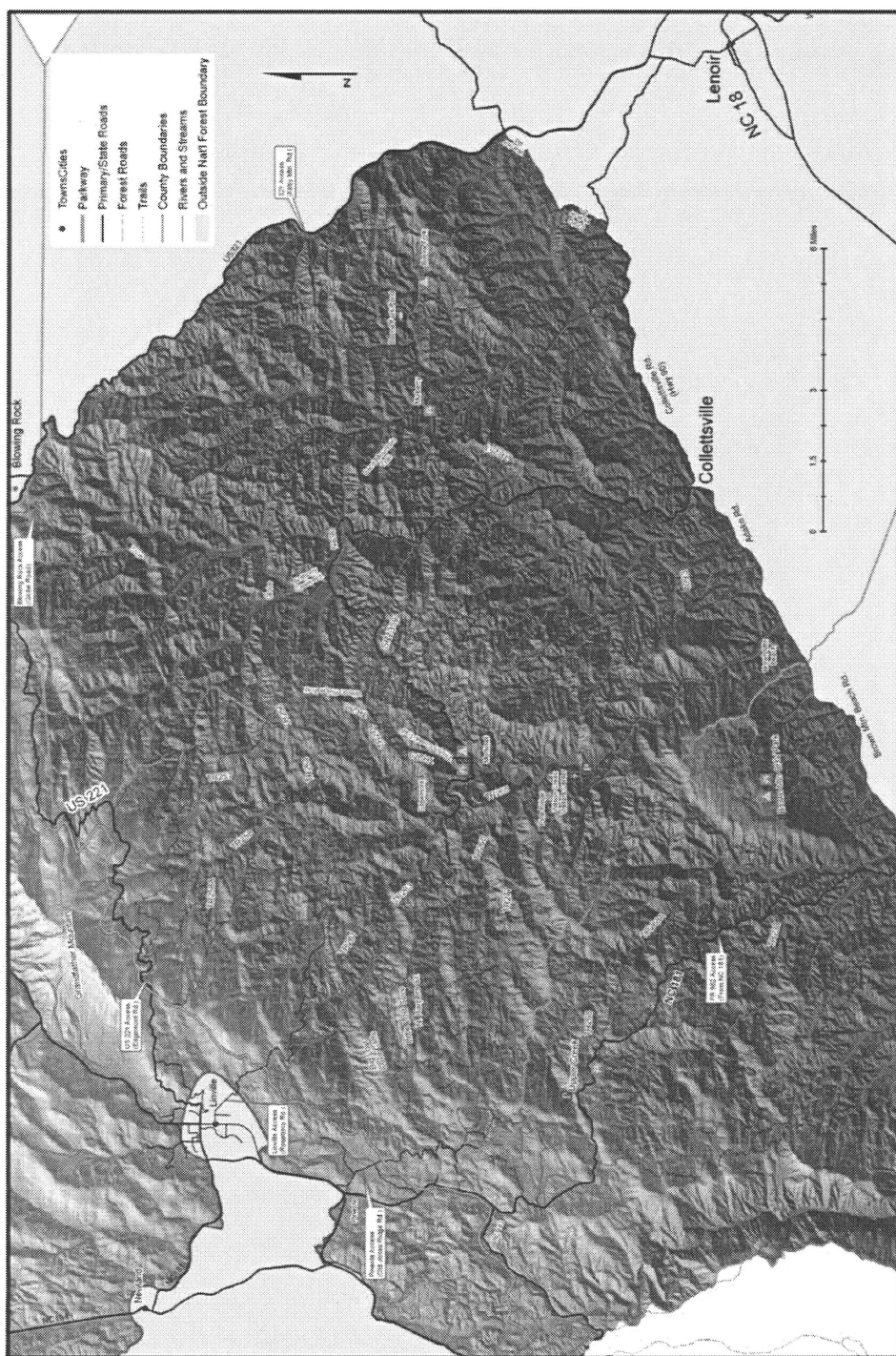


Figure 2. Cartographic design of Wilson Creek Recreation Stakeholder Survey.

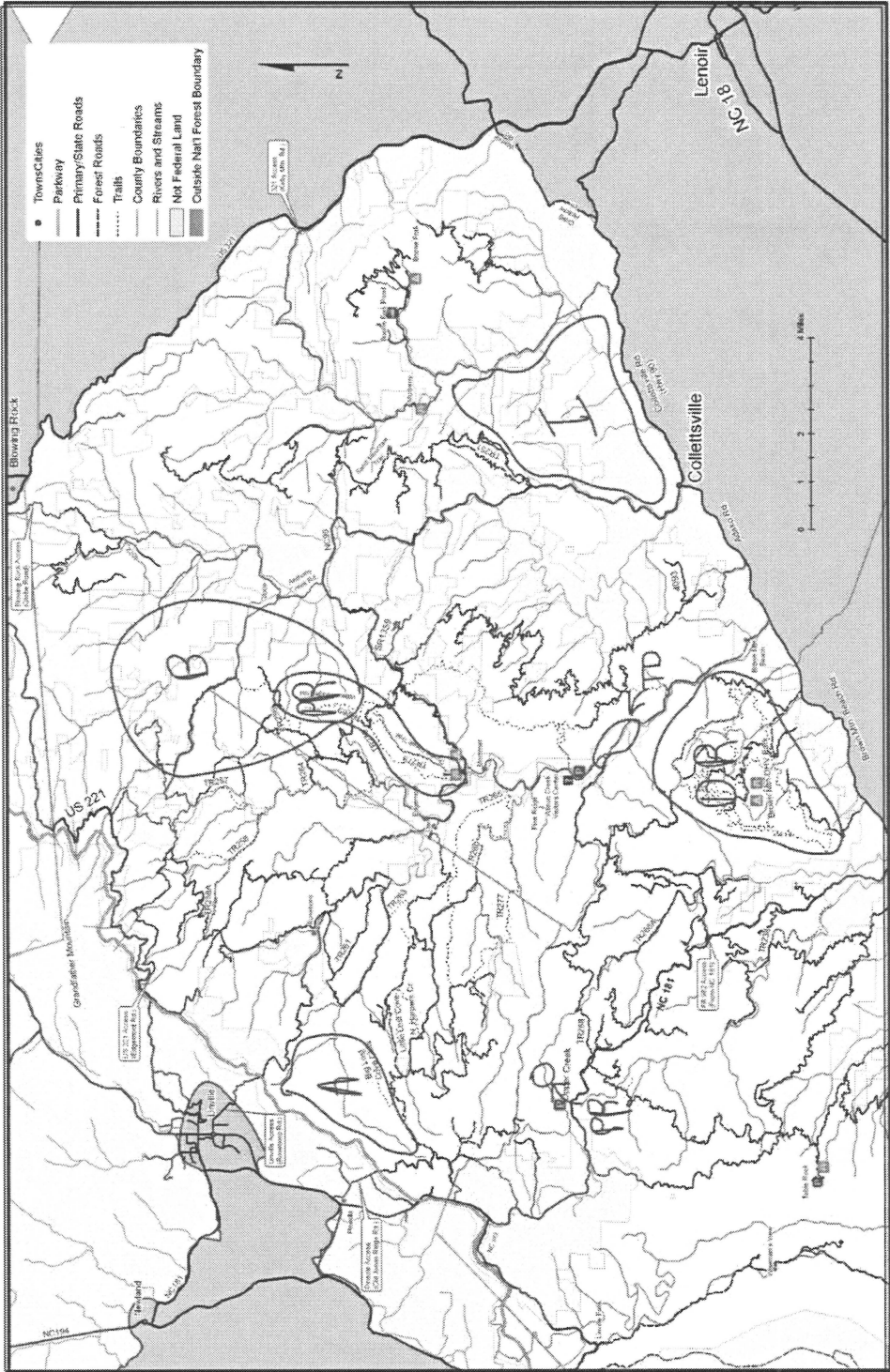


Figure 3. Sample guidelines used in Wilson Creek Recreation Stakeholder Survey.

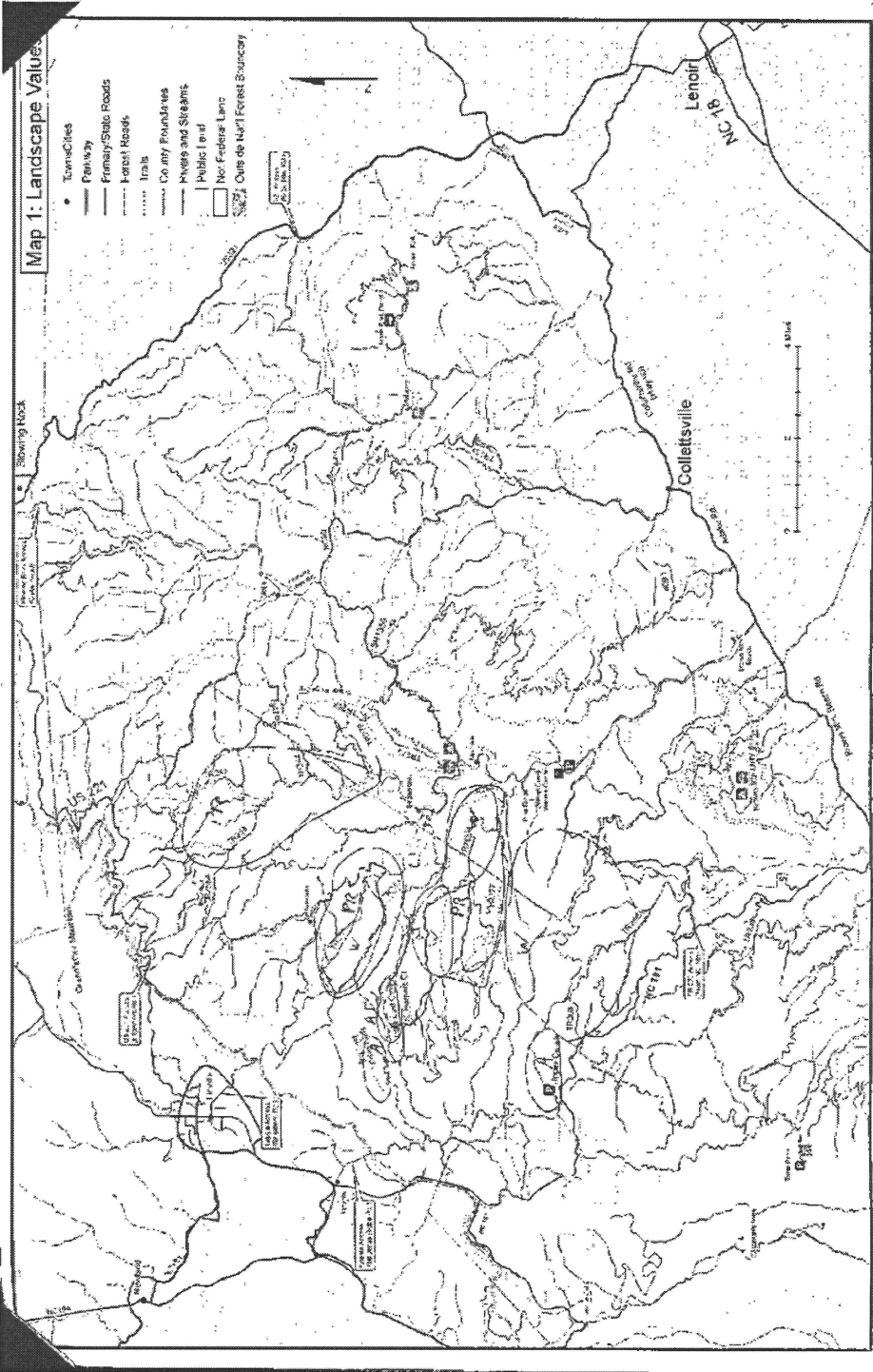


Figure 4. Sample respondent map from Wilson Creek Recreation Stakeholder Survey.

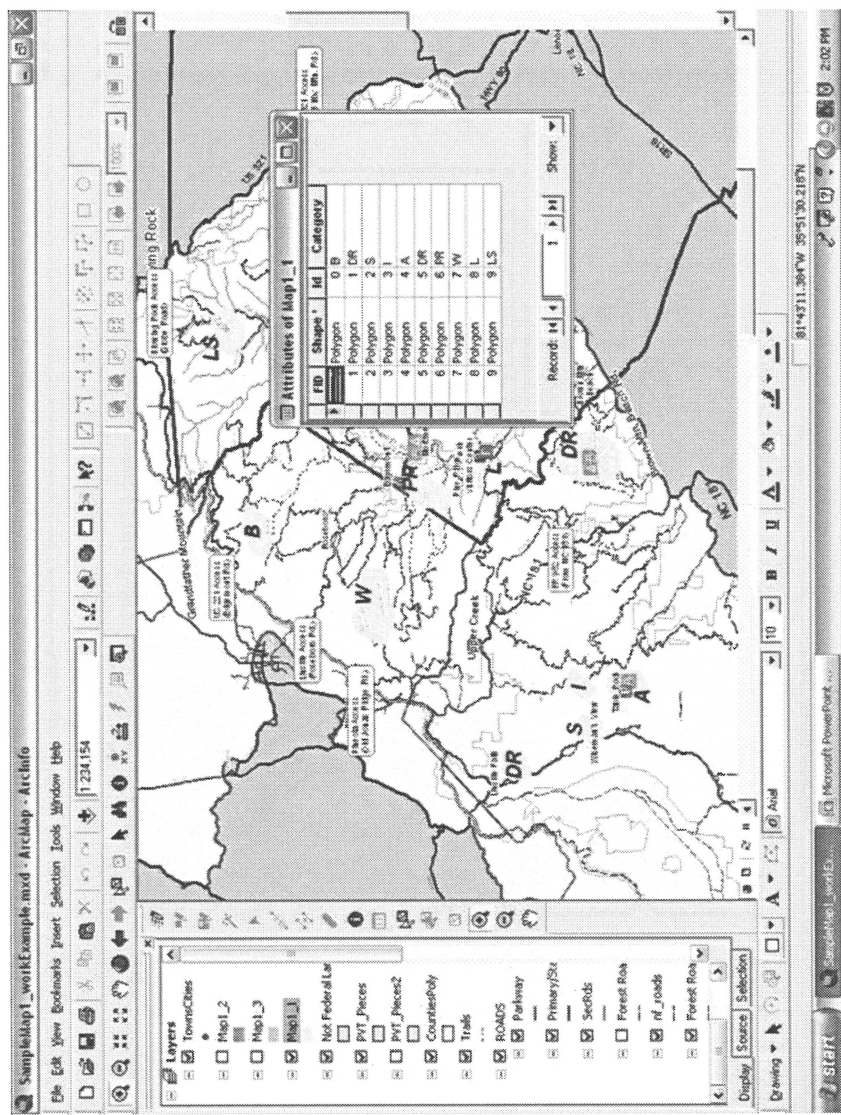
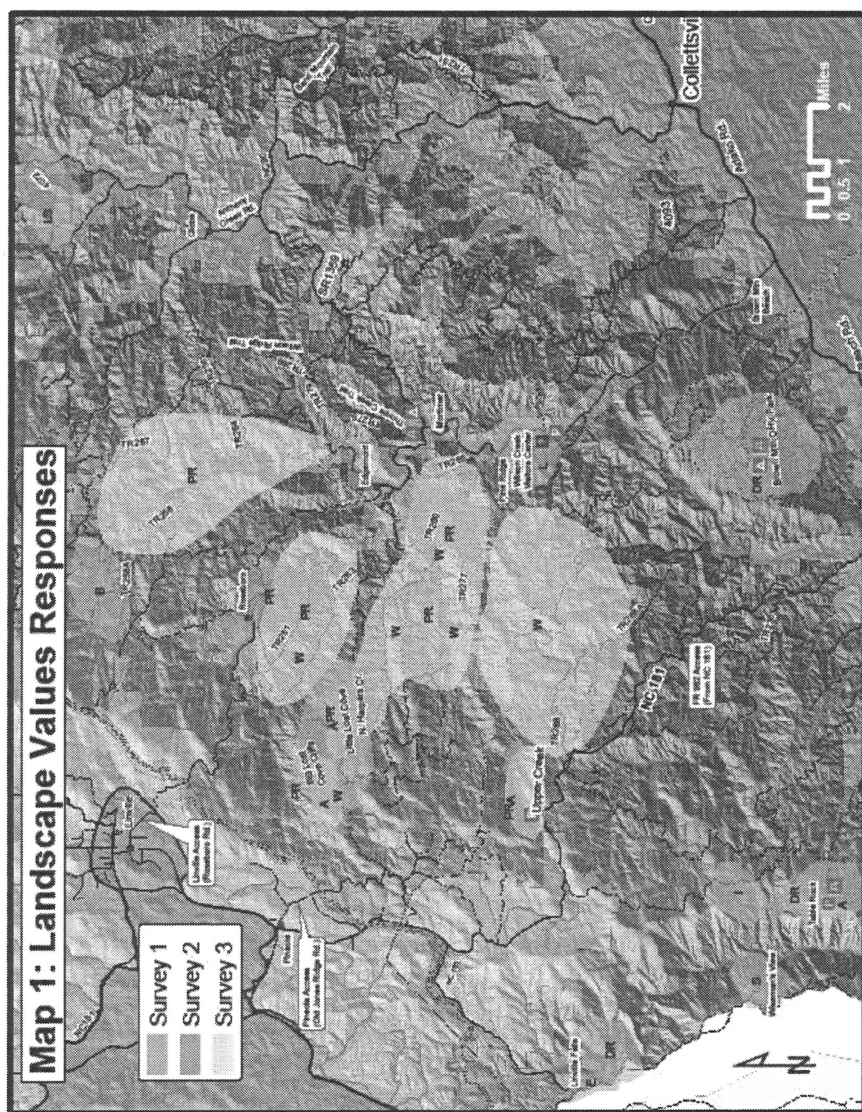


Figure 5. Digitization from respondent's landscape values map.





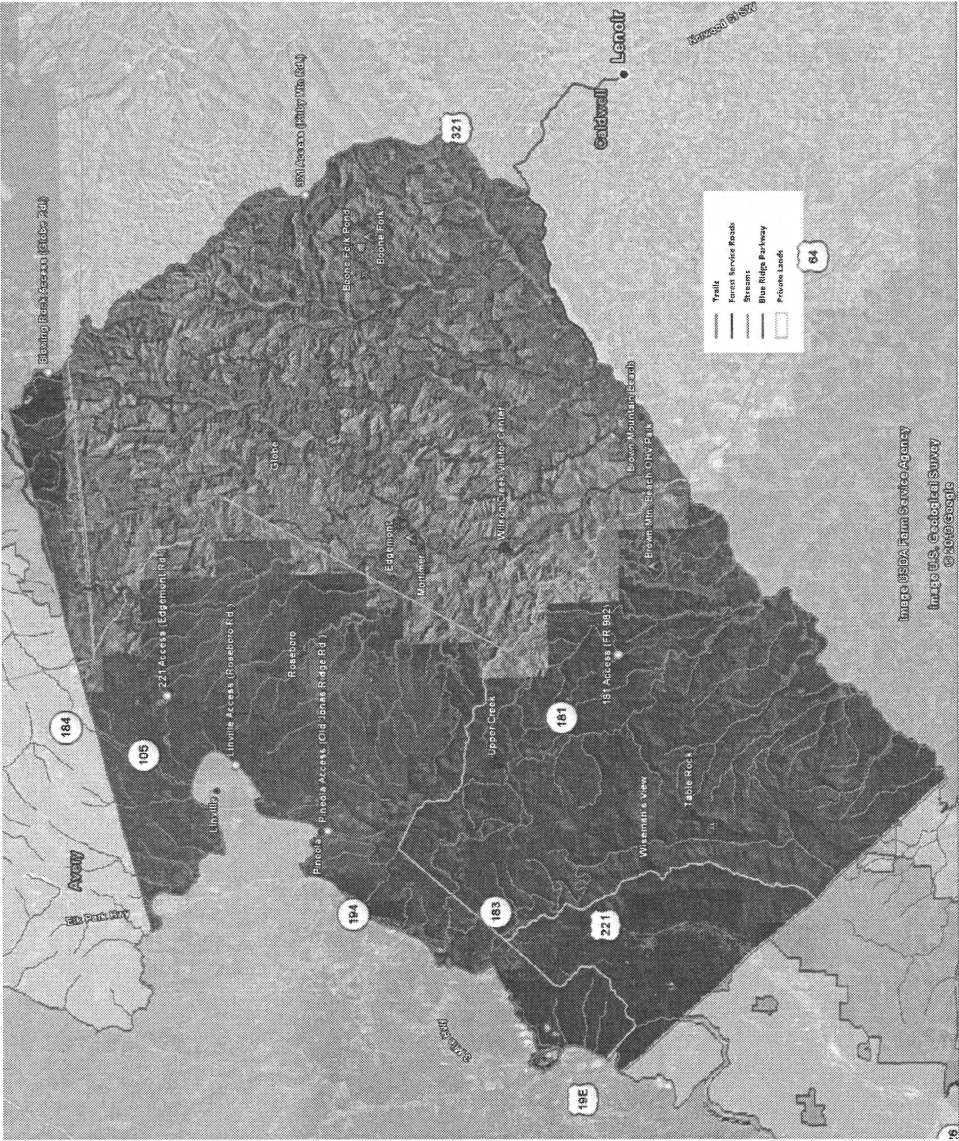


Figure 6. Google Earth Interface for Wilson Creek Recreation Stakeholder Survey.

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USING GIS TO ADDRESS FOOD AVAILABILITY IN DURHAM, NORTH CAROLINA

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Lifestyle choices and genetics contribute to individual susceptibility to health related ailments, but environmental factors such as the accessibility to fresh and healthy food can also affect entire communities. The term food desert is used to describe areas within low income communities that have limited accessibility to supermarkets. We used Geographic Information Systems to explore accessibility to supermarkets in Durham, North Carolina, and suggest potential sites for future supermarkets. Models help explain supermarket accessibility using census-derived indicator variables. Convenience stores also serve as a source of lower quality food.

Keywords: Food desert, food accessibility, GIS

Introduction

It is no surprise that health-related issues such as hypertension, obesity, and diabetes are prevalent in low-income communities. While lifestyle choices and genetics contribute to individual susceptibility, it is possible to identify social and environmental factors associated with geographic location as well. Accessibility to sources for fresh meats, fruits, and vegetables can be an important factor in the overall health of a community.

In some communities, however, typical sources of fresh and healthy foods (supermarkets, farmers' markets and other sources) are outnumbered or even replaced by fast food restaurants and convenience stores. Such food sources may offer options that are convenient and inexpensive, but are also generally less healthy due to high levels of processing and high quantities of salt, sugar and fat. The convenience of proximity is compounded in low-income neighborhoods, where many residents may not have personal transportation and are limited to walking or public transportation, greatly increasing the influence of local food sources on individual food choices. The U.S. Department of Agriculture (USDA) has adopted the term *food desert* to describe those areas within low

income communities that have limited accessibility to supermarkets.

Bountiful Backyards is an organization based in Durham, North Carolina, that seeks to bring healthy food options to communities in need. They operate with a proactive strategy of empowerment, encouraging neighborhoods to create edible landscapes and food forests in urban areas. Bountiful Backyards claims that 64% of people living in Durham County are overweight or obese, and seek to abate this condition through adequate nutrition, education and the access to the appropriate resources. The creation of community gardens not only provides long-term tangible results (increased life expectancy, lower health care costs, better quality of life), but researchers have also seen that these gardens can facilitate new community relationships and strengthen existing ones (Shinew et al. 2004 and Wakefield et al. 2007). While this study does not delve into the phenomenon of urban gardens, it does canvass the geographic landscape in an effort to assess the current state of local food accessibility and to identify the food deserts of Durham, North Carolina.

Literature Review

There have been many studies conducted across the United States, Canada, New Zealand, and the United Kingdom about nutrition and the availability, accessibility, and affordability of fresh fruits and vegetables. Those studies have used quantitative measurements to determine areas defined as food deserts and linked that information to the demographics of the area. Such studies must necessarily establish a definition for healthy food - generally items that satisfy the Food Pyramid of Daily Intake without having a lot of additional fat, sugar, and sodium. Examples of healthy foods are whole grains, fruits, vegetables, and lean meats. Those foods can usually be found in supermarkets and specialized farmer's or grocery markets as well as other local vendors. Fast foods are not considered healthy due to fat, sugar, and sodium content that results from processing and preparation methods.

Even when healthy foods are readily available, universal accessibility within a community remains an issue. There have been many studies explaining these patterns using the backdrop of social-economic indicators. In a one year study, the USDA (2009) found "that low-access to supermarkets is most heavily influenced by characteristics of neighborhood and household socioeconomic environments, such as the extent of income inequality, racial segregation, transportation infrastructure, housing vacancies, household deprivation, and rurality."

McEntee and Agyeman (2009) established a research paradigm citing geography (location), economy (income) and information access (educational status and culture) as the three determining factors behind the accessibility of healthy foods.

There are various definitions for a food desert. According to White (2007), a food desert is a term that describes an urban area with no places that have extensive and affordable healthy food options. The USDA

further defines a food desert to be a census tract where 33% or 500 people, whichever is fewer live either more than 1 mile from a grocery store in an urban area or more than 10 miles from a grocery store in a rural area. In addition, the census tract must have at least 20% of the population below the federal poverty line.

Turrell, Hewit and others (2002) claim those most affected by food deserts include the "socio-economically disadvantaged more likely to run out of food; [who] are less likely to purchase recommended healthy alternatives that are lower in fat, salt and sugar, and high in fiber; and generally consume fewer types of fruit and vegetables, and less regularly, than higher socioeconomic groups". Such definitions do not entail a concept of spatiality. Others such as Morton and Blanchard (2007) as well as Blanchard and Lyson (2006) explore the notion of a 10 mile buffer serving as the threshold limit of a food desert in rural areas. The urban definition seemed most applicable to this study given the limited extent of the study area.

A study by Bertrand, Thérien, and Cloutier (2008) in Montreal, Canada reinforces the idea that accessibility based on transportation options plays a role in the types of food consumed. They found that access to healthy foods is better for those individuals who own a car than for those who walk through the use of "dissemination areas" and buffers. The United States Department of Agriculture (2009) asserts that vehicle ownership is the most important determinant as to whether a family can access healthy food options. Other studies assert disparities in accessibility aligned with race, both with and without income differences (Zenk, and others 2005, Baker, and others 2006).

With respect to income, the USDA (2009) found that 4.1% of the total population lives in low-income areas greater than 1 mile from a supermarket. This distance is insurmountable for those with limited access to transportation. Studies from Edmonton and Montreal,

Canada, have shown that supermarkets occur in low-income/high-need areas, which is counterintuitive to these trains of thought. However, these urban areas are served by smaller convenience-type stores with limited shelf space for fruits and vegetables and irregardless of food quality. (Bodor and others 2006)

In applying this empirical research locally, Quandt and others (2010) explored this phenomenon in Winston-Salem, North Carolina. They used spatial analysis to explore the location of farmer's markets as well as supermarkets on the backdrop of various demographic variables such as poverty, income and race. The goal was to see if all segments of Forsyth County had adequate access to fresh food in the form of gardens, farmer's markets and supermarkets. Their analysis demonstrated that there were indeed limitations to access for low-income residents.

Study Area and Methods

The area of interest is an urban core of 76 contiguous block groups within the City of Durham. Each block group satisfies the census definition of urban with a population density of 1,000 people per square mile or greater, and each borders at least 2 other block groups which also meet the density criterion. One hundred and one census blocks satisfy the density criteria in Durham County. A Location Query was performed to find all block groups (total of 79) that lie entirely within the boundaries of the City of Durham. The ET GeoWizards tool (<http://www.ian-ko.com>) was applied to the block group geometry, and 3 block groups were eliminated by an Attribute Query because they did not satisfy the contiguity requirement.

The study area is generally bounded by major thoroughfares of Woodcroft Parkway to the south, Route 15/501 on the west, the Route 70 Bypass on the east and Horton Road towards the North (Figure 1). It ranges approximately 11.2 miles in the north-south direction and 8.1 miles in the east-west direction at its longest, with an total area of

43.4 mi². Given the availability of data necessary for this analysis, the enumeration unit for this area is the census block group, a subdivision of a census tract. There are 76 of these census block groups within 37 census tracts in this study area.

The latest data provided by the United States Census Bureau provide insight into the inter- and intra-region disparity in the study area. This information was provided through a generous grant from the NCCU Provost, enabling the purchase of ESRI Business AnalystTM software and the latest 2010 select census and business data for the state of North Carolina. It was found that approximately 136,064 people (50.8% of county residents) live in this area of interest which makes up only 15% of the land area of Durham County. Per capita income for this study area is \$23,748, compared to \$27,698 for the entire county. 64.5% of the residents in this area are minority (non-Caucasian), compared to 53.6% in the county. Only 38.4% of the housing units are owner-occupied, compared with 55.9% for the entire county. The median age for residents in this area is 34.1 years old, and 19.8% of residents age 25 and over do not have a high school diploma.

This study area encompasses a wide socioeconomic range. Minus a small cluster along the Durham Freeway, it is apparent that Roxboro Street and Fayetteville Street, major north-south thoroughfares running through downtown Durham and the North Carolina Central University campus, divide the less affluent eastern portion of the study area from it more affluent western half. They will play a prominent part in these analyses and will be labeled on the appropriate maps for reference.

We examined the 76 census blocks in terms of their distance to supermarkets. Data about businesses within North Carolina are provided through ESRI Business Analyst software. Attribute information for each business include the company name, address, city, NAICS (North American Industry Classification Standard) Code, Sales Volume, Number of Employees and Square Footage.

An attribute query was used to identify 54 supermarkets within Durham County using NAICS codes. These 54 businesses were queried to find all markets that had more than 20 employees. In exploring these data, many markets that employed fewer employees appeared to be smaller specialty and international food markets which fall outside of the spirit of this study. After this query, 23 'large' supermarkets remained within Durham County for a location query. These supermarkets include traditional supermarkets such as Kroger, Food Lion and Harris Teeter which provide fresh and affordable food to the community. Large supermarkets in the counties surrounding Durham County were also identified in case the closest supermarket to a census block group in the study area was located in an adjacent county.

The second part of this query was to perform location analysis. A vector-based approach was considered but rejected due to concerns about unintended results for distance measurements generated from irregularly shaped block groups. Instead, the raster command Path Distance was used to compute a distance value for each raster pixel in the study area, using a 100 by 100 foot resolution. When used with default cost values of weight 1, the Path Distance command effectively calculates, for each cell in a raster grid, the distance from that cell to the nearest of a vector-based set of points (in this case the locations of large supermarkets). The resulting grid of the Path Distance analysis is shown in Figure 2. Darker regions represent pixels closer to a supermarket. One can also see the general outline of the Thiessen Polygons, which mathematically serve as non-overlapping service areas for each of the supermarkets.

Each pixel represents the distance from itself to the nearest supermarket, regardless of block group. From there, the average of all pixel distances within each of the 76 census block groups can be computed using the Zonal Statistics as Table function. Using the block group polygon as the input layer and the FIPS

field as the Zone field, the Path Distance raster was summarized. The result of this command is a table with 76 records representing the 76 block groups in the study area. This table contains fields for the FIPS code, as well as a field which represents the average of all distances for each pixel to the nearest supermarket within the block group. For example, in census block group 370630013031, which contains the North Carolina Central University campus, this value is 1.596 kilometers. This means that on average, the nearest supermarket is 1.596 kilometers from each of the approximately 1,200 pixels (100 by 100 feet) in the block group. Finally, this resulting table was joined to the vector GIS layer representing the original census block groups using the FIPS code as the primary key. The data were mapped based on the average distance from the block group to the nearest supermarket (Figure 3).

Results: Supermarket Accessibility

Figure 3 articulates a distinct spatial pattern associated with supermarket accessibility. To the east of Roxboro and Fayetteville Streets, there appears to be less accessibility to large supermarkets compared to the block groups west of this corridor. The lowest quantile of supermarket accessibility, which represents the 15 block groups with the worst accessibility to supermarkets, has a per capita income of \$22,514, more than \$1,000 below that for the entire study area. This area is 68.8% minority and 22% of all adults age 25 and over do not have a high school education. A multitude of qualitative variables go into decisions to locate supermarkets and convenience stores within Durham. Linear regression models can be used to explain the quantitative relationship between supermarket proximity and various census variables or indicators for the 76 block groups in question.

A simple linear regression model was made between the dependent variable and each of the 17 independent variables or indicators. The indicators used in these models are shown

in Table 1. Using the dependent variable *super*, which represents the average distance between each block group and the nearest supermarket (Figure 3), the 17 models were used to test the independent variable versus *super*. For example, a linear model was created to see how well the variable *pci* (per capita income) explained *super* (supermarket accessibility). The other 16 variables were later modeled individually to see how well they explained *super*. These models were computed in R, an open source programming language and platform used for statistical computing and graphics.

Table 1 shows some metrics related to model strength between the dependent and 17 independent variables. No indicators really stood out which explained supermarket accessibility. Indicators related to housing status (own and rental) correlated most significantly ($p < .1$ and $p < .05$ respectively) to supermarket accessibility. The relationship with rentership was negative, which means that accessibility (distance to supermarket) will be better (or decrease) as rentership increases. On the other hand, as ownership increases, accessibility will be worse (distance will be higher), resulting in a positive correlation. This makes some sense, as Chakraborty (2011) found that the homes of low-income residents in Tampa, Florida, were located closer to major thoroughfares. These low-income residents would be more apt to rent their homes as opposed to owning them. In turn, major thoroughfares would tend to be the site of supermarkets and other large retail centers. Inevitably, it shows that supermarket accessibility through these models is more related to community instability (low ownership, high rentership) circuitously via supermarket site selection along major corridors than anything else. Regardless, while areas of lower supermarket accessibility were typically found in poorer neighborhoods, overall models to quantitatively explain these general patterns are not very strong.

Results: Food Deserts in Durham

While the USDA defines food deserts at the census tract level, analysis here is able to define a food desert at a much finer level. For this study area, a food desert must satisfy the following conditions: 1) it is within an urban area 2) greater than 1 mile from a supermarket and 3) has more than 20% poverty. Given that only urban census block groups (using a population density threshold) were selected to create the study area, the entire study area satisfies this first criterion. Further raster analysis will explore the distance and poverty components of a food desert.

Using the previous raster techniques, each 100 by 100 foot pixel can be assigned a distance which represents the distance to the nearest supermarket. A raster query was created to select all pixels greater than 1.60934 kilometers (1 mile) from a supermarket. 58.2% of the approximately 121,000 pixels in the study area satisfy the distance criteria for a food desert. Combined with this distance criterion is a poverty metric. Poverty information is provided by the United States Census Bureau for the year 2000 at the block group level. Poverty information was converted to a raster file using the Polygon to Raster function. Poverty information was originally downloaded from the United States Census Bureau's Factfinder Web site and data were converted from raw data to the percentage of residents who lived below the poverty line by census block group. A raster query was created to find all pixels that had greater than 20% poverty AND were greater than 1 mile from a supermarket.

11.8% of all pixels, which represent about 5.12 square miles of the study area, satisfy the USDA definition of a food desert (Figure 4). Using vector analysis of census block-level data, approximately 24,799 people lived within this food desert as of 2000 (2010 data were not available at the block level at the time of this writing). This is at a much finer resolution than what the USDA defines for food deserts. The food deserts are located in areas with lower education attainment, higher

rentership and higher percentage of minority residents. While there is some supermarket access to low income areas in the northwestern part of the city, a food desert exists in the western part of the city near Duke University. Given the high educational attainment of this area, this is probably mostly off-campus undergraduate and graduate student housing. Limited access is most pronounced in the downtown area of Durham, as well as the northeastern parts of the study area east of Roxboro and Fayetteville Streets. This includes areas surrounding the campus of North Carolina Central University.

Remediating the Food Desert Problem

Given that there are only 23 of these larger supermarkets within the county, the construction of food stores is not a regular event and poses some interesting questions. For example, where might a supermarket locate to best serve people currently living within the food desert? We used a raster-based approach to suggest some answers.

The previously-created raster data layer was used as a starting point because it already satisfies the urbanity, distance and poverty criteria for a USDA food desert. In this layer, the value 1 represents pixels within the food desert while all other values have a value of 'NoData.' The goal is now to find a point (potential supermarket) and an associated 1.6 kilometer (1 mile) radius circle that would overlap with the largest portion of this disjointed area and thus eliminate the food desert status for all areas within the 1 mile 'urban food desert' distance threshold. This was done by computing a Focal Statistic with a circular Neighborhood, using the SUM function to tally the values of all pixels within a 1 mile neighborhood of the calculated pixel. Pixels with low SUM values overlap with very few of the existing food desert pixels (each of which has a value of '1'), while the highest sum values represent locations encompassing a large amount of existing food desert area within a 1 mile threshold, and therefore might serve as good locations for

placement of a new supermarket, if mitigation of food deserts is a concern.

If one supermarket were to be placed in this area to mitigate the extent of the Durham urban food desert, it would most likely be near downtown Durham in the eastern part of the study area. Figure 5 shows the proposed location for that supermarket. By placing a supermarket there, the number of pixels which satisfy the USDA definition of a food desert in the study area would decrease from 11.8% to 7.4%. This percentage was computed by running the Path Distance operation and querying all pixels with a distance greater than 1 mile. The results were intersected (logical AND) with the existing food desert and the VAT (value attribute table) was accessed to compute the number of pixels which still satisfied the query versus the total number of pixels in the study area. Using block level data, the number of people living in a food desert would decrease from 24,799 to 13,497 just by siting this one supermarket. The population values were found by intersecting both scenarios of food deserts (with and without new supermarket) with block level data provided by ESRI. The proposed location is just off of Fayetteville Street and just east of the downtown Durham. This site is currently occupied by public housing apartments.

Another location, though not quite as strong, lies about ½ mile southeast of this first location off of Angier Street. This location is also marked on Figure 5. 7.6% of all pixels within the study area will still lie within a food desert if a supermarket is built in this location. This area is more residential and lies closer to the Durham Expressway. Regardless, these locations represent potential supermarket locations where food deserts would be mitigated the most within the study area. This was based on pure mathematical computations disregarding other quantitative and qualitative issues that necessarily go into a site selection of this magnitude.

Additional Results: Convenience Stores

One of the misconceptions about accessibility of fresh food is that the people living within food deserts have access to food, but just not fresh food via supermarkets and farmers markets. Convenience stores also serve as a source of food. While this food may not be fresh, it is convenient and perhaps the only regular source of food for those with limited transportation. The same type of GIS analysis performed previously can look at the accessibility to convenience stores within this study area.

The requisite NAICS code for convenience stores was queried from a GIS data layer representing businesses for Durham County. Kangaroo Express is the most prevalent in Durham County, with 14 located throughout the county. Once again, a hybrid vector and raster based approach was used to find the average distance from each of the 76 census blocks to the nearest convenience store using the techniques described for supermarkets. For the block group containing the NCCU campus, this distance is .9008 kilometers. On average it is 900.8 meters from each 100 by 100 pixel in the block group to the nearest convenience store (Figure 6). The group of block groups with the highest accessibility (using a quantile classification) to convenience stores has a per capita income of more than \$9,000 below the average for the entire study area, is 84.9% minority and has 18.4% unemployment. This area has more than 60.8% rentership and 35.2% of all residents age 25 and over do not have a high school diploma. These are much more distinct than the patterns seen with supermarket accessibility.

Once again, single linear regression models were used to model convenience store accessibility (average distance between census block group and nearest convenience store) versus the 17 census indicators used as independent variables used in this study. The results are highlighted in Table 1. These results are extremely telling, as all indicators are significant at the $p < .05$ threshold and 15

of the 17 indicators were significant at the $p < .01$ threshold. In exploring the variables that were most significant, convenience store accessibility correlated negatively with minority and no_hs and positively with college and pci. This means that convenience stores will be located closest to low-income, high minority and low education attainment neighborhoods. Figure 7 shows the distinct positive correlation between per capita income and convenience store accessibility. This graph clearly shows that convenience stores are generally located closest to low-income neighborhoods. While there are obviously many other issues affecting this disconcerting pattern, these p-scores and r2 values show that those populations with more limited access to supermarkets (using linear distance as an impedance) which offer a more robust offering of healthy food have much better access to smaller convenience stores which do not have the same offerings or quality of food. These are also the same people with lower income and compromised access to transportation.

Discussion

We explored accessibility to food resources within the same region and their relationships to various census indicators. This study delved into the differential access to fresh food within the 76 census block groups composing the study area and some of the factors that help to explain this access using simple regression models.

A short answer to the question is that – yes, food deserts do in fact exist in Durham and there are people in Durham with limited access to food. Using GIS techniques such as Path Distance, Zonal Statistics and Join, the average distance from each block group to the nearest supermarket was computed (Figure 3). A distinct spatial pattern can be seen, with less supermarket access to those block groups in the eastern portion of the study area which is generally marked with lower income and higher neighborhood instability via census indicators such as high unemployment, less

education attainment, less home ownership and higher vacancy rates. However, in the northwestern part of the study area where poverty is high, there is still accessibility to supermarkets. Quantitative factors that contribute most towards this supermarket accessibility include those related to housing status such as rentership (positive correlation) and home ownership (negative correlation). However, this can probably be attributed to their relative location to major thoroughfares where supermarkets tend to be located. This is further substantiated by the positive correlation to population density, but these overall models as dictated by their p-scores and r^2 values are fairly weak.

The USDA implements a poverty component with distance and population density (urbanity) to delineate areas called 'food deserts.' When combining them together at the pixel level using raster-based commands, this pattern is still readily apparent (Figures 4) at a level much finer than what the USDA provides. It was found that 11.8% of all pixels within the study area satisfy the definition of a food desert. Many of these areas are high minority, high rentership and low education attainment, and includes downtown Durham as well as the areas surrounding the North Carolina Central University campus. Using some precursory vector analysis, this represents approximately 24,799 people based off of 2000 Census block level data (2010 data were not available at this level at the time of this writing). If agglomerated at the tract level (the enumeration unit used by the USDA to define food deserts), these values and locations may be different.

Taking this analysis one step further, the Focal Neighborhood function was used to determine where a supermarket could be built within the existing food desert that would most minimize the extent of the existing food desert in the study area. If a supermarket were built just east of downtown Durham (Figure 5), the total number of pixels within a food desert would decrease from 11.8% down to

7.4% and the number of people living in the food desert would decrease from 24,799 to 13,497 using 2000 data. Downtown Durham has undergone revitalization in recent years. The Durham Performing Arts Center opened in 2008 and in the last decade, the American Tobacco Campus in downtown Durham has been converted from vacant buildings into a thriving residential, commercial and retail center. This information can be useful to business geographers, politicians and public administrators to show where need intersects with those compromised populations with limited access to healthy food. Whether this means benefits such as tax incentives to developers is outside of the realm of this research, it shows major effects on our city by siting a single supermarket in a strategic location to combat this pressing social issue. Spatial patterns and factors related to supermarket accessibility pale in comparison to the same patterns related to convenience store accessibility. While low income areas do have somewhat limited access to supermarkets, but has considerable access to convenience stores. The northeastern portion of the study area has much easier access to convenience stores while the more affluent southwestern portion of the study area has limited access to convenience stores. When applying socio-economic indicators to models related to convenience store accessibility, all indicators are statistically significant and extremely strong compared to supermarket accessibility. These models showed that block groups with low education attainment, low income and rentership have the best convenience store accessibility. Many of these block groups are the same ones with limited access to supermarkets. While 'exploitative' may not be the word to describe it, this is probably not coincidence. Further analysis from a sociological perspective can help explain why these patterns exist.

This paper serves as a survey looking to address a phenomenon of social significance with absolutely no prior research for this study area. Access to food sources is just one metric

to help explain health disparities within our community. While this access was modeled using quantitative census data, information about lifestyle choices, the environment and genetics also play a part into these disparities.

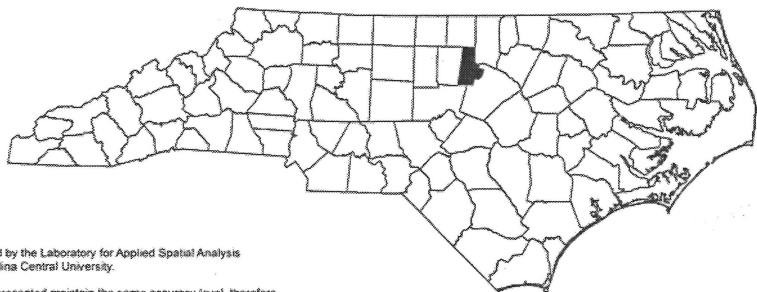
Various models beyond linear regression (2nd order, logarithmic) and standardized dependent variables based on z-scores were also tested, all of which yielded the same general results.

The 17 independent variables used in the models as census indicators were used because of their availability and temporal accuracy, as well as the discretion of the author. Except for poverty data and block level data, all GIS data are updated as of 2010. While research highlighted in this paper have shown that lower income residents have less accessibility to transportation, data about commuting and transportation patterns were not available for the 2010 data set provided.

Lastly, in this study access to fresh food equated to their availability in supermarkets queryable through their NAICS code. However, neighborhood residents do have access to fresh food via farmers' markets and community gardens. There was little GIS data regarding farmers' markets, as only one very small farmers' market was found for Durham County in the GIS dataset. As a result, there is room for improvement regarding the data development methods, the selection of dependent variables/indicators and the complexity of the models employed. Care must be taken when determining an appropriate aggregation unit in which to display and analyze data. The aggregation unit used in this study is the census block group. The use of different scale units which show different patterns may yield completely contradictory results. Openshaw (1984) described this as the 'Modifiable Areal Unit Problem' (MAUP). There exists a finer scale at which data can be collected for this research. However, information about indicators such income, education attainment and unemployment are not available at the block level. In exploring the patterns at

different scales germane to this research (block, block group, tract, zip code) for the available metrics at various scales, they show the same general trends as highlighted in this research and no attempt was made to obfuscate or disguise unintended results using this enumeration unit.

Study Area



This map was created by the Laboratory for Applied Spatial Analysis (LASA) at North Carolina Central University.

Not all data layers represented maintain the same accuracy level, therefore the map scale applied does not necessarily equate to the implied horizontal and vertical positional accuracy.

Source(s): City of Durham, ESRI

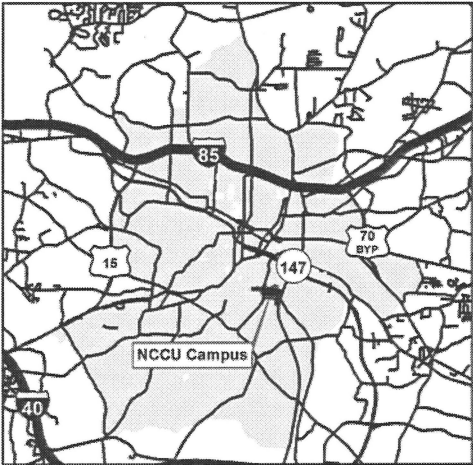
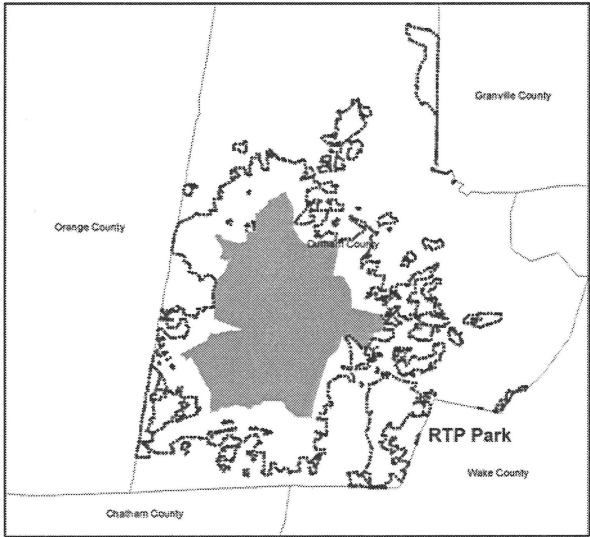


Figure 1: Reference maps.

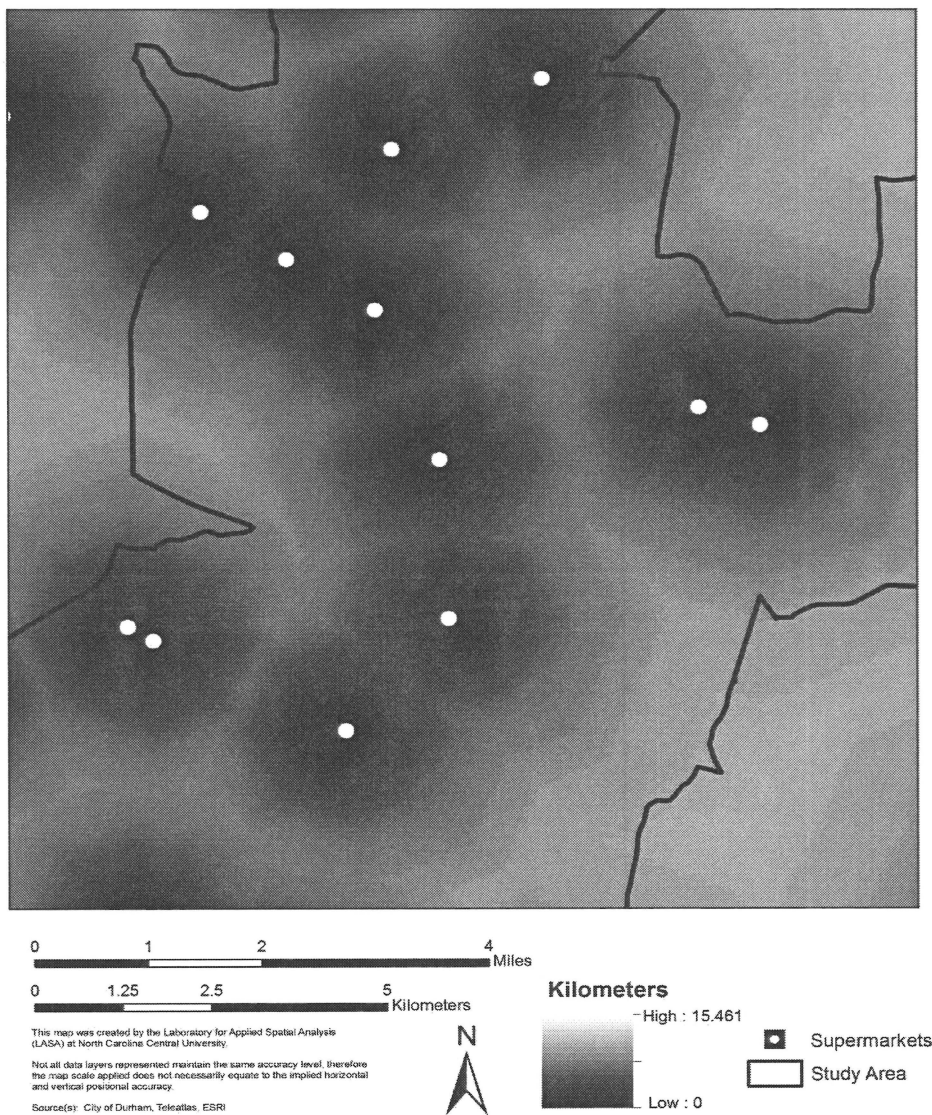
Result of *Path Distance* Command

Figure 2: Results from raster-based Path Distance command.

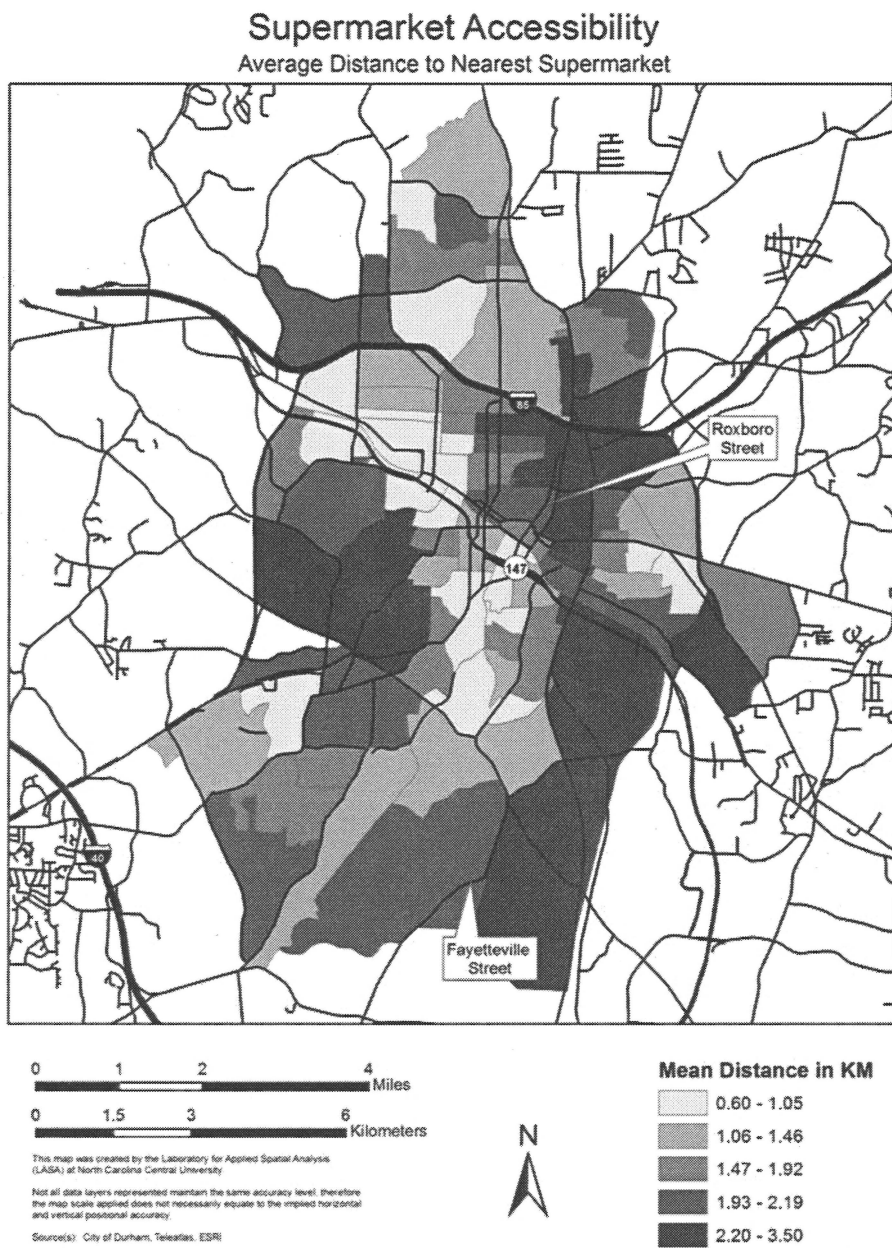


Figure 3. Supermarket Accessibility

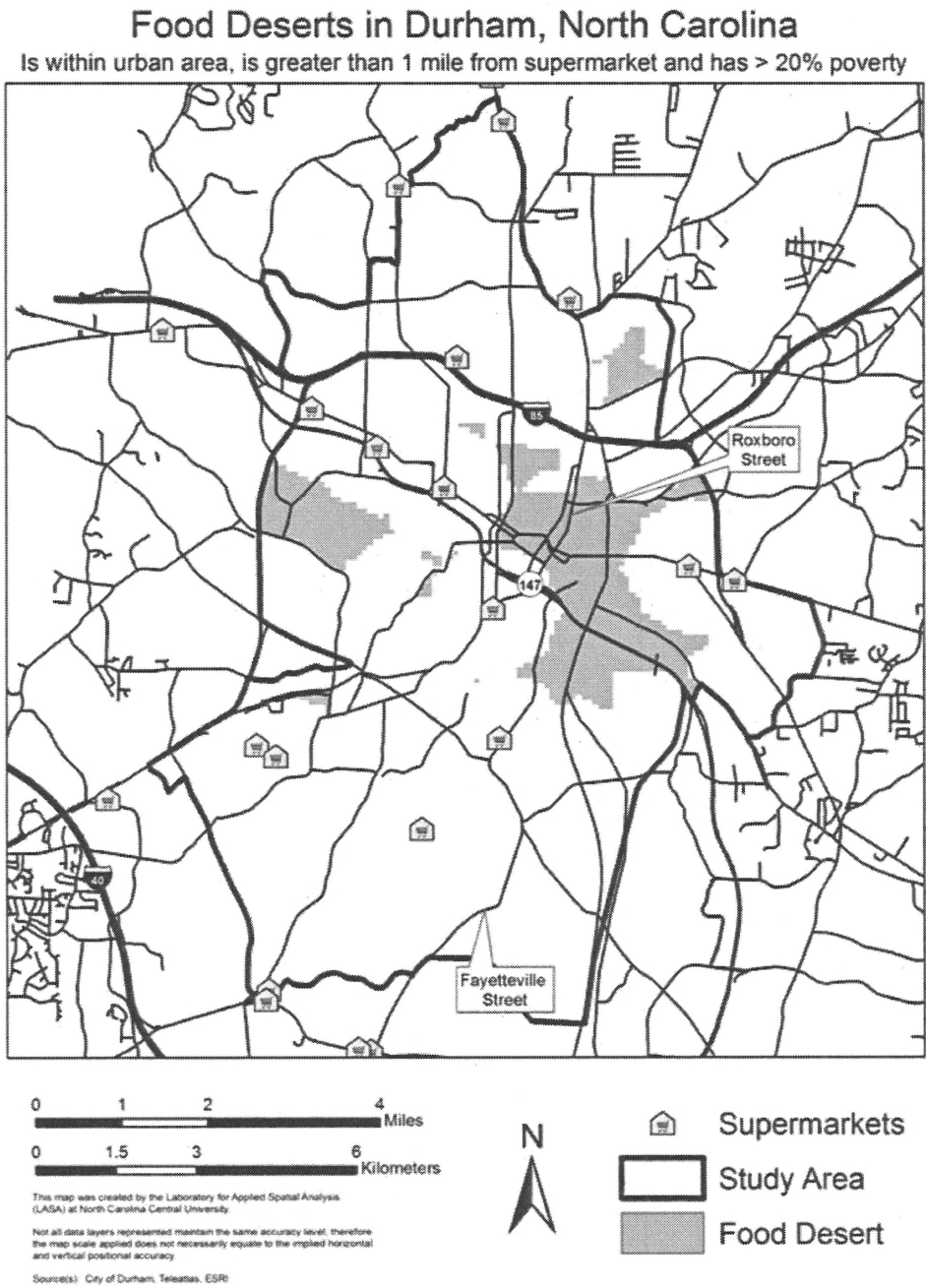


Figure 4: Urban food deserts in Durham North Carolina.

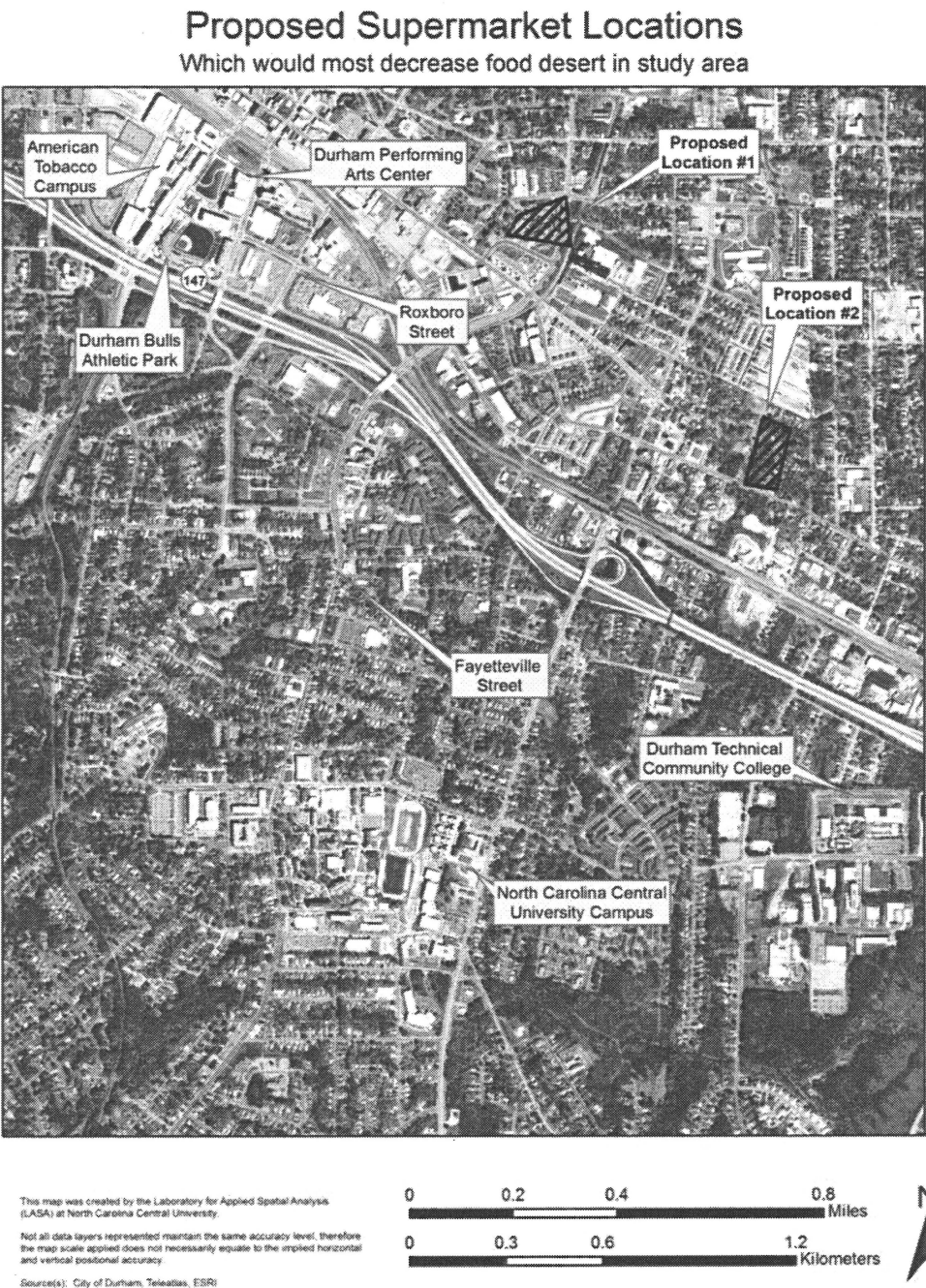


Figure 5: Potential supermarket sites. At location #1, USDA food desert in study area would decrease from 11.6% to 7.4%. At location #2, decrease is about 7.6%



Figure 6: Distance between Census Block Group and nearest convenience store.

Figure 7: Per Capita Income versus Convenience Store Accessibility ($\rho \approx 0$, $r^2 = .3153$). Block groups with lower income have greater convenience store accessibility.

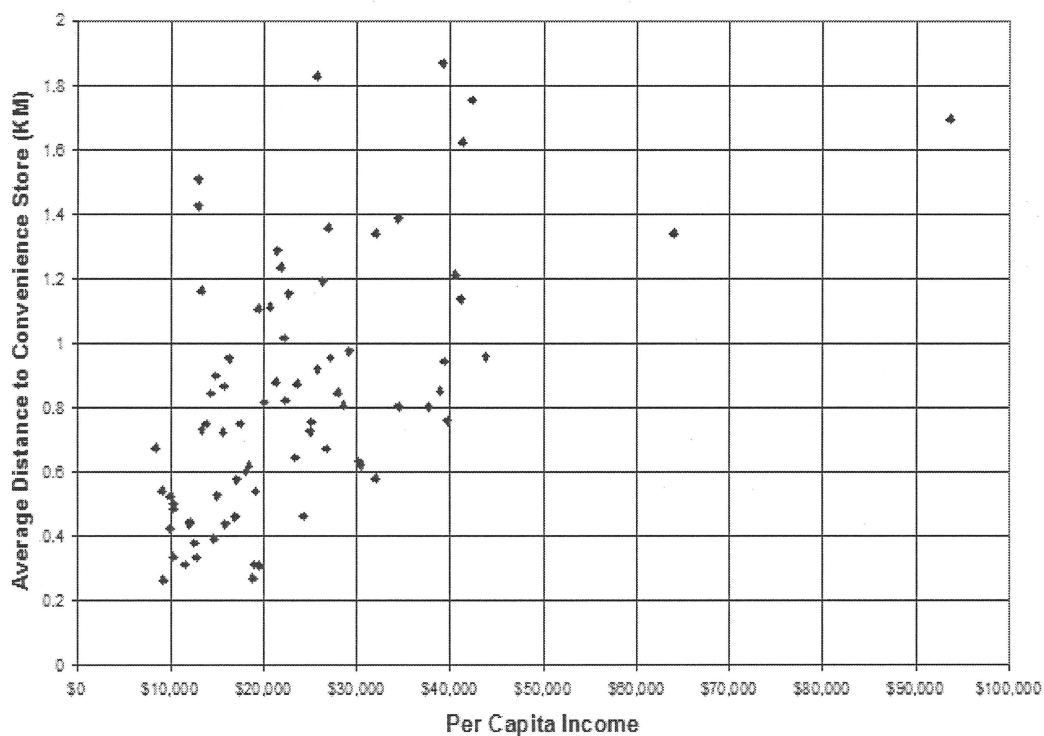


Table 1. Results from single linear regression. Each dependent variable (Supermarket Accessibility and Convenience Store Accessibility) is modeled against a single independent variable. + / - refers to correlation as positive or negative. Positive correlation means that accessibility will be worse. Negative correlation means that accessibility will be better. Enumeration unit is the census block group. P-scores below .00005 are represented as 0 in table.

Variable Name	Description	Supermarket Accessibility		Convenience Store Accessibility			
super	Average distance in kilometers between census block group and nearest supermarket. Measures supermarket accessibility.						
convenience	Average distance in kilometers between census block group and nearest convenience store. Measures convenience store accessibility.						
Independent Variable		+ / -	p-score	R ²	+ / -	p-score	R ²
medhhinc	Median household income (raw values in dollars)	+	.143	.028	+	0	.247
no_hs	% residents over 25 without a high school diploma	+	.947	.006	-	0	.455
college	% residents over 25 with a college degree	+	.649	.002	+	0	.517
minority	% of minority (non-Caucasian) residents	+	.726	.001	-	0	.290
white	% of Caucasian residents	-	.726	.001	+	0	.290
med_age	Median age of residents in years	+	.2303	.019	+	.0165	.075
male	% of residents who are male	-	.6382	.003	-	.0389	.056
female	% of residents who are female	+	.6382	.003	+	.0389	.056
pop_dense	Population density in people per square mile	-	.0533	.049	-	.0002	.166
rental	% of housing units that are rented	-	.0634	.046	-	.0009	.138
own	% of housing units that are owned	+	.0478	.052	+	0	.219
vacant	% of housing units that are vacant	-	.253	.018	-	0	.269
single_parent	% of households that are led by single parents	-	.582	.004	-	0	.270
pqi	Per capita income in dollars	+	.237	.109	+	0	.315
unemploy	Unemployment rate in %	+	.962	.003	-	0	.227
ave_hh_size	Average household size (in people per household)	+	.3349	.013	-	.0143	.078
poverty	Percent of residents below poverty line (2000 data)	-	.642	.002	-	.0033	.111

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Sea Breeze to Sherbet Town: An Historic African American Beach Resort Lost to Affluenza

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From the 1920s to the 1970s African Americans enjoyed the restaurants, nightclubs, and hotels of an exclusively black beach known as Sea Breeze. After an 1898 white supremacist riot, Wilmington blacks had few places to recreate away from whites so Sea Breeze attracted black customers and entertainers and provided a popular refuge. Two inlet projects, a hurricane, and the end of segregation contributed to Sea Breeze's demise. As recent coastal real estate values have grown, Sea Breeze with its water views and access to the Intracoastal Waterway has experienced a building boom which I refer to as affluenza. Wilmington's African American Sea Breeze veterans decry the loss of their beloved beach and the eradication of their history. The social and physical changes in Sea Breeze from the 1920s to the present demonstrate that affluenza trumps African American nostalgia.

Keywords: Historic African American beach, coastal development, affluenza

Introduction

After the Civil War the United States experienced two brief periods of advancement for the former slaves. The first was known as the Presidential period and the second was Radical Reconstruction. During Reconstruction many Southern blacks not only voted, but held public offices and climbed the economic, if not the social, ladder in many Southern towns. At the end of Radical Reconstruction in 1876, labeled "Redemption" by white supremacist southerners, federal troops were withdrawn from the South and blacks were left to fend for themselves. Many did so admirably, although the level of white on black violence was truly horrifying, until the *Plessy v Ferguson*, "separate but equal" Supreme Court decision of 1896, ushered in decades of Jim Crow legislation and the oppression of blacks in the social, political, and economic arenas. The primary subject of this paper is

not Reconstruction or the Jim Crow era, although the context of the story is exemplary of the influence of those times.

The story begins with an African American family with an ironic name, the Freemans of New Hanover County, North Carolina. At the beginning of the Jim Crow era the Freemans had owned land in southern New Hanover county since 1855. They had experienced an economic and social rise with Reconstruction that enabled them to become one of the region's largest land holders. A small piece of their land became known as Sea Breeze, and for a time it was one of the most popular exclusively black waterfront resorts on the southern Atlantic seaboard (Edwards 2003).

Given the current cost of land along the southeastern coast of the United States, it is staggering to think of the real estate fortune held by the Freeman family and sold in greater or lesser amounts after the Civil War. Today,

ocean-front, near ocean, sound-front and river-front lots from Florida to Maryland sell for hundreds of thousands of dollars. In the nineteenth and early twentieth centuries, those places were sparsely occupied by people who earned their living from the land and waters in isolation from the larger state and country.

The isolation began to change in the late-twentieth century. New Hanover County experienced an economic boom for several reasons, including improved access to its beach and river front areas with the completion of Interstate 40 in 1989. Wilmington, a town that Condé Nast described in the late 1950s as one of the “most awful little backwaters” of the East coast was transformed by the arrival of Dino di Laurentis’s movie studio in 1984. New Hanover County, with Wilmington at its’ core, have become an amenity location epicenter for southeastern North Carolina as affluent retirees and lovers of water views, water sports, golf, tennis, fine dining, and numerous other attractions flock to its shores. Thus, New Hanover County experienced the arrival of “affluenza,” a term attributed to Michael Moore and popularized in a Public Television documentary of the same name. The word is defined as: “**Af-flu-en-za:** n. 1. The bloated, sluggish and unfulfilled feeling that results from efforts to keep up with the Joneses; 2. An epidemic of stress, overwork, waste, and indebtedness caused by dogged pursuit of the American Dream; 3. An unsustainable addiction to economic growth. (PBS 1998; de Graaf, Wann, and Thomas 2002).

Sea Breeze Origins

In 1855, Alexander Freeman, the patriarch of the Freeman family, and likely a manumitted slave, bought several hundred acres on Myrtle Grove Sound for a dollar an acre. His heirs, Robert Bruce, Sr. and Archie, continued to acquire nearby parcels until the family owned 2,500 acres in 1876, all which was located between the Cape Fear River and the Atlantic Ocean (Figure 1). In 1877 the

family donated ten acres of the former Gander Hall plantation on the Cape Fear River to St. Stephen A.M.E. Church, which used it for religious camp meetings. St. Stephen’s parishioners and other blacks boarded boats in Wilmington bound for the camp meetings, some of which lasted for days. One meeting in 1879 attracted 2,000 people, another in 1884 attracted 3,000 (Reeves and Tetterton 1998).

A small corner of the Freeman’s land became the all-black resort known as Sea Breeze—a site of fond memories to New Hanover County’s African American population, now nearly lost. In 1887, Robert Freeman, Sr. sold 24 acres situated between Myrtle Grove Sound and the Atlantic Ocean to W. L. Smith, who developed Carolina Beach. Although initial excursions to Carolina Beach were for the “indigent and infirm colored people” of Wilmington, Carolina Beach became a segregated, all-white beach town, as did all the other budding small coastal towns of New Hanover County. For most of the twentieth century Sea Breeze remained the only beach in southeastern North Carolina to which African Americans had access.

Blacks were allowed on the beach at Carolina Beach on Mondays during the 1920s, but that ended after a few years. Atlantic Beach in South Carolina, and Hammocks Beach in Onslow County, were other nearby all-black beaches, but were over an hour away from Wilmington by car. Sea Breeze was considered more attractive than Atlantic Beach because it had more beach front and was not surrounded by whites-only beaches.

For a time in the 1920s, Shell Island (Figure 2), on what is today the north end of the Wrightsville Beach barrier island, was developed as a black resort, but the only structure there, the pavilion, burned in the 1920s and was not rebuilt. It was developed as a whites-only beach in the 1960s, when Moore’s Inlet was closed, making one island from two. The fate of southeastern North Carolina’s other black beaches have been similar to that of Sea Breeze (Edwards 2003).

Wilmington's 1898 White Supremacist Insurrection

Following the war, Wilmington, like other port cities on the Atlantic seaboard, enjoyed a fairly peaceful and remarkably integrated period, with a solid, if not exactly thriving, African American middle class. However, hostile political currents that began in the 1890s reached a crescendo in Wilmington in 1896 when integrated Republicans and Populists formed a "Fusionist" alliance and dominated city politics. White supremacist Democrats conspired to oust the Fusionists, employing racially and sexually charged language in the press and deploying white thugs known as Red Shirts in the streets. In early 1898, a white female lecturer, Rebecca Latimer Felton, advocated lynching to protect white women from Black rapists as an aside in a speech to rural farm women in South Carolina. In August 1898, the editor of Wilmington's Black newspaper, Alexander Manly, read Felton's speech and countered with an editorial in Wilmington's African American *Daily Record*. Manly wrote that many relationships between black men and white women were consensual, although, when discovered, the man was usually lynched.

For several days before the November 9, 1898 election, a local white newspaper ran Manly's editorial repeatedly, triggering a long-planned white Democratic *coup d'état* of the seated city government. The *coup* began with the burning of Manly's building and resulted in the deaths of more than sixty blacks, the forced removal of many members of the city's black middle class, and decades of *de jure* racial apartheid. Over one hundred years later, the 1898 events, referred to variously as a riot, an insurrection, or a massacre, remain essentially unresolved despite recent efforts to acknowledge and commemorate them (Reeves and Tetterton 1998; Umfleet 2006).

Wilmington's Era of Racial Apartheid

After 1898, the existence of a recreational refuge for Wilmington's remaining blacks and those who came to fill the labor void on the docks and in the cotton factories became more important. Wilmington was suddenly a segregated town and the public spaces that whites enjoyed were off limits to blacks. Blacks were able to enjoy some parts of the town, such as ball fields in their neighborhoods, and developed a critically important and extremely valued all-black high school, Williston Industrial High. But post-1898 attitudes and fears curtailed most of their leisure and professional activities and all participation in local government.

However, Sea Breeze was just 15 miles away, and blacks from Wilmington, and increasingly from all over the South, retreated there, free to live it up in its restaurants, cafes, taverns, hotels, and on its piers and beach.

Sea Breeze gained true resort status with the building of a 25 room hotel in 1924. The Lofton Hotel and Dance Hall was followed by the Simpson Hotel the following year and by 1929 another hotel and several other businesses joined them. The destruction of the Shell Island Pavilion, likely a case of arson, made the more remote Sea Breeze, with its long standing black ownership, increasingly attractive to black businesses and their patrons. Bruce Freeman, direct descendant of Alexander and Robert Bruce Freeman, Sr., operated several Sea Breeze businesses until the 1950s. He remembered that 3,000 people came for the Labor Day holiday in 1927 for dancing, athletics, and good food (Freeman 1980; Reeves 1998).

The Sea Breeze of the 1920s was a place where African Americans not only *felt* free, it was a splendid place with a lot to do, located on the shallow Myrtle Grove Sound, across which one could wade to the barrier island to the east and spend time on and in the Atlantic Ocean. That changed in 1930 when Snow's Cut canal was created by the U.S.

Army Corps of Engineers to provide access from the Cape Fear River to the Intra-Coastal Waterway (ICW).

Mandated in 1919, the ICW was a boon to local shipping, but its' dredging through Myrtle Grove Sound, along with the dramatically energized currents moving through Snow's Cut with the tides, changed the placid, shallow character of the sound-front at Sea Breeze. In the 1930s and 1940s at least five vacationers drowned in the suddenly treacherous waters of the sound. Adding insult to injury, the intrusion of the muddy Cape Fear waters into the formerly crystal waters of the sound destroyed the oyster beds adjacent to Sea Breeze.

Disheartened by the new dangers of crossing the sound to the ocean side (and the loss of valuable oyster beds), By the 1930's Sea Breeze loyalists followed an overland route to their segregated beach through the young all-white town of Carolina Beach. However, Blacks who tried that route often faced the racism so characteristic of the Jim Crow South: they were arrested for trespassing because they dared to use "white roads" to reach their segregated beach.

As a result, the business community of Sea Breeze developed a new strategy to allow their patrons to continue to enjoy the Atlantic side of the resort. They acquired several boats to transport beach goers, and in 1951 a restaurant, the Monte Carlo by the Sea, opened on the ocean front. Thus, despite treacherous currents and Jim Crow oppression, Blacks continued to throng to Sea Breeze throughout the 1940s and 1950s. During WWII, Sea Breeze continued to attract visitors, despite coastal blackouts. Many of them were black soldiers from Camp Davis at Holly Ridge or black Marines from Montford Point, two African American military installations north of Wilmington (McLaurin, Melton. 2007). In 1942, the Federal Works Agency built a bath house for them at Sea Breeze. White soldiers and Marines went to Wilmington and Carolina Beach, but some surreptitiously went to Sea Breeze to dance

and listen to "race music" (which morphed in the 1950s and 60s into "beach music").

If anything, Sea Breeze became even more popular after the war, much to the irritation of Carolina Beach residents and authorities. For a time in the 1940s and 1950s hundreds of cars would be parked along Carolina Beach Road (Highway 421 South) near Sea Breeze and hundreds more blacks without cars were seen walking there on weekends and holidays. All-white Carolina Beach residents complained about the noise and the crowds to the Sea Breeze business community. The Carolina Beach police menaced the crowds and arrested those who dared to drive through Carolina Beach to reach Sea Breeze's beach. Occasionally violence was resorted to by "persons unknown," as unaccountable lynchers were described in hundreds of accounts of lynchings across the South in the 19th and early 20th centuries. One man, speaking anonymously, told how his son was shot in the back and crippled by white youths in a drive-by shooting while walking down Carolina Beach Road on his way to Sea Breeze one night in early 1950 (Personal interview 2006).

As Carolina Beach residents and police kept a wary eye on Sea Breeze patrons in the post-war years, a group of entrepreneurs focused on Carolina Beach's increasing attractiveness to fishing vacationers. The Winner family's charter fishing business began in the town's Yacht Basin in 1945, but they had trouble getting their large boats, which could transport 150 people (later 400 people), out to the Gulf Stream, 50 miles off shore where the best fishing was. Their options for reaching the Gulf Stream included taking small boats from the beach side through the surf or taking the large boats through Snow's Cut and out the mouth of the Cape Fear, where Frying Pan Shoals, the Graveyard of the Atlantic, is located. The least unattractive option was a route sixteen miles up the ICW to Masonboro Inlet, at the southern margin of Wrightsville Beach (Figure 2).

In 1952, the U.S. Army Corps of Engineers was persuaded by the Carolina Beach Inlet Development Corporation, a "non-profit" whose purpose was to foster projects to facilitate Atlantic Ocean access for vessels from Carolina Beach via the ICW to promote commercial and recreational fishing and boating, to open a Carolina Beach Inlet. The inlet would be located 1.4 miles north of Sea Breeze and 1,500 feet north of Sea Breeze's beach. A Corps spokesman argued that the inlet, which would separate Masonboro Island from the northern end of Carolina Beach, now known as Pleasure Island, would cause dramatic erosion of the ocean side of the barrier island, specifically of Sea Breeze's beach (United States Army Corps of Engineers 1980).

The Sea Breeze business community was conspicuous by its absence at the public meeting to promote the inlet and its benefits to Carolina Beach at their expense. However, it was 1952, two years before *Brown v Board of Education* would strike down the separate but equal legislation of *Plessy*, and decades before Civil Rights would be an accepted legal and social construct (some would argue that it is yet to happen). In addition, while some Sea Breeze residents were commercial fishermen, there were no charter boat captains among them then, because blacks could not obtain the necessary licenses. Thus, they might benefit from ease of access to the Atlantic, but they had little involvement in charter boat activities other than to work as crewmen on some of Carolina Beach's charter boats.

It is not known exactly why Sea Breeze's interests seem not to have been defended at the meeting. However, Carolina Beach was an incorporated town with a rising and powerful business community of hotel and restaurant owners and realtors. Sea Breeze was an unincorporated African American community, a site of black recreation resented and shunned by the white community that viewed it as an obstacle to their profit margin. They may simply not have known about the meeting, although Ellis

Freeman, at the time near age 90, seems to have participated. One Sea Breeze resident believed that Ellis suffered from dementia at the time and was not competent to represent the interests of Sea Breeze as the threat to their beach loomed. Alternatively, as the inlet would improve access to the ocean for Sea Breeze's fishermen, it would also flush Cape Fear mud from Myrtle Grove Sound, countering one of the negative effects of Snow's Cut, so they may have approved of the inlet. Perhaps they did not understand, as the Corps did then, and the general public does now, that the construction of an artificial inlet results in erosion down shore?

Frank and Lulu (Freeman) Hill left New Hanover County in 1921 after they had been denied a permit to build a draw bridge at Sea Breeze. During the post-war boom years they returned to Sea Breeze after almost 30 years in New York City. They brought their life savings and invested in a restaurant on beach front land that Lulu had inherited. The Monte Carlo on the Sea, nicknamed Bop City, opened in 1951 (Figure 3), the inlet was blasted in 1952, and soon the Hill's noticed that the Atlantic breakers were dangerously close to their building.

Two years later, the 130 mile an hour winds of Hurricane Hazel struck during a full moon at high tide, devastating North Carolina for miles along the coast with a catastrophic storm surge and inland flooding that damaged a 200 mile inland swath of the eastern United States from South Carolina to New York (National Weather Service 1954). The Monte Carlo and most of the adjacent development was ruined. Frank Hill spent the winter of 1955 on the Monte Carlo site, salvaging cinder blocks while living in a shed he made from scavenged wood. By the summer of 1955, he had rebuilt the Monte Carlo, only to be hit again and again by subsequent hurricanes, and rebuilt two more times, although never with flood insurance protection. Beach erosion finally sealed the Monte Carlo's fate. After Hurricane Alma (1962), Frank and Lulu finally gave up on the

Monte Carlo and Sea Breeze's beach.

The same year Sea Breeze beach eroded away, Carolina Beach received Federal funding to renourish their 14,000 feet of shoreline. Unincorporated and powerless Sea Breeze received no funding and no sand. By 1980, the wide strand of beach with the 20 foot high dunes was a narrow spit bearing no resemblance to the beach of the first half of the 20th century. In 1982, Frank and Lulu sued the Corps, but lost because the Corps had publicly warned of the erosion danger in the public meeting in 1951 (Edwards 2003).

Civil Rights and Saving Sea Breeze

The village of Sea Breeze to the west of Myrtle Grove Sound continued to be a destination for black residents of Wilmington through the 1960s and into the early 1970s. However, the decades long Civil Rights struggle finally ended segregation of schools and public facilities. When African Americans began to feel comfortable in formerly forbidden public places, the crowds at Sea Breeze thinned out. Businesses closed and some property was sold to investors. Into the 1980s, Sea Breeze drew large crowds for Sunday afternoon baseball games and special nostalgic events, the largest of which was dubbed "Sea Breeze Days." But the glory days were over and many of the buildings that had endured the storms and time fell into disrepair. Public historians from UNCW assisted a group from the Sea Breeze Community Center (SBCC) that seemed poised to "save" Sea Breeze as a national heritage site. Jenny Edwards, then a UNCW graduate student in History, was asked to write the application to place Sea Breeze on the National Register of Historic places. However, the movement deteriorated when the older residents of Sea Breeze clashed with the developers leading the SBCC. They subsequently declined to continue to participate over the issue of "cleaning up" Sea Breeze. Cleaning up was taken to mean tearing down what was left of the buildings and some of the older Sea Breeze residences.

Thus, the SBCC failed.

In 1988, the New Hanover County Planning Department revisited Sea Breeze, largely as a response to the lapsed initiatives of the SBCC and the interest of a local planner, Wanda Coston, had fond memories of her childhood jaunts to Sea Breeze. An inventory was made and a plan was prepared, but then shelved, as so many are. Figure 4 shows the structures and layout of the village of Sea Breeze from the 1988 plan, with expansive vacant wooded acreage on and near Myrtle Grove Sound. The fishing and water access attracted some buyers and a few new houses were constructed. One is on the sound, right across from the old pier and the fish house (Coston 1988).

The Juggernaut of Sherbet Town

Across the sound on Freeman Beach, at the north end of the town of Carolina Beach a community dubbed Sherbet Town sprang up in the 1990s. It was a gentrifying force of *affluenza* (or real affluence) that has changed the character of most of coastal North Carolina. The nearly empty land across the sound has proved to be irresistible to developers. One of the obstacles to the county's 1988 plan was the absence of water and sewer in Sea Breeze. Of the 20 or so houses there, all used wells and septic tanks. However, a development company, with the decidedly non-geographical name Colorado Coastal Properties, smelled the money and hastened the development of the area by installing their own water and sewer lines, which have been connected to Wilmington's. Colorado Coastal Properties (CCP) is operated by a former Cape Fear Council of Governments planner, who had moved to Colorado, but who knew prime real estate when he saw it and has returned to contribute to the development of Sea Breeze. In 2005 the county's Technical Review Commission (TRC) approved the necessary permits to allow development to proceed, including a permit for Land Disturbing Activity to develop 8.7 acres on Sea Breeze Sound Road

and designating the formerly public roads as private streets, in a deal that cited the benefits of the privately funded water and sewer and “protection” of nearby natural resources. The TRC approved the parceling of 36 single family lots and the CCP plan that includes not only water and sewer but provisions to protect 5 acres of wetlands, a half acre of recreation area, 5 acres of open space, setbacks of 20 feet, building separation of 10 feet, maximum building heights of 35 feet, buffers, landscaping, tree retention, and a Homeowners’ Association. All that is missing is a wall and a gate, which the county refused to permit, but which the Sherbet Town on Freeman Beach across Myrtle Grove Sound (Figure 5) has to protect it from the *hoi paloi* of Carolina Beach.

Sea Breeze’s Future

It is not over yet. A few of the historic buildings still stand and some of the Freeman family members still live in Sea Breeze. Public historians and many former Sea Breeze vacationers, hundreds if not thousands of Wilmingtonians, have such fond memories of Sea Breeze that it will never completely die. However, it will surely be developed along the plan (Figures 6a and 6b), and style, of the current high status architecture that is pricing America’s middle class out of coastal access. Although development at Sea Breeze lagged in the economic crash of 2008, people who can afford water views have come back to southern New Hanover County and new construction was occurring by 2011.

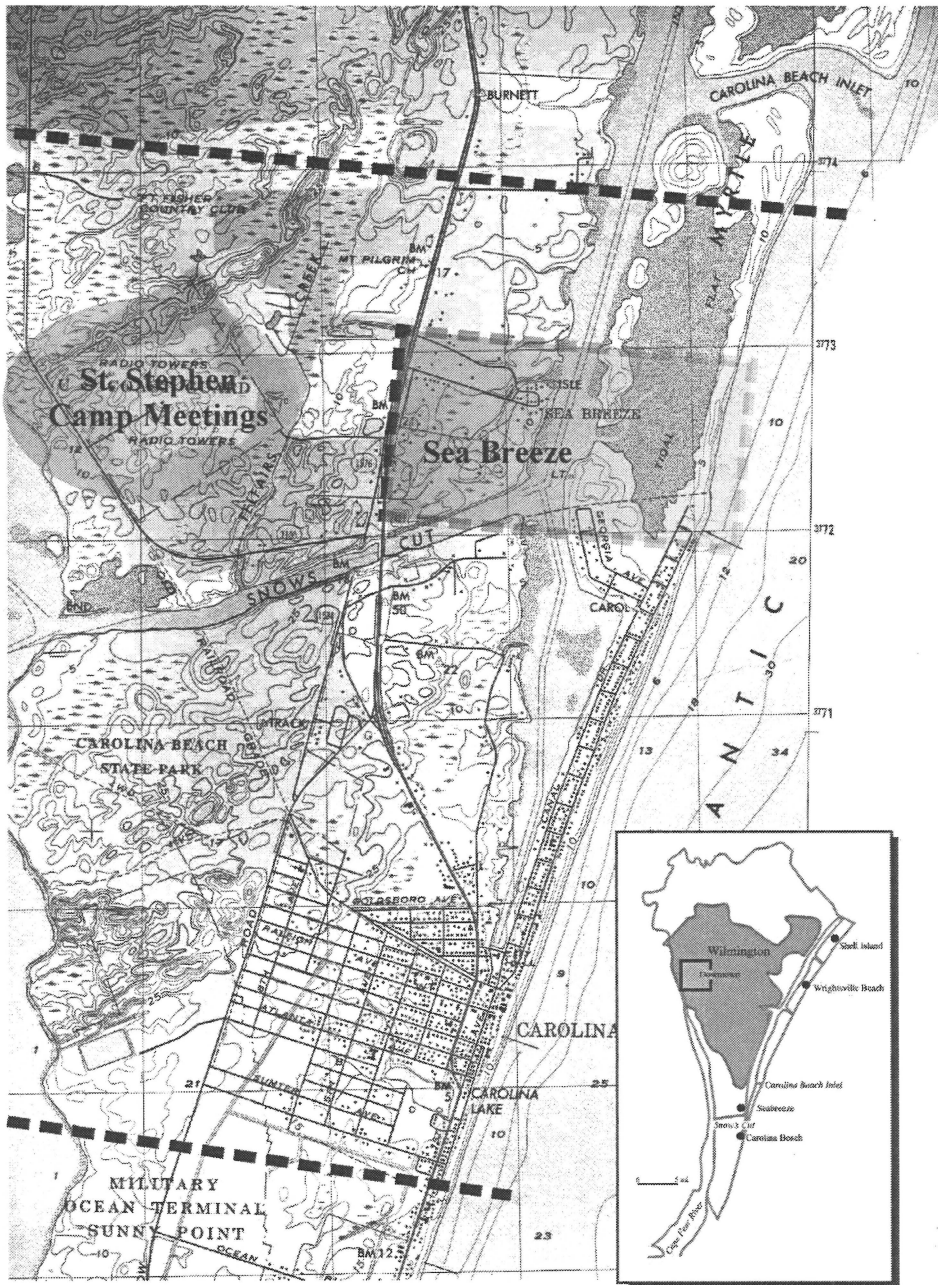


Figure 1. Approximate extent of Robert Bruce Freeman, Sr.'s land in 1902. Snow's Cut was dug in 1930, Carolina Beach Inlet in 1952. Source: Jenny Edwards interview.

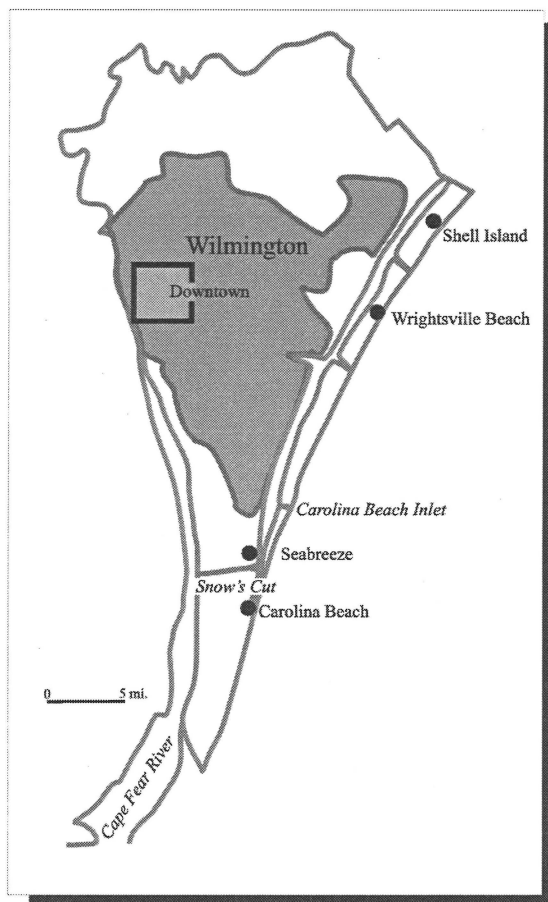


Figure 2. Beach communities in the vicinity of Wilmington.



Figure 3. The first Monte Carlo by the Sea at Sea Breeze, 1951. Source: Cape Fear Museum, Frank Hill Collection.

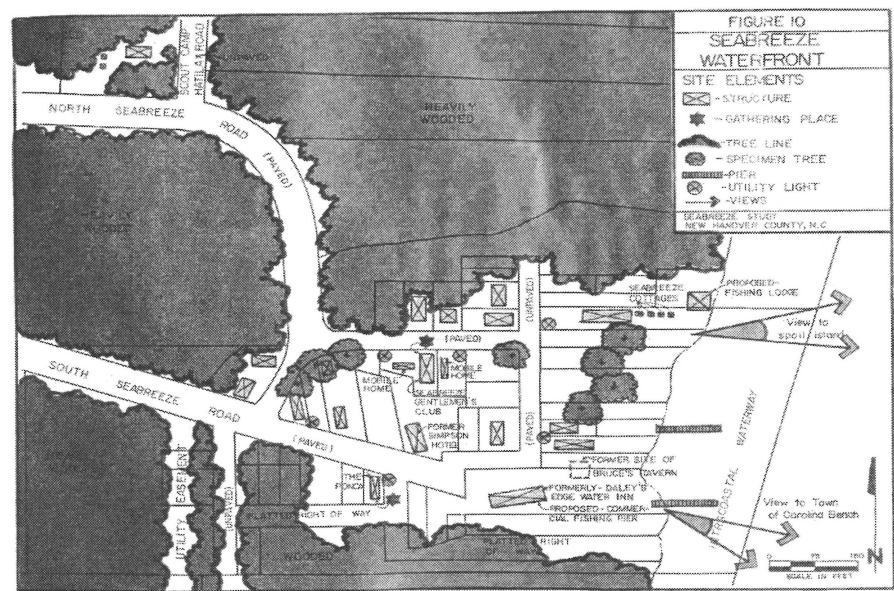


Figure 4. Plat of Sea Breeze village in 1988. Source: New Hanover County Planning Department



Figure 5. Sherbet Town on Freeman Beach.



Figure 6a. Aerial plat of the southern end of the county near Snow's Cut, 2005. Sea Breeze is seen in the western 2/3 of the white box. Sherbet Town is in the southeastern quarter of the box. Source: New Hanover County Planning Department.



Figure 6b. Most of Sea Breeze's 36 platted lots in 2009, as outlined in 6a. Source: New Hanover County Planning Department.

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25th Anniversary of the World Geography Bowl

Neal Lineback
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The World Geography Bowl (WGB) began in 1987 when a Syrian engineering student at North Carolina State University named Bashir Rabat challenged other North Carolina universities to bring teams to compete in a Jeopardy-style game focusing on international affairs. He called it the World Geography Bowl. The purpose of the bowl was to provide an opportunity for students from across North Carolina's educational institutions to meet in a friendly competition.

Appalachian State University (ASU) was invited to participate in the Spring of 1990. Neal Lineback took a team of eight ASU students to compete with teams from nine other universities. The bowl was held at Duke University, and ASU won in one of the most thrilling academic events Lineback had ever seen. He quickly saw the World Geography Bowl (WGB) as a vehicle to excite and attract students to professional Geography meetings.

That summer, Lineback challenged nine other southeastern states to bring a team of their best students to a World Geography Bowl competition at the meeting of the Southeastern Division of the Association of American Geographers (SEDAAG). The meeting and the bowl were held in Columbia, South Carolina, and every invited state arrived with a team. The South Carolina team won the inaugural SEDAAG WGB event. That night, faculty from many SEDAAG schools looked down from the convention center balcony, witnessed seventy students from all across the region playing music and

socializing. They realized the value of the WGB as a benefit to the Division and the discipline. For the first time, professional paper sessions were filled to overflowing with students. There were a few detractors after that first bowl, largely because of some poor questions written by a non-geographer. Lineback realized that the process would need to be refined by involving professional geographers in organizing the event and writing the questions. But in spite of the criticism, most geographers came away from that initial event convinced that WGB would be good for Geography at every level.

Robert Reiman (ASU) and Lineback wrote the question rounds for the 1991 SEDAAG-Asheville WGB in an attempt to raise the geographic content of the questions. Tom Deaton (Dalton State College) also came onboard that year, bringing extensive College Bowl experience that raised the level of professionalism of the event's organization. The New England and St. Lawrence Valley region of the AAG (NESTVAL) also sent Bryon Middlekauff (Plymouth State) to observe the southeastern event. After witnessing several exciting rounds of play the SEDAGG WGB organizers challenged him to bring a NESTVAL team to the AAG's national meeting in Atlanta in the spring of 1993. The two regions squared off in an exhibition game that was the first of its kind at a National AAG Meeting.

With more schools and teams wanting to get involved in WGB events, Lineback recommended to the SEDAAG

Steering Committee that it establish a standing WGB Committee in 1993. He invited one person from each state to join the Committee, plus anyone else who would be willing to serve, resulting in between 12 and 16 Committee members over the years. The original members were: Sanford Bederman (Georgia State), Thomas Deaton (Dalton College), Dorothy Mason (NC A & T), Robert Morrill (Virginia Tech), Robert Myers (West Georgia College), Victoria Rivizzigno (South Alabama), Robert Reiman (retired ASU), Harry Schaleman (South Florida-St. Petersburg), David Weaver (Alabama), and Neal Lineback (ASU). The Committee members wrote questions and Deaton and Lineback assembled them into question rounds. The Committee members also served as Moderators and Judges.

The SEDAAG WGB Committee became the WGB sanctioning body when Lineback was asked to write the official WGB Rules. The Committee passed those rules in 1994. Thomas Deaton became the official Judge at all WGB events and continued to serve in that capacity through 2002. At Deaton's recommendation, the events were changed from a single elimination format to a "round robin," whereby each team played every other team.

In 1994, Ron Abler (AAG Executive Director) authorized the purchase of four buzzer systems with AAG funds. Increased demand for buzzers followed, and two additional systems were purchased in 2000. The buzzers allowed for a more fast paced and accurate play system. They were housed at ASU and mailed out to any state or regional organization requesting their use. Users paid only the mailing costs. Abler also began authorizing travel funds for regional teams participating in National WGB events, thus greatly increasing opportunities for students to participate in National AAG meetings.

That same year (1994), James Young of ASU became the official Scorekeeper for the WGB. Jim designed scorekeeping forms for all events. He has continued in this

capacity to the present, providing accuracy in recordkeeping that was essential to the integrity of the events.

By 1996, Lineback, Reiman, and Deaton realized that the people who wrote WGB questions were not being rewarded adequately and recommended to the SEDAAG WGB Committee that it establish "signature rounds." Each signature round was to be written entirely by one or more people, whose name(s) would be attached as author(s). Signature rounds have encouraged greater participation at every level of WGB events--state, regional, and national.

Osa Brand (AAG) assumed the role of Chair of a National WGB Committee in 1998 to develop rounds and monitor the annual AAG meeting WGB. Brand, Deaton, and Lineback divided up the duties of operating the National event, but Dorothy Mason (NC A&T), Sanford Bederman (Georgia State), and Robert Reiman served as editors and as representatives from the SEDAAG WGB Committee, the sanctioning body.

In 1998, the SEDAAG WGB Committee authorized a very successful "student all-Star vs. faculty dream team" competition at the SEDAAG-Memphis meeting, an event that has been a popular part of the regional meeting ever since. In this event, professional geographers – usually officers of SEDAAG and the AAG – compete against a team of all-stars from non-finalist SEDAAG state teams. The all star competition provides students who do not make the finals a greater incentive to attend the final rounds of play, and motivates considerable friendly competition for seats on the team. The all star vs. dream team round often draws a huge audience of pro-student supporters.

Through academic year 2011-2012, there have been twenty four years of North Carolina WGB events, twenty one years of regional events, and nineteen years of national WGB events. East Lakes, Great Plains/Rocky Mountains, NESTVAL, Middle States

(MAD), and SEDAAG regions have staged regional WGB events since 2000-2001. MAD sent a team to play in the SEDAAG regional competition in 2002-2003. They now produce their own divisional World Geography Bowl competition as well.

During the fall of 2000, a high school version of WGB was initiated at Kennesaw State in Georgia. Since then high school team competition has been held in North Carolina (UNC-Pembroke) and West Virginia (Concord College).

A conservative estimate of student participation in all World Geography Bowl events over the past 25 years is about 12,000, with some 4,500 of those participating more than once. Some students have been so successful at the WGB, that a rules clause limiting them to four years of participation was added. More than 250 faculty members have been involved in writing questions, serving as judges and moderators, and participating as faculty players, question editors, and organizers.

It is impossible to determine the numbers of fans and supporters attending the events. An example would be the final rounds at the 2002 SEDAAG Richmond meeting, where spectators filled a 400 seat meeting room to overflowing. Finals at the SEDAAG meeting are regularly played to a full house, culminating in the ever popular Dream Team event. Perhaps because of the popularity of WGB, SEDAAG meeting organizers now plan for about a 50-50 split in registrations between the student and faculty categories!

Beginning in the fall of 2001, Laurence "Bill" Carstensen (Virginia Tech) and Lineback served as Co-Chairs of the WGB Committee for the SEDAAG-Louisville meeting. Following that meeting, Carstensen became the Organizer of the National WGB Event at the 2002 AAG meeting. At the end of 2001, Lineback stepped down as Co-Chair of the SEDAAG WGB Committee and Director of the National World Geography Bowl. He continued to serve as a regular member of the SEDAAG WGB Committee, assisting

Committee Chair Carstensen, Dorothy Mason, and Chief Judge Tom Deaton with editing question rounds.

Carstensen became Chair of the SEDAAG WGB Committee and the National Director of the World Geography Bowl and served in that capacity through the SEDAAG meeting in Birmingham in 2010, and the spring 2011 AAG National Meeting in Seattle.

Neal Lineback had turned over a well-oiled machine, so Bill's job was initially one of maintenance, but several innovations did appear in the WGB during Carstensen's time as director. At the suggestion of Steve Young from Salem State College in Massachusetts, the practice of using illustrated rounds began at the AAG meeting in Denver. Illustrated rounds now are a standard feature of the finals at the AAG and at SEDAAG. They are used in both student competition and the Dream team round as well. The illustrations not only considerably enlarge the possible questions by inserting visual cues from landforms, urban design, maps, etc., but they also provide the audience with a far superior experience as they play along with the teams up front. Dr. Carstensen has also added innovations to events by inviting teams from other regions and composite teams from the audience to serve as "spoilers," thus broadening the participation and excitement.

There have been a few foreign teams in the AAG event thus far (Canada and the UK), and that trend is likely to continue as the AAG National Meeting continues to grow in popularity as an international meeting. After the AAG meeting in Seattle, the job of director was split into two positions, one for the SEDAAG region, and another for the national event. Jamison Conley, a former player in the bowl while a student at Penn State took on the SEDAAG bowl. Jamison is an assistant professor of Geography at West Virginia University and has run the bowls at SEDAAG since the fall of 2011. For the national event, assistant professor Andrew Shears from the University of Wisconsin-Fox Valley has led the bowl since the spring of

2012. Andrew was also a noted WGB student player during his days at Kent State University. Both the bowls are in good hands and the future is bright.

So what lies in the future of the WGB? It is clear that as it has become better known nationally student interest has increased, participation is up, and the number of divisions putting on their own bowls is up. Early detractors have come aboard, and sometimes “stuffy academicians” get an annual chance to lighten up and have fun with our students and our profession. International competitions will someday appear at the AAG meeting, and the format of the WGB will need

to remain flexible to accommodate more and more teams wanting to participate.

Since its origins in North Carolina, the WGB's diffusion throughout the entire AAG in such a short time is a credit to the way in which it developed and to those who have been involved at every level. The WGB grew up in SEDAAG and remains a source of pride for the division. The directors and committee cannot thank the division and the AAG enough for the support that has made this shining example of student participation in professional meetings possible!

NCGS 2012 Educator of the Year -- Dr. Michael Mayfield

Michael Mayfield is the 2012 recipient of the NCGS Educator of the Year Award. Mike received his Bachelor's degree in Geography from Western Carolina University and his Master's and Doctoral degrees at the University of Tennessee. He taught at the University of Idaho and the University of North Carolina-Greensboro before joining the Appalachian State University faculty in 1988.

Mike has spent 24 years at the Department of Geography and Planning at Appalachian State, rising through the ranks to Professor and serving as Department Chair from 1998-2002. He also served ASU as Faculty Coordinator of General Education from 2007-2010 and as Interim Vice Provost for Undergraduate Education since 2010. Mike was named the Vice Provost for Undergraduate Education at ASU in November 2012 after a national search. He will continue to help shape and lead implementation of a changing undergraduate general education curriculum.

Mike has been recognized as an outstanding teacher with strong interests in undergraduate education and as a proponent of geography as a discipline. For example, he received the SGA Faculty Appreciation Award from the College of Arts and Sciences in 2008 and the UNC Board of Governors Teaching Award in 2000.

Mike has taught 21 different graduate or undergraduate courses in physical geography, primarily in his main research areas of water resources and the geography of rivers. In addition, for 15 years he led field courses for hundreds of students to Costa Rica, Ecuador, Peru, and across the western USA.

Mike is the longest serving GTU advisor in the ASU chapter, serving nearly 24 years in that capacity. He is a long-time supporter of the North Carolina Geographical Society and has published four articles in *The North Carolina Geographer* over the years. He also published two chapters in the Snapshots of the Carolinas (1996) and contributed to the Carolina Bays Bibliography led by Tom Ross, which was published in 2000. Mike also led the North Carolina greenhouse gas inventory as part of a Global Change in Local Places grant from the Environmental Protection Agency.

Dr. Kathleen Schroeder, Chair of the Geography and Planning Department said "Mike has long been recognized as one of the best teachers at Appalachian State University. He received the UNC Board of Governor's Excellence in Teaching Award in 2000 and has been nominated for, or received, virtually every teaching award that we have. Students appreciate his depth of knowledge, preparation and kindness. I could easily provide a long list of Mike's former students that are geographers today because of his influence."

The North Carolina Geographical Society is pleased to present the 2012 Educator of the Year Award to Michael Mayfield.

Christopher A. Badurek, President, North Carolina Geographical Society

Guidelines for Authors

The North Carolina Geographer is an annual peer reviewed journal published by the North Carolina Geographical Society. It serves as an outlet for the dissemination of research concerning topics of regional interest. The journal publishes research articles, a section on Carolina Landscapes that includes descriptions of emerging and interesting features of the region, book reviews, and conference reports. Contributions from faculty, students, professional practitioners, and independent scholars are welcome.

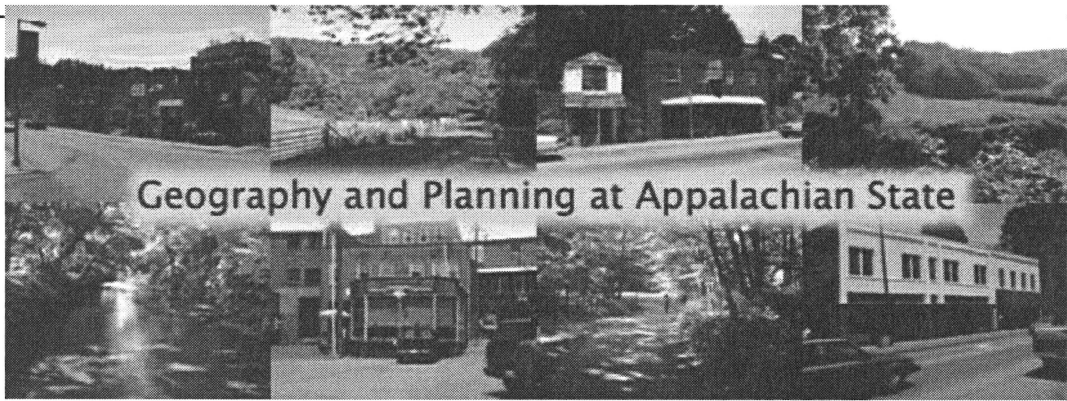
All manuscripts submitted to *The North Carolina Geographer* should adhere to the following guidelines and be in acceptable format ready for peer-review.

- ❖ Only original, unpublished material will be accepted. Submission by electronic means is encouraged. Paper copies may also be submitted through the mail. A separate title page should include the authors name(s) and affiliation(s). An abstract giving the key purpose and findings of the article should follow on a separate page. The first page of text should begin with the title, but not include authorship.
- ❖ All manuscripts should be ready to print single sided on standard 8.5 X 11 inch paper, double spaced, with 1.25 inch margins, using 10 point type. Times Roman type font is preferred.
- ❖ References are to be listed on separate pages, double spaced, and follow the Publication Manual of the American Psychological Association (APA style guide) as used in journals published by the Association of American Geographers (*Annals*, or *The Professional Geographer*).
- ❖ Figures and tables should be submitted on separate pages at the end of the manuscript. Electronic versions or figures or maps should be in .TIFF format to provide for the best reproduction in the journal. Also provide a list of figures and tables on a page separate from the main text of the manuscript.
- ❖ High quality black and white images may be included. Original digital images are preferred to paper photographs.

Submit manuscripts to: michael.lewis@uncg.edu

Michael E. Lewis, Editor *The North Carolina Geographer*
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 Greensboro, NC 27402-6170

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Geography and Planning at Appalachian State

DEGREES OFFERED

B.A in Geography
B.S. in Geography (teaching)
B.S. in Geography (general concentration)
B.S. in Geography (geographic information systems)
B.S. in Community and Regional Planning
M.A. in Geography with thesis or non-thesis (general geography or planning concentrations) options

RESEARCH FACILITIES

The Department occupies the third and fourth floors of a soon-to-be renovated science facility and contains three computer laboratories for work in computer cartography, GIS, and image processing. The laboratories have numerous microcomputers networked to each other and to the campus mainframe cluster. Appropriate peripherals include digitizers, scanners, printers, and plotters. The Department maintains a full suite of professional GIS, image processing, graphic design and statistical software applications in its laboratories. The Department is a USGS repository, and its map library presently possesses over 100,000 maps and 5,000 volumes of atlases, journals, and periodicals; and is also a repository for census material available on CD-ROM including TIGER files, DLGs, and other digital data.

GRADUATE PROGRAM

The Masters program in geography is designed to provide students with a relatively broad range of academic and professional options, preparing them for Ph.D. work in geography and planning, professional applications in GIS, or opportunities in teaching at all educational levels. Accordingly, thesis or non-thesis options are offered with the non-thesis option requiring an internship in regional, urban, or environmental analysis and planning. In addition, the Department participates in a program leading to the Master of Arts degree in Social Science with preparation in geographic education.

For further information, please see: www.geo.appstate.edu
Department Chair: Dr. Kathleen Schroeder (schroederk@appstate.edu)
Program Inquiries: Kathy Brown (brownkv@appstate.edu)



Department of Geography

PROGRAMS AND RESEARCH FACILITIES

Undergraduate tracks include the B.A. in Geography and the B.S. in Applied Geography. The former is a broadly-based geography program, drawing courses from human and physical geography, as well as techniques. The latter has a strong emphasis on spatial analysis, and requires an internship in a state agency or private firm.

At the graduate level the Department specializes in human geography, physical geography and spatial information technologies, and supports a variety of philosophical and methodological approaches within each of these areas. Students are encouraged to develop their research in conjunction with faculty, and to disseminate their findings via professional meetings and journals. Faculty expertise is clustered around the following:

Economic Geography: development policies, practices, and impacts; urban and rural restructuring; and geographic thought (political economy, feminist theory, critical geopolitics).

Cultural Geography: community development; tourist landscapes; cultural ecology; and field methods.

Coastal Plain Geomorphology: coastal geomorphology (aeolian processes and dune formation); drainage basin hydrology; fluvial geomorphology; soil geomorphology; and environmental management (natural hazards research, land and water use planning).

Spatial Information Technologies: geographic information systems (watershed/environmental modeling, topographic effects on digital data); remote sensing and image processing, computer cartography (global databases and map projections), and spatial quantitative methods.

Regional Specializations: Africa-East; Africa-South; Asia-South; Caribbean; Middle East; North Carolina; Western Europe.

Faculty are actively engaged in research in all four clusters, and have received multiple-year grants from, amongst others, the U.S. Department of Agriculture, the National Science Foundation, the New Jersey Sea Grant Program, N.A.S.A. and the U.S. Forest Service.

The department maintains both a fully equipped physical geography laboratory and a Unix-based Spatial Data Analysis Laboratory. The physical geography laboratory is designed for mechanical analyses of soil and sediment, but also includes state-of-the-art GPS, electronic surveying equipment, and instrumentation for monitoring hydrologic and aeolian processes and responses. The spatial laboratory consists of ten Sun workstations, a large format digitizer, and an Esize DesignJet plotter for teaching and research. Primary software includes Arc/Info, ArcView, and Imagine. A PC-based cartography laboratory was recently established. Students also have access to a wide variety of university facilities including the Institute for Coastal and Marine Resources, the Regional Development Institute, International Programs, and the Y.H. Kim Social Sciences Computer Laboratory. The Kim laboratory provides access to PC-based software such as Adobe Illustrator, ArcView, Atlas*GIS, IDRISI, SAS, SPSS, and Surfer.

FOR CATALOG AND FURTHER INFORMATION WRITE TO:

Undergraduate Catalog: Director of Admissions, Office of Undergraduate Admissions, East Carolina University, Greenville, North Carolina 27858-4353.

Tel.: (919) 328-6640. World Wide Web: <http://www.ecu.edu/geog>

Graduate Catalog: Graduate School, East Carolina University, Greenville, North Carolina 27858-4353.

Tel.: (919) 328-6012. Fax: (919) 328-6054.



The Department of Geography and Geology at the University of North Carolina Wilmington offers a Bachelor of Arts degree in Geography. Students who pursue the B.A. degree in geography may choose from a broad, flexible program that meets personal educational goals and interests, including careers and graduate study in physical, human or applied geography. The Department of Geography and Geology also offers a minor in Geospatial Technologies. The minor enables students to achieve a documented expertise in geographic techniques which can then be leveraged to gain employment in the expanding GIS job market. UNCW Geography also supports a vibrant internship program that places students in a wide variety of professional agencies in southeastern North Carolina.

There are three options of concentration for students in the Geography Program at UNCW:

The **applied geography** option is designed for students who are interested in careers as planners, GIS specialists, and historic preservationists.

The **human geography** option is designed for students who wish to pursue a career as regional specialists, international business officials, and social scientists.

The **physical geography** option is designed for students planning careers as meteorologists, climatologists, geomorphologists, and hydrologists.

Faculty research interests include settlement geography of the South, fluvial systems of the Coastal Plain, applied climatology of islands and coasts, GIS applications in watershed management, and the racial landscape of the South. Students are encouraged to participate with faculty in their research and also pursue individual research projects. The geography program makes extensive use of computers for both laboratory and classroom instruction. The department maintains state-of-the-art Spatial Analysis Laboratory (SAL), Cartography Laboratory, the Laboratory for Applied Climate Research (LACR), and a Sediment Analysis Laboratory.

For more information, contact

Dr. Doug Gamble

Department of Geography and Geology

University of North Carolina Wilmington

601 South College Road

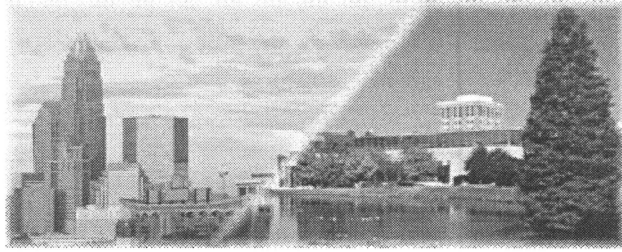
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Fax: (910) 962-7077

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Graduate Programs at The University of North Carolina at Charlotte



Ph.D. Program in Geography and Urban and Regional Analysis

The Ph.D. program focuses on two interconnected research themes: multi-scalar analysis and GIScience. Pairing technology and theory in the core curriculum, the doctoral program is designed to prepare graduates for research positions in the public and private sectors, as well as academic careers. Doctoral assistantships carry stipends of \$13,000 plus healthcare insurance, and a tuition waiver.

For further information contact Dr. Owen J. Furuseh, Director Geography Ph.D. Program at: ojfuruse@uncc.edu or via telephone at 704-687-4253.

Master of Arts in Geography Program Concentrations

Community Planning Track students are awarded the M.A. in Geography and complete a formally structured multi-disciplinary core curriculum with course work in Geography, Architecture, Economics and Public Administration. The Track has an excellent placement record.

Location Analysis Concentration students prepare for careers with retailers, real estate developers, consulting firms, commercial banks, and economic development agencies. Course work is offered by practicing professionals and focuses in: Retail Location, Market Area Analysis, Real Estate Development, Applied Population Analysis, Real Estate Development, and Industrial Location.

Urban-Regional Analysis Concentration trains students for public and private sector planning economic development and Geographic Information Science. Course work may be concentrated in one of the following areas: Economic and Regional Development, Site Feasibility Analysis, Urban Development, and Geographic Information Science.

Transportation Studies Concentration is affiliated with the University's Center for Transportation Policy Studies. Students pursue course work in Transportation Systems Analysis, Transportation Modeling, and Transportation Policy Analysis. Careers are available in public and private sector agencies and in consulting firms.

The M.A. program has a limited number of out-of-state tuition waivers and a significant number of graduate teaching or research assistantships. Typical stipends include awards of \$10,000 for the academic year. Current full-time students receive financial support via assistantships or via contract work.

For further information, visit our website at <http://www.geoearth.uncc.edu/> or contact Dr. Tyrel G. Moore, Graduate Coordinator, Geography M.A. Program at tgmooore@uncc.edu, or via telephone at 704-687-5975.

GEOGRAPHY

The University of North Carolina at Chapel Hill

The University of North Carolina at Chapel Hill is the oldest state university in the country and is one of the nation's premiere public institutions, with extensive and state-of-the-art resources and a range of nationally and internationally recognized academic programs. Set within this environment is Geography, a collegial, dynamic, and highly productive department of 16 faculty, including national and international leaders in areas of human geography, earth systems science and geographic information science. Geography offers the B.A., M.A., and Ph.D. degrees, with most graduate students pursuing the doctorate. The department enjoys excellent collaboration with a set of leading interdisciplinary programs on campus, including the Carolina Population Center, Carolina Environment Program, Shep Center for Health Services Research, Center for Urban and Regional Science, International Studies and Latin American Studies.

Undergraduate Program. UNC's Department of Geography offers a broadly based B.A. degree with concentration in three areas-the geography of human activity, earth systems science, and geographic information sciences. A well-equipped teaching lab directly supports undergraduate teaching and research in Geography, while a range of state-of-the-art facilities can be found at several venues on campus. Students are urged to participate in the University's superior undergraduate programs and resources, undergraduate research, and internships. The department has a student exchange program with Kings College London.

Graduate Program. Our graduate program reflects our ongoing commitment to the highest quality research and our intention to continue to direct resources toward our primary research strengths: Earth Systems Science, Geographical Information Sciences, Globalization, Social Spaces, and Human-Nature Studies. These areas are integrated in individual and group research projects, while interdisciplinary cooperation is also highly valued. Reciprocal agreements with other universities in the Triangle allow graduate students to take courses at Duke University and North Carolina State. Funding is available through fellowship, research assistantships and teaching assistantships. Current graduate research is carried out both locally and globally on six continents with funding from a range of agencies including NSF, NASA, USDA, HUD, NIH and EPA as well as a set of private endowments. Recent graduates have regularly found positions in leading universities, government agencies and private enterprise.

Contact: Dr. John Pickles, Chair of Geography (jpickles@unc.edu) or see:
<http://geography.unc.edu/programs>

The North Carolina Geographer

Volume 19 2012

Research Articles

Local Government Boundary Change in Brunswick County,
North Carolina: 1990 – 2010

Russell M. Smith and Aaron Fennell, Winston-Salem State University

Assessment of GIS Methods for Mapping Perceptions of Forested
Landscapes in Western North Carolina

Christopher A. Badurek and Eric Frauman, Appalachian State University

Using GIS To Address Food Availability in Durham, North Carolina

Garrett Love, Timothy Mulrooney, and LaDonna Brown
North Carolina Central University

Carolina Landscapes

Sea Breeze to Sherbet Town: An Historic African American
Beach Resort Lost to Affluenza

Elizabeth Hines, University of North Carolina-Wilmington

25th Anniversary of the World Geography Bowl

Neal Lineback, Appalachian State University

Laurence "Bill" Carstensen,

Virginia Polytechnic Institute and State University

NCGS 2012 Educator of the Year Award

Michael Mayfield, Appalachian State University

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