1-1-2014

The Contribution of Outdoor Recreation on Rural Property Sales in Mississippi

Jerry Brashier

The contribution of outdoor recreation on rural property sales in Mississippi

By

Jerry Brashier

A Dissertation
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Forest Resources
in the Department of Wildlife, Fisheries and Aquaculture

Mississippi State, Mississippi

December 2014

The contribution of outdoor recreation on rural property sales in Mississippi

By

Jerry Brashier

Approved:

_____

W. Daryl Jones
(Co-Major Professor)

_____

Jeanne C. Jones
(Co-Major Professor)

_____

Ian A. Munn
(Committee Member)

_____

Eric D. Dibble
(Graduate Coordinator)

_____

Stephen C. Grado
(Committee Member)

_____

George M. Hopper
Dean
College of Forest Resources

Name: Jerry Brashier

Date of Degree: December 13, 2014

Institution: Mississippi State University

Major Field: Forest Resources

Major Professor: W. Daryl Jones and Jeanne C. Jones

Title of Study: The contribution of outdoor recreation on rural property sales in Mississippi

Pages in Study: 170

Candidate for Degree of Doctor of Philosophy

To estimate the contribution of outdoor recreation on rural property sales in Mississippi, information was collected from lenders and appraisers associated with the Federal Land Bank, Mossy Oak Properties, and Rutledge Investment Company on properties sold from 2003-2008 in three regions of Mississippi: Mississippi Delta/Hills Region, North Mississippi Region and South Mississippi Region. Property sales information was collected on 102,747 hectares (ha) of rural properties valued at $475.1 million. Hedonic regression analysis was used to quantify the contribution of outdoor recreation on Total Sale Value (TSV). Outdoor recreation contributed $160.6 million of the TSV.

Forests comprised 71% of land coverage statewide. Attributes that were related to TSV statewide were row crop lands, bottomland hardwood forests, mixed pine-hardwood forests, planted pine forests, pasture/fallow fields, natural pine forests, upland hardwood forests, cutover woodland forests, and overnight sleeping quarters. Attributes related to TSV varied across the three regions. Statewide, hunting was expected to be conducted on at least 96% of the properties sold. In the Mississippi Delta/Hills Region,

outdoor recreation contributed the greatest percent increase in land value (55.4%) and properties leased for a greater value ($58.70 per ha).

Information provided by this study will encourage rural property owners to justify enhancements of wildlife habitats, provide recreational opportunities, and enhance their income. Rural land appraisers will use the information to appraise lands more accurately, and resource and regulatory agencies will use it to protect wetlands and other sensitive lands or mitigate for adverse impacts

ACKNOWLEDGEMENTS

The inspiration and encouragement for this work came from Dr. W. Daryl Jones and Dr. Jeanne C. Jones (Committee Co-chairs) and my wife Marilyn. I thank Dr. Stephen C. Grado and Dr. Ian A. Munn, Committee members; Dr. Eric D. Dibble, Professor and Interim Head of Wildlife, Fisheries and Aquaculture; and Dr. Bruce W. Leopold, Professor of Wildlife, Fisheries and Aquaculture for their guidance and support. Thanks are due Dr. Dawn Manning for assisting with sample collections. Thanks also are due the Department of Wildlife, Fisheries and Aquaculture and the Forest and Wildlife Research Center (FWRC) for their support.

This work would not have been possible without assistance from the Federal Land Bank; Mossy Oak Properties, Inc.; Rutledge Investment Company; and Anderson-Tully Company. Ms. Amanda R. Donald and Mr. Michael C. Elliott with Land Bank South in Poplarville, Mississippi provided property sales and wildlife species/habitat information. Because they are in the forest management business and knowledgeable of wildlife habitats and species in Mississippi, Messrs. W. Norman Davis and Stan Priest with Anderson-Tully Company in Vicksburg, Mississippi provided wildlife species/habitat information. The following also provided property sales information: Messrs. Ricky Lagrone and Gary Blair with Land Bank South in Brookhaven, MS; Messrs. Joe Mallard and Ben W. Beavers with Land Bank of North MS in Saltillo; Mr. Jeremy Brock with Land Bank of North Mississippi in Starkville; Mr. James B. Rutledge and Ms. Rebecca L.

Phillips with Rutledge Investment Company in Memphis, Tennessee; and Messrs. Chris Hawley and Lannie Wallace with Mossy Oak Properties, Inc. in West Point, Mississippi.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Outdoor recreation is important on local, state, and national levels in the United States (U.S.). The USDI Fish and Wildlife Service (USFWS) reported that 87.5 million U.S. residents participated in wildlife-related recreation in 2006 (USFWS and USDOC 2007). In 2011, participation by U.S. residents in wildlife-related recreation had increased to 91.1 million (USFWS and USDOC 2011). The Outdoor Industry Association (2012) reported that outdoor recreation provided jobs for 6.1 million Americans who spent $646 billion on outdoor recreational activities in 2011. In the U.S. the economic contribution of fisheries is an important part of outdoor recreation. For example, the USFWS (2011) reported that the total economic contribution of the National Fisheries Program was $3.6 billion annually, amounting to $70 million per week and $10 million per day. In 2011, 13.7 million people went hunting (USFWS and USDOC 2012). Big game attracted 11.6 million hunters and small game attracted 4.5 million. Hunters spent $34 billion on trips, equipment, licenses, and other items to support hunting in 2011 (USFWS and USDOC 2012). Another important economic contribution in the U.S. is the excise-tax collection for wildlife restoration that averaged $251 million per year from 1970-2006. Over the same period, hunters and shooters purchased an average of approximately $3.1 billion (wholesale value) in tax-related items per year, resulting in an

average annual return on investment of 1,100% (Andrew Loftus Consulting and Southwick Associates 2011).

Outdoor recreation is economically important to each state. Wildlife recreation in Mississippi was valued at $974 million in 2001 and increased to $1.1 billion in 2006 (USFWS and USDOC 2008). Jones (2011) reported the value of hunting, fishing, and wildlife-watching in Mississippi was $2.7 billion in 2006. Many hunting and wildlife watching activities occur in forested ecosystems (Holsman 2000), which are common in Mississippi. Mississippi's forests are not only important for outdoor recreation but also for forest products. Henderson et al. (2008) reported forests products harvested from Mississippi's forest lands were worth over $1.1 billion annually. Therefore, combined values from wildlife recreation and forest products in Mississippi's forests can exceed almost $4.0 billion annually (Jones et al. 2011). Although studies have documented the value of outdoor recreation on state and regional economies, limited quantitative research has been conducted on influences of recreational opportunities on land appraisal and sales values (Baen 1997).

Traditionally, recreational land valuation has not played a role in land appraisal, because components related to recreational value are often difficult to quantify (Guiling et al. (2007). However, the potential for recreational use and enhancement of the quality of human life may influence marketability and perceived land values (California State Parks 2005, Jones et al. 2006). In markets where lands are purchased for relaxation, vacationing, and recreational uses, these values may be primary influences on actual sale values (California Research Bureau 1997). In these situations, appraisers may need to understand the traditional and new influences on land values, including recreational

values. Specifically, this information may be especially important to rural land appraisers who play an important role in the valuation and sale of rural properties (Appraisal Institute 2006).

The American Society of Farm Managers and Rural Appraisers (2008) reported that rural land appraisals provide property valuations upon which lenders, farmers, and investors can base lending or investment decisions. The appraised value is used for sale or purchase, estate or financial planning, lease and rental provisions, loan collateral, and tax considerations. Description of the land and improvements, discussion of future uses, estimated property value based on probable income, and comparisons with recently sold properties are included in the appraisal (The American Society of Farm Managers and Rural Appraisers 2008). Rural land appraisers provide expert estimates and analyses of the market value of real estate. However, rural land appraisers may lack an understanding of the influences of recreational values on land values and consequently, they may not include these components in land appraisals (The American Society of Farm Managers and Rural Appraisers 2008). Also, they may not have the methodologies to ascertain recreational values and linkages to overall property values. Information on recreational values and approaches to an evaluation of these values is needed to assist property appraisers in determining property values that include recreational values.

Although this information can be important for professional appraisers, enhancement of approaches to estimate and measure sales values associated with outdoor recreation on rural lands can be used in an integration of land use and conservation planning. This approach can contribute to conservation of forests, grasslands, and wetlands which provide wildlife and fish recreation to property owners and ecosystem

services to the public. Commissioners in Pike County, Pennsylvania accepted the proposal to use integration of land use and conservation planning in the Open Space, Greenways, and Recreation Comprehensive Plan. When implemented this plan would increase nearby property values; create tourism and forest products industries; promote wildlife diversity; provide areas for walking, riding horses, canoeing, swimming, fishing, and hunting; provide nature trails, and create an awareness and appreciation for the environment (Caridi et al. 2008).

CHAPTER I

LITERATURE REVIEW

Land Markets

Land is a major asset in rural society, and a number of factors influence its value (Novack 2003). Non-economic or intrinsic value factors may include valuing an ecosystem and open space for life quality. Measurable economic factors include leasing land for recreation, sale of extractive commodities (i.e., timber or minerals) and development for higher and better uses (Bergstom 2001).

Agriculture and Forestry Values

Key economic activities on rural lands of the U.S. include agriculture and forestry. In 2013, the U.S. Environmental Protection Agency (USEPA) reported that U.S. farmers produced about $143 billion worth of crops and, in 2011, about $153 billion worth of livestock. In 2010, timber-related manufacturing was worth $77 billion (U.S. Census Bureau 2012).

The Mississippi Department of Agriculture and Commerce (2006) reported that agriculture is the number one industry in Mississippi with one in three Mississippians either directly or indirectly employed in agricultural endeavors. Average farms size was 104 hectares (257 acres), and crops grown included soybeans, corn, cotton, hay, rice, and wheat. The value of cropland in Mississippi was $4,471 per ha in 2008 and $5,681 per ha

in 2013, representing an increase in value of 21%. The value of pasture in Mississippi was $5,459 per ha in 2008 and $4,817 per ha in 2003, representing a decrease in pasture value of 12% (U.S. Department of Agriculture [USDA] 2010, U.S. Department of Agriculture [USDA] 2013). In 2006, Mississippi's forest industry delivered $1.21 billion in forest products to mills and other processors (Measells 2007).

Agriculture land values depend on contributors such as soil quality, access to market terminals, government payments, and amenity values such as recreation and scenic views (Nickerson et al. 2012). Barnard (2006) reported that U.S. farm real estate values were important indicators of the financial condition of the farm sector and were influenced by net returns from agriculture production, capital investment in farm structures, interest rates, government commodity programs, property taxes, and non-farm demands for farmland. He also found that farm values had been steadily rising since 1987, but the inflation-adjusted (real) value of U.S. farm real estate was still below the 1982 peak.

Forest land is one of the most important economic assets and generally valued on the basis of market transactions (Wu et al. 2010). Since its inception as an investment class in the mid-80s, timberland value has grown from less than $1.0 billion to more than $50.0 billion, primarily in the U.S. (Rinehart 2010). From 1996 to 2000 over-supply of timber was becoming an issue from enhanced productivity through technology and the industry downsized their portfolio by $2.5 billion. From 2001 to 2004 the stock market declined, and investors were content with low returns of 5.0 to 6.0%. During this period the forest industry shed 14.4 million acres. From 2005 to 2009 the forest industry sold

off another $15.0 billion of timberland. In 2010, U.S. timberland was expected to decline another 10 to 15% (Rinehart 2010).

Aquaculture also is important to national and state economies. Annual production of catfish in the U.S. is over 272 million kg with production concentrated in Mississippi, Louisiana, Alabama, and Arkansas (Brown 2000). In 2005, 40,486 ha of aquaculture ponds produced 165 million kg of catfish in Mississippi (Hanson 2006). By 2012 only 20,894 ha of aquaculture ponds in Mississippi were producing catfish (Mississippi Department of Agriculture and Commerce 2012). Anderson (2008) reported that the decline in catfish production in Mississippi was due to an increase in price of catfish food and competition from imported fish. Although catfish production has been in decline in Mississippi, it was the leading catfish producing state in 2012 with a value of $165 million (Mississippi State University [MSU] Extension Service and Mississippi Agricultural Statistics Service 2012). Although there was a scarcity of data in the literature that quantitatively linked aquaculture with property sales values, the North Carolina Department of Agriculture and Consumer Services (2006) reported that the value of aquaculture lands in North Carolina ranged from $1,976 to $2,964 per ha in 2005. Wynne (1994) reported that costs for aquaculture lands in the southern U.S. varied greatly between sites and regions.

Ecosystem Services

An ecosystem is a community of organisms living in a particular environment and the physical elements with which they interact (Climate Institute 2010). Ecosystem services influence the value of rural properties and are important to landowners and the general public. For example, Yarrow and Yarrow (1999) found that forests, wetlands,

and prairies are important habitats for game and non-game wildlife species and provide critical areas for mating, nesting, foraging, and refugia. Forests also provide food for humans, enhance water and air quality, enhance soil formation and nutrient cycling, preserve biodiversity, control stormwater and flood water, regulate climate changes, and provide raw materials for fuel and shelter (Tempesta and Thiene 1997, Krieger 2001, Qui et al. 2003). Miller et al. (2008) reported that forests contribute to life quality and well-being, enhance aesthetic quality, provide transpiration, reduce wind velocity, and suppress noise pollution. The University of Florida Cooperative Extension Service (2001) reported that non-timber areas also provide ecological values, such as soil and water conservation, which have direct and indirect economic impacts on the national economy.

From an economic perspective, Krieger (2001) reported that the contribution of ecosystem service values of U.S. forests alone is nearly $8 billion annually with services such as soil formation being valued at $2 billion annually. Food production in U.S. forests during the same period was valued at over $10 billion annually (Krieger 2001). Because ecosystem services enhance aesthetic and life-quality for humans, land values are often influenced by the presence of ecosystems on and adjacent to properties (IEH 2001). Shan et al. (2011) reported that ecosystem service values are associated with lakes, rivers, wetlands, forests and conservation lands in rural landscapes and support direct use values, such as recreational and aesthetic services, that are often perceived by landowners and capitalized in land prices.

Landscape Values

Ecosystems, such as forests, can have measurable and intrinsic landscape-level values. Landscapes can provide ecosystem services that benefit many inhabitants beyond property and governmental boundaries. For example, landscape level ecosystems and land use areas can provide habitat for migratory wildlife species and for species that require large territories or home ranges (Yarrow and Yarrow 1999). In addition, diversity of ecosystems types across landscapes can retain source populations of non-migratory birds, reptiles, amphibians, mammals, invertebrates, and native flora (Yarrow and Yarrow 1999).

Many faunal and floral species provide ecosystem services at local and landscape scales. For example, a variety of beneficial insects can aid in control of agricultural pests and pollinate crops; whereas, resident and migratory species of bats and birds control insect pests and contribute ecosystem services of biological control of invertebrate pests at local and landscape levels (IEH 2001). Natural habitats that support native species provide services of soil formation, air and water quality enhancement, and water conservation (IEH 2001). Ecosystems interspersed with human use areas can preserve open space, beautify the landscape, maintain rural character, contribute to the quality of human life, and provide spaces for production of locally raised food products (IEH 2001, Libby 2004, Francis 2005).

When considering the influences of landscapes and land use on rural lands and associated market values, features, such as location, adjacent land use, and on-site conditions are generally considered (Libby 2004, Ma et al. 2011). For example, Bergstom (2001) found that increased urbanization during the economic boom of the

1990s led to accelerated conversion of rural land to residential, commercial, industrial, and other urban-related uses. As a result of land loss due to urbanization, public concern about the loss of benefits associated with agriculture and undeveloped natural areas catalyzed development and implementation of public programs to protect farmland, open space, and green space in many regions of the U.S. (Bergstrom 2001). Cities that have implemented these programs in Georgia include Culloden and Forsyth (Comprehensive Planning Steering Committee of Middle Georgia 2007). Counties that have implemented these programs include McHenry and DeKalb in Illinois and Dane and Waukesha in Wisconsin (Paulson 2003).

According to Hite (2001), expansion of urban centers and industrial development is continually advancing in the U.S. However, a strategy for slowing accelerating rates of development may be conducted through identification and valuation of ecosystem services, including life quality enhancement, maintenance of natural and cultural heritages, and provisions of recreational opportunities. There is a scarcity of data that quantitatively links these features with actual property sales values.

Measurable Contributors to Rural Property Values

In Louisiana, location of tract, proximity to urban centers, accessibility and size of tract, on-site land use, capital improvements, transferrable cost-share government programs, and biotic and abiotic characteristics of property such as forest cover, soil quality, and surface water were determinants of rural land values (Henning et al. 1996, LSU AgCenter 2000). In North Louisiana, McLaren (2004) found that commercial influence was most significant on rural land prices contributing a range of values of $1,743 to $3,747 per ha. She found that other influences on rural property prices

included urban development, proximity to highways, and presence of ponds or impoundments.

In Central Arkansas, the Agri Forum (2005) reported that the upward trend in farmland value was attributed mainly to low interest rates. Other attributes that increased rural property values were fertile black soils and improved farming practices that increased crop yields and the potential for recreational use. The value of cropland in Arkansas was $4,372 per ha in 2008 and $6,323 per ha in 2013, representing a 31% increase. The value of pasture was $5,434 per ha in 2008 and $5,928 per ha in 2013, representing an increase of 8% (USDA 2010, USDA 2013). In Mississippi, Munn et al. (2007) found that land use patterns (i.e., proportion of land allocated to various uses such as agricultural crops, pastureland, aquaculture, forests, wildlife food plots, and residential uses) in part reflected a demand for end products and points to uses that maximize financial returns. Munn et al. (2007) also reported that other influential factors were landowner characteristics and property location and size.

Occurrence of wetlands on or near properties also contributes to rural property values. King (1998) reported that a hectare of wetland may be valued at thousands of dollars or more depending on type and function. Wetland ecosystems contribute to the value of rural property and provide a number of functions, such as providing food, filtering water, reducing the severity of hurricanes and other storm events, and serving as habitat for a variety of faunal and floral species (King 1998). Schuyt et al. (2004) reported that world-wide wetlands that provided recreational opportunities had an economic value of $492 per ha per year. Economic values of other world-wide wetlands

per ha per year were riverine woodlands $206, salt/brackish marsh $165, freshwater marsh $145, and mangrove forests $120.

Many wetlands need to be restored; however, restoring wetlands is costly (King 1998). For example, nationwide restoration costs were reported at $306,280 per ha for forested freshwater wetlands, $208,000 per ha for freshwater emergent wetlands, and approximately $736,000 per ha for bottomland hardwood non-tidal wetlands (King 1998). Although restoration of wetlands may be expensive, ecosystem services values may be indicative of actual property values (King 1998). Paris (2003) reported that the average payment to a landowner to restore wetlands under the Wetland Reserve Program (WRP) was $1,482 per ha and the cost of restoration $618 per ha. The value difference between payment and restoration cost provided farmers with a temporary alternative source of income through a wetlands restoration contract. The Natural Resources Conservation Service (NRCS) (2008) estimated that hunting and bird watching on wetlands restored by WRP in Nebraska's Rainwater Basin contributed $1,235 per ha annually to the economy.

Ecosystem values are associated with lakes, rivers, wetlands, forests, and conservation lands where they provide recreational and aesthetic services that are capitalized in land prices (Shan and Swinton 2011). U.S. residents are willing to pay for coastal restoration (Petrolia et al. 2013). For example, they reported that in 2011 60% of Americans were willing to pay a total amount of $909 to $1,751 per household or $105 billion to $201 billion to implement a project that would restore Louisiana's rapidly eroding Barataria-Terrebonne estuary. This estuary annually supports millions of migratory water birds and a commercial harvest of 270 million kg of fish and shellfish.

A review of the literature showed that there is a scarcity of ecosystem valuations in this regard.

Economic Importance of Outdoor Recreation

Outdoor recreation is comprised of leisure and sport activities undertaken in natural, rural, and urban areas and includes hunting, fishing, picnicking, swimming, cycling, horse riding, boating, walking, and camping among a myriad of other activities (Outdoor Industry Foundation 2005). The USFWS and USDOC (2002) reported that 82 million people in the U.S. participated in outdoor recreation in 2001. In 2010, more than 140 million Americans participated in outdoor recreation that provided 6.1 million jobs and $646 billion in spending (Outdoor Industry Association 2012).

Hunting is an important contributor to national economies. The USFWS and USDOC (2012) reported that 13.7 million people in the U.S. participated in hunting in 2011 with expenditures of $34.0 billion on trips, equipment, licenses, and other items. The average annual expenditure per hunter was $2,484, and overall hunting-related participation had increased 9% from 2006 to 2011. Additionally, the 10-year comparison of the 2001 and 2011 surveys showed an increase in the number of hunters and their expenditures (USFWS and USDOC 2012). Guerrero (2012) reported properties with waterfowl habitat were enhanced in value and had the potential for improving income through leasing land to an outfitter for waterfowl hunting.

Recreational angling is also an economically important outdoor activity nationwide (USFWS and USDOC 2012). Fishing attracted 33.1 million individuals 16 years old and older nationwide in 2011 with expenditures of $41.8 billion (USFWS and USDOC 2012). Individual states reported economic impacts to their economies from

recreational fishing. In Florida, freshwater sport fishing provided recreational opportunities for over 1.32 million participants in 2001 and generated an economic output of $2 billion (Wattendorf 2003). Trout Unlimited (2005) reported that anglers spending in Wyoming increased from $136 million in 1990 to $423 million in 2001.

The contribution of outdoor recreation to state economies varies depending on the type of outdoor recreation conducted and the number of recreationists participating (USFWS and USDOC 2011). The South Dakota Grasslands Wilderness Coalition (2005) reported that hunting and fishing by state residents in 2004 contributed approximately $194 million and $173 million, respectively. The Colorado Division of Wildlife (2004) reported that hunting and fishing in Colorado generated about $1.5 billion in revenues and 20,200 jobs annually. The University of Florida Extension Service (2001) reported that hunting, wildlife viewing, and fishing in Florida generated $5.5 billion in retail sales and an overall economic impact of $7.8 billion in 2000.

Fee Hunting and Fishing on Private Lands

Wildlife recreation has value and income earning potential for landowners through fee hunting and fishing business ventures (Jones et al. 2004). Jones et al. (2006) found that fee access wildlife recreation increased average proceeds from land sales in Mississippi's Delta Region by $809 per ha or 36% during 2002-2005, and rural land prices in this Region were increased by the size of bottomland hardwood forests, pine-hardwood stands, and wildlife supplemental food plots located on properties.

Fee hunting is the process whereby landowners charge a fee for hunters to access their properties. Hunters often pay a fee, either daily or seasonally, to hunt on a landowner's property; in other circumstances, hunters will lease land for a period of time,

usually from three to five years from larger landowners. Land leasing by a hunter is a business agreement between the landowner and the hunter to protect and provide a pleasant experience for both parties (Stribling 1994).

Jones et al. (2004) reported hunting leases in Mississippi were generally contractual and provided a group of hunters the sole right to hunt specified portions of the landowner's property for ≥1 year and other options existed, such as permit hunting and outfitter arrangements. Permit hunting allowed individual hunters the right to hunt a specified portion of the landowner's property for ≤1 day in exchange for a permit or gun fee; whereas, outfitter or guide arrangements provided outfitters with exclusive access for hunting or guided hunts on a specified portion of the landowner's property in exchange for an annual fee or a percentage of an outfitter's gross revenue (Jones et al. 2004).

Southwick Associates (2012) reported that demands for fee hunting opportunities were growing rapidly and expected to continue in the future. This demand was particularly strong in areas with huntable populations of deer and turkey in the Southeast U.S. Similarly, Mozumder (2007) reported recreational hunting leases provide an important practical means for landowners to increase income. Jones et al. (2001) reported annual net revenues averaged $9.66 per ha in Mississippi during the 1997-1998 hunting season.

The USFWS found that money spent by U.S. hunters for land leasing doubled from 1989 to 2000 to reach $625 million, a continuing trend (Burden 2006). Accordingly, wildlife recreationists in the U.S. spent $12 billion on land leasing and ownership in 2001, up from $7 billion in 1996 (Henderson and Novack 2005). Zhang et al. (2006) reported factors influencing hunting lease fees on nonindustrial private forest

(NIPF) -lands in Alabama included the proportion of agriculture land relative to forest land, tract size, year-round water availability, type of access, and enhanced features such as streamside management zones (SMZs), habitat improvements, and provision of services. Hussain et al. (2013) reported that in northern Mississippi a $1 dollar increase in a 0.41 ha lease rate was associated with a 0.80% increase in forest land value and hunting lease income was capitalized into forestland value at a 7.55% rate. Henderson et al. (2005) reported that an empirical analysis of Texas farmland values found that hunting leases and recreation income were being capitalized into farmland value.

Freese and Trauger (2000) reported that one of the most significant fee-hunting regions in North America was Texas where landowners received approximately $300 million from hunting fees as early as 1987. Similarly, in 2005 Texas A&M Agriculture Research and Extension Center (2006) reported that income to Texas land owners from hunting leases exceeded $525 million. Drummond (2005) reported revenues collected from fee hunting on Texas ranches often exceeded returns from cattle ranching. Ranches in Texas providing trophy hunting opportunities for white-tailed deer (*Odocoileus virginianus*) demanded the greatest fee rates (Baen 1997). He also reported that the value of a mature trophy deer harvested via property access or a guided hunt ranged from $1,400 to $6,500 based on antler size and scores. More recently Byers (2008) reported that Boone & Crocket status bucks may be worth $10,000 or more per animal in Texas. Sun et al. (2006) reported that outfitters who engaged in fee hunting in Mississippi received $10.23 in net revenue per ha annually excluding the cost of capital investment. They also reported that outfitters derived 34% of their gross revenues from other wildlife-related activities, such as fishing and wildlife viewing. Additionally, Mississippi

landowners with fee hunting enterprise experience obtained a larger lease fee per ha than landowners with no hunting lease experience (Hussain et al. 2007).

Fee fishing is a means through which pond owners can derive income from their properties and provide fishing opportunities to anglers (Cichra 2002, Burden 2007). Fee fishing is paying for the right to fish and/or paying for any fish caught with three basic types of fee fisheries being defined: long-term leasing, day leasing, and fish out operations (Cichra 2002). Unlike hunting leases, which usually require a large quantity of land to support huntable populations of game species, fishing leases often occur on small bodies of water. For example, 0.41 ha of properly managed water can produce up to 182 kg of harvestable-size fish per year (Cichra 2002). To illustrate revenue collecting from angling, a 1,440 ha reservoir in east central Florida leased for $85,000 in 2000.

Numbers and types of fee fishing businesses may vary in different southeastern U.S. states. Wynne (2006) reported that there were 175 privately-owned fee fishing operations in Kentucky. In North Carolina, fee-fishing trout ponds are heavily stocked with trout and anglers pay from $2.50 to $3.50 per pound for the fish they catch (North Carolina Fishing News 2006). The most common uses of ponds that are not used for fee fishing are to provide other fishing opportunities and water for livestock. Some ponds attract ducks and geese and provide aesthetic value. Ponds have the potential to increase property values due to the recreational opportunities they provide (The Samuel Roberts Noble Foundation, Inc. 2014). There is a scarcity of information on the per ha contribution of ponds on rural property values.

Nonconsumptive Wildlife Uses and Values

Nonconsumptive recreational uses contributed to the economic value of outdoor recreation nationwide (Duffas and Darden 1990), and most outdoor recreationists participated in multiple forms of recreation (Southwick Associates 2012). In the U.S. from 2005 to 2008, 94.6 million participants viewed wildlife, 68.0 million participated in birdwatching, 68.5 million visited a wilderness or primitive area, 34 million engaged in primitive camping, and 22.3 million participated in backpacking (Cordell et al. 2008). In 2006, 266 million people participated in nonconsumptive recreation which supported 5,525 jobs and contributed $635.4 billion to the U.S. economy (Southwick Associates 2011).

Many state and land management agencies reported multiple recreational activities taking place on their landbase (Kaval and Loomis 2003, Shestra et al. 2007, Fly et al. 2010). A visitor day is a cumulative total of 12 hours of recreation by one or several people. In the southeastern U.S. from 1967 to 2003, average values per visitor day for national park recreation were bird watching ($22.05), camping ($21.49), rafting and canoeing ($106.22), hiking ($50.32), boating ($49.10), swimming ($50.77), and wildlife viewing ($33.42; Kaval and Loomis 2003). Shestra et al. (2007) reported that outdoor recreation in the Apalachicola River region, a state wildlife management area in Florida, resulted in a total economic value of $455 million per year. In 2009, the economic contribution by visitors to Tennessee's state parks for recreation was $725.2 million (Fly et al. 2010). In Colorado, wildlife watching activities yielded an economic impact of $940 million in 2001 and supported 13,000 full- and part-time jobs statewide (Pickton et al. 2004).

Other states have reported economic impacts from multiple consumer purchases related to outdoor recreation. The Washington Department of Fish and Wildlife (2002) reported that outdoor recreation creates a monetary impact on sporting goods stores, bait shops, boat ramps, motels, campgrounds, convenience stores, restaurants, gas stations, and other small to mid-size businesses. Ducks Unlimited (2008) reported that outdoor recreation provides benefits to local communities through sales of outdoor gear and guide services. Similarly, Texas Parks and Wildlife Department (2008) reported that original expenditures made by hunters, anglers, and wildlife watchers in Texas generated additional spending throughout the state. For example, a retailer buys more inventory and pays bills, wholesalers buy more from manufacturers, and all these pay employees who then spend their paychecks. Outdoor recreation also contributed to local economies in non-traditional ways, such as cave exploring and glider flying. In Washington, Andrews et al. (2003) found there were important non-traditional uses that enhanced economic impacts. They reported that in Skagit County in 2000 festival attendance produced an economic impact of $14 million and agro-tourism activities produced an economic impact of 15.3 million.

Nonconsumptive fish and wildlife recreation that depend on natural ecosystem types may be categorized as ecotourism (Carver and Caudill 2007). Economic benefits of ecotourism are used in refuge planning and it also facilitates interaction of refuges and local communities (Carver and Caudill 2007). Ecotourism may be recognized at the landscape level and encompass entire physiographic regions or drainage basins. Gillette (2004) reported on the economic and ecological value of Mississippi's Pascagoula River Basin, a 69,000 ha area of alluvial floodplain wetlands and riverine habitats along the

U.S. Gulf Coast. The Pascagoula River and associated marshes supported wildlife and fish-based tourism which in 2011 contributed $19.4 billion to the economies of the U.S. Gulf Coast (Stokes 2013).

Wildlife Recreation and Rural Property Values

According to the Reason Public Policy Institute (RPPI) (2000), outdoor recreation has been stimulating increases in land values. Drummond reported that recreational land purchased in the U.S. in 2003 valued at more than in 2002. She also reported that a hectare of U.S. farmland was $3,359 in January/February 2005, up 7% from January/February 2004. In Arkansas James (2006) reported that waterfowl hunters were buying farmland as early as the 1990s and developing it for recreation (e.g. waterfowl hunting). Additionally, investment in land for recreational opportunities was one of the strongest factors boosting rural land prices nationwide, and poorer quality farmland was being converted to recreational use areas in many regions (Drummond 2005, Henderson and Moore 2006, James 2006). Henderson and Moore (2005) concluded that outdoor recreation influenced the value of agriculture lands, because land value was enhanced where hunting lease rates and recreation income were greater. Eberle et al. (2008) reported farmland being sold for $4,446 to $7,410 per ha for outdoor recreation in Western Illinois in 2006. Dobbins et al. (2010) reported the mean value of outdoor recreational land in Indiana was $6,916 per ha.

Drummond (2005) found that farmlands purchased for hunting and fishing in 2003 increased by 21% in South Dakota and by 17% in Minnesota. In the Northern Forest Region of the U.S., outdoor recreation and tourism created ways that landowners could realize supplemental or primary income from public use of lands (Chase 2005).

Henderson and Moore (2006) reported the right to hunt added $1,075 to $2,786 per ha to the value of land in Texas.

In many areas of the U.S., real estate values were influenced by hunting opportunities and availability of game species. Rodiek and Bolen (1991) reported that hunters in Texas were purchasing ranch lands where white-tailed deer could be managed. In Alabama, Dickson (2002) reported land lease pricing was usually determined on a per acre basis. Leasing rates were highest in the Black Belt Region of west-central Alabama which consistently produced the largest bucks, and lease prices ranged from $49 to $62 per ha. Hussain et al. (2003) reported the major factors influencing hunters' preference for hunting leases in Alabama were harvest success followed by lease rate and accessibility. These factors influence property sales values (Harper 2003).

Henderson and Moore (2006) found that the right to hunt was more valuable than the guarantee of a deer harvest, and "right to hunt" added $375 to $971 per ha to the value of land in Texas. In 100 property parcels sold near and in the Delta region of Mississippi, Jones et al. (2006) found that featured wildlife species were white-tailed deer, rabbits (*Sylvilagus* spp.), Eastern wild turkey (*Meleagris gallopavo*), waterfowl, squirrels (*Scirus* spp.), mourning dove (*Zenaida macroura*), and Northern bobwhite (*Colinus virginianus*), and recreational uses contributed an average increase of 36% ($808 per ha) in property value. Additionally, researchers found that rural properties enhanced through sustainable forestry practices and management of wildlife populations produce recreational and income benefits for landowners in the southern U.S. (Jones et al. 2006, Zhang et al. 2006, Golden et al. 2011).

Land Cover, Wildlife Species, and Rural Property Values

In addition to perceived populations of selected game species, land cover types have been reported to be related to property values (Henderson and Moore 2006). In Alabama, Dickson (2002) found that deer leases with the highest prices were tracts with a combination of pine plantations, mature hardwoods, and multiple food plots that were within close proximity to urban areas. In Florida, ranches with at least 22% coverage of forests or other vegetation received $40 per ha from hunting leases, and when the coverage was doubled, leases increased by 20% (Henderson and Moore 2006). Similarly, Porter (2008) found that a relatively small amount of brush and timber on a property, such as 15% woody cover, increased income and land values. It was found that woody vegetation distributed across the landscape supported populations of bobwhite quail, wild turkey, and white-tailed deer, and resulted in landowner earnings that ranged from $7 to $49 per ha for annual leases in Texas. Gilliland and Vine (2004) reported that in 2002 the mean value of land in the Rio Grande Plain of Texas was $2,989 per ha and land with a wildlife management plan in place was increased by an additional $185 to $371 per ha. Additionally, the presence of impoundments, wetlands, streams, and rivers also have the potential to increase income derived from associated fee enterprises (Jones et al. 2006).

Many studies report the relationship between wildlife presence and food and cover resources (Yarrow and Yarrow 1999). Information made available to citizens through university, organization, and agency outreach programs attempt to educate citizens concerning wildlife habitat, species assemblages, and land uses (Yarrow and Yarrow (1999). For example, many studies have reported on the value of croplands and conservation program acreage to farm game species, grassland birds, and waterfowl

(Messmer 1992, Ringelman 2009). Other sources reported on the value of pastures and fallow fields to early successional wildlife species (Yarrow and Yarrow 1999, Guiling et al. 2007, The Virginia Department of Game and Inland Fisheries 2009). Farm ponds and aquaculture impoundments provide habitat for waterfowl, wading and shore birds, amphibians, reptiles, fish, mammals, and provide recreation and aesthetic quality to the landscape (USDA 2008). Strickland et al. (2008) reported that over 42,510 ha of catfish ponds in the Mississippi Delta attracted approximately 110,000 wintering waterfowl annually.

Early successional harvested gaps interspersed with various stages of forest types and ages benefit wildlife species, such as American woodcock (*Scopolax minor*), ruffed grouse (*Bonasa umbellus*), bobwhite quail, Eastern wild turkey, mourning dove, white-tailed deer, rabbits, black bear (*Ursus americanus*), and Florida panther (*Puma concolor coryi*) (Snyder 1994, Clemson University 1997, University of Florida Institute of Food and Agricultural Sciences 2004). Human perceptions of wildlife presence are related to visible features on a property (Delong and Brittingham 2009). These perceptions in combination with past experience, knowledge levels, or traditional belief systems may influence desirability of a property for recreational leases of land purchases and may ultimately influence property sale values for recreation (Jones et al. 2006, Delong and Brittingham 2009).

In the Rio Grande Plain of Texas, human-made ponds of over 1 ha in surface area enhanced land values (Gilliland and Vine 2004). Analyses of sales in the northern Rio Grande Plain indicated that two to four ha lakes that hold water added $4,000 to $5,000 to the overall value for each surface hectare of the lake. Sales analyses of several

properties in the same area with 41 ha ponds with irrigation wells indicated that the surface area of the lakes added approximately $11,115 per ha in value. Proximity to water bodies may also increase property values. Michael et al. (1996) reported that lakefront property owners in Maine are the recipients of the greatest economic gains from improved lake-water quality because the benefits of water quality can be capitalized in the price of lake-front properties. There is a scarcity of data on the contribution of lakes, rivers, and streams to the per hectare value of rural properties.

Features, such as wildlife habitat, scenic views, riparian corridors, and educational trails, have been reported to enhance rural property values. Several studies in the eastern and western U.S. reported that availability of open space, scenic views, perceived wildlife habitat, and sports angling opportunities can enhance property values (Bastian 2002, Geoghegan 2002, Henderson and Moore 2006, Netusil 2006). In California, Streiner and Loomis (1995) found that property prices increased from three to 13% of the mean value in areas with restored streams. This trend resulted in incentives and activities, such as stream bank stabilization and land acquisition for educational trails (Daugherty 1997). It was also found that the amount and quality of riparian corridors within 0.8 km of rural properties increased sales values of properties. In the alluvial flood plains of Mississippi, the presence of bottomland hardwoods on properties was related to increased land sales values (Hussain et al. 2007).

Attributes Affecting Rural Property Values

Across the U.S., reports have shown that rural property values increased when adjacent to public lands, such as wildlife refuges, lakes, and parks (USFWS 1997, Kelly 2000, Crompton 2005, USDA Forest Service 2006, Virginia Outdoor Plan 2007, White

and Leefers 2007). In Massachusetts, properties located within 100 m of a national wildlife refuge exhibited an increase of $984 per ha regardless of tract size (Neumann et al. 2009). Knetsch (1964) reported that Tennessee Valley Authority's (TVA) reservoir projects substantially increased adjacent land values due to recreational activities from water projects.

Cost-share Programs and Rural Properties

Agriculture and forest land cost-share programs also enhance the quality of rural properties and thereby increase their value (Virginia Department of Forestry 2013). The Natural Resources Conservation Service (NRCS; 2008) reported that agriculture conservation programs help farmers reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits of these programs include conservation of natural resources that sustain agricultural productivity, support economic development, and enhance recreation and scenic beauty. Wu et al. (2010) reported that participation in the Conservation Reserve Program (CRP) increased farmland values in 1997 by 5 to 14% in the Mountain region, 4 to 6% in the Southern Plains region, 2 to 5% in the Northern Plains region, and 0.6% to 1.2% in the Southeast region. Their results suggested that the CRP increased the average farmland value in the U.S. by between $7 and $10 per ha. Also, economic benefits to landowners with cost-share enrollment on their lands include payments excluded from income taxes if certain criteria are met (Internal Revenue Service 2013).

Major farm bill programs include the WRP, Wildlife Habitat Incentives Program (WHIP), Conservation Security Program (CSP), Environmental Quality Incentives

Program (EQIP), and CRP (NRCS 2008). WRP is a voluntary program whereby private landowners are paid a percentage of costs to restore wetlands, and it is a major contributor for achieving the Nation's goal of "no net loss" of wetlands. Participating landowners can establish easements of either permanent or 30-year duration, or can enter into restoration cost-share agreements where no easement is involved (NRCS 2008). WHIP provides financial incentives to private landowners to develop habitat for fish and wildlife (NRCS 2008). CSP identifies and financially rewards farmers and ranchers who meet the highest standards of conservation and environmental management on their operations (NRCS 2008). EQIP provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands (NRCS 2008). CRP provides assistance to farmers and ranchers who comply with federal, state, and tribal environmental laws, and encourages environmental enhancement (NRCS 2008).

The proposed 2014 Farm Bill would allow USDA to continue record accomplishments on behalf of the American people by providing new opportunity and creating jobs across rural America (USDA April 2014). Markets for agricultural products at home and abroad will be expanded. Conservation efforts will be strengthened. New opportunities for local and regional food systems will be created. A dependable safety net for America's farmers, ranchers, and growers will be provided. Important agricultural research will be maintained. All Americans will have access to safe and nutritious food. Additionally, the National Organic Certification Cost-Share Program would be funded at more than double what it was in 2008-2012, allowing more producers to apply (Behar 2014).

Forest enhancement programs in Mississippi include the Forest Resource Development Program (FRDP) and the Forest Land Enhancement Program (FLEP). FRDP provides financial assistance to eligible Mississippi landowners for establishing and improving tree crops (Mississippi Forestry Commission 2007). FLEP promotes the long-term sustainability of NIPF lands in Mississippi (Mississippi Forestry Commission 2008). In addition to cost-share programs enhancing rural property values, including mineral rights with property sales may also enhance rural land values.

CHAPTER II

JUSTIFICATION AND OBJECTIVES

Justification

Ecosystem services are economically valuable resources, and many of these services are becoming scarce (Colt 2000, De Groot et al. 2002). An example of the importance of ecosystems to the U.S. was provided by Costanza et al. (1997) who reported that ecosystems annually provide at least $33 trillion in worldwide services, such as outdoor recreation, water quality and quantity, and outdoor aesthetics. Krieger (2007) estimated that annual ecosystem service values in billions of dollars for U.S. forests were climate regulation $18.5, waste treatment $18.1, food production $10.3, recreation $7.8, raw materials $5.2, soil formation $2.1, and biological control $0.7. The need to improve the methods for measuring the economic importance of ecosystems was reported by Bockstael et al. (2000). Information from this study will accomplish this by expanding the knowledge of the relationship of land sales to wildlife and fisheries recreation, perceived abundance of wildlife, and land cover types across Mississippi and in different state regions. These items are all key ecosystem services beneficial to the environment and society. Landowners could use this information to enhance or increase potential property values by conserving native forest types, increasing and enhancing habitat management practices, and increasing wildlife populations for more recreational opportunities (Jones et al. 2006).

Resource and regulatory agencies, such as the U.S. EPA, U.S. Army Corps of Engineers, USFWS, and Mississippi Department of Marine Resources (MDMR), will have the opportunity to use this information in impact assessments and regulatory decision making. For example, agencies may use this information to determine if a project can be permitted that will impact wetlands, such as bottomland hardwoods, coastal wetlands, and other sensitive habitats, and to determine appropriate mitigation to compensate for impacts. This study's contributions can be used to estimate property values related to outdoor recreation and natural features of land in the Southeast U.S. This type of data is often lacking in environmental impact and mitigation assessments. For construction projects, economic benefits are usually known in terms of jobs created and increased tax revenues to be gained once projects are completed. However, the economic value of ecosystem services lost due to adverse impacts to land and water resources caused by such projects are usually not fully understood.

This study is one of the first to begin to fill this knowledge void by determining the economic value in land sale proceeds as influenced by outdoor recreation conducted on a rural land base in Mississippi. Environmental regulatory decision making (i.e., protection of wetlands and other sensitive habitats) will be better informed by weighing the economic value of development projects versus the economic value of ecosystems services lost to project construction – as mandated by federal laws including the National Environmental Policy Act and Federal Clean Water Act; Bean 1997).

Results from this study could influence lending practices and land appraising activities in the state and in the entire southeastern U.S. by better accounting for the potential positive effects of outdoor recreation on land sales transactions and rural

property values. If this trend is found to be the case, suggestions for altering lending and appraising procedures to better account for outdoor recreation effects on land valuation and sales may be proposed to lenders and rural appraisers. Similar to other states (e.g., Wisconsin), this information also could be used to establish a public agency program, with NIPF landowner participation, aimed at promoting free space in naturally occurring conditions that are in close proximity to recreational areas to increase land appraisals and tax revenues based on property values. Study findings about land values due to outdoor recreation could also be used to establish lower tax rates to promote recreation, timber production, and other activities.

Objectives

The study's overall objective was to quantify the contribution of outdoor recreation on rural land values across Mississippi during 2003-2008. I collected property data on potential influential features related to rural land values. These included perceptions of wildlife species; land cover types and area involved in property sales; location of properties in three state regions; proximity of properties to public lands, interstates, and major cities; onsite recreational activities; cost-share programs on tracts at the time of sale; presence of structures and amenities; and road access to and on properties.

Specific study objectives were as follows to estimate:

1) land value ranges from actual sales of rural lands within Mississippi during years 2003-2008;

2) land value ranges from actual sales of rural lands within 3 major regions of Mississippi including counties within the Mississippi River Alluvial Valley, North Mississippi, and South Mississippi; and

3) relationships between land sales values and land base attributes or conditions, such as cover type, location, road access, amenities or improvements, and perceived wildlife populations.

CHAPTER III

STUDY AREA AND METHODS

Study Area

The study area includes the entire state of Mississippi. Mississippi is located in the humid subtropical climate region (Mississippi Climate Office 2006). It is characterized by temperate winters; long, hot summers; and fairly evenly distributed rainfall throughout the year. Prevailing southerly winds provide moisture for high levels of humidity from May through September. Mean annual temperatures range from 17 to 20^{0}C. Temperatures routinely exceed 38^{0}C during summer months and drop to zero or below during winter months. Annual precipitation levels range from about 127 cm to 165 cm across the state from north to south.

At the time of my sample collection, the majority (77%) of Mississippi land was privately owned (Mississippi Forestry Commission 2010). Approximately 65% of the state's rural land cover was comprised of forests and 35% was comprised of farmland (MSU DAFVM and Mississippi Farm Bureau Federation 2012; Figure 1). Estimates for Mississippi's top five agricultural crops in 2012 were as follows: poultry/eggs $2.53 billion, soybeans $1.16 billion, forestry $1.03 billion, corn $891 million, and cotton $397 million (MSU DAFVM and Mississippi Farm Bureau Federation 2012). Approximately 20,729 ha of aquaculture impoundments existed in the Mississippi River Delta Region and east central Mississippi (MSU Extension Service and Mississippi Agricultural

Statistics Service 2012). The three major population centers in Mississippi were Gulfport on the Gulf Coast, Hattiesburg in southeast Mississippi, and Jackson in central Mississippi. In 2012, the population of Mississippi was 2,984,512 (U.S. Census Bureau 2012). Jackson had the largest population with 173,574 residents.

Soils and vegetation of Mississippi are determined by surface geology, climate, biological influences, and time (Stewart 2003; Figure 2). These factors influence dominant forest cover types and land uses (Table 1). I divided the state of Mississippi into three major regions based on soil resource areas and associated cover types and site productivity (Table 2). The Mississippi Delta/Hill physiographic region includes the Delta of the Mississippi-Yazoo Basin and the Loess Bluffs or Brown Loam Hills (Stewart 2003; Figure 2). Substrates of the Delta/Hill region originated as alluvial and windblown deposits, respectively. Substrates of this region originated from Pleistocene sands, silts, and clays deposited onto older Coastal Plain sediments by the Mississippi River and its tributaries. The Delta/Hill region is characterized by low-lying and gently undulating topographies near the Mississippi River and associated river and stream channels (Stewart 2003). River floodplains are interspersed with backwater swamps, sloughs, meander scars, and overbank deposits and natural levees. Soils are mildly acidic to mildly alkaline with most recently deposited soils developing from alluvium. Soil orders include inceptisols, entisols, and rarely millisols. Predominant natural cover types vary according to substrate elevation, hydrology, and soil structure and chemistry. Bottomland hardwood forests and forested wetlands originally dominated the region and were comprised of oaks (*Quercus spp*.), pecans and hickories (*Carya spp*.), sugarberry (*Celtis laevigata*), elms (*Ulmus spp*.), sycamore (*Platanus occidentalis*), cottonwoods

(*Populus spp*.), ashes (*Fraxinus profunda*), baldcypress (*Taxodium distichum*), swamp tupelo (*Nyssa sylvatica*), and black willow (*Salix nigra*).

The Loess Bluffs occur west of the Mississippi Delta to the north of Vicksburg and along the Mississippi River south from Vicksburg (Stewart 2003). Tertiary deposited sands, clays, and gravels are overlain by up to 320 m of Aeolain wind-blown loess of late Pleistocene silts. Topography is characterized by steeped-sided ravines and narrow ridges comprised of fertile, acid to non-acid brown loams. Dominant soil orders are alfisols on bluffs and upper slopes of ravines and entisols in stream bottoms and drainages. Natural forest cover is dominated by oak-hickory forests and oak-beech magnolia associations from Vicksburg southward (Stewart 2003). Due to soil productivity and water availability, approximately 67% of the Delta/Hills region is used for row crop agriculture, 1% for catfish production, and 32% for production of forest products (Mississippi Institute for Forest Inventory 2009). Major cities in the Delta/Hills region include Greenville with a population of 34,400, Vicksburg with a population of 23,856, Cleveland with a population of 12,334, and Yazoo City with a population of 11,403 (U.S. Census Bureau 2012).

Physiographic regions in north Mississippi are the North Central Hills in the northeast corner of the state, the Central Blacklands (Jackson Prairies) located west of the North Central Hills, the Tombigbee Hills located west of the Interior Flatwoods, and the Loess Bluffs located west of the Tombigbee Hills and the Pine Hills (Stewart 2003; Figure 2). The topography of the North Central Hills is characterized by ridges and valleys composed of sands and clays of Paleocene and Eocene origin. Dominant soil orders are alfisols on the west and ultisols on the east and in drainages. Natural forest

cover is primarily hardwoods, loblolly pine (*Pinus palustris*), and shortleaf pine (*Pinus echinata*).

The topography of the Central Blackland Prairies is gently undulating chalks or marls of the Selma Group of the Cretaceous period (Stewart 2003). Soil orders are mostly dark-colored alkaline vertisols and a few entisols and mollisols. The original vegetation was probably scattered trees with prairie grasses and wildflowers before oak-hickory association became dominant. Topography of the Interior Flatwoods is nearly level and consists of Porters Creek Clay (marine) of Paleocene origin. Dominant soils are acid clays, clay loams, and sandy loams. Dominant soil order is alfisols. Entisols are found in stream drainages (Stewart 2003).

The Tombigbee Hills, also known as the Tennessee River Hills, is an extension of the Fall Line Hills formed by the innermost coastal plain deposits extending across Alabama into Georgia (Stewart 2003). Topography consists of ravines and ridges of sands, clays, and gravels of the Cretaceous period. Streams are numerous. Soils are highly weathered and acidic. Dominant soil orders are very old ultisols, a few alfisols, and entisols in stream drainages. Vegetation is dominated by oak-hickory forests and mixed pine-hardwood forests (Stewart 2003). Forests comprise 60% of the land cover in north Mississippi, and agriculture comprises approximately 40% (MIFI 2008). Major cities in north Mississippi include Tupelo with a population of 34,546, Columbus with a population of 23,640, Oxford with a population of 18,916, and Grenada with a population of 13,092 (U.S. Census Bureau 2012).

Physiographic regions in south Mississippi are the Pine Hills located south of the Central Blacklands (Jackson Prairies) and east of the Loess Bluffs, the Coastal Flatwoods

located south of the Pine Hills, the North Central Hills located north of the Central Blacklands, the Central Blacklands located north-east of the Pine Hills, and the Loess Bluffs located west of the Pine Hills (Stewart 2003; Figure 2). Topography of the Pine Hills is rolling to areas of steep-sided ridges and valleys of clays, sands, and gravels of late Tertiary age. Major formations are the Catahoula Sandstone, Hattiesburg, Pascagoula, and Citronelle. Soils exhibit acidic ph levels. Soil orders are mostly ultisols with a few Alfisols. Entisols occur along stream drainages. Vegetation west of the Pearl River resembles those of the upper coastal plain with mixed hardwoods, loblolly and shortleaf pine, and loess influences from the west (Stewart 2003). East of the Pearl River is the main region of longleaf pine (*Pinus palustris*) with typical lower coastal plain forests including slash pine (*Pinus elliottii*), spruce pine (*pinus glabra*), turkey oak (*Quercus cerris*), laurel oak (*Quercus laurifolia*), red bay (*Persea borbonia*), southern magnolia (*Magnolia grandiflora*), big leaf magnolia (*Magnolia microphylla*), and gallberries (*Ilex spp.*). Topography of the Central Blacklands is rolling hills and ridges and valleys of clays, marls, and limestone of the Jackson and Vicksburg groups. Soils are acid to non-acid. Dominant vegetation includes prairies and various mixtures of pines and hardwoods (Stewart 2003).

Topography of the Coastal Flatwoods is flat with exception of a gently rising belt about 16 to 24 km wide that parallel the coast (Stewart 2003). This physiographic region consists of young deposits of clay, silt, sand, and gravel of Pleistocene and Recent age. Soils are acid with some areas of boggy soils. Soils orders are mostly ultisols with a few entisols, inceptisols, and histosols. Vegetation is similar to the southern part of the Pine Hills. Low sandy bluffs about 2 to 3 m above sea level support live oak (*Quercus*

virginiana), southern magnolia, and saw palmetto (*Serenoa repens*). Near the shore, saline and brackish marshes, pine savannas, and numerous grasses and sedges thrive (Stewart 2003). Major cities in south Mississippi included Gulfport with a population of 67,793, Hattiesburg with a population of 45,989, Biloxi with a population of 44,054, and Meridian with a population of 41,148 (U.S. Census Bureau 2012).

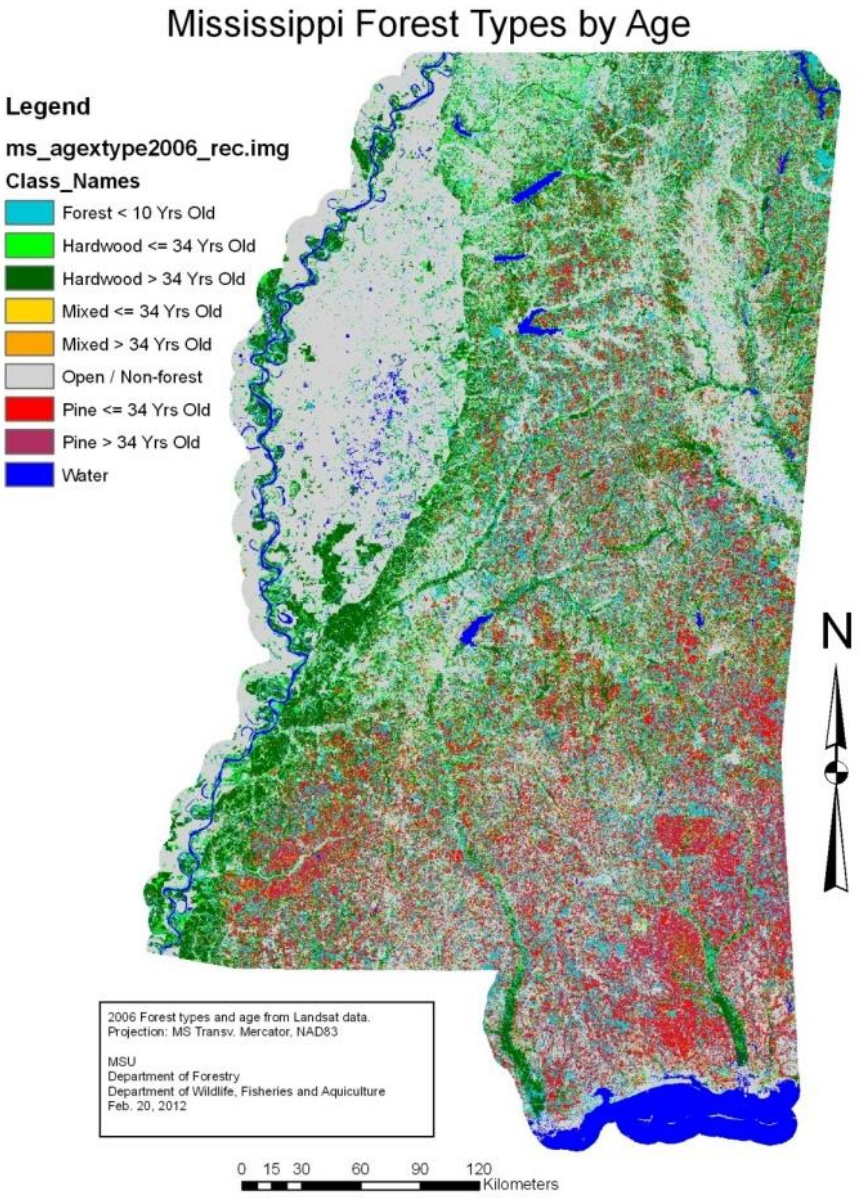

Figure 1 Forest land cover types in Mississippi in 2006 based on the Mississippi Institute for Forest Inventory database.

Forest and Wildlife Research Center, Mississippi State University and the Mississippi Forestry Commission (2006).

Physiographic Region Names

1 North Central Hills (NE corner); Tombigbee Hills
2 Blackland Prairies (Blackbelt) (NE); Central Blacklands (Jackson Prairies)
3 Interior Flatwoods
4 Pine Hills
5 Coastal Flatwoods (Coastal Pine Meadows)
6 Loess Bluffs (Brown Loam Hills)
7 Delta (Yazoo-Mississippi River Basin)

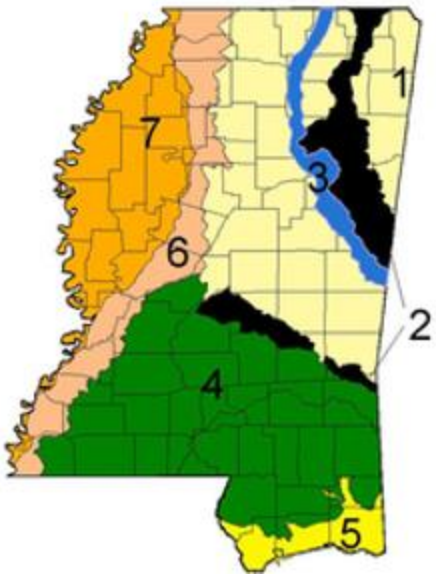

Figure 2 Physiographic regions of Mississippi (Stewart 2003)

Table 1 Cover types and land features on properties for which sales values were collected for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Cover type and land features	Cover type or feature descriptions	Metric requested
Forest cover type, early successional habitat, and forest plantations		
Natural pine forests	Unplanted pine forests	Hectares
Upland hardwood forests	Upland forests composed of hardwood trees, such as white oak, black oak, southern red oak, and hickories	Hectares
Bottomland hardwood forests	Forests composed of oak, gum, and ash in fertile soils of occasionally flooded floodplains	Hectares
Mixed pine-hardwood forests	Forests with overstory consisting of pine trees, such as shortleaf and loblolly pines and hardwood trees, such as American beech, mockernut hickory, southern red oak, and water oak	Hectares
Cutovers	Harvested forest sites ≤5 years of age	Hectares
Planted pines	Pine plantations of all age classes	Hectares
Cutover woodland forests	Harvested woodlands (<15 years of age), sapling stage trees and shrub-bramble thickets	Hectares
Agricultural and other cover type		
Row crops	Crops, such as corn, cotton, rice, or soybeans, of maintained fields	Hectares
Pasture/fallow fields	Lands suitable for grazing and fields that are untilled or unseeded for a year or more or lands plowed without being seeded	Hectares
Farm pond/stock ponds	Human-made ponds ≤8 ha and classified as farm pond or stock pond by land bank staff	Water surface area in hectares
Aquaculture ponds	Water impoundments constructed and managed for catfish production	Water surface area in hectares
Other agriculture Conservation Reserve Program (CRP) grassland	CRP and other planted grassland buffers and fields	Hectares
Permanent lakes	Human-made water bodies >8 ha	Water surface area in hectares
Natural semi-permanent water bodies	Water bodies that do not hold water year-round	Water surface area in hectares
Federal cost-share programs	CRP or Wetland Reserve Program (WRP)	Presence or absence
Rights-of-way	Right-of-way of power line, gas line, or other utility right-of-way transecting property	Hectares
Wildlife food plots	A planted area set aside as a food source for wildlife	Hectares
Onsite roads	Roads located within the boundaries of the property that were traversable by conventional on-road vehicles.	Presence or absence

Table 1 (Continued)

Cover type and land features	Definition of cover type or feature	Metric requested
Amenities and structures		
Access roads	Roads leading to property	Presence or absence
Electricity	Electricity on property	Presence or absence
Levee system	Levee on property	Presence or absence
Barn	Barn on property	Presence or absence
Storage building	Storage building on property	Presence or absence
Lodge	A building larger than a house and accommodates multiple groups	Presence or absence
House	A smaller building than a lodge which does not accommodate multiple groups	Presence or absence
Cabin	A building with few rooms and smaller than a house	Presence or absence
Potable water	Water wells or piped water on property	Presence or absence
Other amenities	Septic System and/or natural gas or propane gas on property	Presence or absence
Hunting	Perceived hunting of white-tailed deer, wild turkey, and/or waterfowl species on property	Presence or absence
Wildlife watching	Perceived watching of wildlife on property	Presence or absence
Horse riding	Presence of pasture or fallow fields with barn on property	Presence or absence
Nature-based tourism	Tourism that relies on natural attractions	Presence or absence
Game species	Perceived presence of deer, wild turkey, and/or waterfowl	Presence or absence
Onsite leases	Recreational leases existing on properties at the time of sales	Presence or absence
Proximity of property to specified feature		
Nearest highway systems	Interstate, U.S., and state highways	Kilometers
Nearest city	Nearest city ≥50,000 residents	Kilometers
Nearest public land base or recreational area	Nearest state park, state wildlife management area, national wildlife refuge, state wildlife refuge, public forest, national park/parkway, or public lake	Kilometers
Property sales information	Year of sales Region of sale Size of property Total sales value of property Bare land sales value of property[1]	 Delta/Hills, NMS, SMS Hectares Dollars Dollars

Table 2 Counties located in the three regions of Mississippi (Pettry 1977) for which property sales values were collected for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Mississippi Delta/Hills (MDH) Region 1 (n = 21)	**North Mississippi (NMS) Region 2 (n = 30)**	**South Mississippi (SMS) Region 3 (n = 30)**
DeSoto	Tate	Hinds
Bolivar	Tishomingo	Copiah
Grenada	Prentiss	Simpson
Sunflower	Union	Jasper
Leflore	Panola	Clarke
Carroll	Lafayette	Franklin
Holmes	Pontotoc	Lincoln
Humphreys	Itawamba	Lawrence
Washington	Monroe	Jefferson Davis
Sharkey	Chickasaw	Covington
Yazoo	Calhoun	Jones
Issaquena	Yalobusha	Wayne
Warren	Montgomery	Amite
Claiborne	Webster	Pike
Jefferson	Clay	Walthall
Adams	Choctaw	Marion
Wilkinson	Oktibbeha	Lamar
	Lowndes	Perry
	Attala	Greene
	Winston	Forrest
	Noxubee	Pearl River
	Madison	Stone
	Leake	George
	Neshoba	Hancock
	Kemper	Harrison
	Lee	Jackson
		Smith[1]

Methods

Data was collected on sales of rural properties that occurred during 2003-2008 in 81 of 82 Mississippi counties. Respondents in this study included professionals from land banks and appraisal companies who accomplished appraisals and property sales transactions. Eight hundred samples were collected for analysis and interpretation of

findings. The three regions of the state were used to catalog the data summary and statistical comparisons. The Mississippi Delta/Hills Region included 21 counties, and the North Mississippi (NMS) and the South Mississippi Region (SMS) included 30 counties each (Pettry 1977; Table 2).

From June 2008 through June 2009, information on properties that were purchased for or potentially purchased for outdoor recreation was obtained from the following participants: Land Bank of South Mississippi in Poplarville and Brookhaven; Mossy Oak Properties, Inc., West Point, Mississippi; Lank Bank of North Mississippi, Tupelo and Starkville, Mississippi; Rutledge Investment Company, Memphis, Tennessee. At land banks excluding Mossy Oak Properties, Inc., land sales information was transferred from the bank's database of loans onto the study questionnaire at the land bank offices with the assistance of lending personnel. In contrast, Messrs. Tom Middleton, Certified Land Specialist, with Mossy Oak at Natchez and Brad McCulley, Certified Land Specialist, with Mossy Oak at Batesville completed their surveys and mailed them to MSU.

Survey Instrument Methodology

In this study outdoor recreation was defined as a voluntary activity that occurs outdoors during leisure time for its own sake and provides a sense of reasonable competence and a feeling of self-satisfaction (Jensen and Guthrie 2006). A mail questionnaire was developed with input from MSU researchers in forestry, wildlife science, and public policy, and with assistance from Mississippi contract sales and loan officers (Appendix A). The questionnaire was designed to maximize response rates through planning and development of survey questions, according to methods described

by Dillman (2000). Survey implementation varied from Dillman's (2000) protocol, because primary respondents were professionals who provided loans to buyers of lands rather than by random sampling. Property sales information recorded by professionals with land banks was transferred during pre-scheduled appointments onto the survey form (Appendix A).

The questionnaire was divided into sections consisting of questions about property information, current land uses, wildlife and fish game species potentially present, property sales information, and presence of existing structures and recreational amenities on properties. The property information section focused on the collection of information on property locations; importance of recreation to the sale; acreage of agricultural, forested, and other lands by specific cover types contained in the tract; and cost-share assistance programs on properties. The land use section collected information about recreational uses on tracts, past leasing activities, existence of water body impoundments on tracts, and road access to properties. The game species section collected information about specific wildlife species present or perceived to be present on properties sold for recreational pursuits. The property sales information section requested pricing information on tracts sold with and without estimates factoring in recreational uses, along with relative proximity of parcels to public lands. Last, the structures and amenities section collected information about existing structures that were present on tracts purchased, mineral rights ownership, and residence information of land purchasers (Appendix A).

Data was encoded into the Statistical Program for the Social Sciences (SPSS) for analyses (IBM 2003). Data entered included property location; area and type of

agricultural land and forestland; and other land uses including water features; present land uses; road presence and access to the property; and wildlife species (i.e., deer, turkey, waterfowl) expected to be associated with land cover types on properties sold. Other property data entered included actual or potential recreation uses; sale amount without land cover and or structures/amenities (i.e., bare land); and sale amount with land cover and/or structures/amenities (e.g., water, house, camp, electricity; study questionnaire attached in Appendix A).

The Mississippi Automated Resource Information System software program was used to convert section, township, and range of each property sold to latitude and longitude (MARIS 2006). After conversion, I used the DeLorme Topo USA 7.0 software program to measure distance from each property parcel to the nearest public land designation (Delorme Topo USA 2000). Public lands included national wildlife refuges, national forests, national parks/parkways, state parks, state wildlife management areas, public lakes/reservoirs, interstate highways, and state highways. These features were listed by the Outdoor Foundation as public lands that could influence the value of rural lands (The Outdoor Foundation 2012).

Statistical Models and Analyses

Descriptive and inferential statistics were used to describe and quantify recreational attributes related to total sale value of rural properties in Mississippi during 2003-2008 (Agresti et al. 2009). When only the presence or absence of a characteristic was known, a dummy variable was created where "1" represented the presence of the variable on the property and "0" represented the absence of the variable on the property (Agresti et al. 2009). Dummy variables were created for road access to properties sold;

road presence; expected presence of white-tailed deer, wild turkey, and waterfowl species; and presence of structures and amenities.

Descriptive analyses were used to describe a number of attributes. The number of properties on which sales values were collected varied by year of property sale in Mississippi (Table 3). Natural and human-made land and water characteristics were analyzed statewide and in the three regions to determine the number of properties on which they were located. Also determined were total hectares, aerial range, mean hectares for each cover type, and percent of hectares by cover type. Number of properties on which cost-share programs (i.e., WRP, CRP) were located, total hectares, mean hectares, and percent of properties by cost-share type were determined statewide and regionally. Statewide, number of properties having structures and amenities and percent of properties with each type of structure or amenity were also determined – as were statewide and regionally, the percent of properties with perceived recreational activities and wildlife types.

Mean distance from property parcel to recreational areas of interest, major highways, and cities with a population ≥50,000 was measured. Mississippi cities in that criterion were Jackson, Gulfport, and Biloxi (The Mississippi Business Journal 2007). Also determined were statewide and regional number of properties with leased lands, total size and mean size of leased lands (ha), and mean value per ha of leased lands. Statewide and regionally, the contribution of outdoor recreation and mean value of properties within <0.8 km to >16 km of public recreational areas were determined. Residence of land buyers by state was also determined from 2003 to 2008.

Inferential Statistical Analyses

Pearson correlation (bivariate analysis) was used to determine explanatory variables statistically related to total sale value (TSV). Bivariate analysis is a Pearson correlation coefficient to determine the strength of the linear relationship between two variables that are measured on interval or ratio scales. TSV was defined as the total sale price per ha multiplied by total property size in hectares (I. A. Munn, MSU, personal communication, 2009). Bivariate analysis was also conducted between explanatory variables to determine if multicollinearity existed between variables (Winship 1999; Appendix B). Multicollinearity occurs when explanatory variables are so highly correlated with each other that regression coefficients are unreliable (Winship 1999, Research Consultation 2007).

Hedonic regression analysis was used to estimate the contribution of explanatory variables to TSV. This multivariate analysis decomposed the item being researched into its constituent characteristics and obtained estimates of the contributory value of each characteristic (Appraisal Institute 2002, Business Dictionary 2010). TSV was selected as the dependent variable for regression modeling purposes. The proposed regression model was TSV = F (Agriculture Hectares, Forest Hectares, Other Hectares, and Other Explanatory Variables). Explanatory variables that were related to TSV by bivariate analysis, land leased dummy variable, and land leased value per ha were included in the hedonic regression models to establish the relationship with TSV (I. A. Munn, personal communication, September 12, 2013).

Partial correlation coefficients (PCCs) determined by the hedonic regression models were examined to determine the linear dependence of a pair of random variables

from a collection of random variables where the influence of the remaining variables was eliminated (McKillup 2006). This analysis displayed the relative weight of influence on TSV by each explanatory variable. Analysis of Variance (ANOVA) test results were used to determine if property values and property features differed significantly by region (McClave et al. 1998; Ninglong Han, Mississippi Department of Health, personal communication, 2011). These comparisons were considered to be important due to different land use trends and bio-communities within the different physiographic regions of the state and the potential for property characteristics to vary across state regions (Pettry 1977, Jones et al. 2006).

Hypotheses

Hypotheses used to test possible relationships between features and attributes of rural properties and TSV estimates of rural lands sold for outdoor recreation were:

H_1: Rural property value will be enhanced by forest, agriculture, and other land-cover types that may provide recreational activities.

H_2: Rural property value will be enhanced by perceived recreational activities.

H_3: Rural property value will be enhanced by proximity to public lands and waters

H_4: Rural property value will be enhanced by roads located on properties and road access to properties.

H_5: Rural property value will be enhanced by existence of leased recreational lands on properties.

H_6: Rural property value will be enhanced by proximity to state and federal highways.

H_7: Rural property value will be enhanced by proximity to population centers (with ≥50,000 residents).

H_8: Rural property value will be enhanced by structures and amenities located on the properties.

H_9: The recreational contribution to rural property value will differ by region within the state where property parcels were located.

H_{10}: Rural property values will be enhanced by the perceived presence of deer, turkey, and waterfowl species on properties sold.

CHAPTER IV

LAND CHARACTERISTICS AND IMPROVEMENTS

Data on land sales values and property characteristics were collected on 800 properties sold in Mississippi from 2003-2008 (Table 3). These data were summarized to investigate property attributes and sales values related to reported recreational value on properties on a statewide basis and within three state regions: Mississippi Delta/Hills Region, North Mississippi Region, and South Mississippi Region.

Statewide Property Characteristics

The 800 properties included in this study were located within 81state counties. Land cover types were partitioned into two major categories – natural and human-made (Appendix C). Properties by number of tracts from North Mississippi comprised 46.9% of the sample; whereas, properties by number of tracts of the Delta and South Mississippi Regions comprised 34.5% and 18.6% of the samples, respectively (Table 3). Tract sizes of properties ranged from 4.1 to 4,817 ha. Forty-seven percent of properties (n = 377) were $\leq$50 ha in size; whereas, 44% (n = 355) ranged in size from >50 to 300 ha. Properties of >300 ha in size comprised 8.5% of properties (Figure 3).

Forest Cover

Forest cover types reported on properties sold statewide included natural pine forests, upland hardwood forests, bottomland hardwood forests, and mixed pine-hardwood forests. These forest cover types were recorded on 45% of the total land cover of 102,747 ha of the 800 properties (Table 4). The remaining 55% of land cover were early succession habitats and tree plantations, agriculture, and other cover types (e.g., human-constructed water bodies, food plots). Bottomland hardwoods were the most prevalent forest cover types, occurring on 131 properties and comprising 23.5% of the land cover. Mixed pine-hardwood forests occurred on 124 properties and comprised 11.1% of the total coverage. Ninety-five properties were reported to have upland hardwood forests which constituted 7.1% of the total coverage. Natural pine forests occurred on 74 properties and constituted the least coverage at 3.4%. Size of forested tracts on properties ranged from $\geq$2 ha to 4,436 ha. Bottomland hardwood forests exhibited the greatest range in size and natural pine forest exhibited the least range in size per property (Table 4). Average hectares of forest cover per property were greatest for bottomland hardwood forests with a mean coverage of 184.5 ha ($\pm$44.7). Mean coverage of other forest types were <100 ha ($\pm$14.0). One property was reported to have a wetland which was 41 ha in size.

Early Successional Habitats and Tree Plantations

Early successional (<15 years), recently harvested ($\leq$5 years), or planted forest cover types comprised 25.7% of land coverage on all properties statewide (Table 4). Cutover woodlands, which were characterized by harvested, unplanted sites with a dominance of sapling stage trees and shrub cover of <15 years of age, was the most

predominant early successional cover type reported on properties statewide. This cover type occurred on 309 properties and constituted 13% of land cover statewide. Cutover woodland cover types exhibited tract sizes ranging from 0.4 to 570 ha and averaged 43.0 ha (±4.0). Coverage of cutover tracts on these properties ranged in size from four to 216 ha and averaged 44.8 ha (±35.8; Table 4). Planted pine forests or pine plantations comprised 10.4% of land cover statewide and totaled 10,681 ha on 154 properties. Mean coverage size of pine plantations was 69.4 ha (±13.5) and reported tract sizes on properties ranged from one to 1,856 ha (Table 4). Fifty-four properties were reported to have cutover woodlands of ≤5years of age, and this cover type comprised statewide coverage of 2.3%.

Agricultural Lands

Agricultural land use on properties comprised 26.6% of land coverage statewide and included row crops, pastures and fallow fields, stock and aquaculture ponds, and planted grasslands established through federal cost-share programs (Table 4). Of the reported agricultural cover types, row crops represented the greatest percentage of agricultural coverage statewide and comprised 15.4% of total land coverage on 130 properties. Land coverage used for row crop production on properties ranged in size from two to 1,010 ha and averaged 122.0 ha (±18.2). Pastures and fallow fields were reported on 192 properties and comprised 7.0 % of land coverage. Pastures and fallow fields ranged from one to 563 ha in size and exhibited an average size per property of 37.2 ha (±4.6). Planted grasslands enrolled in cost-share programs were reported on 65 properties, comprised 2.7% coverage on properties statewide, and ranged in size from two to 237 ha with a mean coverage of 42.5 ha (±5.5). Aquaculture and farm/stock

ponds represented <2.0 % of land coverage and occurred on 38 properties. Surface area hectares of aquaculture ponds ranged from two to 268 ha; whereas, surface coverage of stock or farm ponds on properties were typically ≤8 ha (Table 4).

Other Property Features

Other features reported statewide included wildlife food plots, permanent lakes and human-made ponds, SMZs, and utility rights-of-way (Table 4). Wildlife food plots were reported on 25 properties and comprised 0.2% of coverage on all properties. Food plots exhibited a range of one to 43 ha with an average coverage of 9.8 ha (±2.0). Permanent lakes and human-made ponds were reported on 44 properties, ranged in size from <1 to 27 ha, and comprised 0.2 % of property coverage collectively. SMZs were reported on 12 properties and constituted 0.1% of land coverage statewide. Utility rights-of-way were reported on two properties and ranged in size from two to eight ha (Table 4).

Land Cover and Features in Three Regions of Mississippi

Mississippi Delta/Hills Region

On the 276 properties of the Mississippi Delta/Hills Region, forests constituted the greatest amount of land coverage at 57.1%, followed by agricultural land at 27.3%. Early succession habitats and planted tree plantations occurred on 12.8%. Other features, such as onsite roads, wildlife food plots, stream-side management zones (SMZs), and human-constructed ponds and lakes comprised approximately 3% (Table 5). Bottomland hardwood forests constituted the greatest percentage of land cover at 37.4 %. Bottomland hardwoods occurred on 106 properties and tract sizes averaged 218.6 ha (±55.6) with a range of six to 4,436 ha. Mixed pine-hardwood forests comprised 9.9% of

regional coverage and occurred on 35 properties with an average tract size of 177.4 ha (±40.1) and a range of eight to 1,199 ha. Upland hardwood forests were reported on 52 properties and constituted 6.6% coverage. These forests occurred in the Loess Bluffs physiographic region near the Delta and near the Mississippi River south of Vicksburg. Tract sizes averaged 78.5 ha (±12.3) and exhibited ranges of five to 405 ha. Natural pine forests were found primarily in the Loess Bluffs and border counties, occurred on 29 properties, comprised 3% of land coverage, and averaged 65.9 ha (±27.5) (Table 5).

The most prevalent cover type of early successional forest habitat in the Delta/Hills Region was cutover woodlands that had not been replanted to trees. Occurring on 69 properties, this cover type comprised 7.4% coverage with tract sizes per property ranging from one to 531 ha and averaging 67.0 ha (±10.8). Pine plantations comprised 4.6% of land cover on 33 properties, ranged from five to 602 ha, and averaged 86.1 ha (±21.9). Cutover forests (≤5 years of age) occurred on 4 properties, comprised <1% of land coverage, ranged from 49 to 217 ha, and averaged 121.2 ha (± 36.5; Table 5).

In the Delta/Hills Region, row crops were reported on 86 properties and comprised 21.9% of land cover. Row crops averaged 158 ha (±26.5) on properties and ranged from four to 1,010 ha (Table 5). Other agricultural land uses comprised <3.3% coverage. The greatest number of properties (n = 44) were reported to have CRP planted grasslands; whereas, 21 properties had pastures and fallow fields. Stock ponds and aquaculture ponds were reported on four and 11 properties, respectively (Table 5).

Onsite roads were reported on 99 properties in the Mississippi Delta/Hills Region with coverage averaging 14.5 ha (±4.1) and ranging in size from <1 to 381 ha. The large

number in the range of hectares of onsite roads was due to a large outlier. Wildlife food plots were reported on 13 properties. Land surface retained in food plots ranged from one to 43 ha with a mean of 12.5 ha (±3.5). Other features, including SMZs, rights-of-way, and surface water of human-made water bodies and permanent lakes, comprised 0.3% coverage (Table 5).

North Mississippi Region

Composition of land cover on 375 properties in the North Mississippi Region included forests at 23.9%, early successional habitats and pine plantations at 43.3%, agriculture lands at 30.3%, and other features at 2.6% (Table 5). The most common forest type on properties sold was mixed pine-hardwood. This cover type occurred on 55 properties, exhibited a regional coverage of 10.9%, and averaged 51.6 ha (±9.5). Upland hardwoods were the next most prevalent forest type with a regional coverage of 5.6% on 33 properties. This cover type ranged from four to 155 ha and averaged 43.8 ha (±6.3). Natural pine forests were reported on 35 properties, exhibited a regional coverage of 4.8%, and averaged 36.0 ha (±26.0). Bottomland hardwood forests were reported on 15 properties, comprised 2.6% coverage, and exhibited an average size per property of 46.0 ha (±10.9; Table 5).

Of the early successional habitat and pine plantation cover types in the North Mississippi Region, cutover woodlands were the most prevalent at 25.4% coverage on 192 properties. The size per property of this cover type averaged 34.1 ha (±3.9) and ranged from one to 407 ha. Pine plantations were the next most prevalent with a regional coverage of 14.1%. Occurring on 85 properties, average size reported for pine

plantations was 42.6 ha (±4.1) with a range of four to 166 ha. Cutover forests of <5 years of age comprised 3.8% coverage and averaged 33.6 ha (±5.2) on 29 properties (Table 5).

In the North Mississippi Region, pastures and fallow fields were the most prevalent type of agricultural land use comprising 16.5% coverage. This cover type occurred on 118 properties, ranged in size from <1 to 311 ha, and averaged 36.1 ha (±4.8). Fields with row crops comprised 7.8% coverage on 41 properties, ranged from two to 202 ha, and averaged 48.9 ha (±8.9). Planted grasslands were reported on 20 properties, comprised 5.0% coverage, and ranged from 24 to 126 ha with an average of 64.9 ha (±7.7). Other agricultural land uses included stock and aquaculture ponds which occurred on 12 and 8 properties, respectively. Stock ponds were typically <6 ha size with a mean of 3.1 ha (±0.6); whereas, surface area of aquaculture ponds ranged from two to 95 ha with a mean of 25.6 ha (±10.5; Table 5).

Of other features reported on North Mississippi properties, road coverage comprised the greatest coverage at 1.7% with onsite roads averaging 3.8 ha (± 0.5) on 116 properties. Surface area of water bodies comprised 0.5% coverage with lakes and human-constructed water bodies being reported on 11 and five properties, respectively. SMZs averaged 5.3 ha (±0.7) on four properties (Table 5).

South Mississippi Region

Composition of land cover on 149 properties of the South Mississippi Region equaled 32.1% in forests, 49.5% in early successional habitats and pine plantations, 16.5% in agricultural use, and 2.0% in other features (Table 5). Mixed pine-hardwood forests and upland hardwood forests were the two most prevalent natural forest cover types comprising 16.2% and 12.1%, respectively. Mixed pine-hardwood forests and

upland hardwood forests were reported on 34 and 10 properties, respectively. Average size was 70.5 ha (±15.9) for mixed pine-hardwood forests and 179.6 ha (±100.5) for upland hardwood forests. Ranges on properties were variable with tract sizes of upland hardwood forest ranging from 10 to 1,042 ha. Natural pine and bottomland hardwood forests were reported on 10 properties and averaged 29.7 ha (±8.7) and 27.3 ha (±8.9), respectively (Table 5).

Within the early successional habitats and forest plantations category, pine plantations covered the greatest amount of the land surface on 36 properties of the South Mississippi Region and comprised 28.5%. Pine plantations ranged from one to 1,856 ha and averaged 117.3 ha (±52.9). Cutovers and cutover woodlands comprised 6.1% and 14.9% of land coverage, respectively. Cutover woodlands were reported on 48 properties and ranged from one to 570 ha with an average of 46.2 ha (±13.5). Cutover lands were reported on 21 properties and ranged from eight to 162 ha with an average of 43.2 ha (± 9.5) (Table 5).

Pastures and fallow fields were the predominant agricultural lands in the South Mississippi Region and were reported on 53 properties. This cover type comprised 15.2% coverage regionally, ranged from one to 563 ha, and averaged 42.6 ha (±11.7). Row crops were reported on three properties and comprised 1.2% coverage. Row crops ranged from four to 142 ha and averaged 56.8 ha (±43.4). Other agricultural cover types, such as stock ponds and planted grasslands comprised <0.2% coverage and were reported on ≤3 properties (Table 5). Onsite roads occurred on 39 properties and comprised 1.3% coverage for the South Mississippi Region. Onsite road coverage on properties ranged from <1 to 76 ha and averaged 5.1 ha (±2.0). Wildlife food plots, surface coverage of

lakes and water bodies, and rights of way comprised <0.5% coverage and typically were reported for <5 properties. SMZs were reported on four properties and comprised 0.3% coverage.

Regional Comparisons of Cover Types and Selected Property Features

Forest Cover

Of four forest cover types reported on properties, three cover types exhibited significant differences in coverage between regions, and one cover type, natural pine forests, did not ($F_{2, 797} = 2.0$, $P = 0.202$). Coverage of bottomland hardwood forests differed significantly between the Mississippi Delta/Hills Region and the North and South Mississippi Regions ($F_{2, 797} = 13.7$, $P = 0.000$; Tables 5 and 34). Coverage of upland hardwood forests differed significantly between the Mississippi Delta/Hills Region and the South Mississippi Region and between the North Mississippi and the South Mississippi Regions ($F_{2, 797} = 4.3$, $P = 0.014$; Tables 5 and 35). Mixed pine-hardwood forests differed significantly between the Mississippi Delta/Hills Region and the South Mississippi Region and between the North and South Mississippi Regions ($F_{2, 797} = 4.0$, $P = 0.018$; Tables 5 and 36). Natural pine coverage was not significantly different between state regions ($F_{2, 797} = 2.0$, $P = 0.202$; Tables 5 and 37).

Area of cutover woodlands constituted the greatest coverage of early successional habitat types in the three regions and did not differ significantly between them ($F_{2, 797} = 0.15$, $P = 0.863$). Number of hectares of cutover habitat of <5 years of age differed significantly between the Mississippi Delta/Hills Region and the North Mississippi Region and between the North Mississippi and South Mississippi Regions with the South Mississippi Region exhibiting the greatest percent coverage of woodland cutovers ($F_{2, 797}$

= 4.0, $P = 0.021$). Coverage of planted pines differed significantly between the Mississippi Delta/Hills Region and the North and South Mississippi Regions, and the greatest number of hectares of this cover type was reported for properties in the South Mississippi Region ($F_{2, 797} = 3.0$, $P = 0.0.032$; Tables 5 and 38).

Agricultural Lands

Agricultural land use on properties was variable across the three regions. Land area used for row crop production differed significantly between the Mississippi Delta/Hills Region and the North and South Mississippi Regions with coverage of row crops being greatest in the Mississippi Delta ($F_{2, 797} = 22$, $P = 0.000$; Tables 5 and 39). Amount of land retained in pastures and fallow fields also differed significantly among state regions with properties of the North Mississippi Region exhibiting the greatest amount of this habitat type ($F_{2, 797} = 9.0$, $P = 0.000$; Tables 5 and 40).

Although number of properties with stock and farm ponds varied on properties of the three regions, size or surface coverage did not differ significantly between regions ($F_{2, 797} = 1.0$, $P = 0.350$; Tables 5 and 41). Coverage of aquaculture ponds differed significantly between the Mississippi Delta/Hills Region and the North and South Mississippi Regions with the Mississippi Delta/Hills Region exhibiting the greatest percent coverage in aquaculture ponds ($F_{2, 797} = 7.0$, $P = 0.001$; Tables 5 and 42).

Cost-Share Program Lands

Statewide, 11,053.04 ha of land were enrolled in cost-share practices sponsored by the CRP and/or WRP. CRP enrollment (n = 152) comprised 6,384 ha while averaging 42.11 (±3.24). WRP enrollment (n = 41) comprised 4,669.75 ha averaging 113.77

(±22.67). Twelve properties in the Mississippi Delta/Hills Region had both WRP and CRP enrollment. In the Delta, WRP enrollment (n = 37) was 4,401.62 ha averaging 119.03 (±24.70) and CRP enrollment (n = 90) was 3,358 ha averaging 37.25 (±4.45). In the North Mississippi Region, CRP enrollment (n = 53) encompassed 2,757.50 ha averaging 52.23 (±5.26) and WRP enrollment (n = 3) encompassed 222.70 ha averaging 74.09 (±48.58). In the South Mississippi Region, CRP enrollment (n = 9) comprised 268.83 ha averaging 29.96 (± 9.72) and WRP enrollment (n = 1) comprised 44.53 ha.

Amenities – Structures and Utilities

A total of 330 properties statewide were reported to have buildings, utilities or other amenities present at the time of property sales. Thirty-one properties exhibited the presence of housing, such as a cabin, house, or lodge plus utilities (accessible piped water, electricity, and sewage) and outbuildings (Figure 3). Whereas, the existence of housing without complete utilities and outbuilding set-up occurred on 149 properties. Piped or well water was available on 238 properties with piped water being more frequently recorded than water wells. Other amenities, such as septic and sewage systems, natural gas, and propane storage were present on 81 properties. Barns and other outbuildings were reported on 180 properties. No structural or utility amenities were reported on 480 properties (Table 7, Figure 3).

Recreational Activities

Statewide, hunting was perceived to be an outdoor activity associated with purchased properties on 99% of the 800 properties (n = 790; Table 8). Horseback riding

was associated with 24% of the 800 properties. Wildlife watching was anticipated on 43 properties (5%), and nature-based tourism was planned on 7 properties. When evaluated by region, hunting was the primary recreational use associated with property sales at 96% and 99% of the properties in the South Mississippi and Mississippi Delta/Hills Regions, respectively. Hunting was expected to be conducted on all properties sold in the North Mississippi Region. Other uses, including horseback riding and wildlife watching, were anticipated on <15% of properties in each of the regions (Table 8). The 1% of properties sold in the Mississippi Delta/Hills Region that was not purchased for hunting was purchased for agricultural purposes for income; whereas, the 4% of properties sold in the South Mississippi Region were purchased for forestry and/or agricultural uses.

Statewide and regionally, deer were expected to be the primary species of wildlife hunted (Table 9). Statewide, deer were expected to be hunted on 95% of the properties purchased (n = 757), followed by turkey on 85% (n = 683), and waterfowl on 20% (n = 159). In the Mississippi Delta/Hills Region, deer were expected to be hunted on 95% of the properties, and hunting of turkeys and waterfowl was reported to be at 82% and 45%, respectively. In the North Mississippi Region, deer was expected to be hunted on 97% of properties; whereas, pursuit of turkeys was anticipated on 92%. Hunting of waterfowl was anticipated on <10% of properties in the South and North Mississippi Regions, but was expected on 45% of Delta properties. Deer hunting was a targeted use on 88% of properties in the South Mississippi Region, and turkey hunting was anticipated on 75% (Table 9).

Proximity Measurements to Special Features

Statewide, 589 properties included database information that allowed the estimation of distance from property parcels sold to special features. These features included highways, public recreational areas, and cities (Table 10). The mean distance (km) from property parcels sold to national park/parkways was 39 (±0.9), followed by national wildlife refuges 30 (±0.8), national forests 23 (±0.7), state parks 18 (±0.5), state wildlife management areas 17 (±0.5), and public lakes 17 (±2.0; Table 10).

Lease Holdings on Properties

Of the 800 properties sold, 111 had tracts that were leased for recreation (Table 11). Statewide, the mean number of ha of tracts leased was 73 (±9.5) valued at $50.99 (±2.46) per ha. The number of hectares ranged from 5 to 928. In the Mississippi Delta Hills Region, the mean number of tracts leased was 87 (±15.3), valued at $53.18 (±3.41) per ha, and ranged from 6 to 928 ha. Only one tract was leased in the South Mississippi Region. It consisted of 41 ha valued at $37.05 per ha. In the NMS Region (n = 48), the mean number of tracts leased was 57 (±9.2) valued at $48.41 (±$3.85). Cover types on tracts leased for recreation were bottomland hardwood forests, cutover woodland forests, WRP and CRP enrollments, and food plots (Table 11). Lease values per ha were not statistically different between regions ($F_{2, 104} = 0.685$, $P = 0.507$; Table 52).

Statewide Property Features and Characteristics

Vehicle Access to Properties and Onsite Roads

Roads leading to properties that allowed access by conventional cars or trucks were reported for 86% (n = 689) of properties statewide. Percentages of properties within

regions that had access roads were similar to the statewide average with a range of 85% of properties (n = 127) in the South Mississippi Region to 87% (n = 325) in the North Mississippi Region.

Of the 800 properties sold statewide, 254 properties were transected by improved dirt, gravel, or paved roads which allowed vehicle access and travel within the property's boundary. Statewide, this type of onsite road coverage ranged from <1 to 381 ha and averaged 8.2 ha (±1.7) per property (Table 4). In the Delta/Hills Region, 99 properties exhibited onsite roads; whereas, onsite roads were present on 116 properties in the North Mississippi Region and 39 properties in the South Mississippi Region (Table 5). Road coverage on properties differed significantly between the Delta/Hills Region and North and South Mississippi Regions with properties of the Delta/Hills Region exhibiting the greatest mean coverage (14.5 ha [±4.1]; $F_{2, 797} = 6.1$, $P = 0.002$; Tables 5 and 43).

Residence of Land Tract Buyers

Information on residency of property buyers was provided by land bank staff for 111 buyers of the 800 properties sold during the study period. Of these, 79% were from Mississippi, 14% from Louisiana, 3% from Alabama and Tennessee each, and 1% from Georgia. Tennessee and Alabama buyers purchased land in the North Mississippi Region; whereas, a greater number of buyers from Louisiana and Georgia purchased land in the Mississippi Delta/Hills Region. One buyer from Louisiana purchased one property in the South Mississippi Region (Table 12).

Table 3 Number of properties in Mississippi for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales during 2003-2008.

Number of Properties with Sales Information

Year	Delta/Hills Region (n)	North Mississippi Region (n)	South Mississippi Region (n)	Statewide (n)
2003	17	26	13	56
2004	20	38	32	90
2005	44	82	26	152
2006	92	72	42	206
2007	78	90	30	198
2008	25	67	6	98
Totals	276	375	149	800

Table 4 Summary of statewide land cover types and land feature metrics within Mississippi for estimation of recreational value contributions on total sale value of rural lands in Mississippi during 2003-2008.

Cover types and land features	Total properties[1] (n)	Total hectares (ha)	Areal range (ha)	Mean hectares (±SE)	Hectares per cover type (%)
Mississippi statewide (n = 800)					
Forests and wetlands					
Natural pine forests	74	3,452	3 – 698	46.5 (±10.9)	3.4
Upland hardwood forests	95	7,329	4 – 1,042	77.1 (±12.9)	7.1
Bottomland hardwood forests	131	24,171	2 – 4,436	184.5 (±44.7)	23.5
Mixed pine-hardwood forests	124	11,405	3 – 1,199	91.9 (±13.7)	11.1
Wetland	1	41	0	41	0.04
Total hectares and percent composition		46,398			45.1
Early succession habitats and tree plantations					
Cutovers (≤ 5 years old)	54	2,367	4-216	44.8 (±35.8)	2.3
Planted pine forests	154	10,681	1-1,856	69.4 (±13.5)	10.4
Cutover woodlands (≤15 years old; sapling-thicket)[2]	309	13,384	< 1 – 570	43.0 (±4.0)	13.0
Total hectares and percent composition		26,432			25.7
Agricultural lands					
Row crops	130	15,804	2 – 1,010	122.0 (±18.2)	15.4
Pastures/fallow fields	192	7,143	1 – 563	37.2 (±4.6)	7.0
Farm ponds/stock ponds	19	57	1 – 8	3.0 (±0.5)	0.1
Aquaculture ponds	19	1,442	2 – 268	75.9 (±15.2)	1.4
Planted grasslands (Conservation Reserve Program)	65	2,765	2 – 237	42.5 (±5.5)	2.7
Total hectares and percent composition		27,211			26.6
Other features					
Improved dirt, gravel, or paved roads	254	2,081	< 1 – 381	8.2 (±1.7)	2.0
Wildlife food plots	25	246	1 – 43	9.8 (±2.0)	0.2
Surface area of permanent lakes	11	125	2 – 27	11.4 (±2.1)	0.1
Surface area of human-made ponds[3]	33	129	< 1 – 12	3.7 (±0.5)	0.1
Streamside management zones	12	116	2 – 44	9.9 (±3.4)	0.1
Rights-of-ways transecting property	2	9	2 – 8	4.3 (±3.0)	0.01
Total hectares and percent composition		2706			2.5
Total hectares and percent coverage statewide		102,747			99.9

[1]Includes properties from 81 counties in Mississippi

[2]Cut over lands comprised of mixed sapling stage and shrub cover primarily comprised of non-merchantable size classes of mixed hardwood and pine trees. Some property woodlands had been managed with prescribed fire. Most exhibited an interspersion dominance of woody shrub and vine cover, such as blackberry (*Rubus spp.*) with sapling and pre-commercial size trees (M.C. Elliott, personal communication, June 2, 2008).

[3]Includes surface area of human-made impoundments excluding permanent lakes, farm ponds/stock ponds, and aquaculture impoundments

Table 5 Summary of land cover types and land feature metrics on properties purchased within the three regions of Mississippi for estimation of recreational value contributions on total sale value of rural lands in Mississippi during 2003-2008.

Cover types and land features	Total properties (n)	Total hectares (ha)	Areal range (ha)	Mean no. hectares (±SE)	Hectares per cover type (%)
Mississippi Delta/Hills Region[1] (n = 276)					
Forests and wetlands					
Natural pine forests	29	1,913	3 - 698	65.9 (±27.5)	3.1
Upland hardwood forests	52	4,084	5 – 405	78.5 (±12.3)	6.6
Bottomland hardwood forests	106	23,216	6 – 4,436	218.6 (±55.6)	37.4
Mixed pine-hardwood forests	35	6,209	8 – 1,199	177.4 (±40.1)	9.9
Wetland	1	41	0	41.0	0.04
Total hectares and percentage of forests and wetlands	-	35,463	-	-	57.0
Early succession habitats and tree plantations					
Cutover forests (≤ 5 years)	4	485	49 – 217	121.2 (±36.5)	0.8
Planted pine forests	33	2,834	5 – 602	86.1 (±21.9)	4.6
Cutover woodland forests[2]	69	4,625	1 - 531	67.0 (±10.8)	7.4
Total hectares and percentage of early succession habitats and tree plantations	-	7,944	-	-	12.8
Agricultural lands					
Row crops	86	13,621	4 – 1,010	158.1 (±26.5)	21.9
Pastures/fallow fields	21	649	3 – 227	30.2 (±10.8)	1.0
Farm ponds/stock ponds	4	14	< 1 – 8	3.5 (±1.9)	0.02
Aquaculture ponds	11	1,238	32 – 268	113.0 (±18.5)	2.0
Planted grasslands (Conservation Reserve Program)	44	1,459	2 – 237	33.2 (±6.8)	2.4
Total hectares and percentage of agricultural lands	-	16,981	-	-	27.3
Other features					
Improved dirt, gravel, or paved roads	99	1,439	< 1 – 381	14.5 (±4.1)	2.3
Wildlife food plots	13	162	1 – 43	12.5 (±3.5)	0.3
Surface area of permanent lakes	4	41	2 – 27	10.1(±5.9)	0.1
Surface area of human-made water bodies[3]	13	42	<1- 6	3.2 (±0.6)	0.1
Streamside management zones	4	55	2 – 44	13.7 (±10.3)	0.1
Rights-of-way	1	1	0	1	0.002
Total hectares and percentage of other features	-	1,740	-		2.9
Total hectares and percent composition of all cover and feature types	-	62,128	-		100.0
North Mississippi Region[4] (n = 375)					
Forests and wetlands					
Natural pine forests	35	1,241	5 – 179	36.0 (±26.0)	4.8
Upland hardwood forests	33	1,446	4 – 155	43.8 (±6.3)	5.6
Bottomland hardwood forests	15	682	7 – 168	46.0 (±10.9)	2.6
Mixed pine-hardwood forests	55	2,800	3 – 472	51.6 (±9.5)	10.9
Total hectares and percentage of forests and wetlands	-	6,169	-	-	23.9
Early successional habitats and tree plantations					
Cutover forests (≤ 5 years)	29	974	4 – 97	33.6 (±5.2)	3.8
Planted pine forests	85	3,624	4 – 166	42.6 (±4.1)	14.1
Cutover woodland forests	192	6,541	1 – 407	34.1(±3.9)	25.4
Total hectares and percentages of early succession habitats and tree plantations	-	11,139	-	-	43.3

Table 5 (Continued)

Cover types and land features	Total properties (n)	Total hectares (ha)	Areal range (ha)	Mean no. hectares (±SE)	Hectares per cover type (%)
North Mississippi Region					
Agricultural lands					
Row crops	41	2,013	2 – 202	48.9 (±8.9)	7.8
Pastures/fallow fields	118	4,239	< 1 – 311	36.1 (±4.8)	16.5
Farm ponds/stock ponds	12	38	< 1 – 6	3.1 (±0.6)	0.2
Aquaculture ponds	8	205	2 – 95	25.6 (±10.5)	0.8
Planted grasslands (Conservation Reserve Program)	20	1,299	24 - 126	64.9 (±7.7)	5.0
Total hectares and percentage of agricultural lands	-	7,794	-	-	30.3
Other features					
Improved dirt, gravel, or paved roads	116	445	< 1 – 31	3.8 (±0.5)	1.7
Wildlife food plots	11	74	1 – 23	6.6 (±2.0)	0.3
Surface area of permanent lakes	5	60	8 – 19	12.1 (±2.0)	0.2
Surface area of human-made water bodies	19	83	< 1 – 12	4.4 (±0.6)	0.3
Streamside management zones	4	21	4 – 7	5.3 (±0.7)	0.1
Total hectares and percentage of other features	-	683	-	-	2.6
Total hectares and percent composition of all cover and feature types	-	25,785	-	-	100.1
South Mississippi Region[5] (n = 149)					
Forests and wetlands					
Natural pine forests	10	297	4 – 79	29.7 (±8.7)	2.0
Upland hardwood forests	10	1,797	10 – 1,042	179.6 (±100.5)	12.1
Bottomland hardwood forests	10	273	2 – 98	27.3 (±8.9)	1.8
Mixed pine-hardwood forests	34	2,396	5 - 462	70.5 (±15.9)	16.2
Total hectares and percentage of forests and wetlands	-	4,763	-	-	32.1
Early successional habitat and tree plantations					
Cutover forests (≤ 5 years)	21	908	8 – 162	43.2 (±9.5)	6.1
Planted pine forests	36	4,222	1 – 1,856	117.3 (±52.9)	28.5
Cutover woodland forests	48	2,218	1 – 570	46.2 (±13.5)	14.9
Total hectares and percentage of early succession habitats and tree plantations	-	7,348	-	-	49.5
Agricultural lands					
Row crops	3	171	4 – 142	56.8 (±43.4)	1.2
Pastures/fallow fields	53	2,258	1 – 563	42.6 (±11.7)	15.2
Farm/stock ponds	3	5	1 – 2	1.5 (±0.4)	0.03
Aquaculture ponds	0	0	0	0	0.0
CRP grasslands	1	7	0	7	0.05
Total hectares and percentage of agricultural lands	-	2,441	-	-	16.5

Table 5 (Continued)

Cover types and land use	Total properties (n)	Total hectares (ha)	Areal range (ha)	Mean no. hectares (±SE)	Hectares per cover type (%)
South Mississippi Region					
Other features					
Improved dirt, gravel, or paved roads	39	197	< 1 – 76	5.1 (±2.0)	1.3
Wildlife food plots	1	10	0	10	0.1
Surface area of permanent lakes	2	24	0	12 (±0.0)	0.2
Surface area of human-made water bodies	1	4	0	4	0.03
Streamside management zones	4	40	5 – 15	10 (±2.3)	0.3
Rights-of-way	1	7	0	7	0.1
Total hectares and percentage of other features		282	-	-	2.0
Total hectares and percent composition of all cover types and features		14,840	-	-	100.1

[1]Includes properties in DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson Counties.
[2]Cut over lands comprised of mixed sapling stage and shrub cover primarily comprised of non-merchantable size classes of mixed hardwood and pine trees. Some property woodlands had been managed with prescribed fire. Most exhibited an interspersion dominance of woody shrub and vine cover, such as blackberry (*Rubus spp.*) with sapling and pre-commercial size trees (M.C. Elliott, personal communication, June 2, 2008).
[3]Includes surface area of human-made impoundments excluding permanent lakes, farm ponds/stock ponds, and aquaculture impoundments.
[4]Includes properties in Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee Counties.
[5]Includes properties in Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson Counties.

Table 6 Summary of WRP and CRP enrollment on properties sold within Mississippi and the three regions of the state for estimation of recreational value contributions to total sale value of rural lands sold in Mississippi during 2003-2008.

WRP[1] and CRP[2] enrollment	**Total (ha)**	**Mean (ha, SE)**	**WRP and CRP enrollment (n = 193) (%)**
Mississippi Delta/Hills Region enrollment with WRP[1]and CRP[2]			
WRP[1] enrollment (n = 37)	4,401.62	119.03 (±24.70)	90.2
CRP [2] enrollment (n = 90)	3,358.00	37.25 (±4.45)	59.2
North Mississippi Region[4] enrollment (n = 57)			
WRP[1] enrollment (n = 3)	222.70	74.09 (±48.58)	7.3
CRP[2] enrollment (n = 53)	2,757.50	52.23 (±5.26)	34.9
South Mississippi Region[5] enrollment (n = 10)			
WRP[1] enrollment (n = 1)	44.53	44.53	2.4
CRP[2] enrollment (n = 9)	268.83	29.96 (±9.72)	5.9
Enrollment in cost-share programs statewide (n = 193)			
WRP[1] enrollment (n = 41)	4,668.85	113.77 (±22.67)	21.2
CRP[2] enrollment (n = 152)	6,384.33	42.11 (±3.24)	78.8
Total hectares enrolled in cost-share programs	11,053.18		100

[1]Wetland Reserve Program
[2]Conservation Reserve Program
[3] Counties in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[4] Counties included in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[5] Counties included in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson

Table 7 Properties and associated percentages that exhibited structures and amenities on statewide land tracts purchased for outdoor recreation in Mississippi for estimation of recreational value contribution on rural lands sales during 2003-2008.

Structure/amenity	**Total number of properties[1] (n)**	**Properties with specified attribute (%)**
House	103	11.8
Lodge	11	1.3
Cabin	52	5.9
Barn	44	5.0
Storage building	41	4.7
Piped water	184	21.0
Well water	59	6.7
Electricity	266	30.3
Other amenity	117	13.3
Total	877	100

[1]Some properties had more than one structure/amenity.

Table 8 Activities perceived to be conducted on properties purchased for outdoor recreation within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Perceived recreational activities	**Statewide properties** (%), (n)	**Properties in the Mississippi Delta/Hills Region**[1] (%), (n)	**Properties in the North Mississippi Region**[2] (%), (n)	**Properties in the South Mississippi Region**[3] (%), (n)
Hunting	99 (790)	99 (274)	100 (373)	96 (143)
Wildlife watching	5 (43)	9 (25)	4 (14)	3 (4)
Horseback riding	24 (192)	8 (21)	31 (118)	36 (53)
Nature-based tourism[4]	2 (7)	1 (4)	1 (2)	3 (1)

[1] Counties included in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[2] Counties included in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[3] Counties located in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson.
[4] Includes camping, picnicking, hiking, swimming, and non-motorized boating

Table 9 Percent of wildlife perceived to be on properties purchased for outdoor recreation within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales during 2003-2008.

Perceived wildlife	Statewide properties (%), (n)	Properties in the Mississippi Delta/Hills Region1 (%), (n)	Properties in the North Mississippi Region2 (%), (n)	Properties in the South Mississippi Region3 (%), (n)
Deer	95 (757)	95 (263)	97 (363)	88 (131)
Turkey	85 (683)	82 (226)	92 (346)	75 (111)
Waterfowl	20 (159)	45 (123)	6 (21)	10 (15)

[1]Counties in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.

[2] Counties in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.

[3] Counties in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson.

Table 10 Mean proximity measurements (km) from property parcels sold to nearest features of interest within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales during 2003-2008.

Proximity measurements from statewide and regional property parcels to feature of interest	Mean km (SE)
Statewide (n = 589)	
Interstate	26 (±0.8)
State highway	5 (±0.1)
National wildlife refuge	30 (±0.8)
National forest	23 (±0.7)
National park/parkway	39 (±0.9)
State park	18 (±0.5)
State wildlife management area	17 (±0.5)
Public lake	17 (±2.0)
City with a population ≥50,000	54 (±0.6)
Mississippi Delta/Hills Region (n = 193)[1]	
Interstate	29 (±1.0)
State highway	4 (±0.3)
National wildlife refuge	19 (±1.0)
National forest	32 (±1.5)
National park/parkway	50 (±1.2)
State park	23 (±1.1)
State wildlife management area	21 (±0.9)
Public lake	13 (±0.5)
City with a population ≥50,000	60 (±0.6)
North Mississippi Region (n = 270)[2]	
Interstate	29 (±1.0)
State highway	3 (±0.2)
National wildlife refuge	34 (±1.0)
National forest	21 (±0.8)
National park/parkway	31 (±1.3)
State park	14 (±0.6)
State wildlife management area	15 (±0.6)
Public lake	15 (±0.6)
City with a population ≥50,000	59 (±0.7)
South Mississippi Region (n = 126)[3]	
Interstate	17 (±1.0)
State highway	3 (±0.2)
National wildlife refuge	40 (±1.6)
National forest	14 (±1.0)
National park/parkway	40 (±1.5)
State park	18 (±0.7)
State wildlife management area	13 (±0.9)
Public lake	16 (±0.7)
City with a population ≥50,000	35 (±1.4)

[1]Counties in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[2] Counties in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[3] Counties in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson.

Table 11 Characteristics of land leased for hunting within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Land leased for hunting	Aerial size and mean value of lands leased for hunting			
	Sum	Mean ha	Mean $ per ha	Range in ha
Statewide (n = 111)				
Total	8,099	73 (±9.5)	50.99 (±2.46)	5-928
Mississippi Delta/Hills Region[1] (n = 62)				
Total	5,361	87 (±15.3)	53.18 (±3.41)	6-928
North Mississippi Region[2] (n = 48)				
Total	2,737	57 (±9.16)	48.41 (±3.85)	5-320
South Mississippi Region[3] (n = 1)				
Total	41	41.0	37.05	

[1] Counties in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[2] Counties in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[3] Counties in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson.
[4] No data reported

Table 12 Residences of rural land buyers of recreational lands for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural land sales during 2003-2008.

State residence	Buyers of rural lands in Mississippi (%), (n)	Buyers of rural lands in the Mississippi Delta/Hills Region[1] (%), (n)	Buyers of rural lands in the North Mississippi Region[2] (%), (n)	Buyers of rural lands in the South Mississippi Region[3] (%), (n)
Mississippi	79% (88)	62% (26)	91% (60)	67% (2)
Georgia	1% (2)	5% (2)	0	0
Tennessee	3% (3)	0	5% (3)	0
Alabama	3% (3)	0	5% (3)	0
Louisiana	14% (15)	33% (14)	0	33% (1)

[1]Counties in the Mississippi Delta/Hills Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[2]Counties in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[3]Counties in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson.

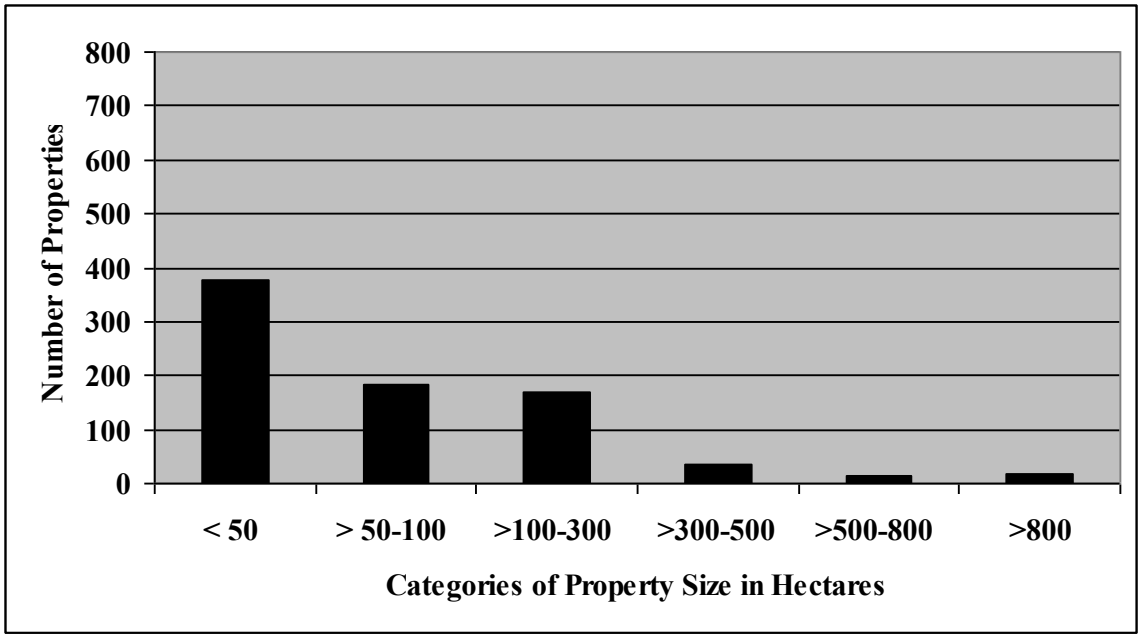

Figure 3 Property size ranges in hectares for 800 properties sold in Mississippi for which sales values were collected to estimate land values associated with outdoor recreation in Mississippi during 2003-2008.

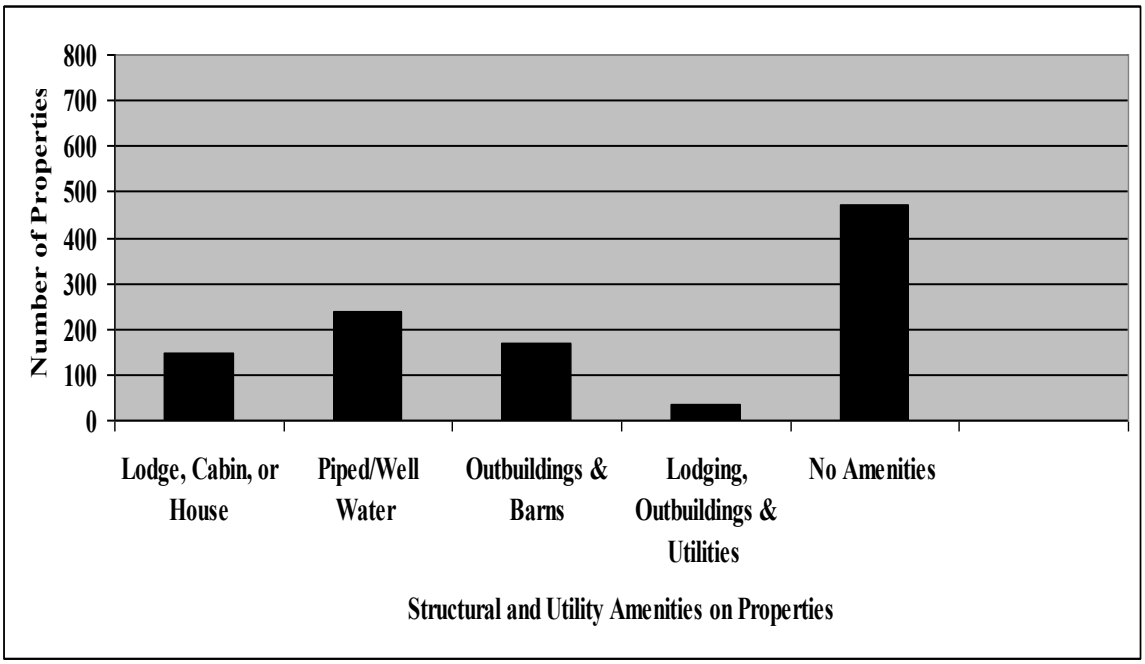

Figure 4 Properties without amenities and with specified amenities (i.e., structures: lodging, storage buildings, barns and utilities: electricity, sewage, gas, potable water) for which sales values were collected to estimate land values associated with outdoor recreation in Mississippi during 2003-2008.

CHAPTER V

RECREATIONAL LAND VALUE AND ASSOCIATED PROPERTY FEATURES

Recreational Contribution to Property Sales Values

Property sales values without recreational use were "bare land" properties. The value of "bare land" properties excluded the value of attributes on or in the property (e.g., forests, agriculture lands, structures, minerals (M.C. Elliott, Land Bank of South Mississippi, personal communication, 2008). Recreation contributions or "add on" value was the average total property sale value per ha with recreation minus the average total property sale value without recreation.

Statewide, the average value of properties purchased was $393,150 (± $ 35,701) without the sales contribution from anticipated recreation (Table 13). The average value of properties with the sales contributions from anticipated recreational was 593,730 (± 57,305), yielding a difference or increase in land value per property due to recreation of $200,580 (±8,655). The average change in land value per ha due to recreation was $1,559.30 or 50.8%. Of the three regions, the largest increase in land value due to recreation was in the Mississippi Delta/Hills Region at 55.4% with an average "add on" value of $1,661.30 (± $ 3.88). In the North and South Mississippi Regions, the increase in land value due to recreation was 47.0% and 41.9%. However, sales values of

properties did not differ significantly between regions ($F_{2, 799}$, = 2.8, P = 0.063; Table 53).

It is important to determine what influence, if any, the two major land cover types had on collected total sales prices if both occurred on the same property. The two major land cover types statewide and in the Mississippi Delta/Hills Region were bottomland hardwood forests and row crop lands. In the Mississippi Delta/Hills Region, bottomland hardwood forests and row crop lands were also the major land cover types. In the North Mississippi Region, mixed pine-hardwood and cutover woodland forests were the major land cover types; whereas, in the South Mississippi Region, planted pine forests and pasture/fallow fields were the major land cover types.

Statewide, properties (n = 29) containing both major land cover types comprised three times more area and sold for slightly less per ha than properties with only one of these two cover types present. Lands leased garnered >$7 more per ha on properties with both major land cover types. In the Mississippi Delta/Hills Region, properties (n = 29) containing both major land cover types comprised a larger area (mean = 278 ha versus 117 ha for tracts without both land covers) and sold for approximately $444 more per ha than properties with only one of the major land cover types on a property. Where both major land cover types were located on the same properties, the lease value was approximately $5 more per ha. In the North Mississippi Region, properties (n = 4) containing both major land cover types constituted a larger area. The land value per ha and land leased value per ha were less with only one of the two major land cover types on a property. In the South Mississippi Region (n = 5), properties with both major land cover types composed twice the size in total area and the mean value per ha was

approximately $1,000 more than tracts with only one of the major land cover types on a property.

Bivariate Analyses

Relationships of TSV of properties and explanatory variables were evaluated at the bivariate level using Pearson's correlation coefficients ($P \leq 0.05$) to determine the candidacy of independent variables for inclusion in hedonic regression analyses (McClave et al. 1998; Tables 28-30).

Hedonic Regression Analysis

Hedonic regression models were used to estimate relationships between the dependent variable (TSV) and independent variables (e.g., characteristics and features that were identified in bivariate analyses procedures [McClave et al. 1998]). This was conducted statewide and for three regions.

The complete linear hedonic regression model for estimating relationships between TSV of all 800 properties and characteristics of these properties had the following form:

Total Sale Value (TSV) = a +B_1 (Row Crop Lands) + B_2 (Pasture/Fallow Fields) + B_3 (Planted Pine Forests) + B_4 (Natural Pine Forests) + B_5 (Upland Hardwood Forests) + B_6 (Bottomland Hardwood Forests) + B_7 (Mixed Pine-Hardwood Forests) + B_8 (Cutover Woodland Forests) + B_9 (Permanent Lakes) + B_{10} (Perceived Waterfowl) + B_{11} (Roads) - B_{12} (Lands Leased Dummy Variable) + B_{13} (Leased Lands Value per Ha) + B_{14} (Overnight Sleeping Quarters) - B_{15}

(Proximity to Interstates) + B_{16} (Proximity to State Highways) - B_{17} (Proximity to National Wildlife Refuges). (Whereas, a = intercept and B_i = parameter estimate.)

The final hedonic regression model that estimated relationships between TSV of all 800 properties and property characteristics had the following form:

TSV = 61,095 + 4,544.58 (Row Crop Lands) + 7,045.08 (Pasture/Fallow Fields) + 5,179.37 (Planted Pine Forests) + 3,262.87 (Natural Pine Forests) + 4,415.25 (Upland Hardwood Forests) + 4,182.99 (Bottomland Hardwood Forests) + 4,108.20 (Mixed Pine-Hardwood Forests) + 3,539.46 (Cutover Woodland Forests) + 7,600.64 (Roads) + 125,098.35 (Overnight Sleeping Quarters).

Evaluation of Partial Correlation Coefficients (PCCs) for property characteristics related to TSV statewide showed that bottomland hardwood forests (PCC = 0.737) had the strongest association with TSV followed by row crop lands (PCC = 0.721, mixed pine-hardwood forests (PCC = 0.666), planted pine forests (PCC = 0.646), pasture/fallow fields (PCC = 0.576), upland hardwood forests (PCC = 0.418), cutover woodland forests (PCC = 0.381), natural pine forests (PCC = 0.284), overnight sleeping quarters (PCC = 0.153), and roads (PCC = 0.087). This model produced an adjusted R^2 of 0.908 and explained 91.0% of TSV (R^2 = 0.910, P = 0.000, F = 338, df = 584; Tables 14-15). Property characteristics not related to TSV statewide were permanent lakes, perceived waterfowl, lands leased value per ha, proximity to interstates, proximity to state highways, and proximity to national wildlife refuges (Table 15).

The complete linear hedonic regression model for estimating relationships between TSV of 276 properties in the Mississippi Delta/Hills Region and characteristics of these properties had the following form:

TSV = a + B_1 (Row Crop Lands) + B_2 (Bottomland Hardwood Forests) + B_3 (Mixed Pine-Hardwood Forests) + B_4 (Natural Pine Forests) + B_5 Planted pine forests) - B_6 (Food Plots) + B_7 (Roads) - B_8 (Perceived Waterfowl) + B_9 (Proximity to Interstates) + B_{10} (Proximity to National Forests) + B_{11} (Proximity to National Parks/Parkways. (Whereas, a = intercept and B_i = parameter estimate.)

The final hedonic regression model for the Mississippi Delta/Hills Region was as follows:

TSV = 509,290 + 4,579.38 (Row Crop Lands) + 3,514.81 (Planted Pine Forests) + 4,269.54 (Natural Pine Forests) + 3,828.50 (Bottomland Hardwood Forests) + 3,787.72 (Mixed Pine-Hardwood Forests).

Evaluation of PCCs for property characteristics related to TSV in the Mississippi Delta/Hills Region showed that row crop lands had the strongest association with total sale value (PCC = 0.746), followed by bottomland hardwood forests (PCC = 0.726), mixed pine-hardwood forests (PCC = 0.604), natural pine forests (PCC = 0.310), and planted pines (PCC = 0.264). The model produced an adjusted R^2 of 0.844 and explained 85.3% of TSV (R^2 = 0.853, P = 0.000, F = 96, df = 192; Tables 16-17). Characteristics of properties not related to TSV were food plots, roads, perceived waterfowl, and proximity to interstates, national forests, and national parks/parkways (Table 17).

The complete linear hedonic regression model used for estimation of relationships between TSV of 375 properties in North Mississippi Region and characteristics of these properties was as follows:

TSV = a + B_1 (Row Crop Lands) + B_2 (Pasture/Fallow Fields) + B_3 (Planted Pine Forests) + B_4 (Natural Pine Forests) + B_5 (Upland Hardwood Forests) + B_6 (Bottomland Hardwood Forests) + B_7 (Mixed Pine-Hardwood Forests) + B_8 (Cutover Woodland Forests) + B_9 (Roads) + B_{10} (CRP grasslands) + B_{11} (Leased Lands value per ha) + B_{12} (Horseback riding) + B_{13} (Amenities).

The final hedonic regression model was as follows:

TSV = -50,787 + 3,931.57 (Row Crop Lands) + 3,970.74 (Pasture/Fallow Fields) + 7,209.93 Bottomland Hardwood Forests + 3,653.97 (Mixed Pine-Hardwood Forests) + 2,742.82 (Cutover Woodland Forests) + 4,222.88 (CRP Grasslands) + 9,230.39 (Lands Leased Per Hectare).

Evaluation of PCCs for characteristics of properties related to TSV in the North Mississippi Region showed mixed pine-hardwoods had the strongest association with TSV (PCC = 0.733), followed by cutover woodland forests (PCC = 0.692), pasture/fallow fields (PCC = 0.556), CRP grasslands (PCC = 0.467), (bottomland hardwood forests (PCC = 0.390), row crop lands (PCC = 0.386), and lands leased value per ha (PCC = 0.356). The model produced an adjusted R^2 of 0.911 and explained 93.7% of TSV (R^2 = 0.937, P = 0.000, F = 36, df = 44; Tables 18-19). Characteristics of properties not related to TSV were planted pine forests, natural pine forests, upland hardwood forests, roads, horseback riding, and amenities on properties (Table 21).

The complete linear hedonic model for estimating relationships between TSV of 149 properties in the South Mississippi Region and characteristics of these properties was as follows:

TSV = $a + B_1$ (Pasture/Fallow Fields) + B_2 (Planted Pine Forests) + B_3 (Cutover Woodland Forests) + B_4 (Roads) + B_5 (Upland Hardwood Forests) + B_6 (Overnight Sleeping Quarters). (Whereas, a = intercept and B_i = parameter estimate.)

Characteristics that were related to TSV ($P \leq 0.05$) statewide by bivariate analyses were included in the hedonic regression model.

The final hedonic regression model was as follows:

TSV = 110,389 + 8,172.66 (Pasture/Fallow Fields) + 6,798.53 (Planted Pine Forests) + 2,089.59 (Upland Hardwood Forests) + 5,439.51 (Cutover Woodland Forests) + 135,603.09 (Overnight Sleeping Quarters).

Evaluation of PCCs showed that pastures/fallow fields had the strongest association with TSV in the South Mississippi Region (PCC = 0.745), followed by planted pine forests (PCC = 0.737), cutover woodland forest (PCC = 0.516), Overnight sleeping quarters (PCC = 0.175), and upland hardwood forests (PCC = 0.163). The model produced an adjusted R^2 of 0.935 and explained 93.8% of TSV ($R^2 = 0.938$, $P = 0.000$, F = 358, df = 148; Tables 20-21). Characteristics of properties sold in the South Mississippi Region not related to TSV were roads.

Hypothesis Determination for Statewide and Regional Variables

Hedonic regression analyses were conducted to test 10 hypotheses related to TSV and explanatory variables. Of the ten hypotheses evaluated for properties sold statewide and within three regions of the state, four were accepted through regression findings and five were rejected based on bivariate analysis, hedonic regression analysis, or ANOVA results (Table 22-23).

Table 13 Outdoor recreation contribution to total sale value of rural lands sold within Mississippi and three regions of the state collected for the period of 2003-2008.

Contribution of outdoor recreation	Statewide (n = 800 properties)	Mississippi Delta/Hills Region[1] (n = 276 properties)	North Mississippi Region[2] (n = 375 properties)	South Mississippi Region[3] (n = 149 properties)
	Average total $ value	Average total $ value	Average total $ value	Average total $ value
Average value per property with recreation	593,730 (±57,305)	1,048,600 (±147,578)	271,110 (± 17,088)	564,030 (± 118,331)
Average value per property without recreation	393,150 (±35,701)	673,720 (±88,577)	185,020 (± 12,258)	397,240 (± 85,228)
Average change in land value per property due to recreation	200,580 (±8,655)	374,880 (±59,001)	86,090 (±4,830)	166,790 (±33,103)
Average total property value per ha with recreation	4,629.14 (±94.11)	4,661.36 (±109.47)	3,965.31 (±132.42)	5,641.84 (±291.76)
Average total property value per ha without recreation	3,069.84 (±67.56)	3,000.06 (±105.59)	2,697.96 (±72.74)	3,976.18 (±218.18)
Average change in land value per ha due to recreation	1,559.30	1,661.30	1,267.35	1,665.66
Percent increase in land value due to recreation	50.8	55.4	47.0	41.9

[1]Counties in the Mississippi Delta Region were DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson.
[2]Counties in the North Mississippi Region were Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee.
[3]Counties in the South Mississippi Region were Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington

Table 14 Parameter output of the final statewide hedonic regression model that estimated the relationship of property characteristics and total sale value of 800 rural properties sold in Mississippi during 2003-2008.

R value parameters			
R	**R^2**	**Adjusted R^2**	**Standard error of the estimate**
0.954	0.910	0.908	$3.29118E5[1]
Analysis of variance parameters (F = 338; *P* = 0.000)			
	Sum of Squares	Degrees of Freedom	Mean Square
Regression	6.228E14[1]	17	3.663E13[1]
Residual	6.142E13[1]	567	1.083E11[1]
Total	6.842E14[1]	584	

[1]Denotes the number of noughts following the decimal.

Table 15 Statewide hedonic regression analysis results evaluating relationships between total sale value (TSV) and explanatory variables for which TSVs were collected for estimation of recreational value contributions on 800 rural lands sales during 2003-2008.

Explanatory variables[1]	**Unstandardized coefficients**		***P***	**95% C.I.**	**PCC value**
	b	**Standard error**			
Constant	61,095	39,896	0.126	--17,267-122,590	
Row crop lands (ha)	4,544.58	183.66	0.000	4,182-4,911	0.721
Pasture/fallow fields (ha)	7,045.08	419.18	0.000	6,219-8,121	0.576
Planted pine forests (ha)	5,179.37	257.22	0.000	4,673-5,684	0.646
Natural pine forests (ha)	3,262.87	461.89	0.000	2,379-4,399	0.284
Upland hardwood forests (ha)	4,415.25	402.93	0.000	3,624-5,343	0.418
Bottomland hardwood forests (ha)	4,182.99	160.89	0.000	3,866-4,377	0.737
Mixed pine-hardwood forests (ha)	4,108.20	193.03	0.000	3,727-4,528	0.666
Cutover woodland forests (ha)	3,539.46	360.52	0.000	2,831-3,950	0.381
Permanent lakes (ha)	6,703.62	3,645.42	0.066	-4,858-12,067	0.077
Perceived waterfowl ($)	5,508.81	39,468.18	0.889	-68,071-94,788	0.006
Roads (ha)	7,600.64	3,653.08	0.038	425-12,132	0.087
Leased lands dummy variable	-213,840	154,256	0.166	-516,823-89,144	-0.058
Leased lands value per ha	1,003.82	6,862.54	0.884	-12,475-16,351	0.006
Overnight sleeping quarters ($)	125,098.35	33,829.82	0.000	55,337-189,821	0.153
Proximity to interstates (km)	-1,044.36	778.28	0.180	-6.325-178	-0.056
Proximity to state highways (km)	6,266.69	4,382.38	0.152	-5,732 14,894	0.060
Proximity to national wildlife refuges (km)	-870.68	743.55	0.242	-5,758-916	-0.049

[1]Explanatory variables: (constant) Row crop lands, Pasture/fallow fields, Planted pine forests, Natural pine forests, Upland hardwood forests, Bottomland hardwood forests, Mixed pine-hardwood forests, Cutover woodland forests, Permanent lakes, Roads, Leased lands dummy variable, Leased lands value per ha, Overnight sleeping quarters, Proximity to interstates, Proximity to state highways, Proximity to National Wildlife Refuges.

Table 16 Parameter output of the final hedonic regression model for the Mississippi Delta/Hills Region that estimated the relationship of property characteristics and total sale value of 276 rural properties sold in Mississippi during 2003-2008.

R value parameters			
R	**R^2**	**Adjusted R^2**	**Standard error of the estimate**
0.924	0.853	0.844	$5.15715E5[1]
Analysis of variance parameters (F = 96; *P* = 0.000)			
	Sum of Squares	Degrees of Freedom	Mean Square
Regression	2.799E14[1]	11	2.545E13[1]
Residual	4.814E13[1]	181	2.660E11[1]
Total	3.281E14[1]	192	

[1]Denotes the number of noughts following the decimal.

Table 17 Hedonic regression analysis results evaluating relationships between total sale value (TSV) and explanatory variables in the Mississippi Delta/Hills Region for which TSVs were collected for estimation of recreational value contributions on 276 rural lands sales during 2003-2008.

Explanatory Variables[1]	**Unstandardized**		***P* value**	**95% C.I.**	**PCC**
	b	**Standard Error**			
Constant	509,290	159365.90	0.002	194,836-823,744	
Row crop lands (ha)	4,579.38	303.78	0.000	1,612-5,179	0.746
Planted pine forests (ha)	3,514.81	953.42	0.000	662-5,398	0.264
Natural pine forests (ha)	4,269.54	970.71	0.000	952-6,187	0.310
Bottomland hardwood forests (ha)	3,828.50	269.58	0.000	1,337 4,362	0.726
Mixed pine-hardwood forests (ha)	3,787.72	371.19	0.000	1,237 4,521	0.604
Food plots (ha)	-714.66	15,356.06	0.963	-12,566 29,585	-0.003
Roads (ha)	12,287,82	7,186.71	0.089	-766.3-26,467	0.126
Perceived waterfowl ($)	-103,489.99	87,713.78	0.240	-276,563-69,538	-0.087
Proximity to interstates (km)	1,815.34	2,253.51	0.422	-2,631 6,262	0.060
Proximity to national forests (km)	-3,858.38	2003.83	0.056	-7,812 96	-0.142
Proximity to national parks (km)	-3,762.05	2,957.12	0.205	-9,596 2,073	-0.094

[1]Explanatory variables: (constant) Row crop lands, Planted pine forests, Natural pine forests, Bottomland hardwood forests, Mixed pine-hardwood forests, Roads, Perceived waterfowl, Proximity to interstates, Proximity to national forests, Proximity to national parks

Table 18 Parameter output of the final hedonic regression model for the North Mississippi Region that estimated the relationship of property characteristics and total sale value of 375 rural properties sold in Mississippi during 2003-2008.

R value parameters			
R	**R^2**	**Adjusted R^2**	**Standard error of the estimate**
0.968	0.937	0.911	$8.09653E4[1]
Analysis of variance parameters (F = 36; *P* = 0.000)			
	Sum of Squares	Degrees of Freedom	Mean Square
Regression	3.038E12[1]	13	2.337E11[1]
Residual	2.032E11[1]	31	6.555E9[1]
Total	3.241E12[1]	44	

[1]Denotes the number of noughts following the decimal.

Table 19 Hedonic regression analysis results evaluating relationships between total sale value (TSV) and explanatory variables in the North Mississippi Region for which TSVs were collected for estimation of recreational value contributions on 375 rural lands sales during 2003-2008.

Explanatory variables[1]	**Unstandardized coefficients**		***P* value**	**95% C.I.**	**PCC**
	b	**Standard error**			
Constant	-50,787	90,949	0.581	-236,280-3,327,256	
Row crop lands (ha)	3,931.57	1,687.01	0.027	486-7,375	0.386
Pasture/fallow fields (ha)	3,970.74	1,067.04	0.001	1,793-6,147	0.556
CRP grasslands (ha)	4,222.88	1,436.23	0.006	1,291-7,152	0.467
Planted pine forests (ha)	1,953.18	1,145.34	0.098	-353-4,289	0.293
Natural pine forests (ha)	-1,995.64	7,880.47	0.802	-18,068-1,408	-0.045
Upland hardwood forests (ha)	2,565.56	1,310.71	0.059	-108-5,236	0.332
Bottomland hardwood forests (ha)	7,209.93	3,059.86	0.025	972-13,452	0.390
Mixed pine-hardwood forests (ha)	3,653.97	608.83	0.000	2,142-4,896	0.733
Cutover woodland forests (ha)	2,742.82	511.29	0.000	1,696-3,789	0.692
Roads (ha)	5,620.81	4,517.63	0.223	-3,597-14,839	0.218
Leased lands value per ha	9,230.39	4,348.71	0.042	361-18,099	0.356
Horseback riding on property	13,145.17	43,555.42	0.765	-186,944-101,977	0.054
Amenities on properties	25,130.39	83,986	0.767	-361,020 196,422	0.055

[1]Explanatory variables: (constant) Row crop lands, Pasture/fallow fields, CRP grasslands, Planted pine forests, Natural pine forests, Upland hardwood forests, Bottomland hardwood forests, Mixed pine-hardwood forests, Cutover woodland forests, Roads, Leased lands value per ha, Horseback riding, Amenities

Table 20 Parameter output of the final hedonic regression model for the South Mississippi Region that estimated the relationship of property characteristics and total sale value of 149 rural properties sold in Mississippi during 2003-2008.

R value parameters			
R	**R^2**	**Adjusted R^2**	**Standard error of the estimate**
0.969	0.938	0.935	$3.67092E5[1]
Analysis of variance parameters (F = 358; *P* = 0.000)			
	Sum of Squares	Degrees of Freedom	Mean Square
Regression	2.896E14[1]	6	4.827E13[1]
Residual	1.914E13[1]	142	1.348E11[1]
Total	3.088E14[1]	148	

[1]Denotes the number of noughts following the decimal.

Table 21 Hedonic regression analysis results evaluating relationships between TSV and explanatory variables in the South Mississippi Region for which sales values were collected for estimation of recreational value contributions on 149 rural lands sales during 2003-2008.

Explanatory variables[1]	**Unstandardized coefficients**		***P* value**	**95% C.I.**	**PCC**
	b	**Standard error**			
Constant	110,389	84,565	0.002	105,490-439,828	
Pasture/fallow fields (ha)	8,172.66	614.96	0.000	6,955 9,386	0.745
Planted pine forests (ha)	6,798.53	6,798.53	0.000	5,766-7,831	0.737
Upland hardwood forests (ha)	2,089.59	1,062.52	0.051	-11 4,189	0.163
Cutover woodland forests (ha)	5,439.51	757.77	0.000	3,942-6,935	0.516
Roads (ha)	-2,725.15	15,675.48	0.862	-33,713-28,262	-0.015
Overnight sleeping quarters	135,603.09	63,859.37	0.035	23,132-261,841	0.175

Table 22 Accepted hypotheses based on bivariate analysis and hedonic regression analysis to estimate relationships between explanatory variables (i.e., property characteristics) and total sales value of rural properties sold in Mississippi from 2003-2008.

Hypotheses and statement summary	**Property regions**	**Explanatory variable**	***P* value; range in partial correlation coefficient**
H_1: Relationship of agriculture and forest and land cover types to total sale value of properties			
	Statewide	Agriculture and forest lands	0.000; 0.087 to 0.737
	Delta Hills	Agriculture and forest lands	0.000; 0.264 to 0.746
	North Mississippi	Agriculture and forest lands	0.000; 0.356 to 0.733
	South Mississippi	Agriculture and forest lands	0.000; 0.163 to 0.745
H_4:Relationship of onsite roads to total sales values of properties			
	Statewide	Onsite roads	0.038; 0.087
H_5: Relationship of leased recreational lands per ha to total sales values of properties			
	North Mississippi	Leased recreational lands	0.042; 0.356
H_8: Relationship of onsite structures and amenities to total sales values of properties			
	Statewide	Overnight sleeping quarters	0.000; 0.153
	South Mississippi	Overnight sleeping quarters	0.035; 0.175

Table 23 Rejected hypotheses based on bivariate analysis and hedonic regression analysis to estimate relationships between explanatory variables (i.e., perceived recreational activities, leased recreational lands, and proximity measurements to federal and state highways and cities) and total sales values of rural properties sold in Mississippi from 2003-2008.

Hypotheses and statement summary	**Property regions**	**Explanatory variable**	***P* value(s)**
H_2: Relationship of perceived recreational activities to total sale value of properties			
	Statewide	Perceived recreational activities	0.140 to 0.794
	Delta Hills	Perceived recreational activities	0.231 to 0.876
	North Mississippi	Perceived recreational activities	0.367 to 0.883
	South Mississippi	Perceived recreational activities	0.218 to 0.883
H_3: Relationship of property proximity to public lands and water bodies to total sales values of properties			
	Statewide	Proximity	0.122 to 0.994
	Delta Hills	Proximity	0.143 to 0.036
	North Mississippi	Proximity	0.382 to 0.834
	South Mississippi	Proximity	0.173 to 0.788
H_5: Relationship of leased recreational lands per ha to total sales values of properties			
	Statewide		0.884
	Delta Hills	Leased recreational lands	0.213
	South Mississippi	Leased recreational lands	Only one tract leased
H_6: Relationship of proximity to federal and state highway to total sales values of properties			
	Statewide	Proximity to state and federal highways	0.054 to 0.083
	Delta Hills	Proximity to state and federal highways	0.414 to 0.732
	North Mississippi	Proximity to state and federal highways	0.090 to 0.350
	South Mississippi	Proximity to state and federal highways	0.536 to 0.527

Table 23 (Continued)

Hypotheses and statement summary	Regions of properties	Explanatory variable	*P* value(s)
H_7: Relationship of proximity to population centers >50,000 residents to total sales values of properties			
	Statewide	Proximity to population centers	0.698
	Delta Hills	Proximity to population centers	0.260
	North Mississippi	Proximity to population centers	0.527
	South Mississippi	Proximity to population centers	0.158
H_9: The recreational contribution to rural property value will differ significantly by region within the state where property parcels were located			
	Delta Hills North Mississippi South Mississippi	Recreational contribution	0.063
H_{10}: Relationship of perceived presence of deer, turkey, and waterfowl to total sales value of properties			
	Statewide	Game species	0.200 to 0.632
	Delta Hills	Game species	0.240 to 0.633
	North Mississippi	Game species	0.201 to 0.448
	SMS	Game Species	0.668 to 0.916

CHAPTER VI

DISCUSSION

Land Appraisal Categories, Methods, and Features

Property appraisals typically include two general categories of natural capital values derived from the land (Bergstrom 2001). Commodity or market values are derived from commercial commodities and include food and fiber products, timber products, mineral products, and manufactured goods. Amenity or nonmarket values have large nonconsumptive or passive use components and include recreational use, scenic appreciation, and cultural/heritage values. Of these two approaches, amenity values have typically been applied to properties purchased for relaxation or recreation (Bergstrom 2001). Additionally, appraisers use various determinants to estimate rural land values, including size and accessibility of tract, capital improvements, cost-share programs, soil quality, crops grown, government programs, low interest rates, proximity to urban centers, and recreational potential (McLauren 2004, Barnard 2006, Henderson and Moore 2006, USDA Forest Service 2006).

Moreover, when rural properties are valued by appraisers, one of three methods is usually used to develop land value estimates. The sales comparison method is used to provide a sales value of the subject property by comparison with the value of the highest and best use of the same or similar properties (American Society of Farm Managers and Rural Appraisers and Appraisal Institute 2000). Allocation of value by land class or type

is the method used when the price paid for each sale is allocated among the various land uses, and these values are applied to the land types or uses on the specific property that is being appraised. Ground rent capitalization is used when dependable, validated data on land rental rates are derived and applied to the subject land.

Of these methods, valuation of land by class and type is the most appropriate for incorporating property attributes that are important to recreational land sales values (Kiker et al. 2002, Nickerson et al. 2012). Information provided by this study on valuation of land by class and type lends itself to be used by landowners and land appraisers to better determine the sales values of recreational lands. Once this information becomes available to the public and other organizations, landowners and land appraisers will have statewide and regional information on the types of cover (e.g., bottomland hardwood forests, mixed pine-hardwood forests, row crop lands) and other attributes (e.g., overnight sleeping quarters) related to property sales values and their contributions to previously documented property sales values in Mississippi, thereby allowing for more accurate estimations of rural land values for purchasing, financing, and accounting purposes.

However, as recreational properties begin to be recognized for their value related to enjoyment and relaxation and more properties enter the market for sales, the sales comparison method may become a useful approach when comparing sales values of similar properties within a specified region. Also, data collected on purchase prices and lease values of recreational properties may provide approaches to land valuation over time in Mississippi, and future sales of recreational properties may be appraised based on these data summaries of past land sales.

Outdoor Recreational Contributions to Rural Property Sales Values

Although a number of determinants have been used by researchers to quantify the value of rural lands, information in the peer-reviewed literature is limited on the contribution of outdoor recreation on rural property values. A study that investigated quantifiable contributions of outdoor recreation to rural property values in the southeastern United States was conducted by Jones et al. (2006) in the Delta Region of Mississippi. They reported that selected characteristics on properties, such as bottomland hardwood forests, mixed pine-hardwood forests and wildlife food plantings, increased property value by 36% over the period 2002-2005. In addition, the authors reported that conservation and management of wildlife and fish resources can produce quantifiable increases in land values that assist in sustaining economic development due to availability of outdoor recreation in rural Mississippi.

Of the 800 property sales that were included in this 2003-2008 study, 102,611 ha of land and water were analyzed to determine the quantitative relationship between outdoor recreation and TSV. Outdoor recreation contributed $160.6 million of the $475.1 million garnered from land sales or over one third of the total land value. The primary reason for purchasing land in Mississippi was to provide land cover types (e.g., bottomland hardwoods, row crops, and mixed pine-hardwoods) that provide hunting opportunities for game species such as deer, turkey, and waterfowl.

Furthermore, my study found that Louisiana resident hunters were more likely to purchase hunting lands in Mississippi than resident hunters from other adjacent states. This may have resulted from rural land being undervalued in Mississippi. The USDA (2013) reported that agriculture land in Mississippi sold for an average value of

$5,928.00 per ha in 2013. During the same year agriculture land in Louisiana sold for an increase of $370.50 per ha over the sale price of Mississippi land per ha with an average value of $6,298.50 per ha.

Attributes Related to TSV

Attributes that influence the presence of wildlife on properties include habitat quality and quantity (SAF 2010, Locascio, Jr. 2012). Quality habitat in the Mississippi Delta/Hills Region made it the principal area for purchasing land by hunters during 2003-2008. This area provides hunting opportunities for deer, turkey, waterfowl, and other game species. More than 44,534 hectares of public hunting and fishing lands are located in the Delta/Hills Region, including 12 state-owned wildlife management areas, five national wildlife refuges, the Delta National Forest, and numerous lakes, rivers, and streams (Spann 2014). In addition, the Mississippi River corridor's emergent and wetland forests provide essential habitat for 40% of North America's migratory waterfowl that provide quality waterfowl hunting opportunities (The Izaak Walton League of America 2013). The National Flyway Council and Wildlife Management Institute (2006) reported in 2005 that 19,200 hunters participated in waterfowl hunting in Mississippi.

Although forests constituted only 32% of total land cover in the Mississippi Delta/Hills Region (MIFI 2009), bottomland hardwoods were by far the predominant cover types purchased by hunters due to their wildlife habitats and hunting-associations. Bottomland hardwoods composed 37% of land cover on properties purchased in the Delta. Forested wetlands, such as these, provide habitat for a wide variety and number of wildlife including deer, turkey, and waterfowl (Defenders of wildlife 2014). Bottomland

hardwood forests and row crop lands had the greatest influence on property values due to recreation. Row crop lands composed 21% land cover on properties purchased in the Delta. Row crop lands can be enhanced for wildlife habitat, particularly marginal lands that can be readily converted to suitable wildlife habitat and subsequent hunting activities through removal from cultivation, vegetative plantings, and flooding allowance (Yarrow 2009). Mixed pine-hardwood forests also influenced property values, composed 10% of land cover, and were located primarily in the Brown Loam Hills physiographic region of the Delta.

In the North Mississippi Region, mixed pine-hardwood forests, cutover woodland forests, pasture/fallow fields, and CRP grasslands had the greatest influence on property values. Early succession forests, such as cutover woodland forests, provide habitat for wildlife such as deer and turkey (Minnesota Department of Natural Resources 2009). Pastures/fallow fields provide habitat for deer and turkey as a food source and for rearing young (McPeake et al. 2008). In addition to providing habitat for grassland birds, CRP grasslands provide habitat for deer, turkey, and waterfowl (Farrand et al. 2005). In the South Mississippi Region, pastures/fallow fields, planted pine forests and cutover woodlands had the greatest influence on property values. Pine forests provide food for deer and turkey, especially when forest management programs such as prescribed burning are used to produce new growth vegetation (Marion et al. 2013). Properties in the South Mississippi Region were also purchased adjacent to tributaries, such as the Pascagoula River, where bottomland hardwood forests provide habitat and hunting opportunities for waterfowl, deer, and turkey.

Properties purchased statewide and regionally by hunters usually included multiple land cover types and in some cases sold for greater prices (e.g., the combination of bottomland hardwood forests and row crop lands in the Delta/Hills Region). Yarrow (2009) reported that combining cover types on the same property provides a greater variety of wildlife habitats that may sustain or increase wildlife populations, thereby enhancing hunting opportunities. The hedonic regression models showed that forests and agriculture lands provided the habitat types sought by hunters and they were the primary land cover types that enhanced land value. Knowing this, landowners may be encouraged to engage in wildlife management activities to increase the value of their property. Additionally, land appraisers may want to evaluate land covers from a recreational perspective to provide more accurate appraisals.

Habitat quality and quantity vary across landscapes and regions (Ning et al. 2008, SAF 2010). In the Mississippi Delta/Hills Region, the increase (55.4%) in land value due to recreation was greater than in the North Mississippi Region (47.0%) or in the South Mississippi Region (41.9%). Although the percent increase in recreational contribution to land sales values was greater in the Mississippi Delta/Hills Region than in the North Mississippi and South Mississippi Regions, the recreational contribution was not significantly different across regions.

To further illustrate that the Mississippi Delta/Hills Region was the prime area in the state for hunting and purchasing of properties for recreation was that tracts in this Region leased for a greater price as compared to other Regions. Although the economic value of leased lands was not significantly different between the Mississippi Delta/Hills Region and the North Mississippi Region, the amount paid for leased hunting lands was

$58.70 per ha in the Mississippi Delta/Hills Region and $49.89 per ha in the North Mississippi Region. Only one tract was leased for hunting in the South Mississippi Region, and it leased for $37.05 per ha. I submit that the lack of tracts being leased for recreation in the South Mississippi Region likely resulted from deer being typically smaller than in the Delta and North Mississippi where soil fertility is greater (Yarrow and Yarrow 1999).

Although statewide and regional agricultural lands and forest lands were the primary contributors to sales values of recreational properties, other attributes also contributed to land value. These attributes were overnight sleeping quarters and onsite roads statewide, overnight sleeping quarters in the South Mississippi Region, and leased land value per ha in the North Mississippi Region. Facilities, such as lodges, provide guide services, food, and other accommodations for hunters and other recreationists that improve the quality of their outdoor experiences (MacKay and Campbell 2004).

Another contributory factor that often influences property value is closeness of property to a recreational area (Table E.1). Although n values were generally low (3 to 33), properties located <0.8 km compared to >16 km from recreation areas often increased in dollar value per ha. Statewide, the percentage increase and dollar value per ha were as follows: national wildlife refuges 27% ($1,208), national forests 14% ($576), national parks 15% ($699), state wildlife management areas 40% ($1,640), state parks 13% ($563), and public lakes 214% ($5,360). These findings further illustrated that properties located within close proximity to public lands and waters often increased in value and suggested that this type of information would benefit land owners and land appraisers if used in the appraisal process.

Other researchers reported similar findings. Crompton (2005) suggested that a positive impact of 20% on nationwide property values abutting national parks is a reasonable starting point guideline for estimating a park's impact. Walter et al. (2006) reported that an average property value located within 100 m of a national park in Orange County, Florida provided an additional 18.3% in outdoor recreation opportunities. Lansford and Jones (1995) reported that waterfront properties in Texas commanded a premium price for the private access they offered for enjoyment of public lake waters for fishing and other recreational activities. Kroeger (2008) reported that the value of open space is reflected in private property and real estate markets, because prices of residential properties surrounding open space reflect the value property owners assign to recreational opportunities and other amenities.

Additionally, Nudel et al. (2012) reported that properties located within 0.8 km of 14 national wildlife refuges in the southeastern U.S. increased in value from 7-9%. These refuges provided recreational activities, such as hunting, fishing, and wildlife watching and also provided scenic vistas and cultural and educational events. The EPA (2002) reported that clean lakes with healthy natural shorelines provided recreational opportunities, aesthetic values, higher property values, jobs, and a higher tax base. The USDA Forest Service (2006) reported that rural property value was increased by proximity to public lands, such as wildlife refuges, lakes, and parks due to opportunities for outdoor recreation. The USNPS (1995) reported that rivers, trails, and greenway corridors have been traditionally recognized for their recreational values, environmental protection, aesthetic appearance, enhancement of property values, and job creation.

Appraisal of Recreational Lands in Mississippi

For a more accurate appraisal of rural recreational lands in Mississippi, the current method of appraising rural lands should be modified. For example, the value of timber on a property should be estimated so it can be partitioned from the recreational value unless the property purchaser only plans on using it for recreation. Other determinations that would provide needed information for property valuation include examining the value of lands enrolled in governmental cost-share programs because these contracts are transferable with land purchases, the extent and value of aquaculture ponds being used for waterfowl habitat and hunting or for catfish production, and the extent and value of cutover woodlands before and after conversion to pasture lands. The known wildlife species and forest management practices on the sales properties should be provided by the seller to the land bank involved in the sales transactions. Knowing the wildlife species on a property may assist a buyer in determining whether or not to buy the property for hunting. Additionally, forest management plans, such as thinning, timber harvesting, and prescribed burning can enhance forest health and vigor, wildlife populations, recreation, aesthetics, and land values (Hamilton et al. 2004). Bierschwale (2014) reported that land management strategies have a major impact on land values as reflected by market demands. Future research can develop protocols for appraisers and financial lenders in using these property attributes in better determining value estimations and collateral for loans to purchase recreational lands.

To obtain better information for a researcher to use in valuing rural properties, several methods could possibly be used. The property seller could be surveyed by a researcher to obtain details about property attributes. Contact could also be made with

the Farm Security Administration, Natural Resources Conservation Service, and county tax assessors to determine if they have relevant information about sales properties (e.g., digitized maps to estimate land cover types and tract sizes). Another approach to obtain better land appraisal information would be for researchers or appraisers to collaborate with financial institutions to incorporate the suggested information needs above into their loan applications and property descriptions attached to bank lending packages.

Management Implications and Conclusions

The type and value of attributes that contributed to statewide and regional rural property values due to outdoor recreation will be of assistance to landowners, land appraisers, and regulatory agencies. This information could be used for property appraisal by allocation of value by land class or type or by land comparison methods. Hedonic regression models revealed that forests and agriculture lands and other attributes (e.g., overnight sleeping quarters) increased sales values of rural properties in Mississippi. By examining these property attributes and associated game species, landowners will be encouraged to manage lands to improve wildlife habitats for hunting opportunities and to increase revenues from leasing or proceeds collected at time of sale. Landowners and land appraisers will also benefit by knowing that properties in close proximity to recreational areas often increase rural property values.

Knowing the attributes and values denoted by this study, lending practices and land appraising activities in the state, and possibly in the southeastern U.S., will be improved by land appraisers being able to better account for positive effects of land cover types, proximity of property parcels to recreation areas, and other attributes on land sale transactions and rural property values. Resource and regulatory agencies, such as the

USEPA, USACE, USFWS, and MDMR will have the opportunity to use this information in impact assessments and regulatory decision making.

This information will assist agencies in determining if a project can be permitted that will impact wetlands, such as bottomland hardwoods and herbaceous wetlands, and in determining appropriate mitigation to compensate for impacts due to infrastructure development pressures. Included in this listing are projects such as highway construction, industrial site construction, and urban expansion, to name a few. For construction projects, the economic benefits are usually known in terms of jobs created and increased tax revenues to be gained with project implementation and completion. However, the economic value that could be derived from land cover types lost due to adverse impacts to land and water resources caused by such development projects are usually not known or not quantified. By having this information, resource and regulatory agencies will be in a better position to compare trade-offs between economic benefits of recreational resources and potential economic implications of a development project.

Information of this type has been used in other states, such as Wisconsin, and could be used to establish programs that involve private landowner participation to maintain rural lands and undeveloped space in naturally occurring conditions that would enhance ecosystem services and aesthetic quality (Wisconsin Department of Natural Resources 2011). Also, study finding about land values due to outdoor recreation could be used to establish less tax rates on private lands to promote green space and recreation activities and enhance timber production (Wisconsin Department of Natural Resources 2013).

REFERENCES

Adams, T. 2012. Mississippi Gulf Coast Community College Estuarine Education Center: Merging outdoor recreation with environmental education. http://masgc.org/bb2012/Abstractpdf/EDFPDFs/EDFAdams. Accessed 2013 June 15.

Agresti, A., and B. Finlay. 2009. Statistical methods for the social sciences. Fourth edition. Pearson Prentice Hall, Upper Saddle River, New Jersey, USA.

Agri Forum. 2005. High prices paid for farmland--not a localized phenomenon. Winter:32(3).

Anderson, J., and S. Samargo. 2007. Wetlands management, economics and recreation. West Virginia University, Division of Forestry and Natural Resources, Morgantown, West Virginia, USA.

American Society of Farm Managers and Rural Appraisers and Appraisal Institute. 2000. The Appraisal of Rural Property. Second edition. Appraisal Institute and American Society of Farm Managers, Denver, Colorado, and Appraisal Institute, Washington, D.C., USA.

American Society of Farm Managers and Rural Appraisers. 2008. Accredited rural appraisers checklist. http://www.asfmra.org/about/index.cfm?fa=rural appraisers. Accessed 2009 June 6.

Anderson, J. 2008. Delta Farm Press. http://delta farm press.com/livestock/mississippi/catfish. Accessed 2011 August 13.

Andrews, A. and D. Stuart. 2003. A baseline assessment of economic impacts of agriculture in Skagit County, Washington. Skagit County Cooperative Extension Service, Pullman, Washington, USA.

Andrew Loftus Consulting and Southwick Associates. 2011. The Financial Returns and Benefits of Hunting and Fishing Excise Taxes, produced for the Association of Fish and Wildlife Agencies, Washington, D.C., USA.

Appraisal Institute. 2002. The dictionary of real estate appraisal. Page 135 *in* Mary Elizabeth Geraci, editor. Appraisal Institute, Chicago, Illinois, USA.

Appraisal Institute. 2006. Some commonly asked questions about real estate appraisers and appraisals. Appraisal Institute, Chicago, Illinois. www.appraisalsinstitute.org/resources/downloads. Accessed 2012 January 20.

Baen, J.S. 1997. The growing importance and value implications of recreational hunting leases to agricultural land investors. Journal of Real Estate Research 14(3):399-414.

Barnard, C. 2006. Farm Real Estate Values. http://www/ers.usda.gov/publications/Chapter1/1.2/. Accessed 2008 January 15.

Bastian, C.T., D.M. McLeod, G.M. Germino, W.A. Reiners, and B.J. Blasko. 2002. Environmental amenities and agricultural land values: a hedonic model using geographic information systems data. Ecological Economics 40(3):337-349.

Behar, H. 2014. Farm bill includes support for organic, including certification cost-share. http://mosesorganic.org/farming/farming-topics/miscellaneous/farm-bill/. Accessed 2014 September9.

Bergstrom, J.C. 2001. Current issues associated with land values and land use planning. Page 1 *in* Proceedings of a Regional Workshop, Southern Natural Resources Economics Committee (SERA-IEG-30), The University of Georgia, Athens, Georgia, USA.

Beringer, J. 2008. Furbearer Annual Report. Missouri Department of Conservation. Jefferson City, Missouri, USA.

Bierschwale, P. 2014. Brush management and its impact on land value. Texas A&M, Agrilife Research and Extension, College Station, Texas, USA.

Bockstael, N.E., A.M. Freeman III, R.K. Kopp, P.R. Portney, and V.K. Smith. 2000. On measuring economic values for nature. Environmental Science & Technology Journal 34(8):1384-1389.

Bordelon, B. 2013. The wild turkey. Wildlife Mississippi. Mississippi Wildlife Federation, Spring 2013:26, Madison, Mississippi, USA.

Barlow, R.J. 2005. Benefits and tradeoffs of timber management for wildlife habitat in Mississippi on industrial and nonindustrial private landownerships. PhD dissertation, Mississippi State University, Starkville, Mississippi, USA.

Brown, L.R. 2000. Fish farming may soon overtake cattle ranching as a food source. World watch Institute. http://www.mindfully.org/Water/Fish-Farming-Overtake-Cattle.htm. Accessed 2008 January 25.

Burch, M. 2006. Wildlife and woodlot management. Creative Outdoors, Upper Saddle River, New Jersey, USA.

Burden, D. 2006. Hunting lease profile. Iowa State University, Agricultural Marketing Resource Center, Ames, Iowa, USA.

Burden, D. 2007. Fee and lease pond fishing. Agricultural Marketing Resource Center, Iowa State University. http://www.agmrc.org/agmrc/commodity/agritourism/Fee+and+lease+pond+fishing.htm. Accessed 2008 February 13.

Business Dictionary. 2010. Hedonic regression. http://www.businessdictionary.com/definition/hedonic-regression.html. Accessed 2013 September 17.

Byers, J. 2008. The bucks of February. Heartland USA. January-February.

California Research Bureau. 1997. Economics of ocean dependent industries in California. http://resources.ca.gov/ocean/97agenda/PDF/chapter_2_031297.pdf. Accessed 2012 January 20.

California State Parks. 2005. The health and social benefits of recreation. www.parks.ca.gov/planning. Accessed 2012 January 20.

Caridi, R.A., Forbes, H., and K.A. Wagner Jr. 2008. www.dcnr.state.pa.us/cs/groups/public/documents,d_001207.pdf. Accessed 2014 May 29.

Carver, E., and J. Caudill. 2007. Banking on nature 2006: the economic benefits to local communities of National Wildlife Refuge visitation. U.S. Fish and Wildlife Service, Division of Economics, Washington, D.C. USA.

Chase, L. 2005. Public Access to private lands for recreation and tourism in the Northern Forest Region. http://64.233.167.104/search?q+cache:SHVnV_9kwLQj.www.privatelandaccess.org/NSRC. Accessed 2008 April 5.

Cichra, C.E. 2002. Fee fishing in Florida. University of Florida, Florida Cooperative Extension Service and Institute of Food and Agriculture Sciences, Gainesville, Florida, USA.

Clemson University. 1997. Response of wildlife to clear cutting and associated treatments in the Eastern United States. Department of Forest Resources Publication No.19, Clemson, South Carolina, USA.

Climate Institute. 2010. Ecosystems and wildlife. http://www.climate.org/topics/ecosystems/. Accessed 2014 May 29.

Colorado Division of Wildlife. 2004. Public lands grazing: a declining economic factor. http://www.publiclandsranching.org/htmlres/myth_economics.htm. Accessed 2008 April 6.

Colt, S. 2001. The economic importance of healthy Alaska ecosystems. http://www.iser.uaa.alaska.edu/. Accessed 2012 March 22.

Combs, D.L. and L.H. Fredrickson. 1996. Foods used by male mallards wintering in southeastern Missouri. The Journal of Wildlife Management 60(3):603-610.

Comprehensive Planning Steering Committee of Middle Georgia. 2007. Joint comprehensive plan update for Monroe County. www.putnamcountyga.us/cmsadmin/uploads/community-agenda-final. Accessed 2014 May 29.

Connecticut Department of Energy and Environmental Protection. 2006. Managing grasslands, shrublands and young forests for wildlife. http://www.ct.gov/deep/cwp/view.asp?a=2712&q=326732&pp=12&n=1. Accessed 2013 May 9.

Conservation Commission of Missouri. 2012. Managing CRP grasslands for bobwhite quail. http/mdc.gov/land-water-care/animal-management. Accessed 2012 August 20.

Cordell, H.K., C.J. Betz, and G.T. Green. 2008. Nature-based outdoor recreation trends and wilderness. International Journal of Wilderness 14(2):7-8.

Costanza, R. d'Arge, R. De Groot, S. Farber, M. Grasso, B. Hannon, K Limburg, S. Naeem, R.V. O'Nell, J. Paruelo, R.G. Raskin, P. Suttin, and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature 387. p. 253.

Crompton, J.L. 2005. The impact of parks on property values: empirical evidence from the past two decades in the United States. Managing Leisure 10:203-218.

Daugherty, W. 1997. The economic value of wetlands and open spaces. San Diego Earth Times. June 1997.

Defenders of Wildlife. 2014. Basic facts about wetlands. http://www. defenders .org/wetlands/basic facts. Accessed 2014 June 22.

DeGroot., M.A. Wilson, and R.M.J. Boumans. 2002. A typology for the classification, description, and valuation of ecosystem functions, goods, and services. Ecological Economics 41(3):393-408.

DeLong, C.A., and M.C. Brittingham. 2009. Wildlife-habitat relationships. Pennsylvania State University, Agricultural Research and Cooperative Extension Service issue 1, University Park, Pennsylvania, USA.

Delorme Topo USA. 2000. Topo USA User Guide. 2 Delorme Drive, P.O. Box 298, Yarmouth, Maine 04096, USA.

Dickson, J. 2002. Fee hunting in Alabama. Auburn University, Extension Service Report ANR-541, Auburn, Alabama, USA.

Dillman, D.A. 2000. The Dillman Total Design Method. http://www.nss.gov.au/nss/home.NSF/0/58fdf2a399f74f14ca2571lab00246626?OpenDocu. Accessed 2012 March 12.

Dobbins, C.L., and K. Cook. 2010. Indiana farmland values and cash rents. Purdue University, Department of Agricultural Economics Farmland Survey, West Lafayette, Indiana, USA.

Downing, D., and J. Clark 1992. Business Statistics. Second edition. Barron's Educational Series, Inc., Hauppauge, New York, USA.

Drummond, S. 2005. Hunting for recreational properties. http://www.ciremagazine.com/article.php?article_id=19. Accessed 2008 February 13.

Ducks Unlimited. 2008. Economic benefits of habitat conservation. http://www.org/Conservation/Habitats/1572/EconomicBenefits.html. Accessed 2008 June 8.

Duffus, D.A., and P. Darden. 1990. Non-consumptive wildlife-oriented recreation: a framework. Biological Conservation 53(3):213-214.

Eberle, P.R., and Wallace, R. 2008. Recreational leases as means to increase landowner income. http://portal.asfmra.org/userfiles/file/journal284_eber1. Accessed 2014 March 9.

Farrand, T.D., and M.R. Ryan. Impact of the conservation reserve program on wildlife conservation in the midwest. http://www.nrcs.usda.gov/Internet/Fse_DOCUMENTS/nrcs143_013476.pdf. Accessed 2014 September 15.

Fly, M.K., B.C. English, R.J. Menard, and K.L. Jenson. 2010. Estimated Economic Impacts of Tennessee's state parks: an executive summary. Tennessee Department of Environment and Conservation, Comprehensive Outdoor Recreation Plan, Nashville, Tennessee, USA.

Francis, C., T. Hansen, and P. Skelton. 2005. Science-based organic farming 2005: toward local and secure food systems. University of Nebraska Extension Division Paper 51, Lincoln, Nebraska, USA.

Freese, C.H., and D.L. Trauger. 2000. Wildlife markets and biodiversity conservation in North America. Wildlife Society Bulletin 28(1):42-45.

Geoghegan, J. 2002. The value of open space in residential land use. Land Use Policy 19:91-98.

Gillette, B. 2004. Ecotourism ventures boost economy, help ecology: Pascagoula River Basin's beauty draws attention. http://www.amazon.com/Ecotourism-ventures-boost-economy-ecology/dp/B00082DRU0. Accessed 2008 April 12.

Gilliland, C.E., and J.B. Vine, Jr. 2004. Where the deer and the antelope play. Tierra Grande publication 1654. http://recenter.tamu.edu/TGrande/vol11-1/1654.html. Accessed 2008 January 8.

Glass, P. 2009. Mississippi Delta forest inventory. http://www.mfc.gov/pdf/MIFI/Inv?MIFI_delta_report. Accessed 2014 February 2.

Golden, K.E., C.S. DePerno, C.E. Moorman, M.N. Peterson, and R.E. Bardon. 2011. Predicting North Carolina landowner participation and interest in wildlife related fee access. Proceedings Annual Conference Southeastern Association of Fish and Wildlife Agencies 65:21-26.

Goulder, L.H., and D. Kennedy. 2009. Interpreting and estimating the value of ecosystem services. Stanford University, Environmental and Resource Economics Department, Stanford, California, USA.

Governor's Natural Resources Leadership Summit (GNRLS). 2006. Land conservation white paper. Marion, Virginia. September 18-19, 2006.

Grafton, W.N., A. Ferrise, D. Colyer, D.K. Smith, and J. Miller. 1990. Conference proceedings: income opportunities for the private landowner through management of natural resources and recreational access. West Virginia University, Extension Service, Morgantown, West Virginia, USA.

Guerrero, S.J. 2012. Analyzing the value of creating waterfowl habitat for farmers/ranchers along the South Platte River. http://www.wcirm.colostate.edu/pub_outreach/waterfowl%20habitat.pdf. Accessed 2014 March 7.

Guiling, P., B. Wade, and D. Doye. 2007. How much influence does recreation have on agricultural land values? Paper presented at the Southern Agricultural Association Annual Meeting, Mobile, Alabama, February 4-7, 2007

Hamilton, R.A., and M.A. Megalos. 2004. Forest land enhancement practices for North Carolina. North Carolina State University, Cooperative Extension Service, Raleigh, North Carolina, USA.

Hanson, T.R. 2006. Catfish farming in Mississippi. http://mshistorynow.mdah.state.us/articles/217/catfish-farming-in-mississippi. Accessed 2013 July 9.

Harper, C. 2003. The hunters' guide to a successful hunt lease. University of Tennessee, Extension Service Publication 1709, Knoxville, Tennessee, USA.

Havens, J.H., R.M. Kaminski, J.B. Davis, and S.K. Riffell. 2009. Winter abundance of waterfowl and waste rice in managed Arkansas rice fields. Proceedings Annual Conference Southeastern Association Fish and Wildlife Agencies 63:41-46.

Hazel, B.R. and E.J. Jones. 1997. Woodland owner notes: Wild turkey management. North Carolina State University, Cooperative Extension Service, Raleigh, North Carolina, USA.

Henderson, J. and N. Novack. 2005. A resurgent rural economy spurs farmland values. http://www.findarticles.com/p/articles/mi_qa3699/is_200501/ai_n13618056/pg_7. Accessed 2008 January 15.

Henderson, J., and S. Moore. 2005. The impact of wildlife recreation on farmland values. The Federal Reserve Bank of Kansas City, Economic Research Department, Report number RWP 05-10, Kansas City, Missouri, USA.

Henderson, J. and S. Moore. 2006. The capitalization of wildlife recreation income into farmland values. The Journal of Agriculture and Applied Economics 38(3).

Henderson, J.E., I.A. Munn, G. Perez-Verdin, and D.L. Grebner. 2008. Forestry in Mississippi: the impact of the forest products industry on the post-Katrina Mississippi economy--an input--output analysis. Forest and Wildlife Research Center, Research Bulletin FO374, Mississippi State University, Mississippi State Mississippi, USA.

Henderson, J.E., S.C. Grado, I.A. Munn, and W.D. Jones. 2010. Economic impacts of wildlife-and fisheries-associated recreation on the Mississippi economy: an input-output analysis. Forest and Wildlife Research Center, Research Bulletin F0429, Mississippi State University, Mississippi State Mississippi, USA.

Henderson, J.R. 2005. Wildlife recreation: rural America's newest billion dollar industry. http://www.extension.iastate.edu/agdm/articles/others/HenJan05.htm. Accessed 2008 February 20.

Henning, S.A., L.R. Vandeveer, G.A. Kennedy, and S. Green. 1996. Louisiana rural values and tenure arrangements. Louisiana State University, Department of Agricultural Economics and Agribusiness A.E.A Information Series No.145, Baton Rouge, Louisiana, USA.

Hite, D., B. Sohngen, J. Simpson, and J. Templeton. 2001. Current issues associated with land values and land use planning. Page 4 in Proceedings of a Regional Workshop, Southern Natural Resources Economics Committee (SERA-IEG-30). Published by Southern Rural Development Center and Farm Foundation, June 2001, University of Georgia, Athens, Georgia, USA.

Holsman, R.H. 2000. Goodwill hunting? exploring the role of hunters as ecosystem stewards. Wildlife Society Bulletin 28:808-816.

Hussain, A., D. Zhang, and J.B. Armstrong. 2003. A conjoint analysis of deer hunters' preferences on hunting leases in Alabama. https://fpauburn.edu/sfws/zhang/working. Accessed 2013 October 13.

Hussain, A., I.A. Munn, S.C. Grado, B.C. West, W.D. Jones and J.C. Jones. 2007. Hedonic analysis of hunting lease revenue and landowner willingness to allow hunting access. Forest Science 53(4):493-507

Hussain, A., I.A., Munn, J. Brashier, W. Daryl Jones, and James E. Henderson. 2013. Capitalization of hunting lease income into northern Mississippi forestland values. Land Economics 89(1):137-153.

Hussain, A., D. Zhang, and J.B. Armstrong. 2004. Willingness to pay for hunting leases in Alabama. Southern Journal of Applied Forestry 28(1):21-27.

IBM. 2003. SPSS 11.0 Guide to Data Analysis. Upper Saddle River, New Jersey, USA.

Internal Revenue Service. 2013. Farmer's tax guide: publication 225. http://www.irs/publications/p225/ch03.html. Accessed 2014 February 14.

Jacobs, D.F. 2006. Importance of hardwood tree plantings. Purdue University, Department of Forestry and Natural Resources FNR-219, West Lafayette, Indiana, USA.

James, L. 2006. Arkansas farmland more valuable. Delta Farm Press. http://www.deltafarmpress.com/news/060330-arkansas-farmland/. Accessed 2008 April 4.

Jensen, C.R. and S.P. Guthrie. 2006. Outdoor Recreation in America. Sixth edition. Human Kinetics Publishers, Champaign, Illinois, USA.

Jones, W.D. 2011. Natural Resources Enterprises: Enhancing Local Synergies and Opportunities in Sustainable Small-scale Forestry and Economic Development to Enhance Global Conservation. 2011 IUFRO Small-Scale Forestry Conference Synergies and Conflicts in Social, Ecological, and Economic Interactions. 24 July 2011, Freiburg. Germany, pp. 113-118.

Jones, W.D., I.A. Munn, S.C. Grado, and J.C. Jones. 2001. Fee hunting: An income source for Mississippi's non-industrial, private landowners. Mississippi State University, Forest and Wildlife Research Center Bulletin FO-164. Mississippi State Mississippi, USA.

Jones, W.D., J.C. Jones, I.A. Munn, and S.C. Grado. 2004. Wildlife enterprises on Mississippi private lands. Proceeding of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies 58:344-355.

Jones, W.D., J.K. Ring, J.C. Jones, K. Watson, D.W. Parvin, and I.A. Munn. 2006. Land valuation increases from recreational opportunity: a study of Mississippi rural land sales. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 60:49-53.

Kaval, P., and J. Loomis. 2003. Updated outdoor recreation use values with emphasis on national park recreation. Colorado State University, Department of Agriculture and Resource Economics Project Number IMDE-02-0070, Fort Collins, Colorado, USA.

Kentucky Department of Fish and Wildlife Resources. 2004. A guide to public hunting areas in Kentucky. http://fw.ky.gov/kfwis/wmaguide.asp. Accessed 2013 May 3.

Kiker, C.F. and A.W. Hodges. 2002. Economic benefits of natural land conservation: case study of northeast Florida. University of Florida, Institute of Food and Agricultural Sciences, Gainesville, Florida, USA.

King, D. 1998. The dollar value of wetlands: trap set, bait taken, don't swallow. National Wetlands Newsletter 20(4):7-11.

Kirchoff, S. 2006. Hot real estate prices extend to rural land. USA TODAY. http://www.usatoday.com/money/economy/housing/2006-03-09-farmland-usat_x.htm. Accessed 2008 February 20.

Knetsch, J.L. 1964. The influence of reservoir projects on land values. Journal of Farm Economics 46(1):231.

Knight, J.E. 2006. Are there ways to capture value from wildlife? Montana State University, Extension Service, Bozeman, Montana, USA.

Krieger, D.J. 2001. Economic value of forest ecosystem services: a review. http://www.wilderness.org/library.Documents/upload/Economic-value-of-Forest-Ecosystem-Services-A-Reviews.pdf. Accessed 2008 April 6.

Krieger, D.J. 2007. The economic value of forest ecosystem services: a review. http://www.cfr.washington.edu/classes.esrm.465/2007/readings/ws_valuation.pdf. Accessed 2013 July 25.

Kroger, T. 2008. Open space property value premium analysis. Defenders of Wildlife, Conservation Economics Program, Washington D.C., USA.

Lansford, N.H., and L.L. Jones. 1995. Marginal price of lake recreation and aesthetics: an hedonic approach. Journal of Agriculture and Applied Economics 27(1):212-223.

Libby, W.L. 2004. Rural-urban issues and research needs. http://aeeosu.edu/sites/aede/files/publication_files/Rural-Urban. Accessed 2014 September 3.

Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group. 2011. Wildlife forestry in bottomland hardwoods: Desired forest conditions for wild turkey, white-tailed deer and other wildlife. http:www.lmvjv.org/library/DFC_Private_Landowner_Brochure. Accessed 2013 May 2.

LSU AgCenter. 2000. Urban Influences on Rural Land Values in Southeastern Louisiana. http://www.bae.lsu.edu/en/communications/publications/agmag/archieve/2000/Winter/Urban+influences+.... Accessed 2008 January 15.

Ma, S., and S.M. Swinton. 2011. Valuation of ecosystem services from rural landscapes using agricultural land prices. Ecological Economics 70:1649-1659.

Mackay, K.J. and J. M. Campbell. 2004. An examination of residents' support for hunting as a tourism product. Tourism Management 25(4):443-452.

Marion, W.R., G.W. Tanner, H.K. Ober, and M. Werner. 2013. Management of pine forests for selected wildlife in Florida. University of Florida, Institute of Food and Agriculture Science publication CIR706, Gainesville, Florida, USA.

MARIS 2006. Geographic Information System. http://www/maris.state.ms.us.HTM/Mapping/internetMapping.html. Accessed 2014 June 23.

Mashour, T., J. Alavalapati, R. Matta, S. Larkin, and D. Carter. 2005. A hedonic analysis of the effect of natural attributes and deed restrictions on the value of conservation easements. Forest Policy and Economics 7(5):771-781.

McClave, J.T., P.G. Benson, and T. Sincich. 1998. Statistics for business and economics. Prentice Hall Publishers, Upper Saddle River, New Jersey, USA.

McCoy, R. 2004. Bottomland hardwood forests: restoration and management. http://www. agebb.missouri.edu/agforest/archives/v8n3/gh4.htm. Accessed 2014 June 15.

McKee, C.W. 1987. Economics of accommodating wildlife *in* Proceedings of managing southern forests for wildlife and fish. USDA Forest Service, Southern Forest Experiment Station, General Technical Report SO-65, New Orleans, Louisiana, USA.

McKeever, D.B. and J.L. Howard. 1996. Value of timber and agricultural products in the United States, 1991. Forest Products Journal 46(10):45-50.

McKillup, S. 2006. Statistics explained: an introductory guide for life sciences. Cambridge University Press, United Kingdom.

McLaren, R.S. 2004. An analysis of marginal effects of land characteristics and purchase factors on rural lands values in north Louisiana. Thesis, Louisiana State University, Baton Rouge, Louisiana, USA.

McPeake, R., J. Jennings and D. Long. 2009. Managing pastures and hay lands for wildlife. University of Arkansas, Cooperative Extension Service FSA9083, Fayetteville, Arkansas, USA.

Measells, M. February 2007. 2006 harvest of forest products. Mississippi State University, Extension Service, Mississippi State, Mississippi, USA.

Mertz, T. 2007. Nature's services: Ecosystems are more than wildlife habitat. http://www.rand.org/scitech/stpi/ourfuture/NaturesServices/section1.html. Accessed 2008 January 8.

Messmer, T. 1992. Managing for the most: a landowners planning and planting guide to conserving North Dakota's wildlife legacy. North Dakota State University, Extension Service Technical Report WL-1000, Fargo, North Dakota, USA.

Michael, H.K., K.J. Boyle, and T. Bouchard. 1996. Water quality affects property prices: A case study of selected Maine Lakes. University of Maine, Agricultural and Forest Experiment Station ISSN 1070-1516, Orono, Maine, USA.

Miller, B.K., L. O'Malley, and J.R. Seifert. 2008. Forests and our environment. http://www.ces.purdue.edu/extmedia/FNR/FNR-139.html. Accessed 2008 January 6.

Minnesota Department of Natural Resources. 2009. Managing your woodland for white-tailed deer. http://www.files.dnr.state.mn.us/assistance/backyard/privatelandsprogram/managing_woodland_deer_.pdf. Accessed 2014 June 23.

Mississippi Climate Office. 2006. Current Mississippi weather information and forecasts. http://www.msstate.edu/dept/geoscience/climate. Accessed 2014 June 5.

Mississippi Department of Agriculture and Commerce (MSDAC). 2006. 2006 Annual Report. http://209.85.165.104/search?q=cache:8ULKtt411vcJ:www.mdac.state.ms/n_library/pub. Accessed 2008 April 2.

Mississippi Department of Agriculture and Commerce (MSDAC). 2012. Aquaculture. http://www.mdac.state.ms.us./publicationsand_forms/publications/pdf/com_aquaculture.pdf. Accessed 2013 July 9.

Mississippi Forestry Association. 2006. Mississippi forest facts acreage and ownership. Jackson, Mississippi, USA.

Mississippi Forestry Commission. 2007. The Forest Resource Development Program. MFC publication #33. Jackson, Mississippi, USA.

Mississippi Forestry Commission. 2008. Forest Land Enhancement Program. http://www.mfc.state.ms.us/landownerassistance/LA7.htm. Accessed 2008 May 15.

Mississippi Forestry Commission. 2010. Caring for the trees and forests of Mississippi. Jackson, Mississippi, USA.

Mississippi Institute for Forest Inventory (MIFI). 2008. North Mississippi Forest Inventory. http://www.mifi.ms.gov/documents/MIFI_North_Report.pdf. Accessed 2014 March 11.

Mississippi Institute for Forest Inventory (MIFI). 2009. Mississippi delta forest inventory. http://www.mfc.ms.gov/pdf/MIFI/Inv/MIFI_delta_report.pdf. Accessed 2014 March 11.

Mississippi State Climate Office. 2006. General description of weather in Mississippi. Accessed 2008 June 6.

Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine and Mississippi Farm Bureau Federation. 2012. Mississippi agriculture overview. http://www.mdac.state.ms.us/agency/agriculture-in-mississippi.htm. Accessed 2013 June 16.

Montana Fish, Wildlife and Parks. 2002. Draft plan released for Thompson-Fisher Land Agreement. http://fwp.mt.gov/news/article_1476.aspx. Accessed 2008 April 4.

Mozumder, P., C.M. Starkbuck, R.P. Berrens, and S. Alexander. 2007. Lease and fee hunting on private lands in the U.S. A review of the economic and legal issues. Human Dimensions of Wildlife 12:1-14.

Mississippi State University Extension Service. 2012. Mississippi Agriculture, Forestry, and Natural Resources. www.dafvm.msstate.edu/factbook.pdf. Accessed 2014 June 4.

Munn, I.A., A. Hussain, B.C. West, S.C. Grado, and W.D. Jones. 2007. Analyzing landowner demand for wildlife and forest management information. Journal of Agricultural and Applied Economics 39(3):557-569.

National Flyway Council and Wildlife Management Institute. 2006. National duck hunter survey 2005 national report. http://www.ncwildlife.org/portals/0/hunting/ducks. Accessed 2013 November 11.

Natural Resources Conservation Service (NRCS). 2008. Washington NRCS Farm Bill Programs and Services. http://www.wa.nrcs.usda.gov/programs/. Accessed 2008 April 17.

National Wildlife Federation. 2013. How does the BP oil spill impact wildlife and habitat? https://www/nwf.org?What-We-Do/Protect-Habitat/Gulf-oil-Spill/Effects-pm-W. Accessed 2014 February 8.

Netusil, N.R. 2006. Economic valuation of riparian corridors and upland wildlife habitat in an urban watershed. Journal of Contemporary Water Research & Education 134:39-45.

Neumann, B.C., K.J. Boyle, and K.B. Bell. 2009. Property price effects of a National Wildlife Refuge: Great Meadows National Wildlife Refuge in Massachusetts. Land Use Policy 26(4):1011-1019.

Nickerson, C., M. Morehart, T. Kuethe, J. Beckman, J. Ifft, and R. Williams. 2012. Trends in U.S. farmland values and ownership. U.S. Department of Agriculture, USDA Economic Bulletin No. 92, 1400 Independence Ave., S.W., Washington D.C., USA.

Ning, Z., T Doyle, and K. Abdollahi. 2008. Gulf coast forests in a changing climate. www.safnet.org/fp/documents/coastal_forests_in_changing_climate_08.pdf. Accessed 2014 June 1.

Nix, A. 2008. Wildlife and the outdoors, streamside management zones. https://www.outdooralabama.com/hunting/hunterresources/articles/streamside.cfm. Accessed 2012 Aug 6.

North Carolina Department of Agriculture and Consumer Services. 2006. Aquaculture in North Carolina catfish inputs, outputs and economics. http://www.ncagr.gov/markets/aquaculture/catfish01.pdf. Accessed 2014 March 5.

North Carolina Fishing News. 2006. Trout Fee-Fishing Ponds in Western North Carolina. http://www.ncwildlife.org?pg03_Fishing/pg3d18.htm. Accessed 2008 February 15.

North Carolina State University (NCSU) Extension Service. 2005. Woodland owner notes: developing wildlife friendly pine plantations. Publication No. E05-44576. Raleigh, North Carolina, USA.

Norusis, M.J. 2000. SPSS 11.0 Guide to Data Analysis. Upper Saddle River, Prentice Hall, New Jersey, USA.

Novack, N. 2003. Rising farmland values: some implications for rural America. http://www.extension.iastate.edu/agdm/articles/others/NovJuly03.htm. Accessed 2008 February 11.

Nudel, M. and C. Cassel. 2012. Home values higher near national wildlife refuges, new study finds. http://www.fws.gov/southeast/news/2012/030.html. Accessed 2013 November 11.

Outdoor Industry Association. 2012. The outdoor recreation economy: Take it outside for American jobs and a strong economy. http://www.outdoor industry.org/pdf/OIAOutdoorRecEconomy. Accessed 2013 June 14.

Outdoor Industry Foundation. 2005. Outdoor recreation participation study for year 2004. <http://www.dcnr.state.pa.us./cs/groups/publicdocuments/doc>. Accessed 2013 June 14.

Paris, J.P. 2003. Wetland Reserve Program financial assistance. http://www.wildlifemiss.org/financial/wetland.html. Accessed 2014 March 7.

Parsons, C. April 2006. Economic value of the natural environment: understanding Washington's critical areas. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Paulson, J. 2003. Protecting farmland on the edge: What policies and programs work? http://aftresearch.org/research/rsourcepublication/wp/wp97-14html. Accessed 2014 May 29.

Perez, D. 2013. The returns of owning a farm. http://www.whitetailproperties.com/the returns-of-owning-a-farm. Accessed 2014 May 29

Petrolia, D.R., M.G. Interis, J. Hwang, M.K. Hidrue, R.G. Moore, and G.S. Kim. 2013. America's Wetland? A national survey of willingness to pay for restoration of Louisiana's coastal wetlands. Department of Agricultural Economics final project report revised April1, 2013. Mississippi State University, Mississippi State Mississippi, USA.

Pettry, D. 1977. Soil resource areas of Mississippi. Mississippi Agriculture and Forestry Experiment Station Information Sheet 1278, Mississippi State University, Mississippi State, Mississippi, USA.

Pickton, T., and L. Sikorowski. 2004. The economic impacts of hunting, fishing, and wildlife watching in Colorado. BBC Research & Consulting final report for Colorado Division of Wildlife, Denver, Colorado, USA.

Porter, M. 2008. The Value of Woody Plants. The Samuel Roberts Noble Foundation, Inc. http://www.noble.org/Ag/Wildlife/ValueOfWoodyPlants/Index.htm. Accessed 2008 February 10.

Qiu, Z., T. Prato, and G. Boehm. 2003. Economic analyses of competing land uses in environmentally fragile rural-urban interfaces. University of Missouri, Center for Agricultural, Resource and Environmental Systems, Columbia, Missouri, USA.

Reason Public Policy Institute (RPPI). 2000. The vanishing farmland myth and the smart-growth agenda. Policy Brief No. 12. Los Angeles, California, USA.

Research Consultation. 2007. What is multicollinearity in multiple regression? http://www.researchconsultation.com/what-is-multicollinearity-multiple-regression. Accessed 2012 August 7.

Rinehart, J. 2010. U.S. timberland post-recession. http://investmentforestry.com/resources/1%20-%20post-recession%20timberland. Accessed 2014 May 29.

Ringelman, J.K. 2009. Managing Agriculture Foods for Waterfowl. Waterfowl Management Handbook. Ducks Unlimited, Sacramento, California, USA.

Rodiek, J.E., and E.G. Bolan. 1991. Wildlife and Habitats in Managed Landscapes. http://books.google.com/books?id=VZKvf5caXaIC&pg=RA1-PA61&1pg+RA1-PA61&dq=habitat+and+r.... Accessed 2008 February 1.

Schuyt, K., and L. Brander. January 2004. Living waters the economic values of the world's wetlands. http://www.unwater.org/downloads/wetlandsbrochurefinal.pdf Accessed 2014 March 6.

Shan, M., and S. Swinton. 2011. Valuation of ecosystem services from rural landscapes using agricultural land prices. Ecological Economics 70(9):1649-1659.

Shrestha, R.K., Stein, T.V., and J. Clark. 2007. Valuing nature-based recreation in public natural areas of the Apalachicola River region, Florida. Journal of Environmental Management 85(4):977-985.

Smith, W.H. 2008. Air pollution and forests. http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=7000629. Accessed 2012 January 26.

Snipes, C.E., S.P. Nichols, D.H. Poston, T.M. Walker, L.P. Evans, and H.R. Robinson. 2005. Current agricultural practices of the Mississippi Delta. Mississippi Agricultural & Forestry Experiment Station Bulletin 1143, Mississippi State Mississippi, USA.

Snyder, S.A. 1994. Southern mixed forest. *In* Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, Colorado, USA.

Society of American Foresters (SAF). 2010. Effects of forest management on wildlife. http://encyclopediaofforestry.org/index.php/Effects_of_Forest_Management_on_Wildlife. Accessed 2013 May 10.

Sorum, J. 2007. Measuring marina economic impacts. http://boating sailing.suite101.com/article.cfm/measuring_marina_economic_impacts. Accessed 2008 June 8.

South Dakota Grasslands Wilderness Coalition. 2005. The Cheyenne River Valley Grasslands Heritage Proposal Fact Sheet. http://www.sdgrasslandscoalition.org/economics_benefits.asp. Accessed 2008 April 3.

Southwick Associates. 2011. The economics associated with outdoor recreation, natural resources conservation, and historic preservation in the United States. http://www.trcp.org/assets/pdf/The_Economic_Value. Accessed 2013 April 13.

Southwick Associates. 2012. Hunting in America. http://www.nssf.org/pdf/research/HuntinginAmerica_Economics

Southwick Associates 2012. The economics associated with natural areas in the Delmarva Peninsula. http://www. trcp.org/assets/pdf/Delmarva. Accessed 2013 June 15.

Spann, J. 2014. Catch your thrill in Mississippi's great outdoors. www.visitMississippi.org/pdfs/April-outdoorsmonth-4-1-14.pdf. Accessed 2014 June 1.

Stewart, R.A. 2003. Physiographic regions of Mississippi. Handout, Department of Biological Sciences, Delta State University, 6 pp. (with addenda by S.P. Faulkner, 2005).

Stiers, J. 2007. Hunting land rural residents make profit off unfarmed property. Gatehouse News Service, Nov 24. Middletown, New York, USA.

Stokes, S., and M. Lowe. 2013. Wildlife tourism and the Gulf Coast economy. http://www.daturesearch.com/wpcontent/uploads/WildlifeTourismReport_Final.pdf. Accessed 2013 July 10.

Streiner, C.F., and Loomis, J.B. 1995. Estimating the benefits of urban stream restoration using the hedonic price method. Rivers 5(4):267-278.

Stribling, H.L. 1994. Hunting leases and permits. Auburn University, Alabama Extension Service Report ANR-0541., Auburn, Alabama, USA.

Strickland, B.K., R.M. Kaminski, A.T. Pearse, and W.D. Jones. 2008. Catfish-duck ponds for the Mississippi Delta. http://www.thefishsite.com/articles/488/catfishduck-ponds-for-the-mississippi-delta. Accessed 2009 August 15.

Sun, X., I.A. Munn, E. Loden, A. Hussain, and S.G. Grado. 2006. Assessment of the economic impacts of Mississippi outfitters for opportunities for expansion. MSU Forest and Wildlife Research Center #FOXXX, Mississippi State University, Mississippi State, Mississippi, USA.

Tempesta, T., and Thiene, M. 1997. Land Reform Bulletin. Sustainable Development Department, Food and Agriculture Organization of the United Nations (FAO). http://www.fao.org/sd/LTdirect/LR972/w6728t04.htm. Accessed 2008 February 11.

Texas A&M Agricultural Research and Extension Center. 2006. Texas Rice. http://beamont.tamu.edu/elibrary/Newsletter/2006_July_Newsletter.pdf. Accessed 2008 April 12.

Texas Parks and Wildlife Department. 2008. Hunting and fishing a $14.4 billion industry in Texas. http://www.tpwd.state.tx.us/newsmedia/releases/?req=20080226g. Accessed 2008 June 7.

Tharp, R. 2009. Wildlife and the outdoors: Wildlife benefits of longleaf pine. Outdoor Alabama. Alabama Department of Conservation and Natural Resources. Montgomery, Alabama.

The Center for Rural Pennsylvania. 1998. Economic values and impacts of sport fishing, hunting and trapping activities in Pennsylvania. http://www.ruralpa.org/hunting.pdf. Accessed 2008 April 8.

The Institute for Ecological Health (IEH). 2001. Ecological benefits from rural land stewardship. http://www.instituteforecologicalhealth.org/conserving_rural_landscapes.html. Accessed 2008 April 2.

The Izaak Walton League of America. 2013. Damaged delta. http://www.iwla.org/index.php?ht=display/ContentsDetails.i/15269/pid/203. Accessed 2013 May 25.

Theodore Roosevelt Conservation Partnership. 2013. Gulf of Mexico recreational fisheries: recommendations for restoration, recovery, and sustainability. http:www.trcp.org/assets/pdf/Gulf_Report_Final.pdf. Accessed 2014 February 8.

The Mississippi Business Journal. 2007. Largest cities driving the Magnolia State's Economy. http://goliath.ecnext.coms2/gi0199. Accessed 2011 March 25.

The Outdoor Foundation. 2012. Participation Report. http://www.outdoorfoundation.org/pdf/researchparticipation. Accessed 2013 February 20.

The Samuel Roberts Noble Foundation, Inc. 2014. Think before constructing ponds. http://www.noble.org/ag/wildlife/constructingponds/. Accessed 2014 March 8.

The Wildlife Habitat Management Institute. 2005. Farm Pond Ecosystems. http://74.125.95.132/search?q=cache:iHFXvZwRNDcJ:ftp://ftp-fc.sc.egov.usda.gov/WHM..... Accessed 2009 August 15.

Trout Unlimited. 2005. The economic value of healthy fisheries in Wyoming: a trout unlimited Wyoming water project report in support of the creation of the Wyoming Wildlife and Natural Resources Funding Act. http://www.tu.org/atf/cf/%7BOD/8ecb7-7349-44B5-A38E-65B2BBBD8A%7D/Economics-Fisheries-wy.pdf. Accessed 08 April 11.

University of Florida Cooperative Extension Service. 2001. A quarterly newsletter for landowners and resource professionals. http://www.sfrc.ufl.edu/extension/FFSnl/ffsn18/.htm. Accessed 2008 April 11.

University of Florida Institute of Food and Agricultural Sciences. 2004. Florida 4-H Ecology. http://www.sfrc.ufl.edu/4h/Ecosystems/Bottomland_Hardwoods. Accessed 2009 August 15.

University of Florida Institute of Food and Agricultural Sciences. 2013. The importance of bottomland hardwood forests in wildlife. http://edis.ifas.ufl.edu/uw316. Accessed 2014 March 17.

U.S. Census Bureau. 2012. Statistical abstract of the United States. http://www.census.gov/prod/2011pubs/12statab/natresor.pdf. Accessed 2014 May 29.

U.S. Census Bureau. 2012. State and county quick facts. http://quickfacts.census.gov/qfd/states/28000.html. Accessed 2013 April 17.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA). 2008. Restoring America's wetlands: a private lands conservation success story. http://www.nrcs.usda.gov/internet/FSE_DOCUMENTS/stelprdb1045079.pdf. Accessed 2014 March 7.

U.S. Department of Agriculture, Forest Service (USDA). 2006. Caring for the land and serving people. http://www.fs.fed.us/projects/four-threats/key-messages/open-space.shtml. Accessed 2008 January 8.

U.S. Department of Agriculture, Forest Service (USDA). 2012. National forests and grasslands in Texas. http://www.fs.usda.gov./activity/Texas/recreation/hunting. Accessed 2012 August 26.

U.S. Department of Agriculture (USDA). January 10, 2007. FEDERAL REGISTER Proposed Rules: 72(6).

U.S. Department of Agriculture (USDA) August 2007. Land values and cash rents 2007 summary. USDA-NASS 1400 Independence Ave., SW, Washington D.C., USA.

U.S. Department of Agriculture (USDA). August 2010. Land values and cash rents 2010 survey. USDA-NASS 1400 Independence Ave., SW, Washington D.C., USA.

U.S. Department of Agriculture (USDA). August 2012. Land values 2012 Summary. USDA-NASS 1400 Independence Ave., SW, Washington D.C., USA.

U.S. Department of Agriculture (USDA). August 2013. Land values 2013 summary. USDA-NASS 1400 Independence Ave., SW, Washington D.C., USA.

U.S. Department of Agriculture (USDA). April 22, 2014. The Agricultural Act of 2014. www.usda.gov/wps/portal/usda/usdahome?. Accessed 2014 May 30.

U.S. Environmental Protection Agency (EPA). 2001. Functions and values of wetlands. http://www.epa.gov/owow/wetlands/pdf/funvalp2. Accessed 2008 May 28.

U.S. Environmental Protection Agency (EPA). 2002. Healthy lakes and higher property values. http://water.epa.gov/type/lakes/upload/healthy_lake. Accessed 2013 November 9.

U.S. Environmental Protection Agency (EPA). 2013. Major crops grown in the United States. http://www.epa.gov/agriculture/ag101/cropmajor.html. Accessed 2013 October 13.

U.S. Fish and Wildlife Service (USFWS). 1997. Banking on nature: the economic benefits to local communities of national wildlife recreation. http://library.fws.gov/Refuges/EconBen_refuges97.pdf. Accessed 2008 April 4.

U.S. Fish and Wildlife Service (USFWS) and U.S. Department of Commerce (USDOC). 2002. 2001 National Survey of Fishing, Hunting, and Wildlife-associated Recreation.

U.S. Fish and Wildlife Service (USFWS). 2007. News release. http://www.fws.gov/newsreleases/showNews.cfm?newsId+208AD97e-F21e-7I6D-4E57C484DFE. Accessed 2008 Apr 13.

U.S. Fish and Wildlife Service (USFWS) and U.S. Department of Commerce (USDOC). 2008. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation – Mississippi.

U.S. Fish and Wildlife Service and U.S. Department of Commerce (USDOC). 2011. National survey of fishing, hunting, and wildlife-associated recreation. http://www.census.gov/prod/2012pubs/fhwii-nat.pdf. Accessed 2013 June 14.

U.S. Fish and Wildlife Service (USFWS). 2011. Net Worth, the economic value of fisheries conservation. USFWS's Division of Economics. Arlington, VA.

U.S. Fish and Wildlife Service (USFWS) and U.S. Department of Commerce. 2012. 2011 National survey of fishing, hunting and wildlife-associated recreation national overview. http://www.doi.gov/news/pressreleases/upload/FWS-national. Accessed 2013 April 15.

U.S. National Park Service (USNPS). 1995. Economic impacts of protecting rivers, trails, and greenway corridors. Fourth edition. Rivers, Trails and Conservation Assistance (RTCA), USNPS, San Francisco, California, USA.

Vermont Agency of Natural Resources. 1998. Fish, Wildlife and Habitat, Wildlife and Vermont's Economy. http://www.anr.state.vt.us/Env98/DOCS/webpages/fish.htm. Accessed 2008 February 15.

Virginia Cooperative Extension Service. 2007. Fee-fishing ponds and streams in Virginia Publication number 420-720, Petersburg, Virginia, USA.

Virginia Department of Forestry. 2013. Tomorrow woods forest management cost-share program. Forest topic 17, Charlottesville, Virginia, USA.

Virginia Department of Game and Inland Fisheries. 2009. Open field management. http://www.dgif.virginia.gov/habitat/landowners/infosheets/opem-field-management.asp. Accessed 2009 August 15.

Walter, M.J., D. Scrogin, V. Seidel, M. Schneider, and P. Walsh. 2006. An economic analysis of the effects of land conservation, parks and open spaces on residential property values in Orange County, Florida. University of Central Florida, Department of Economics, Orlando, Florida, USA.

Washington Department of Fish and Wildlife. 2002. Economic benefits of fish and wildlife recreation in Washington state. http://wdfw.wa.gov/factshts/econ_benefits_rec.htm. Accessed 2008 June 8.

Wattendorf, B. 2003. The Value of Largemouth Bass to Florida's Economy. http://myfwe.com/Fishing/updates/Bass-Values.html. Accessed 2008 February 2.

White, E. and L. Leefers. 2007. Influence of natural amenities on residential property values in a rural setting. Society and Natural Resources: An International Journal 20(7):659-667.

Whittington, A., G. Parkhurst, D. Hudson, and V. Buller. 2005. Impact of hunting and fishing on Mississippi Counties. Selected paper prepared for presentation at the Southern Agricultural Economics Association Annual Meetings February 5-9, Little Rock, Arkansas, USA.

Winship, C. 1999. The perils of multicollinearity: a reassessment. http://courses.gov.harvard.edu/gov3009/fall99/10-20.pdf. Accessed 2012 August 18.

Wisconsin Department of Natural Resources. 2011. The 2011-2016 Wisconsin Statewide Comprehensive Outdoor Recreation Plan. dnr.wi.gov/topic/parks/planning/scorp/pdfs/scorp_2011_16_chap5.pdf. Accessed 2014 June 1.

Wisconsin Department of Natural Resources. 2013. Wisconsin's managed forest law a program summary. PUB-FR-295 Revised January 2013, Madison, Wisconsin, USA.

Wu, J., and H. Lin. 2010. The effect of the Conservation Reserve Program on land values. Land Economics 86(1):1-21.

Wu, S., Hou, Y., and G Yuan. 2010. Valuation of forest ecosystem goods and services and forest natural capital of the Beijing municipality, China. www.fao.prg/docrep/o12/i1507ei1507307.pdf. Accessed 2014 May 29.

Wynne, F. 1994. Budgets for small scale catfish production to supply a fee fishing operation. Kentucky State University, Cooperative Extension Service, Frankfort, Kentucky, USA.

Wynne, F. 2006. Managing Kentucky fee fishing operations. Kentucky State University, Cooperative Extension Service, Frankfort, Kentucky, USA.

Yarrow, G., and D. Yarrow. 1999. Managing wildlife. Sweetwater Press. Birmingham, Alabama, USA.

Yarrow, G. 2009. Managing for wildlife diversity in managed forests. Clemson University, Extension Service Fact Sheet 20, Clemson, South Carolina, USA.

Yarrow, G. 2009. Habitat requirements of wildlife: food, water, cover and space. Clemson University, Extension Service Fact Sheet 14, Clemson, South Carolina, USA.

Yarrow, G. 2009. Providing habitat needs for wildlife through forest and agricultural management, Clemson University, Extension Service Fact Sheet 24, Clemson University, Clemson, South Carolina, USA.

Yorke, D.E. 1995. Wildlife habitat improvement: farmlands and wildlife. University of New Hampshire, Cooperative Extension office, Durham, New Hampshire, USA.

Zhang, D., Hussain, A., and J.B. Armstrong. 2006. Supply of hunting leases from non-industrial private forest lands in Alabama. Human Dimensions of Wildlife 11:1-14.

APPENDIX A

MISSISSIPPI RURAL LAND VALUE SURVEY

The Forest and Wildlife Research Center, Mississippi State University, is collecting limited information from knowledgeable experts concerning rural land sales where price was influenced by recreational use. Please complete the following information for each parcel of land which (in your opinion) sold because of its actual or potential recreational use.

Section I. Property Information

1. County _____ Section _____ Township _____ Range _____

(If the sale involved several detached properties, identify a section near the center.)

2. What was the importance of outdoor recreation in the sale of this property?
(Circle one.)
1) Unable to answer 2) Not important 3) Important 4) Highly important

3. (a) Report the number of acres in the following categories:

- **Agricultural** – row crops, pasture or fallow fields, catfish ponds, or orchards.
- **Forested** – standing timber of any size (e.g., seedlings, saplings, pulpwood, saw timber) or type (e.g., pine, hardwoods, mixed pine-hardwoods), including acres that were recently harvested or will remain in timber production.
- **Other** – all land not included in the agricultural or forested categories.
- **Total Acres** **Agricultural Acres** **Forested Acres** **Other Acres**

_____ _____ _____ _____

3. (b) Agricultural Land
For agricultural lands reported in Question 3 (a) above, estimate number of acres in each of the following uses:

Use:	**Acres involved:**	
Row Crops	_____	
Pasture or fallow fields	_____	
Farm or stock ponds, aquaculture	_____	
Other **(Please specify.)**	_____	_____

3. (c) Forested Land
For forested acres reported in Question 3 (a) above, estimate number of acres in the following conditions or timber type:

Use	**Description**	**Acres**	**Age of Stand**
Cutover	Recently harvested; not replanted	_____	_____
Planted pines	Pine plantations	_____	_____
Natural pines	Mostly natural pines	_____	_____
Upland hardwoods	Mostly hardwoods on upland sites	_____	_____
Bottomland hardwoods	On bottomland sites	_____	_____
Mixed pine-hardwoods	Substantial amounts of both pines and hardwoods	_____	_____

3. (d) Other Land Uses

For land reported as other acres in Question 3 (a) above, estimate the number of acres in the following categories:

Category	**Description**	**Acres**
Permanent water (man-made)	*Ponds, other. Do not include aquaculture ponds.*	_____
Permanent water (natural)	*Sloughs, brakes, beaver ponds, lakes, or major stream.*	_____
Semi-permanent water (natural)	*Similar to above but usually remains dry in summer*	_____
(Semi-permanent water-Agriculture and active timber management are not possible)		
Power lines or gas rights-of-way	*Pathways for transportation and utilities*	_____
Wildlife food plot	*Report only areas used exclusively for wildlife and not for timber or agricultural production.*	_____
Other **(Please specify.)** _____		_____

4. (a) Has a conservation easement been recorded on this property?

Yes _____ No _____ Do Not Know_____

If yes, how many acres are included in the easement? _____

4. (b) Have any acres on the property been enrolled in government cost-share assistance programs?

Yes _____ No _____ Do Not Know_____

(**If yes,** circle program and fill in acreage.)

WRP_____ CRP _____ WHIP _____ EQIP_____ CSP_____

Forestland Enhancement Program _____

Forest Resource Development Program _____

Other (include program name and acres involved) _____

Section II. Land Use

5. Actual or Potential Recreational Uses on the Property (Check all that apply.)

_____ Hunting
_____ Fishing
_____ Wildlife watching/photography (e.g., bird watching)
_____ Horseback riding
_____ Motorized travel (e.g., ATV, dirt bike, boat, and jet-ski)
_____ Nature-based tourism (e.g., camping, picnicking, hiking, swimming, and non- motorized boating)
_____ Other (Please specify.) _____
_____ Do not know

6. Has the land recently been leased for recreational use?

Yes_____ No_____ Do Not Know_____

If yes, describe. (e.g., $8/acre/yr. for forested acres; $5/acre/yr. for entire parcel.)

_____

7. Have any lakes, ponds, sloughs, or impoundments on the property been leased or payments collected for fishing?

Yes_____ No_____ Do Not Know_____
If yes, describe. (Please give amount of payment.)
_____

8. What type of road access exists on/to the property? (Check all that apply.)

On property:	**To property:**
____ Regular vehicle (e.g., car, truck)	____ Regular vehicle (e.g., car, truck)
____ Four-wheel drive vehicle	____ Four-wheel drive vehicle
____ All-terrain vehicle (ATV)	____ All-terrain vehicle (ATV)

Section III. Wildlife and Fish Game Species

9. Check all species perceived to be abundant on the property.
_____ Deer
_____ Dove
_____ Quail
_____ Squirrel
_____ Turkey
_____ Waterfowl
_____ Rabbit
_____ Wild Hog
_____ Game Fish
_____ Other (**Please specify.**) _____

Section IV. Parcel Information

10. The parcel sold for $_____ / acre or $_____.

11. The parcel would have sold for $_____ / acre or $_____ if potential recreational uses were not a factor.

12. Was the sold parcel adjoining or in proximity to public lands?
Yes _____ No _____

13. **If yes**, what type of public land is adjacent to or in proximity of the property? (Check all that apply.)

	Adjoining	**In proximity**
National wildlife refuge	_____	_____
National forest	_____	_____
National park or parkway	_____	_____
State park	_____	_____
State wildlife management area	_____	_____
Public lake and/or reservoir	_____	_____

Section V. Existing Structures and Amenities

14. Which structures existed on the property at time of purchase? (Check all that apply.)
   _____ House(s)
   _____ Lodge(s)
   _____ Cabin(s)/camp house(s)
   _____ Barn(s)
   _____ Storage building(s)
   _____ Water well(s)
   _____ Electricity
   _____ Levee system(s)
   _____ Other structures and/or amenities (Specify type of structure or amenity below.)

_____

15. Were mineral rights included in the sale of the property? ____ Yes ____ No

16. List the county, city, and state of purchaser's residency._____

17. Date of sale

_____

Additional comments regarding the sale:

_____
_____
_____
_____

APPENDIX B

PEARSON CORRELATION ANALYSES

Table 24 Pearson correlation coefficients matrix for statewide explanatory land cover variables on properties for which sales values were collected in Mississippi for estimation of recreational contributions on rural lands sales during 2003-2008.

Variable		Row crop lands	Pasture fallow fields	Plant. pine for.	Nat. pine for.	Up. hdwd. for.	Bottom-land hdwd. for.	Mixed pine-hdwd. for.	Wood-land for.	Food plots
Row crop lands	Pearson Correl.	1	-.044	-.033	-.026	-.024	.023	.028	-.013	.228
	Sig. (two-tailed)		.219	.350	.468	.506	.516	.427	.781	.000
	N	800	800	800	800	800	800	800	800	800
Pasture/ fallow fields	Pearson Correl.	-.044	1	.004	-.017	-.023	-.035	-.044	.162	-.032
	Sig. (two-tailed)	.219		.912	.631	.519	.320	.217	.000	.368
	N	800	800	800	800	800	800	800	800	800
Planted pine for.	Pearson correl.	-.033	.004	1	.212	.645	.006	.130	-.052	.006
	Sig. (two-tailed)	.350	.912		.000	.000	.861	.000	.139	.857
	N	800	800	800	800	800	800	800	800	800
Nat. pine for.	Pearson Correl.	-.021	-.017	.212	1	.005	.066	.109	.066	.007
	Sig. (two-tailed)	.468	.631	.000		.881	.063	.002	.063	.847
	N	800	800	800	800	800	800	800	800	800
Up. hdwd. for.	Pearson correl.	-.024	-.023	.645	.005	1	-.023	-.038	.074	-.005
	Sig. (two-tailed)	.506	.519	.000	.881		.525	.285	.036	.895
	N	800	800	800	800	800	800	800	800	800
Bottom-land hdwd. for.	Pearson Correl.	.023	-.035	.006	.066	-.026	1	-.018	-.034	-.015
	Sig. (two-tailed)	.516	.320	.861	.063	.525		.621	.343	.664
	N	800	800	800	800	800	800	800	800	800
Mixed pine-hdwd. for.	Pearson Correl.	.028	-.044	.130	.109	-.038	-.018	1	-.058	.016
	Sig. (two-tailed)	.427	.217	.000	.002	.285	.621		.103	.660
	N	800	800	800	800	800	800	800	800	800
Wood-land for.	Pearson Correl.	-.013	.162	-.052	.066	.074	-.034	-.058	1	.021
	Sig. (two-tailed	.713	.000	.139	.063	.036	.343	.103		.559
	N	800	800	800	800	800	800	800	800	800

Table B.1 (continued)

Variable		Row crop lands	Pasture fallow fields	Plant. pine for.	Nat. pine for.	Up. hdwd. for.	Bottom-land hdwd. for.	Mixed pine-hdwd. for.	Wood-land for.	Food plots
Food plot s	Pearson correl.	.228	-.032	.006	.007	-.005	-.015	.016	.021	1
	Sig. (two-tailed)	.000	.368	.857	.847	.895	.664	.660	.559	
	N	800	800	800	800	800	800	800	800	800

Table 25 Pearson correlation coefficients matrix for explanatory land cover variables on properties for which sales values were collected within the Mississippi Delta/Hills Region for estimation of contributions of rural lands sales for recreation in Mississippi during 2003-2008.

Variable		Row crop lands	Pasture/ fallow fields	Plant. pine for.	Nat. pine for.	Up. hdwd for.	Bott. land hdwd for.	Mixed pine-hdwd. for.	Wood land for.	Food plot areas	Acres leased for rec.
Row crop lands	Pearson correl.	1	-.048	-.057	-.045	.072	-.020	.005	-.027	.246	.277
	Sig. (two-tailed)		.426	.342	.454	.235	.747	.939	.650	.000	.000
	N	276	276	276	276	276	276	276	276	276	276
Pasture/ fallow fields	Pearson correl.	-0.48	1	-.012	-.005	.087	-.035	-.024	-.019	-.024	-.041
	Sig. (two-tailed)	.426		.841	.932	.150	.565	.688	.756	.695	.498
	N	276	276	.276	276	276	276	276	276	276	276
Plant. pine for.	Pearson correl.	-.057	-.012	1	.602	.017	.031	.520	-.054	.007	-.053
	Sig. (two-tailed)	.342	.841		.000	.780	.612	.000	.368	.911	.378
	N	276	276	276	276	276	276	276	276	276	276
Nat. pine for.	Pearson correl.	-045	-.005	.602	1	-.007	.060	-.118	.016	-.022	-.032
	Sig. (two-tailed)	.454	.931	.000		.908	.322	.050	.798	.713	.601
	N	276	276	276	276	276	276	276	276	276	276
Up. hdwd for.	Pearson correl.	-.072	.087	.017	-.007	1	-.066	-.068	.259	-.049	-.082
	Sig. (two-tailed)	.235	.150	.780	.908		.276	.261	.000	.421	.175
	N	276	276	276	276	276	276	276	276	276	276
Bott. land hdwd for.	Pearson correl.	-.026	-.035	.031	.060	-.066	1	-.038	-.054	-.035	-.006
	Sig. (two-tailed)	.747	.565	.212	.322	.276		.525	.375	.565	.918
	N	276	276	276	276	276	276	276	276	276	276
Mixed pine-hdwd. for.	Pearson correl.	.005	-.024	.420	.118	-.068	-.038	1	-.059	-.010	.061
	Sig. (two-tailed)	.039	.688	.000	.050	.261	.525		.331	.870	.313
	N	276	276	276	276	276	276	276	276	276	276
Wood-land for.	Pearson correl.	-.027	-.019	-.054	.016	.259	-.054	-.059	1	-.035	-.069
	Sig. (two-tailed	.650	.756	.368	.798	.000	.375	.331		.565	.255
	N	276	276	276	276	276	276	276	276	276	276

Table 25 (continued)

Variable		Row crop lands	Pasture/ fallow fields	Plant. pine for.	Nat. pine for.	Up. hdwd for.	Bott. land hdwd for.	Mixed pine-hdwd. for.	Wood land for.	Food plot areas	Acres leased for rec.
Food plot areas	Pearson correl.	.246	-.024	.007	-.022	-.049	-.035	-.010	-.035	1	-.007
	Sig. (two-tailed)	.000	.695	.911	.713	.421	.565	.870	.565		.905
	N	276	276	276	276	276	276	276	276	276	276
Acres leased for rec.	Pearson correl.	.277	-.041	-.053	-.032	-.082	-.006	-.061	.069	-.007	1
	Sig. (two-ailed)	.000	.498	.378	.601	.175	.918	.313	.255	.905	
	N	276	276	276	276	276	276	276	276	276	276

Table 26 Pearson correlation coefficients matrix for explanatory land cover variables on properties for which sales values were collected within the North Mississippi Region for estimation of recreational value contributions on rural lands sales during 2003-2008.

Variable		Row Crop lands	Past./ fallow fields	Plant. pine for.	Nat. pines	Upland hdwd. for.	Bottom-land hdwd for.	Mixed pine-hdwd. for.	Wood-lands	Food plot areas
Row crop lands	Pearson correlation	1	.020	-.081	.013	-.050	.034	.094	.035	-.001
	Sig. (two-tailed)		.705	.118	.807	.338	.511	.070	.496	.989
	N	375	375	375	375	375	375	375	375	375
Past./ fallow fields	Pearson correlation	.020	1	-.079	-.007	-.045	.003	-.068	.161	-.040
	Sig. (two-tailed)	.705		.128	.888	.382	.961	.187	.002	.436
	N	375	375	375	375	375	375	375	375	375
Plant. pine for.	Pearson correlation	-.081	-.079	1	-.031	.100	.001	-.006	.131	.012
	Sig. (two-tailed)	.118	.128		.553	.052	.987	.907	.011	.813
	N	375	375	375	375	375	375	375	375	375
Nat. pines	Pearson correlation	.013	-.007	-.301	1	.080	-.035	.076	.324	.152
	Sig. (two-tailed)	.807	.888	.553		.120	.493	.141	.000	.003
	N	375	375	375	375	375	375	375	375	375
Upland hdwd. for.	Pearson correlation	-.050	-.045	.100	.080	1	-.023	-.054	-.041	-.024
	Sig. (two-tailed)	.338	.382	.052	.120		.652	.294	.434	.644
	N	375	375	375	375	375	375	375	375	375
Bottom-land hdwd. for.	Pearson correlation	-.034	.003	.001	-.035	-.023	1	-.004	.022	-.007
	Sig. (two-tailed)	.511	.961	.987	.493	-652		.933	.674	.891
	N	375	375	375	375	375	375	375	375	375
Mixed pine-hdwd. for.	Pearson correlation	.094	-.068	-006	.076	-.054	-.004	1	-.054	.131
	Sig. (two-tailed)	.070	.187	.907	.141	.284	.933		.256	.011
	N	375	375	375	375	375	375	375	375	375
Wood-lands	Pearson correlation	.035	.161	-.131	.324	-.041	.022	-.054	1	.167
	Sig. (two-tailed	.496	.002	.011	.000	.434	.674	.296		.001
	N	375	375	375	375	375	375	375	375	375
Food plot areas	Pearson correl.	-.001	-.040	.014	.152	-.024	-.007	.131	.167	1
	Sig. (two-tailed)	.989	.436	.813	.003	.644	.891	.011	.001	
	N	375	375	375	375	375	375	375	375	375

Table 27 Pearson correlation coefficients matrix for explanatory land cover variables on properties for which sales values were collected in the South Mississippi Region for estimation of recreational contributions on rural lands sales in Mississippi during 2003-2008.

Variable		Row crop lands	Past./ fallow field lands	Plant. pine for.	Nat. pine for.	Up. hdwd. forests	Bottom-land hdwd. for.	Mixed Pine-hdwd. for.	Wood-land for.	Food plot areas
Row crop lands	Pearson correlation	1	-.028	-.017	-.019	-.007	-.018	-.030	-.011	-.008
	Sig. (two-tailed)		.738	.835	.814	.933	.824	.716	.898	.923
	N	149	149	149	149	149	149	149	149	149
Past./ fallow field lands	Pearson correlation	-.028	1	.015	-.053	-.038	-.053	-.056	.303	-.023
	Sig. (two-tailed)	.738		.852	.525	.648	.519	.494	.000	.778
	N	149	149	149	149	149	149	149	149	149
Plant. pine for.	Pearson correlation	-.017	.015	1	-.001	.909	-.007	-.045	-.076	.054
	Sig. (two-tailed)	.835	.852		.993	.000	.929	.584	.580	.513
	N	149	149	149	149	149	149	149	149	149
Nat. pine for.	Pearson correlation	-.019	-.053	-.001	1	-.007	-.038	-.025	-.042	-.016
	Sig. (two-tailed)	.814	.525	.993		.929	.648	.766	.608	.842
	N	149	149	149	149	149	149	149	149	149
Up. hdwd. forests	Pearson correlation	-.007	-.038	.909	-.007	1	-.025	-.038	-.036	.146
	Sig. (two-tailed)	.933	.648	.000	.929		.758	.650	.665	.075
	N	149	149	149	149	149	149	149	149	149
Bottom-land hdwd. forests	Pearson correlation	-.018	-.053	-.007	-.038	-.025	1	-.058	-.048	-.015
	Sig. (two-tailed)	.824	.519	.929	.648	.758		.481	.561	.851
	N	149	149	149	149	149	149	149	149	149
Mixed pine- hdwd. forests	Pearson correlation	-.030	-.056	-.045	-.025	-.038	-.058	1	-.082	-.025
	Sig. (two-tailed)	.716	.494	.584	.766	.650	.481		.322	.759
	N	149	149	149	149	149	149	149	149	149
Wood-land for.	Pearson correlation	-.011	.303	-.046	-.042	-.036	-.048	-.082	1	-.022
	Sig. (two-tailed	.898	.000	.580	.608	.665	.561	.322		.792
	N	149	149	149	149	149	149	149	149	149

Table 27 (Continued)

Variable		Row crop lands	Past./ fallow field lands	Plant. pine for.	Nat. pine for.	Up. hdwd. forests	Bottom land hdwd. for.	Mixed pine-hdwd. for.	Wood-land for.	Food plot areas
Food plot areas	Pearson correlation	-.008	-.023	.054	-.016	.146	-.015	-.025	-.022	1
	Sig. (two-tailed)	.923	.778	.513	.842	.075	.851	.759	.792	
	N	149	149	149	149	149	149	149	149	149

Table 28 Pearson correlation analysis results on properties for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational contributions on rural lands sales during 2003-2008.

Land cover type	Statewide (n = 800)	Mississippi Delta/Hills Region (n = 276)	North Mississippi Region (n = 375)	South Mississippi Region (n = 149)
Row crop lands				
R	0.324	0.320	0.307	0.006
P[1]	0.000	0.000	0.000	0.946[1]
Pasture/fallow fields				
R	0.103	-0.017	0.356	0.385
P[1]	0.004	0.778	0.000	0.000
Farm pond/stock pond areas				
R	-0.022	-0.026	0.009	-0.032
P[1]	0.527	0.665	0.863	0.702
Aquaculture pond areas				
R	0.009	0.022	0.087	(no data)
P[1]	0.793	0.714	0.092	
CRP grasslands				
R	0.013	-0.031	0.249	-0.023
P[1]	0.710	0.603	0.000	0.785
Cutover forests (≤5 years)				
R	-0.021	-0.017	0.034	-0.035
P[1]	0.560	0.787	0.511	0.674
Planted pine forests				
R	0.373	0.211	0.144	0.868
P[1]	0.000	0.000	0.005	0.000
Natural pine forests				
R	0.174	0.180	0.285	0.020
P[1]	0.000	0.003	0.000	0.805
Upland hardwood forests				
R	0.287	0.048	0.124	0.794
P[1]	0.000	0.428	0.016	0.000
Bottomland hardwood forests				
R	0.776	0.847	0.110	-0.003
P[1]	0.000	0.000	0.033	0.969
Mixed pine-hardwood forests				
R	0.193	0.181	0.467	0.072
P[1]	0.000	0.002	0.000	0.386
Cutover woodland forests (forests in sapling stage with limited silvicultural management)				
R	0.114	0.030	0.561	0.278
P[1]	0.001	0.621	0.000	0.001
Human-made water body areas (excluding livestock and aquaculture ponds)				
R	0.166	-0.190	0.391	(no data)
P[1]	0.356	0.535	0.098	
Permanent lake areas (human-made water bodies >8 ha)				
R	0.701	0.870	0.833	(no data)
P[1]	0.016	0.130	0.080	

Table 28 (Continued)

Land cover type	Statewide (n = 800)	Mississippi Delta/Hills Region (n = 276)	North Mississippi Region (n = 375)	South Mississippi Region (n = 149)
Food plot areas				
R	-0.311	0.861	0.434	(only 1 sample)
*P*1	0.884	0.000	0.182	
Onsite road areas				
R	0.927	0.964	0.450	0.956
P[1]	0.000	0.000	0.000	0.000
Riparian and SMZ areas (forested and protected corridors along streams and rivers that serve as sediment filter strips, bank stabilization, and wildlife habitat (Nix 2008)).				
R	0.139	-0.028	0.081	0.799
P[1]	0.668	0.972	0.119	0.201

[1]two-tailed significance

Table 29 Pearson correlation analysis results for attributes on properties for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales during 2003-2008.

Perceived characteristics, recreational activities, land use, and structures/amenities	**Statewide (n = 800)**	**Mississippi Delta/Hills Region (n = 276)**	**North Mississippi Region (n = 375)**	**South Mississippi Region (n = 149)**
Perception of white-tailed deer (*Odocoileus virginianus*)				
R	0.017	0.046	0.061	-0.022
P[1]	0.632	0.442	0.240	0.790
Perception of Eastern wild turkey (*Meleagris gallopavo*)				
R	-0.030	-0.029	0.066	0.035
P[1]	0.380	0.633	0.201	0.668
Perception of waterfowl				
R	0.208	0.157	0.039	-0.009
P[1]	0.000	0.009	0.448	0.916
Hectares leased for recreation				
R	0.096	0.075	0.183	-0.023
P[1]	0.007	0.213	0.000	0.779
Road access to properties				
R	-0.012	-0.072	0.109	0.106
P[1]	0.741	0.234	0.035	0.197
Anticipated property use: hunting				
R	-0.024	0.009	0.047	-0.101
P[1]	0.505	0.876	0.367	0.218
Anticipated property use: wildlife watching				
R	-0.027	-0.075	0.008	-0.025
P[1]	0.443	0.231	0.883	0.764
Anticipated property use: horseback riding				
R	-0.052	-0.050	0.116	0.035
P[1]	0.140	0.410	0.024	0.674
Anticipated property use: nature-based tourism				
R	-0.009	-0.027	-0.031	0.012
P[1]	0.794	0.653	0.550	0.883
Overnight sleeping quarters (houses, lodges, camps)				
R	0.073	0.062	0.042	0.234
P[1]	0.039	0.307	0.414	0.004
Onsite amenities (electricity, potable water, propane gas, natural gas, or septic system)				
R	-0.002	-0.003	0.117	0.134
P[1]	0.064	0.961	0.024	0.104

[1]two-tailed significance

Table 30 Pearson correlation analysis results for attributes on properties for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales during 2003-2008.

Proximity measurements from property parcels to features of interests	**Statewide** (n = 800)	**Mississippi Delta Region** (n = 276)	**North Mississippi Region** (n = 375)	**South Mississippi Region** (n = 149)
Interstates				
Mean km	26	29	28	17
R	0.087	0.237	-0.083	0.057
P[1]	0.034	0.001	0.172	0.528
State highways				
Mean km	3	4	3	3
R	0.087	0.129	0.081	-0.024
P[1]	0.035	0.073	0.183	0.788
National Wildlife Refuges				
Mean km	30	19	34	40
R	-0.090	-0.006	-0.053	-0.034
P[1]	0.029	0.936	0.382	0.702
National forests				
Mean km	23	32	21	14
R	-0.064	-0.197	-0.010	-0.122
P[1]	0.122	0.007	0.865	0.173
National parks/parkways				
Mean km	39	50	31	40
R	-0.004	-0.324	0.168	-0.086
P[1]	0.920	0.000	0.006	0.339
State parks				
Mean km	18	21	15	13
R	0.050	-0.040	0.079	-0.055
P[1]	0.224	0.577	0.198	0.542
State wildlife management areas				
Mean km	17	21	15	13
R	0.000	-0.106	0.223	-0.091
P[1]	0.994	0.143	0.000	0.309
Public lakes				
Mean km	17	13	20	16
R	-0.018	-0.031	-0.013	-0.010
P[1]	0.671	0.673	0.834	0.914
Cities (towns and cities with population ≥50,000 residents)				
Mean km	54	60	59	35
R	0.016	0.081	0.039	0.127
P[1]	0.698	0.260	0.527	0.157

[1]two-tailed significance

APPENDIX C

COMPARISON OF LAND COVER TYPES

Table 31 Statewide and regional characteristics of natural forest cover types on properties for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Natural forest cover	Number of Properties (n)	Hectares (ha)	Mean hectares (ha), (SE)	Percentage of cover types (%)
Statewide				
Natural pine forests	74	3,452	46.5 (±10.9)	7.5
Upland hardwood forests	95	7,329	77.1 (±12.9)	15.8
Bottomland hardwood forests	131	24,171	184.5 (±44.7)	52.1
Mixed pine-hardwood forests	124	11,405	91.9 (±13.7)	24.6
Wetland	1	41.0	41.0	0.2
Total	425	46,398		100.2
Mississippi Delta/Hills Region				
Natural pine forests	29	1,913	65.9 (±27.5)	5.4
Upland hardwood forests	52	4,084	78.5 (±12.3)	11.5
Bottomland hardwood forests	106	23,216	218.6 (±55.6)	65.5
Mixed pine-hardwood forests	35	6,209	177.4 (±40.1)	17.5
Wetland	1	41	41.0	0.1
Total	223	35,463		100.0
North Mississippi Region				
Natural pine forests	35	1,241	36.0 (±26.0)	20.1
Upland hardwood forests	33	1,446	43.8 (±6.3)	23.4
Bottomland hardwood forests	15	682	46.0 (±10.9)	11.1
Mixed pine-hardwood forests	55	2,800	51.6 (±9.5)	45.4
Total	138	6,169		100.0
South Mississippi Region				
Natural pine forests	10	297	29.7 (±8.7)	6.2
Upland hardwood forests	10	1,797	179.6 (±100.5)	37.9
Bottomland hardwood forests	10	273	27.3 (±8.9)	5.7
Mixed pine-hardwood forests	34	2,396	70.5 (±15.9)	50.5
Total	64	4,736		100.2

[1] Includes properties in DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson Counties.

[2] Includes properties in Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee Counties.

[3] Includes properties in Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson Counties.

Table 32 Statewide and regional human-made characteristics of properties for which sales values were collected within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Human-made cover (N=800)	Number of Properties (n)	Hectares (ha)	Mean hectares (ha), (SE)	Percentage of cover types (%)
Statewide Early Successional Cover Types and Tree Plantations				
Cutover forests (≤5 years of age)	54	2,367	44.8 (±35.8)	8.9
Planted pine forests	154	10,681	69.4 (±13.5)	40.5
Cutover woodland forests[5]	309	13,384	43.0 (±4.0)	50.6
Total	517	26,432		100.0
Mississippi Delta/Loess Hills Region[1]				
Cutover forests (≤5 years of age)	4	485	121.2 (±36.5)	6.1
Planted pine forests	33	2,834	86.1 (±21.9)	35.7
Woodland forests[5]	69	4,625	67.0 (±10.8)	58.2
Regional Total	106	7,944		100.0
North Mississippi Region[2]				
Cutover forests (≤5 years of age)	29	974	33.6 (±5.2)	8.7
Planted pine forests	85	3,624	42.6 (±4.1)	32.5
Cutover woodland forests[5]	192	6,541	34.1 (±3.9)	58.7
Total	306	11,139		99.9
South Mississippi Region[3]				
Cutover forests (≤5 years of age)	21	908	43.2 (±9.5)	12.4
Planted pine forests	36	4,222	117.3 (±52.9)	57.5
Cutover woodland forests[5]	48	2,218	46.2 (±13.5)	30.2
Total	105	7,348		100.1
Agricultural Cover Types				
Statewide				
Row crops	130	15,804	122.0 (±18.2)	58.2
Pastures/fallow fields	192	7,145	37.2 (±4.6)	26.3
Farm ponds/stock ponds	19	57	3.0 (±0.5)	0.2
Aquaculture ponds	19	1,442	75.9 (±15.2)	5.3
CRP grasslands	65	2,765	42.5 (±5.5)	10.2
Total	425	27,156		100.2
Mississippi Delta/Hills Region[1]				
Row crops	86	13,621	158.1 (±26.5)	80.2
Pastures/fallow fields	21	649	30.2 (±10.8)	3.8
Farm ponds/stock ponds	4	14	3.5 (±1.9)	0.08
Aquaculture ponds	11	1,238	113.0 (±18.5)	7.3
CRP grasslands	44	1,459	33.2 (±6.8)	8.6
Total	166	16,981		99.9
North Mississippi Region[2]				
Row crops	41	2,013	48.9 (±8.9)	25.8
Pastures/fallow fields	118	4,254	36.1 (±4.8)	54.5
Farm ponds/stock ponds	12	38	3.1 (±0.6)	0.5
Aquaculture ponds	8	205	25.6 (±10.5)	2.6
CRP grasslands	20	1,299	64.9 (±7.7)	16.6
Total	199	7,809		100.0

Table 32 (Continued)

Human-made cover (N=800)	Number of Properties (n)	Hectares (ha)	Mean hectares (ha), (SE)	Percentage of cover types (%)
South Mississippi Region[3]				
Row crops	3	171.0	56.8 (±43.4)	7.0
Pastures/fallow fields	53	2,258	42.6 (±11.7)	92.5
Farm/stock ponds	3	5	1.5 (±0.4)	0.2
Aquaculture ponds	0	-	-	-
CRP grasslands	1	7	6.9	0.2
Total	60	2,441		99.9
Other Features on Properties				
Statewide				
Improved dirt, gravel, or paved	254	2,081	8.2 (±1.7)	77.1
Wildlife food plots	25	246	9.8 (±2.0)	9.1
Surface area of permanent lakes	11	125	11.4 (±2.1)	4.6
Streamside management zones	12	116	9.9 (±3.4)	4.3
Surface area of human-made Water bodies[4]	33	129	3.7 (±0.5)	4.8
Rights-of-ways transecting Property	2	9.0	4.3 (±3.0)	0.01
Total	337	2,699		99.9
Delta Region				
Improved dirt, gravel, or paved road	99	1,439	14.5 (±4.1)	82.7
Wildlife food plots	13	162	12.5 (±3.5)	9.3
Surface area of permanent lakes	4	41	10.1 (±5.9)	2.4
Streamside management zones	4	55	13.7 (±10.3)	3.1
Surface area of human-made water bodies[4]	13	42	3.2 (±0.6)	2.4
Rights-of-way transecting property	1	1	1	0.06
Total	134	1,740		100.0
North Mississippi Region				
Improved dirt, gravel, or paved roads	116	445	3.8 (±0.5)	65.2
Wildlife food plots	11	74	6.6 (±2.0)	10.8
Surface area of permanent lakes	5	60	12.1 (±2.0)	8.8
Streamside management zones	4	21	5.3 (±0.7)	3.1
Surface area of human-made Water bodies[4]	19	83	4.4 (±0.6)	12.2
Rights-of-way transecting property	0	-	-	-
Total	155	683		100.1

Table 32 (Continued)

Human-made cover (N=800)	Number of properties (n)	Hectares (ha)	Mean hectares (ha), (SE)	Percentage of cover types (%)
South Mississippi Region				
Improved dirt, gravel, or paved roads	39	197	5.1 (±2.0)	69.9
Wildlife food plots	1	10	10.1	3.6
Surface area of permanent lakes	2	24	12.1	8.5
Streamside management zones	4	40	10 (±2.3)	14.2
Surface area of human-made water bodies[4]	1	4	4	1.4
Rights-of-way transecting property	1	7	7	2.5
Total	48	282		100.1

[1] Includes properties in DeSoto, Tunica, Coahoma, Quitman, Tallahatchie, Bolivar, Grenada, Sunflower, Leflore, Carroll, Holmes, Humphreys, Washington, Sharkey, Yazoo, Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkerson Counties.
[2]Includes properties in Tate, Marshall, Benton, Tippah, Alcorn, Tishomingo, Prentiss, Union, Panola, Lafayette, Pontotoc, Itawamba, Monroe, Chickasaw, Calhoun, Yalobusha, Montgomery, Webster, Clay, Choctaw, Oktibbeha, Lowndes, Attala, Winston, Noxubee, Madison, Leake, Neshoba, Kemper, and Lee Counties.
[3]Includes properties in Hinds, Rankin, Scott, Newton, Lauderdale, Copiah, Simpson, Jasper, Clarke, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Jones, Wayne, Amite, Pike, Walthall, Marion, Lamar, Perry, Greene, Forrest, Pearl River, Stone, George, Hancock, Harrison, and Jackson Counties.
[4]includes surface area of man-made impoundments excluding permanent lakes, farm/stock ponds, and aquaculture impoundments

Table 33 Comparison of mean hectares of lands with and without both major land cover types that comprised the greatest percentage of properties within Mississippi and the three regions of the state for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Mississippi Delta Region	**Total mean (ha)**	**Mean agriculture (ha)**	**Mean forest (ha)**	**Mean bottom-land hardwood (ha)**	**Mean row crop (ha)**	**Mean value per hectare with recreation**	**Mean land leased for recreation (ha)**	**Payment per hectare for leased recreational lands ($)**
Properties sold that contained both bottomland hardwoods and row crops	313.6 (±66.5) (n = 29)	206.0 (±53.8) (n = 29)	99.1 (±22.1) (n = 29)	73.0 (±20.6) (n = 29)	205.1 (±53.3) (n = 29)	$4,647.85 (±36.91) (n = 29)	69.2 (±34.5) (n = 29)	$57.79 (±2.17) (n = 9)
Properties sold that did not contain both bottomland hardwoods and row crops	214.2 (±27.9) (n = 247)	44.5 (±7.9) (n = 247)	163.6 (±26.6) (n= 247)	85.5 (±24.4) (n = 247)	31.1 (±7.5) (n = 247)	$4,203.00 (±19.80) (n = 247)	14.1 (±2.7) (n = 247)	$52.71 (±0.5) (n = 52)
North Mississippi Region	**Total mean (ha)**	**Mean agriculture (ha)**	**Mean forest (ha)**	**Mean mixed pine-hardwood (ha)**	**Mean cutover woodland hectares (ha)**	**Mean value per hectare with recreation**	**Mean land leased for recreation (ha)**	**Payment per hectare for leased recreational lands ($)**
Properties sold that contained both mixed pine-hardwoods and cutover woodlands	117.2 (±17.2) (n = 4)	10.5 (±10.5) (n = 4)	207.7 (±23.4) (n = 4)	113.9 (±7.7) (n = 4)	48.2 (±0.4) (n = 4)	$3,046.00 (±84.12) (n = 4)	63.9 (±26.2) (n = 4)	No record
Properties sold that did not contain both mixed pine-hardwoods and cutover woodlands	97.4 (±22.0) (n = 144)	20.9 (±2.7) (n = 371)	44.2 (±3.2) (n = 371)	6.3 (±1.6) (n = 371)	17.1 (±2.2) (n = 371)	$4,4490.14 (±21.23) (n = 371)	6.7 (±2.7) (n = 371)	$48.41 (±0.60) (n = 45)

Table 33 (Continued)

South Mississippi Region	Total mean (ha)	Mean agriculture (ha)	Mean forest (ha)	Mean planted pine (ha)	Mean pasture/ fallow field (ha)	Mean value per hectare with recreation	Mean land leased for recreation (ha)	Payment per hectare for leased recreational lands ($)
Properties sold that contained both planted pines and pasture/fallow fields	172.5 (±139.2) (n = 5)	32.4 (±27.7) (n = 5)	138.5 (±113.6) (n = 5)	137.5 (±113.9) (n = 5)	31.9 ±27.8) (n = 5)	$7,216.38 (±$148.75) (n = 5)	0	-
Properties sold that did not contain both planted pines and pasture/fallow fields	97.4 (±22.0) (n = 144)	15.8 (±4.6) (n = 144)	79.6 (±21.2) (n = 144)	24.5 (±13.2) (n = 144)	14.6 (±4.5) (n = 144)	$6,203.18 (±$49.84) (n = 144)	1	$37.05
Statewide	**Total mean (ha)**	**Mean agriculture (ha)**	**Mean Forest (ha)**	**Bottom-land hardwood (ha)**	**Row crop (ha)**	**Mean value per hectare with recreation**	**Mean land leased for recreation (ha)**	**payment per hectare for leased recreational lands ($)**
Properties sold that contained both bottomland hardwoods and row crops	313.6 (±66.5) (n = 29)	205.9 (±53.9) (n = 29)	99.1 (±22.1) (n = 29)	73.0 (±20.6) (n = 29)	205.1 (±53.9) (n = 29)	$4,647.85 (±$36.94) (n = 29)	69.2 (±34.4) (n = 29)	$57.80 (±2.12) (n = 9)
Properties sold that did not contain both bottomland hardwoods and row crops	92.9 (±10.3) (n = 771)	27.6 (±2.9) (n = 771)	90.5 (±9.7) (n = 771)	28.6 (±8.0) (n = 771)	12.8 (±2.5) (n = 771)	$4,728.40 (±$16.17) (n = 771)	8.1 (±1.2) (n = 771)	$50.56 (±0.41) (n = 98)

APPENDIX D

ANALYSIS OF VARIANCE [ANOVA] AND TUKEY HONESTLY SIGNIFICANT DIFFERENT [HSD] TEST RESULTS FOR EXPLANATORY ACREAGE AND VALUE VARIABLES

Table 34 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different bottomland hardwood acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of Squares	df	Mean squares	F	*P* value
Between groups	7, 469,469	2	3,734,735	13.7	0.000
Within groups	217,689,992	797	273,137		
Total	225,159,461	799			

Multiple comparisons

Tukey HSD

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	203.3[1]	41.5	0.000	105.9	300.6
DELTA	3	203.3[1]	53.1	0.000	78.5	330.0
2	1	-203.3[1]	41.5	0.000	-300.6	-105.9
NMS	3	-0.033	50.6	1.000	-118.9	118.8
3	1	-203.3[1]	53.1	0.000	-330.0	-78.5
SMS	2	0.033	50.6	1.000	-118.9	118.9

[1]The mean difference is significant at the 0.05 level.

Table 35 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different upland hardwood acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	125,563	2	62,781	4.3	0.014
Within groups	11,753,669	797	14,747		
Total	11,879,332	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	27.0[1]	9.6	0.014	4.4	49.6
DELTA	3	6.8	12.3	0.848	-22.2	35.8
2	1	-27.0[1]	9.6	0.014	-49.6	-4.4
NMS	3	-20.3	11.8	0.197	-47.9	7.3
3	1	-6.8	12.3	0.848	-35.8	22.2
SMS	2	20.3	11.8	0.197	-7.3	47.9

[1]The mean difference is significant at the 0.05 level.

Table 36 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different mixed pine-hardwood acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values werecollected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	222,752	2	111,376	4.0	0.018
Within groups	22,083,217	797	27,708		
Total	22,305,969	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	37.1[1]	13.2	0.014	6.1	68.1
DELTA	3	15.8	16.9	0.618	-23.9	55.6
2	1	-37.1[1]	13.2	0.014	-68.1	-6.1
NMS	3	-21.3	16.1	0.385	-59.1	16.6
3	1	-15.8	16.9	0.618	-55.6	23.9
SMS	2	21.3	16.1	0.385	-16.6	59.1

[1]The mean difference is significant at the 0.05 level.

Table 37 Analysis of Variance [ANOVA] test results for Regionally, statistically different natural pine acreage on properties for which sales values were collected on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	18,729	2	9,365	2.0	0.202
Within groups	4,662,032	797	5,850		
Total	4,680,761	799			

Table 38 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different planted pine acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	251,235	2	125,618	3.0	0.032
Within groups	29,088,811	797	36,498		
Total	29,340,047	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	1.5	15.2	0.995	-34	37
DELTA	3	-44.6	19.4	0.057	-90	1
2	1	-1.5	15.2	0.995	-37	34
NMS	3	-46.1[1]	18.5	0.034	-90	-3
3	1	44.6	19.4	0.057	-1	20
SMS	2	46.1[1]	18.5	0.034	-3	9

[1]The mean difference is significant at the 0.05 level.

Table 39 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different row crop acreage on properties

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	2,263,478	2	1,131,739	22.0	0.000
Within groups	40,878,693	797	51,291		
Total	43,142,171	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	108.6[1]	17.9	0.000	66.4	150.8
DELTA	3	119.1[1]	23.0	0.000	65.0	173.1
2	1	-108.61	17.9	0.000	-150.8	-66.5
NMS	3	10.4	21.9	0.883	-41.1	61.9
3	1	-119.1[1]	23.0	0.000	-173.1	-65.0
SMS	2	-10.4	21.9	0.883	-61.9	41.1

[1]The mean difference is significant at the 0.05 level

Table 40 Analysis of Variance [ANOVA] and Tukey Honestly Significantly Different [HSD] test results for regionally, statistically different pasture/fallow field acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	122,638	2	61,319	9.0	0.000
Within groups	5,622,743	797	7,055		
Total	5,745,381	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	22.4[1]	6.7	0.002	-37,992	-6.7
DELTA	3	-31.8	8.6	0.001	-51.8	-11.7
2	1	22.4[1]	6.7	0.002	6.7	37.9
NMS	3	-9.4	8.1	0.480	-28.5	9.7
3	1	31.8[1]	8.5	0.001	11.7	51.8
SMS	2	9.4	8.1	0.480	-9.7	28.5

[1]The mean difference is significant at the 0.05 level.

Table 41 Analysis of Variance [ANOVA] test results for regionally, statistically different farm pond/stock pond acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	4.3	2	2.2	1.0	0.348
Within groups	1,625.2	797	2.0		
Total	1,629.5	799			

Table 42 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different aquaculture pond acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	18,774	2	9,387	7.0	0.001
Within groups	1,106,839	796	1,391		
Total	1,125,621	798			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	9.8[1]	3.0	0.003	2.8	16.7
DELTA	3	11.1[1]	3.8	0.010	2.2	20.0
2	1	-9.8[1]	3.0	0.003	-16.7	-2.8
NMS	3	1.3	3.6	0.926	-7.1	9.8
3	1	-11.1[1]	3.8	0.010	-20.0	-2.2
SMS	2	-1.4	3.6	0.926	-9.8	7.1

[1]The mean difference is significant at the 0.05 level.

Table 43 Analysis of Variance [ANOVA} and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different road acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	17,547.8	2	8,773.9	6.1	0.002
Within groups	1,144,583.7	797	1,436.1		
Total	1,162,131.5	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	9.9[1]	3.0	0.003	2.9	17.0
DELTA	3	9.6[1]	3.9	0.034	0.6	18.7
2	1	-9.9[1]	3.0	0.003	-17.0	-2.9
NMS	3	0.3	3.7	0.995	-9.0	8.3
3	1	9.6[1]	3.9	0.034	-18,7	-0.6
SMS	2	0.3	3.7	0.0995	-8.3	9.0

[1]The mean difference is significant at the 0.05 level.

Table 44 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different WRP acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	268,306.6	2	134,153.3	13.2	0.000
Within groups	8,118,163.7	797	10,185.9		
Total	8,386,470.3	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	38.3[1]	8.0	0.000	19.5	57.1
DELTA	3	39.0[1]	10.3	0.000	15.0	63.1
2	1	-38.3[1]	8.0	0.000	-57.1	-19.5
NMS	3	0.7	9.8	0.997	-22.2	23.7
3	1	-39.0[1]	10.3	0.000	-63.1	-15.0
SMS	2	-0.7	9.8	0.997	-23.7	22.2

[1]The mean difference is significant at the 0.05 level.

Table 45 . Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different CRP acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	88,151.2	2	44,075.6	9.5	0.000
Within groups	3,794,719.9	797	4,648.3		
Total	3,792,871.1	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	15.5[1]	5.4	0.012	2.8	28.2
DELTA	3	29.2[1]	6.9	0.000	13.0	45.5
2	1	-15.5[1]	5.4	0.012	-28.2	-2.8
NMS	3	-13.8	6.6	0.094	-1.7	29.3
3	1	-29.2[1]	6.9	0.000	-45.5	-13.0
SMS	2	-13.8	6.6	0.094	-29.3	1.7

[1]The mean difference is significant at the 0.05 level.

Table 46 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different CRP grassland acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	16,208	2	8,104	5.0	0.010
Within groups	1,389,492	797	1,743		
Total	1,405,700	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	4.5	3.3	0.364	-3.3	12.3
DELTA	3	12.9[1]	4.2	0.007	-3.0	22.9
2	1	-4.5	3.3	0.364	-12.3	3.3
NMS	3	8.5	4.0	0.093	-1.1	17.9
3	1	-12.9[1]	4.2	0.007	-22.9	-3.0
SMS	2	-8.5	4.0	0.093	-17.9	1.1

[1]The mean difference is significant at the 0.05 level.

Table 47 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different cutover acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	11,677	2	5,839	4.0	0.021
Within groups	1,193,382	797	1,497		
Total	1,205,059	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	-2.1	3.1	0.778	-9.3	5.1
DELTA	3	-10.7[1]	3.9	0.018	-20.0	-1.5
2	1	2.1	3.1	0.778	-5.1	9.3
NMS	3	-8.6	3.7	0.055	-17.4	0.2
3	1	10.7[1]	3.9	0.018	-1.5	20.0
SMS	2	8.6	3.7	0.055	-0.2	17.4

[1]The mean difference is significant at the 0.05 level.

Table 48 Analysis of Variance [ANOVA] test results for regionally, statistically different cutover woodland acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	4,246	2	2,123.2	0.15	0.863
Within groups	11,476,701	797	14,399.9		
Total	11,480,948	799			

Table 49 Analysis of Variance [ANOVA] test results for regionally, statistically different human-made water body acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	24.8	2	12.4	2.3	0.099
Within groups	4,256.8	797	5.3		
Total	4,281.6	799			

Table 50 Analysis of Variance [ANOVA] test results for regionally, statistically different permanent lake acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	0.235	2	0.117	0.008	0.992
Within groups	11,593.7	797	14.5		
Total	11,593.9	799			

Table 51 Analysis of Variance [ANOVA] and Tukey Honestly Significant Different [HSD] test results for regionally, statistically different food plot acreage on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	211.6	2	105.8	2.9	0.055
Within groups	28,975.6	797	36.4		
Total	29,187.2	799			

Multiple comparisons

Tukey HSD[1]

Region (i)	Region (j)	Mean difference (i-j)	Standard error	*P* value	95% C.I.	
					Lower bound	Upper bound
1	2	777,442.9[1]	125,721.2	0.000	482,237.2	1,072,648.0
DELTA	3	484,524.1[1]	161,151.8	0.008	106,124.4	862,923.8
2	1	-777,442.6[1]	125,721.2	0.000	-1,072,648.0	-482,237.2
NMS	3	-292,918.5	153,513.0	0.137	-653,381.6	-67,544.7
3	1	-484,524.1[1]	161,151.8	0.008	-862,923.8	-106,124.4
SMS	2	292,918.5	153,513.0	0.137	-67,544.7	653,381.6

[1]The mean difference is significant at the 0.05 level.

Table 52 Analysis of Variance [ANOVA] test results for regionally, statistically different values of lands leased for recreation on properties in the Mississippi Delta/Hills [Delta], North Mississippi [NMS], and South Mississippi [SMS] for which sales values were collected within Mississippi for estimation of recreational value contributions on rural land sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	141.6	2	70.8	0.685	0.507
Within groups	10,758.8	104	103.4		
Total	10,900.4	106			

Table 53 Analysis of Variance [ANOVA] test results for regionally, statistically different recreational influence on property values for which sales values were collected within the three regions of Mississippi for estimation of recreational value contributions on rural lands sales during 2003-2008.

ANOVA	Sum of squares	df	Mean squares	F	*P* value
Between groups	2,581,298	2	1,290,649	2.8	0.063
Within groups	371,764,871	797	466,455		
Total	374,346,168	799			

APPENDIX E

LAND VALUES RELATIVE TO PROXIMITY FROM PROPERTY PARCELS TO RECREATIONAL FEATURES

Table 54 Statewide land value related to distance from public lands or waters for estimation of recreational value contributions on rural lands sales in Mississippi during 2003-2008.

Public area type	Percent difference	Mean sales value (±SE) of properties based on distance category of properties from public land or waters	
		≤0.8 km	≥16.0 km
National wildlife refuges	27%	$5,725 per ha (±3,975) (n = 6)	$4,517 per ha (±512) (n = 409)
National forests	14%	$4,708 per ha (±1,213) (n = 33)	$4,132 per ha (±3,558) (n = 349)
National parks/parkways	15%	$5,224 per ha (±1,702) (n = 3)	$4,525 per ha (±36) (n = 37)
Wildlife management areas	40%	$5,703 per ha (±2,049) (n = 9)	$4,063 per ha (±1,995) (n = 274)
State parks	13%	$5,034 per ha (±1,879) (n = 3)	$4,471 per ha (±439) (n = 300)
Public lakes	214%	$10,060 per ha (±4,655) (n = 7)	$4,700 per ha (±610) (n = 209)