A GEOGRAPHICAL ANALYSIS OF

U.S. GOLF ARCHITECTS

By

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1991

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1994

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 1996

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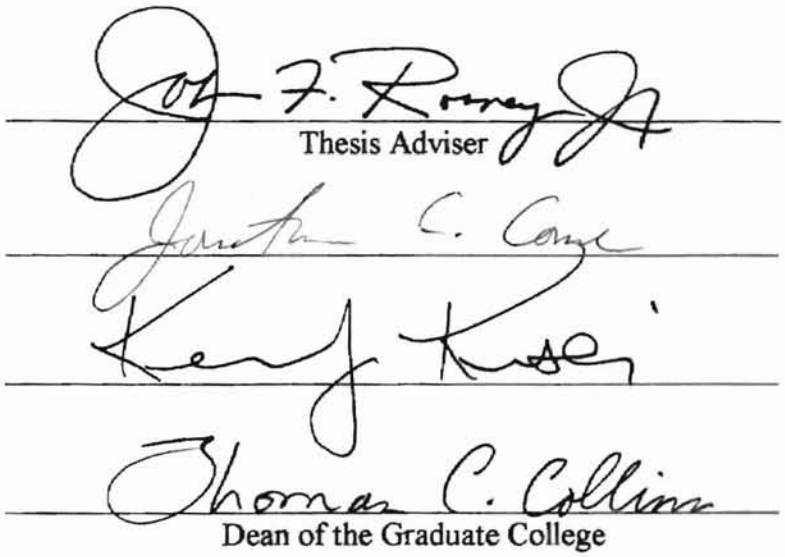
Thesis Approved:



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ACKNOWLEDGMENTS

I would like to begin with a special thanks to Dr. John Rooney for his guidance throughout my time at OSU. Dr. Rooney has been instrumental in improving my writing, sentence structure, and general thought process. In addition, I would like to thank Dr. Jon Comer and Dr. Ken Kiser for making up the rest of my committee.

More thanks goes to the people that have "tolerated" me in the Geography Department. Susan Shaull and Kimberly Cundiff have been exceptional when I needed anything faxed, Fed-Exed, typed, or make change for a Coke. To friends like Eric Hardy, Darin Lee, Tyler Kisling, Ed Clow, Matt Bell, Kevin Koon, Luke Marzen, Andrew Plackner, Brian Frye, and Mahesh Rao.

I appreciate all the support and encouragement that Ray and Donna Hagler during my life. My sisters Renee and Dawnita have always been there when I needed them. You are the best sisters a great guy could ever have. To John and Dawnita who have always been faithful to pick up the meal ticket when they knew I was running low on funds. Thanks to friends like Jamie Cozzens and Shawn Mullens in Arkansas, and the telephone that has always kept us close. Last but not least, I would like to recognize Lisa Milligan. She is not only my wife to be, but she is also my best friend. Thanks everyone.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure Page

CHAPTER I

INTRODUCTION

American sports have played a key role in the development of our culture. The broad scope of sports has changed our lifestyle and our landscape. Sports figures are among the most popular in the national spotlight. People interested in sports can take on the role of spectator or actual participant. Golf has allowed the public to do both.

Golf, like all other sports, has changed considerably since its invention. With better teaching techniques, equipment, and greater understanding of the game, golfers have been able to push their skills to higher limits. It is here that golf course architecture plays such an important role. Golf would certainly not have grown to its present level had it not been for the great number of strategic, challenging courses designed by architects. Since the first permanent golf club in the United States was founded in 1888 inYonkers, New York, golf has positioned itself as one of the premier recreational sports in the country (Adams and Rooney, 1985: 419). Once introduced, golf spread rapidly, thus requiring many new courses to keep up with the demand. American golf course architects had to design and construct courses to cope with the rapid expansion, as well as the technological advancements in golf equipment.

The first golf boom occurred during the 1920's - the Golden Age of Sport (Adams and Rooney, 1985: 423). The rich and affluent fell victim to the popularity of the game and financed the construction of over 4,000 new golf courses which were concentrated in

the Northeast and North Central regions (Adams and Rooney, 1985: 424). However, many of these courses were private organizations that required the purchase of a club membership.

In the late 1950s, a new boom in golf course development occurred. During this growth period, more people were introduced to the game through television coverage. The American middle class had found a new, challenging, and humbling sport. During this growth phase, over 6,000 courses were constructed (Adams and Rooney, 1985: 424). The courses that were constructed were relatively inexpensive compared to club memberships, and gave the many middle income Americans their first chance to experience the game. Who were the architects that built these courses? Where were they building them? Do these courses still exist? These are only some of the questions that I will attempt to answer.

Justification of Research

There have been a great number of books, volumes of information, and huge databases that have dealt with the game of golf. However, there has been one aspect of the game that has gone relatively unnoticed. This is the golf course architect, the person who puts most of the components of golf together. The architects have expanded the game of golf to its present level. They are responsible for providing the very cornerstone of the game (Jones, 1993: xi, Introduction). The game of golf would not have evolved to its present level had it not been for the foresight of great architects. These individuals are responsible for pushing amateur and professional players to new levels of competition.

Each architect produced a unique distribution pattern of golf courses. The golf courses constructed by these architects are depicted spatially here for the first time. There has been little or no research done on the spatial distribution of golf course architects. New insight will be gained by observing the courses' placement throughout the American landscape. The financial aspects of spatial knowledge of the best architecturally courses are seemingly limitless.

Problem Statement and Hypotheses

Architects are constantly trying to make courses more challenging and innovative with each new course that is built. The genealogy of architects is passed from teacher to pupil throughout the building process. With every great architect there is always a great teacher who has nurtured and taught him well.

There has been no attempt to spatially analyze the distribution of golf course architecture in the U.S. Great architects such as Donald Ross, Alister MacKenzie, Perry Maxwell, Robert Trent Jones, and many more have shaped the American golf landscape with their unique and individual designs. The patterns and distribution of their courses are scattered throughout the U.S.

It is my intent to put some spatial order to this somewhat chaotic building pattern of golf courses. The purpose of the research is to analyze the spatial patterns associated with the work of the specific architects utilizing the Database of Golf in America. This database contains information on number of holes, ownership, management, and overall use of the U.S. golf courses. The Database of Golf in America is a unique supply and demand database. It is the only existing database that provides a complete supply-and-

demand perspective for zip codes, counties, Metropolitan Statistical Areas (MSAs) and states. The Database of Golf in America is the property of Golf Digest and the New York Times Leisure Division. The database is updated and managed at Oklahoma State University. However, it contains no information on the architects who design the courses. The quality of a course is associated with the designer. This study will concentrate on ranking the known architecturally designed courses by MSA's (Metropolitan Statistical Areas) and states. The MSA's and states will then be quantitatively ranked by determining the known versus unknown architectural courses. The following hypotheses are:

1) The spatial distribution and location of the individual architect's courses will produce specific regional patterns.
2) Architect designed courses will represent a higher percentage of courses in states which have experienced their greatest growth since 1960.
3) MSA counties will have a higher percentage of architect designed courses than non MSA counties.
4) The works of traditional architects will be more spatially confined than modern and postmodern architects.
5) Nine hole courses (Par 3, Executive) in the Nine Hole Golf Regions are less likely to architecturally designed.

CHAPTER II

LITERATURE REVIEW

Introduction

The literature review will begin with a background look at the geography of sport in America. Sources cited provide an overview of the places and events that have been instrumental in shaping our sports heritage. After the framework for the sports backdrop has been set, the emphasis will turn to literature on the subject at hand which is golf course architecture. This section will deal with the information presented for various aspects of golf course architects, their thoughts and ideas, and courses that are related to these architects.

Sports Geography

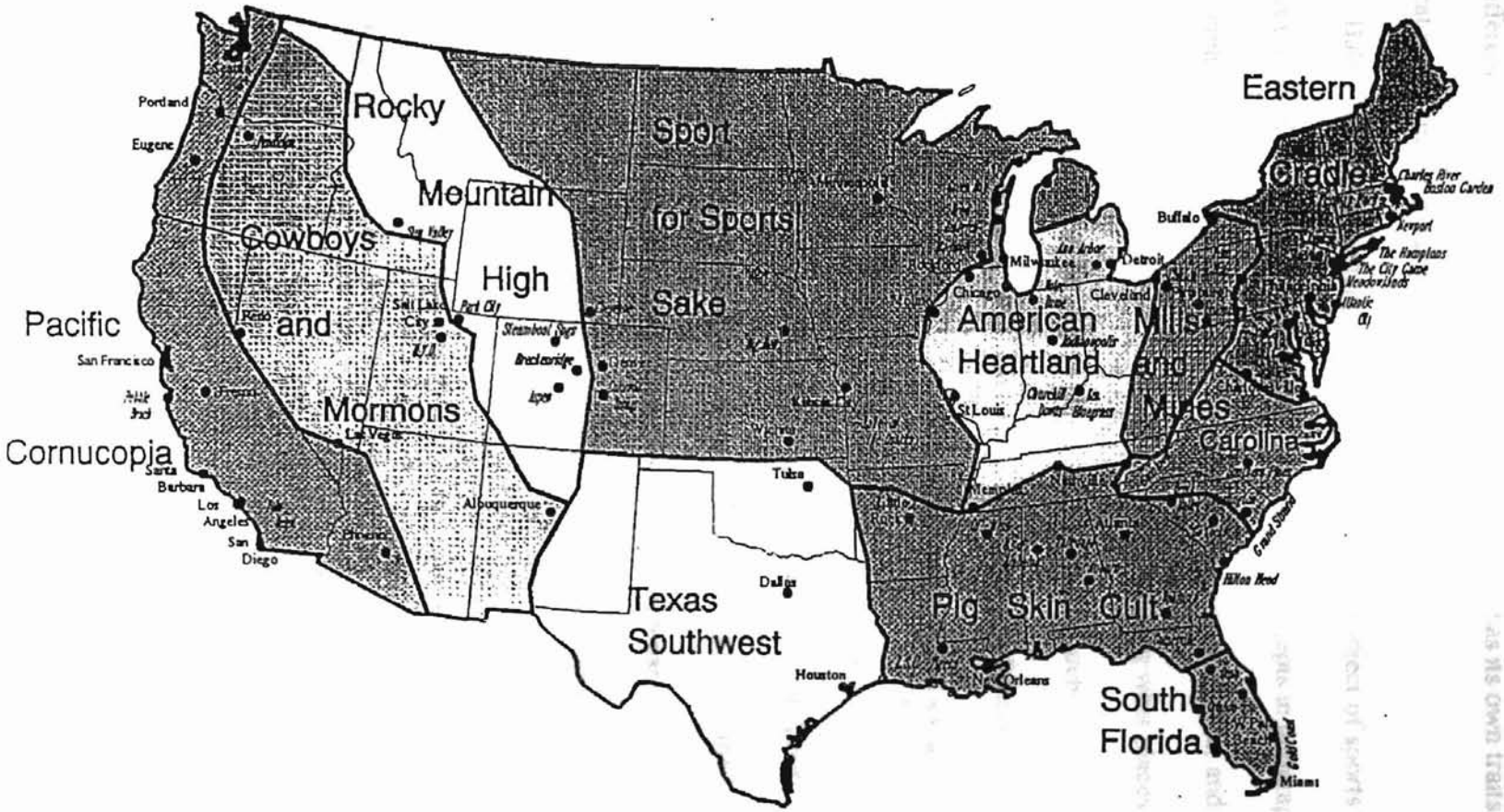
Since Rooney's early works (1969, 1974, 1975), the interest in the geography of sport has dramatically increased. With The Geography of American Sport (1974), Rooney set the stage for the development of the sports sub field within geography. The scope of geography will forever be changed with this unique work. The book is concerned with the locational analysis and spatial behavior associated with sports in the U.S. The dynamic field of sports offers a geographical study of many different aspects of the "sporting community". The focus is on the spatial variation and spatial organization of sport.

Rooney examines the impact of spatial organization on the intensity of competition and fan interests. Other topics discussed include the origin and diffusion of games and players, sport regions, and the effect of sport on the landscape. Attention is also given to sports and national character, and the unique character of place. All of these attributes give the book a unified theme which tie it together.

Rooney's The Recruiting Game (1980 and 1987), follows the recruitment of collegiate athletes over the span of three decades. Never before had the spatial aspect of recruiting been considered. The scope and depth of recruitment has changed considerably during a short span of time. The book gives an insight into the recruitment patterns of major basketball and football powerhouse teams throughout the U.S. Evidence of spatial and regional pattern tendencies are illustrated through the use of maps and data analysis.

The recruitment process is a vital part of keeping intercollegiate sports alive. One integral part of recruiting deals with the spatial variation in production of the athletes. The best athletes are invariably coming from certain "hot spots" of the country in their prospective sports. For example, the Northeast, South, and California tend to be the best places for the recruitment of football stars. In basketball, Illinois, Indiana, and Kentucky have the greatest surplus of basketball talent.

Rooney and Pillsbury's Atlas of American Sport (1992) depicts the great variations in sports for the relatively short periods of 1974 to 1992. In the Atlas of American Sport, the country is divided into eleven distinct regions. The are: Pacific Cornucopia, Cowboys and Mormons, Rocky Mountain High, Texas Southwest, Sport for Sport's Sake, American Heartland, Pigskin Cult, Mills and Mines, Eastern Cradle, Carolina, and South Florida (Figure 1). These regions are strategically designed to group areas of the country



Source: Rooney and Pillsbury (1992)

FIGURE 1. THE ELEVEN SPORTS REGIONS OF THE U.S.

which portray their own individual type of sports, participation rates, and support from different avenues of the sporting world. Each region has its own traits and characteristics that reveal the personality of people who inhabit it.

Bale's Sports Geography (1988) also looks at the subject of sports through a geographical perspective. Bale sees two recurring concepts in geography which gives this discipline a unique characteristic. The concept is space and place, and the subject is associated with 'knowing where things are' and 'knowing what places are like'. Since sports is difficult to define, Bale is concerned with accurately categorizing sports as it relates to the geographic diffusion and location of sport phenomena. He state that the aim of the book is to "draw together a scattered literature and in so doing introduce students to a new perspective on both sport and geography".

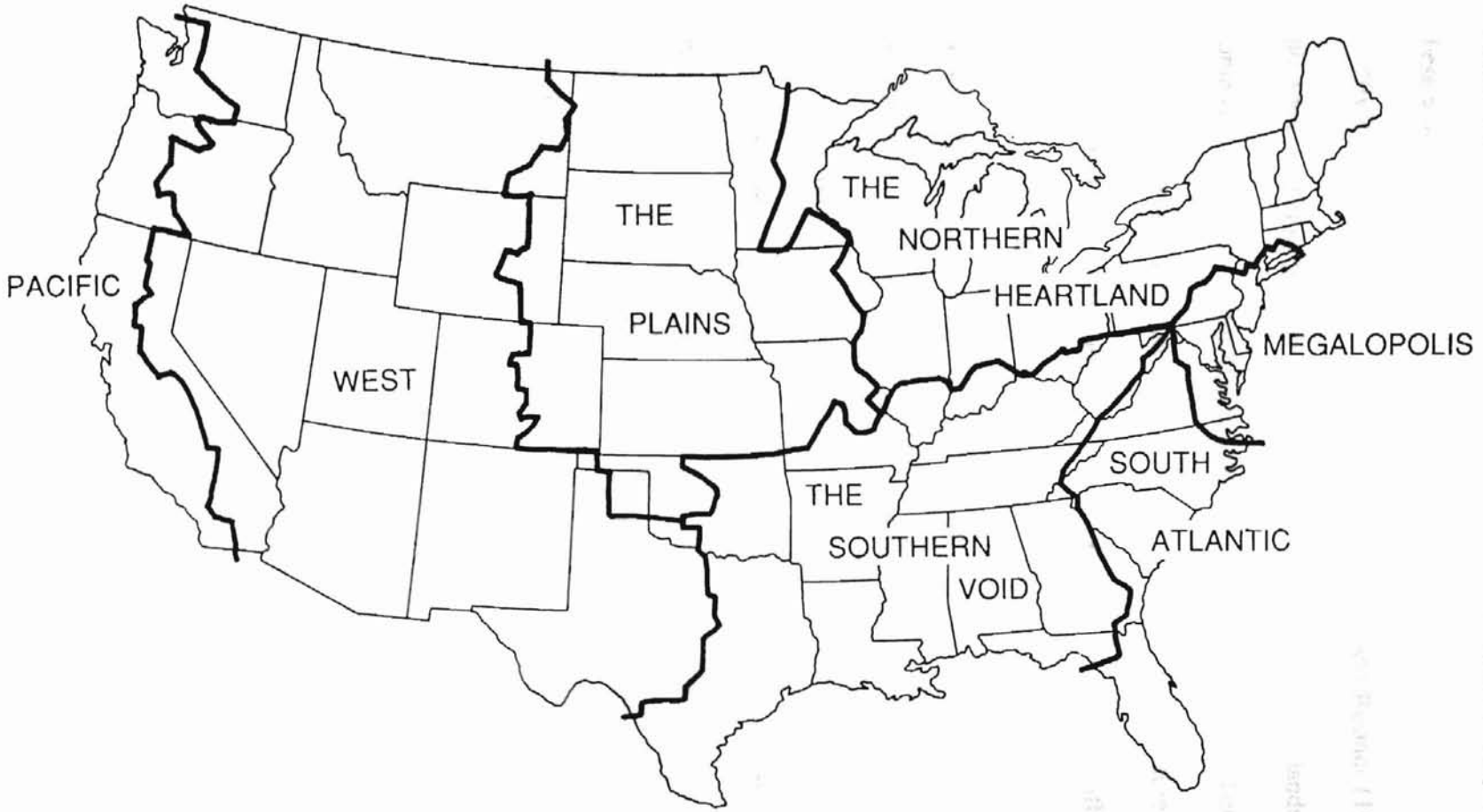
Bale relates the entire baseball playing field as a symbol of America's past. He sees the infield diamond as the urban core of our society. This is where the busiest and most sophisticated interaction takes place. The infield is compared to the supporting hinterland where activity is present but is less crowded. Finally, the outfield is considered to be the last frontier. This is where the danger and action takes place. His analogy of the baseball playing field does show similarities to that of our spatial ideas about urban, suburban, and rural settings within the American landscape.

Geography of Golf

Adams and Rooney's "American Golf Courses: A Regional Analysis of Supply" (1989) is a good source for the supply of golf throughout the U.S. The article divides the nation into seven regions of golf: West, the Plains, the Northern Heartland, the Southern

Void, Megalopolis, South Atlantic, and Pacific (Figure 2). These seven distinct regions show the national distribution of golf holes, per capita accessibility, and the ratio of public versus private courses. The Northern Heartland is considered to be the "traditional center" of the golfing region of the U.S. An estimated 40% of golf holes are located within this region. The Southern Void, on the other hand, is considered to be one of the worst served regions across the nation. The Plains show a trend of high per capita access, particularly in the sparsely populated/non metropolitan areas. The South Atlantic has been very fortunate to find more and more golf participants through the tourists/retirees that have come to play in a more favorable golf environment. The West has shown significant growth in the Southern portion. There tends to be a high rate of golf facilities in this region. The Megalopolis has the largest number of people in this region. The Megalopolis has a strong heritage and golfing tradition. However, it is the worst served region in the U.S. Finally, the Pacific has had trouble with keeping up with supply due to the growing population. Also, existing golf courses have been shut down due to the alternative use of land for real estate, business, and other more valuable land use (Adams and Rooney: 1989:8).

Also, there have been several other articles by Rooney that deal with the ever changing world of the golfing industry. "An Analysis of Regional Golf Supply in the U.S." (1989). deals with a lot of the same information that was found in "American Golf Courses: A Regional Analysis of Supply" by Adams and Rooney (1989). The analysis is based on the differences of supply and demand in each specified region. This article, along with "The Changing U.S. Golf Market" (1989) set the tone for generalizations that could be set for



Source: Rooney and Adams (1989)

FIGURE 2. THE SEVEN GOLF REGIONS

certain areas of the country. Rooney has shown the trends of the golfing market through these works.

"Evolution of American Golf Facilities" by Adams and Rooney (1985) gives an insight into the conception and spread of golf throughout the American landscape. A brief summary of the history of golf establishes a firm base on which to build. Golf had tremendous growth between 1888 and 1900. By 1920, golf had spread throughout most of the country. In the beginning, golf was designed for the upper, affluent class. However, this changed with the production of more courses. More public courses were being built in order to keep up with the demand. Access to courses is still subject to many variables that cross economic, racial, and many other limiting factors.

Rooney and Adams (1989) bring to the forefront the uncertain future of golf development in the U.S. With the rising costs of land, labor, equipment, and other essentials, golf construction is bearing the financial burden. Golf courses are now competing with commercial, industrial, and real estate organizations that realize the monetary potential of the land. As with all businesses, golf has had to adapt in order to survive.

Golf Course Architecture

The Architects of Golf (1993)is the revised edition of The Golf Course (1981) written earlier by Cornish and Whitten. The Architects of Golf is the primary source of information which will be used to show the spatial distribution of courses. Present golf courses are objects that can be dealt with in three ways. First, courses can be totally reconstructed. This method gives little credit to the original architect. Secondly, a course

can be restored to show the original architect's design and thought process. Thirdly, a course can be renovated to make changes to the course but keep its original framework.

The Golf Course is the original work that traces the history of golf to its present status. The book begins with the history of golf, and its evolution on the links of Scotland. From here the game of golf diffused to the British Empire. The first course in England was built at Blackheath in 1608. It is clear that golf spread from Great Britain to North America. However, there is some question as to when and how it sprang up in the U.S. Several courses made claim to the fact that there course was the first one in the U.S.

The most important period time period in golf course architecture was during a span of fifteen years, from 1900 to 1914. This seemed to be a transitional period for golf architects such as Alister MacKenzie, C. H. Alison, and H.S. Colt. For the very first time, golf course architecture was considered a full time profession. Before, golf course architecture was mainly a sideline for a greenskeeper or club pro.

The Golf Course goes on to say that John Reid, the Father of American Golf, founded the first golf course in Yonkers, NY. The focus of the book concentrates on the Pennsylvanian influence such as Oakmont County Club, Mount Airy Country Club, and the Philadelphia Country Club. The Pennsylvania influence helped to shape the overall style for courses that preceded the Roaring Twenties.

The Roaring Twenties was considered the Golden Age of Course Design as referred to by Cornish and Whitten. Many of these courses were planned by British architects. A culturally mixed group of architects such as Alister MacKenzie, Donald Ross, and Perry Maxwell rose to the front of the architecture class. These architects would set high golf design standards for architects that were to follow.

During the years 1932-1952, only 200 new courses were opened for play. In the same time span, there were 600 courses that would be closed forever. During the Depression, times were hard with golf construction clients defaulting on huge sums of money that was never paid to the contractors. Many architects lost huge amounts of money while trying to save the courses that were already under construction. Perry Maxwell was probably the most "visible" architect in America during the Depression. This was due in part because Perry Maxwell had enough personal wealth to continue building courses without the aid of investors. The book continues with the evolution and spread of golf throughout the U.S.

The Architects of Golf is broken into three parts. Like the initial publication, The Golf Course, the revised edition of The Architects of Golf gives similar accounts of the history of golf course architecture. The first section deals with the design alterations from the beginning to the present. The second section lists all of the relevant architects, and a brief description of their style of design. The third and final section lists more than 12,000 courses throughout the world, and their designers. However, in this thesis, it was necessary to choose only the courses in the continental United States. This is due to the fact that Alaska and Hawaii was spatially separated from the U.S. To include these states would present a bias toward the earlier group of architects who did not have as advance transportation.

The Golf Course: Planning, Design, Construction, and Maintenance is a very insightful book which deals with the philosophy of designing a golf course. The book explains the etiquette and procedure that goes into planning, designing, and eventually building the course. A step by step process is given the reader to better understand everything from sand bunkers to putting surfaces.

In Golf by Design, Jones, Jr. (1993) breaks down all phases of golf course design. He chooses courses from around the world to illustrate an idea that is trying to be conveyed. Ultimately, Jones, Jr. tells the player how to look at a golf course from the viewpoint of the architect. In turn, the golfer can better prepare himself/herself to play the course. Robert Trent Jones, Jr. likens the game of golf to chess. Like chess, golf is a game of wits and knowledge. The architect takes the role of the defender against the golfer who is trying to conquer the hole. He states that there are six geographic categories of courses: links or seaside, prairie, parkland, desert, mountain, and tropical.

The Spirit of St. Andrews is a book concerned with the views of the great architect Alister MacKenzie. MacKenzie states his general principles on how a golf courses should be constructed. He contends that a golf course should be arranged in two loops of nine holes each. There should be a large number of two-shot holes, and at least four one-shot holes. He believes that the greens and fairways should be undulating, but not to the point where the golfer is climbing hills. Every hole should be unique and different in character. MacKenzie sees the need for artificial surroundings, but all artificial surroundings should have a natural feel and look (MacKenzie: 1995:40). In addition, MacKenzie states that the landscape of the course should in no way hinder the golfer from finding his ball. The course should always be equally good during the winter and summer months. The texture of the fairways and greens should always stay consistent no matter what time of the year (MacKenzie: 1995:42). These general principles convey the golf course construction requirements by MacKenzie.

Robert Price sees the unique design that a golf course can exhibit. He states that all other sports conform to certain measurements and requirements for their playing surface.

Golf is one of the only sports that is measured by the difference of each playing surface. Each hole is different. This is why golf is so challenging and unconquerable.

Price's book, Scotland's Golf Courses (1989), offers a look at a classification of courses that he has devised. A landscape consists of rocks, soils, landforms, vegetation, and man made structures (Price: 1989, 71). The characteristics of a golf course are determined by the existing morphology, soils, drainage, and vegetation. He classifies the landforms into seven different categories. They can be (1) undulating, (2) hillside, (3) drumlins, (4)eskers, kames, (5) kame terrace, sandur, river terrace, (6) raised beach, platform, and (7) dunes, sand plains (links). Within these seven types of landforms, four types of vegetation can be found. The are (1) woodland, (2) parkland, (3) moorland, and (4) links (Price: 1989, 71).

Price's classification by landform and vegetation makes it possible to classify a course by using these two variables together. However, it is possible to have more than one type of vegetation on a certain landform. Conversely, it is also possible to have more than one type of landform found on a golf course. There are many different combinations that are possible. For this, Price states that variations of landforms and vegetation can be found within the same course.

Chapter III

DATA COLLECTION AND METHODOLOGY

Data Collection

The primary source of data was Cornish and Whitten's The Architects of Golf (1993). Cornish and Whitten provided a listing of over 12,000 courses. For the purpose of this thesis, only the courses in the conterminous United States were identified. In addition, the book provided a state by state listing of all of the architects who were responsible for the original design or the revision of the course.

The Architects of Golf is a revised edition of the book, The Golf Course, by Cornish and Whitten (1981). The original work has a bit more information about history and course design. The revision concentrates more upon updating the designing architect. The Golf Course is the basis for the central focus of this thesis.

The 1995 National Golf Foundation course list was an essential source of data. The course list includes the name of the course, the zip code, city, and state for over 14,000 courses. The course list is the most accurate account of courses in the U.S., but it lacks the important detail of the architect who designed or revised the course. The addition of architects to the 1995 National Golf Foundation course list is vital to ensure the most complete list of courses in the U.S.

In addition, the 1995 Golf Digest's Best Places to Play will act as a measure to determine the quality of courses. The Donald Ross designed courses will be compared to ratings found within Places to Play. This will give strong indications to where the best courses are located and how they rank among other courses.

The 1995 population data came from the Claritas/Compass geodemographic variable database. 1960 population data was taken from the Department of Commerce, Bureau of Census; *Current Population Reports*, Series P-25. The 1995 and 1960 populations were then compared to one another to show the percent increase in each state. Frequent Golfer numbers were also derived from the Claritas Marketing System, *Simmon's Variables*.

Methodology

Building a database for all the golf courses designed by an architect was the first task. The 1995 National Golf Foundation (NGF) course list was merged with a listing of all courses in the United States that were designed by a known architect. A total of 6,600 courses were matched to an architect that designed or modified the existing course. The remaining 6,843 courses did not have an architect designed match. This gives a total of 13,443 courses in the U.S. excluding Alaska and Hawaii.

Once the database was complete, the geographical distribution of the architect designed courses was mapped. A Geographic Information System which is a computer mapping system was used to analyze the spatial distribution of both known and unknown architecturally designed courses. The results were mapped at state and MSA levels. A location quotient (LQ) was calculated in order to rank regions by the number of known/unknown courses:

$$\textbf{Index (LQ)} = (k_m/t_m)/(k_n/t_n)$$

where k_m is the known number of architects at the state, and MSA level, t_m is the total number of courses within each state or MSA, and k_n is the national known architects, and t_n is the national total of courses. A 1.00 is the average index. An index of 1.5 would represent an architect design rate of 50% greater than average; .50 would be 50% below the national average.

A Spearman's rank correlation coefficient was used to test the significance of population versus LQ state rankings. Both population and state LQs are given a ranking from 1 to 49 excluding Alaska and Hawaii. The Spearman **r** value will be figured along with a **z** and **p** value. These values will reveal any correlation to population and state LQs.

After determining the spatial distribution by state and MSA, the information was then organized for statistical manipulation of the data. Maps were then made with Atlas GIS, a licensed under Strategic Mapping, Inc. With these maps, it is possible to locate the areas of concentration of architecturally known and unknown courses throughout the U.S. The states provide a broader spectrum of study, while the MSA's allow a more specific look at courses that are contained within metropolitan areas.

Ultimately, we are assuming that courses designed by architects are superior compared to amateur designers. In some cases, a none architecturally designed course may be high quality. But, on balance, it is believed that architecturally designed golf facilities are superior products. It is also possible and probable that Cornish and Whitten have failed to identify some facilities which were designed by golf course architects.

Chapter IV

Donald Ross: A Case Study

Donald Ross (1872-1948) was the son a stonemason who became one of the biggest innovators of the American golf architectural landscape. Before coming to America, Ross learned the art of clubmaking at David Forgan's shop and was a student of the great Scottish course architect, Old Tom Morris. Ross was persuaded to come to America by a visiting professor named Robert Wilson of Harvard. Once in America, Ross got his first job as club professional of the Oakley Country Club in Boston in 1898 (Cornish and Whitten, 1993: 392).

While at Oakley Country Club, Ross met with the wealthy Tuft family of Medford. The Tuft family encouraged him to become the golf professional at Pinehurst, North Carolina. The rebuilding and planning of courses at Pinehurst brought national notoriety to Ross. His services were in high demand from the year 1912 to his death. Ross would become nationally renowned for both the number of his courses and the popularity of his designs. Over 3,000 workers were employed by Ross by the year of 1925 (Cornish and Whitten, 1993:392). During his lifetime, Ross had built the reputation as one of the most productive and well-respected golf course architects of all time.

Ross was instrumental in forming the American Society of Golf Course Architects (ASGCA) and was considered the society's "patron saint" (Cornish and Whitten, 1993:

394). There are awards in his name for those contributing to the success of golf course design. In addition, the official jacket of the ASGCA is the plaid of which Donald Ross was so fond. The Donald Ross Society was also formed to acknowledge architects who have excelled in their occupation. The Society is based upon the tradition that was set forth by Donald Ross as a man and an architect.

By the middle of the 1920's, Ross had become one of the most prolific course designers of all time. There was such a demand for Ross courses that he had to turn away numerous offers to build. Many of Ross' designs were actually built without his supervision. He had trusty supervisors to oversee the work of new courses. Walter B. Hatch, Walter Johnston, James B. McGovern, James Harrison, and Henry Hughes were the men responsible for keeping Ross' reputation at an all time high (Cornish and Whitten, 1981: 80).

Between 1919 and 1926, 6 of 8 National Opens golf tournaments were played on Ross designed courses. With each new course built, Ross' popularity seemed to rise. To have a Ross designed course was a status symbol for that certain area or region. The notoriety of one of his courses would be a sure bet to draw avid golfers from miles around.

During Ross' architectural career, he produced 303 original designs. In addition, Ross remodeled or expanded 71 courses. A good number of these courses are no longer in existence. In designing a database, it was essential to use the 1995 National Golf Foundation course list to identify the courses in the U.S. Of those courses, 310 Donald Ross courses that were found to be on the NGF list. These courses include both the original design or a remodeled course.

After matching the existing Ross courses to the NGF list, it was then possible to break down the number of courses in each state (Table 1). Massachusetts, North Carolina, Ohio, Florida, and Pennsylvania contain 155 or 50% of Ross' 310 courses. These five states show the areas in which Ross devoted much of his time and energy.

This state pattern shows an Eastern conglomeration of courses. Nearly 94% of Ross' courses were built east of the Mississippi River. This regional bias is clearly shown in a general map (Figure 3). His base of operation was located in Pinehurst, North Carolina. In an era when cross country transportation was difficult, it is no surprise that Ross stayed relatively close to home.

The courses can also be associated with the Golf Supply Regions that were developed by Rooney and Adams (Rooney and Adams: 1989: 8). The Northern Heartland Region is by far the best representative of the Ross courses (Refer to Figure 2). The Northern Heartland Region contains 167 courses that we designed or remodeled by Ross. The South Atlantic Region was next and accounted for 71 courses. Megalopolis housed 33 courses while The Southern Void finished close behind with 32 total courses. The Plains Region finished on the lower end with 6 courses along with 1 course in the Pacific.

In dealing with a smaller scale of geography, Ross courses were examined by Metropolitan Statistical Areas (MSA's). The breakdown of courses within MSA's totaled 254 courses (Table 2). Boston, Chicago, Detroit, Philadelphia, and Providence-Fall River-Warwick Metropolitan Statistical Areas make up approximately 20% of the courses within MSA's.

The majority of Ross courses were built in metropolitan areas. This is possibly due to the higher social awareness of having a "Ross course" which was the thing to have at that

TABLE 1

DONALD ROSS COURSES BY STATE

STATES	COURSES	% by STATE
Massachusetts	41	13.23%
North Carolina	34	10.97%
Ohio	29	9.35%
Florida	28	9.03%
Pennsylvania	23	7.42%
New York	18	5.81%
Michigan	16	5.16%
Illinois	13	4.19%
Georgia	12	3.87%
New Hampshire	11	3.55%
Rhode Island	11	3.55%
Maine	9	2.90%
Virginia	9	2.90%
New Jersey	8	2.58%
Tennessee	8	2.58%
Connecticut	6	1.94%
Maryland	5	1.61%
Minnesota	5	1.61%
Indiana	4	1.29%
Alabama	3	0.97%
Colorado	3	0.97%
South Carolina	3	0.97%
Texas	2	0.65%
Vermont	2	0.65%
Wisconsin	2	0.65%
California	1	0.32%
Iowa	1	0.32%
Kansas	1	0.32%
Kentucky	1	0.32%
Missouri	1	0.32%
TOTAL	**310**	**100%**

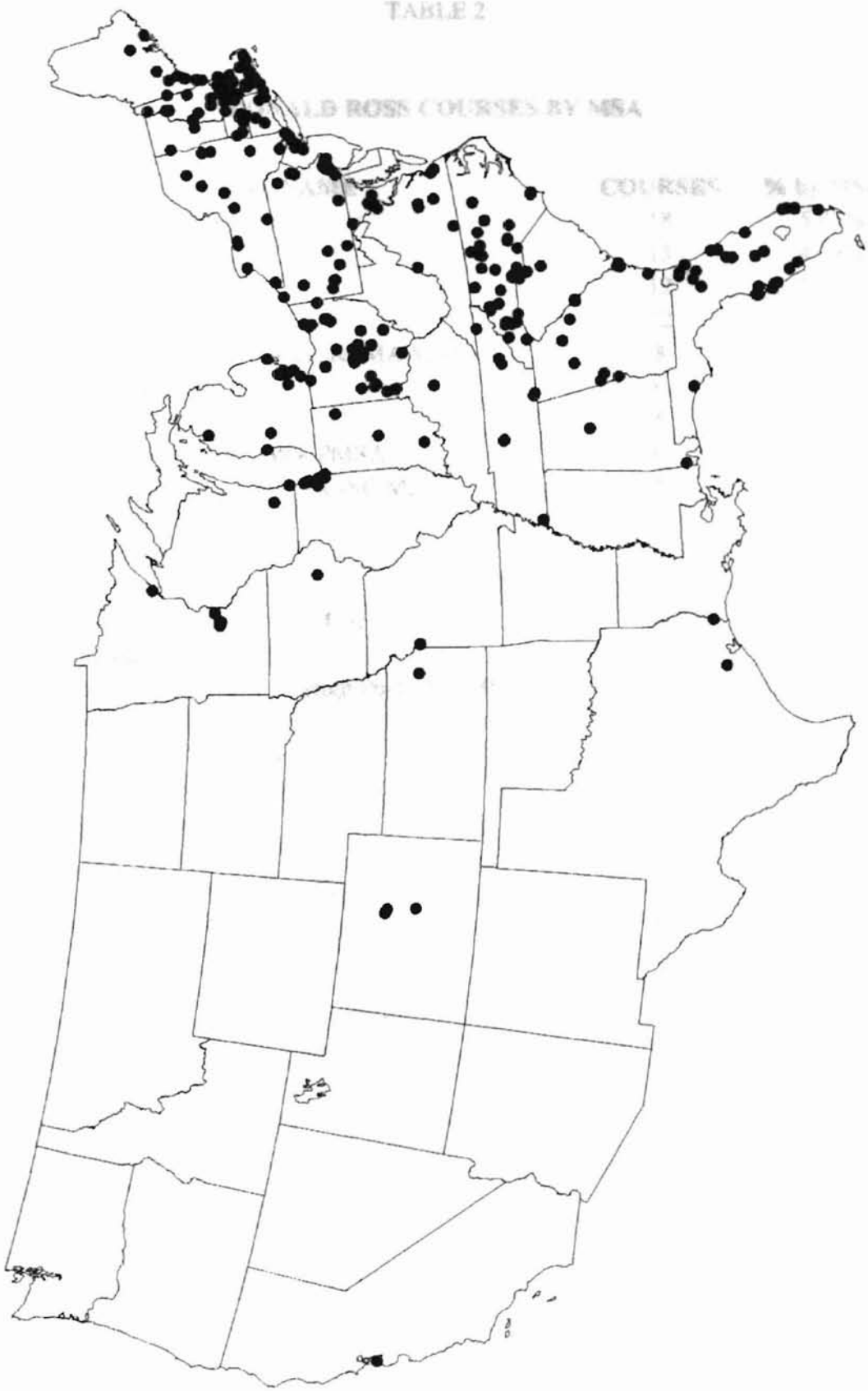


FIGURE 3. DONALD ROSS COURSES by STATE 1911–1945

TABLE 2

DONALD ROSS COURSES BY MSA

MSA NAME	COURSES	% by MSA's
Boston, MA-NH PMSA	18	5.81%
Chicago, IL PMSA	13	4.19%
Detroit, MI PMSA	12	3.87%
Philadelphia, PA-NJ PMSA	12	3.87%
Providence-Fall River-Warwick, RI-MA MSA	8	2.58%
Columbus, OH MSA	6	1.94%
Springfield, MA MSA	6	1.94%
Washington, DC-MD-VA-WV PMSA	6	1.94%
Charlotte-Gastonia-Rock Hill, NC-SC MSA	5	1.61%
Newark, NJ PMSA	5	1.61%
Asheville, NC MSA	4	1.29%
Barnstable-Yarmouth, MA MSA	4	1.29%
Cleveland-Lorain-Elyria, OH PMSA	4	1.29%
Dayton-Springfield, OH MSA	4	1.29%
Greensboro--Winston-Salem--High Point, NC MSA	4	1.29%
Jacksonville, FL MSA	4	1.29%
Minneapolis-St. Paul, MN-WI MSA	4	1.29%
New London-Norwich, CT-RI MSA	4	1.29%
Pittsburgh, PA MSA	4	1.29%
Rochester, NY MSA	4	1.29%
West Palm Beach-Boca Raton, FL MSA	4	1.29%
Worcester, MA-CT PMSA	4	1.29%
Canton-Massillon, OH MSA	3	0.97%
New York, NY PMSA	3	0.97%
Portsmouth-Rochester, NH-ME PMSA	3	0.97%
Raleigh-Durham-Chapel Hill, NC MSA	3	0.97%
Richmond-Petersburg, VA MSA	3	0.97%
Sarasota-Bradenton, FL MSA	3	0.97%
Savannah, GA MSA	3	0.97%
Tampa-St. Petersburg-Clearwater, FL MSA	3	0.97%
Augusta-Aiken, GA-SC MSA	2	0.65%
Birmingham, AL MSA	2	0.65%
Chattanooga, TN-GA MSA	2	0.65%
Cincinnati, OH-KY-IN PMSA	2	0.65%
Daytona Beach, FL MSA	2	0.65%
Denver, CO PMSA	2	0.65%
Glens Falls, NY MSA	2	0.65%

TABLE 2. CONTINUED

DONALD ROSS COURSES BY MSA

MSA NAME	COURSES	% by MSA's
Grand Rapids-Muskegon-Holland, MI MSA	2	0.65%
Hartford, CT MSA	2	0.65%
Hickory-Morganton, NC MSA	2	0.65%
Knoxville, TN MSA	2	0.65%
Miami, FL PMSA	2	0.65%
Nashville, TN MSA	2	0.65%
New Bedford, MA PMSA	2	0.65%
Norfolk-Virginia Beach-Newport News, VA-	2	0.65%
Orlando, FL MSA	2	0.65%
Utica-Rome, NY MSA	2	0.65%
Wilmington, NC MSA	2	0.65%
Ann Arbor, MI PMSA	1	0.32%
Atlanta, GA MSA	1	0.32%
Bangor, ME MSA	1	0.32%
Beaumont-Port Arthur, TX MSA	1	0.32%
Bergen-Passaic, NJ PMSA	1	0.32%
Buffalo-Niagara Falls, NY MSA	1	0.32%
Burlington, VT MSA	1	0.32%
Cedar Rapids, IA MSA	1	0.32%
Colorado Springs, CO MSA	1	0.32%
Columbus, GA-AL MSA	1	0.32%
Duluth-Superior, MN-WI MSA	1	0.32%
Elmira, NY MSA	1	0.32%
Erie, PA MSA	1	0.32%
Fayetteville, NC MSA	1	0.32%
Fitchburg-Leominster, MA PMSA	1	0.32%
Fort Myers-Cape Coral, FL MSA	1	0.32%
Fort Wayne, IN MSA	1	0.32%
Gainesville, FL MSA	1	0.32%
Gary, IN PMSA	1	0.32%
Hagerstown, MD PMSA	1	0.32%
Hamilton-Middletown, OH PMSA	1	0.32%
Houston, TX PMSA	1	0.32%
Indianapolis, IN MSA	1	0.32%
Jamestown, NY MSA	1	0.32%
Johnson City-Kingsport-Bristol, TN-VA MS	1	0.32%
Johnstown, PA MSA	1	0.32%

TABLE 2. CONTINUED

DONALD ROSS COURSES BY MSA

MSA NAME	COURSES	% by MSA's
Kansas City, MO-KS MSA	1	0.32%
Kenosha, WI PMSA	1	0.32%
Lakeland-Winter Haven, FL MSA	1	0.32%
Lawrence, MA-NH PMSA	1	0.32%
Lewiston-Auburn, ME MSA	1	0.32%
Lexington, KY MSA	1	0.32%
Lowell, MA-NH PMSA	1	0.32%
Manchester, NH PMSA	1	0.32%
Mansfield, OH MSA	1	0.32%
Melbourne-Titusville-Palm Bay, FL MSA	1	0.32%
Memphis, TN-AR-MS MSA	1	0.32%
Middlesex-Somerset-Hunterdon, NJ PMSA	1	0.32%
Milwaukee-Waukesha, WI PMSA	1	0.32%
Mobile, AL MSA	1	0.32%
Newburgh, NY-PA PMSA	1	0.32%
Panama City, FL MSA	1	0.32%
Pittsfield, MA MSA	1	0.32%
Portland, ME MSA	1	0.32%
Punta Gorda, FL MSA	1	0.32%
Rocky Mount, NC MSA	1	0.32%
San Francisco, CA PMSA	1	0.32%
Scranton--Wilkes-Barre--Hazleton, PA MSA	1	0.32%
Stamford-Norwalk, CT PMSA	1	0.32%
Syracuse, NY MSA	1	0.32%
Toledo, OH MSA	1	0.32%
Topeka, KS MSA	1	0.32%
Waterbury, CT PMSA	1	0.32%
York, PA MSA	1	0.32%
Youngstown-Warren, OH MSA	1	0.32%
TOTALS	**254**	**100%**

time. Of the 310 courses, 254 were found within the MSA's (Figure 4). This means that 56 were located outside the MSA's. 82% of all of Ross' courses were positioned in areas that were heavily populated and urban in nature. Ultimately, Ross built courses that were located in high profile areas of the country. This is the primary reason that he was such a touted golf course architect.

To truly understand how Ross' courses rank among other courses, it is necessary to use some type of rating system. The rating system that will be used is Golf Digest's Best Places to Play. Golf Digest has surveyed magazine subscribers about many aspects of the courses they have played. The subscribers rate the courses from 1 to 10 with 10 being the highest possible score. The subscribers also compare courses that are in the same relative area.

The 1995 Golf Digest's Best Places to Play rated 4,324 courses. Of those 4,324 courses, 58 Ross designed courses were identified. This rating system is somewhat biased since it only rates courses that are open to the public. Ratings are also biased by the inclusion of many municipal courses, which in many cases are poorly maintained. The courses identified are among the best courses designed or remodeled by Ross (Table 3). The majority of Ross' courses were designed after 1925. This is the height of his course design productivity. The top three ratings, a 10,8,8, were all in the state of North Carolina. This shows that Ross chose to concentrate on those courses close to his home in Pinehurst, North Carolina.

When Ross came to Pinehurst, North Carolina from Scotland, no one could guess the impact that he would have on American golf. Leroy Culver was the original designer of

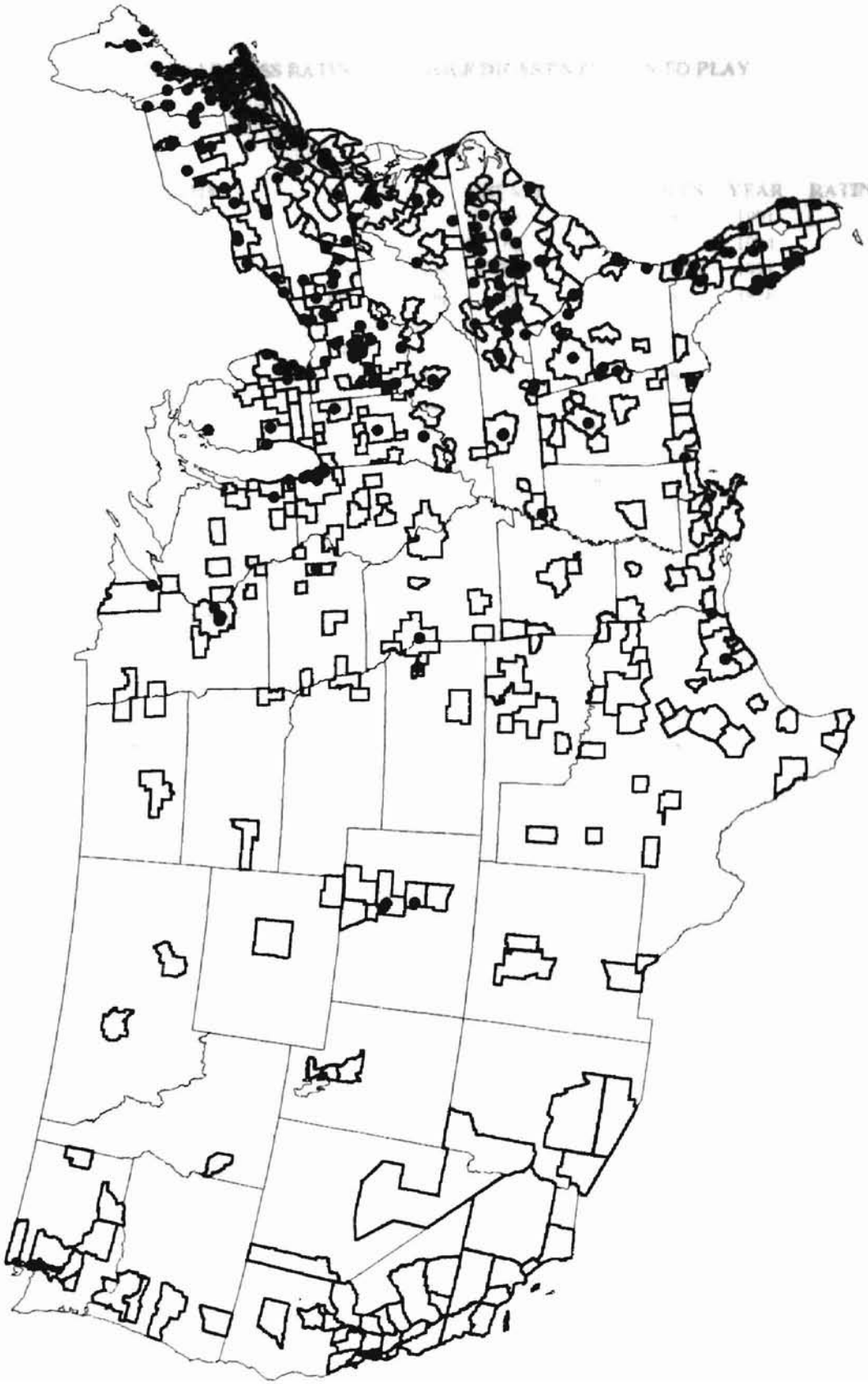


FIGURE 4. DONALD ROSS COURSES by MSA 1911–1945

TABLE 3

DONALD ROSS RATINGS BY GOLF DIGEST'S PLACES TO PLAY

COURSE NAME	CITY	STATE	TYPE	HOLES	YEAR	RATING
Pinehurst Resort & CC #2	Pinehurst	NC	PN	18	1901	10
Linville Golf Club	Linville	NC	PN	18	1924	8
Pine Needles Resort	Southern Pines	NC	PN	18	1921	8
Sagamore Resort	Bolton Landing	NY	DF	18	1928	8
Timacuan Golf & CC	Lake Mary	FL	DF	18	1923	7
French Lick Springs Resort	French Lick	IN	DF	36	1907	7
Wachusett Country Club	West Boylston	MA	DF	18	1911	7
Mid Pines Resort	Southern Pines	NC	DF	18	1921	7
Wentworth By The Sea	New Castle	NH	DF	18	1910	7
Thendara Golf Club	Thendara	NY	DF	18	1923	7
Granville Golf Course	Granville	OH	DF	18	1924	7
Manakiki Golf Course	Willoughby	OH	MU	18	1922	7
Woodstock Country Club	Woodstock	VT	DF	18	1895	7
Delray Beach Municipal Golf Course	Delray Beach	FL	MU	18	1926	6
Forest Hills Golf Course	Augusta	GA	DF	18	1926	6
Sheraton Savannah Resort & CC	Savannah	GA	DF	18	1927	6
Cohasset Golf Club	Cohasset	MA	PE	18	1894	6
George Wright Golf Course	Hyde Park	MA	MU	18	1938	6
Penobscot Valley Country Club	Orono	ME	DF	18	1923	6
Pinehurst Resort & CC #1	Pinehurst	NC	PN	18	1901	6
Pinehurst Resort & CC #3	Pinehurst	NC	PN	18	1907	6
Southern Pines Country Club	Southern Pines	NC	DF	27	1910	6
Chautauqua Golf Club	Chautauqua	NY	DF	27	1896	6
Mark Twain Golf Course	Elmira Heights	NY	MU	18	1939	6
Buck Hill Golf Club	Buck Hill	PA	DF	27	1926	6
Triggs Municipal Golf Course	Providence	RI	MU	18	1932	6
Hamptons Golf Course	Hampton	VA	MU	27	1921	6
Norwich Golf Course	Norwich	CT	MU	18	1895	5
Dunedin Country Club	Dundedin	FL	MU	18	1928	5
Fort Myers Country Club	Fort Myers	FL	MU	18	1917	5
Hyde Park Golf Club	Jacksonville	FL	DF	18	1925	5
Ponce De Leon Golf Center	St. Augustine	FL	DF	18	1913	5
Sandy Burr Country Club	Wayland	MA	DF	18	1924	5
Rackham Golf Course	Huntington Woods	MI	MU	18	1925	5
Waynesville Country Club	Waynesville	NC	DF	27	1926	5
Mill Creek Golf Club	Ostrander	OH	DF	18	1928	5
Bedford Springs Golf Course	Bedford	PA	DF	18	1904	5
Winnapaug Golf & CC	Westerly	RI	DF	18	1922	5
Fort Mill Golf Club	Fort Mill	SC	DF	18	1942	5
Shennecossett Golf Course	Groton	CT	MU	18	1916	4
Bass River Golf Course	South Yarmouth	MA	MU	18	1902	4
Poland Springs Country Club	Poland Springs	ME	DF	18	1895	4
Oakland Hills Country Club	Birmingham	MI	PE	36	1918	4
Rogell Golf Course	Detroit	MI	MU	18	1930	4
Warren Valley Country Club	Dearborn Heights	MI	MU	36	1927	4
Monroe Country Club	Monroe	NC	MU	18	1936	4

TABLE 3. CONTINUED

DONALD ROSS RATINGS BY GOLF DIGEST'S PLACES TO PLAY

COURSE NAME	CITY	STATE	TYPE	HOLES	YEAR	RATING
Maplewood Country Club	Bethlehem	NH	DF	18	1897	4
Brainerd Golf Course	Chattanooga	TN	MU	18	1926	4
Bobby Jones Golf Complex	Sarasota	FL	MU	36	1927	3
Daytona Beach Golf & CC	Daytona Beach	FL	MU	36	1921	3
Bacon Park Golf Course	Savannah	GA	MU	27	1929	3
Fairview Golf Course	Fort Wayne	IN	DF	18	1927	3
Ponkapoag Golf Course	Canton	MA	MU	36	1938	3
Buncombe County Golf Course	Asheville	NC	MU	18	1927	3
Bethlehem Country Club	Bethlehem	NH	MU	18	1909	3
Miami Shores Golf Course	Troy	OH	MU	18	1926	3
Wyandot Golf Course	Centerburg	OH	DF	18	1922	3
Pocono Manor Golf Club	Pocono Manor	PA	DF	36	1910	3

Pinehurst #1 (Cornish and Whitten, 1981: 80). Ross remodeled the course to his liking using his knowledge of Scottish links as a model. Pinehurst became the getaway for many wealthy businessmen. Men like Horace Rackam and Henry Ford were thoroughly impressed with Ross' designs. Ross was then hired to construct the Detroit Golf Club and the Dearborn Country Club. This gives some explanation to the spatial pattern in which Ross built his courses. Also, this shows the great influence that Pinehurst Resort & Country Club had on the golfing community.

As shown in Places to Play table, Pinehurst #2 course was the only course rated as a perfect 10. His best work took place in relatively close proximity. He designed three more "gems" in the area in addition to Pinehurst #2. Ross would design the #3 course also at Pinehurst Country Club, Mid Pines, and Pine Needles. These courses have been relatively unchanged through the years. Ross' trademark of small, undulating greens, narrow fairways, and a great variety of holes made his courses challenging for all types of golfers. It is evident that Ross chose to do his best work near his home in Pinehurst. This can be twofold in nature. Ross had better access to courses built around his home base. He had more opportunities to oversee the work that was being done. In turn, Ross' "gems" would insure his reputation in the area around his home.

CHAPTER V

ANALYSIS AND RESULTS

Introduction

This chapter is devoted to analyzing the spatial patterns of golf course architecture. With each golf course there must be an architect. In some cases the architect is known, and in other instances, the architect is unknown, most probably an amateur, an engineer, or a committee of golfers with a commitment to building a course for their own use. The architect may not have originally designed the course, but may have been involved in remodeling or changing it in some way.

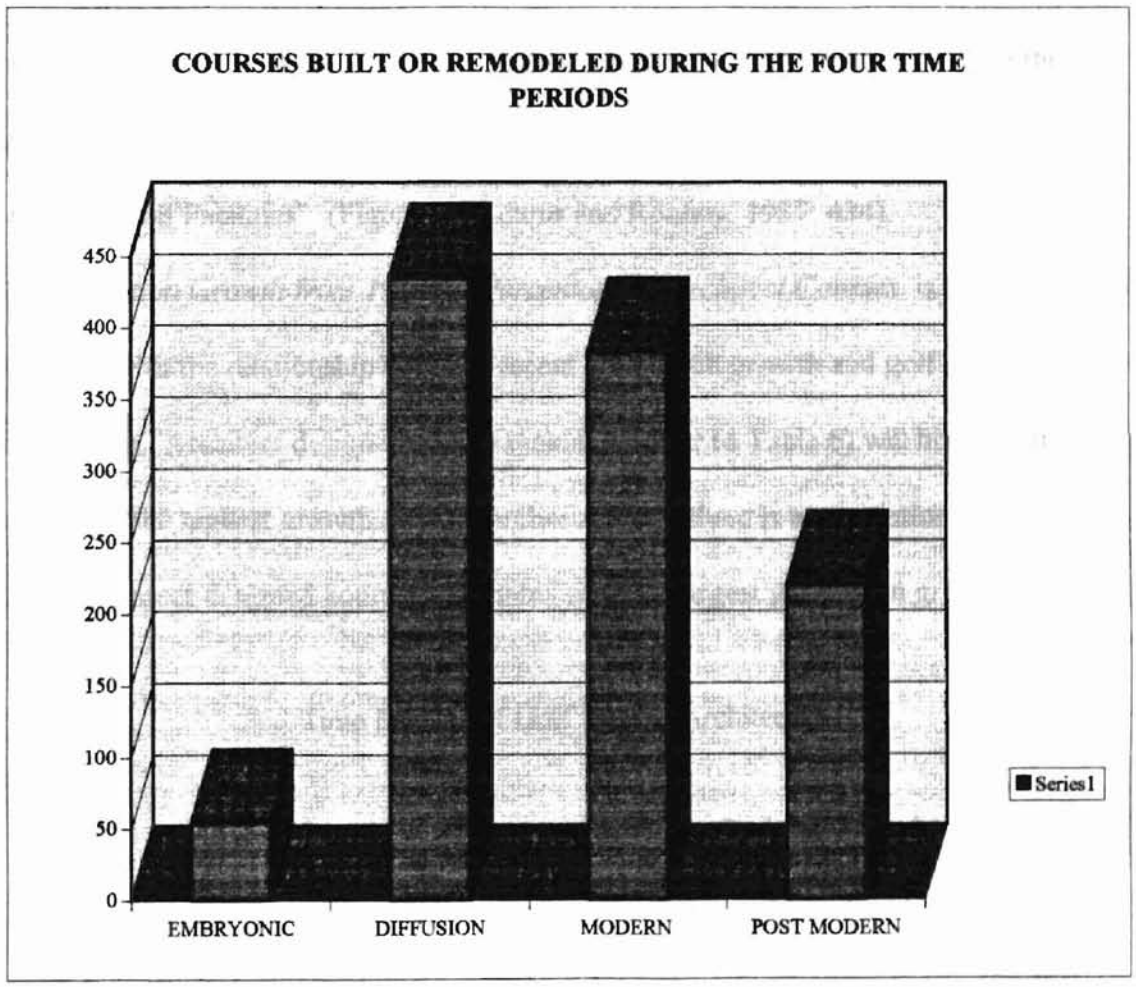
The chapter will be broken down into four parts. The first part, *Time Periods of Golf Course Architecture*, will cover four time periods of golf course architecture. Each time period focuses on three "elite" architects who have designed courses within each specified time frame (Table 4). The twelve architects were selected on the basis of their most productive designing years in accordance with the respective time periods. The twelve architects are: Alister MacKenzie, Willie Dunn, Jr., Willie Park, Jr., Donald Ross, A.W. Tillinghast, Perry Maxwell, Robert Trent Jones, Dick Nugent, Ted Robinson, Jerry Matthews, Pete Dye, and Tom Fazio.

State and Metropolitan Statistical Area (MSA) Rankings is the second section and ranks each state and MSA on the basis of known vs. unknown golf architects. Location

TABLE 4

NUMBER OF COURSES BUILT/REMODELED DURING 4 TIME PERIODS

EMBRYONIC	DIFFUSION	MODERN	POST MODERN
54	435	383	220



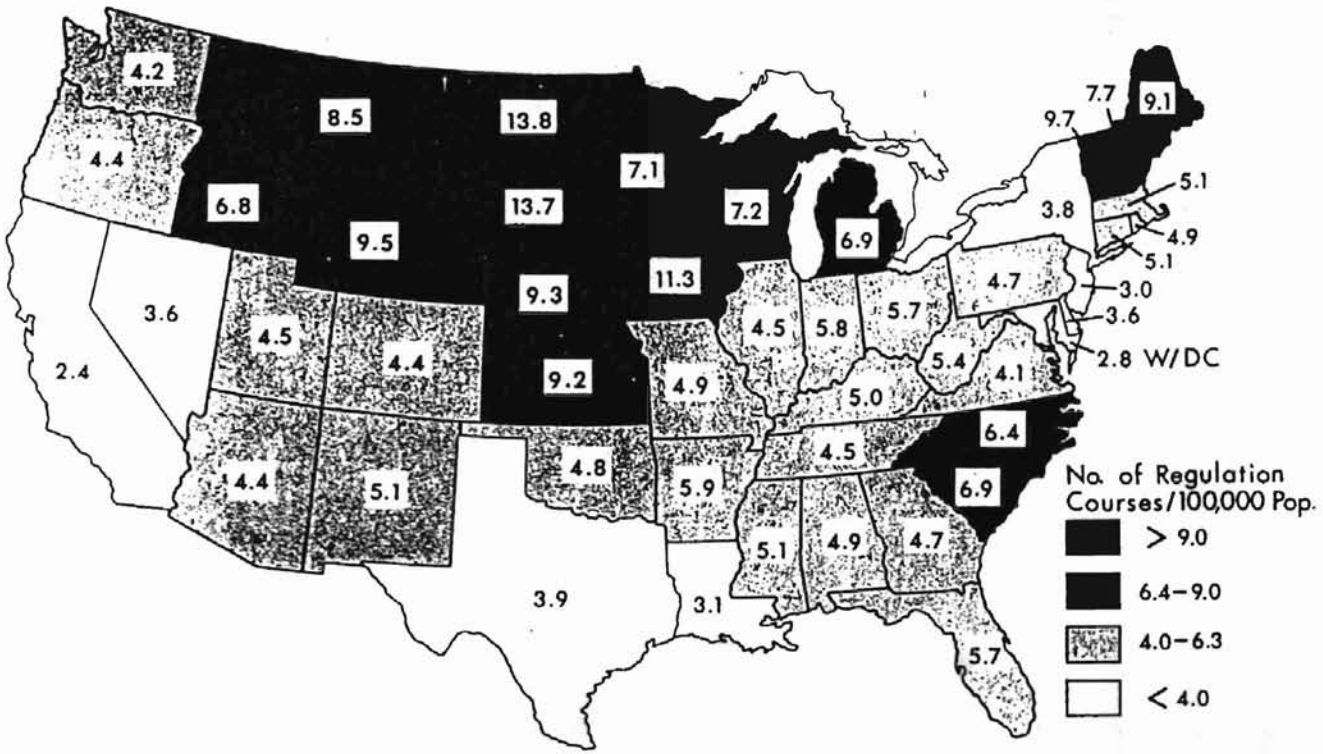
quotients are used as the best indicator of the position that each state and MSA occupy. In addition, an index was formulated to measure the qualitative aspect in ranking courses. State and MSA totals (known architect designed courses/ unknown architect designed courses) highlight urban and rural differences. All states will be represented with the exception of Alaska and Hawaii.

Architecturally Designed Courses in the Nine Hole Golf Regions will depict each Nine hole course in the United States. Each nine hole golf course will have a known or unknown architect assigned to it. The nine hole courses will be analyzed due to the influence of the construction of Nine Hole Golf Regions identified in "Evolution of American Golf Facilities" (Figure 5) (Adams and Rooney: 1985: 434).

Population Growth from 1960 vs. Percentage of Architect Courses is the final section and deals with the relationship between recent population growth and golf course architecture. Architect designed course rankings (Refer to Table 6) will be compared to states with the highest growth. It is hypothesized that there is a correlation between the known architect designed courses and states with the largest population growth.

Time Periods of Golf Course Architecture

The first time period in golf course architecture is the Embryonic Period (1888 - 1910). The year 1888 marked the inception of golf in the United States, with the first permanent course being built in Yonkers, New York (Adams and Rooney: 1985: 421). The first group of "elite" architects of this time were Alister MacKenzie (1870 - 1934), Willie Park, Jr. (1864 - 1925), and Willie Dunn, Jr. (1865 - 1952). These men were the pioneers of



Source: Rooney and Adams (1985)

FIGURE 5. NINE HOLE FACILITIES AS % OF ALL REGULATION COURSES BY STATE.

golf course architecture in America. They chose to design courses as a sideline since golf course architecture was not considered a primary occupation at the time.

During the Embryonic Period, golf course design was primarily done by manual labor. The landscape stayed relatively unchanged since large landmoving machines were not available. The architect had the luxury of choosing almost any piece of land that was there for the taking. Unfortunately, many of these early courses were taken over by commercial or residential companies that saw a greater monetary value in the land.

The three "elite" architects accounted for 54 course designs during the Embryonic Period. Willie Park, Jr. led production with 31 courses. Alister MacKenzie was second with 17 courses. Willie Dunn, Jr. brought up the rear with just 6 courses (Table 5). These courses were in close proximity to each other (Figure 6). The courses are tightly grouped together on the west coast of California and throughout the northeast. The primary reason for this is the restriction of cross continental travel. These three architects stayed close to home. Compared to the other three periods, the Embryonic's 54 of 1092 courses make up just 5% of the "elite" twelve total courses. This demonstrates the limited resources and hardships that traditional architects had to endure. It also reflects the small number of courses constructed during the period. Perhaps it also points to the fact that that golf course builders did not believe that architects were necessary.

The Diffusion Period (1911 - 1945) is just as the name describes it. The architects of this time were eager to expand the game of golf and increase its popularity. Golf courses were now being dispersed throughout the U.S. The courses were not so tightly packed together as were noted in the Embryonic Period due to better transportation methods. Rather, the course distribution had a more evenly distributed pattern (Figure 7). Donald

TABLE 5

COURSES BUILT OR REMODELED BY ELITE 12 ARCHITECTS

ARCHITECT	PERIOD	# OF COURSES BUILT OR REMODELED	% OF CHOSEN 12 ARCHITECTS	% OF NATIONAL KNOWN ARCHITECTS
Donald Ross	Diffusion	310	28%	4.70%
Robert Trent Jones	Modern	203	19%	3.08%
Dick Nugent	Modern	96	9%	1.45%
Jerry Matthews	Post-Modern	91	8%	1.38%
Ted Robinson	Modern	84	8%	1.27%
A.W. Tillinghast	Diffusion	79	7%	1.20%
Tom Fazio	Post-Modern	65	6%	0.98%
Pete Dye	Post-Modern	64	6%	0.97%
Perry Maxwell	Diffusion	46	4%	0.70%
Willie Park, Jr.	Embyonic	31	3%	0.47%
Alister Mackenzie	Embryonic	17	2%	0.26%
Willie Dunn, Jr.	Embryonic	6	1%	0.09%
TOTALS	**4 PERIODS**	**1092**	**100%**	**16.55%**

FIGURE 6. EMBRYONIC PERIOD ARCHITECTS, 1888–1910

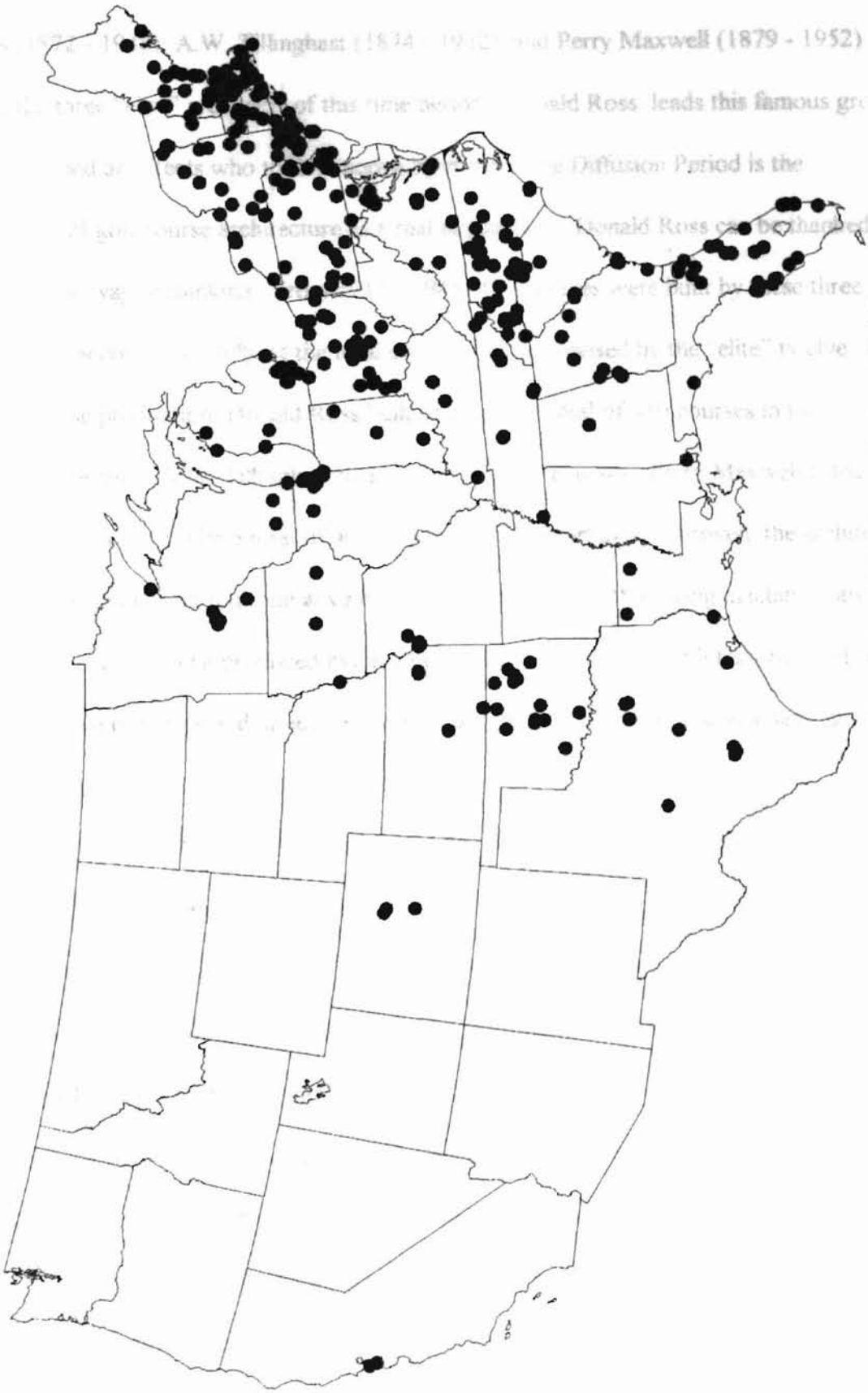


FIGURE 7. DIFFUSION PERIOD ARCHITECTS, 1911–1945

Ross (1872 - 1948), A.W. Tillinghast (1874 - 1942), and Perry Maxwell (1879 - 1952) were the three "elite" architects of this time period. Donald Ross leads this famous group of renowned architects who took America by storm. The Diffusion Period is the beginning of golf course architecture as a real occupation. Donald Ross can be thanked for this new way of thinking. From 1911 - 1945, 435 courses were built by these three men. This accounts for 40% of the total courses built or revised by the "elite" twelve.

In course production, Donald Ross built or revised a total of 310 courses in the Diffusion Period. A.W. Tillinghast was second with 79 courses. Perry Maxwell made a respectable showing with a total of 46 courses. As transportation improved, the architects of the Diffusion Period took full advantage. The advanced earth moving machinery also helped the courses to be produced much quicker though many were still built by hand with the assistance of horses and mules. This increase in course production was a harbinger of things to come.

Before long, the Modern Era Architects were on the golf scene. This new group of architects further expanded golf design and construction. These post WWII architects had the capabilities to travel throughout the U.S. They also had the benefit of greater technology to help design the courses. Advanced machinery helped to shape the landscape for more dramatic course designs. During the Modern Era, the three "elite" combined to build or design a total of 383 courses. They were responsible for 35% of the 1,092 courses of which the chosen 12 have designed. Architects during the Modern Era focused on mass production of courses to serve the growing number of golfers. These architects have designed courses in all but five U.S. conterminous states (Figure 8). The

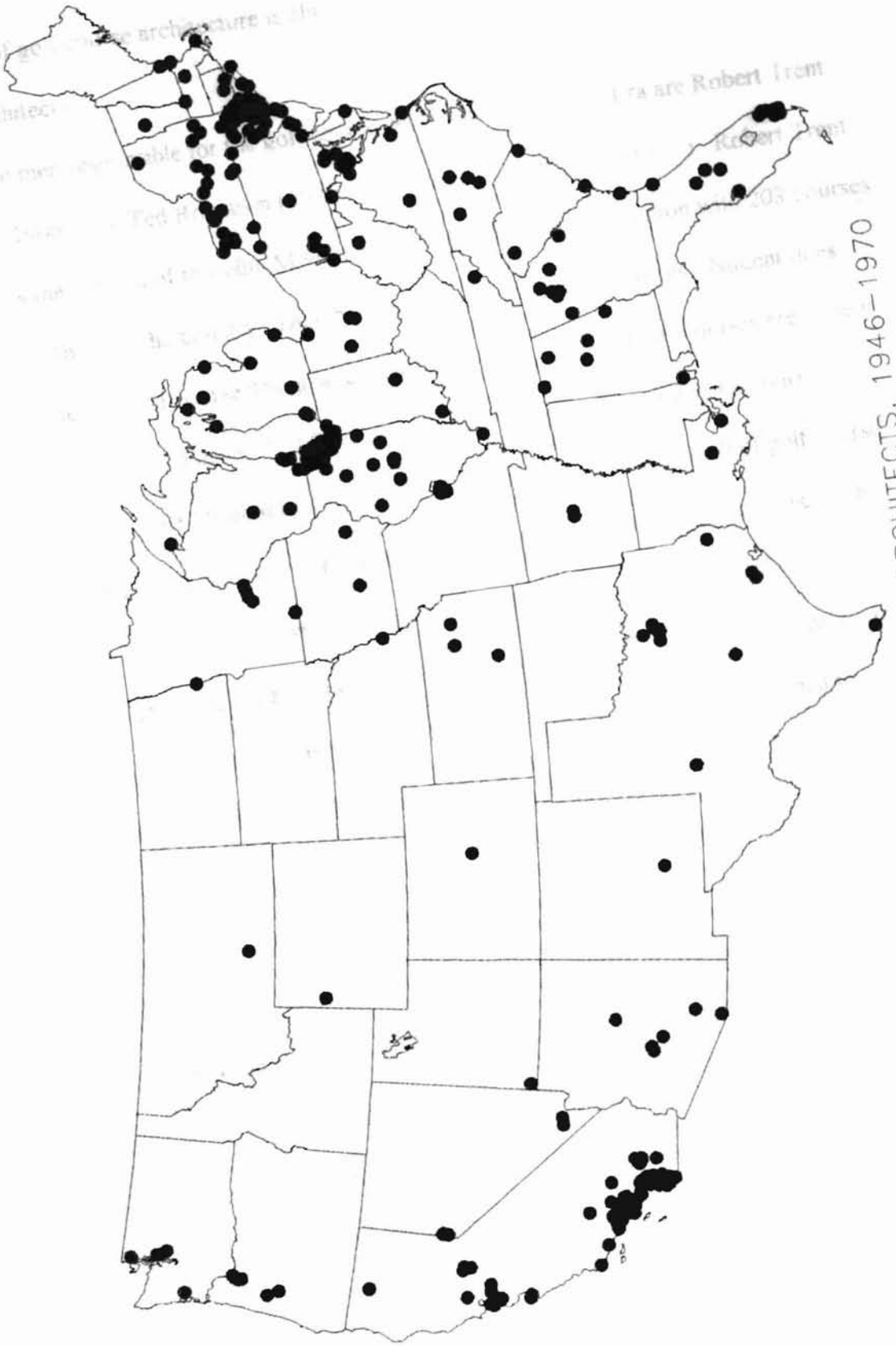


FIGURE 8. MODERN ERA ARCHITECTS, 1946–1970

spread of golf course architecture is almost evenly distributed. This is the ultimate goal of golf architects.

The men responsible for the golf course design in this Modern Era are Robert Trent Jones (1906 -), Ted Robinson (1923 -), and Dick Nugent (1931 -). Robert Trent Jones is the veteran of this elite Modern Era group. He leads production with 203 courses scattered through the country. Dick Nugent is credited with 96 courses. Nugent does show some regional course design and remodeling as a majority of his courses are done in the state of Illinois. Finally, Ted Robinson is close behind with a total of 84 courses.

Finally, the Post Modern Era Architects are ready to display their skill of golf course design. Traveling to specific golf course sites is no longer a problem for architects who have access to better travel systems. The real test for these architects is to find suitable sites in which to build their courses. Technology has increased with computer designing systems and advanced software. In this Post Modern Era, the architects seemed to be more regionalized in their building and remodeling (Figure 9). For instance, Jerry Matthews (1934 -) has done work almost exclusively in the Michigan area. Tom Fazio (1945 -) has done the majority in Florida and South Carolina with a smattering of other course designs around the country. The exception, Pete Dye (1925 -), has done a large number of courses in California and Florida. He tends to do his designing in resort areas on the east and west coast. Many of Dye's courses are located in tourist areas. This explains the reason for the majority of them being found in California and Florida. Dye was a late bloomer of in golf course designing, but chose to make it his lifelong profession.

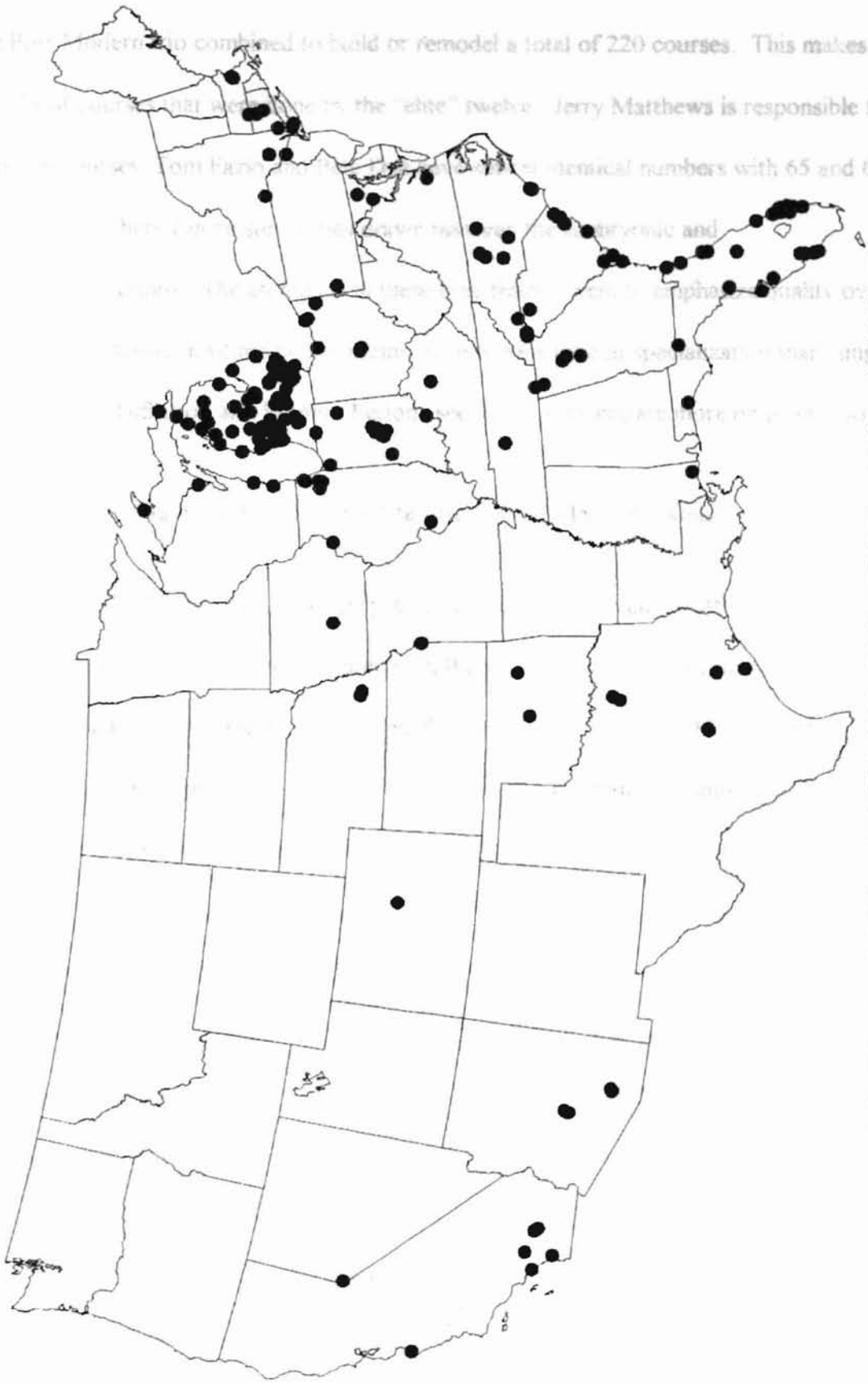


FIGURE 9. POST MODERN ERA ARCHITECTS, 1971–PRESENT

The Post Modern trio combined to build or remodel a total of 220 courses. This makes up 20% of courses that were done by the "elite" twelve. Jerry Matthews is responsible for 91 of the courses. Tom Fazio and Pete Dye have almost identical numbers with 65 and 64 respectively. There can be similarities drawn between the Embryonic and Post Modern Periods. The architects in these time frames seem to emphasize quality over quantity. In a sense, this time period seems to be more a time of specialization than simply numbers. The Diffusion and Modern Periods seemed to concentrate more on production.

State and Metropolitan Statistical Area (MSA) Rankings

A total of 13,443 courses were analyzed to determine the overall distribution of courses with and without known architects. In the state analysis, 6,600 courses were found to have known architects who designed or remodeled them. 6,843 courses had no known golf course architect (Table 6). The breakdown of courses is almost 50/50. The spatial pattern of known architects is shown to be concentrated in California, Texas, Florida, and the Northeast portions of the country (Figure 10). Surprisingly, the unknown architect courses display almost the same pattern as the known courses (Figure 11). However, these maps are based on the total number of known/unknown architecturally designed golf courses. State LQ's give a better representation of how each state ranks. Larger states with higher population will naturally have more courses from which to choose. States like Florida, Texas, California, Illinois, Michigan, and other states from the Northeast region are exemplary (Figure 12). These states are ranked highest because they have more total courses. In reality, this does not paint a true picture of the correct rankings.

TABLE 6

STATE ARCHITECT LQ's

STATE NAME	TOTAL COURSES	COURSES WITH ARCHITECTS	LQ's WITH ARCHITECTS
District of Columbia	6	5	**1.70**
Maine	121	85	**1.43**
Nevada	53	37	**1.42**
Maryland	150	104	**1.41**
Delaware	25	17	**1.39**
California	794	539	**1.38**
Utah	83	56	**1.37**
Oregon	159	106	**1.36**
Florida	914	595	**1.33**
Connecticut	178	115	**1.32**
New Hampshire	99	63	**1.30**
Colorado	179	111	**1.26**
New Jersey	267	161	**1.23**
South Carolina	299	180	**1.23**
Arizona	222	132	**1.21**
Virginia	258	149	**1.18**
Massachusetts	339	195	**1.17**
Vermont	55	31	**1.15**
North Carolina	499	274	**1.12**
Rhode Island	49	26	**1.08**
Illinois	612	319	**1.06**
Oklahoma	162	82	**1.03**
Wyoming	45	22	**1.00**
Georgia	347	166	**0.97**
Michigan	711	340	**0.97**
New Mexico	66	31	**0.96**
New York	730	338	**0.94**
Pennsylvania	622	281	**0.92**
Washington	238	107	**0.92**
Montana	78	34	**0.89**
Missouri	289	125	**0.88**
Kansas	232	100	**0.88**
Texas	722	310	**0.87**
Ohio	691	292	**0.86**
Kentucky	245	95	**0.79**
Idaho	80	31	**0.79**
Indiana	394	152	**0.79**
West Virginia	104	40	**0.78**
Tennessee	245	94	**0.78**

TABLE 6. CONTINUED

STATE ARCHITECT LQ's

STATE NAME	TOTAL COURSES	COURSES WITH ARCHITECTS	LQ's WITH ARCHITECTS
Alabama	212	78	**0.75**
Minnesota	371	131	**0.72**
Wisconsin	380	133	**0.71**
Nebraska	173	60	**0.71**
Arkansas	139	47	**0.69**
Mississippi	134	39	**0.59**
Iowa	321	88	**0.56**
Louisiana	148	40	**0.55**
South Dakota	105	26	**0.50**
North Dakota	98	18	**0.37**
TOTALS	**13443**	**6600**	

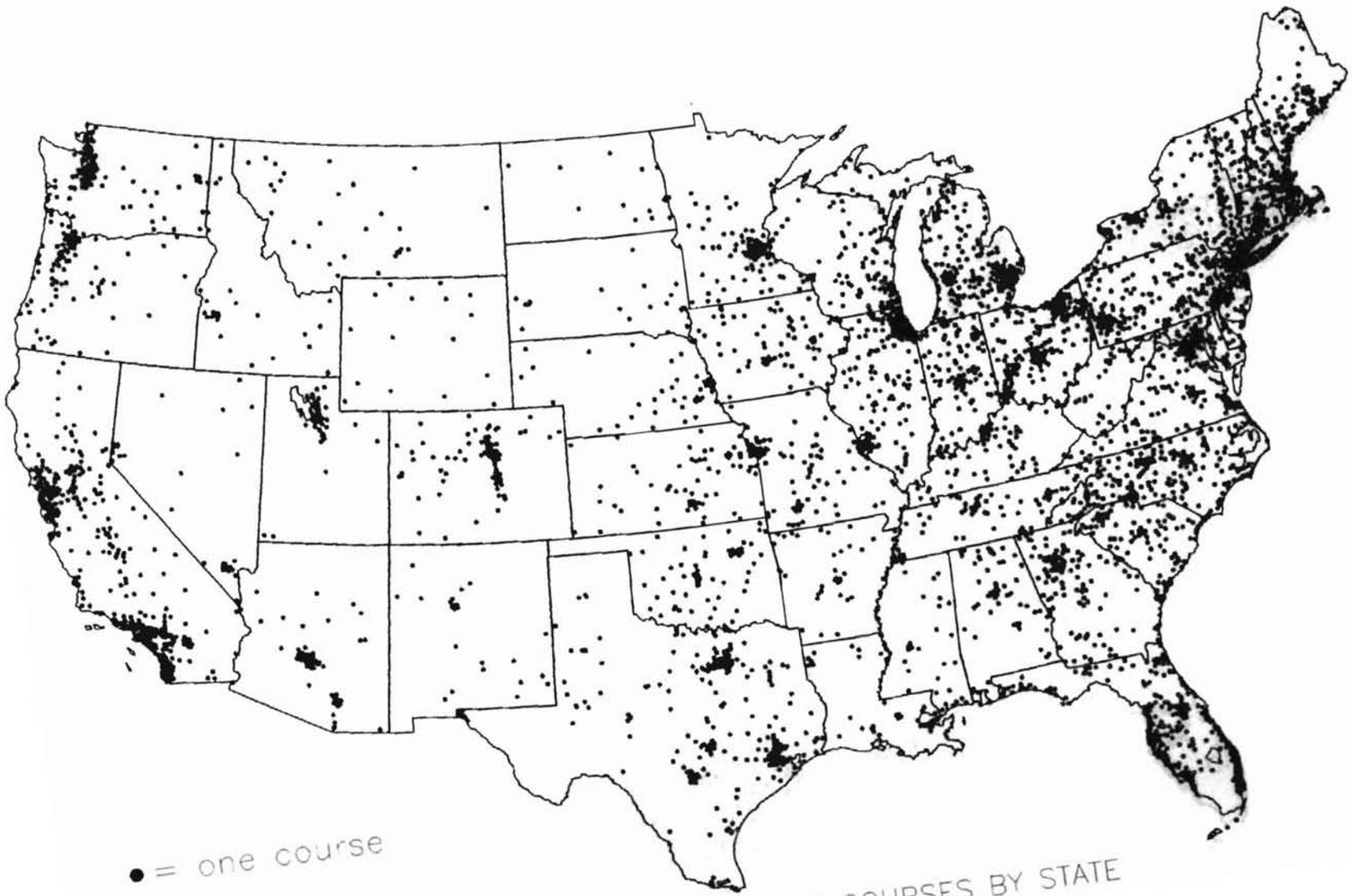


FIGURE 10. KNOWN ARCHITECT COURSES BY STATE

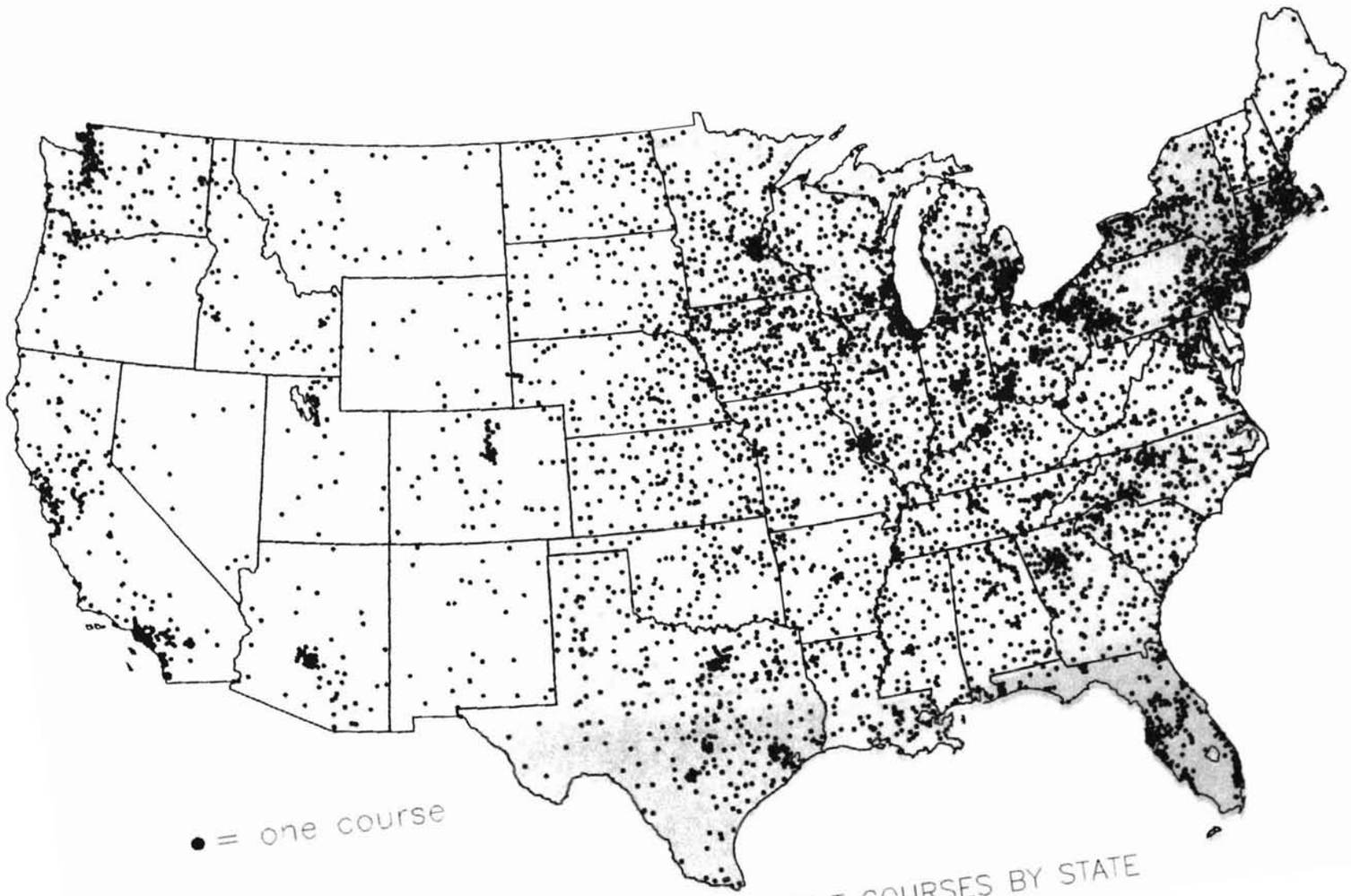


FIGURE 11. UNKNOWN ARCHITECT COURSES BY STATE

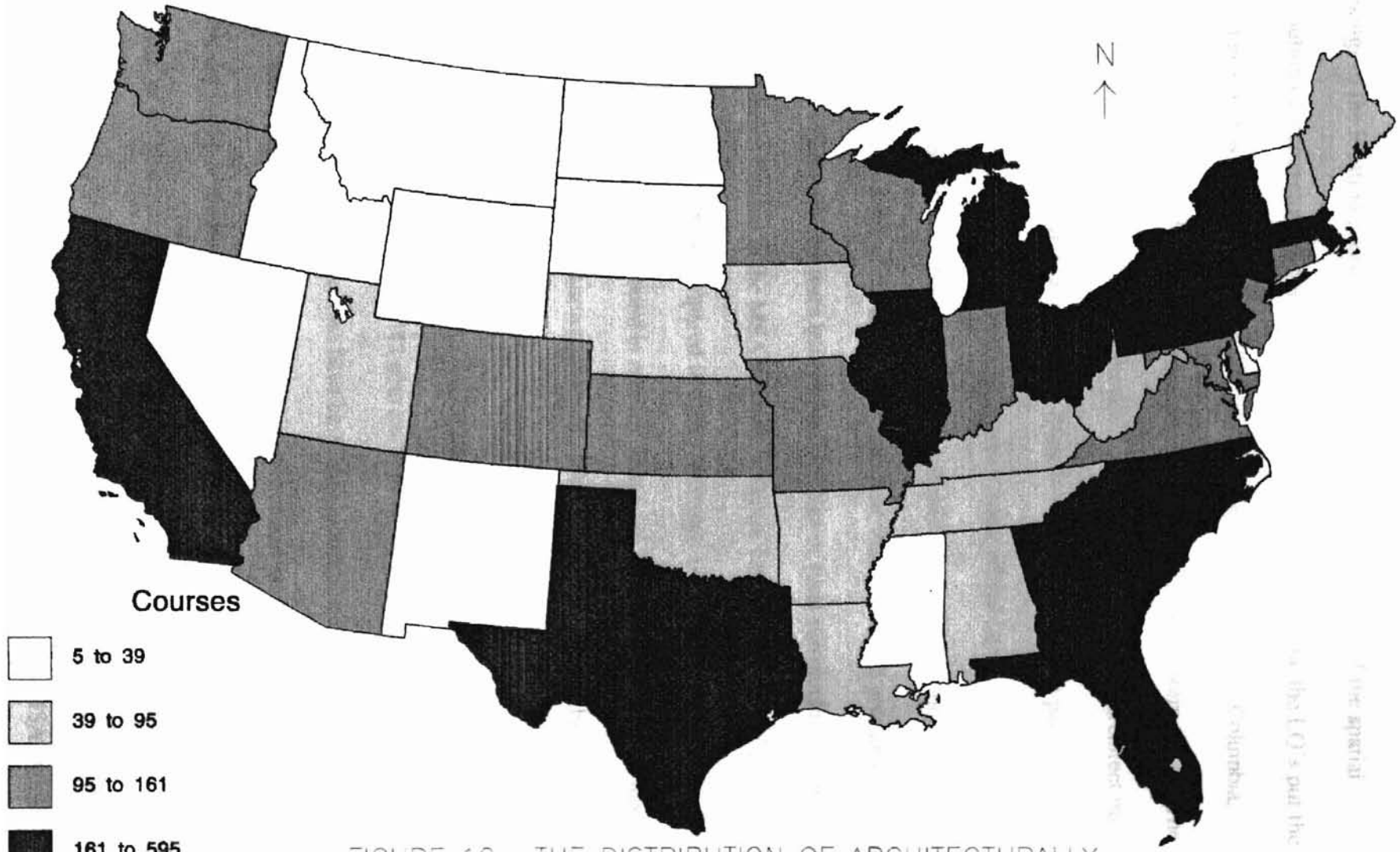


FIGURE 12. THE DISTRIBUTION OF ARCHITECTURALLY DESIGNED GOLF COURSES

Rankings of the location quotients provides an accurate assessment of the spatial distribution of architecturally designed courses (Figure 13). Mapping the LQ's put the pattern in a somewhat different light. The LQ's are highest in District of Columbia, Maine, Nevada, Maryland, Delaware, California, and several other western states. The map of the LQ's reduce the Northeast section of states found in the total architect map. The LQ's shift the concentration of courses from the east to the western part of the U.S. This may be some part be due to the western states being settled later.

Metropolitan Statistical Areas (MSA's) are a smaller level of geography that will help to focus in on certain areas of the country. In addition, each MSA will give an indication to the number of courses that were built in metropolitan or rural surroundings. The total number of courses located in the MSA's is 8,863 (Figure 14,15). The total of courses with known architects is 4,878 as compared to 3,985 unknown architects (Appendix A). The numbers indicate that courses found in metropolitan areas have a 55% chance of having a course that was designed by a known architect. This is 5% more than at the state level. Also, the number of courses built in metropolitan areas outnumber those in non metropolitan areas. Population numbers for MSA's total 209,054,251 versus 53,251,874 in non-MSA areas. Of the total 13,443 courses, only 4,580 were built in non metropolitan areas. It is evident that more courses have been built in metropolitan areas than rural settings. One explanation could be that metropolitan areas tend to have more money available for hiring architects.

A total of 4,580 courses are located outside MSA boundaries. Of those 2,851 had no known architect designed or remodeled course. Only 1,729 of all non-metropolitan courses had any type of known golf course architect. A very high 62% of non-MSA courses were

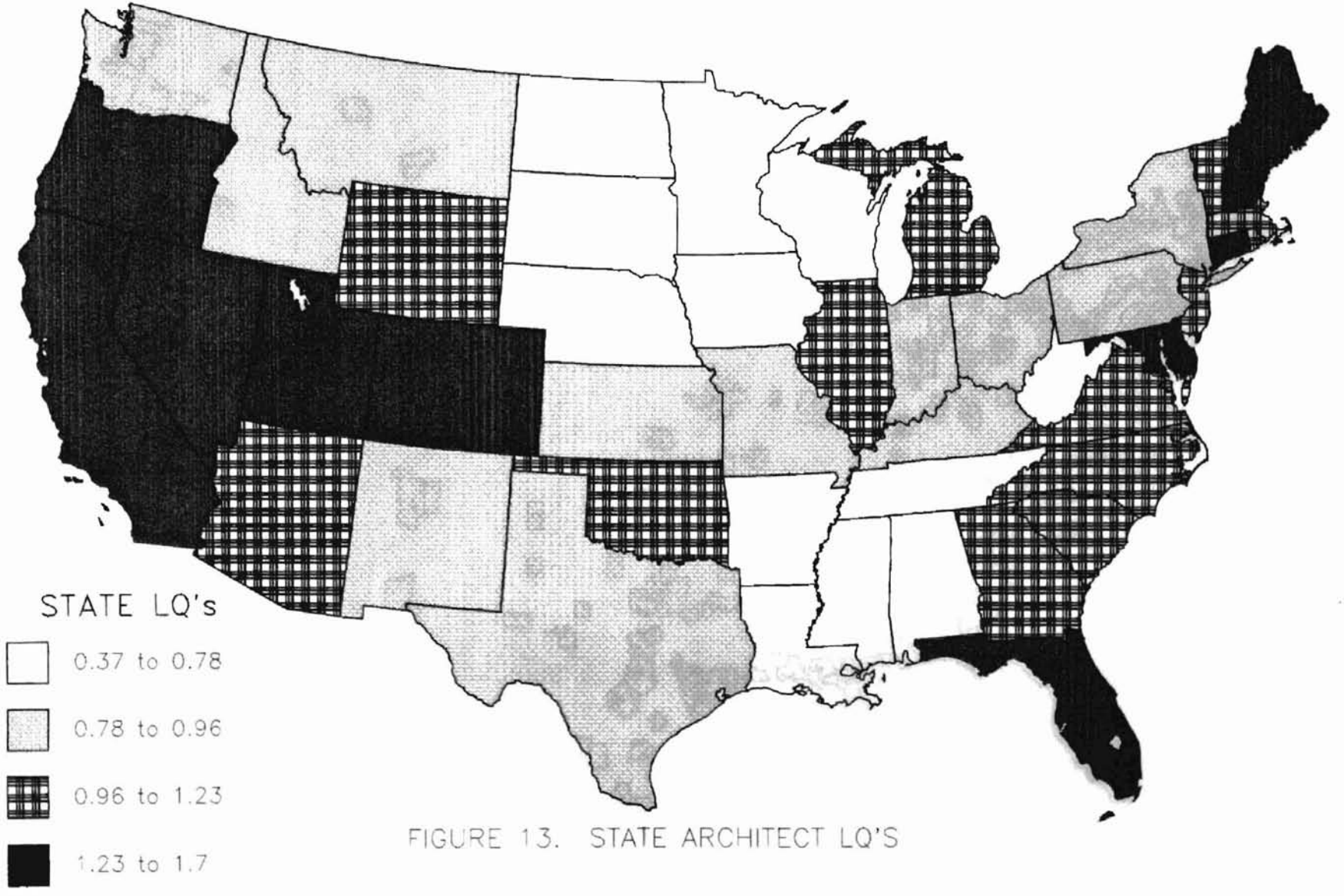


FIGURE 13. STATE ARCHITECT LQ'S

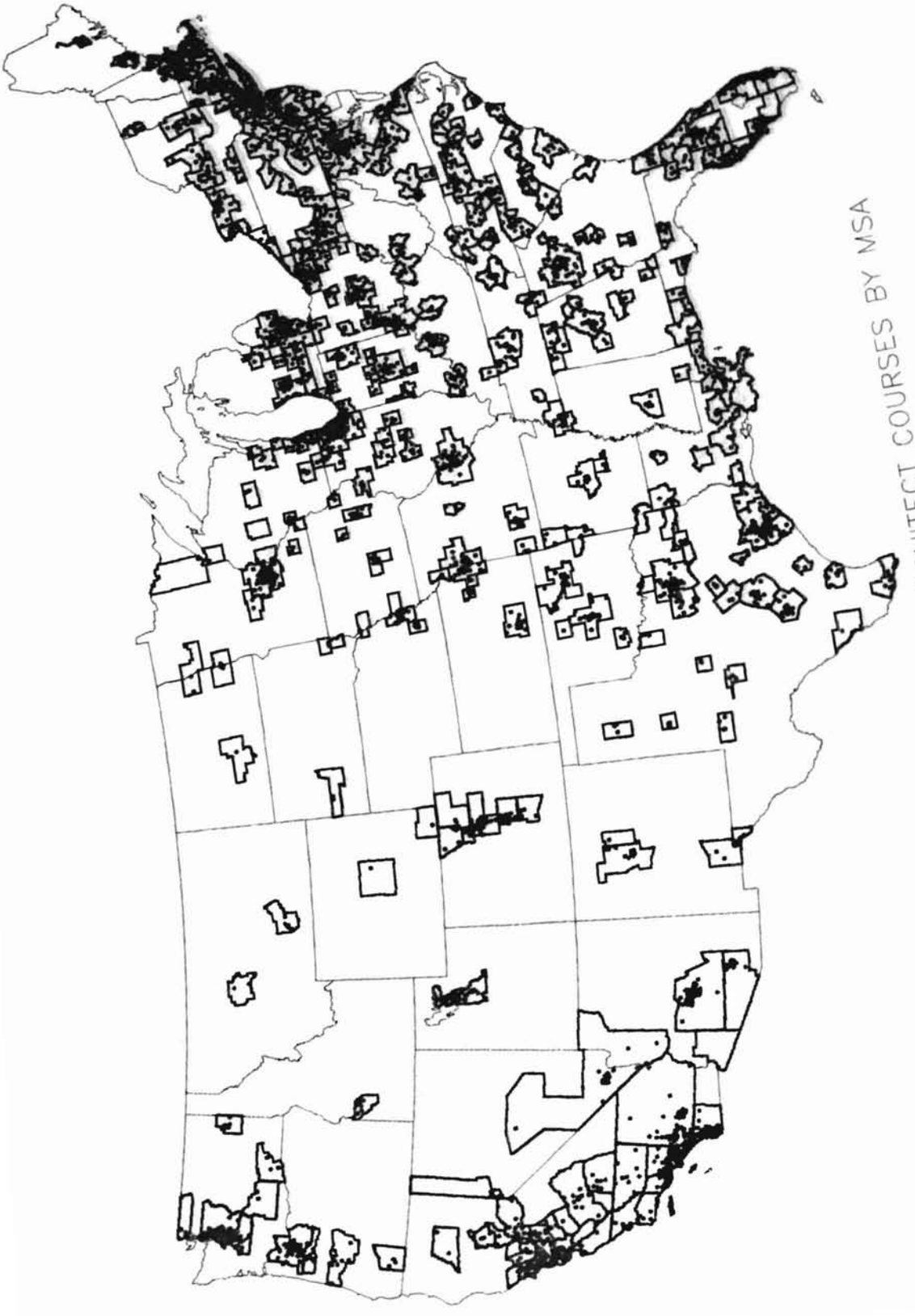


FIGURE 14. KNOWN ARCHITECT COURSES BY MSA

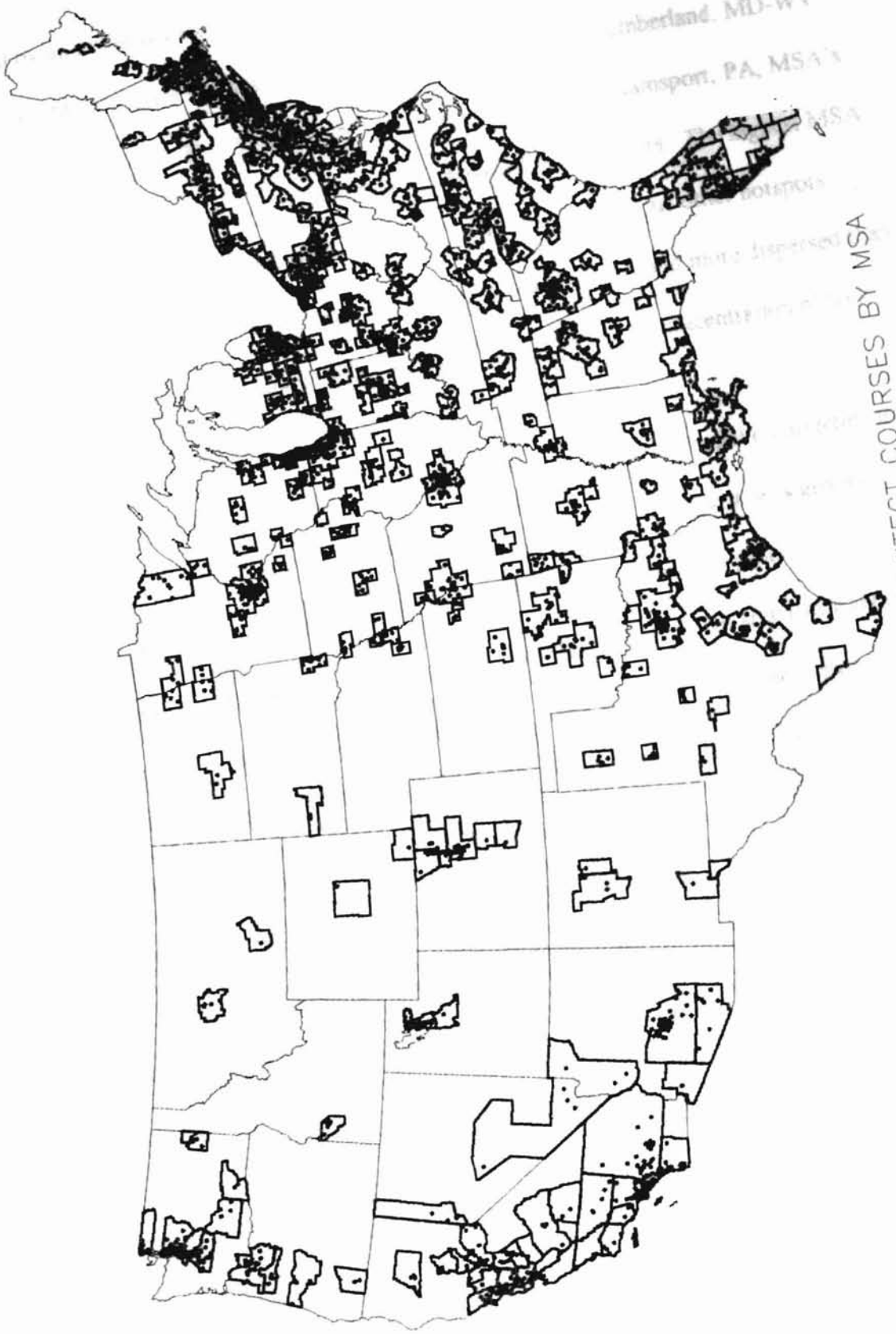


FIGURE 15. UNKNOWN ARCHITECT COURSES BY MSA

designed by an unknown architect.

Several MSA's have the highest LQ of 1.82. Bangor, ME, Cumberland, MD-WV, Danville,VA, Decatur, IL, Florence, SC, Laredo, TX, and Williamsport, PA, MSA's have the distinction of having all of their courses designed by architects. The highest MSA location quotients are found in Florida, California, Nevada, and various other hotspots (Figure 16). Since Metropolitan Statistical Areas are much smaller and more dispersed than states, it is often difficult to find any regional patterns. However, a concentration of high LQ patterns is prevalent on both the east and west coasts.

Rooney has developed a ranking system for all U.S. golf courses based on architectural design. He developed a point system to weight each course. Each course was given a value of .5. This limits the number of courses weighing too heavy in the final product (i.e. California, New York, Florida). If the area had a course with a known architect it received a value of 2. The virtuoso architect was given the most weight in the rating system. Twelve architects defined by Cornish and Whitten are considered to be "virtuosos". The twelve include Willie Park, Jr., Alister MacKenzie, Donald Ross, Stanley Thompson, A.W. Tillinghast, Robert Trent Jones, Pete Dye, Tom Fazio, Jack Nicklaus, Rees Jones, Robert Trent Jones, Jr., and Desmond Muirhead (Table 7). These specified twelve should not be confused with the twelve architects that were dealt with in Time Periods of Golf Course Architecture.

Courses with a virtuoso in it will receive a score of 4. The highest possible raw score that each individual course can get is a 6.5 (.5 + 2 + 4). It is necessary to divide the total raw counts by the number of Frequent Golfers (20+ times annually) to identify the access

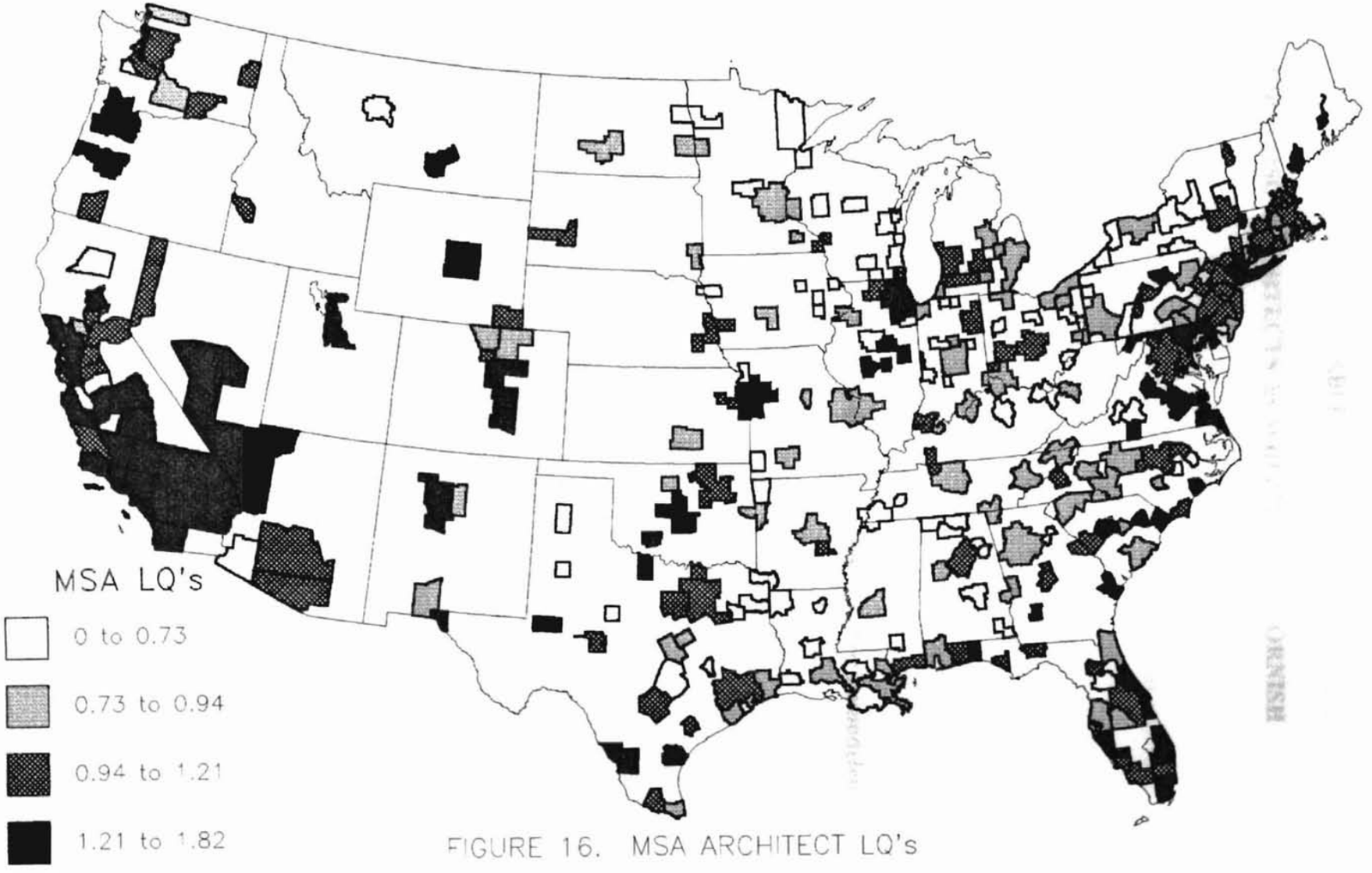


FIGURE 16. MSA ARCHITECT LQ's

TABLE 7

VIRTUOSO ARCHITECTS by WHITTEN AND CORNISH

ARCHITECT	# of Courses Designed or Remodeled
Willie Park, Jr.	31
Alister Mackenzie	17
Donald Ross	310
Stanley Thompson	15
A.W. Tillinghast	79
Robert Trent Jones	203
Pete Dye	64
Tom Fazio	65
Jack Nicklaus	39
Rees Jones	24
Robert Trent Jones, Jr.	32
Desmond Muirhead	26
TOTAL	**905**

to an area's courses (Table 8). This produces a state or MSA index that is weighted by golfers per golf course.

The state architect index shows the highest values to be in Maine, North and South Carolina, and the Rocky Mountain Region (Figure 17). When compared with the state architect LQ map, the state architect index map identifies a very different conglomeration of states with high indexes, with the exception of Maine.

The state indices clearly show certain regional patterns, but MSA indices help to identify smaller areas that have heavy concentrations of architecturally known courses. However, some MSAs will qualify as resort areas (Table 9). Resort MSAs are those places that are subject to large numbers of golfers who are visiting or on vacation. These MSAs have a higher number of frequent golfers than is indicated in the table. Nineteen Metropolitan Statistical Areas have been classified as resort locations. For this reason, they will have to be dealt with separately. The bulk of these resort MSAs are found in Florida, California, North Carolina, and South Carolina (Figure 18).

The MSAs not recognized as resorts are the focus of study (Appendix B). These MSA indexes are based on the "local" frequent golfers with little outside influence. The majority of high indexes for architecturally designed courses tend to be found in the Northern Heartland, Megalopolis, and South Atlantic golf regions. Three of the top ten MSA indexes are located in Maine (Bangor, Lewiston-Auburn, and Portsmouth-Rochester). The remaining seven are found in Pittsfield, MA, Jamestown, NY, Jackson, MI, Danville, VA, Stamford-Norwalk, CT, Jacksonville, NC, and Decatur, IL (Figure 19). These MSA are clustered in the northeast portion of the country with the exception

TABLE 8

STATE ARCHITECT INDEX

STATE NAME	TOTAL COURSES	COURSES WITH ARCH.	COURSES WITH VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	STATE RAW NUMBER	FREQUENT GOLFER STATE COUNTS	STATE INDEX
Maine	121	85	11	1.43	274.5	43947	**0.00624616**
South Carolina	299	180	30	1.23	629.5	112837	**0.005578844**
South Dakota	105	26	0	0.50	104.5	20963	**0.004984974**
New Hampshire	99	63	13	1.30	227.5	46876	**0.00485323**
Vermont	55	31	5	1.15	109.5	23162	**0.004727571**
North Carolina	499	274	59	1.12	1033.5	225986	**0.004573292**
Wyoming	45	22	1	1.00	70.5	15696	**0.00449159**
North Dakota	98	18	0	0.37	85	19268	**0.004411459**
Nebraska	173	60	3	0.71	218.5	50059	**0.004364849**
Kansas	232	100	6	0.88	340	83350	**0.004079184**
Montana	78	34	1	0.89	111	27910	**0.003977069**
Michigan	711	340	29	0.97	1151.5	302330	**0.003808752**
Florida	914	595	86	1.33	1991	526757	**0.003779731**
Iowa	321	88	2	0.56	344.5	93361	**0.003689978**
Rhode Island	49	26	12	1.08	124.5	35619	**0.003495326**
Ohio	691	292	58	0.86	1161.5	345881	**0.003358091**
Massachusetts	339	195	53	1.17	771.5	235824	**0.003271508**
Minnesota	371	131	12	0.72	495.5	154494	**0.003207244**
Connecticut	178	115	28	1.32	431	138382	**0.003114567**
Indiana	394	152	17	0.79	569	182803	**0.00311264**
Kentucky	245	95	5	0.79	332.5	108732	**0.003057977**
Oregon	159	106	3	1.36	303.5	100857	**0.003009211**
Wisconsin	380	133	9	0.71	492	165079	**0.002980391**
Utah	83	56	1	1.37	157.5	53104	**0.002965878**
Idaho	80	31	0	0.79	102	34530	**0.002953953**
Arizona	222	132	9	1.21	411	143258	**0.00286895**
Colorado	179	111	11	1.26	355.5	124874	**0.00284687**

TABLE 8. CONTINUED

STATE ARCHITECT INDEX

STATE NAME	TOTAL COURSES	COURSES WITH ARCH.	COURSES WITH VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	STATE RAW NUMBER	FREQUENT GOLFER STATE COUNTS	STATE INDEX
Georgia	347	166	30	0.97	625.5	221125	**0.002828717**
Illinois	612	319	30	1.06	1064	386562	**0.002752469**
Pennsylvania	622	281	51	0.92	1077	403979	**0.00266598**
Missouri	289	125	9	0.88	430.5	162248	**0.002653345**
Oklahoma	162	82	4	1.03	261	99063	**0.002634687**
West Virginia	104	40	3	0.78	144	55273	**0.00260525**
New York	730	338	107	0.94	1469	609533	**0.002410042**
Arkansas	139	47	2	0.69	171.5	71252	**0.00240695**
Tennessee	245	94	14	0.78	366.5	155026	**0.00236412**
Alabama	212	78	10	0.75	302	128087	**0.002357772**
Nevada	53	37	4	1.42	116.5	50442	**0.002309583**
Virginia	258	149	21	1.18	511	224767	**0.002273465**
New Mexico	66	31	2	0.96	103	48268	**0.002133919**
Mississippi	134	39	2	0.59	153	74216	**0.00206155**
New Jersey	267	161	40	1.23	615.5	309970	**0.001985676**
Texas	722	310	25	0.87	1081	548261	**0.001971689**
Delaware	25	17	1	1.39	50.5	26730	**0.001889263**
Maryland	150	104	17	1.41	351	187779	**0.001869219**
Washington	238	107	1	0.92	337	182859	**0.00184295**
California	794	539	64	1.38	1731	1081318	**0.001600824**
Louisiana	148	40	4	0.55	170	113237	**0.001501276**
District of Columbia	6	5	0	1.70	13	14038	**0.000926058**
TOTALS	**13443**	**6600**	**905**				

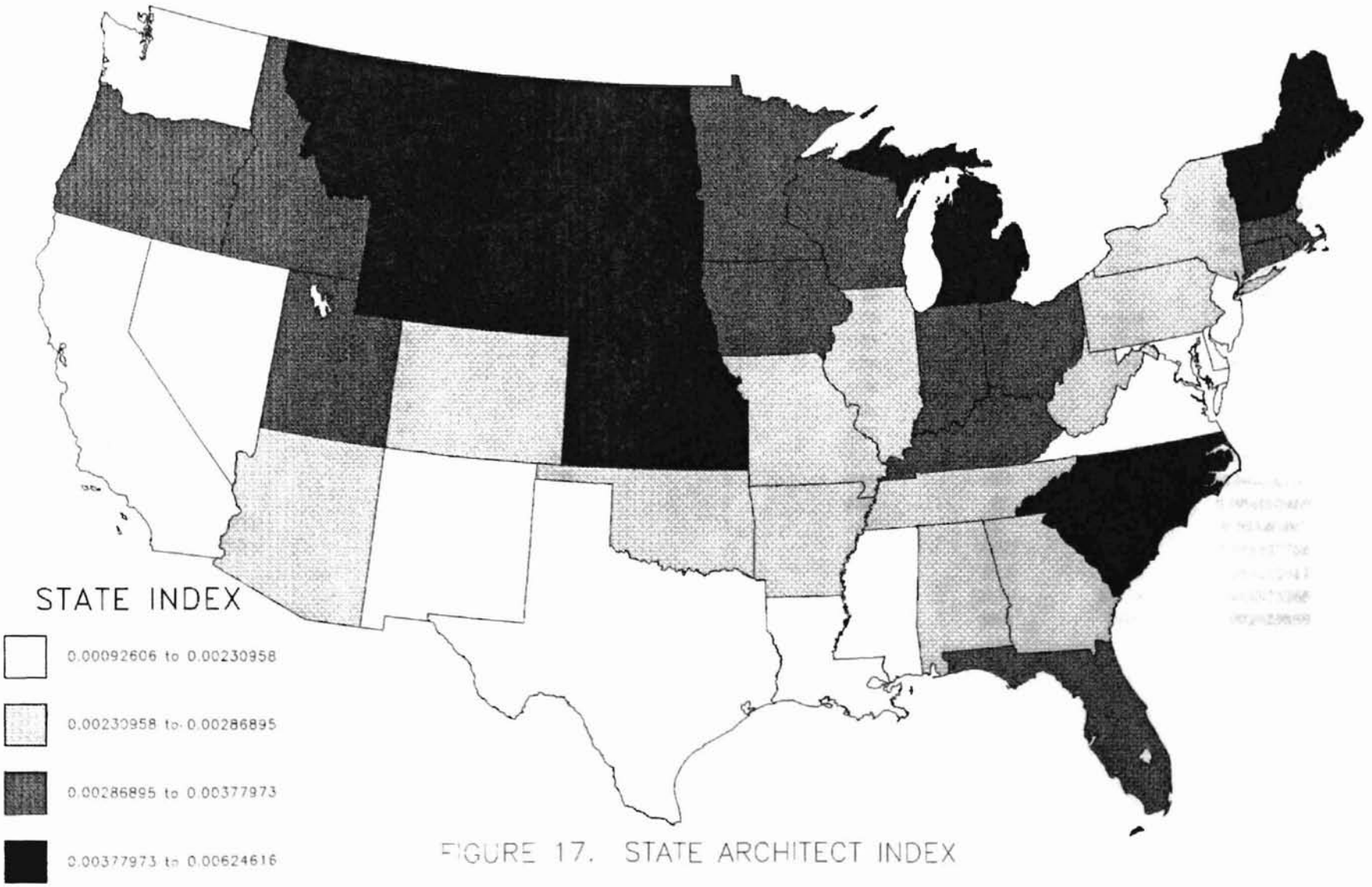


FIGURE 17. STATE ARCHITECT INDEX

TABLE 9

RESORT MSA ARCHITECT INDEX

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	MSA RAW NUMBER	FREQUENT GOLFERS	MSA INDEX
Myrtle Beach, SC MSA	50	42	7	1.53	137	5540	**0.024729242**
Naples, FL MSA	48	29	3	1.10	94	9172	**0.010248583**
Wilmington, NC MSA	28	22	4	1.43	74	7228	**0.010237963**
Barnstable-Yarmouth, MA MSA	26	20	5	1.40	73	7382	**0.009888919**
Fort Pierce-Port St. Lucie, FL MSA	46	32	5	1.26	107	13274	**0.008060871**
West Palm Beach-Boca Raton,FL MSA	109	93	24	1.55	336.5	45830	**0.007342352**
Fort Myers-Cape Coral, FL MSA	58	36	3	1.13	113	17616	**0.006414623**
Asheville, NC MSA	15	9	4	1.09	41.5	7374	**0.005627882**
Salinas, CA MSA	20	15	6	1.36	64	11644	**0.005496393**
Fort Walton Beach, FL MSA	13	9	0	1.26	24.5	4922	**0.004977651**
Panama City, FL MSA	9	6	1	1.21	20.5	4392	**0.004667577**
Sarasota-Bradenton, FL MSA	61	44	4	1.31	134.5	29825	**0.00450964**
Lakeland-Winter Haven, FL MSA	41	20	2	0.89	68.5	15772	**0.00434314**
Punta Gorda, FL MSA	12	11	1	1.67	32	7785	**0.004110469**
Biloxi-Gulfport-Pascagoula, MS MSA	18	10	1	1.01	33	9692	**0.00340487**
Riverside-San Bernardino, CA PMSA	139	100	16	1.31	333.5	99322	**0.003357766**
Atlantic-Cape May, NJ PMSA	19	9	3	0.86	39.5	12256	**0.003222911**
Phoenix-Mesa, AZ MSA	137	84	4	1.11	252.5	87818	**0.002875265**
Brownsville-Harlingen-San Benito, TX MSA	11	5	0	0.83	15.5	7636	**0.002029859**

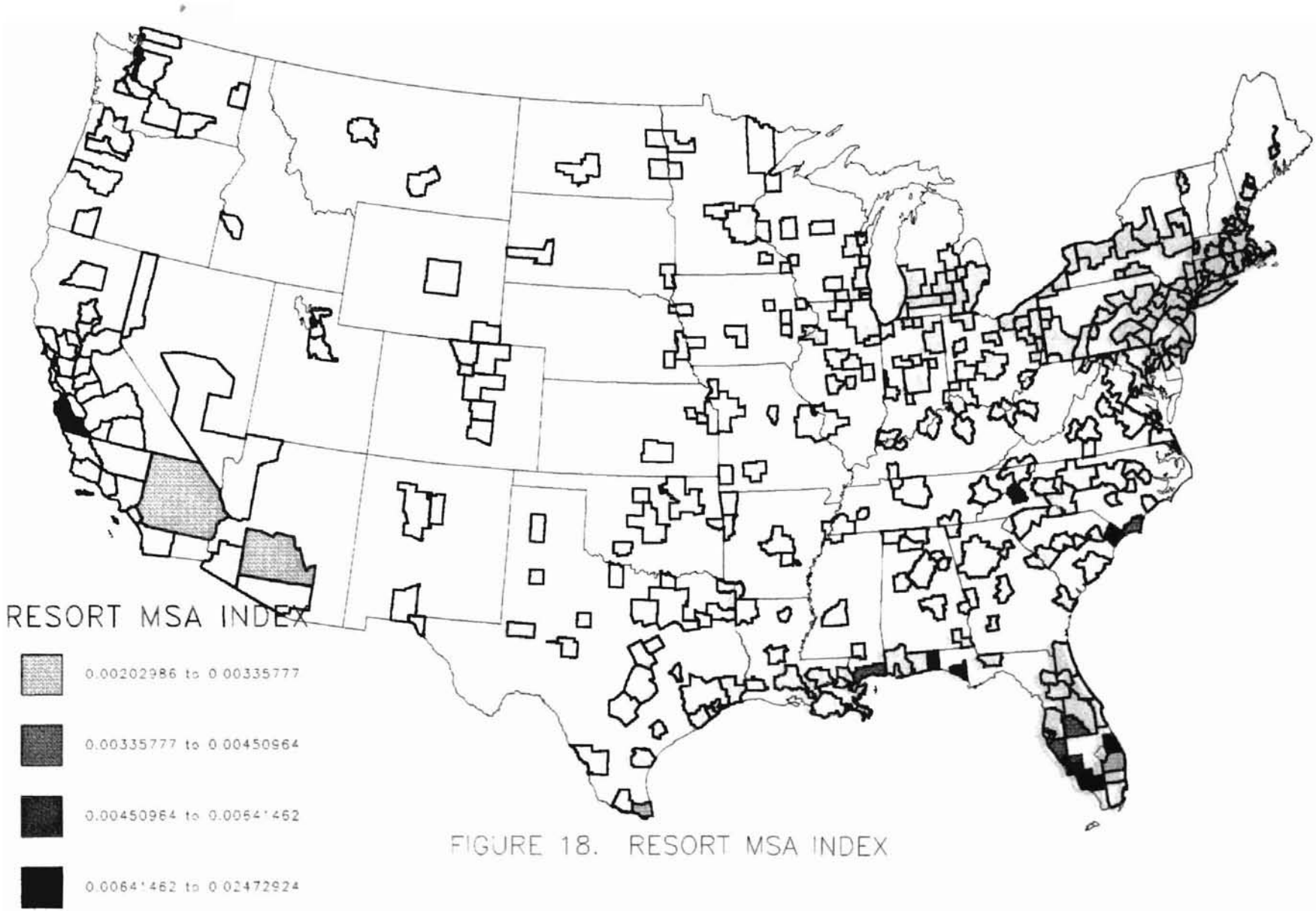


FIGURE 18. RESORT MSA INDEX

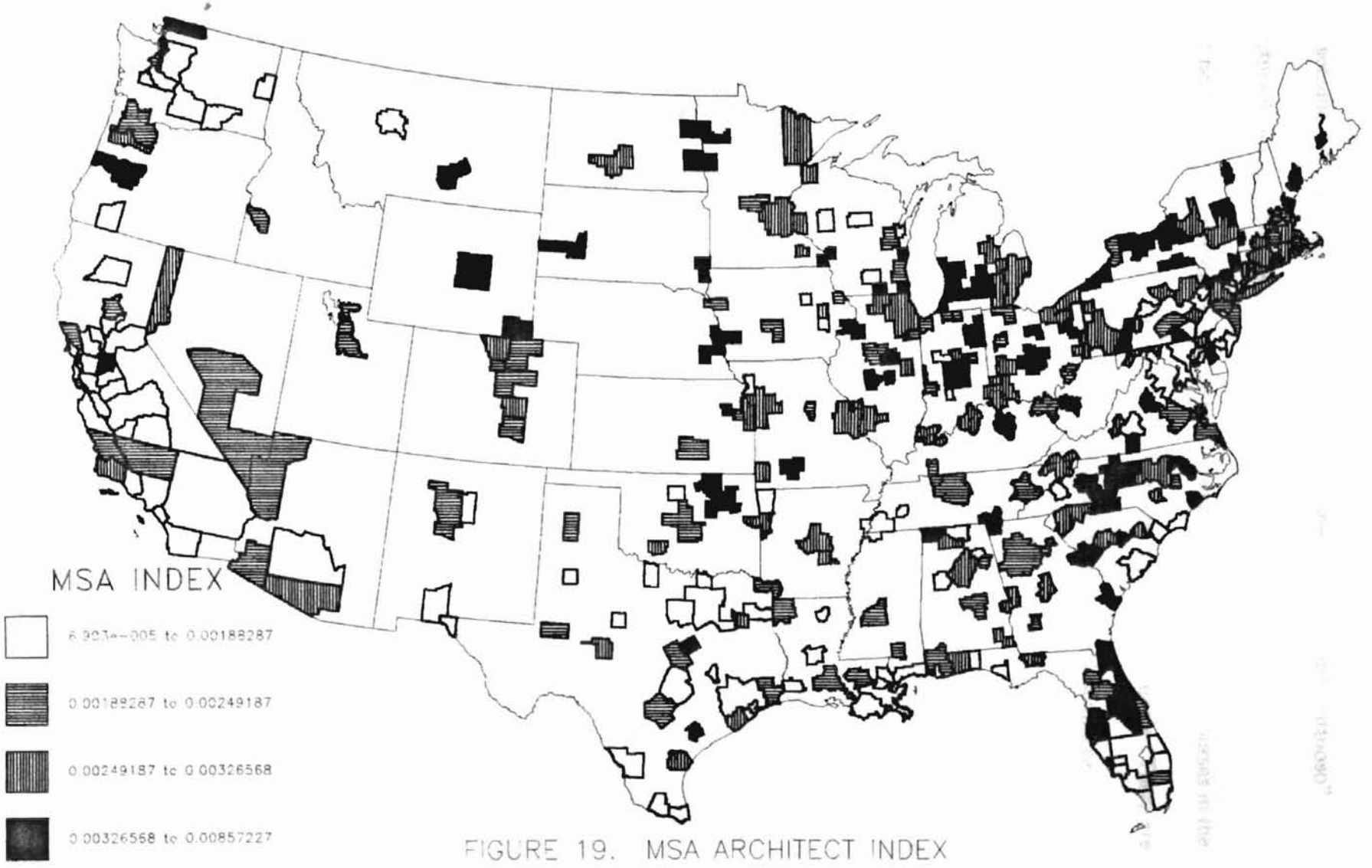


FIGURE 19. MSA ARCHITECT INDEX

of Jacksonville, NC. This pattern shows the large number of known and "virtuoso" architecturally designed courses in this area of the U.S.

The next step in the analysis is to identify the architects who have built courses in the MSAs with the highest indexes. Pittsfield, Massachusetts MSA is an example. There are a total of 10 courses in the MSA. Of those, 6 were determined to be designed or remodeled by a known architect. Wayne Stiles and Rowland Armacost did two courses while Alex Findlay and Walter Nettleton designed one course. The two courses, Berkshire Hills Country Club (A.W. Tillinghast) and Country Club of Pittsfield (Donald Ross), have the distinction of being "virtuoso" designed courses.

Jamestown, New York MSA comes in second on the index ranking. This MSA has 16 courses. There are three courses that are known to be architecturally designed, and three others have been designed by a virtuoso. Jamestown, New York is a highly visible city that could attract "big" architect names. William Harries, Ferdinand Garbin, and Alfred Schardt are recognized as the architects who have designed courses in the area. The virtuosos who are responsible for the remaining three are Donald Ross and Robert Trent Jones, who has two courses in the MSA. Donald Ross is once again mentioned as a repeat architect in a MSA.

Bangor, Maine MSA has only 6 courses within its confines. However, all six courses are represented by an architect. Five courses are architecturally known with only one virtuoso course being represented. The known architects of the MSA are Bob Girvan, Charlie Emery, Geoffrey Cornish, Ham Robbins, and Winn Pike. These architects have done courses primarily in the same area of the country. This shows the regional trend of golf course architects. The lone virtuoso architect once again was Donald Ross. Ross has

been mentioned in each of the top three MSAs. This attests to the great scope of courses of which Donald Ross produced.

Jackson, Michigan has the highest ranking index outside the northeast. This MSA has a large number of golf courses within its boundaries with a total of 21 courses. Of those, 9 are known to be architecturally designed. The Jackson MSA also has the distinction of being the highest ranked MSA with no virtuoso architect. For lack of a better term, Jackson could be called the generic MSA of the top four. The architects who are responsible for the courses are Arthur Hamm (2), Floyd Hammond (2), Arthur Young, Jim LaVernock, Morris Wilson, Tom Bendelow, and William Newcomb.

The top four MSAs give an indication of where courses are most likely to be architecturally known. The remaining MSAs seem to be located in the upper midwest of northeast portion of the country. This trend holds true for approximately the first thirty MSAs. After this, the pattern becomes more scattered and distributed throughout the U.S. landscape.

Architecturally Designed Courses in the Nine Hole Golf Regions

Nine hole courses are can be viewed as a separate entity of golf courses. They were built in order to provide faster play. In most cases, nine hole facilities can be more economical . The nine hole facilities can be broken down into three distinct types. These are Regulation, Executive, and Par 3 courses. The Regulation courses tend to exhibit characteristics similar to regulation 18 hole courses. The only difference is that they only contain nine holes. The Executive course is one that is designed for quick play. The course is shorter in order to keep play moving. A typical Executive 9 hole course never

exceeds 2,700 yards. Executive courses are often built due to the limited supply of land. Par 3 courses are similar to executive courses in that the course is played at a quick pace. Par 3's are simply a shortened version of regulation courses. The name, Par 3, actually speaks for itself. Each hole has a limitation of 3 strokes for par.

Regulation nine hole facilities tend to be clustered in the upper Midwest, and throughout the Northeast (Figure 20). Iowa leads the country with 224 total state regulation 9 hole courses. Texas, New York, Illinois, and Michigan round out the top five with 216, 178, 166, and 159 respectively (Table 10). The Upper Midwest is the dominant region. Small towns typically have more 9 hole courses. A greater number of small towns have the wealth necessary to build a 9 hole facility.

As shown in Table 10, only 7 states have over 50% known architecturally designed Regulation 9 hole courses. Only 894 architecturally designed courses are known out of a total of 3,549 regulation courses. 25% of all regulation 9 hole courses fall within this category. This evidence shows that regulation 9 hole courses have far greater number of unknown designed courses. The total of known architecturally designed courses plummet after the top 7 states. The regulation 9 hole facilities play a secondary role to 18 hole courses when dealing with architectural design. It is evident that regulation 9 hole courses are geared for keeping up with demand as opposed to focusing on the intricate details of course design. Regulation 9 hole courses tend to attract the golfers who are concerned with "getting a decent tee time."

Executive 9 hole courses are a shortened version of the regulation 9 facilities. There are only 484 of these courses in the U.S. (Figure 21). These courses are most abundant in California, Florida, and New York. They are primarily found in heavily populated states

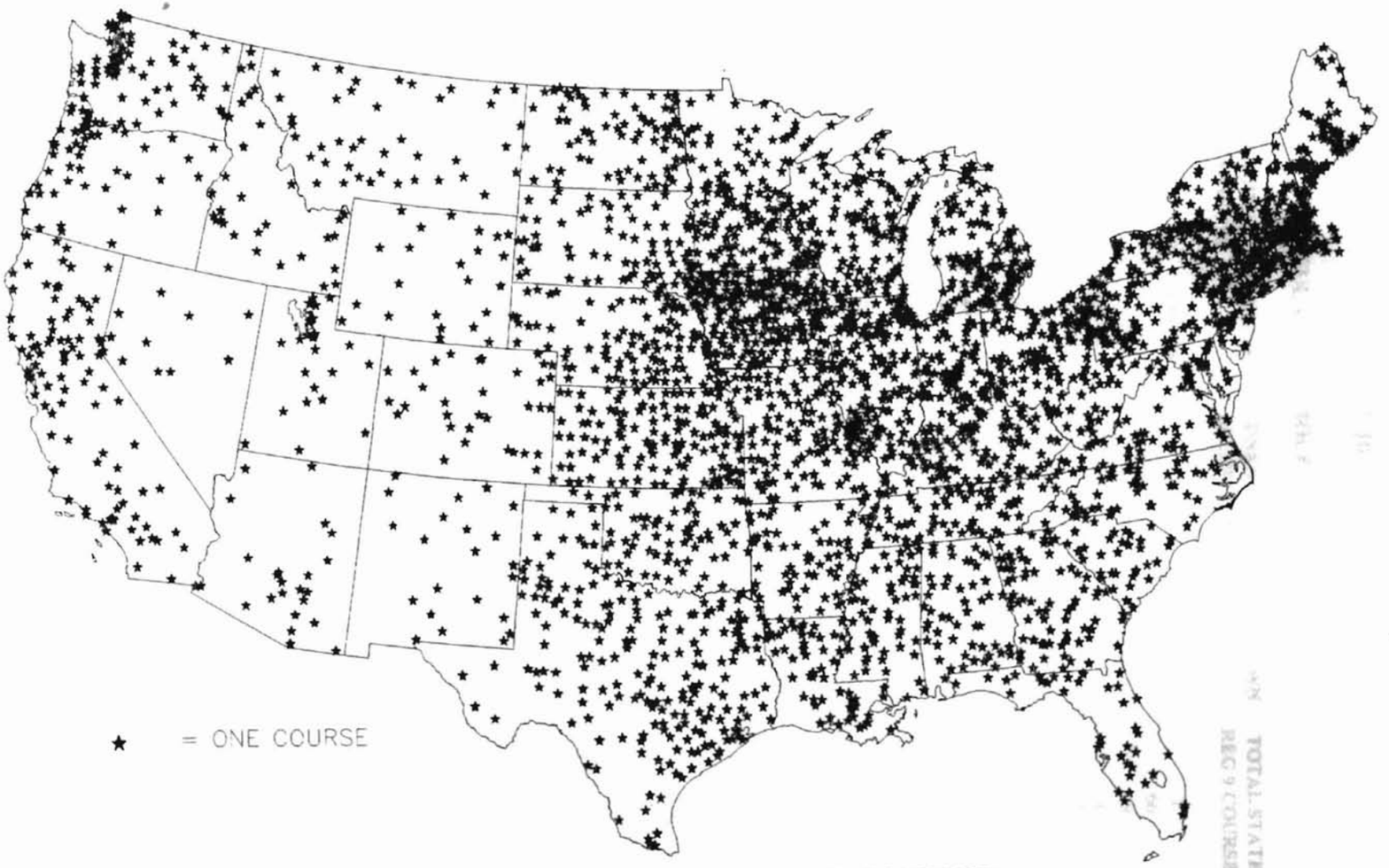


FIGURE 20. REGULATION 9 HOLE COURSES

TABLE 10

REGULATION 9 HOLE COURSES

STATE	KNOWN ARCHITECTS	% KNOWN	UNKNOWN ARCHITECTS	% UNKNOWN	TOTAL STATE REG 9 COURSES
Delaware	1	100.00%	0	0.00%	1
Maine	47	71.21%	19	28.79%	66
Oregon	31	63.27%	18	36.73%	49
Maryland	10	62.50%	6	37.50%	16
New Hampshire	20	62.50%	12	37.50%	32
Utah	14	56.00%	11	44.00%	25
Florida	22	55.00%	18	45.00%	40
California	47	48.45%	50	51.55%	97
New Jersey	14	45.16%	17	54.84%	31
Massachusetts	46	43.81%	59	56.19%	105
Connecticut	16	40.00%	24	60.00%	40
Wyoming	9	39.13%	14	60.87%	23
Nevada	4	36.36%	7	63.64%	11
Arizona	9	36.00%	16	64.00%	25
Vermont	6	35.29%	11	64.71%	17
Oklahoma	24	33.33%	48	66.67%	72
West Virginia	12	31.58%	26	68.42%	38
Michigan	49	30.82%	110	69.18%	159
Washington	20	30.30%	46	69.70%	66
Colorado	10	29.41%	24	70.59%	34
Illinois	48	28.92%	118	71.08%	166
Pennsylvania	33	27.97%	85	72.03%	118
Georgia	20	27.40%	53	72.60%	73
Montana	12	27.27%	32	72.73%	44
Missouri	34	26.56%	94	73.44%	128
Kentucky	21	25.30%	62	74.70%	83
Kansas	34	25.00%	102	75.00%	136
Idaho	7	22.58%	24	77.42%	31
New Mexico	5	21.74%	18	78.26%	23
Virginia	10	21.74%	36	78.26%	46
Ohio	27	21.26%	100	78.74%	127
South Carolina	6	17.65%	28	82.35%	34
Indiana	17	17.53%	80	82.47%	97
New York	31	17.42%	147	82.58%	178
Wisconsin	20	16.53%	101	83.47%	121
Iowa	36	16.07%	188	83.93%	224
North Carolina	9	16.07%	47	83.93%	56
Nebraska	15	15.46%	82	84.54%	97
Rhode Island	2	15.38%	11	84.62%	13
Minnesota	19	13.97%	117	86.03%	136
Texas	30	13.89%	186	86.11%	216
Alabama	7	12.96%	47	87.04%	54
Mississippi	7	11.86%	52	88.14%	59
South Dakota	9	11.69%	68	88.31%	77
Arkansas	7	11.11%	56	88.89%	63
North Dakota	8	10.67%	67	89.33%	75
Louisiana	5	8.33%	55	91.67%	60
Tennessee	4	5.97%	63	94.03%	67
TOTALS	**894**		**2655**		**3549**

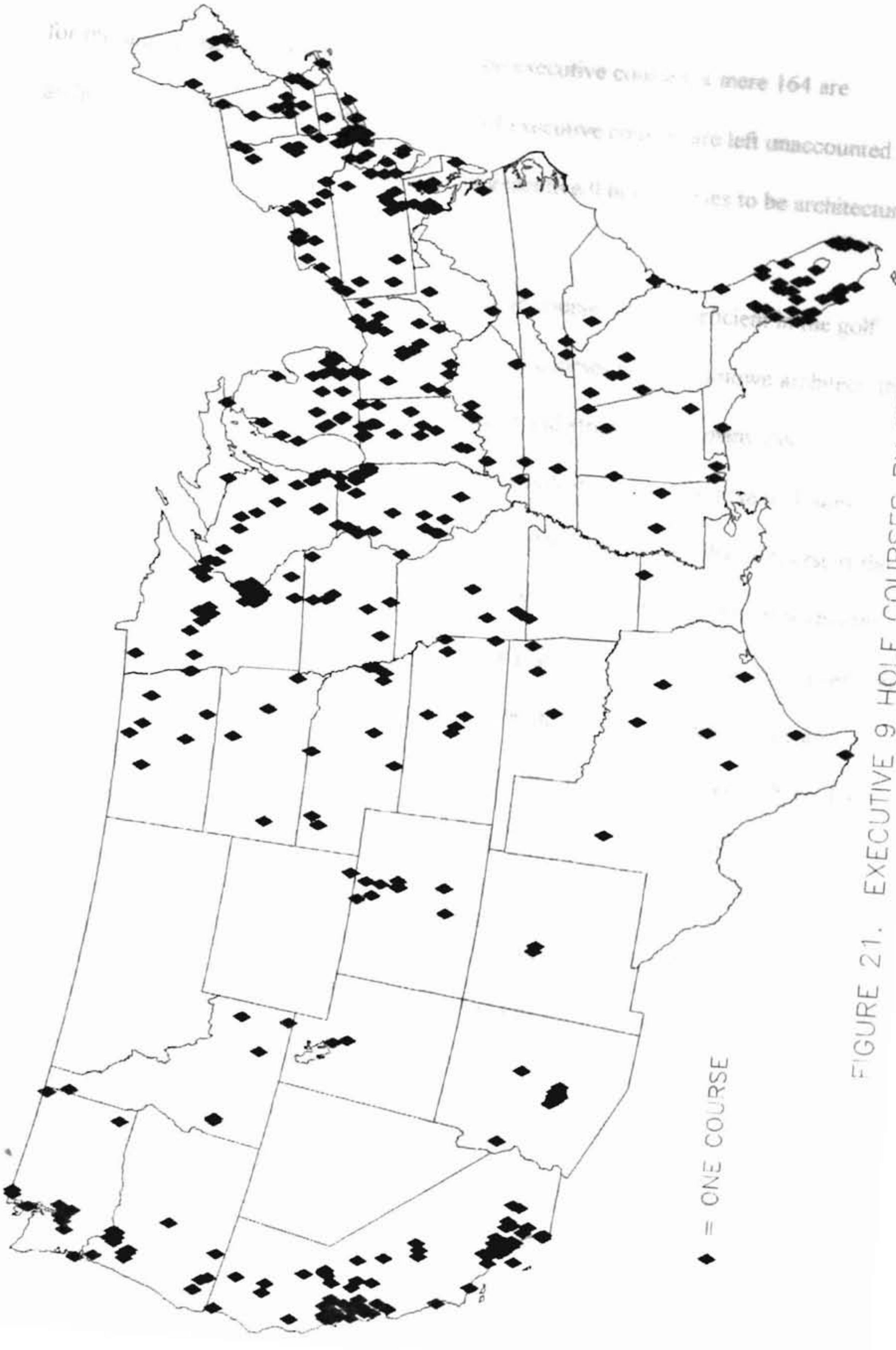


FIGURE 21. EXECUTIVE 9 HOLE COURSES BY STATE

for the simple reason of limited space. Of the executive courses, a mere 164 are architecturally designed. A total of 66% of all executive courses are left unaccounted. Only eleven states have over 50% percent of executive 9 hole courses to be architecturally designed (Table 11).

Again, the numbers show that executive 9 hole courses can be deficient in the golf design department. With only 1/3 of the executive courses having a known architect, the majority of courses probably have a lack of design and structure. In many cases, the courses will probably be secondary to the eighteen hole courses in the area in design.

Par 3 nine hole courses are really in a class all by themselves. The Par 3 course is the shortest of the nine hole courses. Par 3 courses account for only 505 courses within the U.S. golfing landscape. Of these, 178 have a known architect, a low 35%. However, this is a better percentage than the regulation 9, and executive 9 hole courses. Once again, California, Florida, and New York head the list with 58, 39, and 28 respectively (Table 12). The Par 3 courses seem to be following the same regional pattern as the executive courses (Figure 22).

Of all of the Par 3 courses, only twelve of the 45 states exhibited over a 50% mark of architecturally designed courses. Reasoning behind this deals primarily with the structure of a Par 3 course. A Par 3 course is the smallest course in relation to Regulation 9 and Executive 9 hole courses. A smaller course limits the amount of creativity that an architect can show through his design. The design of a smaller scale course will be produced more easily and efficiently. This could explain the lack of known architecturally designed courses for the majority of 9 hole facilities.

TABLE 11

EXECUTIVE 9 HOLE COURSES

STATE	KNOWN ARCH.	% KNOWN	UNKNOWN ARCH.	% UNKNOWN	TOTAL STATE EXEC 9COURSES
Arkansas	1	100.00%	0	0.00%	1
Utah	2	100.00%	0	0.00%	2
Wyoming	1	100.00%	0	0.00%	1
New Jersey	3	60.00%	2	40.00%	5
Arizona	10	50.00%	10	50.00%	20
Connecticut	1	50.00%	1	50.00%	2
Maryland	3	50.00%	3	50.00%	6
Mississippi	1	50.00%	1	50.00%	2
North Carolina	2	50.00%	2	50.00%	4
South Dakota	2	50.00%	2	50.00%	4
Texas	4	50.00%	4	50.00%	8
California	33	45.83%	39	54.17%	72
Michigan	11	45.83%	13	54.17%	24
Florida	18	43.90%	23	56.10%	41
Oregon	7	43.75%	9	56.25%	16
Kansas	3	42.86%	4	57.14%	7
Georgia	2	40.00%	3	60.00%	5
New Hampshire	2	40.00%	3	60.00%	5
Alabama	2	33.33%	4	66.67%	6
Colorado	3	33.33%	6	66.67%	9
Indiana	5	33.33%	10	66.67%	15
Oklahoma	1	33.33%	2	66.67%	3
Virginia	1	33.33%	2	66.67%	3
Minnesota	9	30.00%	21	70.00%	30
New York	11	28.95%	27	71.05%	38
Kentucky	2	28.57%	5	71.43%	7
Illinois	6	25.00%	18	75.00%	24
Maine	1	25.00%	3	75.00%	4
Missouri	1	25.00%	3	75.00%	4
North Dakota	2	25.00%	6	75.00%	8
Ohio	5	21.74%	18	78.26%	23
Wisconsin	3	17.65%	14	82.35%	17
Idaho	1	16.67%	5	83.33%	6
Washington	2	14.29%	12	85.71%	14
Pennsylvania	2	13.33%	13	86.67%	15
Nebraska	1	11.11%	8	88.89%	9
District of Columbia	0	0.00%	1	100.00%	1
Iowa	0	0.00%	9	100.00%	9
Louisiana	0	0.00%	1	100.00%	1
Massachusetts	0	0.00%	6	100.00%	6
South Carolina	0	0.00%	2	100.00%	2
Tennessee	0	0.00%	1	100.00%	1
Vermont	0	0.00%	2	100.00%	2
West Virginia	0	0.00%	2	100.00%	2
TOTALS	**164**		**320**		**484**

TABLE 12

PAR 3 NINE HOLE COURSES

STATE	KNOWN ARCH.	% KNOWN	UNKNOWN ARCH.	% UNKNOWN	TOTAL STATE PAR 3 NINE HOLE
South Dakota	2	100.00%	0	0.00%	2
Oregon	4	80.00%	1	20.00%	5
Maine	3	75.00%	1	25.00%	4
Nevada	3	75.00%	1	25.00%	4
Connecticut	2	66.67%	1	33.33%	3
Colorado	10	62.50%	6	37.50%	16
Georgia	3	60.00%	2	40.00%	5
New Jersey	7	58.33%	5	41.67%	12
Utah	4	57.14%	3	42.86%	7
Nebraska	5	55.56%	4	44.44%	9
Illinois	10	50.00%	10	50.00%	20
North Dakota	1	50.00%	1	50.00%	2
Missouri	4	44.44%	5	55.56%	9
California	24	41.38%	34	58.62%	58
Florida	16	41.03%	23	58.97%	39
Iowa	2	40.00%	3	60.00%	5
Minnesota	9	39.13%	14	60.87%	23
Texas	8	36.36%	14	63.64%	22
New York	10	35.71%	18	64.29%	28
Pennsylvania	7	35.00%	13	65.00%	20
Maryland	1	33.33%	2	66.67%	3
Washington	7	33.33%	14	66.67%	21
Michigan	7	31.82%	15	68.18%	22
Indiana	4	30.77%	9	69.23%	13
New Hampshire	2	28.57%	5	71.43%	7
Idaho	1	25.00%	3	75.00%	4
New Mexico	1	25.00%	3	75.00%	4
Alabama	2	22.22%	7	77.78%	9
Massachusetts	2	22.22%	7	77.78%	9
South Carolina	2	22.22%	7	77.78%	9
Kentucky	3	21.43%	11	78.57%	14
Kansas	1	20.00%	4	80.00%	5
West Virginia	1	20.00%	4	80.00%	5
Arizona	1	16.67%	5	83.33%	6
North Carolina	2	16.67%	10	83.33%	12
Ohio	4	16.67%	20	83.33%	24
Virginia	1	14.29%	6	85.71%	7
Wisconsin	2	10.00%	18	90.00%	20
Arkansas	0	0.00%	1	100.00%	1
Louisiana	0	0.00%	3	100.00%	3
Mississippi	0	0.00%	2	100.00%	2
Montana	0	0.00%	4	100.00%	4
Oklahoma	0	0.00%	2	100.00%	2
Rhode Island	0	0.00%	1	100.00%	1
Tennessee	0	0.00%	5	100.00%	5
TOTALS	**178**		**327**		**505**

FIGURE 22. PAR 3 NINE HOLE COURSES

Par 3 courses were built primarily for economic reasons. Most are cheap to play, and were also cheap to construct. In many cases, the budget for a Par 3 could not afford to hire an architect. The money that is saved during construction of a course can be passed onto the golfer who is willing to overlook the absence of an architect. Since land is getting harder to obtain, Par 3s will most likely have a place in the golfing industry future.

Population Growth from 1960 vs. Percentage of Architect Courses

1995 state population was taken from Compass/Claritas Geodemographic Database. The 1995 numbers were then compared to the 1960 state population totals which were taken from the Department of Commerce (Bureau of the Census). The population growth and % increase were figured for all states (Table 13). The only states with negative increases were West Virginia and District of Columbia.

Each state was then compared to each state location quotient for known architects (Refer Table 5). One exception that stands out is the case of the District of Columbia. The District of Columbia is a special case. D.C. has only a total of 6 courses. Of those, 5 are architecturally designed by a known architect. West Virginia on the other hand ranks near the bottom quarter of the location quotients for states.

States such as Maine, Nevada, Maryland, Delaware, California, Utah, Oregon, and Florida all ranked high on both population percent increase and state LQ known architects. However, it is necessary to run a Spearman's rank correlation coefficient to accurately record any significant correlations. The equation is:

$$r_s = 1 - 6(\sum d^2)/ N^3 - N$$

TABLE 13

STATE POPULATION INCREASE COMPARED TO STATE LQ's, 1960-1995

STATE NAME	1960 POP	1995 POP	POP GROWTH	PERCENT INCREASE	COURSES WITH ARCH.	RANK POPULATION	RANK LQ
Alabama	3,276,000	4,249,837	973,837	130	78	26.5	40
Arizona	1,321,000	4,155,806	2,834,806	315	132	2	15
Arkansas	1,792,000	2,471,910	679,910	138	47	23	44
California	15,862,000	31,678,652	15,816,652	200	539	6	6
Colorado	1,768,000	3,724,429	1,956,429	211	111	5	12
Connecticut	2,543,000	3,272,168	729,168	129	115	28.5	10
Delaware	449,000	712,398	263,398	159	17	16	5
District of Columbia	766,000	563,732	-202,268	74	5	49	1
Florida	4,997,000	14,118,076	9,121,076	283	595	3	9
Georgia	3,958,000	7,160,359	3,202,359	181	166	10	24
Idaho	671,000	1,156,283	485,283	172	31	13	36.5
Illinois	10,084,000	11,805,251	1,721,251	117	319	38.5	21
Indiana	4,583,000	5,787,633	1,204,633	126	152	32.5	36.5
Iowa	2,757,000	2,837,678	80,678	103	88	46	46
Kansas	2,180,000	2,567,031	387,031	118	100	37	31.5
Kentucky	3,045,000	3,850,163	805,163	126	95	32.5	36.5
Louisiana	3,263,000	4,330,077	1,067,077	133	40	25	47
Maine	974,000	1,242,600	268,600	128	85	30.5	2
Maryland	3,111,000	5,040,705	1,929,705	162	104	15	4
Massachusetts	5,154,000	6,048,812	894,812	117	195	38.5	17
Michigan	7,833,000	9,524,277	1,691,277	122	340	36	25
Minnesota	3,422,000	4,600,326	1,178,326	134	131	24	41
Mississippi	2,185,000	2,687,798	502,798	123	39	34.5	45
Missouri	4,326,000	5,305,803	979,803	123	125	34.5	31.5
Montana	679,000	867,075	188,075	128	34	30.5	30
Nebraska	1,417,000	1,629,848	212,848	115	60	41	42.5

TABLE 13. CONTINUED

STATE POPULATION INCREASE COMPARED TO STATE LQ's, 1960-1995

STATE NAME	1960 POP	1995 POP	POP GROWTH	PERCENT INCREASE	COURSES WITH ARCH.	RANK POPULATION	RANK LQ
Nevada	291,000	1,501,577	1,210,577	516	37	1	3
New Hampshire	609,000	1,143,963	534,963	188	63	9	11
New Jersey	6,104,000	7,935,029	1,831,029	130	161	26.5	13.5
New Mexico	953,000	1,679,572	726,572	176	31	11.5	26
New York	16,855,000	18,193,530	1,338,530	108	338	43	27
North Carolina	4,576,000	7,147,392	2,571,392	156	274	17	19
North Dakota	634,000	638,633	4,633	101	18	47	49
Ohio	9,737,000	11,140,120	1,403,120	114	292	42	34
Oklahoma	2,337,000	3,276,731	939,731	140	82	22	22
Oregon	1,772,000	3,126,934	1,354,934	176	106	11.5	8
Pennsylvania	11,328,000	12,074,991	746,991	107	281	44	28.5
Rhode Island	858,000	994,783	136,783	116	26	40	20
South Carolina	2,395,000	3,691,462	1,296,462	154	180	18	13.5
South Dakota	683,000	725,397	42,397	106	26	45	48
Tennessee	3,577,000	5,229,824	1,652,824	146	94	20	38.5
Texas	9,631,000	18,629,572	8,998,572	193	310	7	33
Utah	900,000	1,942,224	1,042,224	216	56	4	7
Vermont	389,000	583,090	194,090	150	31	19	18
Virginia	3,987,000	6,614,831	2,627,831	166	149	14	16
Washington	2,856,000	5,421,995	2,565,995	190	107	8	28.5
West Virginia	1,856,000	1,826,929	-29,071	98	40	48	38.5
Wisconsin	3,959,000	5,113,067	1,154,067	129	133	28.5	42.5
Wyoming	331,000	480,158	149,158	145	22	21	23
TOTALS	**179,034,000**	**262,306,125**			**6600**		

After ranking the population increase and state Location Quotients, the **r** value is .4738. The **r** value is converted to a **z** value of 3.28. By using a one-tailed test, a **p** value of .0005 is considered to be highly correlated. The H_o ($r = 0$) states that the correlation has no relationship. The H_A ($r > 0$) states that there is a positive correlation. It is evident by the **p** value of .0005 that there is a positive relation.

CHAPTER VI

CONCLUSIONS

The purpose of this thesis was to analyze the spatial patterns associated with the works of golf course architects who have designed or remodeled golf courses in the U.S from 1888-1995. The courses were ranked by using location quotients in addition to state and MSA indices devised by Dr. Rooney. Both ranking systems were performed at the state and Metropolitan Statistical Area (MSA) level.

Population growth since 1960 is highly correlated with architecturally designed courses. Nine hole facilities were analyzed as a separate entity. Nine hole courses tended to be designed by amateurs.

The case study of Donald Ross reflected a high concentration of courses near his home at Pinehurst, North Carolina. The majority of Ross' courses were built in metropolitan areas. The courses with top ratings in Golf Digest's Places to Play shows that Ross did his best work near Pinehurst. His exceptional architecture close to home assured his reputation as a supreme architect.

The four time periods of golf course architecture were analyzed. The Embryonic Period (1888-1910) lacked the advanced technology to produce mass numbers of courses. The work of this period was spatially constricted to certain areas of the country. The

Diffusion Period (1911-1945) architects expanded their works to a greater portion of the U.S. This period accounts for 40% of all courses built by the 12 elite architects.

Modern Period architects (1946-1970) also focused on building a greater number of courses. Modern architects were able to use technology and advanced transportation to supply courses to almost all of the conterminous states. The three architects of this period were responsible for 383 of the 1,092 courses built by the Elite 12 architects. Finally, the Post Modern architects (1971-Present) possessed the luxury of many resources from which to construct exceptional courses. The Post Modern Period architects were more regionalized in their work. This characteristic is similar to the Embryonic architects, but for different regions. The Embryonic architects were regional out of necessity while the Post Modern architects are more specialized in their approach due to greater competition.

A total of 13,443 courses were analyzed. The ratio of known to unknown architects was approximately 50:50. Courses were mapped and ranked at the state and MSA level according to total number of known architects, LQ's, and index. LQ's were based on the number of known/unknown architects compared to courses within each specified state or MSA. The architect index includes "virtuoso" architects assigning special qualitative values to the ranking. Architect LQ ratings identify the states and MSAs that have higher populations. The architect index ratings deal more with the states and MSAs with a lower population and number of frequent golfers. The two ranking systems enable the ranking of architecture from two different perspectives.

The three distinct types of nine hole facilities, Regulation, Executive, and Par 3, all share a similar characteristic. These facilities lack courses that have been architecturally designed by a known architect. They tend to be secondary to 18 hole courses in terms of

legitimate course design and remodeling. Regulation courses are the best example with only 25% of all courses having an known architecturally designed course.

Architect designed courses represent a higher percentage of courses in states that have experienced their greatest growth since 1960. Population numbers from 1960-1995 identify the states with the highest growth also rank at the top of the architect LQ rankings. The District of Columbia is the only exception due to the small number of courses contained within this unique "state".

In doing the study, there are also some recommendations for future research in this area. It is highly recommended that the information compiled on architecturally designed golf facilities be utilized in a geographic database. To fully realize the potential of this work would require the development of a rating system for private golf courses. This being accomplished would enable the comparative analysis of all geographic areas. Thus, we could compare MSAs; Boston vs. Chicago, New York vs. Los Angeles, Akron vs. Altoona, etc.

A long term goal would be the establishment of golf facility quality index for all places in the United States. The index would be based on information concerning architect design and course quality as measured by user satisfaction.

Such a rating system would be a valuable tool for states and cities in the promotion of golf tourism and tournament sponsorship. It would also provide golfers with vital information relevant to golf travel, and planning, particularly those with a strong interest in the golf architectural community.

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APPENDICES

APPENDIX A

MSA ARCHITECT LOCATION QUOTIENTS

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Bangor, ME MSA	6	6	**1.82**	0	**0.00**
Cumberland, MD-WV MSA	4	4	**1.82**	0	**0.00**
Danville, VA MSA	7	7	**1.82**	0	**0.00**
Decatur, IL MSA	8	8	**1.82**	0	**0.00**
Florence, SC MSA	4	4	**1.82**	0	**0.00**
Laredo, TX MSA	2	2	**1.82**	0	**0.00**
Williamsport, PA MSA	2	2	**1.82**	0	**0.00**
Colorado Springs, CO MSA	15	14	**1.70**	1	**0.15**
Punta Gorda, FL MSA	12	11	**1.67**	1	**0.19**
Stamford-Norwalk, CT PMSA	23	21	**1.66**	2	**0.19**
Provo-Orem, UT MSA	9	8	**1.62**	1	**0.25**
Charlottesville, VA MSA	8	7	**1.59**	1	**0.28**
El Paso, TX MSA	8	7	**1.59**	1	**0.28**
Champaign-Urbana, IL MSA	7	6	**1.56**	1	**0.32**
West Palm Beach-Boca Raton,FL MSA	109	93	**1.55**	16	**0.33**
Albuquerque, NM MSA	13	11	**1.54**	2	**0.34**
Myrtle Beach, SC MSA	50	42	**1.53**	8	**0.36**
Dover, DE MSA	6	5	**1.51**	1	**0.37**
Lewiston-Auburn, ME MSA	6	5	**1.51**	1	**0.37**
Corpus Christi, TX MSA	11	9	**1.49**	2	**0.40**
Bergen-Passaic, NJ PMSA	31	25	**1.47**	6	**0.43**
Hagerstown, MD PMSA	5	4	**1.45**	1	**0.44**
Pittsfield, MA MSA	10	8	**1.45**	2	**0.44**
Pueblo, CO MSA	5	4	**1.45**	1	**0.44**
Las Vegas, NV-AZ MSA	33	26	**1.43**	7	**0.47**
Wilmington, NC MSA	28	22	**1.43**	6	**0.48**
San Francisco, CA PMSA	36	28	**1.41**	8	**0.49**
Oklahoma City, OK MSA	31	24	**1.41**	7	**0.50**
New Haven-Meriden, CT PMSA	22	17	**1.40**	5	**0.51**
Ventura, CA PMSA	22	17	**1.40**	5	**0.51**
Barnstable-Yarmouth, MA MSA	26	20	**1.40**	6	**0.51**
Albany, GA MSA	4	3	**1.36**	1	**0.56**
Billings, MT MSA	8	6	**1.36**	2	**0.56**
Casper, WY MSA	4	3	**1.36**	1	**0.56**
Chico-Paradise, CA MSA	8	6	**1.36**	2	**0.56**
Eugene-Springfield, OR MSA	16	12	**1.36**	4	**0.56**
Jacksonville, NC MSA	8	6	**1.36**	2	**0.56**
Lawton, OK MSA	4	3	**1.36**	1	**0.56**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Salinas, CA MSA	20	15	**1.36**	5	**0.56**
Santa Barbara-Santa Maria-Lompoc, CA MSA	16	12	**1.36**	4	**0.56**
Orange County, CA PMSA	50	37	**1.34**	13	**0.58**
Portland, ME MSA	19	14	**1.34**	5	**0.59**
Salt Lake City-Ogden, UT MSA	38	28	**1.34**	10	**0.59**
Miami, FL PMSA	34	25	**1.34**	9	**0.59**
Daytona Beach, FL MSA	30	22	**1.33**	8	**0.59**
Vallejo-Fairfield-Napa, CA PMSA	15	11	**1.33**	4	**0.59**
Bloomington-Normal, IL MSA	11	8	**1.32**	3	**0.61**
Visalia-Tulare-Porterville, CA MSA	11	8	**1.32**	3	**0.61**
Waterbury, CT PMSA	11	8	**1.32**	3	**0.61**
San Diego, CA MSA	79	57	**1.31**	22	**0.62**
Sarasota-Bradenton, FL MSA	61	44	**1.31**	17	**0.62**
Riverside-San Bernardino, CA PMSA	139	100	**1.31**	39	**0.62**
Odessa-Midland, TX MSA	7	5	**1.30**	2	**0.64**
Nassau-Suffolk, NY PMSA	111	79	**1.29**	32	**0.64**
Kansas City, MO-KS MSA	72	51	**1.29**	21	**0.65**
Melbourne-Titusville-Palm Bay, FL MSA	20	14	**1.27**	6	**0.67**
Savannah, GA MSA	10	7	**1.27**	3	**0.67**
Oakland, CA PMSA	43	30	**1.27**	13	**0.67**
Columbia, SC MSA	23	16	**1.26**	7	**0.68**
Fort Pierce-Port St. Lucie, FL MSA	46	32	**1.26**	14	**0.68**
New York, NY PMSA	88	61	**1.26**	27	**0.68**
Fort Walton Beach, FL MSA	13	9	**1.26**	4	**0.68**
Springfield, IL MSA	13	9	**1.26**	4	**0.68**
Wichita, KS MSA	26	18	**1.26**	8	**0.68**
San Jose, CA PMSA	29	20	**1.25**	9	**0.69**
Salem, OR PMSA	16	11	**1.25**	5	**0.70**
Santa Rosa, CA PMSA	16	11	**1.25**	5	**0.70**
Bakersfield, CA MSA	19	13	**1.24**	6	**0.70**
Norfolk-Virginia Beach-Newport News, VA MSA	41	28	**1.24**	13	**0.71**
Baltimore, MD PMSA	63	43	**1.24**	20	**0.71**
Fresno, CA MSA	22	15	**1.24**	7	**0.71**
Richmond-Petersburg, VA MSA	31	21	**1.23**	10	**0.72**
Los Angeles-Long Beach, CA PMSA	101	68	**1.22**	33	**0.73**
Denver, CO PMSA	58	39	**1.22**	19	**0.73**
Portland-Vancouver, OR-WA PMSA	58	39	**1.22**	19	**0.73**
Chicago, IL PMSA	290	194	**1.22**	96	**0.74**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Boulder-Longmont, CO PMSA	12	8	**1.21**	4	**0.74**
Burlington, VT MSA	9	6	**1.21**	3	**0.74**
Lowell, MA-NH PMSA	9	6	**1.21**	3	**0.74**
Medford-Ashland, OR MSA	6	4	**1.21**	2	**0.74**
Panama City, FL MSA	9	6	**1.21**	3	**0.74**
Pine Bluff, AR MSA	3	2	**1.21**	1	**0.74**
Sherman-Denison, TX MSA	3	2	**1.21**	1	**0.74**
State College, PA MSA	6	4	**1.21**	2	**0.74**
Topeka, KS MSA	9	6	**1.21**	3	**0.74**
Orlando, FL MSA	74	49	**1.20**	25	**0.75**
Middlesex-Somerset-Hunterdown, NJ PMSA	41	27	**1.20**	14	**0.76**
Fort Lauderdale, FL PMSA	58	38	**1.19**	20	**0.77**
Newark, NJ PMSA	76	49	**1.17**	27	**0.79**
Macon, GA MSA	14	9	**1.17**	5	**0.79**
Boston, MA-NH PMSA	131	83	**1.15**	48	**0.81**
Bridgeport, CT PMSA	19	12	**1.15**	7	**0.82**
Evansville-Henderson, IN-KY MSA	16	10	**1.14**	6	**0.83**
New London-Norwich, CT-RI MSA	16	10	**1.14**	6	**0.83**
Tucson, AZ MSA	32	20	**1.14**	12	**0.83**
Fort Myers-Cape Coral, FL MSA	58	36	**1.13**	22	**0.84**
Washington, DC-MD-VA-WV PMSA	129	80	**1.13**	49	**0.84**
Lincoln, NE MSA	13	8	**1.12**	5	**0.86**
Racine, WI PMSA	13	8	**1.12**	5	**0.86**
Phoenix-Mesa, AZ MSA	137	84	**1.11**	53	**0.86**
Birmingham, AL MSA	36	22	**1.11**	14	**0.86**
Hartford, CT MSA	64	39	**1.11**	25	**0.87**
Naples, FL MSA	48	29	**1.10**	19	**0.88**
Asheville, NC MSA	15	9	**1.09**	6	**0.89**
Cheyenne, WY MSA	5	3	**1.09**	2	**0.89**
Lawrence, KS MSA	5	3	**1.09**	2	**0.89**
Nashua, NH PMSA	10	6	**1.09**	4	**0.89**
Reno, NV MSA	10	6	**1.09**	4	**0.89**
Richland-Kennewick-Pasco, WA MSA	5	3	**1.09**	2	**0.89**
Rockford, IL MSA	20	12	**1.09**	8	**0.89**
San Angelo, TX MSA	5	3	**1.09**	2	**0.89**
San Luis Obispo-Atascadero-Paso Robles, CA MSA	10	6	**1.09**	4	**0.89**
Santa Cruz-Watsonville, CA MSA	10	6	**1.09**	4	**0.89**
Springfield, MO MSA	15	9	**1.09**	6	**0.89**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Stockton-Lodi, CA MSA	15	9	**1.09**	6	**0.89**
Tallahassee, FL MSA	10	6	**1.09**	4	**0.89**
Victoria, TX MSA	5	3	**1.09**	2	**0.89**
Wilmington-Newark, DE-MD PMSA	15	9	**1.09**	6	**0.89**
Yuba City, CA MSA	5	3	**1.09**	2	**0.89**
Grand Rapids-Muskegon-Holland, MI MSA	76	45	**1.08**	31	**0.91**
Raleigh-Durham-Chapel Hill, NC MSA	44	26	**1.07**	18	**0.91**
Dutchess County, NY PMSA	17	10	**1.07**	7	**0.92**
Lansing-East Lansing, MI MSA	34	20	**1.07**	14	**0.92**
Houston, TX PMSA	106	62	**1.06**	44	**0.92**
McAllen-Edinburg-Mission, TX MSA	12	7	**1.06**	5	**0.93**
Tacoma, WA PMSA	24	14	**1.06**	10	**0.93**
Augusta-Aiken, GA-SC MSA	26	15	**1.05**	11	**0.94**
Tulsa, OK MSA	33	19	**1.05**	14	**0.94**
Fort Worth-Arlington, TX PMSA	47	27	**1.04**	20	**0.95**
Allentown-Bethlehem-Easton, PA MSA	14	8	**1.04**	6	**0.95**
Altoona, PA MSA	7	4	**1.04**	3	**0.95**
Boise City, ID MSA	14	8	**1.04**	6	**0.95**
Clarksville-Hopkinsville, TN-KY MSA	7	4	**1.04**	3	**0.95**
Dallas, TX PMSA	84	48	**1.04**	36	**0.95**
Fitchburg-Leominster, MA PMSA	7	4	**1.04**	3	**0.95**
Gainesville, FL MSA	7	4	**1.04**	3	**0.95**
Manchester, NH PMSA	7	4	**1.04**	3	**0.95**
Rapid City, SD MSA	7	4	**1.04**	3	**0.95**
Rocky Mount, NC MSA	7	4	**1.04**	3	**0.95**
Omaha, NE-IA MSA	44	25	**1.03**	19	**0.96**
Hamilton-Middletown, OH PMSA	16	9	**1.02**	7	**0.97**
Seattle-Bellevue-Everett, WA PMSA	68	38	**1.02**	30	**0.98**
Biloxi-Gulfport-Pascagoula, MS MSA	18	10	**1.01**	8	**0.99**
Bremerton, WA PMSA	9	5	**1.01**	4	**0.99**
Fort Wayne, IN MSA	36	20	**1.01**	16	**0.99**
Kenosha, WI PMSA	9	5	**1.01**	4	**0.99**
La Crosse, WI-MN MSA	9	5	**1.01**	4	**0.99**
Modesto, CA MSA	9	5	**1.01**	4	**0.99**
Monmouth-Ocean, NJ PMSA	45	25	**1.01**	20	**0.99**
Portsmouth-Rochester, NH-ME MSA	20	11	**1.00**	9	**1.00**
Columbus, OH MSA	90	49	**0.99**	41	**1.01**
Newburgh, NY-PA PMSA	24	13	**0.98**	11	**1.02**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Kalamazoo-Battle Creek, MI MSA	37	20	**0.98**	17	**1.02**
San Antonio, TX MSA	37	20	**0.98**	17	**1.02**
Spokane, WA MSA	13	7	**0.98**	6	**1.03**
Lawrence, MA-NH PMSA	17	9	**0.96**	8	**1.05**
Sacramento, CA PMSA	36	19	**0.96**	17	**1.05**
Philadelphia, PA-NJ PMSA	150	79	**0.96**	71	**1.05**
Pensacola, FL MSA	19	10	**0.96**	9	**1.05**
Dayton-Springfield, OH MSA	42	22	**0.95**	20	**1.06**
Albany-Schenectady-Troy, NY MSA	48	25	**0.95**	23	**1.07**
Tampa-St. Petersburg-Clearwater, FL MSA	106	55	**0.94**	51	**1.07**
Atlanta, GA MSA	134	69	**0.94**	65	**1.08**
Louisville, KY-IN MSA	59	30	**0.92**	29	**1.09**
Minneapolis-St. Paul, MN-WI MSA	157	79	**0.91**	78	**1.10**
Benton Harbor, MI MSA	14	7	**0.91**	7	**1.11**
Bismarck, ND MSA	6	3	**0.91**	3	**1.11**
Brazoria, TX PMSA	10	5	**0.91**	5	**1.11**
Charleston, WV MSA	10	5	**0.91**	5	**1.11**
Enid, OK MSA	2	1	**0.91**	1	**1.11**
Greeley, CO PMSA	6	3	**0.91**	3	**1.11**
Jacksonville, FL MSA	54	27	**0.91**	27	**1.11**
Las Cruces, NM MSA	6	3	**0.91**	3	**1.11**
Little Rock-North Little Rock, AR MSA	28	14	**0.91**	14	**1.11**
Owensboro, KY MSA	6	3	**0.91**	3	**1.11**
Rochester, MN MSA	6	3	**0.91**	3	**1.11**
Saginaw-Bay City-Midland, MI MSA	24	12	**0.91**	12	**1.11**
Santa Fe, NM MSA	4	2	**0.91**	2	**1.11**
Trenton, NJ PMSA	12	6	**0.91**	6	**1.11**
Tuscaloosa, AL MSA	6	3	**0.91**	3	**1.11**
Wheeling, WV-OH MSA	8	4	**0.91**	4	**1.11**
Yolo, CA PMSA	4	2	**0.91**	2	**1.11**
Nashville, TN MSA	45	22	**0.89**	23	**1.14**
Lakeland-Winter Haven, FL MSA	41	20	**0.89**	21	**1.14**
Charleston-North Charleston, SC MSA	29	14	**0.88**	15	**1.15**
Toledo, OH MSA	29	14	**0.88**	15	**1.15**
Pittsburgh, PA MSA	142	68	**0.87**	74	**1.16**
Charlotte-Gastonia-Rock Hill, NC-SC MSA	69	33	**0.87**	36	**1.16**
St. Louis, MO-IL MSA	122	58	**0.86**	64	**1.17**
Atlantic-Cape May, NJ PMSA	19	9	**0.86**	10	**1.17**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Des Moines, IA MSA	19	9	0.86	10	1.17
Springfield, MA MSA	32	15	0.85	17	1.18
Beaumont-Port Arthur, TX MSA	15	7	0.85	8	1.19
Lancaster, PA MSA	15	7	0.85	8	1.19
Gary, IN PMSA	28	13	0.84	15	1.19
Detroit, MI PMSA	197	91	0.84	106	1.20
Flint, MI PMSA	26	12	0.84	14	1.20
Greenville-Spartanburg-Anderson, SC MSA	48	22	0.83	26	1.20
Brownsville-Harlingen-San Benito, TX MSA	11	5	0.83	6	1.21
Fayetteville, NC MSA	11	5	0.83	6	1.21
Greensboro--Winston-Salem--High Point, NC MSA	75	34	0.82	41	1.22
Worcester, MA-CT PMSA	31	14	0.82	17	1.22
Mobile, AL MSA	20	9	0.82	11	1.22
Providence-Fall River-Warwick, RI-MA MSA	56	25	0.81	31	1.23
Killeen-Temple, TX MSA	9	4	0.81	5	1.24
Lafayette, IN MSA	9	4	0.81	5	1.24
Wichita Falls, TX MSA	9	4	0.81	5	1.24
York, PA MSA	18	8	0.81	10	1.24
Bellingham, WA MSA	16	7	0.79	9	1.25
Fort Collins-Loveland, CO MSA	16	7	0.79	9	1.25
New Orleans, LA MSA	32	14	0.79	18	1.25
Cincinnati, OH-KY-IN PMSA	90	39	0.79	51	1.26
Knoxville, TN MSA	30	13	0.79	17	1.26
Brockton, MA PMSA	14	6	0.78	8	1.27
Columbia, MO MSA	7	3	0.78	4	1.27
Danbury, CT PMSA	14	6	0.78	8	1.27
Davenport-Moline-Rock Island, IA-IL MSA	28	12	0.78	16	1.27
Fargo-Moorhead, ND-MN MSA	14	6	0.78	8	1.27
Jackson, MI MSA	21	9	0.78	12	1.27
Kokomo, IN MSA	7	3	0.78	4	1.27
Sioux Falls, SD MSA	14	6	0.78	8	1.27
Sumter, SC MSA	7	3	0.78	4	1.27
Waco, TX MSA	7	3	0.78	4	1.27
Yakima, WA MSA	7	3	0.78	4	1.27
Chattanooga, TN-GA MSA	26	11	0.77	15	1.28
Cleveland-Lorain-Elyria, OH MSA	130	55	0.77	75	1.28
Hickory-Morganton, NC MSA	19	8	0.77	11	1.29
Jackson, MS MSA	19	8	0.77	11	1.29

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Akron, OH PMSA	48	20	0.76	28	1.30
Columbus, GA-AL MSA	12	5	0.76	7	1.30
Fort Smith, AR-OK MSA	12	5	0.76	7	1.30
Harrisburg-Lebanon-Carlisle, PA MSA	36	15	0.76	21	1.30
Rochester, NY MSA	75	31	0.75	44	1.30
Scranton--Wilkes-Barre--Hazleton, PA MSA	34	14	0.75	20	1.31
Johnson City-Kingsport-Bristol, TN-VA MSA	22	9	0.74	13	1.31
Indianapolis, IN MSA	86	35	0.74	51	1.32
Abilene, TX MSA	5	2	0.73	3	1.33
Amarillo, TX MSA	10	4	0.73	6	1.33
Baton Rouge, LA MSA	20	8	0.73	12	1.33
Bryan-College Station, TX MSA	5	2	0.73	3	1.33
Cedar Rapids, IA MSA	10	4	0.73	6	1.33
Decatur, AL MSA	10	4	0.73	6	1.33
Elmira, NY MSA	5	2	0.73	3	1.33
Goldsboro, NC MSA	5	2	0.73	3	1.33
Hattiesburg, MS MSA	5	2	0.73	3	1.33
Joplin, MO MSA	10	4	0.73	6	1.33
Lubbock, TX MSA	10	4	0.73	6	1.33
Memphis, TN-AR-MS MSA	35	14	0.73	21	1.33
Montgomery, AL MSA	15	6	0.73	9	1.33
Sharon, PA MSA	10	4	0.73	6	1.33
South Bend, IN MSA	15	6	0.73	9	1.33
St. Joseph, MO MSA	5	2	0.73	3	1.33
Canton-Massillon, OH MSA	28	11	0.71	17	1.35
Johnstown, PA MSA	23	9	0.71	14	1.35
Milwaukee-Waukesha, WI PMSA	72	28	0.71	44	1.36
Huntsville, AL MSA	13	5	0.70	8	1.37
Mansfield, OH MSA	13	5	0.70	8	1.37
Roanoke, VA MSA	13	5	0.70	8	1.37
Reading, PA MSA	21	8	0.69	13	1.38
Austin-San Marcos, TX MSA	40	15	0.68	25	1.39
Dothan, AL MSA	8	3	0.68	5	1.39
Greenville, NC MSA	8	3	0.68	5	1.39
Jamestown, NY MSA	16	6	0.68	10	1.39
Muncie, IN MSA	8	3	0.68	5	1.39
Parkersburg-Marietta, WV-OH MSA	8	3	0.68	5	1.39
Tyler, TX MSA	8	3	0.68	5	1.39

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Buffalo-Niagara Falls, NY MSA	57	21	**0.67**	36	**1.40**
Ocala, FL MSA	14	5	**0.65**	9	**1.43**
Ann Arbor, MI PMSA	48	17	**0.64**	31	**1.44**
Athens, GA MSA	6	2	**0.61**	4	**1.48**
Binghamton, NY MSA	24	8	**0.61**	16	**1.48**
Dubuque, IA MSA	6	2	**0.61**	4	**1.48**
Glens Falls, NY MSA	12	4	**0.61**	8	**1.48**
Janesville-Beloit, WI MSA	12	4	**0.61**	8	**1.48**
Lafayette, LA MSA	15	5	**0.61**	10	**1.48**
Merced, CA MSA	3	1	**0.61**	2	**1.48**
Monroe, LA MSA	6	2	**0.61**	4	**1.48**
New Bedford, MA PMSA	12	4	**0.61**	8	**1.48**
Olympia, WA PMSA	9	3	**0.61**	6	**1.48**
Syracuse, NY MSA	70	23	**0.60**	47	**1.49**
Youngstown-Warren, OH MSA	49	16	**0.59**	33	**1.50**
Peoria-Pekin, IL MSA	22	7	**0.58**	15	**1.52**
Huntington-Ashland, WV-KY-OH MSA	19	6	**0.57**	13	**1.52**
Shreveport-Bossier City, LA MSA	19	6	**0.57**	13	**1.52**
Erie, PA MSA	26	8	**0.56**	18	**1.54**
Florence, AL MSA	10	3	**0.55**	7	**1.56**
Grand Forks, ND-MN MSA	10	3	**0.55**	7	**1.56**
Green Bay, WI MSA	10	3	**0.55**	7	**1.56**
Lima, OH MSA	10	3	**0.55**	7	**1.56**
Waterloo-Cedar Falls, IA MSA	10	3	**0.55**	7	**1.56**
Lexington, KY MSA	34	10	**0.53**	24	**1.57**
Anniston, AL MSA	7	2	**0.52**	5	**1.59**
Bloomington, IN MSA	7	2	**0.52**	5	**1.59**
Steubenville-Weirton, OH-WV MSA	14	4	**0.52**	10	**1.59**
Madison, WI MSA	18	5	**0.50**	13	**1.61**
Appleton-Oshkosh-Neenah, WI MSA	22	6	**0.50**	16	**1.62**
Elkhart-Goshen, IN MSA	12	3	**0.45**	9	**1.67**
Iowa City, IA MSA	8	2	**0.45**	6	**1.67**
Lynchburg, VA MSA	12	3	**0.45**	9	**1.67**
Texarkana, TX-Texarkana, AR MSA	4	1	**0.45**	3	**1.67**
Vineland-Millville-Bridgeton, NJ PMSA	4	1	**0.45**	3	**1.67**
Wausau, WI MSA	8	2	**0.45**	6	**1.67**
Terre Haute, IN MSA	13	3	**0.42**	10	**1.71**
Sheboygan, WI MSA	9	2	**0.40**	7	**1.73**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	LQ's WITH ARCHITECTS	COURSES WITHOUT KNOWN ARCHITECTS	LQ's WITHOUT ARCHITECTS
Sioux City, IA-NE MSA	9	2	**0.40**	7	**1.73**
Fayetteville-Springdale-Rogers, AR MSA	15	3	**0.36**	12	**1.78**
Galveston-Texas City, TX PMSA	10	2	**0.36**	8	**1.78**
Jackson, TN MSA	5	1	**0.36**	4	**1.78**
Lake Charles, LA MSA	5	1	**0.36**	4	**1.78**
Redding, CA MSA	10	2	**0.36**	8	**1.78**
Yuma, AZ MSA	5	1	**0.36**	4	**1.78**
Utica-Rome, NY MSA	39	7	**0.33**	32	**1.82**
Duluth-Superior, MN-WI MSA	23	4	**0.32**	19	**1.84**
Great Falls, MT MSA	6	1	**0.30**	5	**1.85**
St. Cloud, MN MSA	12	2	**0.30**	10	**1.85**
Longview-Marshall, TX MSA	13	2	**0.28**	11	**1.88**
Kankakee, IL PMSA	9	1	**0.20**	8	**1.98**
Alexandria, LA MSA	6	0	**0.00**	6	**2.22**
Eau Claire, WI MSA	10	0	**0.00**	10	**2.22**
Gadsden, AL MSA	6	0	**0.00**	6	**2.22**
Houma, LA MSA	5	0	**0.00**	5	**2.22**
Jersey City, NJ PMSA	2	0	**0.00**	2	**2.22**
TOTALS	**8863**	**4878**		**3985**	

APPENDIX B

MSA ARCHITECT INDEX

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	MSA RAW NUMBER	FREQUENT GOLFERS	MSA INDEX
Pittsfield, MA MSA	10	8	2	1.45	29	3383	**0.008572273**
Jamestown, NY MSA	16	6	3	0.68	32	4851	**0.006596578**
Bangor, ME MSA	6	6	1	1.82	19	3363	**0.005649718**
Jackson, MI MSA	21	9	0	0.78	28.5	5092	**0.005597015**
Lewiston-Auburn, ME MSA	6	5	1	1.51	17	3086	**0.005508749**
Danville, VA MSA	7	7	0	1.82	17.5	3277	**0.00534025**
Portsmouth-Rochester, NH-ME MSA	20	11	4	1.00	48	9077	**0.005288091**
Stamford-Norwalk, CT PMSA	23	21	8	1.66	85.5	16376	**0.005221055**
Jacksonville, NC MSA	8	6	0	1.36	16	3076	**0.00520156**
Decatur, IL MSA	8	8	0	1.82	20	4037	**0.004954174**
Benton Harbor, MI MSA	14	7	1	0.91	25	5082	**0.004919323**
Glens Falls, NY MSA	12	4	2	0.61	22	4631	**0.004750594**
Savannah, GA MSA	10	7	5	1.27	39	8251	**0.0047267**
Portland, ME MSA	19	14	1	1.34	41.5	8884	**0.004671319**
Johnstown, PA MSA	23	9	2	0.71	37.5	8091	**0.004634779**
Grand Rapids-Muskegon-Holland, MI MSA	76	45	3	1.08	140	30229	**0.004631314**
Utica-Rome, NY MSA	39	7	4	0.33	49.5	10700	**0.004626168**
Binghamton, NY MSA	24	8	4	0.61	44	9528	**0.004617968**
Augusta-Aiken, GA-SC MSA	26	15	5	1.05	63	13707	**0.004596192**
Kenosha, WI PMSA	9	5	1	1.01	18.5	4058	**0.004558896**
Elmira, NY MSA	5	2	2	0.73	14.5	3199	**0.004532666**
Kalamazoo-Battle Creek, MI MSA	37	20	2	0.98	66.5	14877	**0.004469987**
Billings, MT MSA	8	6	1	1.36	20	4517	**0.004427718**
Columbus, OH MSA	90	49	15	0.99	203	46368	**0.004378019**
Fort Wayne, IN MSA	36	20	2	1.01	66	15086	**0.004374917**
Youngstown-Warren, OH MSA	49	16	6	0.59	80.5	18774	**0.004287845**
Springfield, IL MSA	13	9	1	1.26	28.5	6702	**0.004252462**
Rapid City, SD MSA	7	4	0	1.04	11.5	2716	**0.004234168**
Lansing-East Lansing, MI MSA	34	20	1	1.07	61	14460	**0.004218534**
New Bedford, MA PMSA	12	4	2	0.61	22	5231	**0.004205697**
Racine, WI PMSA	13	8	0	1.12	22.5	5427	**0.004145937**
Syracuse, NY MSA	70	23	5	0.60	101	24912	**0.004054271**
Bloomington-Normal, IL MSA	11	8	0	1.32	21.5	5320	**0.004041353**
Canton-Massillon, OH MSA	28	11	4	0.71	52	13033	**0.003989872**
Newburgh, NY-PA PMSA	24	13	5	0.98	58	14593	**0.003974508**
New London-Norwich, CT-RI MSA	16	10	4	1.14	44	11179	**0.003935951**
Greensboro--Winston-Salem--High Point, NC MSA	75	34	9	0.82	141.5	36144	**0.003914896**
Erie, PA MSA	26	8	1	0.56	33	8448	**0.00390625**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	MSA RAW NUMBER	FREQUENT GOLFERS	MSA INDEX
Sioux Falls, SD MSA	14	6	0	0.78	19	4925	0.003857868
Bellingham, WA MSA	16	7	0	0.79	22	5732	0.003838102
Burlington, VT MSA	9	6	2	1.21	24.5	6397	0.00382992
Davenport-Moline-Rock Island, IA-IL MSA	28	12	1	0.78	42	11010	0.003814714
Daytona Beach, FL MSA	30	22	4	1.33	75	19781	0.003791517
Springfield, MA MSA	32	15	7	0.85	74	19655	0.003764945
Rochester, NY MSA	75	31	11	0.75	143.5	38335	0.003743316
Casper, WY MSA	4	3	0	1.36	8	2160	0.003703704
State College, PA MSA	6	4	2	1.21	19	5135	0.003700097
Lincoln, NE MSA	13	8	2	1.12	30.5	8262	0.0036916
Omaha, NE-IA MSA	44	25	0	1.03	72	19511	0.003690226
Steubenville-Weirton, OH-WV MSA	14	4	0	0.52	15	4086	0.003671072
Hickory-Morganton, NC MSA	19	8	2	0.77	33.5	9130	0.003669222
Worcester, MA-CT PMSA	31	14	5	0.82	63.5	17456	0.003637718
Grand Forks, ND-MN MSA	10	3	0	0.55	11	3036	0.003623188
Mansfield, OH MSA	13	5	1	0.70	20.5	5662	0.003620629
Jacksonville, FL MSA	54	27	7	0.91	109	30128	0.003617897
Rocky Mount, NC MSA	7	4	1	1.04	15.5	4298	0.003606329
Sheboygan, WI MSA	9	2	1	0.40	12.5	3475	0.003597122
Janesville-Beloit, WI MSA	12	4	1	0.61	18	5012	0.003591381
Fargo-Moorhead, ND-MN MSA	14	6	0	0.78	19	5441	0.003492005
Lexington, KY MSA	34	10	3	0.53	49	14087	0.003478384
Charleston-North Charleston, SC MSA	29	14	2	0.88	50.5	14535	0.003474372
Charlotte-Gastonia-Rock Hill, NC-SC MSA	69	33	10	0.87	140.5	40461	0.00347248
Dover, DE MSA	6	5	0	1.51	13	3746	0.003470368
Dutchess County, NY PMSA	17	10	3	1.07	40.5	11671	0.00347014
La Crosse, WI-MN MSA	9	5	0	1.01	14.5	4213	0.003441728
Charlottesville, VA MSA	8	7	0	1.59	18	5245	0.00343184
Victoria, TX MSA	5	3	0	1.09	8.5	2479	0.003428802
Greenville, NC MSA	8	3	1	0.68	14	4089	0.00342382
Eugene-Springfield, OR MSA	16	12	1	1.36	36	10531	0.003418479
Chattanooga, TN-GA MSA	26	11	3	0.77	47	13775	0.003411978
Orlando, FL MSA	74	49	5	1.20	155	45724	0.003389905
Wichita, KS MSA	26	18	1	1.26	53	15660	0.003384419
Topeka, KS MSA	9	6	1	1.21	20.5	6093	0.003364517
Indianapolis, IN MSA	86	35	10	0.74	153	45778	0.003342217
Terre Haute, IN MSA	13	3	1	0.42	16.5	4967	0.003321925
Cheyenne, WY MSA	5	3	0	1.09	8.5	2560	0.003320313

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Florence, AL MSA	10	3	1	0.55	15	4539	**0.003304693**
Louisville, KY-IN MSA	59	30	2	0.92	97.5	29856	**0.003265675**
Cleveland-Lorain-Elyria, OH MSA	130	55	11	0.77	219	68474	**0.003198294**
Salem, OR PMSA	16	11	0	1.25	30	9381	**0.003197953**
Hagerstown, MD PMSA	5	4	1	1.45	14.5	4545	**0.003190319**
Fort Collins-Loveland, CO MSA	16	7	1	0.79	26	8162	**0.003185494**
Pittsburgh, PA MSA	142	68	13	0.87	259	81599	**0.003174059**
Ann Arbor, MI PMSA	48	17	2	0.64	66	20845	**0.003166227**
Sumter, SC MSA	7	3	0	0.78	9.5	3004	**0.00316245**
Rochester, MN MSA	6	3	1	0.91	13	4131	**0.003146938**
Joplin, MO MSA	10	4	0	0.73	13	4149	**0.003133285**
Akron, OH PMSA	48	20	1	0.76	68	21808	**0.003118122**
Sharon, PA MSA	10	4	0	0.73	13	4183	**0.003107817**
Bismarck, ND MSA	6	3	0	0.91	9	2898	**0.00310559**
Springfield, MO MSA	15	9	1	1.09	29.5	9556	**0.003087066**
Saginaw-Bay City-Midland, MI MSA	24	12	1	0.91	40	13061	**0.003062553**
Little Rock-North Little Rock, AR MSA	28	14	2	0.91	50	16331	**0.003061662**
Evansville-Henderson, IN-KY MSA	16	10	0	1.14	28	9150	**0.003060109**
Wichita Falls, TX MSA	9	4	0	0.81	12.5	4104	**0.003045809**
Fayetteville, NC MSA	11	5	1	0.83	19.5	6427	**0.003034075**
Colorado Springs, CO MSA	15	14	2	1.70	43.5	14352	**0.003030936**
Wheeling, WV-OH MSA	8	4	1	0.91	16	5309	**0.00301375**
Hartford, CT MSA	64	39	8	1.11	142	47353	**0.002998754**
Fort Smith, AR-OK MSA	12	5	0	0.76	16	5336	**0.002998501**
Fitchburg-Leominster, MA PMSA	7	4	1	1.04	15.5	5217	**0.002971056**
Rockford, IL MSA	20	12	0	1.09	34	11451	**0.002969173**
Kansas City, MO-KS MSA	72	51	5	1.29	158	53342	**0.002962019**
Decatur, AL MSA	10	4	0	0.73	13	4417	**0.002943174**
Greenville-Spartanburg-Anderson, SC MSA	48	22	3	0.83	80	27188	**0.002942475**
Duluth-Superior, MN-WI MSA	23	4	1	0.32	23.5	8027	**0.002927619**
Birmingham, AL MSA	36	22	4	1.11	78	26717	**0.002919489**
Toledo, OH MSA	29	14	3	0.88	54.5	18707	**0.002913348**
Owensboro, KY MSA	6	3	0	0.91	9	3100	**0.002903226**
Providence-Fall River-Warwick, RI-MA MSA	56	25	9	0.81	114	39368	**0.002895753**
Reading, PA MSA	21	8	2	0.69	34.5	12006	**0.002873563**
Albany-Schenectady-Troy, NY MSA	48	25	5	0.95	94	32804	**0.002865504**
Minneapolis-St. Paul, MN-WI MSA	157	79	9	0.91	272.5	95401	**0.002856364**
Columbia, SC MSA	23	16	0	1.26	43.5	15352	**0.002833507**

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Kokomo, IN MSA	7	3	0	0.78	9.5	3360	**0.002827381**
Raleigh-Durham-Chapel Hill, NC MSA	44	26	6	1.07	98	34679	**0.002825918**
Tulsa, OK MSA	33	19	3	1.05	66.5	23566	**0.002821862**
Cincinnati, OH-KY-IN PMSA	90	39	3	0.79	135	47877	**0.002819726**
Cumberland, MD-WV MSA	4	4	0	1.82	10	3557	**0.002811358**
Dayton-Springfield, OH MSA	42	22	5	0.95	85	30236	**0.002811218**
Flint, MI PMSA	26	12	0	0.84	37	13220	**0.00279879**
Bridgeport, CT PMSA	19	12	4	1.15	49.5	17858	**0.002771867**
Waterbury, CT PMSA	11	8	1	1.32	25.5	9210	**0.00276873**
Newark, NJ PMSA	76	49	17	1.17	204	73982	**0.002757427**
Johnson City-Kingsport-Bristol, TN-VA MSA	22	9	3	0.74	41	15026	**0.002728604**
Altoona, PA MSA	7	4	0	1.04	11.5	4220	**0.002725118**
Cedar Rapids, IA MSA	10	4	1	0.73	17	6249	**0.002720435**
Florence, SC MSA	4	4	0	1.82	10	3695	**0.00270636**
Hamilton-Middletown, OH PMSA	16	9	1	1.02	30	11116	**0.002698813**
Corpus Christi, TX MSA	11	9	1	1.49	27.5	10201	**0.002695814**
Macon, GA MSA	14	9	0	1.17	25	9367	**0.002668944**
Danbury, CT PMSA	14	6	2	0.78	27	10128	**0.002665877**
Brazoria, TX PMSA	10	5	1	0.91	19	7152	**0.0026566**
San Angelo, TX MSA	5	3	0	1.09	8.5	3210	**0.002647975**
Santa Barbara-Santa Maria-Lompoc, CA MSA	16	12	2	1.36	40	15163	**0.002638**
Pine Bluff, AR MSA	3	2	0	1.21	5.5	2090	**0.002631579**
Champaign-Urbana, IL MSA	7	6	0	1.56	15.5	5935	**0.002611626**
Visalia-Tulare-Porterville, CA MSA	11	8	1	1.32	25.5	9769	**0.002610298**
Columbus, GA-AL MSA	12	5	1	0.76	20	7754	**0.002579314**
Pensacola, FL MSA	19	10	0	0.96	29.5	11446	**0.00257732**
Waterloo-Cedar Falls, IA MSA	10	3	0	0.55	11	4276	**0.002572498**
Detroit, MI PMSA	197	91	16	0.84	344.5	134609	**0.002559264**
Reno, NV MSA	10	6	2	1.09	25	9769	**0.002559116**
Tucson, AZ MSA	32	20	3	1.14	68	26665	**0.002550159**
Dothan, AL MSA	8	3	0	0.68	10	3929	**0.002545177**
Roanoke, VA MSA	13	5	1	0.70	20.5	8071	**0.002539958**
Nassau-Suffolk, NY PMSA	111	79	26	1.29	317.5	125060	**0.002538781**
St. Louis, MO-IL MSA	122	58	7	0.86	205	80759	**0.002538417**
Scranton--Wilkes-Barre--Hazleton, PA MSA	34	14	4	0.75	61	24179	**0.00252285**
Lawton, OK MSA	4	3	0	1.36	8	3187	**0.002510198**
New Haven-Meriden, CT PMSA	22	17	2	1.40	53	21126	**0.002508757**
Chicago, IL PMSA	290	194	26	1.22	637	254102	**0.002506867**

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Boston, MA-NH PMSA	131	83	24	1.15	327.5	130672	**0.002506275**
Clarksville-Hopkinsville, TN-KY MSA	7	4	0	1.04	11.5	4615	**0.002491874**
Lawrence, KS MSA	5	3	0	1.09	8.5	3413	**0.002490478**
Norfolk-Virginia Beach-Newport News, VA MSA	41	28	7	1.24	104.5	41999	**0.002488154**
Jackson, MS MSA	19	8	1	0.77	29.5	11903	**0.002478367**
Albany, GA MSA	4	3	0	1.36	8	3234	**0.002473717**
Provo-Orem, UT MSA	9	8	0	1.62	20.5	8504	**0.00241063**
Buffalo-Niagara Falls, NY MSA	57	21	5	0.67	90.5	37815	**0.00239323**
Muncie, IN MSA	8	3	0	0.68	10	4183	**0.002390629**
Richmond-Petersburg, VA MSA	31	21	4	1.23	73.5	30852	**0.002382342**
Ocala, FL MSA	14	5	1	0.65	21	8831	**0.002377987**
South Bend, IN MSA	15	6	0	0.73	19.5	8243	**0.002365644**
Santa Cruz-Watsonville, CA MSA	10	6	1	1.09	21	8883	**0.002364066**
Melbourne-Titusville-Palm Bay, FL MSA	20	14	1	1.27	42	17840	**0.00235426**
York, PA MSA	18	8	1	0.81	29	12406	**0.002337579**
Lima, OH MSA	10	3	0	0.55	11	4708	**0.002336449**
Salt Lake City-Ogden, UT MSA	38	28	0	1.34	75	32138	**0.002333686**
Dubuque, IA MSA	6	2	0	0.61	7	3004	**0.002330226**
Fort Lauderdale, FL PMSA	58	38	5	1.19	125	53687	**0.00232831**
Mobile, AL MSA	20	9	2	0.82	36	15463	**0.002328138**
Knoxville, TN MSA	30	13	2	0.79	49	21096	**0.002322715**
Sioux City, IA-NE MSA	9	2	0	0.40	8.5	3669	**0.002316708**
Killeen-Temple, TX MSA	9	4	1	0.81	16.5	7124	**0.002316115**
Tacoma, WA PMSA	24	14	1	1.06	44	19355	**0.002273314**
Harrisburg-Lebanon-Carlisle, PA MSA	36	15	0	0.76	48	21176	**0.002266717**
Pueblo, CO MSA	5	4	0	1.45	10.5	4648	**0.002259036**
Nashua, NH PMSA	10	6	0	1.09	17	7542	**0.002254044**
Beaumont-Port Arthur, TX MSA	15	7	1	0.85	25.5	11340	**0.002248677**
Elkhart-Goshen, IN MSA	12	3	0	0.45	12	5348	**0.002243829**
Nashville, TN MSA	45	22	3	0.89	78.5	35071	**0.002238317**
Williamsport, PA MSA	2	2	1	1.82	9	4030	**0.002233251**
Chico-Paradise, CA MSA	8	6	0	1.36	16	7167	**0.002232454**
Manchester, NH PMSA	7	4	1	1.04	15.5	6944	**0.002232143**
Boulder-Longmont, CO PMSA	12	8	0	1.21	22	9908	**0.002220428**
Tallahassee, FL MSA	10	6	1	1.09	21	9483	**0.002214489**
Santa Rosa, CA PMSA	16	11	2	1.25	38	17166	**0.002213678**
Des Moines, IA MSA	19	9	1	0.86	31.5	14253	**0.002210061**
San Luis Obispo-Atascadero-Paso Robles, CA MSA	10	6	1	1.09	21	9506	**0.002209131**

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Tampa-St. Petersburg-Clearwater, FL MSA	106	55	5	0.94	183	82845	**0.002208944**
Athens, GA MSA	6	2	1	0.61	11	4980	**0.002208835**
Goldsboro, NC MSA	5	2	0	0.73	6.5	2944	**0.00220788**
Gary, IN PMSA	28	13	1	0.84	44	19943	**0.002206288**
Atlanta, GA MSA	134	69	10	0.94	245	111157	**0.00220409**
Peoria-Pekin, IL MSA	22	7	0	0.58	25	11395	**0.002193945**
Milwaukee-Waukesha, WI PMSA	72	28	2	0.71	100	45863	**0.002180407**
Lafayette, IN MSA	9	4	0	0.81	12.5	5773	**0.002165252**
Baton Rouge, LA MSA	20	8	2	0.73	34	15765	**0.002156676**
Portland-Vancouver, OR-WA PMSA	58	39	2	1.22	115	53565	**0.002146924**
Denver, CO PMSA	58	39	5	1.22	127	59615	**0.002130336**
San Antonio, TX MSA	37	20	6	0.98	82.5	39086	**0.00211073**
Appleton-Oshkosh-Neenah, WI MSA	22	6	0	0.50	23	10907	**0.002108738**
Oklahoma City, OK MSA	31	24	1	1.41	67.5	32032	**0.002107268**
Amarillo, TX MSA	10	4	0	0.73	13	6196	**0.002098128**
Anniston, AL MSA	7	2	0	0.52	7.5	3584	**0.002092634**
Hattiesburg, MS MSA	5	2	0	0.73	6.5	3107	**0.00209205**
Boise City, ID MSA	14	8	0	1.04	23	11040	**0.002083333**
Shreveport-Bossier City, LA MSA	19	6	0	0.57	21.5	10323	**0.002082728**
Yuba City, CA MSA	5	3	0	1.09	8.5	4089	**0.002078748**
Lawrence, MA-NH PMSA	17	9	1	0.96	30.5	14746	**0.002068358**
Columbia, MO MSA	7	3	0	0.78	9.5	4596	**0.002067015**
Huntington-Ashland, WV-KY-OH MSA	19	6	0	0.57	21.5	10555	**0.002036949**
Gainesville, FL MSA	7	4	1	1.04	15.5	7613	**0.002035991**
Parkersburg-Marietta, WV-OH MSA	8	3	0	0.68	10	4966	**0.002013693**
St. Cloud, MN MSA	12	2	0	0.30	10	5006	**0.001997603**
Montgomery, AL MSA	15	6	0	0.73	19.5	9789	**0.001992032**
Brockton, MA PMSA	14	6	0	0.78	19	9540	**0.001991614**
Kankakee, IL PMSA	9	1	0	0.20	6.5	3281	**0.001981103**
Bakersfield, CA MSA	19	13	0	1.24	35.5	18113	**0.001959918**
Las Vegas, NV-AZ MSA	33	26	1	1.43	72.5	37322	**0.001942554**
Albuquerque, NM MSA	13	11	2	1.54	36.5	18956	**0.001925512**
Bremerton, WA PMSA	9	5	0	1.01	14.5	7543	**0.001922312**
Wausau, WI MSA	8	2	0	0.45	8	4172	**0.001917546**
Middlesex-Somerset-Hunterdown, NJ PMSA	41	27	5	1.20	94.5	49409	**0.001912607**
Monmouth-Ocean, NJ PMSA	45	25	4	1.01	88.5	46394	**0.001907574**
Odessa-Midland, TX MSA	7	5	0	1.30	13.5	7137	**0.001891551**
Greeley, CO PMSA	6	3	0	0.91	9	4763	**0.001889565**

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Vallejo-Fairfield-Napa, CA PMSA	15	11	1	1.33	33.5	17792	**0.001882869**
Stockton-Lodi, CA MSA	15	9	1	1.09	29.5	15700	**0.001878981**
St. Joseph, MO MSA	5	2	0	0.73	6.5	3462	**0.001877527**
Lafayette, LA MSA	15	5	0	0.61	17.5	9337	**0.001874264**
Iowa City, IA MSA	8	2	0	0.45	8	4277	**0.00187047**
Houston, TX PMSA	106	62	5	1.06	197	105601	**0.001865513**
San Diego, CA MSA	79	57	4	1.31	169.5	91302	**0.001856476**
Las Cruces, NM MSA	6	3	0	0.91	9	4851	**0.001855288**
Philadelphia, PA-NJ PMSA	150	79	19	0.96	309	167157	**0.001848562**
Tyler, TX MSA	8	3	0	0.68	10	5471	**0.001827819**
Austin-San Marcos, TX MSA	40	15	2	0.68	58	31791	**0.001824416**
Bergen-Passaic, NJ PMSA	31	25	8	1.47	97.5	53567	**0.00182015**
Great Falls, MT MSA	6	1	0	0.30	5	2748	**0.001819505**
Medford-Ashland, OR MSA	6	4	0	1.21	11	6082	**0.001808616**
Tuscaloosa, AL MSA	6	3	0	0.91	9	5013	**0.001795332**
Lubbock, TX MSA	10	4	0	0.73	13	7378	**0.001761995**
Lowell, MA-NH PMSA	9	6	1	1.21	20.5	11661	**0.001757997**
Huntsville, AL MSA	13	5	1	0.70	20.5	11705	**0.001751388**
Abilene, TX MSA	5	2	0	0.73	6.5	3714	**0.001750135**
Sherman-Denison, TX MSA	3	2	0	1.21	5.5	3144	**0.001749364**
Fort Worth-Arlington, TX PMSA	47	27	1	1.04	81.5	47023	**0.001733194**
Baltimore, MD PMSA	63	43	8	1.24	149.5	86547	**0.001727385**
Dallas, TX PMSA	84	48	5	1.04	158	91591	**0.00172506**
Ventura, CA PMSA	22	17	1	1.40	49	28450	**0.00172232**
Memphis, TN-AR-MS MSA	35	14	1	0.73	49.5	28774	**0.001720303**
Fresno, CA MSA	22	15	0	1.24	41	23989	**0.001709117**
Jackson, TN MSA	5	1	0	0.36	4.5	2639	**0.001705191**
Longview-Marshall, TX MSA	13	2	0	0.28	10.5	6164	**0.001703439**
Lynchburg, VA MSA	12	3	0	0.45	12	7048	**0.001702611**
San Francisco, CA PMSA	36	28	9	1.41	110	64675	**0.001700812**
Monroe, LA MSA	6	2	0	0.61	7	4202	**0.001665873**
Charleston, WV MSA	10	5	0	0.91	15	9009	**0.001665002**
Bloomington, IN MSA	7	2	0	0.52	7.5	4552	**0.001647627**
Green Bay, WI MSA	10	3	0	0.55	11	6681	**0.00164646**
McAllen-Edinburg-Mission, TX MSA	12	7	0	1.06	20	12175	**0.00164271**
Madison, WI MSA	18	5	1	0.50	23	14046	**0.001637477**
Enid, OK MSA	2	1	0	0.91	3	1840	**0.001630435**
Washington, DC-MD-VA-WV PMSA	129	80	14	1.13	280.5	173664	**0.001615188**

MSA NAME	TOTAL COURSES	COURSES WITH KNOWN ARCHITECTS	VIRTUOSO ARCH.	LQ's WITH ARCHITECTS	MSA RAW NUMBER	FREQUENT GOLFERS	MSA INDEX
Miami, FL PMSA	34	25	5	1.34	87	54039	**0.001609948**
New Orleans, LA MSA	32	14	2	0.79	52	32895	**0.001580787**
Fayetteville-Springdale-Rogers, AR MSA	15	3	0	0.36	13.5	8596	**0.001570498**
Spokane, WA MSA	13	7	0	0.98	20.5	13102	**0.001564647**
Redding, CA MSA	10	2	0	0.36	9	5830	**0.001543739**
Yakima, WA MSA	7	3	0	0.78	9.5	6361	**0.001493476**
Waco, TX MSA	7	3	0	0.78	9.5	6383	**0.001488328**
Lancaster, PA MSA	15	7	0	0.85	21.5	14495	**0.00148327**
Olympia, WA PMSA	9	3	0	0.61	10.5	7128	**0.001473064**
Laredo, TX MSA	2	2	0	1.82	5	3461	**0.001444669**
Seattle-Bellevue-Everett, WA PMSA	68	38	0	1.02	110	76991	**0.001428738**
Richland-Kennewick-Pasco, WA MSA	5	3	0	1.09	8.5	5972	**0.001423309**
Wilmington-Newark, DE-MD PMSA	15	9	1	1.09	29.5	20792	**0.001418815**
Trenton, NJ PMSA	12	6	0	0.91	18	12789	**0.00140746**
Sacramento, CA PMSA	36	19	2	0.96	64	48156	**0.001329014**
Bryan-College Station, TX MSA	5	2	0	0.73	6.5	5079	**0.001279779**
Modesto, CA MSA	9	5	0	1.01	14.5	12056	**0.001202721**
Yolo, CA PMSA	4	2	0	0.91	6	5019	**0.001195457**
Oakland, CA PMSA	43	30	3	1.27	93.5	79009	**0.001183409**
Galveston-Texas City, TX PMSA	10	2	0	0.36	9	7617	**0.001181568**
Orange County, CA PMSA	50	37	5	1.34	119	102134	**0.001165136**
Eau Claire, WI MSA	10	0	0	0.00	5	4446	**0.001124606**
El Paso, TX MSA	8	7	0	1.59	18	16080	**0.001119403**
Santa Fe, NM MSA	4	2	0	0.91	6	5404	**0.001110289**
Yuma, AZ MSA	5	1	0	0.36	4.5	4097	**0.001098365**
Texarkana, TX-Texarkana, AR MSA	4	1	0	0.45	4	3695	**0.001082544**
Allentown-Bethlehem-Easton, PA MSA	14	8	0	1.04	23	22083	**0.001041525**
Gadsden, AL MSA	6	0	0	0.00	3	2918	**0.001028101**
New York, NY PMSA	88	61	20	1.26	246	245635	**0.001001486**
San Jose, CA PMSA	29	20	1	1.25	58.5	62678	**0.000933342**
Lake Charles, LA MSA	5	1	0	0.36	4.5	4910	**0.000916497**
Vineland-Millville-Bridgeton, NJ PMSA	4	1	0	0.45	4	4549	**0.000879314**
Alexandria, LA MSA	6	0	0	0.00	3	3535	**0.000848656**
Los Angeles-Long Beach, CA PMSA	101	68	6	1.22	210.5	281202	**0.000748572**
Merced, CA MSA	3	1	0	0.61	3.5	5437	**0.000643737**
Houma, LA MSA	5	0	0	0.00	2.5	4936	**0.000506483**
Jersey City, NJ PMSA	2	0	0	0.00	1	14487	**6.90274E-05**
TOTALS	**8003**	**4282**	**668**				

VITA

Rusty Wayne Hagler

Candidate for the Degree of

Master of Science

Thesis: A GEOGRAPHICAL ANALYSIS OF U.S. GOLF ARCHITECTS

Major Field: Geography

Biographical:

Personal Data: Born on November 5, 1970, the son of Ray L and Donna J. Hagler; reside at Siloam Springs, Arkansas.

Education: Graduated from Van Buren High School, Van Buren, Arkansas, in 1989; received Associate of Arts Degree from Central Baptist College in 1992; received Bachelor of Arts Degree from University of Central Arkansas in 1994; completed requirements for the Master of Science Degree at Oklahoma State University in May, 1996.

Professional Experience: Fellowship, New York Times/Golf Digest, Oklahoma State University, August, 1994, to May, 1996; Research Assistant, Oklahoma State State University, August, 1994, to May, 1996.

Professional Memberships: Gamma Theta Upsilon Honor Society.