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Whose Woods These Are: Human-Environment Relationships Among Stakeholders of South Mississippi's Longleaf Pine Ecosystem

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WHOSE WOODS THESE ARE: HUMAN-ENVIRONMENT RELATIONSHIPS AMONG STAKEHOLDERS OF SOUTH MISSISSIPPI'S LONGLEAF PINE ECOSYSTEM

by

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ABSTRACT

Between 1870 and 1920, the longleaf pine belt of the southeastern United States experienced an extensive and unsustainable period of logging. In the years after the logging boom the landscape of the Southeast was reforested, but fire suppression and a preference among landowners for loblolly pine resulted in a dense and less resilient forest with reduced biodiversity. This research looks at the human geography of remnants of the longleaf pine ecosystem in South Mississippi and the nature of contemporary relationships between South Mississippi residents and this ecosystem.

In an effort to make sense of the complex relationships between people and the longleaf pine ecosystem, I conducted secondary source research and ethnographic interviews with individuals involved in forestry, forest-related economic activities, forest conservation and restoration, and similar fields. For many people the longleaf pine ecosystem is more than the landscape outside of their window; it is also a place full of memory, connection, and meaning. In this thesis, I have identified a collection of human-environment relationships in South Mississippi and illustrated how people have altered, and in turn been altered by, the contemporary landscapes of the longleaf pine ecosystem.

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Completing this thesis would not have been possible without the contribution of the research participants, the support of fellow graduate students and mentors in the Geography program, and the steadfast encouragement and scrupulous editing provided by my advisor, Dr. David Cochran. I am grateful to my committee members Dr. Andy Reese and Dr. Joby Bass for their guidance, to the faculty and staff of the School of Biological, Environmental, and Earth Sciences for providing me with an opportunity and a space in which to pursue this project, and to the Honors College for their support during the final stages of writing. I am also indebted to my family and friends whose names appear throughout this document as pseudonyms for the research participants, and whose support long predates this project.

DEDICATION

This thesis is dedicated to the future generations of South Mississippi who will inherit the story of the longleaf pine, and to my dad, who taught me to be curious, and to always make time to stop by the woods.

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ALRI	America's Longleaf Restoration Initiative
CCC	Civilian Conservation Corps
FFA	Future Farmers of America
HFRA	Healthy Forests Restoration Act
IRB	Institutional Review Board
LLA	Longleaf Alliance
MSU	Mississippi State University
RCW	Red-Cockaded Woodpecker
T&E	Threatened and Endangered
UEAM	Unevenly Aged Management

CHAPTER I – Introduction

Research Problem

Between 1870 and 1920, the longleaf pine belt of the southeastern United States experienced an extensive and unsustainable period of logging (Jose et al. 2006). In South Mississippi, the lumber and turpentine industries became important components of the regional economy, and the development of railroads in the region helped expedite the clear cutting of pine forests (Hoffman 1998). The logging boom dramatically transformed the landscape of South Mississippi, leaving this previously forested region largely cleared by the early 1900s (Earley 2004).

Following the decline of logging in the 1920s, the deforested region experienced a phase of regrowth, facilitated by a combination of planting and natural regeneration (Jose et al. 2006). These new forests, however, did not resemble the previous forests, which had been the product of centuries of natural and anthropogenic fire disturbance (Jose et al. 2006). Even prior to the logging boom, widespread and regular controlled burning had become less frequent as Native American populations declined and European colonial and post-colonial settlement suppressed burning as a form of land management (Denevan 1992). Fire suppression continued after the logging boom and was a key factor in the composition of the new forests, primarily because it allowed for the development of dense undergrowth where there had previously been open forest floor. In competition with dense undergrowth, longleaf seeds have a difficult time germinating, and seedlings have a difficult time surviving (Haywood et al. 2015).

In the years after the logging boom, the landscape of the Southeast was reforested, but other pine species, notably loblolly pine (*Pinus taeda*), were preferred to longleaf

pine (*Pinus palustris)* for planting and harvesting due to their faster and more easily managed growth (Mississippi Forestry Commission 2022; Hodges et al. 2016). Other prominent native pine species which can be found in South Mississippi include slash pine (*Pinus elliottii*), and shortleaf pine (*Pinus echinata)* (Hodges et al. 2016). These trees will be referenced using their common names throughout the remainder of this document.

Though there is now more diversity of tree species in this region once covered by longleaf pine, some keystone species of the longleaf ecosystem have become threatened or endangered as a result of the environmental change associated with the logging boom of the late 19th and early 20th centuries. Native grasses and other plants are threatened by fire suppression and invasive species, and the decrease of certain animals such as the gopher tortoise and red-cockaded woodpecker broadly impacts plant and animal communities (Jose et al. 2006). For example, the burrows created by gopher tortoises are utilized by hundreds of other species, as are the cavities created in living longleaf pine trees by red-cockaded woodpeckers (Jose et al. 2006). In this sense, forest regrowth alone is not the sole indicator of a healthy, regenerating ecosystem.

For as long as people have lived in Mississippi's pine forests, they have altered the structure of the landscape. Today, amid the barrage of development, agriculture, logging, and changes in the region's climate, the landscape is under increasing stress. Mississippi is still perceived as a forested state, but urban and suburban development and increasingly complex highway networks are no less a part of the landscape. As built environments grow and change, peoples' relationships with the landscape do as well. Trying to recreate a historic landscape that no longer exists is problematic in that it ignores what is here now. On the other hand, it is possible to help the pine forests of

today achieve a new balance and stability alongside existing urbanization. The key is to understand how new relationships between people and their environments impact the contemporary natural landscape.

Forestry remains one of Mississippi's top industries, making the health of the forests and the sustainability of forest industries essential to the stability of the economy of the state. There has been increased interest in restoration of the longleaf pine forests in recent decades, driven by both ecological and economic concerns. Some notable milestones are Congress's authorization of America's Longleaf Restoration Initiative (ALRI) in 2009, as well as the launching of the Forest Service's Million Acre Challenge in 2017 (Matthews et al. 2020). The historic longleaf pine ecosystem once covered more than 90 million acres, stretching from Texas to Virginia. Before European settlement, 56 million acres of that forest was longleaf pine dominant, and over 34 million acres were longleaf mixed with other pines and hardwoods (Jose et al. 2006). The current acreage of longleaf dominant forest in the Southeast is estimated to be 4.5 million acres (Oswalt and Guldin 2021). The goal of ALRI is for longleaf acreage to reach 8 million acres by 2025, but this will be possible only if current efforts are expanded (Guldin et al. 2016; ALRI 2021).

The future of longleaf pine is in the hands of the foresters, conservationists, private landowners, longleaf pine straw businesses, non-profit organizations, and other longleaf enthusiasts who interact with and have established their livelihoods by way of the longleaf ecosystem. Understanding the human-environment relationships within this group of South Mississippians is fundamental to a holistic discussion of longleaf restoration.

Figure 1. The Historic Range of Longleaf Pine in the Southeastern United States

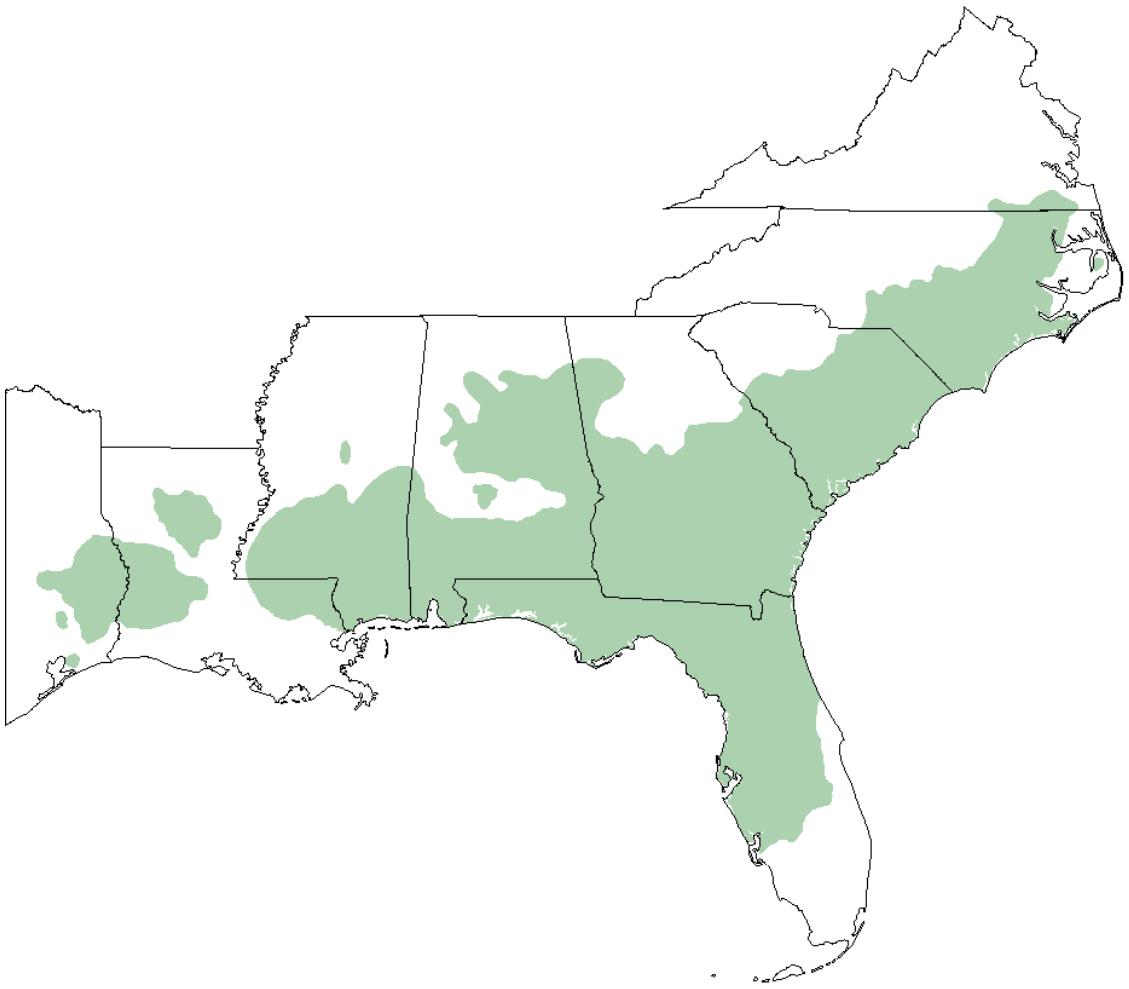
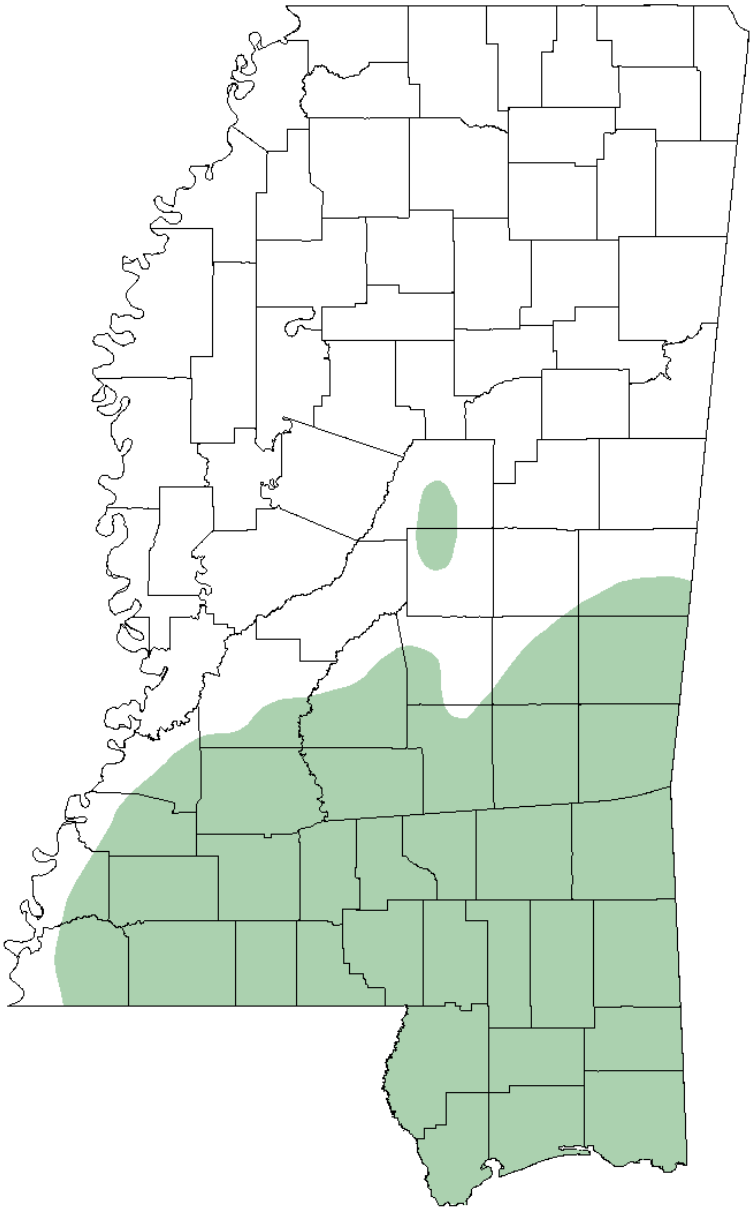


Figure 2. The Historic Range of Longleaf Pine in South Mississippi



Research Objectives and Questions

The economic value, biological diversity, and need for restoration of the southeastern longleaf pine belt has been the subject of considerable research, but there has been relatively little attention devoted to understanding the relationship between the local community and the pine forests. I propose to document some of the contemporary relationships between South Mississippi residents and pine forests, and to ascertain how human attitudes and interactions with the forests have affected and will continue to affect the future of this biological community. This research will help bridge the gap between the ecological health of the forests and their economic value, and hopefully will lead to a more holistic understanding of what has happened to longleaf forests, as well as how Mississippi can move forward towards maintaining a healthy economy, restoring a unique ecosystem, and fostering greater respect for its landscapes.

There are several subjects on which I intend to focus my thesis research. The first is a history of human impact on South Mississippi's longleaf pine forests, which will help to establish background and context for my primary body of research. The second will be a brief discussion of environmental ethics scholarship as it pertains broadly to forests and forestry in the United States. The third will cover ethnography as a method for human geography research, and the fourth will be an in-depth analysis of present-day relationships with and attitudes towards the forests, and how these might impact the future of South Mississippi's landscapes. The questions I hope to answer by combining these avenues of research are as follows:

1. Regarding people involved in forestry, forest conservation and restoration, and forest related economic activities, what are the current relationships with and perspectives on the longleaf pine ecosystem?
2. How have these relationships affected treatment and use of the ecosystem, and subsequently what conclusions can be drawn about the future of longleaf pine in South Mississippi?

In this chapter, I have given a brief introduction to the history of the longleaf pine ecosystem in South Mississippi, and an introduction to present-day interest in the restoration of that ecosystem. I have introduced the purpose of my research, and the questions which I set out to answer. In Chapter II, I explore literature addressing multiple aspects of my research problem to provide historical context and a discussion of the concepts behind my research methods. The literature review covers the subjects of logging in Mississippi's pine belt, the restoration, conservation, and management of longleaf pine, environmental ethics, environmental perception, ethnography, and place.

In Chapter III, I explain my research methodology, including my ethnographic approach to conducting personal interviews with ten research participants. I explain the step-by-step process of identifying, contacting, and interviewing those participants, and subsequently analyzing the content of the transcribed interviews in the context of my research questions. In Chapter IV, I present and discuss my analysis of the interview content, which is broken and organized into eight thematic sections. After considering all ten interview transcripts, the eight themes which stood out to me were that of the participants livelihoods and professions, their knowledge of the longleaf ecosystem, defining restoration and conservation, private land ownership and management,

prescribed burning, changes on the landscape and within the regional culture, perceptions of the forests' value, and the participant's spiritual connection with the environment.

In Chapter V, I provide my final thoughts on how the results of the personal interviews answer my research questions. I return to the research problem, and discuss how this thesis addresses what gaps exist between longleaf conservation and the forest products industry, and how the combined experience and knowledge of longleaf stakeholders and enthusiasts across South Mississippi contributes to a more holistic understanding of the longleaf ecosystem as both a valuable home for biodiversity and a culturally important place.

CHAPTER II – Literature Review

Logging in Mississippi's Pine Belt

Logging swept through and leveled the pine forests of the Southeast between the 1870s and the 1920s, in many cases causing significant, near-unrecoverable damage to local biological communities and soils (Hickman 1962; Hoffman 1998; Hoffman 2002; Earley 2004). Lawrence Earley's *Looking For Longleaf,* Nollie Hickman's *Mississippi Harvest,* and Gilbert Hoffman's *Steam Whistles in the Piney Woods* are some of the better known studies that document this striking historic period, and in the case of Hickman and Hoffman, focus specifically on Mississippi (Hickman 1962; Hoffman 1998; Hoffman 2002; Earley 2004). As the lumber industry grew in South Mississippi, the introduction of railroads facilitated new economic growth as well as easier and quicker transportation of logs across the country (Hoffman 1998; Sturkey 2019). Prior to the use of railroads and dummy lines, the transportation of longleaf pine logs was limited to navigable rivers near logging sites, which limited the spatial extent of logging. Some of the most prominent mills in South Mississippi at the time were operated by the J. J. Newman Lumber Company, Tatum Lumber Company, and Camp & Hinton Company (Hoffman 1998). There were many other mills of varying sizes and degrees of success along major railroads, which converged in Hattiesburg, such as the New Orleans & Northeastern, the Gulf & Ship Island, and the Mississippi Central lines (Hoffman 2002). The transition from river transport to railroad lines coincided with the development of port cities along the Gulf Coast, which allowed increasing demand for longleaf pine to be met across the United States and overseas (Hoffman 1998; Sturkey 2019).

Most of the logging operations focused on old-growth longleaf pine, sometimes referred to as southern pine or yellow pine. Longleaf was well regarded for its strength, durability, resistance to decay, and high resin content, which kept the wood in high demand (Hickman 1962; Hoffman 1998). Longleaf pine timber was desired for the construction of homes and buildings, ships, railroads, telephone poles, and many other materials (Hickman 1962). Lumber was not the only forest resource in demand, however, and the production of turpentine, resin, and tar became profitable extractive industries in their own right, as examined by Robert Outland in *Tapping the Pines* (Outland 2004).

The rapid growth of the longleaf industry was not without its pitfalls. When commercial logging in South Mississippi first began, forests were so extensive that buyers could be picky about the quality of timber, which resulted in many old growth trees being cut down and subsequently wasted because of perceived flaws in the wood (Earley 2004). Many logs were also lost in rivers before railroads became the primary mode of transportation. When steam skidders were introduced and used to clear cut stands of trees, which was considered the fastest way to harvest timber, they caused considerable damage to the land. The skidders cut down or uprooted young trees in their path and exposed the soil to erosion (Fickle 2001). The frenzy of logging and the rapid proliferation of sawmills eventually slowed, because by the 1920s most old-growth stands had been cut down.

The Longleaf Pine Ecosystem

Fire suppression, urbanization, logging, and agriculture are all contributors to the fragmentation, depletion, and degradation of the historic longleaf pine ecosystem (Fill 2017). But in addition to anthropogenic disturbances, the unique ecology and its

relationship to the region's climate are equally important elements of this story. History, ecology, and climate all contain important insights into the perceived value of the forests, and consequently how the ecosystem has been altered over time.

The composition of the old growth southeastern pine forests included an open canopy of longleaf and a handful of other pines and hardwoods, and a species-rich understory (Jose et al. 2006). Native grasses and other herbaceous plants account for most of the diversity, though there is also a considerable amount of animal biodiversity (Jose et al. 2006). Wiregrass and bluestem grasses are two of the keystone groundcover species, the former growing in forests near the coast, and the latter growing in the northern part of the historic longleaf range (Fill et al. 2021; Fill 2017; Mulligan et al. 2002; Means 1997; Outcalt 1992). The understory has been equally impacted by the anthropogenic disturbances responsible for the decline of longleaf, and restoring a balanced ecosystem calls for the consideration of not just longleaf, but all native species.

Understanding the relationship between the longleaf ecosystem and the climate of the Southeast is likewise relevant to restoration. Thunderstorms, tornadoes, tropical cyclones, and forest fires are all linked to the functioning, spatial heterogeneity, and biodiversity of the ecosystem (Gilliam 2006, 2021; Sui et al. 2015). Some wind damage from severe weather is beneficial for the environment, as it opens new areas of the canopy and changes the extent and distribution of shade, thus maintaining a high sun environment (Gilliam 2006, 2011). However, longleaf trees have proven more resistant to severe winds than loblolly or slash pine, and planting longleaf could be one way to minimize hurricane-related impacts to South Mississippi's forests and tree farms (McNulty 2002; Emanuel 2005; Johnsen 2009; Gilliam 2021).

Fire plays a significant role in maintaining wetlands, uplands, and ecotones within the longleaf-grassland ecosystem, and the suppression of regular burning is harmful to established habitats and plant and animal species (Van Lear et al., 2005). Without regular fire, pitcher plant bogs become overrun by pine and hardwood seedlings and saplings, and other herbaceous species not normally found in bogs. In the pine forests, natural and anthropogenic burning eliminates competitive ground cover, allowing young longleaf trees access the soil exposed by the frequent low-intensity fires (Haywood et al. 2015; Jose et al. 2006; Gilliam 2006, 2011, 2021; Van Lear et al. 2005; Stambaugh et al. 2011). Native grasses, such as wiregrass and bluestem grasses, constitute a substantial portion of the fine fuels responsible for these characteristic low-intensity fires, along with pine needles and other small plants and leaf litter (Fill 2017; Means 1997; Outcalt 1992).

Because of the changing climate, evaluating the longleaf pine ecosystem from a climate perspective is relevant to restoration efforts, commercial logging, and other forest industries (Emmanuel 2005; Craig et al. 2019). Conserving and restoring longleaf pine can provide better hurricane and drought tolerance, support more diverse wildlife communities, and help to restore the ecosystems of endangered species (Jose et al. 2006; Kush et al. 2004; Haywood et al. 2015). Additionally, longleaf pine can survive up to four hundred years and produces abundant resin, and thus holds a wealth of information for studying the climate (Stambough et al. 2021; Henderson and Grissino-Mayer 2009).

Restoration, Conservation, and Management

Recent restoration efforts have managed to largely halt the decline of longleaf ecosystems, to rehabilitate degraded and clear-cut land, and to convert some areas of forest back to longleaf (Oswalt and Guldin 2021). Public land has been critical to

restoration efforts in Mississippi thus far, notably the work of the United States Forest Service in De Soto National Forest (Jose et al. 2006). In the long run, however, private landowners will be responsible for much of the restoration given that far more forest land is privately held (Oluoch 2021; Jose et al. 2006). The management challenges for both public and private landowners, whether they are harvesting trees or preserving them, are important context for the development of peoples' attitudes towards the forests.

Interest in longleaf pine restoration among conservation and preservation groups, the U.S. Forest Service, forestry companies, and private landowners stems from multiple objectives. Among them are preserving or restoring wildlife habitats and biodiversity, interest in the economic viability of longleaf stands, concern for the aesthetic value and resilience of the landscape, desire for outdoor recreational space, and conservation of family land (Mills 2013). Though the goal of longleaf restoration is to bring back as many healthy longleaf stands as possible, in some cases it would not be economically or ecologically viable to clear-cut existing stands of other tree species (Guldin et al. 2016). One alternative argument is to locate mixed forests, harvest the trees that are not longleaf, and re-introduce a fire regime (Guldin et al. 2016). Another is to keep the mixed stands and increase the percentage of longleaf in order to preserve the existing ecosystem (Guldin et al. 2016). Unevenly aged management (UEAM) is also a viable option in some cases. Because of the varying ages of the trees in UEAM (each acre could contain seedlings, saplings, and harvestable trees), harvesting can occur more often, and because of this flexibility, UEAM has potential for both public and private lands (Dyson 2012).

Regularly burning the understory of a longleaf pine stand is an essential management practice for a healthy longleaf ecosystem, but fire presents several

challenges to the process of restoration. Because burns are more difficult to manage in areas where fire has been suppressed and there is an abundance of fuel, many landowners are wary of reintroducing a fire regime. Unfavorable weather conditions such as storms, droughts, and strong winds make it difficult to schedule burns in advance (Jose et al. 2006; Mitchell et al. 2014). In addition to landowners, local communities have raised concerns as well, particularly that if not properly managed, the smoke from controlled burns can obscure road visibility and enter residential areas (Mitchell et al. 2014). An increase of hazardous weather due to anthropogenic climate change could further exacerbate these concerns (Mitchell et al. 2014).

When only considering the short-term, loblolly pine is a more economically competitive tree than longleaf pine. In the long-term, however, there are several compelling economic arguments in favor of longleaf (Alavalpati et al. 2002). Though it takes longer to mature, longleaf produces more dense timber than other southern pine species, making it more valuable, particularly for utility poles (Massey 2021; Longleaf Alliance 2011). Utility poles are one of the most important southern pine products, and over time the value of longleaf poles has proven more stable than other pine species (The Longleaf Alliance 2011). Despite this, other potential benefits of the longleaf ecosystem need to be considered, and timber production needs to be combined with other revenue streams in order for longleaf to compete economically with faster growing pine species (Massey 2021; Susaeta and Gong 2019). Potential benefits and revenue streams may include pine straw harvesting, hunting leases, grazing, water yield, carbon credits, biodiversity, and greater resilience and adaptability to severe weather, pests, and diseases (Massey 2021; Mills 2021; Susaeta and Gong 2019). Some research argues that pine

straw harvesting is one of the most profitable alternative revenue streams to combine with timber production, though timber and pine straw may still need to be combined with other revenue streams to outcompete loblolly (Mills 2013; Massey 2021; Susaeta and Gong 2019; The Longleaf Alliance 2011). Additionally, government assistance programs that provide financial incentives to landowners can make planting longleaf a more financially viable option (Massey 2021; Oluoch 2021). Carbon credits, forest recreation, water yield, and endangered species protection are all potential avenues for financial incentives (Oluoch 2021).

If a landowner has a desire to protect the landscape and ecosystem, they have the option to place their land under a conservation easement (Cummins n.d.). The Mississippi Land Trust published a guide to conservation easements for Mississippi Landowners which outlines some of the basic facts and incentives. The primary incentive for conservation easements is landscape protection, but in order to help landowners feel financially comfortable with the decision, conservation easements provide considerable federal tax benefits (Cummins n.d.). Some recreation, timber management, and resource use could still be allowed under a conservation easement, as long as the specified intent of the easement is being followed (Cummins n.d.).

Environmental Ethics and Perception

Balancing the use of pine forests in South Mississippi for commercial purposes with efforts towards restoration is a task that ultimately requires a discussion of environmental ethics. There are, and always have been, a host of differing views on the value of the environment, many of which can be seen in the actions and attitudes of present-day forest industries, conservation groups, and individuals in South Mississippi

(McShane 2009; Palmer 2014). An examination of prevailing ideas within environmental ethics, combined with an ethnographical analysis of the results of the interview portion of this project, will help to provide a clearer picture of the contemporary relationships between South Mississippians and the longleaf pine forests.

Environmental ethics emerged as a subfield of philosophy in the 1970s, though people and societies have contemplated their relationships with the environment for far longer throughout history (McShane 2009; Palmer 2014). Whether or not the environment has intrinsic value, what the relationship between humans and the environment should be, and how much of a hands-on or hands-off approach should be taken are some of the central debates within environmental ethics (McShane 2009; Palmer 2014; Brennan 2022; Forbes and Lindquist 2000; Manning et al. 1999). Humans are dependent on the environment's resources, and therefore in the context of human interests, the environment holds instrumental value. But whether people believe that the environment has value in and of itself can affect land management as well as conservation and restoration efforts.

Aldo Leopold's "The Land Ethic," a foundational work in environmental ethics, explored the idea of humans as members of the "land-community" (Leopold 1949; Nelson 1998). Rather than elevate the value of individual species to that of humans in order to protect them, Leopold proposed a consideration for the overall health of the environment and the many interdependent relationships between its members, including humans (Leopold 1949; Forbes and Lindquist 2000). Environmental perception, the idea that the events of daily life, culture, religion, and any other experiences or socioeconomic conditions affect peoples' perceptions of the environment, also influences human

behavior towards the land (Tuan 1974). Management of longleaf pine forests is therefore in part affected by the culture and values of people in South Mississippi and throughout the Southeast.

Ethnography and Place

Originating in the field of anthropology, ethnography is a research method which has become popularized throughout many academic disciplines. It is a means of studying culture through immersion, and of learning about the subject at hand through the point of view of the local community (Spradley 1979). To study the relationships between the people of South Mississippi and longleaf pine ecosystem, I developed my research method through the lens of human geography as well as ethnography. In *The Ethnographic Interview,* James P. Spradley argues that culture is not something which can be directly observed, but rather must be learned and inferred by listening to and observing people (1979). The role of the ethnographer is to make inferences about a culture from people's words and actions, and subsequently analyze and describe the culture being studied (Pole 2003; Spradley 1979).

Spradley focuses primarily on language, and what can be inferred from an ethnographic interview (1979). One goal of ethnographic research is to portray the perspective of the people in the culture being studied, not the ethnographer's perspective (Pole 2003). Conducting personal interviews is one way to accumulate specific and individual experiences from the inside perspective. When writing an ethnographic analysis, individual experiences and stories convey a culture with more authenticity than generalized statements, so it is important to utilize the knowledge divulged during the interviews (Spradley 1979).

Though ethnography was originally utilized for cultural anthropology, it can be an inclusive research method applicable to the social sciences, humanities, and even the natural sciences (Pole 2003). Ethnography goes hand in hand with human geography, particularly with the study of place, a geographical subject studied across as many disciplines as ethnography (Cresswell 2015; Tuan 1977). Place is a concept which seems simple, just a location marked by geographic coordinates. But place implies a memory, and it is the substance of space (Cresswell 2015; Tuan 1977). If space implies openness and the capacity for movement, place implies stopping somewhere on the path of that movement and discovering somewhere to belong and to find value (Cresswell 2015; Tuan 1977; Tuan 1974).

The longleaf pine ecosystem once blanketed the landscape of South Mississippi, and for many people the memory of that landscape as well as the landscape that exists today defines part of their experience living in this region. For them it is more than a landscape and more than an ecosystem; it is a place full of memory, connection, and meaning. Where landscape is primarily something which can be viewed from the outside, place is somewhat the opposite. A place is somewhere to go, to be inside of, and to be experienced; it is not just something to be looked at (Cresswell 2015; Tuan 1977). And the juxtaposition of the memory of the historic longleaf pine ecosystem with the contemporary reality of the forests' condition is at the core of this experience.

As much as place is something to be experienced, it can also become a perspective. To know the world as a collection of places is to attach meaning and connection between people and those places (Cresswell 2015). And for good or ill,

people's perspectives are often shaped by the character of the place with which they identify, and they know other places through that perspective as well (Cresswell 2015).

The role of place in this research is as a means to qualify the longleaf pine ecosystem of South Mississippi as it is experienced by the people who live in and around it. All of the subjects covered in this chapter are a part of what makes the longleaf ecosystem a place. The history, environment, and management of the region have given it a story, something for people to connect with, and somewhere to find value and meaning.

CHAPTER III – Methodology

This thesis project was approved by the University Institutional Review Board (IRB) in April 2022 (Protocol Number: 22-281). The project was modified and re-approved in October 2022, and concluded in October 2023. All signed participant consent forms are kept in a locked file drawer in Walker Science Building (WSB), and digital files and recordings are kept on a secure password protected computer, which remains with me at all times. At a time when the data is no longer needed, digital files will be erased, and paper files will be destroyed. In order to maintain participant confidentiality, I have only revealed information pertaining to organizational/institutional affiliation and livelihood when permission was given by the participant. Additionally, I have changed the names of the participants on the interview transcripts and in Chapter IV of this document, where the results of the personal interviews are discussed.

To explore the human geography of South Mississippi's longleaf pine ecosystem, I combined secondary research with personal ethnographic interviews. My discussion of secondary sources in the literature review provided the historical background, contemporary relevance, and theoretical framework of my research. In the literature review I explored the logging history of the Southeast, the ecology and climate of the longleaf ecosystem, longleaf restoration and conservation, timberland management, environmental ethics and perception, ethnographic research methods, and the concept of place.

For the personal interviews, I set out to identify individuals involved in forestry, forest-related economic activities, forest conservation and restoration, and similar fields in order to understand the relationship between people and their environment, the culture

among the residents of the longleaf pine ecosystem, and how they perceived the longleaf pine ecosystem.

The identification of participants was ongoing throughout the research process, and by the conclusion of the project included employees of the U.S. Forest Service, Longleaf Alliance, Mississippi State University Extension Forestry, U.S. Fish and Wildlife Service, and the Nature Conservancy, as well as local private landowners and a local pine straw raking business. The process of identifying participants was a combined technique of purposeful sampling and the *snowball method*, which involves asking each participant at the conclusion of their interview if they knew of other individuals with whom it would be beneficial for me to talk.

At the beginning of the participant identification process, I reached out to each individual and/or organization to identify a suitable spokesperson. I then scheduled the times and locations of the interviews with each participant by telephone or email. All participants were briefed on the purpose and goals of the research before their interviews and told that they would be asked to sign a standard informed consent form if they consented to participate. I administered the form to the participants at the beginning of our meeting before the interview began, at which time we signed the form and discussed the information within to ensure a clear understanding of its contents.

All personal interviews were conducted between March and August of 2023, and for each interview I travelled to off-campus locations convenient for the participant. These locations included their places of employment, their homes, and local coffee shops and restaurants. I recorded each interview with the participants' knowledge and consent and created transcripts of the interviews using Microsoft Word's transcription software. I

later reviewed the conversations, identified important information and themes, and organized the research results according to an analysis of the data collected from the interviews. The most prevalent subjects within the collection of interviews included the profession and livelihood of each person, the longleaf ecosystem, longleaf restoration and conservation, private land ownership, prescribed burning, ways in which the landscape and the culture have changed over time, perceived values of the ecosystem, and each participant's spiritual relationship with their environment.

The table below contains the list of prompts I used to guide each interview. All participants were asked each question, except when the topics had already been covered by the participant, or if the flow of our conversation rendered a question irrelevant. As each conversation took a unique course, I did not ask the questions in the exact order listed below. Instead, I reordered the questions as the interview progressed in a way that seemed most natural to the flow of conversation. Though participants were asked the same questions, each person's interpretations were unique, and I occasionally asked additional questions specific to each conversation if I needed clarification on a subject, or if I wanted the participant to expand on a comment.

Table 1 *Personal Interview Prompts*

1. Did you grow up in Mississippi? Did you grow up around a lot of nature?
2. What led you to your current job?
3. Why did you want to work with Mississippi's pine forests?
4. What do you love about the forests?
5. What value do you see in the forests?
6. Do you think Mississippi's pine forests are being sustainably managed?
7. Do you think there is a balance between forest industries and conservation? Or do you think one or both needs more attention?
8. How much time do you spend in the forests themselves? Is most of your work done indoors or outdoors?
9. Do you interact with the forests primarily for work/professional reasons?
10. Do you enjoy being in the forests for recreation?
11. How has your idea of the pine forests changed over time? Has it stayed the same? If it has changed, what changed it?
12. What are your views on the ongoing efforts to restore the longleaf pine forests of South Mississippi?
13. Do you feel that you have a spiritual connection with the environment?
14. If you are a member of an organized religion, or if you are not affiliated with an organized religion but consider yourself spiritual, do you see a connection between your spirituality and your work with the environment?
15. Do you know of any other individuals I should interview, or organizations I should reach out to?

CHAPTER IV – Results

I interviewed ten participants, all of whose livelihoods are intertwined with the longleaf pine ecosystem of South Mississippi. Many of the participants grew up in Mississippi alongside the pine forests, but a few were drawn here in pursuit of their careers, and one simply in pursuit of nature. Their combined knowledge and perspectives speak to a wide range of experiences, each distinctive, though all connected. I have already discussed the importance of the individual plants and animals within the longleaf pine biological community to the overall health of the ecosystem, but there is a parallel, interdependent relationship among the people who work in, utilize, conserve, exploit, and care for that ecosystem. Whether through forestry, land ownership, small businesses, or environmental organizations, there is a shared experience and sense of place which permeates the lives of each person I interviewed. The ten with whom I spoke are but a small sample of a much larger community, and there are many more perspectives to explore in that community. But I believe the perspectives represented here provide valuable insight into some of the more salient relationships between the longleaf pine ecosystem and those people who make their living from it, directly or indirectly.

My conversation with each participant spanned a variety of subjects, including childhood experiences with nature, family history, careers and passions, the longleaf ecosystem, public and private land ownership and management, longleaf conservation and restoration, spirituality and nature, and many other tangents where our conversations led us. Together, each participant's input on these subjects depicts not only the story of their life and relationship with longleaf, but also some of the human relationships within

their local community, and the inherent connection between the people who work or live in South Mississippi's pine forests.

Participant Livelihoods and Professions

In conducting personal interviews, I wanted to not only identify a diverse selection of perspectives, but also identify the relationships between those perspectives. Because my primary method of identifying potential participants was by asking for recommendations at the end of each interview, I ended up with a network of participants who were closely connected to each other, and the connection between each of the participant's stories became clearer with each interview. If there was a subject one participant felt they could not offer insight into, they would recommend to me someone who could, and thus I was able to fill many gaps in my research.

My search began with the United States Forest Service, where two participants are employed. Lawrence, my first interviewee, is a forester who has worked in the De Soto National Forest for thirty years, though he is not from the area originally. He was born in California, grew up out West, and began his forestry career in Texas. After a few years of working in Texas, he was offered a job in De Soto, and jumped at the opportunity. During his career in Mississippi, he has traveled around the country helping fight fires. Though he has been offered forestry jobs in other places around the country, he has been happy to stay put in De Soto because he loves the forest, he loves working with a forest that burns, and he has never wanted to uproot his family. Lawrence believes much of what he does as a forester is teach, because he values a continuous growth of communication and collaboration within the Forest Service. He is passionate about each office of the Forest Service working together and being mindful of a common goal.

> "… I want people to understand how the whole process works, because that gives you more skin in the game … [W]hat's the deal about soils? What's the deal about fire? Why do we cut timber? Why are we thinning? Why are we clear cutting? If people understand all of that, they get the big picture."

Zakary, another De Soto forester, is a Mississippi coast native who was always connected to nature and has always been inclined to be outdoors. He grew up between the beach and a little patch of woods, and as a teenager he participated in an outdoor program which had a profound impact on him. He continued to help run the program with his mentor, who helped to encourage his love of nature and teach him about the environment. It was in college, however, when Zakary began to consider studying the subject more seriously.

> "I met a biology professor who showed me how alive biology was. In high school for whatever reason, the subject seemed dead. I don't know if it was the way it was taught, or maybe my perception or whatever, but later on it seemed like something that was alive."

After completing his graduate education, Zakary worked a couple of different environmental jobs before joining the U.S. Forest Service in 2002. He wanted a job that would allow him to work outside, but he also needed an income and benefits, as he had just gotten married and was taking care of a new baby. Before he took the job, Zakary was hesitant about the type of work he would be doing with the Forest Service.

> "[T]he Forest Service here and other places too didn't have the best reputation for always doing things that were ecologically sound, because for many, many years, lots of forests had been kind of run like a tree farm, without as much emphasis, or if any, on the ecosystems that were present. I think they did a fairly good job of protecting water and things like that, but there wasn't as much thought that went into all of the threatened and endangered species and the unique habitats… So, I thought about when I was offered the job … will I be able to do some good here ecologically? And I thought, well, I definitely won't do any good if I don't go work there."

Inherent in his work is the opportunity to continually learn about the environment, which is partly why he has worked as a forester for so long. In learning about the environment and encountering many projects and problems involving development, industry, and conservation, Zakary has learned how to approach conflicting or competing interests.

> "… I guess what I see myself now as is a liaison between humans and the environment. I've always been able to find creative solutions or creative ways to approach something that may seem like it could only go one way or the other. There's always middle ground. There's always a way to take care of the environment, to take care of the plants and animals and the land, and still allow things to function."

Regarding the Forest Service itself, Zakary emphasized that the forests they manage are "working forests," where "we cut trees for the right reasons in the right places," and that they actively work within the local timber markets, and with local loggers and mills. George emphasized the same point, that the Forest Service manages forests in a way that benefits the economy as well as the land, and he believes that most foresters he knows would agree.

> "Every forester I know well, no exceptions, would claim that there is no conflict between good conservation and timber management … And I'm proud of the fact that there are more trees in Mississippi today than when I was born. And there's more acres of forests in Mississippi today, so according to that metric I think we're doing a pretty good job."

Both Lawrence and Zakary expressed a sense of peace and appreciation with where they have ended up in their careers. In particular, Zakary recognized that "the people, the communities, the forests, the role of fire and the old local knowledge, people that have lived around the forest for a long time," all are a part of what separates this ecosystem and community from other places.

In a similar position to Lawrence and Zakary, but working as an extension forester for Mississippi State University (MSU), George grew up in central Mississippi, and when reflecting on his childhood, he does not remember it revolving around nature, but he believes that his family spent more time outside than most, and that his childhood and family life helped to inspire his love of nature. They hunted, fished, and generally enjoyed the outdoors. George has been at his extension forestry job since 2002. He had no knowledge of forestry as a profession until it was time to decide on a college degree, and forestry caught his eye. "… I said, well, I love being in the woods, I'll just declare forestry. Fell in love with it."

Although he practices some on the ground forestry as part of his job, most of his time is spent teaching. George's teaching experience is well rounded, as he has at one point or another taught children, undergraduate and graduate college students, and adults, though teaching professional foresters who are required to accrue continuing education hours is where he spends a lot of his time. "So, you could say instead of practicing forestry, I talk about forestry more than anything else." He also works with landowners to connect them with the financial opportunities for planting and restoring longleaf. Though teaching and public speaking are not in the usual job descriptions of a forester, George could not be happier in his role.

> "As I mentioned earlier, foresters are notorious for being introverted and quiet and not liking to talk. And so, I really have carved out a niche. I love public speaking. I love talking. I love going out and doing meetings and things, and it's kind of rare in forestry to have a forester that enjoys doing this work."

In addition to the Forest Service and MSU Extension Forestry, I also interviewed an employee of the U.S. Fish and Wildlife Service who works in South Mississippi. David was born and raised in West Texas, and when he was in the first grade, he was

struggling in school until his class spent a day outside, and his teacher noticed him engaging with the class and even taking the lead. It was then that she intervened in his education, and catered all of his future lessons to wildlife and the outdoors.

In high-school David got involved with Future Farmers of America (FFA), and enjoyed it so much that he continued to study agriculture when he started college. The commercial element of agriculture eventually lessened its appeal to him, and after a few years in and out of college, he obtained a degree in Forest Game Management. Now, David's primary job as a biologist is to work towards the restoration of longleaf pine, to help manage invasive species, and to work hand-in-hand with private landowners on these issues. Though he works with longleaf pine now, when he first began his career the interest among the community in longleaf management "…was slow getting started…" He has learned a lot, and has made management mistakes along the way, but one of David's goals is to help provide young professionals in his field with the longleaf management knowledge he had to learn on his own. "So, it's more than just working with individual landowners; it's trying to help these younger generations that are in this field, knowing that they didn't get the education on longleaf that I didn't get myself."

The vast majority of David's work is with private landowners, however, and he has professional and personal knowledge to offer as a private landowner himself. He has been interested in the human aspects of management since college, and on the three-legged stool of his job, "…population management, habitat management, and people management …" managing people is the longest leg, and requires the most effort.

The Nature Conservancy is an environmental non-profit organization whose employees also work with public and private landowners. Patti is a Mississippi native

whose extended family was always outdoors camping, fishing, and quail and dove hunting. Patti owns land with mixed pine and hardwood forest, which was her childhood home. She now works for the Nature Conservancy, and when considering the role of nature in her childhood she notes, "I think that part of that probably led me to where I am now. [I was] always interested in history, always interested in animals and the natural environment." She helps to manage the Nature Conservancy's land acquisitions in Mississippi, as well as its efforts towards longleaf pine restoration and conservation, among other things. And the connection between the environment and the history of people on the landscape is something she considers often, out of personal interest and because historic preservation often comes into play when the Nature Conservancy is seeking to protect a piece of land.

> "[M]y whole thing, I think, is just about protecting historical resources and protecting natural resources … I love history and I love genealogy and finding out what your ancestors did for a living. And a lot of mine were loggers, or … made their living off the forest."

Patti does not get to work outside as much as she once did, and wishes she could be outside more, but she understands why she ended up in management. She has worked with the Nature Conservancy for many years, and in a management position her experience and knowledge is available for more projects and to more people.

> "And now I have people that work for me that do the outside stuff more than I do. Which is sad but, at the same time, I know that what I'm doing is important too. If I'm managing grants or writing proposals, that's going to keep them employed and keep the projects going."

Much like Zakary, and all of the participants in one way or another, Patti sees her role in part as someone who works in-between people and nature. There are many demands on the forests, and not just demands for resources, but demands for restoration as well. The

people advocating for one or the other are always heard by someone, and often their voices fall on the ears of people in positions such as Patti's. "[J]ust trying to figure out how to connect people to nature, that's what I do."

Though she works a lot with forests and with people, her true passion is bodies of water, and "… the forests come with it …" A lot of her work with pine forests comes from the Nature Conservancy's goals and because she lives in the Piney Woods. But she cares deeply about rivers, lakes, and streams. In particular, she has a deep personal and professional connection with the Pascagoula River. "The Pascagoula River is my specialty, my heart, I love it, you know? … [I]t flows right through the Piney Woods. So, yeah, I'm here to stay."

Isabel, another employee of the Nature Conservancy, grew up in Mississippi, beginning when she moved with her family here as a ten-year-old. When I asked about her experience with nature during her childhood, she told me,

> "I always had an affinity for nature when I was little. My parents weren't really outdoorsy types, I just kind of figured it out on my own. And I had other family members that were more outdoorsy … I've always been drawn to nature. When I was a kid, I loved butterflies. That was my jam."

After studying biology and ecology in college, she loves how working with the land allows her to be outside in the woods, to interact with all of the native species, and also to work with both public and private partners in order to affect the landscape on a larger level even though her day-to-day work deals with land management on a smaller scale. When I asked her why she wants to work with the pine forests, and why she stays where she is, Isabel spoke about the connection between the people and the land.

> "I wanted to be more conservation goal oriented because the ecology and the ecosystem itself in which we live, this is the air we breathe and the water we drink

> … That's the big picture connection that keeps me going, and also leaving the legacy for future generations and hopefully younger professionals …"

The Nature Conservancy itself is a private landowner and uses the forest land it owns in some ways as a demonstration forest. This allows them to credibly recommend management practices to other private landowners, and to work closely with other partners, such as the U.S. Forest Service and private organizations. They are a worldwide conservation organization, with significant investments in North America. Each state can have its own chapter, and Mississippi has had a chapter since the 1980s, though land purchases began in Mississippi in the 1970s. In 1974, the Nature Conservancy made one of its largest purchases to date, and helped to preserve one of Mississippi's most well-kept environmental secrets, the Pascagoula River.

> "It's the largest river by volume of water that's undammed in the lower 48 states. It's not the only river, it's not the longest river, but it is the biggest by volume of water. It's pretty impressive that we've been able to keep it that way … And I think it was a backhanded compliment, but people would say … 'If Mississippi can do it then anybody could do it.' Whatever, I don't care. We got it done" (Patti).

Because of their whole systems approach to conservation, the employees of the Nature Conservancy consider all biotic and abiotic aspects of the land they work with and purchase. This also means that they do not always purchase land if they feel they will not be able to manage it with the attention it needs. They will work on the land and help to conserve and protect the ecosystems and resources even if they are not planning to purchase it, or if they purchase it with the knowledge that they are going to sell it to someone else.

> "Sometimes we will take ownership of a piece of land that we know we're going to transfer to the state of Mississippi or to the federal government … And then sometimes we sell land. So, we've had a couple of preserves that don't really fit in with our mission anymore. So, we'll sell them to what we call a conservation

> buyer, but we keep an easement on it that protects it from being divided or from somebody building something on it, and we have to go and check it every year and make sure that it's being taken care of" (Patti).

As an employee of the Nature Conservancy, Patti spoke about the importance of relationships with state and federal employees, particularly in Mississippi where she has witnessed many colleagues move around to different positions in the state throughout the years. "So, you don't ever want to burn any bridges with anybody. They're going to end up being in charge of something that you need over here." Working with the state is an important part of her job, especially when it comes to funding. Last year the state approved new conservation funding, which received a lot of attention. "[T]hey allotted $10 million this year for proposals, and they got $50 million worth of proposals … and it shows the state that, hey, there's a big need here, we need to keep uppin' that money."

Conservation projects like the ones the Nature Conservancy seeks out and takes on will always be in supply, whereas people and funding are frustratingly limited. Deciding which projects to pursue and how much effort to devote to them is one of the most challenging aspects of Patti's job. "[Y]ou can just see all the need out there and you just have to pick and choose." But where management has its challenges, Patti finds joy in telling the longleaf story. Teaching people the history of what the land used to look like and what it could look like in the future is another of her passions. "I see my role as, I'm the storyteller."

Patti and Isabel, through the Nature Conservancy, have also worked with Mississippi's Longleaf Implementation Team, a local group associated with the Longleaf Alliance (LLA). LLA is a non-profit organization, established in 1995, that works throughout the Southeast, coordinating the longleaf management and restoration efforts

of "private landowners, forest industries, state and federal agencies, conservation groups, researchers, and other enthusiasts," (The Longleaf Alliance 2021). To Isabel and Patti, the value of working within the Longleaf Implementation Team is the diverse partnership, and the opportunity to have interdisciplinary conversations and develop relationships. But as I began to learn about Patti, she is always thinking of where the improvement needs to be, which in this case lies in the outreach efforts.

> "We're not reaching enough; I know we're not reaching enough. And we're reaching white men, really … because that's who traditionally has been managing the forest. That's who's made the decisions on family lands, and that's who comes to the County Forestry Association meetings. So, that's one thing I'm trying to figure out, is how we find women that own land and empower them to manage it …"

Managing for timber is not the only opportunity for profit on pine forest land. One industry which has grown alongside the timber industry is pine straw raking. Although the most widely recognized pine forest product is the trunk of the tree itself, whether it is destined for pulpwood, boards, plywood, or pole timber, pine straw has become a valuable resource throughout the Southeast (Barber 2006). I sought out a southern Mississippi pine straw business in order to understand and gain insight into a profit-driven perspective on pine forests, particularly one that was interested in the straw more than the timber. I was eventually introduced to Winston, the owner of a pine straw business in South Mississippi. Winston grew up in central Mississippi, where there is much less, if any, longleaf pine. He always loved the longleaf trees, however, and remembers trips south where he would get to see them. "I used to come to Hattiesburg every once in a while when I was a young boy, and I always thought the longleaf pine was the prettiest tree in the world."

Winston runs his business with the help of his son and a couple of employees, but he has not always been in the pine straw business. He made his way there through family connections and started out raking slash pine straw with his brother in Georgia. Eventually, he began raking longleaf straw after spending years observing its higher quality from afar, and found his way back to Mississippi where he has now been for thirty years.

Winston does not see himself as a direct advocate for longleaf conservation and restoration, claiming that, "[T]he best part of the job for me is when somebody writes me a check." But he is passionate about the quality of longleaf straw over other southern pines. In that way, and in his clear connection to the people he works with, buys from, and sells to, who also work with longleaf on a daily basis, I believe he is as much an advocate for longleaf as anyone who claims the title outright. Winston's business never rakes pine straw with machines, choosing only to hand-rake a property, no matter the size, in order to protect the trees, soil, and other species on the property. Raking with a machine also results in dirtier straw which becomes harder to clean, and repeated machine raking on uneven topography can lead to erosion. Removing some of the straw, particularly from more dense pine stands, also allows for natural grasses and other groundcover to grow where otherwise they would have been smothered by pine needles. Winston noted that, "We try to leave a place better than it was before we found it." As one of the largest and most trusted pine straw businesses in South Mississippi, by dealing exclusively with longleaf straw Winston and his family are making the case for longleaf every day. "And I won't ever be a millionaire in it, but it's made a decent living for me

and my family and other workers. And it's about like family now, I've been with them so long."

In addition to foresters, biologists, conservationists, and small business owners, I also spoke with a handful of people whose primary connection to the longleaf story is the land that they own. Mary, another Mississippi native, lives in South Mississippi and owns just over two hundred and fifty acres of loblolly pine with her two brothers. Mary is the only private landowner with whom I spoke who does not own any longleaf pine. But I was interested in speaking with someone who owned forested land but had not been immersed in the longleaf restoration movement. Mary and her brothers inherited the land from their father, who inherited it from his parents.

> "[M]y father worked that land as a boy. He would go out there and he would have to run the tractor on the property. So, of course, he had a love for that particular piece of property. There were other properties in the family, but that's the one that he had the most closeness to, I suppose. And then he and I would go … and ride and look at the land and everything and just look at the trees. That was before the tornado went through … [T]he timber on it at that time was just gorgeous."

Their family land was previously used as farmland for cows and corn, but they allowed the loblolly pines to grow and take over the landscape. In 1991, a tornado damaged the entire property, which led them to harvest what they could and cut the remainder of the trees. They replanted the whole acreage in the same year, and since then they have worked with a forester to thin their trees twice. Mary intends to do a full cut of the remaining timber sometime after a third thinning. Selling the timber has always been the family's intention, but she "would like to see it regrown after we do our final cut." They have never burned their property out of concern for neighboring properties, though they eventually would like to burn. They sell some straw from the property, using machine raking, and they do their best to encourage the turkey and deer populations for

hunting. Mary and her extended family value the land as their family heritage, as a place for recreation, and as financial security. She told me that, physically and financially, "[M]y father wanted it to be there for our retirement."

When on my way to an interview with another longleaf pine landowner, I was only expecting to meet Matthew, with whom I had been in contact. But a friend of his, Robert, was visiting at the time, and it happened that Robert owns a small piece of property adjacent to Matthew's and wanted to join the conversation with an entirely unique perspective of his own. The two had been friends for a handful of years, Matthew having inherited his family land, and Robert having been born and raised in New Orleans, purchasing his land only recently during the COVID-19 pandemic.

Matthew was born in Louisiana as well, but his parents purchased the first one hundred and forty acres of their property in 1952 when he was four years old. His dad loved to hunt quail and wanted a place to keep and run his quail dogs, as well as a place to go and spend time outside. But purchasing the land was a significant investment for Matthew's family. "My parents borrowed everything they could to buy this land. Mother taught school and dad was a geologist, and every bit of the money that they made went into buying land."

They used the land as a weekend and vacation property until Matthew moved back permanently after finishing college and starting his career elsewhere. He has lived on the property since 1991, and had been using all of his spare time for several years before that to visit the property. "I'm seventy-five now and I was four when we started. I've had seventy-one years of watching this place."

Robert and Matthew met when Robert and his wife moved to a piece of property adjacent to Matthew's. Robert wanted to meet his neighbors, so he called Matthew, "…and that was it." Robert has used Mississippi as his backyard for a long time, and he eventually grew tired of living in small New Orleans apartments. When COVID-19 hit, he felt that it was time to move, and he and his wife sought out land in Mississippi. When they made it, it felt to Robert like they were coming home.

> "I've learned so much and become in touch with so much … Longleaf is a keystone for everything, culturally, for the environment, on a biology level, animals, plants, people, everything. I've just learned so much being out here. It's shaped my life."

In their roles as liaisons and storytellers, each person has a love of the environment on which to fall back when the work becomes overwhelming or disappointing. Whether their love for the land is found in its peacefulness, the complexity of the ecosystem, or even if the struggle to articulate their relationship with the land, each person has an experience which holds them here. One of David's favorite times in his forest is a cold, moonlit, winter night. "I like to walk through the woods at night without any lights or anything, and just listen and look … It's just peaceful."

Zakary finds himself frequently gazing out over the landscape, observing and reflecting.

> "I love the perspective of being able to gaze out … I like seeing the different colors … just seeing the interactions of life out there, maybe you're near some of the red cockaded woodpecker colonies and you get to watch those feeding and moving about. Or you're watching some other animal run through the forest, whether that's a deer or rabbit … And often when we're out there prescribed burning, you're watching the interaction of fire with nature, vegetation, wind, the smoke. I like checking out the clouds. I like being by moving water. I like looking at the lay of the land. The plants tell the story of the landscape … The animals will tell a story. And they're all working together" (Zakary).

And sometimes what connects us with our environment is so intangible that the participants' struggled to define the connection. They only know that it provides them with something, a feeling or perspective, which they are better off with than without.

> "I just love being out in the woods. It's very difficult to describe why. I would have probably enjoyed other forest ecosystems or other rural land maybe as much, maybe not. But I happen to be here, so I'm sort of married to this place and not ready to divorce it. I love it" (Matthew).

In this section I have begun to answer the question of what human environment relationships exist between the people who work closely with the longleaf pine ecosystem and the land they manage. The array of interests, careers, and paths to living and working in South Mississippi led to discussions not only about each person's livelihood, but also of ecosystem characteristics, longleaf restoration, private land ownership, prescribed burning, changes on the landscape and in each of the participants' lives, the value of the land, and spiritual connections with nature. All of these subjects contain interchangeable material and ideas, but each contains unique insights as well. They contribute to an understanding of the participants' relationships with the longleaf ecosystem as beyond that of a job or livelihood, and of containing as many tangible elements as intangible ones.

Insights into the Longleaf Ecosystem

Although I conducted most of my research on the longleaf pine ecosystem before I began interviewing participants, I learned something new about longleaf, or the other southern pines, with each interview. One question I had not answered for myself during my research was in regard to the spatial relationship and geographic distribution between longleaf, loblolly, and slash pine. Isabel was able to clarify this subject, explaining that slash pine was the wetland pine, naturally occurring in more lowland areas. Loblolly pine

was the transitional species, growing between the lowland slash pines and the upland longleaf. She also explained that this is the reason why loblolly and slash are less adapted to fire, and more prone to fire damage. The periodic fires which swept the uplands would only occasionally impact the lowlands, resulting in loblolly and slash being less adapted to fire disturbance overall. In my interview with George, he elaborated further on this subject, noting that although there is a considerable amount of spatial overlap between all three species, it is fair to say that slash grew more commonly along the coast, where the soil was sandier and poorer than further inland. Slash and loblolly have a much higher tolerance for poor soil than longleaf, another reason why many people prefer not to plant longleaf. And where longleaf stands fade out near central Mississippi, the conditions become more favorable for shortleaf pine.

Prior to interviewing George, I had firmly believed that Mississippi was home to more pine species than hardwood species. George explained that it was not entirely wrong to assume that there were more pines than hardwoods, particularly in South Mississippi. But looking at the state as a whole and considering the past, hardwood wins the majority. The historical distribution of pines and hardwoods looked very different than today's distribution, in that the Mississippi Delta was a "giant hardwood bottom before we cut it all down to plant cotton and soybeans and corn" (George). The commercial forestry industry, which is by far dominated by pine trees, helps feed into the perception that pines are the majority tree. The market usually favors pine harvesting over hardwood, as pine timber is steadily in demand, and demand for hardwood timber in the Southeast is more variable. In addition, because residences, towns, and roads tend to be built more frequently in upland areas and ridgetops, we are more likely to see pines,

which are more common to upland areas, than hardwoods, which are more common in bottomland areas. Regardless of historical landscapes and human perception, in the end it is a close comparison.

Raking and selling pine straw has become an interesting business within the culture of timberland management, and one of the most interesting discussions of longleaf ecology from the interviews was that of its needles (Barber 2006). When I pulled up to Winston's pine straw business, the location and physical structure itself was unassuming, tucked away in a stand of pines and made up of a few trailers, garages, semi-truck containers, and of course, bales of straw. After speaking with Winston, however, it was clear that the façade did not match the expertise with which the business is run. Most, if not all, of the longleaf straw they sell comes from local private landowners, though they sell all around the state, as well as surrounding states. Their customers range from municipal governments that purchase multiple semi-trucks worth of straw, to homeowners who purchase on occasion one bale for their garden.

Pine straw lasts six months before needing to be replaced and helps retain moisture through drier periods. If its purpose is to fill a garden bed, pine straw helps to keep weeds and grass down when placed at the recommended thickness, which according to Winston is about four inches. As an alternative to mulch as a cover for garden beds around homes, Winston is convinced that pine straw attracts fewer termites. "You walk up to a house that's got mulch in the beds and all around the house, you might as well get your sprayer out … because it's going to have termites … [B]ut pine straw, you seldom see a termite in pine straw."

The spatial distribution of longleaf and shortleaf which George elaborated on gave me some insight in longleaf pine needles as well. The distribution of the tree species is related to historic patterns of frost. When ice gathers on longleaf pine needles, they become much heavier and more at risk of damaging the tree than shortleaf needles, which endure freezing rain or snow by accumulating less weight. Shortleaf is better adapted for freezes, and longleaf to the warmer southern landscape.

In relation to fire, longleaf straw has its strengths there too. In his experience as a forester, Zakary has seen the benefits of longleaf pine straw as fuel for regular fires.

> "[Y]ou look at slash pine and loblolly [and] the needles are much shorter. They're not as spindly as far as getting hung up in everything. And longleaf drops a lot of needles, so they're just big. Bigger needles burn well. They get hung up in stuff, and they dry out quicker. That's my observation."

The longleaf ecosystem was not the most discussed topic during the personal interviews, but it was interesting to see what pieces of information each participant had gleaned from their experiences. Working with the land in their various jobs has led the participants to accumulate knowledge over time, and what the participants know of the longleaf ecosystem speaks to the effect they have had on the landscape, as well as to the future of longleaf. Though as an ecosystem it has been exploited and neglected, there are many people today who are invested in its healthier future.

In this section I included ecosystem information which was new to me at the time of the interviews, and I chose to not discuss in detail information which the participants largely considered common knowledge, such as the history of the ecosystem, or information which could be better elaborated on in another section of this chapter. Some examples of the latter are the nuances of managing invasive species like cogongrass, or the complicated history of fire on the landscape. Fire is discussed its own section because

of the breadth of information I received from the participants, and cogongrass is discussed in the section addressing landscape and cultural changes because the participants frequently commented on it in that context.

All aspects of the longleaf ecosystem have undergone changes, stress, or degradation over the last one hundred and fifty years. Each participant has experience with different ecological or management aspects due to how the ecosystem has changed, and as a result, they have all been engaged in corresponding aspects of restoration.

Restoration through Conservation

My conversations with the participants about restoration tended to go in one of two directions. Either we discussed on-the-ground restoration efforts, such as the rehabilitation of gopher tortoises through the Head Start program, or we discussed the concept of restoration, and the meaning of sustainability and conservation from different perspectives. Most of the remarks were positive, and in favor of restoration, particularly a holistic approach which addresses all members of the plant and animal community. The only frustration or doubt that was expressed was on the subject of reaching the people of South Mississippi, and conveying the goals and importance of restoration in a way that speaks to each person. Patti has noticed that when speaking with landowners, it can be difficult to convince them to completely change their trajectory towards longleaf restoration. It has been easier for her to ask them to consider the value of what is already there. “I think that’s the easiest thing to talk people into, is protecting what they already have rather than changing it, necessarily.”

On Mary’s property, she and her family grow primarily loblolly pine, and no longleaf. When asked about longleaf restoration and its growing popularity, she admitted

to knowing very little about the ecosystem, its history, and its benefits for biodiversity. Her family intends to clearcut the property in a few years, and she was interested in learning more about longleaf in case they decide to replant. Mary's perspective on longleaf is an example of the difficulty which foresters, conservationists, and other groups face when trying to reach and inform each and every local landowner, as well as the compelling economic appeal of the fast-growing loblolly pine. But her perspective also represents the general curiosity and open-mindedness which exists among some landowners. Many people choose loblolly out of necessity and convenience, but that does not mean they are opposed to the idea of longleaf, only that the infrastructure for longleaf management requires work before it becomes a viable option for small landowners.

Winston does not own land, nor does he intend to live within the longleaf pine ecosystem after he retires. But after years of raking pine straw, he has seen many outcomes of both good and poor management, and he knows what he would do were he in the position of a landowner. "If I had a place that had longleaf on it, I would definitely want to replant it. If I cut it, I'd rather be one of the guys that did come back and try to take care of it and all, [and] get it back to where it was before I did cut it."

One obstacle to restoration is the fragmentation of the landscape. Urban and suburbanization have broken up the once contiguous forest into smaller disconnected sections. A severe side effect of this fragmentation is how it restricts the path of fire. In George's opinion, the present danger of prescribed burning lies in the built environments scattered throughout a once mostly clear path. "In my opinion, the reason we have less longleaf is because we cut it all down. The reason it didn't respond and grow back is because the lack of fire, which is a result of fragmentation and increased population."

Fragmentation has other side-effects as well. Chief among them is habitat loss. Keystone species such as the gopher tortoise and red-cockaded woodpecker are endangered because their habitat has either been logged, or broken into pieces. Both species have made progress away from extinction, but only with the heavy involvement of people. The Head Start program, located on the Camp Shelby Joint Forces Training Center in Perry and Forrest County, specializes in incubating, raising, and releasing gopher tortoise eggs. Gopher tortoises lay their eggs just outside of their burrows, which makes the eggs especially susceptible to predation from coyotes, racoons, and other native predators. Because of their loss of habitat and the vulnerability of their soft shells when they hatch, the Headstart program seeks out eggs found throughout Camp Shelby and collects and incubates them in a hatchery next to the Nature Conservancy office on the property.

The gopher tortoises are kept up to two years inside the facility before they are released back onto the property. The tortoises, who normally hibernate in the wild, do not hibernate in the hatchery. This makes it possible for them to grow to the size of a wild five-year-old tortoise by the time they are two years old. Because it can take up to twenty years for them to reach sexual maturity, releasing them when they are bigger affords them a better chance of surviving until adulthood. This also gives their shells a bit more time to harden so they are less susceptible to predation. The Gopher Tortoise Head Start program has been running for almost ten years and releases a batch of tortoises annually.

On a more contemplative note, discussing restoration with George and Patti led them to reflect on the meaning of conservation and sustainability. At the core of George's perspective on restoration is how he defines sustainability. "I want to avoid making

irrevocable decisions. In other words, if I do something that decides some issue for my great grandkids, and they don't have a say-so in it, that's a wrong decision."

George referenced the Sandhill Crane Refuge near the coast of Mississippi as an example of a restoration effort which some believe is futile, but which he believes would be irresponsible to abandon.

> "The landscape is not there. We're never going to get them back. So, there's a legitimate debate on as much money as we spend on that, we could take that money and apply it to endangered or threatened ecosystems or species where we could really have a big impact. And I don't know, I understand those arguments. I can't even argue against them other than, to me, if we didn't spend the money on the Sand Hill Crane, just as an example, and we let it go away, well, we've made that decision not for ourselves, but for every human that comes for the next however long we're around. And I don't like that. As long as they're still there, there's a chance that maybe the facts on the ground will change in a thousand years from now. Maybe we can restore the species. But if they're gone, they're gone. So, to me, sustainability is more about, I want to avoid limiting the options for future generations."

George has experienced the difficulty of overcoming the cultural connotation of words such as 'conservation' and 'environmental,' in the context of a politically conservative South Mississippi.

> "[O]ur industry is overwhelmingly old, white, and male, and very conservative, not just politically, but temperamentally. And so, we have a tendency to react poorly or defensively about anything with those words like environmental … I think we've got a good story to tell in forestry when it comes to clean water, clean air, carbon sequestration, wildlife habitat. And it bothers me when my people react poorly to words that we should claim, because we're the good guys in that story."

Patti spoke with a little more confidence about the conservatism of South Mississippi. Though environmentalism and conservation, when enmeshed in politics, may have been labeled as liberal ideals, many people, regardless of political affiliation, value the health and resilience of their land and the green spaces in their community.

> "[P]eople see me as a tree hugger, and I guess I am. But [I've] talked to a lot of landowners, and they're all very conservative … But buddy, don't cut down a tree on their land. Once it gets down to that level, they're all conservationists. We're some of the best conservationists that there are, I think, in this state, because we really do we care about our land and the lands that we hunted for decades, and it's hard to value that."

With the amount of environmental language floating around, it is easy to use certain words interchangeably, such as preservation and conservation. And at some point, the words themselves can only accomplish so much. As long as the meaning and intention are present, do the nuances between the words truly matter? In some cases, no. But language is still an important tool, and communication about longleaf management faces enough challenges as it is. The difference between preservation and conservation is an important one for private landowners to understand, as the former implies a hands-off approach and a restriction on any profit they may be able to make from their land, and the latter opens up far more economically appealing opportunities. David defines preservation and conservation with the help of a plum tree.

> "Let's just say I have a plum tree that has a lot of fruit on it … So, I take that fruit and I make jelly out of it, and I put it on the table or in the cabinet and just look at it, and look at that tree and say, 'You sure made me some good plum jelly." But I don't eat the jelly, and I don't do [anything] with the tree. Well, then it grows up, gets shaded out, and I [have] jelly that's gone bad in the jar, and the tree just falls apart and dies or gets choked out."

David is saying here that preservation means people do not manage the land, and do not utilize its resources. In some situations, preservation is called for. But in South Mississippi, where the economy relies on the land and trees, and where people have grown up with the land and affected it for generations, he believes conservation is a more appropriate method.

> "Conservation is a wise use of our natural resources. So, I go out to the tree, and I prune the tree and I cut a lot of the brush around it so it can get good sunlight, and

> I water it and fertilize it. And I make jelly and I go home, and I eat it on my biscuits."

Conservation defines the ideal arrangement between industry and ecosystem health. It takes into account the presence of people and the needs of the community in the present and the future, as well as the intrinsic value of nature, and its right to not be unwisely and unjustly exploited. Conservation is the sustainable use of resources which acknowledges humans as part of the ecosystem and in need of its resources, but mitigates the use of resources in order that the needs of future generations, and of the ecosystem, are also met. When most of the participants spoke about restoration, it was in the context of conservation. None of them argued that restoration was only possible if we stopped utilizing forest resources; everyone more or less acknowledged that the two could coexist. And at the heart of conservation are landowners who need to profit from their timberland in order to keep it, and who must find ways to consider conservation goals without forsaking the economic value of their property.

Private Land Ownership and Management

Public and private land both play a role in conservation and restoration, and a commendable amount of longleaf restoration work has been and continues to be conducted on public land in Mississippi. While public land should not be disregarded, much of the historic range of longleaf pine in the state is in the hands of private landowners. What will make the ultimate difference for restoration are the decisions and actions of those landowners, who are in a unique and challenging position in the context of conservation and restoration goals. Some landowners, like Matthew, are frustrated with the pace of local and federal government because they are deeply invested in the potential value of their property.

> "The government sometimes moves pretty slow, and you've got people in the government that aren't yet ready to recognize the value of private land ownership … [T]here's a lot of red tape in government agencies that have done some of the conservation on government land to allow some of those same things to take place on private land, or to encourage it. There needs to be some improvement there … If they don't work with private landowners, they're not going to be as successful as they should be."

Ultimately, management of public land faces as many challenges as management of private land. In trying to ensure the protection of the natural environment from mismanagement, we often back ourselves into a corner of paperwork and red tape, and frustrations on either side are inevitable when we are forced to navigate a labyrinth of our own making.

Communication poses a particular difficulty as well, as forestry and land management professionals like David whose job it is to reach out to and assist private landowners face a diverse clientele. "No one landowner is alike." There are many private landowners who are knowledgeable about pine forest management, but many lack experience and education on the subject. Each person has a different idea of what purpose they want their land to serve, and in David's experience, most need help finding money to see their ideas through. "Many landowners are land rich, but money poor. And a lot of them do what they do on their own."

In addition to the challenge of connecting landowners to funding, grants, and government incentive programs, considerable effort is made by the U.S. Forest Service, the Mississippi Forestry Association, the Mississippi Forestry Commission, and other groups to reach landowners and make available educational materials and opportunities. But, once again, people and resources are frustratingly limited, and acres and acres of historic longleaf pine land are left unmanaged, or improperly managed.

Out of all the participants, David has the most experience working with private landowners. After years of communication practice, he has adopted the title of "Coffee Shop Biologist."

> "If I come to your house and knock on your door to talk to you about a government program, it's not going to work … In the South there's a lot of mistrust for the government already. Down here … all of your older landowners, they go to the coffee shop every day, anywhere from 2:30 p.m. to 4:30 p.m. So, I'll go to these coffee shops, and get a cup of coffee, introduce myself, tell them what I do … That's how I've got my foot in the door working with landowners. I've got to be one of them. I'm not the G-man, I put my pants on one leg at a time just like they do, and I'm there to help them."

David's secret to a successful relationship with a private landowner is time. He invests days of his time getting to know each landowner, their family, and their land, and what their visions are. "When I do a site visit, I plan on being there all day. And I'll look at whatever they want to look at, anything they want to look at. We'll talk, get to know each other, and then there's that mutual trust. And then we go from there."

Getting to know each person and their land is important for management as well as relationship building. As each landowner is unique, so is their land. Some may want to plant trees on a property that is not suitable for trees, or others may need to rehabilitate the soil, and David frequently advises landowners on the best use of their time and money.

> "If I come to you as a landowner and you want to plant longleaf, I want to know the history of your tract. Has it always been timber, was it longleaf? And then was it planted in loblolly, and you want to go back to longleaf? Or was it a cotton field, corn field, was it cattle operation, dairy farm? … Because the past history of that property can dictate what we gotta do getting ready for it, and it also kind of dictates the quality of that stand down the road."

Approaching landowners with a set agenda of longleaf restoration is usually not helpful for David either. The occasional landowner will be inspired by the sole goal of

restoration, but most have already been forming their own ideas about their land, and approaching them with something entirely different and potentially expensive is counterproductive. “My job is not to tell them what to do, but help them get to where they want to be … This is your canvas, you’re the painter, what do you want it to look like?”

Though being approached with the idea of longleaf restoration may seem daunting to landowners, David also works mostly with landowners who can visualize their land serving multiple purposes. Some landowners he has dealt with are solely concerned with profit, which he finds difficult because of his love for biology and conservation. But many of the relationships he has built are fruitful in that they understand the holistic approach to timber management. “Most of the landowners I work with understand that they can have their cake and eat it too. You can have timber value, you can have aesthetics, you can have the wildlife value.”

While there are a variety of financial incentives available for private landowners who want to manage their land for longleaf, they are not always easy to find online, or easy to apply for, and many involve copious amounts of paperwork. In many cases, it is easier, cheaper, and less stressful to plant loblolly pine, and the returns on that investment are seen much sooner.

> “And loblolly, loblolly is our cash crop, but it is a weed. It’s a trash tree … Foresters can be stupid and make bad decisions and still be okay. It will grow anywhere, it will grow well anywhere, it responds to poor management just fine … With loblolly, you can let it sit there basically stagnant for ten or fifteen years … So, it’s just an easier tree to manage” (George).

Most landowners who decide to manage for longleaf know that it will take time, and are often more concerned with future security and future generations than they are with immediate financial concerns.

> "[I]f you've got 40 years to play with, then you know you're going to come out better in the long run with longleaf because you'll get better wood. But that's kind of a numbers game, so you have to really want to do it not just for money but for a legacy purpose. And some private landowners really embrace that legacy of the longleaf pine on the landscape and will plant longleaf pine not necessarily for them, but for their future generations" (Zakary).

However, many landowners do not have the option to make a long-term investment. Their land may be an important source of income and not just a weekend home, a conservation investment, or land for hunting and other forms of recreation. In order to keep their land, landowners are faced with the cost of management and taxes.

> "[P]eople don't want to lose their land, and land taxes are expensive for us … I think for the most part, we're okay. But there's little incentive for people to go back to what a native forest used to look like in Mississippi in comparison to how fast a loblolly will grow. And you can make money off of it over and over and over again" (Patti).

While discussing private land ownership with George, he was interested in the driving motivations behind why people own timberland. In each of my interviews, we touched on this topic, and the reasons put forward by the participants included financial security, family heritage, cultural heritage, personal pride, recreation, environmental stewardship, and relaxation, or in Matthew's words, "… peace and tranquility." George argued that while money was a consistent factor, and necessary for many people, it was rarely anyone's first or primary reason for owning timberland.

> "The number one answer is almost always a legacy or heir. It's just to have something to give to my heirs. That's why people own timberland. Top two or three are always that and recreation, hunting, just being out there in it, to have a pretty place or whatever. Those are the reasons why people own forest in Mississippi. Well, what's interesting is the economic returns are never anywhere

> near the top. But they're consistently in everybody's answer. The way I interpret that, and the way everybody else does too, is the economic stuff isn't why they own it, but it's necessary in order to be able to own it."

Most private landowners face financial challenges, and they do not always have the same expertise and resources that are available for the management of public land such as De Soto National Forest. But Patti believes that they also are not restricted in the same ways that public land managers are. The few landowners who have the money and the time can manage their land with more freedom. The optimistic perspective on this subject is that this could be a strength for conservation. But on the other hand, a lack of restriction can lead to greater percentages of poor management. Patti is worried that cultural knowledge of timberland management, which used to be more widespread throughout the Southeast, is being lost to time.

> "We were talking about how the lands passed from generation to generation and that knowledge is passed along too, but sometimes it's not passed or somebody else buys it, and they don't know, so they wouldn't know that they're even supposed to manage it … You don't know what you don't know."

One of the biggest challenges Matthew faces is finding and paying people to manage his property, particularly because the property is not generating a sustainable income. The largest single income on the property is a grant which helps to pay for the planting and prescribed burning of longleaf. With the one or two part-time employees he has working the land, in addition to himself, and Robert volunteering his help, the maintenance is still about two years behind. The daily mental and physical challenges of managing timberland are taxing for anyone, landowners and foresters alike. "Look, honest, half the time I'm in the woods what's going through my mind is, these damn briars, or mosquitoes, or ticks, or I hope I don't step on a snake, or I'm ready to get this done so I can get a cold beer." (George).

Having a connection to the land is what has helped many of the participants through the management challenges. In Mary's case, she finds security and a sense of pride in her land. She said of herself, "I was always a country girl …" and it was clear that she connected part of her identity to the land, even though her perspective was not that of an environmentalist or a conservationist.

> "[A]s a landowner, I actually own something. I actually have some value in that property that, if I'm ever homeless, I can go pitch my tent on my property. So, I don't know. A lot of people don't value owning property. They don't want the responsibility; they don't want the expenses of owning a property. But it's security for me."

Matthew's connection to his land is more than a means of financial security or a conservation project, though one day he hopes to place it under a conservation easement. But Matthew feels as though he is part of the land, and his relationship with his environment is an important part of his identity.

> "I value everything about this place. I mean, it is *me*. I've been here since I was four years old, my whole life has been given to this place. And I laugh, on my tombstone it just ought to say, 'Here lies [Matthew]. He gave his whole life to this old piece of land. Thank goodness."

The relationship between private landowners and their land, particularly those landowners who have inherited family land and want to protect it for the future, is one of the most poignant relationships I explored throughout the interview process. Together, private landowners own the majority of historic longleaf pine acreage, and if there is a future in which the longleaf pine ecosystem is restored throughout the Southeast, and not just on national forests and other public lands, then that future relies on the efforts of private landowners. Private land management must not be separate from public land management, however, because though the land may be owned by different people, the ecosystem is nevertheless connected.

One of the greatest challenges to managing the entirety of the ecosystem is figuring out how to regularly burn the fragmented landscape. Of the responsibilities that exist for timberland management, fire is a necessity. Burning the pine forests regularly is the fastest and most efficient way to manage the understory, and it is a natural disturbance which the forests are adapted to endure. As I will discuss in the next section, the story of fire before and after the logging boom has led to mixed messages, cultural perspectives, and environmental conditions that have made it difficult to reintroduce regular burning at a rate and consistency which the longleaf ecosystem needs in order to bounce back from the degradation it has experienced.

Setting the Woods on Fire

The history of fire in the longleaf ecosystem is as unique as the ecosystem's biodiversity. The return interval for fire in South Mississippi is fleeting compared to other forested regions on the continent. Longer return intervals lead to a greater buildup of fuel, and the resulting fires can be large enough disturbances that they lead to a secondary succession. Though these fires are as natural as the more frequent ones in the Southeast, people attached to them a greater sense of fear and devastation because of their infrequency and intensity. George recently traveled to the Pacific Northwest, and in a conversation with some of the local foresters, compared the difference in fire return intervals between their respective regions.

> "[T]heir natural and historic fire return intervals are hundreds of years, maybe a thousand years, between fires … I mean, that's back to bare dirt and the forest starts over from scratch … [H]istorically, [South Mississippi gets] a fire every two years on every acre that could burn, which is just a totally different system. When you take fire out of the picture, number one, and then you fragment the landscape like we have with all the roads and the houses and towns, longleaf just can't really compete as an ecosystem."

Unfortunately for the longleaf pine, prescribed burning is another area where private landowners falter when considering managing for longleaf. The risk of a controlled burn getting out of hand, or of the smoke obscuring a road or entering a neighborhood, town, church, or school is enough to make most landowners falter. And if the risks were not enough, the laws and paperwork surrounding a controlled burn, and specialized techniques which foresters use to set and manage the burn are disheartening as well. Prescribed fire can be seen as a risk and a chore which many landowners eagerly opt out of. Patti, even though she is acutely aware of the importance of burning, has yet to burn her land.

> "[W]hen we first moved out there, this was 1985 when my family moved to this property, and my dad always burned stuff off. And he burned, and it got out. We had to call the volunteer fire departments … I have not [burned] since then. But yeah, it needs it, it should be burned, it's [an] environment that evolved with burning for sure."

When conducted properly, however, and with the correct legal preparation, prescribed fire is nevertheless the healthiest and most efficient way to manage for a thriving longleaf pine ecosystem. I asked Lawrence for an in-depth explanation of how the Forest Service goes about a controlled burn, and he began by explaining the process of creating a burn plan. Mississippi requires a burn plan, which protects whoever is managing the burn if something out of their control goes wrong during the burn. In the case of an incident, they might end up paying some money, but there will be no criminal indictment as long as the burn plan was followed. The plans are thick and intricate, and sometimes created two to three years before a burn. Lawrence did not touch on all the aspects of the plan, but he did note that the Forest Service burns require at least one fire engine, one bulldozer with a plow, four firefighters, and a Burn Boss present. Before

burning, it is also necessary to check for threatened and endangered species, such as the red cockaded woodpeckers (RCW) and gopher tortoises, and any kind of infrastructure. Weather parameters must be established, and even when a burn date is set, if any part of the weather conditions become unfavorable, the burn will be postponed. “We’re always being really careful about not letting fire get off of us onto somebody else’s land … (Zakary).

Boundaries for containing the fires that are established in the burn plan can include roads, rivers, and creeks, and sometimes, if necessary, a plowed boundary. To start the process, backing and flanking fires are set first. Later in the day, usually after two o’clock in the afternoon, the head fire it set. Two o’clock is typically the hottest, driest, and windiest part of the day, so waiting for that time to pass means there is a better chance for higher humidity and lower temperature. Fires are usually set with a helicopter, which drops what the foresters call a ‘ping pong ball.’ These are small capsules containing potassium permanganate. They are put through a machine in the helicopter which injects the ball with ethylene glycol, and the ball is then dropped through a chute where, after thirty seconds, it will have hit the ground and caught fire. The helicopter will drop the ‘ping pong balls’ in a grid pattern throughout the entire burn site, resulting in multiple smaller fires, covering a few acres each, which all run into each other. This way, there is no massive buildup of one main fire, which could get out of control much easier, especially on a site with a higher fuel load. The fuel load of the forests was once mostly pine needles and grass, but now it is also made up of other bushes and plants and hardwood saplings and seedlings, which can fuel a much more intense fire. All of the different fires allow for an even buildup of heat, which does a better job of pushing the

smoke up into the atmosphere until it hits the mixing height, which is the height in the atmosphere where the smoke meets the transport winds that push the smoke further out into the atmosphere. The best-case scenario is when the transport winds are switching, and they diffuse the smoke. The even distribution of fire is important in helping avoid one large column of smoke rising into the atmosphere, which would fall back down to the surface after cooling. The ping pong ball grid fire method is meant to avoid prescribed burns emulating wildfires with one plume of smoke, and one front building up all of the energy.

Frequent and prescribed burning is one more aspect of the cultural timberland management knowledge which is nearly lost to time. "[T]he Southern states have a long, long history of just the common man setting the woods on fire and seeing the results of it …" (Lawrence). But even people whose families have lived and owned land in the region for generations have begun to lose the knowledge and tradition. South Mississippi does not receive the greatest influx of population compared to other areas of the Southeast undergoing rapid urbanization, yet there are still many new residents. Almost every participant who has dealt with a prescribed burn, or owned land, commented on the loss of cultural knowledge. Lawrence has encountered concern about the smoke rising out of De Soto National Forest from people who live south of the forest.

> "I'd say recently in the last ten to fifteen years when we do a large burn and put a lot of smoke in the air, we're starting to get people from the coast driving up there to see what's happening. That never used to happen. Because people would look up and they'd go, oh yeah, that's the De Soto, they're burning. We are getting an influx of people coming that … don't know what's going on."

Patti has frequently dealt with the lack of prescribed burning knowledge when burns need to be conducted on Nature Conservancy land. With her love of history and culture, the loss of knowledge seemed to affect her more than the other participants.

> "They don't know what it is, and they don't understand that it's a good thing for the land … and it would just burn until it came to something that stopped it … And people realize that that's when there's fresh green grass in the pasture, and that was good for the animals that live there."

She brought up one of her preserves near the Sandhill Crane Refuge which needs to be burned, but is also very near I-10, which is always packed with traffic, and it is therefore difficult to plan a burn anywhere near it.

> "[S]moke is a real problem on I-10 because there have been crashes when they've done prescribed burns … So, they have installed these giant electronic signs that give you a warning like, 'Smoke Ahead,' … [I]t says 'Prescribed Fire,' or something, but people don't know what that means."

Communication is key, as with every other aspect of longleaf pine restoration and management. But prescribed fire communication is about more than the message of longleaf; it is essential for the safety of the community.

> "The idea is to try to knock on doors. We have little door hangers, and then we work through the media, through news, to let people know. But that's important, to let people know what prescribed burning is about, so that they're cool with that happening on the landscape, understanding the benefits of it, and okay with that" (Zakary).

Communication about fire has gone wrong in the past, enough to change an entire nation's perspective on fire, which is another reason burning the forests is approached with caution and mountains of paperwork. Both Patti and David brought up the history of Smokey Bear and how the fearful perspective of fire was a set-back for longleaf restoration. When Smokey Bear was introduced, prescribed burning had already fallen out of practice across the Southeast. But any hope of reintroducing the practice was

effectively dashed when people across the country adopted Smokey's message, and fire was given a negative and harmful connotation. "So, things grew up, people changed their attitudes about fire and now it's hard to change it back" (Patti).

Of the various human environment relationships within South Mississippi, the one that exists between people and fire is particularly strained, and poses complicated challenges for the future of the longleaf pine ecosystem. People's fear of wildfires and reluctance to risk a controlled burn escaping their property has created an even greater risk of devastating fires. In South Mississippi and among foresters and landowners, this attitude has been increasingly less prominent since the end of the logging boom. But it takes time for a cultural idea as pervasive as a fear of fire to shift, and it will likely never be fully reversed because of the physical threat to people's homes and communities.

The presence of fire in the longleaf ecosystem, and lack thereof, is only one of the changes which has occurred on the landscape in the participants' memories. There are many others, such as the introduction of cogongrass, damage from Hurricane Katrina, an expansion of the U.S. Forest Service's mission, and personal changes in the lives and perspectives of the participants. An awareness and acknowledgement of change on the landscape and in our own perspectives is important for understanding our relationship with the environment. To be aware of how a relationship has changed is to be more aware of the relationship itself, and can help us to understand how our relationship with the environment affects our decisions concerning it.

Landscape and Cultural Change Over Time

A landscape can change in the blink of an eye, as can cultural perceptions. In the case of longleaf pine, in a little over a hundred years the landscape has undergone a

complete transformation. As multiple generations of families and individuals have observed this change to their home, and as various forest industries and land management practices have come and gone, cultural perceptions of forests and forest management have changed as well. In lieu of this, one of the questions I felt it was important to ask each participant was whether or not they have observed any landscape changes, cultural shifts, or changes in their own way of thinking during the time they have lived and worked in South Mississippi.

Many of them mentioned changes in the flora, such as the proliferation of cogongrass across the region, or the land-use changes, such as new mills or land cleared for agriculture. Others brought up how their perspectives have shifted to be either more or less human centered when it comes to land management, or how they have come to understand the perspectives of their colleagues and clients over the years. A deeper holistic understanding of the longleaf ecosystem was something most of the participants experienced, as well as the changes in the perception of longleaf after Hurricane Katrina damaged many people's timber.

Whereas everyone expressed a deep sense of loss regarding the change in culture around prescribed fire, they all expressed stress and agitation when speaking about cogongrass. The difficulty with cogongrass management lies in its relationship to fire. "[I]t grows in an ecosystem that's similar to ours that receives periodic fires … and we need fire as a management tool here too. So that's the problem. We got to figure out a way to have fire and not have cogongrass" (Lawrence).

Growing up, Patti did not recognize cogongrass was an invasive species, she only recognized its distinctive look. But now that she works with the ecosystem, her perspective has changed.

> "I didn't understand about invasive species when I was young … And I knew where a little patch [of cogongrass] was growing up. They had these pretty little white plumes, and I thought it was pretty… But now I know what that is, and I see how it's spread, and it's all down the medians of the highway. And they're just mowing it, and it's just floating everywhere. And I never would have thought about that as a kid, [that it's] not supposed to be here."

Zakary, with a deep personal connection to nature, but also speaking from the U.S. Forest Service's perspective, recognizes that nature will often take its own course, with or without the aid of people. People can mitigate problems caused by invasive species and work to restore native ecosystems, but globalization will continue to exacerbate the transportation of non-native species across the globe. It is worth asking the question that if cogongrass thrives in this environment, and it requires deep pockets and vast amounts of herbicides to keep it in check, would it not be a better use of time, money, and resources to leave it be?

> "Some people think [invasive species] are here for a reason. Some people think they need to go. I think the official policy is we want to preserve native ecosystems, and that's why the [U.S.] Forest Service tries to keep them out" (Zakary).

Cogongrass adds its own financial burden on top of existing longleaf management expenses, but the greatest threat of cogongrass is that it chokes out the native biodiversity and burns hotter and more intensely than the native grasses, creating the risk of dangerous fires. Everyone I spoke with agreed that it has only caused further challenges to longleaf restoration, ecologically and financially.

> "[I]t's on every preserve we have, it's on every sandbar of the river. And we spend a lot of money on it. We spend a lot of money trying to kill it, and you start

> thinking we're never going to eradicate it, it's not going to happen. So, we just have to figure out the places where we don't want it, you know?" (Patti).
>
> "[T]he [U.S.] Forest Service has sprayed a lot of cogongrass to keep it in check. It's basically just knocked it back. You could spray a whole road and if you leave it alone for two years, you come back, and it looks like you were never there. Are we really doing any good or not, I'm not sure. But I know that it's been kept in check" (Zakary).

The spread of cogongrass was exacerbated by Hurricane Katrina, and especially from the clean-up afterwards which transported debris containing pieces of cogongrass roots and rhizomes all over South Mississippi. But Hurricane Katrina also marked a shift in the cultural perception of longleaf pine. People, especially landowners, noticed that more longleaf trees survived after Katrina, and that downed longleaf trees were still salvageable for lumber, while loblolly and slash mostly went to pulpwood. As a result, longleaf timber sold at a higher price than loblolly or slash after Katrina, and people were not quick to forget.

Winston remembers the aftermath of Katrina well because their business was hit hard, and pine straw raking came to a temporary halt because the debris from the storm obstructed their ability to rake clean straw. But he also remembers the effect of Katrina on each of the pine species.

> "[Katrina] destroyed a lot of trees. A lot of people … didn't know how to get started back because … a lot of [their trees] were downed. But the longleaf tree … was stronger than the loblolly and the slash because … it had to blow the whole root, so it wouldn't break like the loblolly and slash. [Loblolly and slash] would just snap in two about halfway up the trees, and it'd be ruined. But [there weren't] as many longleaf trees downed as [there were] the other types of pines, because they've got a better root system …"

In Zakary's time with the U.S. Forest Service, he remembers a distinct shift within their mission, marked in part by Hurricane Katrina. Prior to Katrina, the Forest Service was managing largely for merchantable timber, and continuing to plant loblolly

pine anywhere they wanted to reforest, sometimes in areas that had never been pine forest before. Lawrence remembered this time as well as one of the prominent changes during his career. "… the biggest change for me is that the focus when I started, the forest plan that we were under, was product centric, so the forest was more run like an industrial forest. Our job was to get product out to the public." Gradually there was a shift in their mission, and they began to manage more for the health of the ecosystem, while still being able to manage for timber. Zakary explained that the shift occurred for multiple reasons, and that it was not immediate, but developed over time.

> "Of course, there [were] some major events that caused that change. Hurricane Katrina was one of the events, and some retirements, some new leadership, a lot of things had to happen, some pressure from outside, getting sued by outside groups. Some Fish and Wildlife Service presence asking for certain things. When the dust settled from Hurricane Katrina, we had a massive salvage operation after that on the De Soto National Forest. But when everything kind of settled from that, we had an idea where we wanted to go, we had a new Ranger down on De Soto Ranger District, and so, we had a new policy. And it didn't stop us from cutting trees. It actually opened us up to be able to do a lot of cutting for the right reasons in the right places …"

In order to explain what the change within the Forest Service mission meant, Zakary explained some of the history of De Soto and the work that had been done on the land. There are two districts within De Soto, the De Soto Ranger District and the Chickasawhay Ranger District. Zakary spoke mainly about the former.

These national forests were created in the 1930s, out of land that had been clear cut and grazed after the logging boom. There had been some natural regeneration of longleaf as a result of people burning in order to help their cattle graze, but the regrowth was sparse, and much of the land suffered from erosion. The national forests were planted by the Forest Service and the Civilian Conservation Corps (CCC) throughout the 1930s and 1940s, though the planting often did not take into consideration the nuances of the

topography, and many trees were planted in lowlands and bogs where there would never have been longleaf forest. The forests were largely managed as tree farms, and primarily composed of loblolly pine, though there was a lot of slash pine planted on the Chickasawhay Ranger District. It was not until the 1970s that people began to reconsider longleaf and its fire regime. There are only a handful of longleaf stands which have reached almost a hundred years of age, and though the loblolly and slash do not perform as well as longleaf pine in the face of fire, Zakary noted that once they get old enough and less susceptible to fire damage, they mimic the longleaf ecosystem well enough. And in George's mind, any forest is better than no forest. "[I]f a loblolly plantation isn't perfect forest, fine, okay, it's not the same as a longleaf savanna ecosystem. [But it's] a hell of a lot better than a dollar store parking lot."

After explaining the history, Zakary explained that the major change, which occurred in 2007 – 2008 when they used the Healthy Forest Restoration Act (HFRA) to establish an environmental assessment for longleaf restoration, was to begin managing for longleaf restoration and habitat improvement, with timber as a byproduct of that management. "It's a byproduct, it's not the goal. The goal is let's improve this habitat. Let's restore this ecosystem. How do we do that?" They are able to use the authority of the HFRA because the ecosystem is fire-dependent, and because it contains threatened and endangered species (T&E) and occurrences of wildland-urban interface. From there, the plan was to avoid clear cutting longleaf pine, only loblolly and slash if they are growing somewhere longleaf should be. In places where longleaf is mixed with loblolly and slash, they cut everything but the longleaf and plant more longleaf in the gaps. "And that's how you restore longleaf. You keep what you got" (Zakary).

This method of longleaf restoration results in different ages of longleaf pine growing within the same stand, which is a healthier composition that allows the ecosystem to build resilience. Zakary explained that the diversity of the trees' ages should be matched by the diversity of fire disturbance, so that the patterns of growth are more akin to a healthy and historic stand of longleaf pine.

> "So, it's like a mosaic of different ages. And that's what you want. And then when we come in and burn, we burn in a mosaic pattern too … So, if we get hurricanes, wildfires, hopefully forests can be resilient, and also sustainable for years to come."

In 2020, the 2008 decision was reworked to include the Chickasawhay Ranger District in addition to the De Soto Ranger District, which together make up over 500,000 acres of National Forest land. In addition to the longleaf environmental assessment, the De Soto Ranger District has an environmental assessment for the other ecosystem types which are found within the greater longleaf pine ecosystem.

> "It's not all pine … we've got a little bit of bottomland hardwood. We've got pitcher plant bogs. We've got some coastal savanna that's more like what you would find around the Sand Hill Crane Refuge down in Jackson County. And also mesic slope forest, actually hardwood dominated forests. These are all ecosystem types that may have been altered and had pine trees planted in them by the Forest Service in the 50s or 60s or 70s. If we find these areas, we can go in and cut some of those pine trees out or lay them down, whatever we need to do to let that system come back …"

Though ecosystem health was not always at the forefront of the U.S. Forest Service's mission, the timber management skills that carried over from before the shift are invaluable to longleaf management. Now, the management of De Soto is able to incorporate the economic needs of the community as well as the environmental needs of the landscape. In Zakary's opinion, the new diversity of expertise within the Forest Service staff is one reason for the success of longleaf restoration.

> "We got great foresters and great silviculturists, so that main part of our mission, cutting trees, planting trees, growing trees, burning the woods … we know how to do that real well, and that's stuff we need … Back then it was, I think, mostly foresters, maybe some engineers for roads, but now you've got archaeologists and wildlife biologists and botanists and ecologists …"

Apart from the changes within the Forest Service, many of the participants have experienced more personal changes while living and working in the pine belt. Working with one ecosystem for a long time becomes an immersion not just in the plant and animal community, but in the community of people as well. Working with the land, and restoring and conserving the land requires building relationships with the people who call it home. For Isabel, it has been tempting for her to allow her love of biology and love of studying the biodiversity of South Mississippi to take precedence over the people here. But throughout her career, she has come to understand how people are as much a part of the environment as the plants and animals. "When I was younger, I was like, everybody's so anthropocentric, you know? … But as I got older that changed. I get it, I get where the connection needs to be."

Patti went through a similar experience as she began working with clients, partners of the Nature Conservancy, and employees of the state of Mississippi. She has always been comfortable outdoors, but many of her partners and clients did not grow up the same way she did, and never developed a relationship with their natural environment. "I always just felt comfortable outdoors, but a lot of people don't. I've come to understand that, and that's been hard for me to understand …"

A big change for Lawrence, George, and David lies in their understanding of the longleaf ecosystem. For Lawrence, learning that there were other ecosystems and communities apart from the longleaf tree was an important realization during his career.

"The main thing that has changed for me is just my understanding of how it works, and learning the different little sub ecosystems that are in it, and the value of those little small ecosystems …" His personal perception and change in thinking mirrors the shift within the Forest Service which he and Zakary worked through, and which George experienced towards the beginning of his career in extension forestry. George was a newcomer to longleaf pine as well, but over time he has watched the cultural interest grow.

> "I knew very little about longleaf when I started in my career. There were obviously some people working on it. The Forest Service was really moving towards more longleaf management at that time … I think it's a bigger concern in our society."

As a landowner, Matthew has spent a lot of time learning about managing the different aspects of the ecosystem. He did not always understand that managing for one part meant managing for all parts. It takes time to realize how all of the separate pieces of the ecosystem work together. "Probably the biggest change in my thinking is going from looking at the trees and the use of the ground separately as opposed to a unified ecosystem …"

For Patti, the industry and land use changes have been what caught her attention. She has observed both the loss and the introduction of different mills across the state, and though she has a deep commitment to the restoration of the ecosystem, she also holds the livelihoods of local landowners close to her heart. One of the newest mills going up is the Enviva pellet mill in Stone County, which Patti believes will ultimately be beneficial for the people and the landscape.

> "I was glad to see those industries come in, unlike some of my colleagues, because people need a place where they can sell their timber, or they're going to do something, [they've] got to make money off that land somehow to pay land taxes … [The industries] created a market which is good because a lot of the

> paper mills have shut down, and there's very few places for people to take their timber."

The issue with the pellet mill which Patti admits, is that logging teams have to bring chips to the mill, and not everyone can afford or has access to a convenient chipper.

> "[T]hey were having to drive all the way to Cantonment, Florida because they couldn't afford a chipper, and Enviva wants chips … [T]hem having to drive the Cantonment, Florida, and the diesel prices, means they can't pay the landowner very much."

It is not only mills that are changing the landscape; Patti has noticed that, interestingly, more truck farming agriculture, such as melons and squash, is moving into South Mississippi. "I never would have thought I would see it; I thought it would go the other way … but I'm definitely seeing acres and acres and acres of land being cleared of trees for that, and that's surprising me …"

Just as addressing change is important for a holistic consideration of environmental management and conservation, so is addressing what value that environment holds for the people who live in and around it. Successful conservation, as explained by David and his plum tree, considers the needs of people and the environment. And what people need from the environment is directly related to what value they believe it holds.

Perceptions of Value

Each of the participant's lives, careers, families, cultures, spiritualities, and experiences have exposed them to the environment in different ways. Each unique combination leads to a unique perception of value. Sometimes those perceptions end up looking quite similar to one another, and other times a person's articulation of their thoughts and feelings yields something I have never heard. When viewed together, the

interviews I conducted illustrate a holistic body of knowledge of what value the environment holds in itself, and what value it holds for the people of South Mississippi.

In an attempt to address the tension between conservation and industry, a few participants explained that they see and understand the intrinsic value of the environment, but through time and experience have come to believe that the way to conserve the longleaf ecosystem, and any environment, is to understand what instrumental value it holds for people. Patti has had to reconcile her own desire to protect the environment with others' desire to make money off of it. "I think growing up and when I first got into it, it's like, why wouldn't we just protect it because it's there? … But just getting more experience you realize people see it as money signs."

Sometimes the way to people's hearts is not by arguing for nature's right to exist and be protected regardless of its usefulness to society, but instead through people's love for their family and their community. George, who spends much of his time working with and educating landowners and families, is driven by his desire for people to connect with the land.

> "[M]y concern is centered around people, specifically future generations … I care about the longleaf ecosystem, about blue stem grasses, red cockaded woodpeckers, and all these things. They're beautiful. They deserve to exist, they have intrinsic value on their own. But for me personally, it's about making sure that my great, great grandkids get to see it and get to experience it."

George is not alone in his fear that future generations may not get to experience the environment as we know it, or as it was long before the present-day. David has observed that there are gradually less and less reasons for the average person to connect with nature on daily basis out of necessity, and not everyone is drawn to outdoor recreation. "My fear is, my grandkids, my kids, they're not half as connected to the land

as I am. And I'm probably not half as connected to the land as my dad was. So, each generation it seems like we get further and further away from the land."

Patti has discovered that when she is teaching people about longleaf, one of the most powerful ways to help people connect with the story and understand what happened to the landscape is to make it personal. "I give presentations about longleaf, and I use family photographs in there, and it just makes it kind of come home to people, I think." When she shows photographs of people standing in front of an old growth longleaf pine stand in South Mississippi, and then shows photographs from a few years later with people standing in front of stumps, she can see the realization sink into her audience. People begin to think of their own land, and the landscape of Mississippi with which they have grown up, and it is difficult to imagine that landscape being exploited to the point where it can no longer be recognized. Though many people in South Mississippi have moved here from other places, still more can claim a family legacy in the area. For Patti, this long-term connection to family land is special to South Mississippi.

> "[P]eople are not just coming here in droves like they are to Florida or North Carolina or Virginia. I think we have a lot of people that have just been on their land a long time, and have a real sense of place, and they love the forest. That's the thing I think might be different than some of the states …"

In a different vein, though it can be tempting to take people out of nature when we blame ourselves for environmental degradation or task ourselves with its restoration, Patti argues that we are not a force which acts outside of our environment; people are no less part of the environment than the longleaf pine. "[P]eople are nature. We're part of it. And you can't ever really separate it … I can't separate it in my mind. So we have to figure out how to help people help nature …"

As part of the environment, it is instinctive for people to feel as though natural areas are a refuge from built environments. Lawrence sees a connection between people and the environment, particularly the importance of green spaces for people's physical and mental health. "I think the real value of the forest for society is a place to go and get away from your cell phone and your computer and stress."

Balancing the utilization of the forests' resources with the preservation of the ecosystem's health is at the center of the U.S. Forest Service's work, and another value Zakary sees. He reasons that people need the resources, and if we are going to extract them from the forests, then the environment also needs stewardship. And if resource extraction and environmental stewardship are strongest together, Zakary perceives the Forest Service's joint mission of resource management and environmental conservation as a strength. Aside from lumber, pulpwood, and chip and saw, the Forest Service oversees the extraction of other resources, such as oil and gas.

> "Part of our mission is providing opportunities for minerals and oil and gas. We have some oil and gas wells [in] the forest … So, you have to be careful and creative about how you do it so you're not going out there and trashing beautiful areas … So there's ways to work with it where you're still taking care of the resources, but you're also able to provide other services for humans."

Patti, Isabel, and Zakary all spoke about the value of the forests for helping to provide clean water. If the forests of South Mississippi are lost, so too is a considerable amount of the natural water filtration which the trees, vegetation, and soil provide.

> "[T]here's millions of gallons of fresh water that come out of springs and seeps every day flowing [out] of the forest, going into our creeks and rivers, that are diluting whatever else is in there that's running off of developed land. That's a great benefit that's not usually counted or talked about. So, when you do have land that's not developed land, that's managed well and allowed to function somewhat naturally, you get these ecosystem benefits" (Zakary).

Having unpaved, forested land full of soil allows for water to be absorbed by the earth, instead of hitting concrete, causing flooding, and draining directly into creeks and rivers where it exacerbates erosion. In South Mississippi, this is happening in places like Black Creek, a federally designated wild and scenic river. The Black Creek area is more than a water resource, and it provides recreation opportunities for many people who do not have access to private land. The same is true for many other places within De Soto National Forest. Among those recreation opportunities, hunting is particularly popular in South Mississippi, and it is a driving motivation for many people who own or lease land as well. It is an important cultural activity, and it is also a way in which to open a conversation about managing land for native wildlife, which in many cases means managing for longleaf pine. David, who hunts in his personal life, has experienced the importance of hunting to many landowners while working with them to manage their land for game.

> "[Hunting] is a culture that's still very much alive in the South … It's a very important part of what we do. I can't imagine not hunting. Now, it's not about the kill. A hunter goes through many different phases. One is learning how to hunt, and then they get into the numbers game … [But it's] not about killing the game, it's about the hunt, it's about the challenge, it's about working the dogs."

Winston likewise has always enjoyed hunting not for the hunt itself, but because it provides an opportunity and a space to be outside.

> "I've had a love for land my whole life, because by hunting and fishing, stuff like that, I was outdoors just about all my life. If I wasn't working, I'd be fishing or hunting. I'd love to just hear the birds singing if I was turkey hunting. I like to watch squirrels. And it wasn't me just killing something, I just enjoyed the outdoors, and I didn't want to be shut up in a room in a house."

While many of the participants who work in forest management might believe that one of the easiest ways to convince people of the value of conserving and restoring

the longleaf pine ecosystem is to make it personal, the intrinsic value has not been forgotten. Zakary advocates that a primary role of the forest is as "… a home for wild plants and animals." Many of the species living in the longleaf pine ecosystem are endemic to the region, and once extinct here, will be extinct globally. "[W]ild plants and animals need a place to go. This is it for South Mississippi."

The biodiversity found on De Soto National Forest, a feat of restoration which some private landowners have achieved on their land as well, is another component of the forests' value. The value of the biodiversity is coupled with its availability to the public as a place to experience the ecosystem being restored.

> "[Y]ou can wind up in a really unique habitat type, whether that's a pitcher plant bog, incredibly diverse and filled with pollinators and carnivorous plants and wildflowers, orchids. Or some of our mesic areas which are really neat, always with heavily spring fed streams, funky plants, usually hardwood dominated. And then you can turn that toward the majestic monotony of the longleaf pine ecosystem itself, looking at that beauty. And when it's well burned, you can really see out through there and you've got the blue stem grass growing. That's a pretty picture" (Zakary).

Some of the ways in which Matthew utilizes his land for the benefit of the public are to invite student groups to conduct research, and to host field days and workshops for the local community and schools. He sees his land as a tool for education, and also as a wealth of biodiversity. Matthew is one of the landowners whose property has a great deal of restored biodiversity, and growing as a landowner alongside the growth of the forest on his land has shown him the intricacies of the ecosystem, and a value beyond timber.

> "I hardly ever use the word longleaf anymore without putting the word ecosystem behind it. I don't consider myself a grower of trees and timber and wood products. In fact, I put no value on the actual wood product … The value is on the ecosystem as a whole, and the understory, the wildlife, the plants. It's a very unique ecosystem that I really respect."

As I have only begun to demonstrate in this section, the environment holds an assortment of value for each person. Though many people value the environment for the same or similar reasons, it also provides something personal for everyone which only they can articulate, which is another unique result of individual ethnographic interviews. Some of the things which the participants and their communities value are inherent byproducts of managing for longleaf pine. If they value hunting, outdoor recreation, healthy timber, clean water, or a space for their families to engage with the environment, the way to ensure that those things persist in South Mississippi is to help the native longleaf ecosystem thrive, whether or not they are explicitly interested in longleaf restoration.

While conducting the interviews, the participants would sometimes guide me down conversational paths I had not anticipated. One conversation linked with that of value, and on which I expand in the next section, was that of their various spiritualities, and how those spiritualities were, or were not, connected to their relationship with the land.

Spirituality and the Environment

In many, if not most, organized religions and spiritual traditions, nature is woven into the belief systems, doctrines, mythologies, and practices. It is an inescapable subject in most religions due to the centrality of life and death, and the parallels to our own life cycles we see in the environment around us. When observing our natural environment, it is instinctive to wonder about our own lives and how we fit into that environment.

To ask about the participants' spirituality, and if it influenced their relationship with the environment, was not something I had considered until I was led to the subject

during my interview with Lawrence. Towards the end of our conversation, he mentioned something a pastor had said on a podcast he had recently listened to. I then realized that it would be an oversight to ignore how the religious culture of the southeastern U.S. affects how people relate to their environment. Whenever I broached the subject of religion and spirituality, whether they belonged to an organized religion, considered themselves spiritual but did not attend any particular church, or felt there was no significant connection between faith and the environment, each participant had a perspective to share.

Lawrence had multiple faith-based analogies specific to longleaf pine which he had considered prior to our conversation. The first was about fire, and how it is as much a spiritual concept as it is a physical presence on the landscape.

> "I did this presentation one time for my pastor and our men's group about the ties between what the Bible says about fire and how it actually works on the landscape. And so, one of the things that really made my pastor laugh was, in the longleaf ecosystem … fire is of low intensity but very frequent. Spiritually, that's what you want. You want very frequent fires in your spirit. Clean things out. Start over again. But the fires that get on the news are infrequent and very intense. You don't want that in your spirit."

Keeping to the theme of spiritual cleaning, Lawrence then brought up that longleaf pine is a self-pruning tree, a practice which he believes we should all adopt.

> "So, all these things, these branches that are not serving a purpose, [that] are actually maybe detrimental to the growth of the tree, it sloughs them off and gets rid of them. And I think if you look at yourself personally, that's something you might want to look at. Like if you have branches that are only causing you trouble and keeping you from growing, you might want to slough those things off."

When I discussed spirituality with Mary, her perspective shifted slightly in the context of her Christian faith. Mary views her land as a livelihood and a source of

financial stability. But when speaking about her faith, she acknowledges the land as belonging to God, and believes it is her job to steward it.

> "[W]e're given the land and we're supposed to be good stewards of it. Because it's God's. It belongs to God. We're supposed to take care of it. And so I guess, having faith in God has given me the idea that yes, I need to take care of this because it's special. It was a gift from God."

David's Christianity and relationship with God is one of deep gratitude. At a turning point in his career and personal life, he felt that God wanted him to stay in Mississippi when pressure from work and family was telling him to move back to Texas. He listened, stayed in Mississippi, and was offered his current job, where he has been happy for a long time. Nature has been connected to a turning point or intervention more than once in David's life, and because he feels God is connected to those as well, his faith and love of nature are tied together.

What differs about Isabel, Patti, Zakary, Matthew, and Robert and their spiritual relationships is that they do not consider themselves as belonging to any specific religious community or organization, but all consider themselves spiritual in some way. Matthew falls somewhere in the middle, acknowledging that he prays to God, but not in the context of a particular faith.

> "I don't consider myself extremely religious in the sense of organized religion, but I consider myself having a spiritual relationship with God, and I pray routinely. But yes, there is a spiritualism, and always has been for me, associated with this place … I pray for wisdom and being a good steward of the land."

Isabel believes that "there is definitely a spiritual, heartwarming connection there," and Patti is confident that "you certainly feel something when you're out there. And I know it brings my spirits up to be out in nature, for sure." Zakary not only recognizes the connection between himself and the environment but seeks to be a point of

connection for other people as well. His connection to the land is something he feels strongly enough that he is compelled to share it with others and help them to experience the same. “I feel deeply connected, whatever you want to call that. And I feel deeply connected to the land, to the Earth, and doing my best to take care of the earth while at the same time being a liaison between humans and the environment.”

Though some of the participants do not belong to an organized religion, they understand why some people feel this connection so strongly. Isabel was raised Southern Baptist, but in college she wanted to explore what belief systems other people followed. While there she “read a lot on different types of religions,” as well as “made a point to meet people from different cultures and different religions and different backgrounds.” Allowing herself to experience those different belief systems changed the perception she had developed before going to college, though not so that she chose to belong to a different religion. But she believes that everyone has a right to connect with nature in their own way, and her lack of religious affiliation does not lead her to discount others’. “I do respect someone who does tie that in, because I would expect them to respect my personal opinions.”

Patti is in a similar situation but has had a more difficult time understanding a religious connection to the environment after hearing contradictory messages throughout her life, particularly from within the Christian community of South Mississippi where she has spent most of her time and done most of her work.

> “I’ve talked to a lot of people that are like that. ‘This is my church, being out in the woods.’ And it’s an interesting thing to think about. There’s a couple of different ways that can go, because sometimes they’re Christians or religious people that think, ‘We’re over everything, we have dominion over everything, and we get to cut it down, or we get to do whatever we want to, or pave it over.’ And

> then there's a whole other branch of that that says, 'We're the stewards of it, and we should take care of it.' … I have trouble reconciling both of those things."

If Robert has questions or doubts about connecting his spirituality to his land, they are outweighed by his passion for the relationship he has developed with the longleaf ecosystem. For him it is both refuge and purpose, a place of freedom and a place to work.

> "For me, with this place, with this ecosystem, with these woods, with everything, it's extremely spiritual … I'm compelled to be here and help this habitat as much as possible. Just as I'm compelled to breathe. It's just like that, it's the exact same thing. So, if I'm out here dragging a drip torch, I don't really separate anything … This is like Mother Nature doing this to herself. She's doing this through us. That's how I feel, that's how spiritual it is for me … Every morning I wake up a flawed man trying to be better, and I'm compelled to nurture this. And the 'why' to that, I don't know if I can answer it."

Each participant recognizes something intangible which exists between people and their environment, and that there is a relationship with the land besides our use of its resources. Religion and spirituality are important to the culture of South Mississippi, and many of the participants identify part of their connection to the environment as spiritual, but there is no one way to define such a connection.

In each section of this chapter, I have presented a fraction of how the participants' lives have impacted or have been impacted by the longleaf pine ecosystem. What led each of them to their job or land, how they interpret their purpose, how they interact with the environment, and what aspects of the environment they have come to value are all questions I used to guide both the interview process and the process of linking the participants' stories together. Individually and together, the participants have cultivated unique relationships with the longleaf pine ecosystem, impacted it directly and indirectly, and contributed to the cultural perception and experience of the longleaf story in South Mississippi.

CHAPTER V – Conclusion

Regarding people involved in forestry, forest conservation and restoration, and forest related economic activities, what are the current relationships with and perspectives on the longleaf pine ecosystem in South Mississippi? This was the first question I set out with, and though I interviewed ten participants, I discovered more than ten answers. In studying the human geography of the longleaf pine ecosystem, I have explored the human-environment relationships of people who work regularly and directly with the ecosystem. At this intersection of humans and the environment are foresters like Lawrence, Zakary, and George, biologists and conservationists like David, Isabel, and Patti, small business owners like Winston, and landowners like Mary, Robert, and Matthew. They are an example of some of the contemporary relationships between the residents of South Mississippi and the pine forests, but each of these human-environment relationships is more complex than a job or a livelihood. Personal lives, politics, finances, and spirituality are only some of the layers of these stories. These participants are an example of the people who, consciously or unconsciously, are learning how to reconnect with the land, how to reconnect others to the land, and how to find common ground between the demands of conservation and development. The value of this research is that it shows through local human geography stories that there are people in South Mississippi who see the connection between people and the environment, and are seeking to use that connection to both ecological and economic advantage.

The stories of the participants are ones of people learning to communicate with each other about goals which may seem conflicting. How can you sell timber *and* restore longleaf pine? How can you conserve biodiversity *and* generate an income? How can you

live a contemporary life *and* have a relationship with the natural environment? But what this research has shown is that there are many people in South Mississippi who do not see these ideas as conflicting. They are under no delusion that growing longleaf over loblolly, and pouring time and money into longleaf management will not match the short-term profits of a loblolly tree farm. But these people's thoughts are as much in the future as they are in the present. Many desire a healthier ecosystem now and a healthier ecosystem in the future, for the longevity of biological diversity and for the enjoyment and appreciation of future generations, and they know that restoring longleaf pine is the means for both. Across the interviews, I have observed an attempt among the participants to understand the seemingly conflicting objectives of conservation, industry and development as compatible. Their relationships with the longleaf ecosystem are entangled in more than one of these areas, and so they can see value in more than one as well.

The second question I wanted to answer was, how have the relationships between the people and pine forests of South Mississippi affected treatment and use of the ecosystem, and what conclusions can be drawn about the future of longleaf pine in South Mississippi? Through their work, each participant has had many direct effects on the treatment and use of the ecosystem. Some of them are deliberately working towards restoration by setting fires, planting trees, and running educational programs. Others are promoting longleaf inadvertently, such as Winston who, though primarily concerned with his work, sells exclusively longleaf straw and is gradually convincing people of its quality. Others like Mary have not been involved in longleaf management at all, and possibly never will, but they nevertheless care about the land they are managing. As

George would say, a loblolly tree farm is “a hell of a lot better than a dollar store parking lot.” Conservation, restoration, and timberland management are as complex as the human-environment relationships in which they play a part, and achieving a balanced relationship between them is where the collective expertise of people like the ones I interviewed is having an important impact.

The statements of the interview participants have illustrated that the cultural perception of longleaf pine is as important to restoration as is planting trees and burning the woods. Events such as Hurricane Katrina, which demonstrated the resilience of the longleaf tree for many landowners, and when the U.S. Forest Service expanded their mission, were important drivers of a cultural shift towards a greater acceptance of longleaf pine management. These events are just some examples of a marked change in many people’s perception of longleaf and relationship with the land, and their effect on people is something I could have only learned from speaking with those who lived and worked with them. The people and communities that are invested in the future of the landscape are deeply connected, and I might have remained ignorant of the level of connection had I not taken an ethnographic approach to the personal interview process. By allowing the participants to help direct me towards each new interview, I was able to locate and record a diverse but related body of knowledge and experience.

The diversity among the professions and backgrounds of the participants is as much a strength as it is a challenge to longleaf management. There are many gaps to bridge between public land and private land, state foresters and private landowners, public offices and private nonprofit organizations, and conservation and industry. But this diversity also means that there are always fresh perspectives, ideas, resources, and

knowledge. Another goal of this research was to address the gap between the ecological health and economic value of South Mississippi's pine forests. What this research shows is that most people do not value their land for financial gain alone, but most need the profits from selling forest resources in order to keep the land. The same holds true for the state of Mississippi; it could not afford to keep its forests if it did not profit from them. Other forms of development would move in out of economic necessity, and it would be difficult to conserve the ecosystem. In the case of longleaf pine, industry and conservation depend on each other. Conservation efforts would be futile if the state could not afford to keep and manage large, contiguous, and biodiverse forests, and the timber industry would contribute to the degradation of the landscape and its ecosystems were it not to consider the role of conservation in maintaining the health of the environment, and the continued availability of healthy, merchantable timber.

In this thesis I have illustrated how people have altered, and in turn been altered by, the contemporary landscapes of the longleaf pine ecosystem. The transition from the historic longleaf forests to the present-day landscape of South Mississippi has been the combined product of the first large disturbance that was the logging boom, followed by a piecemeal fragmentation of the environment. There has been no single cause of the loss of the longleaf ecosystem, and there can be no single solution to its restoration. The conservation and restoration of longleaf pine, balanced against a sustainable use of the forests' resources, must consider not only all of the biotic and abiotic components of the ecosystem, but all of the types of people, land, professions, businesses, desires, values, and goals which are found within the population of South Mississippi. This research portrays a glimpse of the breadth of this diversity and demonstrates that the restoration of

longleaf pine requires communication with the local community as much as it requires funding and resources.

Conducting more ethnographic interviews with people from other professions and with other perspectives would be valuable to the continuation of this research. Employees of sawmills, timber management operations, and members of logging teams would fill a gap in the ethnographical study of longleaf pine stakeholders, as would other non-profit organizations, more landowners, businesses, and people or groups who do not deal directly with forest management but who benefit from timber sales, such as school districts receiving revenue from 16th section land. An inclusion of people who live in South Mississippi but possess no ties to the longleaf ecosystem, and perhaps no access to the land, would be another way to expand this research.

Though relationships between people and the environment of South Mississippi are formed and lost every day, understanding as many of them as possible, and how they connect with one another, is essential to the cultivation of a holistic approach to restoring the longleaf pine ecosystem.

APPENDIX A – IRB Approval and Modification Letters

Office *of*
Research Integrity

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NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident submission on InfoEd IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER:	22-281
PROJECT TITLE:	Perspectives on the Pine Belt: An Analysis of the Relationship Between the People and Pine Forests of Mississippi
SCHOOL/PROGRAM	Geography & Geology
RESEARCHERS:	PI: Helen Greene Investigators: Greene, Helen~Cochran, David~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	20-Apr-2022 to 19-Apr-2023

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

Office *of*
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Modification Institutional Review Board Approval

The University of Southern Mississippi's Office of Research Integrity has?received the notice of your modification for your submission *Perspectives on the Pine Belt: An Analysis of the Relationship Between the People and Pine Forests of Mississippi* (IRB #:22-281).

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
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RESEARCHERS:	PI: Helen Greene Investigators: Greene, Helen~Cochran, David~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	26-Oct-2022 to 25-Oct-2023

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

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