

1985

A new face on the countryside: Indians and colonists in the Southeastern forest (ecology, environment, Virginia, North Carolina, South Carolina)

Timothy Howard Silver
College of William & Mary - Arts & Sciences

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**A NEW FACE ON THE COUNTRYSIDE: INDIANS AND COLONISTS IN THE
SOUTHEASTERN FOREST**

The College of William and Mary in Virginia

PH.D. 1985

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A NEW FACE ON THE COUNTRYSIDE: INDIANS AND COLONISTS
IN THE SOUTHEASTERN FOREST

A Dissertation

Presented to

The Faculty of the Department of History
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree of
Doctor of Philosophy

by

Timothy Howard Silver

1985

APPROVAL SHEET

This dissertation is submitted in partial fulfillment of
the requirements for the degree of

Doctor of Philosophy

Timothy H. Silver
Author

Approved, December 1985

James Axtell
James Axtell, Chairman

Thad W. Tate
Thad W. Tate

James P. Whittenburg
James P. Whittenburg

Stewart Ware
Stewart Ware
Dept. of Biology

James H. Merrell
James H. Merrell
Dept. of History, Vassar College

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For Sharon,
Chief Keeper of Our Oikos

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The exhilaration (and relief) a student feels upon completing a dissertation and a degree often inclines him to thank everyone and everything within sight and memory--from his first grade teacher who gave him his start to the family dog who kept a patient vigil during the long nights at the desk. The only thing more offensive than paying undue homage to primary pedants and persevering pets is neglecting to thank those who did play significant roles in bringing the project to fruition. I hope to be guilty of neither extreme.

Three members of my dissertation committee deserve special recognition. Stewart Ware took on the responsibility of guiding me through unfamiliar ecological literature, proving in the process that a scientist can also be a humanist. James H. Merrell willingly offered me the results of his own research and convinced me (at exactly the right time) to stop amassing notecards and put pen to paper. Most important, my director, James Axtell, allowed me the freedom to pursue my ideas while reminding me (as he has since my first seminar) that "research" becomes "history" only when communicated with subtlety and style.

A number of other historians influenced my work, but none more than William Cronon. Although I do not know Cronon personally, his Changes in the Land: Indians, Colonists, and the Ecology of New England has been my roadmap for exploring related themes in the southern colonies. My interpretations of Indians and Europeans sometimes differ from his--just as the ecology of the Southeast differs from that of New England. Even so, anyone familiar with Cronon's work will recognize its impact on the following pages. Indeed, Cronon's book gave interdisciplinary environmental history a new "legitimacy" without which my dissertation might not have been possible.

No amount of intellectual guidance can take the place of practical help. The Interlibrary Loan staff of the Earl Gregg Swem Library at the College of William and Mary processed my requests with such efficiency that even an avowed pad-and-pencil traditionalist like myself had to marvel at the magic of the library's computers. Likewise, the Special Collections staff at Swem went out of their way to assist me in examining early pamphlets and books promoting colonization in the Southeast. In addition, the College and the History Department provided me with funds for an extended research trip to the Library of Congress. Two of my fellow graduate students, John M. Craig and Michael J. Puglisi, took more than a passing interest in my work, offering constructive criticism and providing invaluable "long-distance" checks of notes and quotations. I also benefited from the suggestions of several colleagues at Appalachian State University, most notably Carl Ross and Jeff Boyer.

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ABSTRACT

Traveling in the Carolina backcountry in 1768, the itinerant Anglican minister Charles Woodmason observed that the countryside had begun to "wear a New Face." Small farms had been carved from the woodlands, Old World crops grew in cleared fields, and cattle and hogs had supplanted indigenous animals. This dissertation examines the evolution of that "New Face" in the southeastern colonies of Virginia, the Carolinas, and Georgia.

The first Europeans to see the Southeast found mixed hardwood forests, pinelands, savannahs, marshes, and bottomland swamps. These diverse habitats were home to an infinite variety of wildlife, including whitetailed deer, black bears, wild turkeys, buffalo, elk, and beaver. The landscape had been shaped by long-term ecological change and by varying patterns of topography, rainfall, and fire.

The environment had also been altered by Indian habitation. Southeastern Indians were neither despoilers nor conservators of nature. Seeking subsistence and survival, the natives fished, farmed, hunted, and burned the woods, all of which affected the various forest ecosystems.

Early contact between natives and colonists introduced Old World diseases into the Southeast, microorganisms which killed Indians by the thousands. With their culture torn apart by depopulation, the natives ensured their survival by finding a place within the European system. Indians willingly supplied colonists with animal skins, meat, and medicinal plants. This "Indian trade" led to the extinction of buffalo and elk and nearly wiped out beaver, deer, and ginseng.

European settlement brought more changes. Agricultural clearing reshaped local climates. Selective cutting of white and live oak, hickory, white cedar, and baldcypress made those trees scarce in settled regions. Naval stores production reduced sizeable tracts of pinelands to patches of scrubby hardwoods.

Tobacco, rice, and indigo exhausted soils. Colonists' plows increased erosion. Domestic animals destroyed native grasses and woody plants. European weeds and grasses, carried to the Southeast by transplanted livestock, replaced indigenous species. Legislators placed bounties on animals which threatened crops or livestock, encouraging wholesale killing of crows, squirrels, and wolves. Agriculture and woods ranching simplified existing relationships between plants and animals, creating an ecologically unstable "new South."

Attributing such changes solely to European capitalism is an oversimplification. The innovations of a capitalist economy triggered complex cultural interaction between Indians, colonists, slaves, and the land itself--an ongoing dialectic which pushed all three groups toward exploitation of the environment.

A NEW FACE ON THE COUNTRYSIDE: INDIANS AND COLONISTS
IN THE SOUTHEASTERN FOREST

INTRODUCTION

GOING TO THE WOODS

In early 1984, while researching this dissertation, I had the misfortune to encounter firsthand one of the ecological consequences of European colonization: a streptococcus infection which confined me to bed for ten days. As the fever abated and boredom set in, I asked several of my fellow graduate students to bring me reading material from my office in the history department. Most of my colleagues knew that I was working on what might be termed an "unconventional topic." My somewhat surreptitious visits to the biology department had not gone unnoticed, and somehow longleaf pines, canebrakes, and rice birds had worked their way into my everyday vocabulary. But until that point, few of my fellow laborers had really questioned me in detail about my dissertation. A simple request for reading material changed all that. As they searched my shelves for titles such as The Deer of North America, The World of the Beaver, and How to Know the Weeds, my friends began to wonder exactly what I was doing in that office and whether or not it had anything to do with colonial American history, our chosen field of study.

By that time I could point them to William Cronon's recently published Changes in the Land: Indians, Colonists, and the Ecology of New England and, with the delusory confidence of an advanced graduate student, claim that I was following a path broken by one of the most noteworthy books of the previous year. I could also cite several

personal reasons for the study: coming of age in the environmentally-conscious 1970s (I remember the first "Earth Day"), a general interest in things "woody," and a closet desire to be a scientist (from which I was originally dissuaded by an introductory course in algebra and analytical geometry). To their credit, my colleagues were not so easily convinced. With a tenacity born of reading and critiquing seminar papers, they demanded another justification. As they collectively phrased it, "We like the woods too, but how does all this help us understand colonial America?"

It was a fair question, one which, to use an ecological metaphor, forced me to stop thinking about trees and try to see the forest. The more I thought and talked about the relationship between history and ecology, the less "unconventional" my topic became and the more common ground I found with my colleagues. Like many graduate students trained in the last two decades, we were devotees of the "new Social History." For the most part, we could agree with Gary B. Nash that "the history of public events is lifeless and limited, often unable to move us or recreate a feeling of the past." Like Nash and Leo Tolstoy, most of us preferred to search for those "infinitesimally small elements" of life that move all people, politicians and peasants alike.¹

But simply to uncover those small elements is not enough. To study the environment only to find out "how people lived" is to become an antiquarian, interested in the past only because it is past. History, by definition, is the story of change over time, a process studied not just to learn where we have been, but how we got there and ultimately where and how we are. The challenge for us is not just to discover how people acted in the past but how their behavior changed and why. The

search for answers inevitably draws social historians deeper and deeper into that complex web of human activity known as "culture." Simply defined, culture means "a way of life, the framework within which any group of people--a society--comprehends the world around it and acts in it." The study of culture, and therefore the study of social history, encompasses all the characteristics of a society, including technology, economics, religion, and political organization. In short, the social historian must concern himself with virtually every facet of human experience.²

As if that were not challenging enough, those of us interested in the colonial period must be concerned not with one culture, but three. When European explorers and early colonists crossed the Atlantic, they discovered a land already inhabited by Indians. From 1619, when a Dutch vessel brought twenty slaves to Jamestown, that land also became home to Africans. As Nash reminds us, "God is not English" and any study of colonial America should be undertaken with an eye toward understanding the process of interaction between red, white, and black Americans. In keeping with that goal, an increasing number of social historians (myself and most of my fellow students included) have moved toward "ethnohistory," a hybrid of anthropology and history which provides a suitable framework for considering long-term contact between people of different cultural backgrounds.³

The distinction between social history and ethnohistory should not be exaggerated. Both seek to explain "sociocultural change" or alterations in ways of life stemming from historical factors and events.

The differences lie primarily in the method of analysis. Traditionally most historians have been inclined to rely primarily on the written record--documents, books, and manuscripts which, during the colonial period, were written mainly by European observers. Historians have always been careful to question and evaluate the reliability of such sources, but ethnohistorians carry that critical process even further. Drawing on the methodology of anthropologists, ethnohistorians use their knowledge of language, folklore, customs, and other "cultural phenomena" to filter out and correct biases which might otherwise distort the picture of non-European societies. In an effort to add color and depth to European perceptions, ethnohistorians working in the colonial period often move beyond the confines of the written record to examine maps, music, oral tradition, artifacts, and a wide variety of other sources which provide insights into the lives of Indians and Africans. If done well, ethnohistory becomes multi-cultural social history, allowing its practitioners to glimpse those "infinitesimally small elements" which moved all those who, either by choice or chance, made North America their home.⁴

Toward that end, a study of the natural environment can be extremely useful because it provides precisely what social and ethnohistorians are seeking: a culturally comprehensive context within which to examine human behavior. Whether male or female, Indian, European, or African, every human being living in colonial North America came into contact with the natural world every day. Such an encounter could take myriad forms. It could be as life-threatening as a smallpox virus or a bite from a malaria-carrying mosquito. It could be as economically ominous as a swarm of grasshoppers in a tobacco field or as

psychologically traumatic as hearing a wolf howl in the distance. It might be as intellectually demanding as trying to solve the mysteries of wheat rust or as whimsical as wondering if bear meat increased one's sexual desires. For those seeking to understand colonial America, the physical environment provides a broad fabric of human experience from which to unravel the threads of individual lives as well as the varying patterns of community life. To examine man's relationship with the natural world is to consider many "infinitesimally small elements," all of which add up to the most intensely personal and socially-important human goal: daily survival.

Although an environmental perspective provides social and ethnohistorians a huge, multi-cultural laboratory in which to work, conducting research there presents special problems. In biological terms, an ecosystem "includes all of the organisms (i.e., 'the community') in a given area interacting with the physical environment." Such interaction necessarily produces change, with or without human influence. Even in the absence of man, ponds silt up to become meadows; meadows sprout trees and become forests; forests are altered by wind, fire, insects, disease, and a host of other forces. Nature, as the adage goes, abhors a vacuum. Consequently man's role in bringing about environmental change differs somewhat from his part in effecting other types of change studied by historians. For example, a colonist who voted for a representative to his legislative assembly could be said to "cause" change in the makeup of that body. But a colonist who cleared a field to plant tobacco was a "causative agent," setting in motion a complex series of ecological processes which were the more direct "cause" of a change in the forest pattern. When he clears fields, kills

game, or cuts trees, man can speed up or slow down those natural processes. He can never eliminate them altogether. Studying environmental change does not mean studying man against nature, but man and nature--human actions played out on a much larger ecological stage.⁵

The size of that stage becomes immediately apparent in trying to define the chronological limits of "the colonial period." Those of us interested in a multi-cultural approach to colonial history realize that the story of man in America begins not with Columbus in 1492, but somewhere between 70,000 and 30,000 B.C. when Indians first crossed the Bering Strait. A study which seeks to incorporate ecological change must begin much earlier, millions of years before the arrival of Europeans. During that period, varying patterns of topography, temperature, rainfall, and glaciation produced ecological changes far more extensive than those wrought by either Indians, colonists, or slaves. But many of those earlier changes affected the ways in which human beings lived in North America. A true "environmental history" begins not with the arrival of man, but with the formation of the continent, an event shrouded in the distant mists of geologic and ecological time.

Determining an end is no easier than finding a beginning. Politically, the colonial period ended either in 1776, 1783, or 1789, depending on whether one accepts a declaration, victory in war, or a new government as "irrefutable" proof of independence. Those dates mean little within an ecological context. Some environmental changes were visible almost immediately. European livestock and weeds became "American" livestock and weeds as soon as they took up residence in New World fields and forests. But other trends, such as deforestation,

fluctuations in wildlife populations, and soil exhaustion, did not become apparent to contemporary observers until the late eighteenth and early nineteenth centuries. Environmental historians must not only look backward past 1492 or 30,000 B.C., but also forward past 1800.

Working on an ecological stage means rethinking space as well as time. Traditionally historians have relied on man-made boundaries to define the geographical limits of their work. Those doing political or economic history may consider a particular state, county, or town. Intellectual historians often focus on the work of a single individual or a certain school of thought. Ecological boundaries are not so easily delineated. Longleaf pine trees do not suddenly stop growing at the North Carolina-South Carolina border. A Virginia whitetailed deer looks and acts much like a Georgia whitetailed deer. And a herring is a herring whether it swims in the James, Cape Fear, or Savannah River.

The solution at first seems obvious: simply use natural boundaries. Instead of states, counties, and towns, study the coastal plain or piedmont; or better yet focus on a particular forest type such as pine or oak-hickory. But that, too, would prove unsatisfactory. Neither Indians nor colonists restricted their activities to conform to topography or vegetation patterns. The natives took deer from both piedmont and coastal forests. Colonists grew crops in both regions. If nature scoffs at man's boundaries, man, to a certain extent, ignores nature's. To allow only topography to dictate scope would place the "stage" ahead of the "actors" and prove as unwieldy as using man-made political boundaries.

In an effort to include both actors and their stage (and because I hope to expand on Cronon's analysis of New England), I have elected to

examine a region that might be defined as the "English colonial Southeast." In geographic and ecological terms, it is an area of North America bordered on the east by the Atlantic Ocean, on the west by the Appalachian mountains, on the north by the Potomac River, and on the south by an indistinct vegetational border which separates the inland oak-hickory forest from the mixed hardwood vegetation common to the Gulf coast. Politically defined, the region encompasses the English colonies of Virginia, North and South Carolina, and Georgia. I have chosen to exclude Florida partially because its tropical climate and ecology differ substantially from the rest of the Southeast; but also because until 1819, the region was officially the province of Spanish colonists whose cultural background and goals for the New World differed from those of their English counterparts to the north.

Even boundaries which consider both the landscape and its human inhabitants can never be absolute. Spanish explorers venturing north from Florida and Mexico glimpsed the southeastern interior almost a half century before Englishmen landed at Roanoke. Giovanni da Verrazzano, one of the first Europeans to see the south Atlantic coast, was neither English nor Spanish, but an Italian sailing under the flag of France. As the geographer Carl Ortwin Sauer has noted, exploration and colonization of the Southeast (and indeed all of North America) resulted from a wide range of "European activities" which grew out of "the greater game of power politics" played on the eastern shore of the Atlantic.⁶

Historians studying the southeastern environment must remain keenly aware of such "activities" outside North America, for European politics and trade patterns often influenced ecological change. The Crown did

not actively seek to colonize Georgia until 1732, when England needed a buffer against Spanish Florida. For historians, the delay in settling Georgia means that most (though not all) of the evidence for earlier ecological change must be drawn from Virginia and the Carolinas. Africa and the Caribbean figure as prominently as Europe in a study of the colonial Southeast. Rice, which became the major commercial staple in South Carolina and Georgia, initially came to the Southeast from Madagascar. Slave labor to work rice fields and other plantation tracts came from West Africa. Demand for hoops and staves to make barrels for West Indian rum and molasses helped determine the ways in which colonists used the southern forest. Adopting an environmental perspective also requires understanding something of the ecology, economics, and politics of what the historian K.G. Davies has labeled "the North Atlantic World."⁷

Enlarging the chronological and geographical horizons of colonial America ultimately compels the environmental historian to expand his methodological purview as well. Those interested in ecological change must not only make use of the anthropological analysis common to ethnohistory, they must also venture into other related disciplines with which those trained in the "liberal arts" are generally less familiar. Using firsthand European accounts to describe the colonial landscape calls for techniques used by historical geographers. Assessing the impact of agriculture, Indian and colonial, requires a basic understanding of soil exhaustion and patterns of forest succession, processes normally studied by botanists and plant ecologists. Writing about commercial hunting necessarily entails investigating animal behavior, breeding habits, and predator-prey dynamics, scholarly

territory that usually falls within the boundaries of zoology or, more specifically, animal ecology. As I explained to my questioning colleagues, I read books about deer, beaver, and weeds because they were essential characters in the story I set out to tell.

By the time I had thought through the nature and scope of that story and tried to communicate it to my fellow students, I no longer wondered (even if they still did) whether my dissertation had anything to do with our chosen field of study. In fact, I now had the opposite problem: the topic seemed to have everything to do with everything. It spanned not only the four hundred years of "the colonial period," but the vast expanse of ecological time. It involved not just the Southeast, but Europe, Africa, and the West Indies. It meant reading not only history, but geography, ecology, and anthropology as well. As any historian knows, plowing such a wide field of scholarly ground is an enterprise fraught with potential pitfalls. Like the "facts" of history, anthropological, geographical, and ecological "truths" are easily misinterpreted by "outsiders" disengaged from scholarly debate within those disciplines. Knowing that studies which seek to be all-inclusive seldom are, I confronted a question even more troubling than that posed by my dubious colleagues: Is an environmental perspective worth the accompanying risks?

My answer is "yes"--not only because the environment comes closest to furnishing a culturally comprehensive context for studying colonial America, but also for another, more philosophical reason. To practice history is to interpret the past for one's contemporaries, to provide "responsible answers to their urgent questions about their place in time and space, about their own cultural roots and realities." In other

words, we seek to learn the lessons of the past and apply them to the present, perhaps even the future. Inevitably that process entails deciding what is good and bad, right and wrong in past human behavior. Engaging in such "moral criticism" is not as simple as chastising villains or praising heroes. Instead the historian's job is to judge human beings "by the standards they set for themselves," a task which requires description and narration of motives as well as actions, intentions as well as results. Striving to "portray the past in its own light" ensures that "the lessons for the present will be clearly and subtly drawn."⁸

For ethnohistorians, moral criticism becomes doubly (or triply) difficult because we usually deal with two or more cultures, each with its own values and goals. Within that context, each group must be treated fairly.⁹ In that regard, the environment can be immensely valuable, for it is perhaps the most impartial judge of human behavior. Within the forest, a dead deer is a dead deer, whether it falls to an Indian's stone-tipped arrow or a ball from a colonist's musket. When a patch of piedmont woods is cleared, whether by Indians, colonists, or slaves, pines are always the first trees to grow back. But nature also distinguishes between varying degrees of use. Too many dead deer result in a shortage. Land farmed too intensively becomes eroded and exhausted. If the story of land use is told accurately, the landscape itself becomes a kind of magic mirror which affords a student of the environment the opportunity to see and record what the people of the past tried to do, what they did, and what they might have done.

What follows is the story of two systems of land use, one Indian and one colonial, each with its own merits and drawbacks. Perhaps by

examining both societies on their own terms we can arrive at an understanding of our present place in the natural world and begin to decipher the answers to current ecological problems. And that is the very purpose of history, environmental or otherwise. Challenged by my colleagues to come up with a suitable justification for my "unconventional topic," I eventually turned to the writings of Henry David Thoreau, one of the most unconventional characters of his time. Explaining why he chose to live alone for two years near Walden Pond, Thoreau wrote, "I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived."¹⁰ Colonial historians seeking to learn those essential facts and lessons can do no better than to follow Thoreau's example and go to the woods.

CHAPTER I
IN SEARCH OF "THE FOREST PRIMEVAL"

"This is the forest primeval," wrote Henry Wadsworth Longfellow in 1847. In this since-forgotten land, "the murmuring pines and the hemlocks, Bearded with moss, and in garments green [stood] like Druids of eld, with voices sad and prophetic; [stood] like harpers hoar, with beards that rested on their bosoms." Here Hiawatha grew to manhood and Evangeline bravely carried on the Lord's work. Here one could feel and smell "the dew and damp of the meadows" and hear the "rushing of great rivers" which echoed through the wilderness like thunder in the mountains.¹ Literary scholars often dismiss Longfellow's descriptions of early America as the idyllic and nostalgic musings of a "fireside poet," but his visions of the forest primeval also reflect a fascination with the early landscape that has tugged at the American conscience for more than a century. Almost fifty years after Longfellow's epic "Evangeline," Francis Parkman described the early woodlands as "one vast continuous forest ... the depths of immemorial forests, dim and silent as a cavern." He took pains to point out the "repulsive transition from savagery to civilization, from the forest to the farm," and like Longfellow, lent human characteristics to heroic elms and oaks who watched the destruction and "bided [their] own day of doom."²

Longfellow and Parkman wrote primarily about the Northeast and Ohio Valley, but those interested in the south Atlantic region have been no

less inclined to grandiose speculation, especially in the conservation-conscious twentieth century. America's fireside poet and her consummate Boston Brahmin might well be proud of this passage from a 1958 lecture describing the early southern pine forest.

Trunks of longleaf and slash pine were exceptionally straight and well-formed. Their wide spacing and bright orange bark conveyed a feeling of openness and color, more like a park than a forest. The subtropical sun, pouring through the scattered foliage, likely as not reflected the irridescence of wild turkeys feeding on the succulent pine mast. High in the tops of the tall pines the soft sighing of the wind accompanied the cheerful call of the bobwhite.

Although intriguing in their style and grace, such descriptions immediately put a cautious historian on his guard. What sort of environment did European settlement disrupt? Did the early landscape compare favorably with Longfellow's poetry and Parkman's vivid imagination? How should one describe the southeastern forest primeval?

Explorers and colonists from France, Spain, and England traveled in or near the Southeast throughout the sixteenth century and some took care to note the natural surroundings. However, due to the region's diverse topography and the hazards attending early colonization, most European visitors saw only limited areas for only short periods. Accounts of Verrazzano's 1524 voyage and the expedition of Pedro de Quexos one year later sometimes offer colorful descriptions, but reveal mainly what the explorers could observe from shipboard. In 1526, Lucas Vesquez de Allyn founded the colony of Santa Elena (St. Helena) in the South Carolina sea islands, but he saw only marshy land and salty water before disease and food shortages cost him his life and drove his party out of the area.⁴

Hernando DeSoto and Juan Pardo both led extended expeditions through the southeastern interior, but even records from those marathon marches expose only long narrow swaths along their trails. Likewise, French Huguenot outposts in the sea islands in the early 1560s quickly fell victim to Spanish attacks and a Spanish Jesuit mission on Chesapeake Bay suffered the same fate at the hands of Indians. Although Santa Elena remained a Spanish possession throughout the last third of the sixteenth century, the few soldiers who resided there spent their time warding off French and English efforts to unseat them and had little chance to take detailed notes on the landscape. Not until the English established the Roanoke and Jamestown settlements did colonists begin to venture inland along the Atlantic coast and paint a more general picture of the natural environment.⁵

Moreover, most Europeans described only what they thought would be of interest to their countrymen back home. With the exceptions of several professional naturalists, most were not interested in the land for its own sake. Instead, they came seeking "commodities of the country" which might lure and sustain colonists or be shipped back to Europe and sold at a profit.⁶ DeSoto's band of explorers journeyed inland only after the Indians at Appalachee told them of vast stores of gold which lay "in the direction of the sun's rising." English and French explorers also hoped to find precious metals, but realized that other items such as fish, fur, and timber might prove equally valuable. Like DeSoto and Pardo, they were disappointed when they failed to find gold, but as Ralph Lane, governor of the first Roanoke colony reported,

when it came to commodities, "no realme in Christendome" could compare to the Southeast.⁷

Those who sailed the seas only had to look overboard to confirm Lane's observation. Spanish mackerel, bonitos, red drums, sea bass, and other tasty fish could be taken with nets or lines in the coastal waters. In fall, migrating bluefish became so obsessed with their pursuit of smaller fish that they sometimes chased their prey into shallow tidal pools where the larger fish remained trapped when the tides receded. When such feeding frenzies occurred, colonists could gather "Cart-loads" of bluefish as big and as well flavored as salmon. Shellfish, too, seemed to appear miraculously along the sounds and bays. Crabs, clams, scallops, and mussels could be gathered with ease and outgoing tides often left banks of oysters lying along coastal rivers.⁸

Farther inland, every creek and brook flourished with "exceeding good fish of divers kinds" including bream, bass, perch, and freshwater eels. In spring, these waters proved doubly productive as several ocean species came up the rivers to spawn. Herrings and alewives appeared in March, accompanied later by striped bass, sea trout, shad, smelt, and a few flounder. All these fish might be eaten or salted and sent to Europe, but another migratory species, the sturgeon, promised the most immediate and lasting profits. These bottom-dwelling fish ranged in size from three to six feet with the smaller, younger fish arriving in March to be followed by their older and larger relatives who sometimes remained in the rivers until September. One early fisherman at the mouth of James River reported taking "a frigot's lading of sturgion, Base, and other great fish" and believed that had he been provided with

salt, he might have acquired enough to last an entire year. Christopher Newport, whose 1607 voyage up the James provided one of the first glimpses of Virginia's interior, conservatively estimated that sturgeon alone could be worth \$1000 per year to English fishermen. Future colonists would never want for food or money as long as they had "good nets answerable to the breadth and depth of [the] rivers."⁹

Like the waters, the southeastern skies seemed to offer an endless source of food and virtually every early explorer compiled a list of the area's birds. Traveling through the Carolina backcountry, DeSoto's expedition encountered "numerous wild fowl" including quail and grouse which reminded them of African partridges.¹⁰ During the warm months, cranes, herons, eagles, hawks, ospreys, and other smaller birds could be seen along the coast feeding on the abundance of fish. As the weather cooled, and the fish moved out of the streams, migrating wildfowl moved in, prompting one English colonist to remark that, "As in summer the Rivers and Creeks are fill'd with fish, so in Winter they are in many places cover'd with Fowl." To convince prospective settlers that the birds could be easily killed, he added, "I am but a small Sports-man, yet with a Fowling-Piece, I have killed above Twenty of them at a shot."¹¹

Other birds besides wildfowl also made a seasonal appearance in the Southeast. As spring berries and wild fruits began to ripen, great flocks of small, brightly-colored Carolina parakeets moved into the woods to feed. The birds soon proved a menace to colonists' orchards and gardens, but initially they marveled at the parakeets' iridescent plumage and swift, darting flight. Noting that the birds resembled East

Indian parrots, William Strachey, first Secretary of the Jamestown colony, thought their presence might mean that Virginia lay near a "South-Sea" which would afford the much-coveted quick passage to the Orient.¹²

Numerous as they were, however, parakeets could not begin to rival the hordes of passenger pigeons which flew over the region in fall and winter. In the Carolinas during the early eighteenth century, John Lawson saw flocks of pigeons so thick they blotted out the sun and took fifteen minutes to pass overhead. Strachey described the birds as "thickened cloudes" and took great care to avow his honesty in the matter, lest someone doubt his pigeon stories and call his whole account into question. When they roosted, the pigeons sometimes broke limbs from trees and covered the ground with several inches of dung. Passing through oak lands, they often consumed every acorn and left a bare forest floor in their wake. Colonists in the Southeast only saw the birds during their southerly migrations and since they returned to their spring breeding grounds in the north via a more westerly route, they could only be hunted during fall and early winter. Yet because of their prodigious numbers, hunters using even the crudest fowling pieces could bring down at least one pigeon with every shot and more than one colonist attested to the delicious flavor of their meat.¹³

Migratory wildfowl and pigeons might keep settlers well-fed in fall and winter, but at other times they would have to rely on the wild turkeys which ran through the American woods like the pheasants of Europe. Unlike the coastal water birds and passenger pigeons, turkeys observed no special seasons or territorial boundaries. Indians in the

western Carolinas presented DeSoto's men with seven hundred turkeys at one time, while Newport's 1607 expedition found so many of the fowl on a small point of land upriver from Jamestown that they called the spot "Turkey Ile," a name it still bears today. John Lawson saw as many as five hundred of the birds in one flock and estimated that half a turkey could feed eight hungry men for two meals. In his description of South Carolina, Peter Purry singled out wild turkeys as the most common birds, reporting that "those who love Fowling may easily take them."¹⁴

Those who preferred four-footed game also found much to like about the Southeast. The region provided a number of "divers beastes fitt for provision," the most common of which were whitetailed deer. Sailing along the south Atlantic coast, Verrazzano spotted "abundance of animals, stags, [and] deer." Strachey found herds of up to two hundred whitetails along the Virginia rivers and Ralph Hamor, another Virginia colonist, thought the land must surely furnish some special grass or herb that allowed deer to breed in incredible numbers. Writing of South Carolina in 1682, Thomas Ashe observed that the animals ran in such infinite herds that the entire colony might be compared to one giant deer preserve. Whitetails not only promised tasty venison to feed colonists, but also skins, which, when dressed by the Indians, compared favorably with European chamois. Among the "merchantable commodities" included in his "Briefe and True Report" of the first Roanoke colony, Thomas Harriot listed thousands of such skins, noting that they could be acquired from Indians in exchange for "trifles."¹⁵

Although not as plentiful as their smaller, whitetailed cousins, wapiti or American elk also inhabited the southeastern forest, providing

good meat and skins which could be sold "at very high prices."¹⁶ Arthur Barlowe, a captain on the 1584-85 Roanoke voyage, reported that the coastal Carolina Indians often dealt in "Buffe skins." Barlowe probably used the term to describe more roughly dressed deerskins, but the natives might have shown him buffalo hides. At the time of contact, bison ranged south through the Atlantic states at least as far as Georgia. In 1733, William Byrd II encountered a buffalo calf while on his way to inspect some newly-acquired land in northeastern North Carolina and though Lawson listed the beast's "Chief Haunt" as "the Land of Mississippi," he also knew of several killed along Cape Fear River.¹⁷ A variety of other animals promised valuable furs. Lawson saw beaver dams wherever he traveled and while surveying the boundary between Virginia and North Carolina in 1728, Byrd's party often found it difficult to cross creeks which beavers "render'd quite impassable for any creature but themselves." An additional abundance of otters, muskrats, foxes, and southeastern minks seemed to guarantee an endless supply of pelts which, as Harriot noted, would soon "yeeld good profite."¹⁸

Although initially not valued for their skins, the numerous black bears in the southern forest often attracted European attention. Noticing that Indians relished bear's flesh, colonists decided to sample the meat and found it "very toothsome, sweet [and] as good to be eaten as the flesh of a Calfe of two yeares olde."¹⁹ The thick layer of fat the animals put on in preparation for winter served as cooking grease for fish and other fried foods. It had more flavor than butter and "never turned acid in the stomach." As Englishmen began to explore the

interior and rely more and more on bears for food, they came to believe the giant beasts offered other advantages, including the prospect of increased sexual prowess and virility. William Byrd noted that Indians often gave bear meat to men who hoped to become fathers, a diet which soon made them "exceedingly impertinent" to their poor wives and thereby increased the odds of pregnancy. Those who accompanied Byrd on his survey mission and partook liberally of the meat experienced similar yearnings. All the married members of his party and even some of the single men fathered children within forty weeks of their return. That phenomenon probably owed more to the forced celibacy of the trip than the properties of bear meat, but Byrd concluded that the flesh could never be "a very proper diet for saints, because 'tis apt to make them a little too rampant."²⁰

A different sort of mythology grew up around creatures considered dangerous to man or his property. Europeans spilled much ink warning future colonists about bobcats and panthers that might someday prey upon livestock, alligators which could destroy fish weirs, rattlesnakes and copperheads whose bites could endanger both horse and rider, and the cunning catamounts which inhabited the western mountains. Most Europeans, especially Englishmen, professed an almost pathological fear of wolves and always kept a sharp eye out for these "dog[s] of the woods." Gray wolves, once native to the Southeast, traveled in packs at night, stalking the deer herds and frightening colonists with their bone-chilling cacophany. Lawson offered his readers an account of a less than comfortable night spent among such howling beasts at the edge of a Santee River swamp.

When we were all asleep in the beginning of the Night, we were awakened with the dismal and most hideous Noise that ever pierced my Ears. This Sudden Surprizal incapacitated us of guessing what this threatening noise might proceed from; but our Indian Pilot [guide] (who knew these Parts very well) acquainted us that it was customary to hear such music along that Swamp side, there being endless Numbers of Panthers, Tygers, Wolves, and other Beastes of prey, which take this Swamp for their Abode in the Day, coming in whole Drowes to hunt the Deer in the Night, making this frightful Ditty til Day appears.²¹

Animals which did not promise immediate financial rewards (or renewed sexual vigor) and posed no apparent threat to life or limb seldom received much notice from European observers. Gray and flying squirrels, rabbits, skunks, and raccoons all appear in the earliest accounts, but most writers did little more than compile lists of such seemingly insignificant species. One small animal, the opossum, often attracted more attention, primarily because it was unknown in Europe. Wherever explorers went, they took great care to describe this "strange and incredible" mammal. Ralph Hamor likened it to a "Pigge, of a month old" and added this provocative analysis of the animal's reproductive habits: "she hath commonly seven young ones ... which at her pleasure until they be a moenth olde or more she taketh up into her belly, and putteth forth again without hurt to herselfe or them."²²

Accustomed to the fields and fences of their homeland, Europeans wondered why the new land contained few domestic animals. The Indians kept dogs, but no cats, hogs, cattle, sheep, horses, or poultry and apparently made no attempt to tame the numerous wild turkeys.²³ The first colonists also marveled at the paucity of worrisome rodents. Black rats, long the scourge of European town-dwellers, had not yet made their way to the Southeast and the region remained completely free of

the common house mouse.²⁴ Other, infinitely more troublesome organisms well known in Europe were also missing, a point Ralph Lane seemed to recognize when he described a land "so wholesome, that we have had no one sicke, since we touched land here." The microbes responsible for smallpox, measles, influenza, and a host of other European maladies were initially as scarce as rats and livestock.²⁵

One possible explanation for the lack of these contagions lies in the migration patterns of the Indians who first settled the region. Most anthropologists and archaeologists agree that the first men to see the Americas came from Asia by way of a land bridge across Bering Strait. They settled the upper reaches of North America in an area characterized by arctic tundra and grassland. Here the cold climate restricted the growth of disease-causing organisms so that many Asian and European ailments disappeared before Indians began to migrate to the Southeast. And, since the natives kept few domestic animals, they avoided diseases transmitted to humans by livestock. Yet, as Allyon's experience at Santa Elena indicated, the southeastern environment could create other problems. Seasoning, salt poisoning, dysentery, dietary deficiencies, and eventually malaria all took a heavy toll, proving Lane's description of healthy conditions to be, like most European accounts, a report limited by both space and time.²⁶

Like their descriptions of southeastern animals, European accounts of the climate reveal as much about the expectations of the authors as they do about the forest primeval. The first Englishmen to settle in the Southeast came expecting a climate like that of the Mediterranean coast, a notion based on the premise that the two areas lay in the same

latitude and therefore must have similar or perhaps even identical temperatures. It took some time to dislodge this "climatic fallacy," partially because the early writers wished to attract colonists with tales of a comfortable climate, and because initial observations seemed to confirm such beliefs. After spending a bit more than a year on the comparatively mild North Carolina coast, Harriot could write that "the ayre there [was] much warmer than in England, [but] never so violently hot as [it] sometimes is under and between the Tropikes, or nere them." While exploring Virginia in mid-May, Newport's party concluded that the climate more closely resembled that of the West Indies, with warm days and cool nights the typical weather pattern. Only a seasoned traveler and veteran of colonization like John Smith could correct such reports and inform prospective colonists that the summers could be as hot as those in Spain and the "extreme sharpe" cold of winter as biting as in France and England.²⁷

The climate might not compare favorably with that of southern Greece and Italy, or be altogether healthy, but the temperate Southeast did promise a long growing season and agricultural plenty, especially when viewed in conjunction with the region's soils. Preoccupied with finding a populous Indian kingdom which could provide him with gold like that of Peru, DeSoto spent little time analyzing soil unless it seemed to offer mineral wealth. English explorers also took an interest in the soil's geologic properties, sometimes sifting or tasting it to determine whether or not it contained anything of value. However, unlike DeSoto, Englishmen seemed to relish the very dirt itself. Barlowe believed the soil adjacent to the North Carolina sounds to be "the most plentifull,

sweete, fructfull, and wholesome of all the world" and the further toward the interior one ventured, the better it became. Fifteen or twenty miles inland the sands of the coast mixed with clay until they finally produced "marl as red as Blood" which would "lather like Soap." When Europeans reached the Appalachian foothills, they found still richer ground "equal to Manure itself [and] almost impossible in appearance to wear out."²⁸

Anyone needing further proof of the soil's fertility could look at the natural vegetation. DeSoto's party often took time out from their quest for gold to marvel at the various trees growing in the Carolina backcountry and Blue Ridge mountains. Even "without planting or pruning," they reached "the size and luxuriance they would have were they cultivated in orchards by hoeing and irrigation." Newport's men reported that the land along the James produced "wood of all kinds ... the fayrest yea and the best that any of us (traveller or workman) ever saw." The Quaker naturalist William Bartram, who journeyed through the interior in the late eighteenth century, feared that "to keep within the bounds of truth and reality, in describing the magnitude and grandeur of [the] trees would ... fail of credibility." However, in spite of his anxiety over whether or not he would be believed, Bartram could not resist telling his readers about the perfectly straight oaks which sometimes measured eleven feet in diameter and whose first limbs appeared forty or fifty feet above the ground. In the North Carolina uplands, John Lawson saw oaks, hickories, and chestnut trees so tall that the best gun, even when loaded with long-range swan shot, could not bring down a turkey perched on the lowest limbs. The forests not only

amazed the eye, they also appealed to the nose. Pines, cedars, bays, southern magnolias, and a host of other "sweet-smelling timber trees" produced the most "odiferous and fragrant woods" as pleasant and delightful as anywhere in the world.²⁹

Although captivated by the forest's aesthetic qualities, Europeans could not help but see the commercial potential of the woodlands. The majority of England's forests had been cleared for agriculture by the end of the Anglo-Saxon period and as the population rose during the late fifteenth century, the fuel demands of iron production, salt-boiling, and glass-making further depleted the wood supply. As early as 1593, Parliament moved to restrict timber-cutting and by the time Englishmen arrived at Jamestown, those industries had already begun to make use of coal. Forests like those seen by Bartram and Lawson indicated that southeastern colonists would never face such difficulties. The huge oaks and hickories, with their dense, hard wood seemed to guarantee an endless supply of long-lived coals for heating and cooking. Deposits of "Pit-coal" lay buried in the mountains, but as one early eighteenth-century observer noted, prospective settlers would find it "not worth their while to be at the expense of bringing it, Timber being so plenty."³⁰

Other trees which delighted the senses also promised to line the pockets of colonists and merchants. Pines meant pitch, tar, rosin, and turpentine as well as masts big enough to outfit the largest ships. Red cedar could provide wood for ceilings, chests, and boxes, and when laid among linens or fine woolens, it would destroy moths and other harmful vermin. Bald cypress, that water-resistant tree of the coastal

swamplands, afforded the best clapboard and Atlantic white cedar the most lasting shingles. An abundance of sassafras, a tree "of the most rare vertues in phisick," might cure everything from plague to venereal disease. Most who viewed the natural vegetation could agree with Alexander Whittaker, minister of Virginia's Henrico congregation, that such valuable trees could only make one "admire at the beautie and riches which God hath bestowed upon [those] that yet know how to use them."³¹

During certain seasons, the woods could supplement a colonist's diet. Hickories, black walnuts, chinquapins, and some oaks all produced nuts favored by Europeans and the good fathers at the Chesapeake Jesuit mission made extensive use of the plums and cherries they found nearby. Mulberry trees attracted attention because in addition to their edible fruit, they offered the food necessary for raising silkworms which in turn might provide one of the most coveted Oriental cloths. In some areas of the southeastern forest, grapevines completely covered the ground or obscured tall trees from view, engendering dreams of a wine industry like that of Spain or France. Blackberries, huckleberries, and wild raspberries grew in thickets along the rivers or at the edge of the woods. In one highly exaggerated tract promoting overseas colonization, the author warned prospective settlers to step lightly in early summer, lest their feet become "died in the bloud of large and delicious Strawberries." Their first experiences with the "Indian plum" or persimmon nearly convinced Europeans that the fruit had too "rough" a taste to be of much value, but they later learned that if allowed to ripen fully, it too could be sweet and enticing.³²

The picture of the southeastern landscape which emerges from these European accounts initially seems to confirm the poetic observations of Longfellow, Parkman, and others. Rivers well-stocked with fish, skies filled with birds, beautiful, fragrant, and valuable woodlands full of tasty game, a temperate climate, rich soil--all the images suggest a land of plenty. But what sort of land? Like a slowly developing photograph, the historical record tells only part of the story. Their limited experience, emphasis on aesthetics, and concern with commodities blinded Europeans to the often complex relationships between New World climates, soils, plants, and animals. Even when a voyage along a river permitted them a look at larger communities of vegetation and wildlife, explorers and colonists tended to single out items which fit their shopping lists. Viewing a wide panorama along Cape Fear River in 1663, William Hilton could only describe "good tracts of land, dry [and] well wooded," which contained an "abundance of Deer and Turkeys" as well as numerous partridges, parakeets, and waterfowl. His party heard several wolves howling in the woods and found the remains of a deer the animals had killed and torn to pieces.³³

For the historian interested in pre-colonial ecosystems and subsequent change within those communities, such descriptions are of only limited value. The major elements of the forest ecosystem appear (soil, vegetation, herbivores, and carnivores) but they exist only as unrelated individuals. Yet the search for the southeastern forest primeval need not end here; it simply must go in another direction. The south Atlantic landscape has changed considerably since the arrival of Europeans, but the basic soil and vegetation patterns are still

discernible, affording the opportunity to visualize pre-colonial forests.

Geographically, the region divides into three zones: the coastal plain, piedmont, and mountains. Within these zones, several bands or "associations" of vegetation dominate the landscape. Along the outer coastal plain, the sandy soils produce a "southern mixed hardwoods association" which includes American beech; white, live, and laurel oaks; and the evergreen southern magnolia. Moving west into the inner coastal plain and the clay-laden soils of the piedmont, the association changes to "oak-hickory" with white, red, and black oaks as well as mockernut and shagbark hickories the predominant trees. In the Appalachian foothills and mountains, the dark, organic soils help create an "oak-chestnut" region and here the presettlement forest consisted chiefly of American chestnut, chestnut oak, and red oak.³⁴

Although these bands of vegetation help further expose the picture of the early southern woods and provide some sense of soil-vegetation relationships, they too are limited in what they describe. Ecologists sometimes disagree on the exact definition of "association," but most use the term to delineate mature stands of trees that are relatively similar.³⁵ Like European accounts of the woodlands, descriptions based strictly on associations create an impression of the forest as a static entity and tend to obscure its diversity. Soil is an essential agent in forest composition, but other environmental elements play key roles in determining its makeup. Ecologists refer to these influences as "limiting" or "regulatory" factors because when in short supply, they can slow down or limit potential growth within the forest. Conversely,

when they are available in sufficient quantities, the forest may easily reach its growth potential.³⁶

One regulatory factor of prime importance in the Southeast is temperature. While Europeans gradually determined that the region did not compare to the Mediterranean countries, it took even longer for them to note more subtle variations in annual temperatures. Excepting small-scale and local irregularities, lower wintertime readings occur in the western piedmont and mountain regions where increased elevation and distance inland tend to keep the air cooler. In summer, the inner coastal plain experiences the most severe heat with areas immediately adjacent to the ocean kept more temperate by the cool, moist air over the sea. Latitude, too, plays a part in determining annual temperatures so that Virginia's coastal plain generally remains cooler than that of the Carolinas, a trend Francis Yeardley noted in 1654 when he wrote that South Carolina did not experience "Virginia's nipping frosts." Influenced by topography, the complex temperature patterns greatly affected presettlement forests. Subtropical species such as the palm-like cabbage palmetto might be typical of the mixed hardwoods association along the southern shores of the Carolinas, but be entirely absent from northern North Carolina and Virginia. Likewise, more northerly species like the eastern hemlock grew in the cooler, higher elevations of western North Carolina and Virginia, but could only be found in the extreme northwestern section of South Carolina's oak-chestnut region.³⁷

Moisture also plays a critical role in regulating the composition of the southeastern forest. Annual rainfall is adequate over most of the region, but like temperature, the amount of water present in any

given area varies with topography. In the coastal plain where tides regularly influence freshwater rivers and creeks, large, open expanses of marshland greeted European explorers and settlers. Near the coast, cordgrass, marsh hay, and a variety of small shrubs dominated the salt marshes. Farther inland, brackish overflow produced black rushes and coarse saltgrass. Still farther upstream, other rushes, sedges, grasses, and cattails grew in the freshwater marshes along the streambeds. At Santa Elena, Allyon quickly found out that such areas were no place for colonists, but in their search for valuable lands and commodities, early English explorers often mistook the marshes for valuable grassland. Along James River, George Percy reported "many great and large meadows, having excellent good pasture for any cattle." Farther south, early colonists described "marshes and meadows" sometimes spanning fifteen hundred to three thousand acres.³⁸

In other low-lying and poorly drained parts of the coastal plain, the fluctuating water table intersected the surface, creating different types of wetlands which colonists described as "pocosins," "bays," or "dismal swamps." Here dense growths of shrubs and vines sprang from the peaty soils and trees such as sweet bay, tulip poplars, and red maples clustered together to form thick "bay forests" which also produced the bald cypress Europeans favored as a source of clapboard. Spanish moss, capable of absorbing the abundant moisture directly from the air, often hung from the cypresses making the trees look much like the Druids mentioned in Longfellow's poem. As explorers and colonists moved west, they found less and less wetland due to the increasing elevation. Most of that which they did encounter lay along the rivers of the piedmont.

Subject to periodic flooding and covered with rich alluvial soil, these "bottomland swamps" produced a number of wetlands trees such as willow oak, red gum, and the red cedar colonists found so attractive.³⁹

A lack of moisture could be as important as an abundance of it in determining the character of the early forest. In southern North Carolina and across South Carolina, a band of sandhills still divides the piedmont from the coastal plain. As its name implies, the region is often rolling and hilly like the piedmont, but its sandy topsoil more closely resembles that of the coastal plain and helps keep the area well-drained. The sandhills are also far enough inland to experience extremely hot summer temperatures and during that season, the region becomes even drier. Scrubby turkey oaks (so named because the large birds seem to prefer their acorns), blackjack oaks, and a few grasses and woody plants grow in sparse patches that are sometimes separated by large expanses of bare sand. These "barrens" seemed almost a wasteland to the farming Englishmen and Mark Catesby, the famous colonial naturalist, thought them "not capable of cultivation," although he wondered how the stunted oaks could bear acorns at a height of only two feet.⁴⁰

Farther west, drainage patterns helped control the density of the upland forests. In the piedmont and foothills, dominant oaks and hickories also mingled with black walnuts, sugar maples, and chestnuts, all of which flourished in the more fertile clay soils. Studies done on similar vegetation and soils in Ohio and Pennsylvania show that, if allowed to grow undisturbed, such trees can become enormous, much like the oaks described by Bartram and Lawson. Elevation keeps the area

well-drained and the huge trees soak up most of the precipitation which remains in the soil, making it difficult for other smaller species to germinate. In addition, the trees and grapevines which often climb their trunks create a thick canopy that blocks out the summer sun. The darkness, too, limits the growth of underbrush so that the woods remain open and parklike. William Strachey may have been describing just such a forest in piedmont Virginia when he wrote of oaks so large they would "beare square of good Tymber for 20 yds. long," yet the ground beneath them stayed so clean that it remained "passable both of horse and foote."⁴¹

Another regulatory factor also played a critical part in determining vegetation patterns. William Bartram witnessed it in action in southern Georgia when he stopped at a private home seeking shelter from a violent thunderstorm. With a naturalist's curiosity, Bartram stepped to the door to watch the tempest. He saw lightning dance across the sky until suddenly it opened "a fiery chasm in the black cloud, darted with inconceivable rapidity on the trunk of a large pine tree ... and set it in a blaze." The flames climbed ten or twelve feet up the tree and burned for fifteen minutes before the ensuing rains extinguished them. Most modern Americans, accustomed to caveats issued by Smokey the Bear and the United States Forest Service, usually regard fire as a curse on the woodlands. However, natural fires often influenced early forest ecosystems, especially in temperate regions like the Southeast. Verrazzano saw smoke all along the south Atlantic seaboard and the earliest English explorers realized that fires were "verie ordinarie all alongst this coast."⁴²

Like the blaze Bartram saw in Georgia, most lightning-set fires did not become conflagrations. Accompanied by precipitation which kept the forest floor damp, they burned slowly and usually only at ground level. These limited fires occurred all over the Southeast, but were more common in the coastal plain where generally warmer and drier conditions allowed them to smolder for days and cover a larger area. John White's party may have seen just such a creeping surface fire in 1590 while searching for the "lost" Roanoke colony. Investigating smoke which they thought might indicate a settlement, White's group went ashore to find only "grass & sundry rotten trees burning about the place."⁴³

Kept in check by climate and topography, these periodic fires had a tremendous impact on the natural vegetation, including that famous tree of southern folklore: the pine. Few trees are better adapted to a particular environment than those pines native to the South. With one or two possible exceptions, all southern pines require a mineral seedbed. This trait makes them ideally suited to the sandy soils of the eastern piedmont and coastal plain where English colonists first encountered them. Some species, like the pond pines which grew in the pocosins and loblolly pines which also favored wetter sites, cropped up in sporadic and almost entirely pure stands. But other types, slash and longleaf pines, spanned larger areas, producing a vast band of pinelands which stretched through the coastal plain from extreme southeastern Virginia, across the Carolinas, Georgia, and the Deep South into present-day Texas. For fifteen hundred miles, the scaly-barked conifers reigned supreme, interrupted only here and there by an occasional swamp and its accompanying hardwoods. However, without recurring fires, these

seemingly inexhaustible sources of pitch, tar, rosin, and turpentine would have disappeared. Ecologists classify the southern pines as "pioneer species," meaning that they are among the first trees to appear after a site has been cleared or burned. If allowed to grow undisturbed by fire for long periods, pines eventually give way to "climax" forests of southern mixed hardwoods and oak-hickory.⁴⁴

Fire not only maintains pines, but also aids them at other stages of growth. Under some conditions ground fires can burn off the litter which accumulates on the forest floor, exposing and enriching the mineral soils the trees favor. Some evidence indicates that heat from periodic fires may even help pond pine cones to open and their seeds to germinate more rapidly. Longleaf pines, which eventually became the mainstay of the colonial naval stores industry, have perhaps the most interesting relationship with fire. After germination, the tree sends out a taproot which continues to grow for several years while the above-ground plant remains in a low shrub stage and looks more like a clump of grass than a tree. During these early years of growth, the needles become susceptible to a fungus, commonly called "brown spot disease." However, the fungus can be controlled if infected needles burn before new growth in spring. The longleaf's bud is protected by the long needles and scales so that a cleansing fire does not destroy the tree itself. Although vulnerable to destruction by fire as they begin to grow above ground, longleaf pines become fire-resistant once they reach the sapling stage. Protected from the heat by their thick scaly bark, some can even survive defoliation by flames, providing the upper section of the trunk is not scorched.⁴⁵

Because they depend so heavily upon fire for survival, longleaf pine forests tend to encourage periodic burns. The trees drop their lengthy needles all over the underlying vegetation where they cling and dry out producing natural tinder which requires only a lightning strike to ignite. Once the underbrush (which is often composed of competing oaks and hickories) burns off, the pine forest can become quite open. If the soil contains enough moisture, bluestem or other grasses may grow under the pine canopy, creating a park effect even more dramatic than that of the upland oak forests. English colonists found such open pine woods appealing, describing them as "a vast Forest of fine Walks, free from the heat of the Sun [and] so clear and open that a Man may easily ride a hunting amongst the Trees, Yielding a Prospect very Pleasant and surpassing." Other pinelands, however, held less promise. Where drier conditions prevailed, as in the sandhills, pines stood alone or apart in bare sand with only a few stunted oaks or other small shrubs and grasses growing between them. Like the turkey oak wastelands, these "pine barrens" seemed uninhabitable, although some Englishmen thought they recognized grazing potential in the pine mast and coarse grasses.⁴⁶

Pinelands subject to more frequent burning over long periods sometimes produced savannahs with even more widely spaced trees, little or no underbrush, and an abundance of grasses. Most of these (broomsedge, wiregrass, panic grass, and toothache grass) are highly flammable, a trait which tends to perpetuate fire and thereby maintain the savannahs. Decaying grasses also add a dark, humic layer to the soil, increasing its fertility and aiding in moisture retention. In the outer coastal plain, where the water table lies close to the surface,

savannahs become nearly saturated and other trees such as cypress, pond pine, and various oaks, may spread over the grassland. Under such wet conditions, savannahs also produce showy flowering plants such as orchids and deer's tongue.⁴⁷

At the time of the Discoveries, savannahs extended along the coastal plain from southern Virginia to Alabama, creating broad open plains within the pine, oak, and mixed hardwood forests. Europeans usually found these miniature prairies enchanting. Exploring the Virginia interior in 1670, John Lederer expressed his surprise and delight when, after traveling "through the shade of the vast Forest," he came out of the "melancholy darkness of a sudden into a clear and open skie." Others referred to the grassy patches as "natural lawns" and thought some of them as beautiful as those cultivated by gardeners in Europe. Moreover, the waist-high grass appeared to offer "good Pasturage for cattle" and if they could be drained during the wet season, savannahs might provide fertile fields for wheat, corn, and other grains.⁴⁸

Fires in the coastal plain also helped maintain other plants and trees which Europeans considered valuable. Under the right conditions, blackberries or wild strawberries flourished in the open sunny environments created by periodic burns. Atlantic white cedar, that wetlands tree favored for shingles, needs an open seedbed and exposed peat soil in order to germinate. Fires occurring in the coastal plain swamps helped burn off accumulated ground litter and open the forest canopy allowing the trees to get a toehold. Without such fires, broadleaf trees such as sweet bay or oaks would soon have replaced the highly

regarded cedars. Even the treasured sassafras benefited from fire. Like white cedar, sassafras is intolerant of shade and sprouts prolifically after a burn, although unlike longleaf pine, it is not fire-resistant and can be destroyed by even a light fire while in the sapling stage. Descriptions of the trees around the Jamestown settlement indicate that its swampy surroundings may have been subject to occasional fires. Newport's party reported that the region produced "Saxafroge what store we pleast" and George Percy described cedar, cypress, and other sorts of "goodly trees" as well as "beautiful strawberries, four times bigger and better than ours in England."⁴⁹

More than a century after Percy and Newport told their readers of the potential value of tidewater forests, another Virginian, William Byrd II, detected a key difference in the composition of the early southeastern woods. While surveying his now famous dividing line, Byrd noticed that in the Carolina coastal plain, the pines were "of a different species from those that grow in Virginia; their bearded Leaves [were] much longer and their cones much bigger." Byrd did not realize it at the time, but he had just observed a subtle change in the fire-maintained vegetation. In the upland oak, hickory, and chestnut woods of the piedmont and mountains, broadleaf deciduous trees kept the forest floor shaded in summer, maintaining cool moist conditions near the ground and limiting the fire season to a short period between leaf fall and the beginning of winter rains and snows. Those lightning fires which did occur usually burned much smaller areas than in the coastal plain and encouraged the growth of different pioneer species such as eastern white, pitch, and table mountain pines in the higher elevations

and Virginia, shortleaf, and loblolly pines in the piedmont. Like their coastal plain counterparts, these pines generally flourish in the mineral soil exposed after a light burn, but as Byrd noted, they all have relatively short needles which, when dropped, lie close together and are less combustible. Consequently, the farther west and north colonists ventured, the less common natural fires and the associated vegetation became.⁵⁰

However, one fire-maintained plant could be found growing in certain moist soils throughout the region. It shared coastal plain pocosins with pond pines; it grew along piedmont river bottomlands with black oaks and tulip poplars; DeSoto's party found it near the head of Broad River in western North Carolina. Modern plant ecologists know the species as Arundinaria, but colonists and explorers called it "cane" and the areas in which it thrived became known as canebrakes. A type of bamboo, cane produces a heavy underground stem which allows the plant to store food, but remains out of the reach of foraging animals and fire. When a canebrake burns, vigorous new shoots spring from the protected roots and during the warm wet weather of early summer grow at an incredible rate--sometimes as much as an inch and a half within 24 hours. The plants often form dense, tall thickets which, as Mark Catesby observed, "are hardly penetrable but by Bears, Panthers, wildcats, and the like." In the absence of fire, canebrakes soon reach maturity or, as John Brickell described it in his account of eighteenth-century North Carolina, "they grow old [and] bear an Ear like Oats ... soon after which they decay both Root and Branch."⁵¹

Coupled with the Southeast's diverse topography, factors such as temperature, moisture, and fire lent a patchwork quality to the early southern forest. Rather than one thick, unbroken stand of trees, it emerges as a collection of many adjacent, but often dissimilar communities. Within this giant mosaic, clear-cut boundaries between vegetation types were usually the exception instead of the rule. At the western edge of the pinelands, oaks and hickories mingled with the conifers and along the fringes of savannahs, trees typical of the surrounding woodlands might already be present. Ecologists label this phenomenon the "edge effect" and it added to the forest's hodgepodge appearance. Traveling only a few miles in any direction could bring a colonist into contact with myriad types of vegetation, much like a walk through today's forests. Attempts by contemporaries to describe such overland treks usually produced hurried, garbled, wide-ranging accounts like this one from an early eighteenth-century visitor to South Carolina. "I crossed the Savannah River, and went through a body of very good land, being most of it oak and hickory and fine cypress swamps, as likewise a fine body of black walnut, and likewise a great number of laurel trees ... the next morning early [I] came to an old Indian camp in an open pine barren."⁵²

A description of the presettlement woods as an almost miscellaneous assortment of trees and smaller plants may rob Longfellow's forest primeval of some of its charm, but it makes it easier to comprehend the basic relationships between vegetation and animal life. Just as each individual tree adapted to a specific set of climatic and soil conditions, each major animal species preferred a certain habitat. Those

migrating wildfowl which could be killed twenty at a time favored the marshlands, while Carolina parakeets feasted on the fruits and berries available in open areas and edgelands. Passenger pigeons relied on acorns and other nuts and tended to roost in the upland oak and hickory regions. Colonists found wild turkeys in open hardwood or pine forests where the birds could feed on nuts or pine mast, but still keep an eye out for predators such as bobcats and the larger birds of prey. Seeking shelter from such enemies at night, turkeys could retire to the lowest branches of nearby trees which afforded lofty, well-protected roosts.⁵³

Whitetailed deer and elk browsed the new growth which abounded in fire-maintained communities like savannahs and mature pine forests. In spring, the open forest canopy allowed deer favorites such as May hawthorn, greenbriar, and bluestem grass to flourish. In summer, blackberries, the tender shoots on oaks, and the southern crabapple drew the animals' attention. During the cooler months, when new growth became scarce, whitetails relied on acorns or such post-fire sprouters as sassafras and red maple. However, while they needed open, "new forests" for feeding, deer also required dense cover to escape predators such as wolves, bobcats, and catamounts. Transition zones along the forest fringe and canebrakes, with their nutritious forage and thick growth, provided just such refuge and, like open areas, served as prime deer habitat.⁵⁴

Canebrakes, savannahs, and grassy pine lands also attracted bison which, once they reached maturity, could usually outrun potential predators or fend them off with horns and hooves. Bears favored berries and other fruits produced in edgelands and savannahs during the warm

months, but in fall they opted for oak woods where, according to William Byrd, they lived upon "Acorns, chestnuts, and chinkapins, wild Hony and wild grapes." Although "clean feeder[s]" and "naturally not carnivorous," Byrd continued, bears did venture to the rivers in March "when fish [began] to run ... on which they [were] forct to keep Lent, til some Fruit or Berry [came] in Season."⁵⁵

Some smaller mammals, including raccoons, squirrels, opossums, skunks, and the native mice favored old forests where darkness and tall trees either aided in avoiding predators or enabled the pursued to scramble out of reach. Others, like the fur-bearers, shared coastal wetlands with marsh birds or resided farther inland where rivers, creeks, and bottomland swamps provided the appropriate habitat. In these regions, beaver found the poplar and ash trees they needed for dams, while carnivores like otters relied on the abundance of fish.⁵⁶

A simple understanding of animal habitats not only enables the historian to see beyond the shopping lists of Europeans, but also reveals another crucial element of the early forest. All ecosystems, forested or otherwise, depend on a continuous flow of energy to sustain them. That energy passes through the system by way of various food chains. Sunlight provides the initial energy which green plants capture and either use for growth or store in starches, protein, and other nutrients. Mature plants return seeds and dead matter to the soil, providing organic material which in turn renews the plants. Herbivores, such as bison, deer, elk, and smaller mammals, obtain their energy indirectly from the plants they consume. Carnivores, such as the wolves colonists feared, acquire their energy thirdhand from the plant-eaters

they kill and pass it along to decay bacteria and the soil through bodily wastes or flesh left behind after they feed. In each transfer, some energy is lost, so that no food chain is 100 percent efficient; "a pound of deer meat cannot produce a pound of mountain lion." Due to this inefficient flow of energy, the amount of new growth within a given area of the southern forest determined the number of deer, and deer the number of wolves and other predators--a fundamental relationship which made the forest a dynamic, living system.⁵⁷

The constant movement of energy within the southeastern forest meant that like most living things, it changed from day to day, hour to hour, or in some cases minute to minute. When beavers dammed creeks to create ponds, they reduced the flow rate, causing silt to accumulate in the streambed. If the dams held for long periods or leaked only slightly, the silt might reach the water's surface creating a marshy stand of sedge grass and eventually a meadow. If deer became too plentiful in a certain region, they might reduce the number of sprouting hardwoods, holding back the competing oaks and hickories and allowing pines to maintain their dominance without the aid of fire. In contrast, too many woodlands mice or wild turkeys feeding on longleaf pine mast might enable the hardwoods to gain a toehold sooner. A migrating flock of passenger pigeons could clear an oak forest of acorns or deposit so much dung that the existing ground cover perished to be replaced by plants more suited to the nitrogen-laden waste.⁵⁸

Other, perhaps less obvious, factors also engendered change in the early woods. Insects and fungi attacked trees causing them to decay and die. Hurricanes, tornadoes, thunderstorms, and ice toppled such dead

wood or broke and uprooted living trees, creating open areas which gave life to vegetation usually kept out by the lack of light. Constant action by wind and salt spray from the ocean worked to stunt live oaks growing along the south Atlantic coast so that they formed a twisted, dense thicket of dwarf trees. Even farther west, where less frequent fires encouraged something approaching a "climax" forest, the system probably underwent constant change. Recent studies indicate that such seemingly stable woods are not completely self-perpetuating and permanent, even if the climate remains unchanged. Young trees may not quite replace old ones as they die, or as wildlife moves into more open areas, the energy flow may slow down, limiting the nutrients available in the soil.⁵⁹

Those forces at work in the forest at the time of contact played only bit parts in a far larger drama of woodlands development. A true search for the southeastern forest primeval should begin almost a hundred million years ago when the region itself received definition from the processes of continental drift. Much of the coastal plain still lay under the sea where ocean currents were already at work depositing the sandy soils still typical of the area. Over the next thirty to forty million years, flowering plants rose to ecological prominence, while diversification within the insect kingdom allowed for pollination and the emergence of specialized species like deciduous trees. During the following ten million years, mammals and birds replaced dinosaurs as the dominant animals and developed the ability to regulate their body temperatures physiologically, an important adaptation to the earth's cooling temperatures. At that point

(approximately 25 million years past), a forest closely related to present deciduous forests occupied an almost unbroken belt across the northern continents. Broadleaf trees dominated the vegetation, but the woods also contained numerous conifers. California redwoods and sequoias, as well as the magnolias and sweet gums of the Southeast are all remnants of this forest, offering some clue to its original range and composition.

A more uniform North American topography probably contributed to this single, continuous vegetation pattern and as the continent underwent geologic change, the forest followed suit. The development of the Rockies and other western mountain ranges, important determinants of temperature and rainfall, augmented continual global cooling which eventually culminated in several glacial advances across North America. Each major glacier destroyed most of the existing woodlands and gradually new forests emerged to fill the void left by the retreating ice. Ecologists still debate the nature of such "interglacial" vegetation (so named because it arose between periods of glacial advance), but evidence drawn from fossil pollen samples suggests that those woods may have resembled modern forests. During the recent ecological past (about thirty thousand years ago), however, a major glacier, the Wisconsin ice sheet, destroyed those woodlands. With the possible exception of some of the higher mountains, most of the Southeast escaped the Wisconsin ice sheet, but the cold climate created a forest like that now present in northern New England and southern Canada. Northern conifers, such as spruce and jack pine, grew in the North Carolina coastal plain and tundra may have been part of the

vegetation pattern in the southern Appalachians. Not until twelve to fourteen thousand years ago did the Wisconsin ice sheet begin to retreat and the ensuing warmer temperatures did not produce something akin to current forest patterns for another seven to nine thousand years. The forest seen by Europeans in the sixteenth century existed only as the product of extensive, long-term change. Both it and today's woodlands may be but one short phase in the span of ecological time.⁶⁰

Viewed from this perspective, the search for the forest primeval becomes more an academic than a practical quest. Like the Europeans who witnessed it firsthand, historians can only describe fragments of a phenomenally complex system. Some areas produced tall, bearded trees like the Druids in Longfellow's poem; in others, only small, stunted saplings grew. Upland stands of oak and hickory probably resembled Parkman's descriptions, with their thick canopy and wide spacing creating a dim, cavernous environment. But in other places, like the savannahs and salt marshes, so few trees flourished that they could scarcely be called forests at all. Even a specific band of vegetation like the pinelands could be open, grassy, and park-like, or little more than a sandy wasteland. For thousands of years before human settlement, animals took food from the forest and altered its composition. In short, every forest organism, plant or animal, formed an infinitesimally small part of the ecosystem and at the same time functioned as a self-contained unit for gathering, storing, and releasing energy. Composed of these ever-changing living things and influenced by climate and topography, the forest primeval existed only at a particular instant in time and space. It might have appeared the same on succeeding days,

in succeeding years, or even succeeding centuries, but it remained an elusive entity, one which neither ecologist nor historian can totally reconstruct.⁶¹

The failure of the search for the presettlement forest is not as serious as it seems. For most ecologists, archaeologists, and others concerned with man's relationship to the natural world, a past ecosystem functions primarily as a model or matrix within which to plot the impact of subsistence activities and settlement patterns.⁶² Man becomes the most crucial agent of change and those components of the system most important to him become most meaningful for the historian. As early European accounts of the landscape indicate, the significant parts of the forest system are usually landforms and resources, such as trees for firewood and construction, animals for meat and hides, or in some cases soils for planting. While the entire forest primeval lies beyond the historian's grasp, a diligent search for it does produce these critical elements, creating an environmental backdrop for evaluating man's interaction with his natural surroundings.

But acknowledging the importance of human habitation in a particular ecosystem ultimately points to another problem inherent in any description of the early southern forest. Although explorers and colonists were the first to write about the region, they were not the first to use its resources. That distinction belonged to southeastern Indians and their Paleolithic ancestors. In ecological terms, one of the key traits distinguishing man from other animals is the degree of control he exerts over his environment and any human population inevitably alters the ecosystem it inhabits.⁶³ The forest primeval, as

seen by Europeans, was not only the product of extensive climatic and geological change; it had also been shaped by a long history of Indian habitation. Thus the story of man's relationship with the southeastern forest begins not with the "rediscovery" of the region by Europeans, but with the initial "discovery" and use of the land by its earliest human inhabitants.

CHAPTER II
SUBSISTENCE AND SURVIVAL

Like the forest, southeastern Indian societies flourished long before European explorers and colonists began to write about them. The same glaciers which influenced the prehistoric woodlands also allowed the first men to move into North America. As the ice sheets advanced and retreated, the level of the sea rose and fell accordingly and at least twice during the sixty thousand years of glaciation, the fluctuating water level exposed the Bering Strait land bridge to permit migrations from Asia. Recent archaeological data dates man's arrival in the Americas from the first exposure of the bridge, a point approximately forty to fifty thousand years past. Although evidence remains fragmentary, the first Indians may have appeared in the Southeast as early as thirty to forty thousand years ago and archaeologists are reasonably certain that the natives had become a permanent fixture in the ecosystem by the time the Wisconsin ice sheet began to retreat.¹

The ensuing millennia of human experience bred variety in native society so that, in some ways, southeastern Indian cultures exhibited as much diversity as the early landscape. Anthropologists have identified at least four language families within the region: Algonkian, typified by the Powhatans in Virginia; Iroquoian among the Cherokees and Tuscaroras; Siouan, which may have influenced Catawba dialect; and

farther south, Muskogean among the Chickasaws, Alabamas, and Creeks. As one anthropologist described it, "the languages which belonged to these families were as different from each other as English is from Chinese." Even these four major groups probably offer only an inkling of social and cultural differences. Archaeologists are limited to evidence from a few well-preserved sites and historians must rely on records left by Europeans which, like their descriptions of the early forest, reflect the interests and preconceptions of their authors. Those cultures considered economically and strategically important to colonists attracted the most attention so that the activities of larger groups such as the Powhatans and Cherokees were relatively well-documented, while other, smaller bands, like the Congerees of South Carolina received only fleeting notice.²

Historians may regret this selectivity, but most European observers probably thought it a waste of time to compile detailed accounts of every tribe's activities. As James Adair, an English trader with the southeastern Indians, told his readers in 1775, the natives' "rites and customs are in several respects different. But they agree in essentials throughout the whole extent of the American world." Adair stressed likenesses among Indians as part of an effort to persuade Europeans that the natives descended from the ten lost tribes of Israel (a theory still in vogue in the late eighteenth century), but his argument for uniformity should not be dismissed as mere theological hyperbole. A long residence in the same general area not only created cultural differences,

but also meant that the various Indian groups had to adopt similar methods of obtaining food and the other necessities of life.³

Assuming man migrated into the southern half of North America thirty to forty thousand years ago, the first Indians encountered a land much different from that "discovered" by Europeans. Large, cold-adapted mammals, such as the mammoth and the straight-horned bison, roamed southeastern forests, providing the human residents with much of their food supply. These "Paleo-Indians" hunted the beasts with sharp spears which could be thrown short distances or thrust into the animals at close range. In addition, they sometimes stampeded an entire herd over a precipice or into a gully. Those beasts not immediately killed by the fall could be quickly dispatched with boulders or spears and the entire kill could be butchered on the spot.⁴

Assessing the ecological impact of such prehistoric hunting is as risky and uncertain as dating man's arrival in the Southeast, but the limited archaeological evidence provides grounds for some interesting speculation. If the Paleo-Indians came to the Southeast via the first land bridge and the cold climate filtered out disease-causing microbes, the natives would have faced few natural checks on their population. They also must have enjoyed a virtually unlimited food supply. When man first enters an ecosystem, the animals he hunts have no knowledge of the defensive measures necessary to avoid his weapons. Such early association between human and animal populations usually produces a predator-prey relationship ecologists describe as "strongly limiting," meaning that the prey (in this case mammoth and bison) might be completely exterminated, precisely what happened in North America.⁵

Archaeologists date the mammoth's extinction at about eleven to nine thousand years ago and believe the ancient bison vanished about one thousand years later. Since both disappeared at a time when glaciers were retreating and the earth growing warmer, climate may have played a role in their disappearance, but the highly efficient hunting practices employed by the Paleo-Indians contributed to it. More important, the availability of game and lack of disease fostered a "population explosion" during which the hunters spread across all of North America. The boom, however, was short-lived. Unbalanced predator-prey relationships function that way for only a brief period and as the animals declined, the Paleo-Indian population also dwindled. Thousands of years before Columbus or even the Norse voyages, North America and the Southeast had already experienced a dramatic ecological upheaval.⁶

The end of glaciation forced those Indians who survived in the Southeast to adapt to warmer temperatures and the changing forest pattern. Oaks, hickories, and other deciduous trees now furnished nuts and fruits which could be gathered at certain seasons. Hunting remained an important facet of Indian subsistence, but deer, bear, elk, turkey, and other smaller woodlands species replaced mammoth and bison as the dominant game animals. Indians near the coast also made use of mussels, oysters, and the many varieties of fish which inhabited the rivers and streams. Ecologically, this "Archaic" period of south Atlantic prehistory is important because Indians began to exploit a definite territory. Although they moved from site to site fishing, hunting, or gathering wild foods, they depended on locally available resources and became more sedentary than their Paleo-Indian ancestors.⁷

Indian subsistence patterns became further circumscribed between 2000 B.C. and A.D. 1000, a period during which the natives began to grow some of their food. In its early stages, Indian agriculture relied on indigenous plants such as sunflower, sumpweed, knotweed, and maygrass, all of which produced edible seeds that might be stored for future consumption. Little more than selectively cultivated weeds, these first domesticated species flourished best in open or "disturbed" ground which featured bare soil and limited competition from other plants. In the Southeast, such environments could readily be found along river flood-plains where receding waters annually deposited darker alluvial soils. Indians soon showed a preference for settling such sites, a trait which further tied particular groups to certain regions.⁸

Near the end of the second millenium B.C., the natives began to add tropical crops to their agricultural repertoire. Bottle-nosed gourds and squash, two plants originally domesticated in Mexico, arrived first. These crops served a dual purpose since in addition to their edible seeds, both produced hard rinds that could be dried and cut to form handy containers. Around 200 B.C., a variety of Central America corn, known as "tropical flint," also found its way to the Southeast. Characterized by small ears with ten to fourteen kernels, "tropical flint" added important vegetable protein to the Indians' diet, but probably did not adapt well to the cooler North American climate. Some four hundred years later, (200-400 A.D.), southeastern Indians began to cultivate a second type of corn. This species, "eastern flint," probably originated in the Guatemala highlands where it adapted to moist soils and cooler weather, characteristics which made it ideally suited for cultivation in

the south Atlantic region. At about the same time, the natives also acquired several common beans, including kidney, snap, and pole varieties. As Indians began to grow and harvest the introduced tropical plants, indigenous crops such as sunflowers declined in importance and by the time of European contact, a well-developed agricultural system based on corn, beans, and squash dominated native horticulture.⁹

Agriculture did not reach every part of the Southeast at the same time nor have an equal impact in all areas. Depending on latitude, the growing season along the coastal plain could be as long as 240 days, allowing Indians to cultivate two or more crops per year. In the mountains, though, that period might be limited to 180 days, forcing the natives to rely more on hunting and gathering. A longer growing season in the east did not always mean more farming. Some more northerly coastal plain cultures, such as the Powhatans, probably farmed less intensively than their southwestern neighbors because their settlements along tidal rivers gave them easy access to other nutritious foods such as oysters and migratory ocean fish. Over time, however, agriculture made subsistence easier for all the natives. Corn and beans stored at the end of the growing season made occasional shortages of meat and wild foods less threatening. Writing in 1705, Virginia colonist Robert Beverley noted that:

Indian corn was the Staff of Food upon which the Indians did ever depend; for when Sickness, bad Weather, War, or any other ill Accident kept them from Hunting, Fishing, and Fowling; this with the addition of some Peas, Beans, and other such Fruits of the Earth as were then in Season; was the Families¹⁰ Dependence, and the Support of their Women and Children.

Beverley probably knew little of ecology, but his comments show that, like the forest, human populations are affected by limiting or regulatory factors, one of which is the availability of food. By smoothing out seasonal shortages, agriculture reduced the role of food in limiting Indian numbers, creating the opportunity for a second population boom in the centuries just before contact. Recent demographic studies show that the Atlantic coastal plain from present day Florida to Massachusetts may have been home to as many as 2,211,000 Indians. A lack of detailed documentation for the earlier colonial years makes it difficult to estimate population density in the southeastern piedmont and mountains, but along the coast, where fish and agriculture provided an adequate food supply, the figure may have been as high as 12.6 to 17.6 Indians per square mile. Considering that in 1790, figures for state populations ranged between 8.2 in the Carolinas to 11.6 in Virginia, the increase in Indian numbers becomes even more impressive.¹¹

Allowing for regional and climatic differences, Indian subsistence patterns seem to bear out Adair's comments regarding cultural similarity. Whether they spoke an Algonkian or Iroquoian dialect, resided in the coastal plain or mountains, all natives practiced four basic forms of subsistence. They hunted game animals, fished the streams and rivers, planted and harvested crops, and gathered available wild foods. Those practices emerged after thousands of years of social development and were shaped by both culture and environment. The first Europeans to visit the Southeast may have thought they had discovered a "plain

wilderness" inhabited only by "savages," but they really encountered a people and a land with a history as diverse and dynamic as their own.¹²

Although shared cultural experience allows for generalizations, another, more abstract obstacle often stands in the way of an objective environmental history of the pre-contact Indians. Recognizing modern man's depredations on the environment, some scholars have gone out of their way to portray Indians as conservationists. This view of Indians as "nature lovers" dates at least to 1847 when George Perkins Marsh published The Earth as Modified by Human Action. Ecologists know Marsh's book as one of the first works to promote environmental awareness, but it also depicted Indians as conservators who understood and appreciated nature to a greater degree than "civilized races." Some fifty years later, William Christie MacLeod, a well-known anthropologist, argued that Indians and other "primitive peoples ... knew in detail just what the supply of each thing was--wild grasses, berries, roots, animals, trees--and knew where each was to be found ... and in approximately what quantity."¹³

Since Marsh and MacLeod both wrote during a period when forest conservation first became a cause célèbre in the United States, their work might be excused as a simple reflection of the times, but the view of Indians as woodlands managers has shown a remarkable persistence. Writing in 1972, Wilbur R. Jacobs described modern America as "increasingly mechanized, polluted, and depersonalized" and pointedly asked, "Can such a society help but profit from having a better understanding of the Indian's historic reverence for the land and his humane lifestyle?" Three years later, Wilcomb Washburn characterized the Indian's

"close and intimate relationship with nature" as the key trait which "distinguish[ed] Indian life from European life." Anyone who doubts the endurance of the image into the 1980s needs only to turn on a television and witness the Cherokee actor Iron Eyes Cody shedding a poignant tear as he surveys a littered landscape.¹⁴

In one sense, Cody is an apt choice for the role because some of the best information regarding southeastern Indian views of their relationship to plants and animals comes from James Mooney's record of the Cherokee oral tradition taken between 1897 and 1900. The tradition most often quoted to illustrate attitudes like those expressed by Cody is that which explains the origin of disease and medicine. According to Mooney's retelling of the story, Indians once lived in peace with nature, but as their population grew and their settlements spread, they began to crowd out the animals. Moreover, man invented bows, knives, blowguns, and other weapons with which to hunt the larger beasts and carelessly trampled smaller creatures under his feet. In an effort to remedy the problem, the animals met in council and, after discussing several possible solutions (including using the natives' own weapons against them and engendering dreams of decaying fish which would destroy Indian appetites), decided to invent and name many new diseases which could kill off their human antagonists. Upon learning of the animals' plans, the plants, who remained friendly toward Man, agreed to furnish cures for some of the new ailments so that Indians might defeat the animals' designs. A number of trees, shrubs, and herbs then took on medicinal qualities and when native conjurers failed to recognize a

given illness and its remedy, they could consult the spirits of certain plants for help.¹⁵

Interpreting such oral traditions, some scholars point to the human characteristics assigned to animals and argue that men and other living things "were not as sharply separated" as they were in the cosmology of western Europeans. In the case of the Cherokees, at least one anthropologist has depicted this belief system as a complex "Concept of Natural Balance" which, "quite independently of Malthus," recognized that man can become too populous and thereby damage or destroy his surroundings. In such cases, Indian cosmology allowed animals or the elements to strike back at man if he became too callous in his dealings with them.¹⁶

To avoid retaliation, the natives had to observe certain guidelines in their hunting. Cherokee hunters prayed to the wind to cover their scent and, when taking deer, they prayed for the animal's forgiveness. When the hunters brought meat to their villages, Cherokee conjurers first offered some of it to the "Keepers of the 4 winds" so that they would not bring bad weather or destroy crops. Other southeastern cultures engaged in these or similar ceremonies. John Lawson reported that young Indian men never ate the first bear, deer, or fish they killed for fear that the animals would become angry and never again allow themselves to be taken. William Byrd marveled at an Indian's reluctance to prepare deer and turkey together because cooking beasts of the field and birds of the air in the same pot might offend "The Guardian of the Forest."¹⁷

Other rituals surrounded the plant world. The Cherokees not only thanked the providers of grain with the Green Corn Festival, but also took care not to eat the first fruits of the fields until local shamans had offered a measure of the harvest to the appropriate spirits. William Bartram also discovered something of the Indian reverence for corn when a Cherokee chieftain offered him some for his horse. Bartram interpreted this gesture as an indication of "the highest esteem" since Indians believed "corn was given by the Great Spirit only for food for man." Wild plants inspired similar admiration. Mooney discovered that when hunting valuable ginseng, the Cherokees spoke of it as a "sentient being ... able to make itself invisible to those unworthy to gather it." In searching for the fragrant and medicinal roots, Indian collectors passed over the first three plants they encountered and took the fourth only after offering a prayer and the gift of a small bead as compensation to the plant's spirit. After this gesture, other plants could be taken at will.¹⁸

Such deep respect for the natural world initially seems to confirm the view of Indians as environmentalists, but it might also be interpreted as a sophisticated exploitation ethic. In keeping with their cosmology, Indians sensed a kinship with plants and animals, yet had to destroy them in order to survive. Apologizing to a deer after killing it, appeasing the spirit of ginseng, or offering meat to the four winds allowed such exploitation to be carried out with a minimum of remorse. The rituals served as important psychological devices for working out the fundamental tension in the Indians' relationship with nature. Human beings, whether Indian or European, African or Asian, never exist in

total harmony with the environment. Because they depend on the ecosystem for food and other necessities, they disrupt it or rechannel its energy flow to suit their needs. Such control implies neither conservation nor waste. It does suggest that Indians exerted as much influence as necessary to ensure their survival and that the pattern of exploitation depended both on native culture and on the environment itself.¹⁹

If their belief system permitted Indians to take what they needed from the landscape, the forest dictated when they could take it. One of the most striking features of the southern forest is seasonal variation. Birds, fish, and mammals migrate and breed according to changes in temperature, rainfall, and the availability of food. Sap rises and falls in trees to turn the dense, dark summer forest into open leafless winter woods. South Atlantic Indians paid particular attention to these changes. Among some natives, the various months took on names which described the weather or the foods available at that time. In the coastal plain and piedmont, March might be known as "herring month." Indians might refer to April or May as the time "when Turkey-Cocks gobble" and describe June as "strawberry month." Other natives employed simpler methods of marking the seasons. In the western mountains and foothills, an area subject to great seasonal variation, the Cherokees distinguished gogi, the warm season between April and October, and gola, or cold time, which spanned the rest of the year. Regardless of the complexity of their calendars, Indians understood that the variable climate determined their subsistence patterns. Food and other necessities had to be taken where and in what quantity they could be found

and that meant moving or altering their diet as the forest about them changed.²⁰

Virtually every facet of native social organization reflected the need for seasonal mobility. At the time of contact, Indians usually lived along rivers in villages which varied in size according to population density and the extended kin networks which formed the basis of their society. However, unlike European towns, these settlements often served as little more than base camps from which to explore and exploit the surrounding territory. William Bartram discovered that Indian villages were "generally so situated as to be convenient for procuring game" with "a large district of arable land adjoining or in its vicinity." However, if circumstances dictated, the natives might choose "a convenient fertile spot at some distance from their town" to which they journeyed in spring to plant their crops. Indian travels and knowledge of the woodlands often amazed European observers. John Lawson thought it remarkable that even though Indians knew nothing of the English compass, they could "draw Maps very exactly of all the Rivers, Towns, Mountains, and Roads" several days' journey away. Their willingness to sleep outside in warm weather and a disdain for what Europeans considered basic household amenities further aided extended forays into the forest. According to Robert Beverley, "a Grass-plat under the covert of a shady Tree, is all the lodging they require, and is as pleasant and refreshing to them, as a Down Bed and fine Holland sheets are to us."²¹

Europeans found the division of labor within Indian society even more difficult to comprehend. As William Byrd phrased it while

describing the Nottoways of Virginia, "The little work that is done among the Indians is done by the poor Women, while the men are quite idle, or at most employed only in the Gentlemanly Diversions of Hunting and Fishing." Women ran the households, cooked, made pottery, gathered firewood, and most striking in English eyes, tended the fields. But Byrd's assessment is only generally correct. Men usually took sole responsibility for the ritually important tobacco crop and women sometimes aided in procuring fish. Byrd and other colonists also failed to recognize the benefits of such a system. Hunting and fishing required men to be away from the villages for long periods and by attending to the more sedentary duties, Indian women helped facilitate the forest travels.²²

At the onset of the warm season, March in the coastal plain and April or May further west, able-bodied men left the villages to fish. Along coastal rivers, the natives used weirs to capture the migrating ocean species. The traps usually consisted of two parallel lines of small poles woven together with marsh reeds or oak strips to form a hedge. Indians then placed the hedges across the streambed at high tide, leaving openings which allowed fish to enter but not escape. When the tides receded, sturgeon, herring, shad, and alewives remained confined in shallow water where they could be clubbed with sticks, dipped out with nets attached to long poles, or speared with shafts of green cane tipped with spiked deer horns or turkey claws. Farther inland, where swifter currents and a lack of tidal activity made wooden weirs less effective, the Indians erected small stone corrals, built in a "V" shape with the small end of the enclosure pointing downstream.

The natives then waded into the river above the trap and scared the fish into the larger opening, driving them toward the narrow end where they could be easily killed.²³

If deep water made trapping fish difficult, Indians sometimes stretched a single line across the stream and attached several shorter strands to it. At the end of these "trot lines," they fixed U-shaped hooks made from deer or turkey bones and baited them with shellfish or other cut bait. Paddling dugout canoes, the natives inspected their lines several times a day, removing fish and rebaiting the hooks. In larger streams and when fishing offshore, Indians sometimes took their boats out at night, using torches made from longleaf pine to attract their quarry, killing the fish with bows and arrows. While men pursued fish in the streams and ocean, women and children made short trips from the villages to gather oysters and other shellfish. Children also enjoyed taking crayfish which they lured with pieces of venison skewered on a stick of cane. When the freshwater lobsters latched onto the meat with their claws, Indians quickly pulled up the sticks and flung the crayfish far up on the bank. According to Lawson, this method could produce "several bushels" of crayfish in only a short time.²⁴

Judging from European accounts, most springtime fishing expeditions enjoyed similar success. John Smith reported that coastal Virginia Indians lived almost exclusively upon fish during March and April and Lawson noted that inland natives relied heavily on "Trout and other species of Fish which these parts afford." In spite of the vast numbers taken by Indians, fish populations seem to have suffered few ill effects. High water during early spring probably allowed many spawning

fish to escape the weirs, ensuring the survival of enough fry to replace those taken. Moreover, most natives made no attempt to lay in a large surplus of fish. Smith found that "Powhatan, their great king and some others that are provident, rost their fish ... upon hurdles ... and keepe it til scarce times," but for most south Atlantic Indians, spring fishing provided only a great seasonal feast which lasted for the duration of the spawning runs.²⁵

As the weather continued to warm and spawning activity decreased, Indian fishing became more sporadic, but one summertime technique could be highly effective. As James Adair explained it,

In a dry summer season they gather horse chestnut and different sorts of roots, which having pounded pretty fine and steeped a while in a trough they scatter this mixture over the surface of a middle sized pond and stir about with poles till the water is sufficiently impregnated with intoxicating bittern; the fish are soon inebriated and make to the surface with their bellies uppermost.

The modern horse chestnut is a tree introduced from southeastern Europe and the nuts Adair referred to must have been the fruit of the red buckeye, a common southern tree whose fruit contains active ingredients like those of rotenone, an organic poison. When applied in sufficient quantity, it attacked the fish's central nervous system and produced the stupefying effect.²⁶

Adair's reference to horse chestnut also suggests that he understood similar methods employed in Europe where poachers used the nuts to tap private ponds. Black slaves also knew much about fish poisoning and since Adair wrote in 1775, the techniques he mentions might have been introduced to the natives after contact. However, several groups, including the Powhatans, report a long tradition of catching fish with

poison and the Cherokees apparently used pounded walnut bark to produce the same effect as the buckeye. Agricultural Indians, who understood and often seemed preoccupied with the resources of the plant world, might easily have learned to poison fish on their own.²⁷

The paralyzing effects of the buckeye are only temporary and as Adair noted, those fish "speedily removed to good water ... revived in a few minutes." But most never got that chance. Indians gathered them up by the basketful and feasted for several days. These excursions became great social gatherings, organized and directed by someone with authority, and probably resembled the warm weather "fish frys" still popular with many southerners. Although they might appear quite destructive, such poisoning parties had few detrimental effects on fish habitat. The need to saturate a small area of a pond or stream with herbal poisons precluded their use on large rivers or during the periods of high water associated with spawning runs. Poisoning remained only an occasional exercise and seems to have been mainly a tactic of inland tribes who used it to supplement staple foods such as corn and wild game.²⁸

Just as women contributed to the haul of fish by gathering oysters and mussels, men helped out with the heavier agricultural duties. Clearing new ground began with the first hint of warm weather, perhaps as early as late February or the first of March before the fish began to run. As the sap rose in the larger trees, the men used stone axes to remove the bark to a point three or four feet above the ground, a technique which drained off sap and kept the trees from sprouting new leaves. After piling smaller wood and kindling around the base of the

trees, Indians set fire to the scarred lower trunks. According to John Smith, this practice quickly "scortch[ed] the roots" so that, deprived of further nutrients, the trees would "grow no more." Smaller trees and undergrowth presented fewer problems. The natives first hacked out a broad strip across the outer edge of the land they intended to cultivate and then fired the brush and underwood, using the cleared path as a fire break "in order to prevent the whole forest from burning." Once the smaller growth burned, the ground could be tilled and planted with the blackened larger trees left standing until decay allowed them to be pushed over and removed.²⁹

Men occasionally took time out from fishing to help prepare the ground for planting, but that task usually fell to women. Using hoes made of wood, bone, or shell, Indian women broke up the ground to a depth Thomas Harriot estimated at about five inches. They then worked the soil into hills some twelve to twenty feet in diameter and about three feet apart. Several grains of corn and beans could be planted in each hill with squash, pumpkins, and sunflowers sowed in shallow trenches between the mounds. Planting took place in several stages. Women seeded the smaller "garden plots" near the habitations as soon as weather permitted, planting corn which would bear ears by the beginning of summer and could be eaten green. The natives held off planting the larger fields until wild fruits and berries ripened, a ploy which served "to draw off the birds from picking up the grain." In the eastern coastal plain where the first frosts often did not appear until mid-November, Indians could continue to plant well into June and still anticipate harvesting their crops before the cold season began.³⁰

To explorers and colonists accustomed to the well kept fields of the European countryside, the Indian plots must have looked like something from a gardener's nightmare. Over several years of use, the hills developed into large mounds of earth which gave the fields an uneven character. As the plants began to sprout, the land turned into an agricultural jungle. Beans and squash covered the ground or climbed the cornstalks. Pumpkins or gourds popped up at irregular intervals within the dense foliage. Since the larger fields served the entire village, no fences delineated individual shares. Only uncultivated strips of land marked the barriers between family portions. Yet, as John Lawson observed, "every man knows his own proportion and it scarce ever happens that they rob one another of as much as an Ear of Corn."³¹

Although Indian agriculture seemed fit to "choak up the fields," Europeans had to admit that native farming techniques generally produced bumper crops. Most observers attributed such production solely to the soil's natural fertility, but other, more subtle environmental factors contributed to the high yields. Beans helped replace nitrogen taken out of the soil by the other crops, while the competition between various plants for sunlight and moisture gradually forced them to develop larger hardier seeds which, in turn, increased the harvest. Planting corn in hills also encouraged the stalks to send out buttress or bracer roots from the lower part of the stem which functioned like tiny guy wires to keep the plants from falling over during periods of hard rain and high winds. In addition, the thick cover provided by beans and squash reduced weed growth and prevented rain from washing away the soil around the hills.³²

Efficient planting and tillage enabled Indians to make the most of their fields, but without additional minerals, no soil could support such intensive farming for very long. No matter where or how it is practiced, agriculture always disrupts the already inefficient flow of minerals within the ecosystem. Man consumes the fruits and seeds of the species he cultivates so that the soil never recovers the energy stored in those parts of the plants and gradually becomes depleted. European farmers eventually learned to delay soil exhaustion by treating the ground with manure or turning under the dead stalks and vines to return other organic matter to the ground. Since Indians kept no livestock, either for food or draft animals, they had no such fertilizer. Instead they employed the same method originally used to clear their lands, burning off dead plants to make way for a new crop. Such fires helped release nitrogen from the leftover vegetable matter and although most of the critical element escaped in gases produced by the flames, the ash residue also contained "mineralized nitrogen" which proved highly beneficial to new plants. Explorers and colonists had less technical explanations, but clearly understood the results of the process. "They [Indians] never Dung their Land," wrote John Brickell, "but set fire to the Weeds, which makes very good Manure."³³

Even periodic burning could not maintain Indian fields forever. When land no longer produced, the natives simply moved on, deadening trees in another area and planting again. Eventually, the old plots might be returned to cultivation, but in the meantime, the forest slowly went about its work of reclaiming the land. In the coastal plain where more frequent fires kept the forest in a state of flux, such openings in

the woods occurred naturally, but in the piedmont old Indian fields added a new dynamic to the landscape. Showy, flowering, indigenous weeds such as horseweed and white aster appeared during the first two years after the fields lay fallow. By the third summer, broomsedge, a tall blue-green or reddish-brown bunch grass, grew on the deserted sites, creating weedy meadows in the midst of the forest. Under the right conditions, wild strawberries or blackberries might crop up in the sunny clearings. If the fields remained untended for more than three years, "pioneer" trees such as loblolly and Virginia pines invaded the plots, eventually growing in thick, pure stands and replacing the weeds and grasses. As the pines reached maturity some eighty to 140 years after abandonment, dogwoods, sourwoods, and red maples moved in, to be followed later by oaks and hickories.³⁴

This pattern of "old field succession" enhanced the mosaic quality of the piedmont woods, but large tracts of forest remained untouched because the Indians' stone tools could not remove or deaden the largest trees. John Lawson reported that "the Indians are not inclinable to settle the richest land, because the Timbers are too large for them to cut down, and too much burthened with Wood for their Laborers to make Plantations of." Indeed, Lawson continued, the Carolina backcountry had "no inhabitants but the Beastes of the Wilderness." Although Lawson did not know it, one of the largest of those beasts, the buffalo, probably would not have found its way to the Southeast had Indians not cleared small patches of the woods. Coastal plain savannahs offered the grassy habitats the animals favored, but the older oak-hickory and oak-chestnut forests of the piedmont and mountains kept the animals out of the upper

Southeast until after 1500. By the mid-sixteenth century, however, the farming Indians had created enough openings in the upland forests to allow bison to migrate through them. By 1700, buffalo inhabited the coastal plain in Georgia and the Carolinas and colonists sometimes spotted small herds moving through the piedmont. Bison never became as common in the Southeast as in the Great Plains and Indians had no intention of attracting the animals when they abandoned their fields, but the migrations illustrate one way in which Indian agriculture influenced both plant and animal populations.³⁵

Planting and fishing kept the natives busy during much of the spring, but in summer, they had time for other activities such as religious festivals, warfare, and various sports. Green corn, small and large game animals, roots, and wild vegetables became the dietary staples of inland natives while those along the coast continued to rely on fish. Indians living along tidal rivers often left the villages, moving upstream to hunt and gather the available wild foods. In tidewater Virginia and other low-lying areas of the coastal plain, these summer migrations played a key role in helping Indians maintain their health. The unrelenting summer heat common to the outer coastal plain made the rivers run low and brackish and as colonists at Jamestown soon discovered, drinking the tainted water could bring on an often fatal case of salt poisoning. Farther up the rivers the water ran swifter and clearer and the summer abundance of squirrels, turkeys, berries, and other wild produce helped accommodate the seasonal travels. As autumn approached, Indians moved back to the villages in order to protect their maturing crops from crows, raccoons, bears, and other woodland thieves.

Harvesting late corn, beans, squash, and pumpkins continued well into October, making the final weeks of the warm season a time of feasting and plenty.³⁶

With their crops stored and their bellies full, Indian men prepared for the late fall hunt. Throughout the warm season, the natives took game whenever they could and many explorers who traveled the rivers in spring received gifts of deer, bear, and turkey from coastal Indians. At the beginning of the cold season, however, a number of environmental factors combined to make it the best time for hunting. The great quantity of nuts and acorns available then not only provided food for the hunters, but also attracted large flocks of turkeys and numerous bears and deer to the oak-hickory forests. After foraging on the mast in preparation for winter, the animals reached their heaviest weights and furnished more meat and fat than at any other time. In preparation for the cold months ahead, the animals acquired their heaviest coats of the year, making fall or early winter the best season to procure skins for clothing and bedding.³⁷

Other peculiarities of animal behavior aided cold weather hunters. In the more temperate southern forests, black bears do not sleep away the winter like their northern counterparts. Instead, they take short naps for a few days at a time, a sort of semi-hibernation during which they become somewhat sluggish and easier to hunt. In contrast, bucks, made bold by the rutting season, become more active, abandon some of their usual caution, and are more easily approached and killed. Migrations of waterfowl into the southern coastal plain and the southerly movements of passenger pigeons meant that more birds were in

the area than at any other time. With wildlife on the move, most of the able-bodied men, women, children, and adolescents again left the villages to set up temporary lodging wherever game seemed plentiful.³⁸

Like their use of weirs to trap spawning fish, Indian hunting techniques took advantage of changes in animal behavior. Using a bow made of hickory or southern witchhazel and arrows tipped with stone, turkey claws, or deer antlers, a single Indian hunting alone often disguised himself in a deerskin and crept through the woods imitating the habits of his prey. When a whitetail allowed him to get close enough, the hunter shot the animal and tracked it through the forest using bloodstained foliage as a trail. This "deer decoy" method proved especially effective against rutting bucks who sometimes charged the hunters looking to lock horns in a fight.

For taking several deer or other game animals at one time, however, no system could rival that known as fire-hunting. John Smith's description of one such hunt along Chickahominy River shows just how efficient the tactic could be. "Having found the Deare," Smith explained, "They environ them with many fires and betwixt the fires they place themselves. The deare being thus feared [frightened], by the fires and their voices, they chace them so long within that circle, that many times they kill 6, 8, 10, or 15 at a hunting." Canebrakes, with their nutritious forage and dense cover, were frequent targets of fire hunts. While traveling along Santee River, Lawson was startled by a noise which sounded like two armies engaged in combat with small arms. Upon closer examination, he "found it to be some Sewee Indians firing the Cane Swamps," which enabled them to "kill great Quantities of both

Bear, Deer, Turkies, and what wild Creatures these Parts afford." Where topography permitted, Indians used fire to drive game onto a narrow peninsula or into a river where, as Smith noted, "with their boats they have Ambuscadoes to kill them."³⁹

The exact impact of such intensive hunting is difficult to measure. Venison was by far the most important meat in the Indians' diet, yet the vast numbers of deer seen by explorers and early colonists would seem to indicate that native depredations had little effect on the herds. Moreover, modern wildlife researchers know that, if allowed to reproduce unchecked, deer can overpopulate, overbrowse their habitat, and become susceptible to famine and disease. But this tendency does not mean that (as one anthropologist has suggested) Indians "did the deer a favor" by hunting them so efficiently. As Lawson's tales of howling beasts point out, deer had a number of other enemies, including wolves, bobcats, and panthers. Since these predators could seldom run down healthy, mature whitetails, they relied primarily on young, aged, or diseased animals to supply their needs, thereby providing a natural check on the herds. Indian hunters were less selective in the types of animals they killed. Ralph Hamor, who thought God provided a special herb or grass which allowed deer to increase, believed that without such divine intervention, "the Naturalls [Indians] would assuredly starve: for the Deare (they kill as doe wee Beefes in England) all the year long, neither sparing yong nor olde, no not the Does readie to fawn, nor the yong fawnes, if but two daies old."⁴⁰

Hamor's argument for providence notwithstanding, the survival of both deer and Indians has a more scientific explanation. Predator-prey

dynamics and their effects upon animal populations remains one of the most hotly debated fields in animal ecology and estimating the impact of human predators requires even more caution, especially four hundred years after the fact. Even so, a few general precepts apply to Indians and deer. Predators that rely on several food sources and who hunt efficiently are usually able to continue stalking their quarry even when its populations decrease. Other foods eliminate the shortages normally created by diminishing prey, allowing predator populations to remain stable or perhaps even increase. Since Indians varied their subsistence patterns according to the seasons and were able to take many deer at once, they may have pressured the herds more than either they or most colonists realized.⁴¹

Another fundamental theory of predator-prey dynamics holds that, if enough cover exists to make a constant number of animals unavailable to hunters, prey populations may fluctuate, but will not disappear. Their use of stone tools kept the Indians from clearing heavily wooded areas for agriculture so that southeastern deer had plenty of opportunity to avoid the natives. Forest succession in areas that were cleared also provided food favored by browsing whitetails and created the kind of edge habitats the animals needed for protection. This complementary relationship does not mean that Indians made a conscious effort to maintain the deer population. Most of the first explorers to reach the Southeast reported that the largest herds resided far up the rivers, near the mountains and away from the Indian villages, an odd phenomenon considering the animals' preference for newer forests and fire-maintained vegetation common to the coastal plain. Such comments

could refer to fall movements of deer into the oak-hickory forests farther inland, but they might also indicate local shortages of venison. In densely populated areas, where topography and efficient tribal organization prevented the herds from escaping, Indian hunting may have had serious implications for the deer population. Noting that the Powhatans used the land between Virginia's major rivers as a natural corral for game, Smith observed that "little cometh here which they [the Indians] devour not."⁴²

Smith extended his analysis of Indian hunting to include "Hares, Pattridges, Turkeys or Egges, fat or leane, yonge or olde" of which the natives "devour all they can catch." However, these and other species probably suffered less than deer. Black bears have a low reproductive rate and might have been exterminated had Indians hunted them as staple food. But while they enjoyed the taste of bear's flesh, the natives valued the animals primarily for their fat from which they produced oil for cooking and grease to repel bothersome summer insects. Taken in winter, a single fat bear could produce a great quantity of oil, making it unnecessary to kill more than a few. Besides, bear hunting could be dangerous. As the giant beasts retired to hollow trees for their short winter naps, the natives set the dens on fire, smoking out the sleepy animals and shooting at them with their bows. Once wounded, a bear became a vicious adversary and native hunters sometimes had to scramble up slender saplings too small for the animals to climb to avoid being mauled.⁴³

Like bears, passenger pigeons provided an important source of oil and grease. Roosting in the lower limbs of trees, the birds became easy

prey for Indians who invaded the roosts at night with torches fashioned from split pine limbs. The bright lights blinded the pigeons and native hunters knocked them from their perches with long poles, a technique which allowed them to "bring away some thousands" of the birds. Like fish poisoning expeditions, roost raids were occasional outings which could take place only during fall migrations and only when the birds chose to roost nearby. In addition, the natives preferred to kill squabs which produced the best meat and most oil. Adult birds could escape and breed again, assuring the survival of the species.⁴⁴

Whenever they could, Indians killed and ate wild turkeys, but those prodigious birds preferred loftier roosts than passenger pigeons and could not be taken in quantity. Instead, the natives had to stalk turkeys on foot, scatter the flocks, and hope that three or four would take refuge in a neighboring tree where they could be shot down with bows and arrows. Migratory waterfowl probably required similar tactics and although they might be hunted well into winter, their populations suffered few ill effects. Likewise, rabbits, squirrels, and other small game depended on their high reproductive rates to ensure survival against Indian hunting, in much the same way they endure the deprivations of modern man and his sophisticated weapons.⁴⁵

While Indian men pursued the various game animals, women maintained the temporary households and gathered nuts from the winter forest. Nutmeats had myriad uses in Indian kitchens. The fruits of the mockernut or white hickory might be pounded between two stones to produce a powdery nutritious meal which tasted "as well as any almond." The meal could then be thrown into a pot of boiling water and the entire

mixture strained to create an oily "hickory milk ... as sweet and rich as fresh cream" which supplied a liquid base for corn cakes. Boiling live oak and other acorns helped extract natural oil from the nuts which the natives used for cooking. Roasted over a fire, chestnuts and Allegheny chinquapins became tasty complements to venison and other game. The Indians' fondness for nuts also created subtle variations in the forest pattern. Nuts discarded or lost soon sprouted and mast-bearing trees often grew in profusion around the Indian villages. Thomas Harriot probably saw accidentally transplanted hickories, black walnuts, and chinquapins when he reported chestnuts "in great store" along the North Carolina coast.⁴⁶

A number of other trees and plants common to the south Atlantic forest also furnished useful products. In the western piedmont and mountains, Indians found it worthwhile to tap the silver maples and the few sugar maples which grew in the higher elevations. After collecting the sap in gourds, they boiled it to create a sugary syrup which could be used to sweeten a variety of dishes. Indians living further west also had access to many leaves and roots which produced natural dyes. Both western and eastern natives especially valued vermilion, the roots of which produced a red powder the natives mixed with bear grease to make body paint. They not only applied the mixture for decoration (when, as Lawson noted, "they intend to be fine"), but also used it on their hair to repel lice. Eastern natives who craved the root were more than willing to travel west for it. But in summer, marauding Iroquois, enemies of several southeastern tribes, made their way into the western forests. Southern Indians in search of vermilion often found such

expeditions costly in terms of lives and captives. The red root eventually became so valuable that some coastal plain Indians tried to transplant it near their villages, an experiment that failed when the plants did not adapt to the hotter, drier conditions.⁴⁷

Most forest products were easier to come by. When the natives could not get witchhazel or hickory for their bows, they substituted mulberry or locust, both of which provided the necessary strength and flexibility. Indians also needed tough, pliable wood for their wigwams. They usually selected long, narrow saplings of hickory, pine, or cedar, implanting the larger ends in the ground and tying the tops together with oak strips to form a circular or quonset-shaped framework. They then covered the scaffolding with other readily available forest products such as cane, reeds, or bark from white cedar, pine, or other suitable trees. For their canoes, southeastern Indians preferred large pines or yellow poplars. They used fire both to fell the giant trees and to hollow out the canoes, producing dugouts thirty to forty feet long and two or more feet across. The boats could carry up to twenty passengers and, although bulkier than the birch bark canoes used farther north, they were easily maneuvered and with proper handling could "be forced up a very strong current." Removing a few saplings or isolated larger trees left openings in the canopy which allowed more light to reach the forest floor, but probably engendered no more change in vegetation patterns than similar gaps created by wind and ice storms. It was Indian demand for another seemingly abundant product that had the greatest impact on the appearance of the standing forest.⁴⁸

With only their bark- or reed-covered dwellings to protect them from the unpredictable southern winter, Indians used wood at a rate that would astound modern fireplace buffs. Lawson thought native wigwams "as hot as stoves" and reported that anyone sleeping there would surely "sweat all night." In addition, Indians required wood for cooking, for preserving meat and nuts, and for boiling the bark they used to tan the hides they wore. According to both John Brickell and Robert Beverley, Indians preferred pine for all their fires. Because it burns so rapidly, pine is a much less efficient fuel than oak or hickory, but Brickell believed the natives liked it because "the Smoak never offends the Eyes," a characteristic he attributed to the "Volatile parts of the Turpentine" which were naturally "friendly and Balsamic."⁴⁹

Since they slept in such confined, smoky quarters, Indians frequently contracted conjunctivitis and the medicinal pine vapors may indeed have soothed their eyes. But the natives had other reasons for burning pine. As Mark Catesby described it, "In Woods of Pine Trees are frequently seen Glades or Openings, occasioned by the Fall of Trees, which lie prostrate one Way," forming "a straight and regular Avenue an hundred Feet wide ... and some Miles long." Such destruction, Catesby continued, could be attributed to "violent Gusts of Wind." Known today as windthrow, the phenomenon Catesby observed is comparatively rare, especially at lower elevations. However, with their light, brittle wood, pine limbs or smaller trees could be blown down by even moderate winds or broken in winter by freezing rain. Under the right conditions, pine forests could become quite littered with such debris which Indian women could easily gather and carry to the villages. Since their

limited technology kept Indians from cutting down large oaks and hickories and splitting the trees into usable cordwood, such deadfalls became the primary source of fuel. Removing fallen wood created open forests in areas which otherwise would have appeared darker and more foreboding to early colonists. Commenting on what he regarded as the happy result of such wood-gathering in Virginia, John Smith wrote, "Neare their habitations is but little small wood, or old trees on the ground, by reason of their burning them for fire. So that a man may gallop a horse amongst these woods any waie, but where the creekes or Rivers shall hinder." Once Indians exhausted the local supply of deadfall wood, they had to move on. Together with soil depletion, fuel shortages became one of the major reasons for relocating villages.⁵⁰

Indians not only burned dead wood, they also set the living forest on fire. Off the Carolina coast in 1524, Verrazzano saw Indians intentionally burning the woods and smelled "the sweet fragrance [of the smoke] a hundred leagues away." While exploring Chesapeake Bay in 1607, George Percy spotted smoke in the woods and found that "the savages had been burning down the grass," a fire he thought might be a signal to other Indians "to bring their forces together and so give us battell." Near Chickahominy River, Smith encountered "abundance of fires all over the woods" and William Byrd reported that other Virginia Indians regularly fired the forest. By the mid-eighteenth century, so many colonists had observed Indians kindling woods fires that William De Brahm's report on conditions in South Carolina listed "The Burning of the Grass and Underwoods in the Forrests" as "an ancient Custom of the Indians."⁵¹

As much as it intrigued Europeans, the natives' apparent pyromania has proved to be of even more interest to modern scholars. Writing in 1910, Hu Maxwell of the United States Forest Service described Virginia Indians as "wasteful and destructive savages" who were "by nature incendiary" and squandered the region's resources like pirates plundering a treasure ship. More recently, scholars have looked for and emphasized the positive effects of Indian fires. They argue that the natives kindled fires much like those caused by lightning which, although they altered the ecosystem, ultimately proved beneficial to both Indians and the woodlands. Instead of "incendiary savages," Indians become pre-colonial foresters, carefully managing their environment and conserving their resources. Like early descriptions of the forest, such interpretations reveal as much about the authors' biases as they do about Indians and fire. As a forester in 1910, Maxwell was keenly aware of the growing clamor for conservation, a concern reflected in his sharp critique of Indian burning. Later writers have been influenced by recent arguments over prescribed burning in modern forests, a debate which has focused attention on the advantages of periodic burns. Both views oversimplify a number of complex ecological and historical problems. Few forces in nature are as unpredictable as fire. In any given area, its effects depend on a wide range of geographical and environmental factors, important considerations in a region as topographically and climatically diverse as the Southeast.⁵²

Perhaps the most important variable governing the effects of woodlands fire is the amount of heat generated by the blaze. Heat depends on the fire's intensity and intensity on the fuel supply. The

initial fuel for such fires is usually ground litter made up of twigs, leaves, broken limbs, and bark which accumulate on the forest floor. The amount of litter varies according to forest type. In pine lands, where the trees depend on fire, litter accumulates rapidly; in oak woods, where trees are less prone to break from wind or ice, it piles up slowly. Seasonal change also affects litter accumulation. In deciduous forests, leaf fall greatly increases the amount of potential fuel, making autumn and early winter the time of the most intense fires. The volume of available fuel can be further affected by the time elapsed since the last burn. One fire can consume much of the forest litter, and woods fired every year are less susceptible to an intense fire than those burned sporadically and at long intervals.⁵³

The varying amounts of fuel in southern forests dictated when and how often Indians could burn. Those who inhabited inland oak woods probably fired the forest annually and did their burning in early winter when enough dry leaves and twigs had collected to facilitate a fire. In the drier "piney woods" of the coastal plain, Indians could burn at other seasons and may have fired the woods twice a year: in fall and again in spring as an extension of agricultural clearing. Such frequent fires kept litter accumulation to a minimum so that seasonal blazes burned slowly and at ground level. In this respect, they did resemble lightning fires, but without the additional moisture common to thunderstorms, Indian-set blazes could burn longer and cover a larger area. However, the natives rarely allowed that to happen. In the Southeast and over most of North America, intentional burning remained largely a local practice, limited to forests around the villages and

nearby woods. Large sections of woodlands remained untouched by the fires.⁵⁴

In the burned areas, older standing trees suffered only slight damage. As De Brahm felt compelled to point out, "Persons who are not acquainted with the Nature of burning the Woods in America ... might suppose that the trees are liable to be set a burning." If that were the case, De Brahm continued, "all the Trees in America would have been burnt down, before any European came there." The trees survived because Indian-set fires rarely burned hot enough to do them any harm. The thick bark on the larger pines kept them well protected and the lack of fuel prevented the fires from igniting the mature oaks and hickories. According to De Brahm, "a full grown Tree never [caught] Fire, unless at the Bottom, with no more effect than to have his Bark a little sindged."⁵⁵

Along with accumulated litter, the real victims of such fires were small saplings, grasses, and woody plants that grew on the forest floor. Consequently, seasonal burning established open woodlands and widely-spaced trees around the Indian villages, a phenomenon which helps account for some of the park-like pine and oak forests noted by colonists. Other ecological effects were less obvious. As Indians discovered when they burned their old fields, a light fire on relatively level land can deposit a layer of nitrogen-rich ash. In the coastal plain, periodic burns probably increased soil fertility. But in other regions, soil may have suffered. In rocky, upland areas, such as the Appalachian foothills and mountains, seasonal burning may cut into the accumulated humus, thereby destroying some of the nutrients available to

trees. Repeated burning of sloping terrain can also increase erosion. The remaining large trees help break up and scatter moisture, but without forest litter to absorb and hold them, winter rains can remove a portion of the topsoil, making it difficult for plants and trees to regenerate. Well aware of this problem, modern foresters exercise great care when burning elevated areas, but Indians probably paid little attention to surrounding topography when they fired the woods.⁵⁶

Where fire enriched the soil, undergrowth came back quickly. Bluestem and other grasses soon grew under the tall trees to be followed by various shrubs and newly sprouting hardwood trees. Such new growth often attracted birds and browsing game animals, a trend De Brahm recognized when he noted that Indians burned "in order to allure the Deers upon the new grass." Under the right conditions, predators such as wolves and foxes might move in to feed on the herbivores, speeding up the energy flow and increasing the entire animal population. But like the edge habitats created by Indian agriculture, such forage grounds appeared at random and were inefficiently maintained. Although whitetailed deer graze bluestem and other grasses, they favor woody plants, shrubs, and sprouting hardwoods. Recent studies show that in southern forests, such growth takes time to establish itself and in order to produce sufficient browse to attract and maintain deer, burned areas need to be left alone for four to five years. By firing the woods annually or semi-annually, Indians destroyed as much forage as they created, and the grassy habitats they maintained proved more suitable to quail and other upland birds than to the larger game animals. This must have been especially common in older pine forests where periodic burning

eliminated competing hardwoods which otherwise would have offered suitable browse. Deer may have responded to the grass, but they sought their favorite foods elsewhere.⁵⁷

Regular burning created other difficulties for Indians. Firing oak woods in late fall or early winter destroyed some of the mast available to both Indians and the animals they hunted at that season. The lack of mast around the villages may help explain the need to move into the surrounding forests to hunt. Moreover, in consuming the forest litter, ground fires also destroyed a great deal of potential firewood and could have contributed to local shortages of that precious resource. Other useful products such as saplings and bark for wigwams, pine needles and reeds for weaving baskets, and materials for bows, arrows, and axes might have also been in short supply in areas frequently burned.⁵⁸

If seasonal burning created as many problems as it solved, why did Indians continue the practice? The answers lie not in the intricacies of fire ecology, but in the more practical and larger context of native subsistence patterns. As people of the forest, Indians enjoyed its bounty, but also had to put up with its pests. A host of insects plagued them at various seasons, including ticks, chiggers, lice, biting flies and mosquitoes, spiders, and most commonly, fleas. Stopping at an Indian dwelling along Santee River, Lawson found it teeming with "Millions of Fleas," adding that most native wigwams were usually "fuller of such Vermin, than any Dog-Kennel." Southern farmers still burn fallow fields and woodlands near their homes to keep down such infestation and Indians found it equally effective. Commenting on these

and other benefits, De Brahm wrote:

The Fire of the burning old Grass, Leaves, and Underwoods consumes a Number of Serpents, Lizards, Scorpions, Spiders and their Eggs, as also Bucks [bugs], Ticks, Petiles [reptiles], Muskitoes, with other Vermins, and Insects in General very offensive, and some very poisonous, whose Increase would, without this Expedient, cover the Land, and make America disinhabitable.⁵⁹

Thick, overgrown forests not only harbored fleas and ticks, they might also shelter marauding Iroquois or local enemies. Open woodlands near the villages provided an effective security zone where intruders or their tracks might be easily identified. Forests choked with undergrowth also stood in the way of Indian travels. In keeping with their semi-nomadic way of life, the natives needed quick access to their hunting and fishing grounds as well as an easy route over which to transport seeds and produce to and from outlying fields. John Smith realized the important role open woods played in Indian travel when he encountered a Mannahock Indian in the Virginia piedmont and asked him what lay beyond the mountains. The Indian replied simply, "the Sunne," telling Smith that he knew nothing else "because the woods were not burnt." Adding an explanatory note, Smith told his readers, "They cannot travel but where the woods are burnt."⁶⁰

If fire aided woodlands travel, such journeys also facilitated the spread of fire. During their extended trips away from the villages, Indians occasionally set those woods on fire, either by accident or on purpose. George Percy identified one potential source of accidental fire while exploring coastal Virginia when he discovered "a place where they [the natives] had made a great fire, and had been newly roasting oysters." Upon seeing the Englishmen, the Indians fled, leaving both the fire and shellfish still burning. Although that fire apparently

never got out of hand, similar abandoned camps could present a serious fire hazard. William Byrd reported that Iroquois war parties venturing south to attack their enemies often left their campfires burning which "soon put the adjacent Woods into a flame." Considering the extent of Indian travels, that scene must have been repeated many times in southern forests, especially since Indians hunted in the oak woods in fall when they were dry and most susceptible to a spark.⁶¹

The hunt itself might be another source of an accidental blaze. The circular fires used to hunt deer sometimes kindled the surrounding forests. At times such fires could be a welcome sight to tired and hungry Englishmen. Once while low on provisions, Lawson's party found "the Woods newly burnt and on fire in many places," a sign which gave them "great Hopes that Indians were not far off." The next day the expedition came upon a group of Santee hunters who relieved their plight with turkeys, bear's oil, and venison.⁶²

Fires accidentally set by Indians while hunting or traveling varied in intensity, but most were more destructive than the controlled seasonal ground fires. In areas not frequently burned, litter and brush piled up on the forest floor, providing enough fuel for a devastating wild fire which might blacken vast expanses of forest and kill or displace wildlife. While en route to St. Augustine in 1744, Edward Kimber, a military commander with James Oglethorpe's Florida expedition, saw in South Carolina "a thick mournful wood, which had been robbed of Leaves and Growth, by former Indian Fires." Byrd came upon similar ground while surveying the dividing line, noting that the area lay in such complete desolation that he "could not see a Tree of any Bigness

standing within our Prospect." Byrd also revealed that he knew something of the type of fire involved when he added, "The Woods are not there burnt every year, as they generally are amongst the Inhabitants. But the Dead Leaves and Trash of many years are heapt up together, which being at length kindled by the Indians that happen to pass that way, furnish fewel for a conflagration that carries all before it."⁶³

Whether accidental or intentional, fires set by Indians enhanced the patchwork quality of the southern forest. In some instances, Indian burning helped maintain pinelands, savannahs, and canebrakes and may have briefly increased wildlife populations. At other times, in other areas, it might rob the soil of minerals, increase erosion, or destroy available animal forage and cover. Occasionally, Indians were responsible for destructive wildfires like those feared by modern foresters. The varying effects of Indian-set fires make it impossible to classify the natives either as Maxwell's "incendiary savages" or the amateur fire ecologists described in more recent interpretations. Instead, the Indian became an important "fire agent" in the southern forest, augmenting the comparatively low number of blazes kindled by lightning and increasing the odds for both beneficial and destructive woods fires.⁶⁴

This view of Indians as haphazard burners might annoy those who still see the natives as conservationists, but it is more consistent with their overall patterns of subsistence and forest exploitation. When they had food, Indians consumed it quickly, sometimes gorging themselves with five or six meals in one day. As Hugh Jones, an early eighteenth-century mathematics professor at the College of William and Mary noted, "They have no notion of providing for futurity; for they eat

night and day while their provision lasts, falling to as soon as they awake, and falling asleep again as soon as they are well crammed." Indians were equally cavalier about food shortages. During their summer migrations, when they depended largely upon berries and other wild produce, they sometimes went for days without food. Late winter, too, could bring periods of sporadic hunger as game animals moved out of the oak forests and supplies of corn began to dwindle. In keeping with their stoic nature, the natives accepted such lean times as inevitable and rode them out without complaint. Their imprudent eating habits and willingness to go hungry in a land of apparent plenty never ceased to amaze Europeans. John Smith spoke for many Englishmen when he remarked about the "strange" manner in which the Indians' "bodies alter[ed] with their diet." Like "deer and wild beastes, they seem[ed] fat and lean, strong and weak." A well-developed scheme of fire management or any other sort of long-range conservation ethic would have been completely out of character for southeastern Indians.⁶⁵

Just as they failed to understand the complementary nature of sex roles in Indian society, Europeans saw few advantages in a way of life which seemed to squander so many resources. In part, they were blinded by their inability to recognize the shortcomings of their own subsistence patterns. In Europe, farmers enclosed small, private plots and produced all they could, hoping to market the surplus. They relied on domestic animals such as cattle, hogs, and sheep for their meat, thereby eliminating the need to hunt. Yet, like Indians, colonists sometimes suffered periodic shortages of food and other necessities. Droughts, floods, insects, birds, disease, or a host of other natural disasters

could quickly destroy enclosed crops and livestock. Warfare or political turmoil might sever international commercial ties and cut off needed raw materials. Southeastern Indians usually avoided such problems. If floods or drought destroyed their crops, they turned to fish, venison, nuts, or hundreds of other wild foods so that temporary shortages became less threatening and could be accepted as a matter of course. Within seasonal limits, the natives enjoyed as much or perhaps even more security than their English counterparts, a lesson the Jamestown colonists learned when they turned to the Indians for food to see them through the winter.⁶⁶

To achieve that security, Indians depended on the forest ecosystem. The land reflected that dependence in the form of open woodlands, weedy old fields, pines growing in pure stands on former agricultural sites, or blackened forests destroyed by wildfire. For several millennia before European contact, Indians took whatever the land offered. Sometimes they took it efficiently; on other occasions they reduced animal populations, depleted soil, and demolished plant life. In some cases seasonal variation decided what they could take; at other times their limited technology kept them from taking full advantage of the available resources. Even the very nature of the security they sought dictated the ways in which they utilized the land. Always confident that they could obtain whatever they required in sufficient quantities, the natives saw no need to overuse a single resource or to take more than enough to meet their immediate needs. To view Indian land use in terms of management or waste is to miss the point. Their exploitation of the southern forest made Indians nothing more and nothing less than

human. Within the context of their own culture, they did what they had to in order to subsist and survive.

CHAPTER III

VANISHING INDIANS, VANISHING ANIMALS

In comparing Indian subsistence to that of animals, John Smith and other colonists gave vent to an idea that had long been part of the European conscience. Conquistadores had used it to justify their depredations in Mexico and Peru, claiming that the cruel, barbaric, and bestial Indians deserved no less than total subjugation to the cultured and peaceful Spanish. Native resistance to the intended conquest only enhanced the image, and a number of translated Spanish treatises warned Europeans journeying to America that they could expect to confront unruly savages governed only by animal passions and lacking the distinctly human powers of reason and intellect. English and French explorers who followed the Spanish to the New World added their own embellishments. During his voyage to the Arctic in 1502, Sebastian Cabot captured three Eskimos and paraded them around England as sadistic carnivores whose brutish demeanor made them little better than forest beasts. Those who read Verrazzano's brief account of Indians found out that the natives wore only animal skins, ran and maneuvered through the woods with great agility, and possessed "sharp cunning" -- characteristics which did little to dispel the man-beast image initially created by the Spanish.¹

At the same time, however, another vision of the Indian vied for a place in the European imagination. Not all reports from the New World

suggested bestial inhabitants. Columbus encountered generous, caring Indians, innocent and childlike in their manners and in their dealings with Europeans. John Hawkins wrote of courteous, friendly natives who welcomed his party and provided them with much-needed provisions.² Occasionally this more favorable view of Indians surfaced alongside derogatory comments. Even while warning of their cunning nature, Verrazzano had to admit that the natives showed "great delight at seeing us," explained "where we could most easily secure the boat," and "offered us some of their food."³ Although it seems to defy logic, this schizoid view of Indians and their subsistence patterns held special appeal for Elizabethan explorers. With the exception of Sir Walter Raleigh and several others who favored permanent colonization, most Englishmen envisioned neither widespread settlement nor large-scale agricultural production in America. Instead they planned on searching for gold and silver, discovering the Northwest Passage, and in the meantime, trading with the Indians. To ensure its success, such a commercial venture not only required natives who were technologically and culturally inferior and therefore in need of English goods, but also Indians intelligent enough to recognize the advantages of such commodities and amicable enough to swap their resources for items offered by European traders.⁴

English ideas about New World commerce stemmed directly from their involvement in the Levantine and Muscovy trade. For over fifty years, English merchants had been "trafficking" with those countries, turning a tidy profit without invading the land or incurring the wrath of its inhabitants. In the Southeast they sought a similar relationship and initially hoped to establish only well-fortified outposts along major

rivers to which Indians might bring their goods.⁵ Their first contact with the natives at Roanoke Island in 1584 seemed to confirm both the validity of the scheme and their beliefs about the inhabitants. Within three days of arrival, Englishmen sighted Indians in dugout canoes coming to meet them. The visitors offered one of the natives a hat, shirt, and a taste of wine, receiving in return a load of fish. After this initial contact, more Indians came to greet the Englishmen and a wide variety of goods began to change hands. Describing the almost casual manner in which the trade developed, Arthur Barlowe wrote, "A daye or two after this we fell to trading with them exchanging some things we had for Chammoyses, Buffe, and Deere skins." Soon, Barlowe continued, "there came down from all parts great store of people, bringing with them leather, corral [shells], divers kindes of dies very excellent, and exchanged them with us."⁶

To Barlowe and his companions, it seemed as if the natives paid outrageous prices for English goods. The natives offered twenty deerskins for a single metal dish, fifty hides for one copper kettle, and "very good exchange" for hatchets and knives.⁷ Indian traders, however, thought the rate of barter more than fair. Animal skins were common items readily procured in the nearby forest, while knives, hatchets, and utensils were looked upon as exotic luxury goods. Moreover, coastal Carolina natives already knew something of the value of such items thanks to two European ships which had foundered off the treacherous Outer Banks some thirty years earlier. The first vessel, probably Spanish, went down in 1558. After nursing the survivors back to health, the Indians helped the Europeans construct two dugout canoes

in which they might journey south to New Spain. But the tiny vessels proved no match for the tricky tides and currents and the natives eventually found the empty boats washed ashore on a nearby island. Early contact with Spanish sailors must have introduced the natives to European technology, for when part of a second vessel turned up on the beach six or seven years later, they pulled out the nails and spikes and fashioned them into crude metal instruments.⁸

Even without those fortuitous encounters, Englishmen probably would have found the natives eager to obtain metal goods. As the explorers soon realized, Indians did not necessarily need to understand the function of European products in order to want them. Instead, the natives often employed such goods within the context of their own culture, frequently assigning them a new value or significance. Barlowe reported that one of the local werowances immediately took a fancy to a "bright tinne dishe," but instead of eating from it, the chieftain "clapt it before his breast, & after[wards] made a whole in the brim thereof, & hung it around his necke, making signes that it would defend him against his enemies arrowes."⁹

Indians had other reasons for greeting Englishmen enthusiastically. Long before Elizabethan adventurers arrived at Roanoke or Spanish ships sank offshore, the natives had swapped goods with their western neighbors. The inland tribes offered products from the oak and hickory forests, including flint, a harder species of cane, turkey and grouse feathers, animal skins, and the treasured red roots. In exchange, they received salt, dried fish, deerskins, shells, and medicinal plants from the piney woods. Such trade probably developed as a sidelight to Indian

travels. Natives passing through friendly towns were usually greeted with hospitality and treated to tobacco, food, and other refreshment. In return, the traveler might offer his host shells, red roots, or other items as a gesture of friendship. Those Indians who presented the English adventurers with fish, skins, and other goods did so out of a long tradition of gift-giving and intended them as tokens of their desire for peaceful relations with their visitors.¹⁰

Having encountered a people already well versed in the rudiments of commerce and having received such a warm welcome, Englishmen waxed eloquent about the prospects for long-term trade with the natives. In his 1588 treatise, Thomas Harriot confidently wrote that although "in respect of us they [the Indians] are a people poore," they seemed "very ingenious" and showed "excellencie of wit" in the use of English goods. Furthermore, Harriot predicted, "they upon due consideration shall find our manners of knowledge and crafts to exceed theirs" and continue to "desire our friendship & love." Although the Indians apparently possessed little precious metal, English traders could look forward to a profitable haul of furs from otters, minks, beavers, and muskrats. In addition, deerskins could be acquired "from the naturall inhabitants, thousands yeerely by way of trafficke for trifles." Adding a final and distinctly ecological note, Harriot reported that so many whitetails roamed the coastal forests that even an extensive trade would result in "no more wast or spoyle of Deere then is and hath beene ordinarily in time before."¹¹

Harriot wrote his "Briefe and true report" in an effort to discount certain adverse rumors about the Roanoke expeditions and to encourage

Englishmen to go to the New World, intentions which help account for the tract's upbeat tone. But for all his optimism, Harriot had to admit that even the casual exchange of goods had caused Indian-English relations to deteriorate. In July members of the 1585 expedition discovered a silver cup missing and dispatched a punitive force to a nearby village to question the natives about it. When the Indians denied taking the cup, the Englishmen "burnt and spoyled their corne and Towne" while the natives fled.¹² Whereupon relations worsened and the outnumbered English occasionally used displays of force to convince the Indians that their European visitors should not be challenged on the battlefield. As Harriot explained it in concluding his treatise, "some of our companie towards the end of the yeare, shewed themselves too fierce in slaying some of the people, in some towns, upon causes that in our part, might easily enough have been borne withall."¹³ In spite of the Indians' good will, Englishmen seemed destined to find the bestial savages about whom they had heard and read so much.

For the Indians, however, such sporadic violence at first seemed much less serious than the immediate ecological consequences of commerce. Along the Carolina coast, the informal trade brought about the single most important change in the southeastern environment: the introduction of disease-causing organisms from Europe. Once set loose in the Southeast, the microparasites quickly invaded Indian hosts whose bodies lacked the capacity to repel them. The natives' susceptibility to European diseases resulted not from any inherent genetic weakness, but rather from a lack of experience with such ailments. Because their ancestors had lived in a land free of Old World pathogens, many

generations of Indian children had grown up unexposed to common European maladies and had never developed the antibodies which might have helped ward off infection. Contact with explorers and colonists who carried the organisms set off devastating epidemics which swept through Indian villages like fire in a virgin forest. Describing the devastation in coastal Carolina, Harriot wrote, "within a few dayes after our departure from every such towne, the people began to die very fast, and many in short space; in some townes about twentie, in some fourtie, in some sixtie, & in one six score, which in truth was very manie in respect of their numbers." Harriot went on to note that "The disease also was so strange, that they neither knew what it was," and even the "oldest men in the country" could not remember a similar episode.¹⁴

Had the Roanoke explorers been able to question natives farther inland, they might well have found Indians who remembered such trying times. Almost a half century earlier similar epidemics had ravaged the southeastern interior, leaving only empty villages and a few grieving survivors in their wake. Exploring the Indian chiefdom of Cofitachequi in the South Carolina backcountry in 1540, DeSoto found "great towns dispeopled" due to "a plague in the country" two years earlier.¹⁵ In one deserted village where the disease had been particularly "rigorous and devastating," the expedition found only "four large houses ... filled with the bodies of people who had died of the pestilence." During their stay in the backcountry, DeSoto's party also found items of Spanish manufacture stored in Indian graves. The explorers believed the natives might have obtained the goods from members of Allyn's ill-fated

1526 expedition, indicating that in the interior, as on the coast, alien goods and microbes invaded villages simultaneously.¹⁶

Neither Harriot's account nor the various narratives of DeSoto's travels provide enough information to allow a positive identification of the disease or diseases which depopulated the Indian towns. However, the Europeans may have infected the natives with a strain of "epidemic" or "louse-borne" typhus. Transmitted to man by the common body louse, typhus became so common aboard European sailing vessels that most sailors regarded it as an endemic rather than an epidemic disease. Moreover, typhus plagued Sir Francis Drake's crew and seems to have been passed on to Indians in Florida just prior to his stop at Roanoke Island in 1586. Since lice and other external parasites flourished in and around native wigwams, the contagion might easily have been introduced into the interior either by Spanish explorers or by Indians trading with their neighbors further inland. Drake himself might have brought typhus to the coast or it could have been transmitted by any of the Roanoke adventurers. Typhus probably continued to devastate coastal tribes well into the seventeenth century. Recounting the early exploration of Virginia and New England, John Smith reported that Indians in both regions had been attacked by a "mortal disease." Where he had once seen "one hundred or two hundred Salvages," there were now "scarce ten to be found."¹⁷

An outbreak of typhus might also help account for the vague descriptions of the early epidemics. Louse-borne typhus initially produces a red rash, but as the disease progresses, it results in high fever and general sickness which resembles a number of other ailments.

In both Europe and America, medical diagnosis remained a highly speculative art well into the eighteenth century and when typhus again invaded Maryland in the 1760s, some physicians identified it only as a "Malignant Distemper ... brought in by a Vessel." Long accustomed to recurring typhus aboard ship and unable to recognize it in epidemic form, DeSoto, Harriot, and Smith might well have characterized it only as "a pestilence," or "strange and mortall disease."¹⁸

Whether triggered by typhus or some other ailment, the early deaths in the interior and outer coastal plain were only the first waves in what became a floodtide of Indian mortality. Colonists who observed the continuing decline in Indian numbers soon realized that their plight largely resulted from that most lethal of Old World pathogens: smallpox. Introduced into Hispaniola by Spanish sailors in 1516, the deadly virus quickly spread to Puerto Rico, Cuba, and the Mexican coast, eventually finding its way into mainland North America. Although the exact geographic extent of this early epidemic remains unclear, smallpox might have been transmitted to the interior tribes and could have contributed to the desolation DeSoto witnessed.¹⁹ The disease made its first documented appearance along the south Atlantic coast in 1667 when an infected sailor brought the virus into what is now Northampton County, Virginia. The local natives "died by the hundred" and as the epidemic spread to neighboring villages, "practically every tribe fell into the hands of the grim reaper and disappeared." Two years later, a second epidemic struck the tidewater with equally disastrous results and a third outbreak in 1696 spread the destruction south through the Carolinas to the chiefdoms along the Gulf coast.²⁰

Englishmen traveling through the southern coastal plain at the turn of the century found the natives decimated; at times accounts of their travels read like a roll call of Indian dead. When Lawson began his journey through the Carolinas in 1700, he discovered the Sewee Indians along Santee River "very much decreased" and further upstream the Congerees had "lost much of their former numbers." Writing in 1707, John Archdale reported that one eastern Carolina tribe, the Pemlicoos, had been completely exterminated and that most of the region's other Indians had barely escaped the same fate. In a shockingly frank appraisal of the devastation further north, Robert Beverley noted simply, "The Indians of Virginia are almost wasted."²¹

Beverley went on to explain that smallpox had rendered the coastal Indians incapable of raising more than five hundred warriors and that the natives lived "much in fear" of their more populous western neighbors.²² But as the eighteenth century wore on, western tribes found out that the disease played no favorites. Sporadic outbreaks of smallpox between 1700 and 1720 spelled doom for the remaining natives in central Virginia; by 1728, William Byrd could write that a band of two hundred Nottoways were "the only Indians of any consequence" still within the limits of white settlement. In the Carolinas, all the piedmont and mountain nations had encountered the disease by 1760, with the Cherokees losing fully half their population in 1738 and the Catawbias suffering the same fate in 1759. In 1763 Dr. John Milligan of South Carolina reported "many [formerly] populous tribes already extinct." When Governor John Drayton published his description of the state in 1802, he found it necessary to remind his readers that Indians had once been

plentiful in the region, explaining that "the smallpox and other fatal disorders ... had powerful tendencies in reducing their numbers and at length obliterating their names."²³

Some colonists thought smallpox epidemics to be the work of higher powers. Noting that Englishmen had met less armed resistance than their Spanish counterparts, Archdale explained that "it [had] pleased Almighty God to send unusual Sickness among them [the Indians], as the Smallpox &c. to lessen their Numbers; so that the English, in comparison to the Spaniard[s], have but little Indian blood to answer for." Other Englishmen, however, realized that whether they intended it or not, settlers were the real merchants of death. Lawson reminded his readers that "we have abandoned our own Native Soil, to drive them out and possess theirs." But even those sympathetic to the natives only partially understood the reasons for their rapid demise. Because they lacked immunity to all Old World diseases, every introduced microbe carried the potential for wholesale destruction. A deadly disease like smallpox might easily wipe out 80 to 90 percent of those exposed. Natives fortunate enough to survive an initial onslaught gained some resistance to the contagion, but such "acquired immunity" could not be passed on to Indian babies and each new generation faced the spectre of similar losses. Moreover, even those with some resistance to smallpox remained susceptible to other pathogens. As Lawson succinctly put it, "where the Europeans come, the Indians ... [are] very apt to catch any Distemper they are afflicted withal."²⁴

Among people so prone to infection, other diseases, generally considered less virulent than smallpox, proved almost as lethal. After

its introduction into Mesoamerica in 1531, measles quickly became the second greatest killer of Indians. Because measles produces a purplish red rash, colonists often confused it with other eruptive diseases such as smallpox and scarlet fever. However, judging from outbreaks reported in the seventeenth and eighteenth centuries, measles probably preceded smallpox into the tidewater region and reached epidemic proportions nearly as often. In 1663 the Virginia Council proclaimed a day of prayer in hopes of driving out the contagion, and colonists farther south documented additional epidemics in 1717, 1747, 1759, and 1772. Like smallpox, measles remains incurable even today. Modern doctors keep the disease at bay by treating the symptoms and warding off other infections until the body's own defenses destroy the virus. For Indians, however, measles proved doubly dangerous. They not only lacked the necessary antibodies to beat back the disease, but as their bodies weakened, they became vulnerable to secondary infections, such as colds and other respiratory viruses.²⁵

Partially because it struck in conjunction with measles and smallpox, influenza ranked only slightly behind those diseases as an agent of depopulation in the Southeast. Influenza broke out in Europe in 1556 and a serious epidemic plagued the continent until 1560. Passed on to the Aztecs by Spanish adventurers, the disease swept through the Southeast in 1559, bringing a second wave of death to Indian societies already reeling from the effects of typhus and other contagions. Influenza produces few unique or distinguishing symptoms and English colonists often referred to it as an "epidemical cold," "general catarrh," or "Winter Distemper"---terms also applied to an infinite

variety of fevers, agues, and respiratory ailments. Such descriptions make later epidemics difficult to identify, but the disease ravaged the Southeast at least three more times after English settlement. In 1696 it broke out simultaneously with smallpox. In 1761 it struck on the heels of a measles epidemic, spreading across all of North America during a "flu season" which lasted well into July. Between 1778 and 1783 the disease again surfaced alongside smallpox in a continent-wide epidemic which handed out still more death sentences to Indians in the Southeast.²⁶

Although typhus, smallpox, measles, and influenza accounted for the majority of Indian deaths in the Southeast, several other Old World pathogens played smaller roles in the macabre drama. Colonists seldom identified it as causing epidemic mortality, but whooping cough became a serious problem for Indian children. Chicken pox and scarlet fever, two ailments not clearly distinguished until the late eighteenth century, probably cropped up often in native villages to be mistaken for measles and smallpox. Diphtheria and bubonic plague struck New Spain in the first years of the seventeenth century and typhoid appeared along the Gulf coast as early as 1588. All these maladies might have found their way into the upper Southeast in the decade preceding English colonization.²⁷

In 1767 James Adair reported that several bands of southeastern Indians came down with a disease characterized by "sharp pains in the head, at the lower part of the ears," accompanied by swelling in the face, throat, and testicles, symptoms which indicate the natives suffered from mumps. Recent studies show that mumps and similar viral

infections destroy certain pancreatic cells and can lead to increased incidence of diabetes in races previously unexposed to such diseases. Today, the incidence of diabetes in American Indians ranges from half again to seven times that of the general United States population. This trend not only suggests a high rate of viral infection, but also indicates that diabetes might have afflicted many Indians during the later colonial period.²⁸ With so many imported diseases acting as shock troops, even the first colonists to the backcountry found Indian numbers greatly reduced. As William Byrd II observed in 1733, "the highest inhabitant on the South Side of the Dan [River] reacons himself perfectly safe," wishing only that "the Bears, wolves, and panthers were as harmless as the Indians."²⁹

Europeans had not always found it so easy to settle the Southeast. During the early years of colonization, Englishmen died from typhoid, dysentery, salt poisoning, and a host of other ailments. In later years, colonists suffered alongside Indians during every smallpox, measles, and flu epidemic. But even though the grim reaper's scythe cut both ways, the settlers eventually won the war of attrition, a victory which guaranteed them title to the land and its resources. Their triumph owed much to the armor of immunity. Antibodies built up through generations of exposure ensured that any epidemic would leave a large portion of the population healthy enough to provide food, water, and care for the sick. In Indian villages, however, all the residents often fell ill at the same time, leaving no one to hunt, gather food, or nurse the victims. At certain seasons, the absence of such support services could produce grave consequences. Due to cool dry winds which helped

spread the virus, smallpox often left villages incapacitated in late winter or early spring when food supplies were dwindling and fields needed planting. With the entire population rendered immobile, what had once been an accepted period of sporadic hunger rapidly escalated into a critical food shortage. Bodies already wracked by smallpox failed to receive the nutrients needed to ward off secondary infections. Survivors often had to face the summer without a supply of fish or early corn and in their undernourished state became even more susceptible to other contagions. Late winter and early spring gradually became deadly seasons with short-lived annual outbreaks of flu and pneumonia contributing to the general population decline.³⁰

English colonists not only enjoyed immunity and support services, they also benefited from years of experience with the invisible enemies. Although such infamous techniques as bleeding, leeching, and purging make modern Americans wonder about the proficiency of colonial doctors, the latter understood many of the basic treatments for infectious diseases. Most important, they knew that the maladies spread through contact and often quarantined infected towns or ships to prevent further infection. They also realized that continued exposure to cold and dampness could bring quick death to victims already debilitated by smallpox, measles, and influenza. By the early eighteenth century colonial doctors prescribed more sophisticated treatments. As early as 1700 English physicians practiced variolation, a process by which they placed pus from smallpox pustules into an incision in the skin of a healthy person. The resulting infection generally proved mild and, although the effect was temporary, those subjected to variolation had a

far better chance of surviving an ensuing epidemic. Used only sparingly in England, variolation got a more extensive trial in America where, despite complications resulting from improperly administered inoculations, the technique played a major role in reducing fatalities from smallpox.³¹

While colonists had learned to combat the diseases of Europe, Indians had grappled with other health problems. As English physicians soon discovered, native shamans could be highly effective in treating a number of common disorders. To counter the deadly venom of snakes and spiders, they employed numerous "snakeroots" including fern or seneca root, an herb belonging to the chicory family. One of the most highly regarded of all medicinal plants, fernroot produced a milky juice which could be taken internally as a antidote, while its leaves were steeped and applied directly to the bite. Never having encountered poisonous snakes in Europe, most Englishmen ascribed great curative powers to the roots, believing Indians to be "the best Physicians for the bite of these and all other venemous Creatures."³² It took some time before colonists realized that the plants themselves only aided in reducing the pain and inflammation of snakebite. Medicine men kept their patients alive with a number of concomitant treatments, such as sucking out poison or applying tourniquets to prevent the spread of venom. Indians used similar techniques to treat arrow wounds, burns, assorted inflammations, and rashes. Poultices made from poplar, elm, sassafras, or dogwood bark proved so effective that some Englishmen who traded regularly with the Indians preferred native remedies to those offered by white physicians.³³

In the years before their contact with explorers and traders, the natives had learned to treat other persistent ailments. Infants troubled with colic might be given an infusion of sassafras or juniper berries, remedies also used to relieve constipation in both children and adults. Middle-aged and older Indians sometimes suffered from several diseases of the bones and joints, especially arthritis and rheumatism. These maladies were sometimes treated with ointments made from herbs and animal fat, but more commonly with a visit to the village sweat lodge, a small enclosure covered with skins or bark with a pot of steaming water or red hot stones in the center. According to John Smith, so many Indians crowded into these miniature saunas that they soon began to "sweate extreamely," a process which provided great relief from "dropsies, swellings, aches, and such like diseases." The natives usually followed a trip to the sweat lodge with a plunge into an icy creek or river, which also helped alleviate "nervous and rheumatical disorders."³⁴

Made confident by generations of success in treating indigenous ailments, Indians called on the same techniques to combat the new diseases, but often succeeded only in hastening their own demise. Effective as they might be against wounds and burns, poultices did nothing to check virulent eruptive diseases, and medicine men attempting to suck the "poison" from smallpox pustules quickly infected themselves or carried the contagion to other wigwams. The sweat lodge, too, proved no place for victims of Old World pathogens. The steamy, cramped conditions furnished an ideal environment for the propagation and spread of deadly microbes while excessive sweating and the ensuing cold bath

invited bronchial pneumonia and other secondary infections. Europeans still struggling to comprehend the nature of infectious disorders sometimes concocted elaborate technical explanations for the fatal therapy, but clearly understood its results. "No sooner than they are attacked with the violent Fevers," wrote Lawson, the Indians "fling themselves over Head in the Water, in the very Extremity of the Disease, which, shutting up the Pores, hinders a kindly Evacuation of the Pestilential matter, and drives it back, by which Means Death most commonly ensues."³⁵

Indians not only tried to counter the unfamiliar diseases with treatment, but also relied on an array of rituals designed to console the mind and spirit. Medicine men, shamans, and herbalists danced, chanted, sang, and cajoled in an effort to convince their patients that various spirits and divine beings had joined in the battle against disease. Relatives and friends of the victim often aided the medicine man, providing important emotional support for both patient and physician. As one Englishman noted, "the fathers, mothers, brothers, or nearest relations are always with them; and they will never show anyways cast down before the sick person for fear of discouraging them."³⁶ Modern physicians now recognize the value of such psychological therapy, realizing that the patient who thinks he will recover often does. However, such "holistic" techniques are effective only when mind and body work together; the natives' lack of biological defenses usually muted the power of positive thinking. Visiting relatives not only watched their loved ones die, but also contracted the infectious

ailments themselves, circumstances which made them question the reliability of their physicians and deities.³⁷

The hideous symptoms of the various disorders proved as demoralizing as their invincibility. Like all North American Indians, those in the Southeast took great pride in their appearance. Christopher Newport found the natives along James River to be "lusty, streight men, very strong" who delighted in "dying and painting themselves" to call attention to their perfectly formed bodies. Confronted with the toxic red rash common to measles and the draining pustules, callous scabs, and horrible scars of smallpox, many Indians elected to take their own lives. While among the Cherokees during the 1738 smallpox epidemic, James Adair saw Indians cutting their own throats, shooting themselves, or jumping into raging fires to escape the indignity and humiliation of disfigurement. In one instance, even the collective efforts of friends and family could not discourage one "great warrior" bent on putting an end to his misery. After discovering that his relatives had removed all sharp objects from his wigwam, he implanted one end of a hoe handle in the ground and repeatedly threw himself upon the "fatal instrument" until he forced it down his throat and "immediately expired."³⁸

Although their previous experience with disease left Indians ill-prepared for the physical and psychological trauma of Old World epidemics, the natives quickly learned more effective techniques. As early as 1701 Lawson noted that the Indians of the Carolinas had "become a little wiser" in the treatment of smallpox, knowledge which, together with acquired immunity, now prevented the disease from destroying whole villages. When the Cherokees and Catawbias encountered smallpox in the

mid-eighteenth century, both groups eventually gave up sweating and bathing after seeing half their population vanish. Indians also learned from watching and listening to colonists. Acting upon the advice of Adair and other English traders, several bands of southeastern natives began to invoke strict quarantines, posting sentinels outside healthy villages with orders to treat infected Indians and Englishmen "as the most dangerous of all enemies."³⁹

Adair and his fellow merchants had good reasons for trying to keep the Indians healthy; by the mid-eighteenth century, trade with the natives had become a lucrative enterprise. The fate of the "lost" Roanoke colony signaled a twenty-year commercial hiatus in the Southeast, and with the early success of tobacco culture in Virginia, the Indian trade Harriot had found so promising seemed to lose much of its economic appeal. Worsening relations between Virginia natives and English settlers compounded the problem, prompting the colony to outlaw the Indian trade in 1631. At the same time, officials moved to prohibit the export of deerskins, either hoping to focus colonists' energies on agriculture or perhaps encourage development of a local tanning industry. Although a small number of trappers and traders successfully circumvented such restrictions, most settlers preferred raising tobacco to trafficking with the natives. However, with the Navigation Acts of 1651 and 1660, tobacco produced in the colonies could be shipped only to England or her possessions, and the resulting surplus in the mother country curtailed sales and quickly forced prices down. Aided by a 1659 act which lifted the previous restrictions on Indian trade, several of

the westernmost landholders began to explore the possibilities of shipping furs and skins across the Atlantic.⁴⁰

Planters along Virginia's colonial frontier found it relatively easy to add skins to their commercial repertoire. Many already employed one or more natives as hunters to supply meat for their families, servants, and slaves. The Indians, still more than willing to swap what they considered common items for more exotic English goods, readily offered up hides of animals skinned for the table. But most planters soon realized that the greatest commercial opportunities lay farther west and south, where Indian populations had not yet been devastated by European diseases and where fur-bearing animals abounded. Beginning in 1644, after a series of Indian attacks on outlying settlements, the Virginia Assembly established forts along major rivers near the fall line. When it proved too costly to keep soldiers garrisoned there, officials leased the posts to individual colonists who were to staff the forts in return for land and goods from the interior. Chief among those selected as caretakers were such prominent planters as Abraham Wood, Edward Bland, William Byrd I, and Cadwallader Jones.⁴¹

With their upkeep assured by such wealthy benefactors, the fall line forts soon became headquarters for the skin trade and bases for exploring the west. During the next quarter century, explorers such as John Lederer, Thomas Batts, Robert Fallam, and James Needham charted the southeastern interior, establishing commercial contacts with the Indians of the southern piedmont and mountains. Although they seldom ventured into the backcountry, Wood, Bland, the elder Byrd, and Jones became successful frontier merchants. They not only acquired pelts from

natives who visited their frontier outposts, but also commissioned others to act on their behalf, providing trade goods on credit in exchange for skins to be delivered later. By 1674 casks of furs had taken their place alongside tobacco hogsheads in ships leaving tidewater ports.⁴²

Of all the Virginia planters, William Byrd I became the most successful trader, a legacy he passed on to his son, William Byrd II. The Byrds prospered because their plantations near the falls of the James lay nearest the great trading path to the Catawbas and Cherokees who lived four hundred miles away. However, with the founding of the Carolina colonies, Byrd and the other Virginians eventually found themselves competing with planters who enjoyed an even more advantageous position. Like the Virginians, Carolina planters employed agents or factors to take goods to the interior and bring back furs. But because their route to the western tribes proved shorter and easier, Carolina traders could "travel and abide amongst the Indians for a long time," procuring more hides and increasing profits. The Carolinians also enjoyed easier access to Charles Town, which after its founding in 1670, rapidly emerged as the premier port town in the South and the center of the region's fur trade. Every spring, traders brought hides to be packed and shipped to London, returning to Indian country with blankets, metal utensils, and other trade goods. Before rice joined tobacco as a great southern staple, South Carolina depended largely on the Indian trade for its economic survival.⁴³

As important as they were to the international trade, animal skins were not the only commodities traders brought to Charles Town. They

also dealt in Indian slaves. The South Carolina slave trade began in 1671 when the colony's proprietary government authorized soldiers then fighting the Coosa Indians to auction their captives in the port town. The slave trade increased as Englishmen encouraged Indians to sell off the captives they took in various intertribal conflicts. Some colonists put the captured natives to work in their fields, but because the Indians often fled to the forests or staged rebellions, most slavers preferred to ship them to New England or the West Indies. Profits from the sales could then be invested in cattle or land. The trade also offered Englishmen the advantage of keeping interior tribes in a weakened state so that they became less threatening as potential allies of the French and Spanish.⁴⁴

Although hides and slaves were the most valuable commodities traded in Charles Town, southeastern planters continued to rely on Indians to keep them supplied with other goods. Joel Gascoyne, author of a 1682 tract promoting colonization, informed prospective settlers that South Carolina natives readily offered their "services to fish, [and] hunt their Game for a Trifle." Colonists also bought a wide variety of medicinal plants both for their own use and to ship abroad. Englishmen not only valued seneca root as an antidote for snakebite, they also employed it to treat "gout, dropsy, poison, and other grievous distempers." Valuable as it might be, however, seneca ranked well behind the most treasured of all herbs: ginseng. Like sassafras, ginseng root could be brewed into a pleasant-tasting tea which Englishmen took as a general tonic and aphrodisiac. As William Byrd II explained in 1735, the root "is highly cordial, it recrutes the wasted spirits, and repairs

a decayed constitution. In one word, it makes those who take it frequently live to great age, and in very good health whilst they do live." The plant's "vertues are so great," Byrd wrote on another occasion, "that mankind is not worthy to have it in plenty."⁴⁵

The nature of the south Atlantic Indian trade makes it easier to understand Adair's concern for the natives' well-being. None of the region's major commodities could be acquired in quantity without Indian cooperation. Generations of experience in the southeastern forest made the natives experts at locating game and medicinal plants. As John Smith observed, "by their continuall ranging, and travel, they know all the advantages and places frequented with Deare, Beastes, Fish, Foule, Rootes, and Berries." Some colonists thought such abilities a natural outgrowth of the natives' "bestial" character. Noting that native hunters always took more beaver than English trappers, Mark Catesby explained that Indians "have a sharper sight, hear better, and are endowed with an instinct approaching that of the Beasts," qualities which enabled them "to circumvent the Subtleties of these Wary Creatures." Indians were equally skilled at stalking humans. Prisoners had long been regarded as the chief spoils of Indian warfare, and warriors returning from battle with a string of captives in tow quickly increased their prestige within the village community. Since successful warriors were "the proudest Creature[s] living," English traders found it easy to enlist them for procuring slaves.⁴⁶

Because their participation in the trade made the natives dependent on and eventually subservient to English settlers, scholars have often wondered why Indians readily joined in an enterprise which eventually

sealed their doom. As Barlowe, Harriot, and Lane found out at Roanoke, the natives' willingness to engage in commerce owed something to pre-contact intertribal trade and their accidental exposure to European technology. One modern historian, however, has suggested other motives. Writing of Indians in southern Canada, Calvin Martin argued that the natives participated in the fur trade because they believed that animals, rather than colonists, were responsible for the new epidemic diseases. According to Martin, Indians cared less about trade goods than they did about waging a crusade against their animal antagonists.⁴⁷

Other scholars studying Canadian Indians have found ample evidence to contradict Martin's ideas, and his thesis fares little better in the Southeast.⁴⁸ Although Cherokee oral tradition singled out animals as agents of disease, the beasts occupied a comparatively low place in the overall hierarchy of the belief system. They could be held responsible for common complaints such as rheumatism or arthritis, but a serious epidemic could only be the work of a highly-placed deity, one who intervened in everyday affairs only to correct a major transgression. Consequently, when smallpox broke out among the Cherokees in 1738, their shamans blamed it not on animals, but on "the adulterous intercourses of their young married people" who had committed their sexual sins in fields tended by "the religious men." To remedy the problem, the priests suggested that the offenders "lie out of doors, day and night, with their breasts frequently open to the night dews" which had originally inspired "their unlawful copulation." Like so many other native prescriptions, the treatment proved almost as lethal as the disease.⁴⁹

Martin's thesis not only fails to account for such action among the Cherokees, it also underestimates the Indians' desire for European trade goods. Once they stopped wearing metal utensils as charms, the natives discovered that, in contrast to traditional earthen cookware, copper kettles and tin dishes did not crack or explode when exposed to intense fires. Knives and hatchets eased the drudgery of cutting trees and skinning animals. Blankets and duffel supplied by English traders did double duty as coats and bedclothes. But utility did not always determine demand. Well into the eighteenth century, traders provided the natives with decorative items such as combs, mirrors, earbobs, and leather belts with buckles. These "prestige goods" enabled Indian males to increase their status as astute traders and providers for their families.⁵⁰

Indians added to their self-esteem by imbibing rum and other spirits supplied by the traders. Made confident by a long night of "drunken Frolicks," warriors boasted and sang of their battle skills, sometimes backing up such bravado by killing fellow villagers. Once sober, the murderer could blame his heinous deed either on demon rum or on the trader who supplied the insidious poison, thereby acquiring a convenient alibi for what otherwise would have been a serious breach of village law. The natives also drank to obtain a "dream-like state of religious possession" which enabled them to commune with various deities, making rum a valuable commodity at religious ceremonies and social gatherings. Such cultural values inclined Indians to drink often and to excess, giving them still another incentive to join in the trade.

As Lawson remarked, most southeastern Indians would "sell all they have in the World, rather than not have their full Dose" of rum.⁵¹

With all its flaws, however, Martin's thesis does help focus attention on other, more subtle links between trade and epidemic disease. When first introduced into the Southeast, Old World pathogens wiped out Indians of all ages. But as the natives slowly learned to cope with the diseases and built up immunity, the microparasites preyed primarily on infants and young children.⁵² Since Indian mothers generally abstained from sexual intercourse for two or three years while they breastfed each child, births were less frequent than in Europe. Parents depended on their offspring for care and support in their old age. The young also provided for the future security of their village. Young boys received training as warriors, while girls practiced domestic duties and child care.⁵³

During the eighteenth century, infectious diseases also carried off a disproportionate number of elderly natives. Like children, the aged occupied important places in native society. After proving their ability during their youth, older men held most of the important political and religious positions. They made critical decisions regarding warfare, designated days for feasting and fasting, and directed village rituals. In addition, the aged were the most skillful artisans who practiced and taught conventional methods of constructing wigwams, canoes, baskets, and stone tools. With their heavy toll among the old, epidemics eroded the natives' cultural memory and restricted the dissemination of traditional lore.⁵⁴

As surviving Indians watched their relatives perish about them, they felt increasingly uneasy about the future. Without young men to train as warriors, they faced possible extermination at the hands of colonists or other natives. Without elderly artisans, they had no choice but to rely heavily on European goods and technology. As one South Carolina colonist observed in 1763, the "daily decrease in their numbers [is] a circumstance that gives them much concern, however agreeable it may be to the selfish and all-grasping Europeans." Facing biological disaster and European encroachment, the natives had to find a place within the rapidly expanding colonial system. Securing such a position meant producing commodities Europeans considered valuable. Southeastern Indians carried out no vendetta against animals, nor did they surrender completely to European expansion. Instead, they pursued what their ancestors had always sought--survival. Edmond Atkin, English superintendent for Indian affairs, explained it best in 1755 when he informed the Crown that "the policy of the Indians is Simple and Plain. 'Tis confined to Securing their personal Safety, a Supply of their Wants, and fair Usage."⁵⁵

Within the framework of the developing southeastern market, a "Supply of their Wants" took on new meaning. Although Indians had not always used their resources efficiently, precontact subsistence patterns had fostered unconscious conservation. The natives had defined "demand" in terms of immediate need, making it unnecessary to kill more animals or gather more plants than the village could use. However, to acquire technologically advanced and socially prestigious European goods, Indians now had to procure enough hides and roots to trade with

colonists and still meet their own needs. Commenting on this new concept of "demand," Mark Catesby noted that before colonization, the natives "made no other Use of the Skins of Deer, and other Beasts, than to Cloath themselves, their Carcasses for Food, probably, then being of as much Value to them as the Skins." But, Catesby continued, "they now Barter the Skins to the Europeans for other Cloathing and Utensils they were before unacquainted with," their "Destruction of Deer and other Animals being chiefly for the Sake of their Skins." The depopulation wrought by epidemic diseases meant that fewer natives now stalked the animals, but those who did go into the forest carried with them a new survival ethic based on the requirements of the European market.⁵⁶

They also went into the woods armed with European guns. At first colonial governments refused to supply the natives with firearms, fearing the weapons would only increase attacks on white settlements. Traders, however, cared less about warfare than about profit and soon found ways to circumvent official mandates. When guns took their place alongside blankets, kettles, and rum, Indians quickly learned the basics of handling the weapons, taking great care to sight and adjust a particular gun to suit their needs. According to Lawson, when Indians "first have bought a piece, and find it to shoot any Ways crooked they take the Barrel out of the Stock, cutting a notch in a Tree, wherein they set it straight, sometimes shooting away above one hundred Loads of Ammunition, before they bring the Gun to shoot according to their Mind." Such meticulous practice made the natives excellent marksmen. Most could hit their target at will "with a single Ball, missing but two Shoots [sic] in about forty."⁵⁷

Together with their intricate knowledge of the woodlands and their increasing demand for European goods, the Indians' proficiency with firearms did not bode well for southeastern animals. Well aware of the success of New England and Canadian traders, southern merchants and their Indian partners first turned their attention to the most prized American furbearer, the beaver. Due to the popularity of felt hats made from the animals' soft gray underfur, London hatters clamored for all the pelts the colonies could produce. Virginia merchants annually sent some two thousand beaver skins to England between 1699 and 1714, exporting a whopping 48,000 pelts in 1712. Their competitors in the Carolinas averaged only six hundred furs per year during the same period, but in three different years (1699, 1700, and 1703), their exports topped fifteen hundred skins.⁵⁸

Unlike most rodents, beavers live together in colonies, a trait which prompted some Englishmen to compare the animals' social organization with that of humans. William Byrd II believed every beaver pond to be under the supervision of a "Master Beaver" who quickly chastised any resident who did "not exert himself to the utmost in felling of trees." Such habits, Byrd thought, meant that beavers "have more of Instinct, that Half-brother of Reason, than any other animal." Beavers not only mimic man's sociability, they also practice similar reproductive habits. Pairing for life, the animals mate in mid-winter and give birth to four or five kits in early summer. The kits remain with their mothers for two years during which time she bears no more offspring.⁵⁹

Although neither Byrd nor the Indians who supplied him with furs realized it, the beaver's sedentary habits and sociability made it especially vulnerable to overhunting. Primarily nocturnal, the animals lay "Snug in their Houses all Day" where they became easy prey for Indians armed with guns and paddling dugout canoes. When the natives smashed their lodges and dams, the animals fled to open water or waded ashore when they could be easily killed. The beaver's long cycle of parenting and low rate of reproduction meant that, once decimated by Indian hunters, beaver colonies might never regenerate. Moreover, the furry kits proved almost as valuable as their larger parents, so that native hunters left few young beavers behind to repopulate the pond. By the time William Bartram explored the Southeast in the late 1780s, only "a few beavers" remained in the coastal plain and piedmont. When John Drayton published his description of South Carolina in 1802, he sadly observed that east of the mountains, "the beaver is but rarely to be met with."⁶⁰

The beaver's demise offered other benefits besides the pounds and shillings merchants got for pelts. Colonial millers sometimes chose abandoned ponds as sites for their waterwheels, replacing the poplar and ash dams with walls of stone and mortar. But if no human tenant took over their upkeep, the dams fell into disrepair and the ponds behind them slowly dissipated, destroying acres of breeding grounds for malaria-carrying mosquitoes. Other results were less advantageous. Hundreds of square miles of prime fish habitat vanished to be replaced by marshy meadows of sedgegrass. Unrestricted by beaver dams, inland streams flowed faster and cut deeper into their beds, speeding up

erosion and increasing the odds of periodic flooding. Without beaver ponds to impede them, forest fires could spread quickly and cover a larger area. Within the ever-changing forest ecosystem, the disappearance of one industrious rodent had far-reaching implications that few southern colonists understood or took time to note.⁶¹

The few beavers left in the Southeast by 1800 owed their survival to the southern climate. Thanks to the region's temperate winters, the animals did not develop the same thick, luxurious coats as their northern cousins. As Byrd noted, fur from the Southeast eventually proved less valuable than that from "the more Northern Countries where it is longer and finer." Yet most southern fur traders probably saw little reason to lament the poor quality of their beaver pelts; for the same climate which kept beaver coats thin helped propagate the most valuable southeastern mammal: the whitetailed deer. As Harriot discovered at Roanoke, deerskins stripped of their hair and tanned by Indians produced beautiful buff-colored leather much like European chamois. London tailors used the cured hides to make comfortable durable breeches and other garments which were then re-exported to central Europe.⁶²

Like the natives, colonists also relied on whitetails for food. Accustomed to the enclosed estates and private hunting preserves of their homeland, Englishmen marveled at the ready availability of venison. Prospective colonists who read Lawson's account must have been delighted to learn that in the Carolinas "a poor Laborer that is Master of his Gun &c. hath as good a Claim to have continued Courses of Delicacies crowded upon his Table, as he that is master of a great Purse." Settlers who took time to learn the basics of deerhunting from the

Indians found little reason to doubt Lawson's description. While surveying along Roanoke River, Byrd encountered a colonist named Epaphroditus Bainton who spent "most of his time in hunting and ranging the Woods, killing generally more than 100 Deer in a Year." Bainton's success owed much to his vigor (according to Byrd, he was "young enough at 60 years of age to keep a Concubine, & to walk 25 miles a day") and his Indian-like habit of stalking the animals quietly on foot (he had once been thrown from a horse and had nearly broken his neck). But even more lethargic colonists who preferred to ride could put meat on their tables as long as they had goods to trade with the Indians. Commenting on the growing importance of venison to the plantation meat trade, Thomas Ashe reported that "one hunting Indian" annually killed "more than an 100, sometimes 200 head of Deer" for a single household. Most wealthy planters probably found it hardly worth their while to hunt (except for sport), since they could procure from Indians "the whole Deare's Flesh" for goods worth only six pence.⁶⁴

To meet the demand for leather and venison, Indian hunters launched an all-out assault on southeastern deer which made their precontact depredations on the herds look tame. Solitary hunters, who once had to approach the skittish whitetails camouflaged in buckskin, now only had to get within rifle range to bring down their quarry. Moreover, the deep, bloody wounds left by musketballs made it easier to track disabled animals through dense foliage. As Mark Catesby remarked in 1731, "the Use of Guns has enabled them [Indians] to slaughter far greater Numbers of Deer and other Animals than they did with their primitive bows and arrows." Guns became even more effective when used in conjunction with

the ancient practice of fire-hunting. Ranging the woods in late fall when deer were on the move, gun-toting Indians seldom allowed any whitetails to escape the fiery enclosures. Due to the comparatively low prices Europeans paid for venison, most natives used fire-hunting "only for the sake of the skins, leaving the carcasses to perish in the woods." Arriving in North Carolina after the skin trade was in full swing, John Brickell thought it odd that "The Deer, which is so highly esteemed in European Countries, for the delicacies of It's [sic] Flesh, is little valued amongst these Savages, only for the Plunder of his Skin."⁶⁴

Tanning techniques also reflected the new urgency of the hunt. When they sought skins only for their personal garments, Indians had meticulously cured the hides by soaking them in a mixture of water, hickory bark, and pulverized deer brains. The supple skins were then stretched over a framework of small saplings and smoked on both sides. Commercial hunting, however, required speedier methods. To accommodate English traders, the natives often neglected the first steps, simply smoking the hides to dry and preserve them. According to William Byrd II, the new technique not only proved more expedient, but also made the hastily-dressed buckskins "smell so disagreeably" that rats and other destructive vermin "need[ed] good Stomach to gnaw them in that condition."⁶⁵

Like beavers, whitetails are less polygamous than most mammals, and some bucks mate only with one doe. The gestation period is long, usually seven months, and a doe rarely gives birth to more than two fawns. Combined with the actions of predators, this relatively low

reproductive rate meant that whitetails, too, were highly susceptible to overhunting. Coastal plain herds, doomed by their close proximity to European settlement and the merchants of Charles Town, disappeared first. Those tribes heavily involved in the fur trade found their supply of deer diminished by the end of the seventeenth century. Traveling among the Tuscaroras in 1701, Lawson reported "Venison very scarce to what it is amongst other Indians." One year later, Indians in southeastern Virginia complained to the Virginia Council that Tuscarora hunters had ventured into their territory in search of deer. Lawson believed the Tuscaroras' problems resulted from "the great Number of their People" who had grown "too populous for one range." But since epidemic diseases had already drastically reduced their precontact population, the Tuscaroras now had fewer mouths to feed than ever before. The shortage of deer more likely resulted from their contact with Edward Bland and other Virginia skin merchants, an association which began as early as 1650.⁶⁶

The rapidly escalating trade soon created similar problems farther inland. Between 1699 and 1715, an average of 54,000 skins annually left Charles Town. In the mid-eighteenth century, that figure soared to more than 147,000 reaching a peak of 236,000 hides in 1768. After the founding of Georgia in 1732, Savannah also emerged as a major shipping point for deerskins, exporting more than two million pounds (the equivalent of half a million deer) between 1764 and 1773.⁶⁷ Anyone venturing into the backcountry, Indian or Englishman, could witness the effects of overhunting. As early as 1728 Byrd admonished those journeying to the Virginia interior to take along enough provisions for ten days, since it

would take that long to reach an area where deer and other game still abounded. While among the Yuchi Indians of Georgia in 1797, Benjamin Hawkins found "no game of any kind" and encountered natives who had "suffered much ... with hunger." Four years later, the Creek chieftain Mad Dog pointedly told a Pensacola merchant that "our deer and game is almost gone." Remembering happier times, Mad Dog continued, "When the Acorns fall deer are usually about, but where now are the deer?" His question was one Harriot had thought would never be asked.⁶⁸

While Indians struggled against food shortages, colonists grappled with the economic problems created by overhunting. In 1709 the South Carolina missionary Francis Le Jau reported that merchants who dealt with coastal tribes now had to swap more of their goods for Indian slaves. As Le Jau put it, "the Skinns trade do's not flourish as formerly."⁶⁹ In an effort to preserve the traffic in leather, colonial governments passed laws designed to limit the hunting season. Noting that "Deer are very much destroyed and diminished," the Virginia Assembly in 1699 made it illegal to kill whitetails between February 1 and July 1 or to receive skins taken during those seasons. North Carolina passed similar legislation in 1745 and South Carolina followed suit in 1769. The closed hunting season offered two advantages. It kept all deer protected for five months of every year and kept hunters out of the woods in spring and summer until a new generation of fawns had been born. South Carolina's law also contained a provision to protect bucks in September and October during the rut.⁷⁰

To offer the diminishing herds even more protection, colonial legislatures sought to curtail the most efficient (and therefore most

destructive) hunting methods. Virginia outlawed fire-hunting in 1738, explaining that in addition to destroying deer, the practice ruined much timber and pasture land. Realizing that the natives were the most avid fire-hunters, the Assembly declared that Indians caught using the technique would have their guns confiscated. In the Carolinas, legislators banned another type of fire-hunt, making it unlawful to stalk deer at night using torches. Like the modern poacher's trick of "spotlighting" deer, the torches temporarily blinded and paralyzed the animals so that they became easy targets. Colonists who owned "beagles or hounds" also faced stiff fines if local constables discovered those animals running at large and threatening the herds.⁷¹

Although well-intentioned and based on sound ecological reasoning, such measures did little to stem market hunting. Before 1800 all three colonies found it necessary to extend the closed season to September 30. In the backcountry, where deer were more plentiful, Indian and white hunters proved especially difficult to control. In 1768 North Carolina legislators noted that colonists with "no settled habitation [and] no visible means of supporting themselves" regularly ventured into the backcountry, killing deer "at all seasons of the year," and leaving the carcasses in the woods. In an effort to remedy the problem, the legislature passed laws requiring those taking deer in the backcountry to produce certificates proving that they had "planted and tended five thousand corn hills ... in the preceding year or season" in the county in which they hunted--a measure not unlike the "residency requirement" imposed on modern hunters. Virginia, the colony in which the deerskin trade began, suffered most from the ongoing slaughter. In 1772 the

Virginia Assembly imposed a four-year moratorium on the killing of "any wild deer." Such drastic measures became necessary because "in many parts of the colony" hunters and Indians had "almost destroyed the breed." If the depredations continued unchecked, the bill warned, "the inhabitants will not only be deprived of that wholesome and agreeable food, but the trade, in the article of skins, will be greatly diminished." The Assembly also feared for the sustenance of the College of William and Mary, which drew most of its revenue from a tax on skins.⁷²

Although most concerned about the dearth of beaver and deer, eighteenth-century colonists discovered that the lethal combination of increased demand and more efficient weapons had taken its toll on other species. Merchants and clothiers preferred deer or beaver skins, but seldom turned up their noses at any well-dressed pelt. By 1800 bearskins sold for as much as two dollars each, a bounty which soon made those giant beasts scarce around English settlements.⁷³ Like bears, buffalo and elk had once been protected by their staying power against bows and arrows, but sharp horns and hooves presented no deterrent to Indians and colonists equipped with rifles. In 1763 Dr. John Milligan of South Carolina noted that "buffalo's are sometimes found in the woods near the mountains, but they are not so numerous as they were a few years ago." Forty years later, Governor Drayton reported bison "entirely exterminated" in the coastal plain and piedmont. Likewise, by the 1780s, Bartram could find "but few elks, and those only in the Appalachian mountains." Smaller furbearers also disappeared. Bartram found the dwindling population of otters confined to the western back-country. The muskrat, he discovered, could no longer be seen "in

Carolina, Georgia, or Florida within one hundred miles of the seacoast." Only the scavenging opossum, whose seemingly filthy habits and thin fur made its pelt undesirable, survived "in great abundance."⁷⁴

Other animals suffered less, but still felt the effects of market hunting. John Archdale noted that wild turkeys also became a staple of the meat trade, with natives bringing the prodigious birds "many miles" to trade for goods worth but "two Pence Eng[lish] Value." Traveling through Virginia in 1759, the itinerant minister Andrew Burnaby saw Pamunkey Indians killing migratory wildfowl "a hundred dozen" at a time. The birds eventually turned up "at the tables of most of the planters," who ate them "at breakfast, dinner, and supper." While in Georgia, Bartram feasted on "horseloads" of passenger pigeons taken by a local planter and his slaves. According to Bartram, the hunters used techniques learned from the Indians, blinding the birds with torches and knocking them from their roosts with long poles. Although pigeons survived throughout the colonial period, similar practices and expanding urban meat markets would eventually spell doom for the huge flocks. Even medicinal plants did not escape the ravages of the Indian trade. By 1802, Drayton could write that "Ginseng has been so much sought by the Cherokee Indians for trade, that at this time it is by no means so plenty as it used to be in this state."⁷⁵

With animals disappearing as fast as Indians, some Englishmen no longer found it necessary to compare the two. In contrast to John Smith and other seventeenth-century colonists, Lawson berated those who still looked on the natives as "little better than Beasts in Human Shapes." Adding that southeastern settlers "possess[ed] more Moral Deformities

and Evils than these Savages do," Lawson urged colonists to learn native languages, religions, and social customs. Such knowledge, he contended, would soon prove that, before contact, the Indians had been "the freest People in the World." Robert Beverley went even further in condemning his insensitive colleagues, noting that "all that the English have done since have going thither, has been to make some of these Native Pleasures [including hunting] more scarce." Beverley found it particularly disconcerting that the settlers had not made "Improvements equivalent to that Damage." This seemingly sudden concern for traditional Indian culture and precolonial subsistence arose in part because the natives no longer seemed to pose a serious threat to English settlement. Diminished and dependent, the same bestial savages who struck terror in the hearts of the earliest explorers could now safely be regarded as curious and pathetic victims of the European incursion.⁷⁶

Although such comments reflect the guilt associated with conquest, they also present colonial historians with an important moral question. Were Lawson and Beverley right to lay the blame for such environmental problems solely on their fellow Englishmen? Their argument has much to recommend it. Europeans not only initiated the contact, but also benefited (in terms of land and security) from the devastation wrought by Old World diseases. Colonists also made little effort to save Indian lives or curtail overhunting until those problems threatened to erode profits. By then, as colonial legislators discovered, the most serious ecological damage had already been done.

But Lawson and Beverley may also be guilty of painting too poetic a picture of precolonial Indian life. Long accustomed to taking whatever

they needed whenever and however they could, the natives welcomed European firearms as more efficient tools for obtaining the trade goods they coveted. Moreover, some ancient practices (such as the fire-hunt) had always been used to procure game in quantity and proved highly adaptable to commercial hunting. From a purely historical perspective, Europeans may bear most of the responsibility for depopulating the forest, but Indians must be viewed as willing partners in the slaughter.

From a cultural and ecological standpoint, however, the issue becomes more complex. In trying to explain modern man's relationship to the natural world, scientists have uncovered what many ecologists believe to be a fundamental truth. As humans become more independent of a particular ecosystem, they tend to use its resources more often and with greater intensity.⁷⁷ This simple axiom is as applicable to the colonial period as to the twentieth century. Before contact, the forest had determined what Indians could take and when they could take it. Since the natives relied on the land for their tools and agricultural implements, the ecosystem had also dictated how and to what extent available resources might be tapped. By introducing European technology and trade goods into the Southeast, explorers and colonists freed Indians from their dependence on the forest and its seasonal moods. But due to the destructive alien microbes which accompanied firearms and metal goods, that very liberation brought with it dependence on the English colonial system, a new relationship Indians and animals often paid for with their lives.

William Bartram, whose Quaker religion and work as a naturalist provided him with insights seldom shared by other colonists, may have

offered the best contemporary evaluation of the problems created by intercultural commerce. While en route to Fort James at the confluence of the Broad and Savannah rivers, Bartram found "the wild country now almost depopulated." He observed "vast forests, expansive plains, and detached groves" filled with "heaps of white gnawed bones of ancient buffalo, elk, and deer, indiscriminately mixed with those of men, [and] half grown over with moss." Noting that the scene proved "rather disagreeable to a mind of delicate feelings and sensibilities," Bartram concluded that "some of these objects recognize past transactions and events, perhaps not altogether reconcilable to justice and humanity."⁷⁸ Modern Americans who share such delicate ecological sensibilities should not be too quick to condemn either Englishmen or Indians. Instead they should view the destruction of wildlife as the understandable, although lamentable, result of a contest of cultures played out in a land of plenty.

CHAPTER IV
THE FOREST PRODUCTIVE

If the waning supply of beaver and deer created problems for southeastern colonists, the disappearance of Indians provided double compensation. Depopulating epidemic diseases not only reduced the threat of Indian attacks, they also left former village sites and their surrounding agricultural fields open for English settlement. Without Indian tenants to burn and seed them, the plots soon began the long process of reverting to forest, first sprouting weeds and grasses which in turn gave way to small trees and woody plants. Like the naturally-occurring savannahs, the grassy Indian fields proved especially appealing to English colonists. For generations, their ancestors had equated dense dark forests with wildness and danger. Most Englishmen viewed uncut woodlands as something akin to Shakespeare's foreboding Forest of Arden: "a desert inaccessible under the shade of melancholy boughs." Such woods, Englishmen thought, were the proper home for animals, not humans. Even the term "savage," liberally applied to both "bestial" Indians and forest-dwelling Irishmen, derived from the Latin word "silva," meaning wood. With their meadow-like appearance, the former Indian plots offered a welcome psychological respite from the imaginary terror of the wildwood.¹

The availability of Indian fields also meant that colonists might be spared the back-breaking work of clearing the forest. The prospect

of such exhausting labor often proved a powerful deterrent to those thinking of emigrating to the New World. The author of a 1650 tract promoting colonization in the Carolinas found it necessary to assure prospective settlers that they need not fear "that the Country is overgrowne with Woods, and consequently not in many Yeares to bee penetrable for the Plough. For there are immense quantity of Indian fields cleared already to our hand, by the Natives, which till we grow over populous may every way be absolutely sufficient." Like most of those who wrote advertisements for the New World, the author overstated his case. Some early colonists enjoyed the security and ease of settling abandoned Indian land, but most farming Englishmen had to clear their own plots. As Joel Gascoyne wrote in his 1682 treatise describing life in South Carolina, "the first thing requisite and necessary for the Settler to embrace, is to fell Timber, and to clear the Ground." In English eyes, agricultural clearing became the initial step in reducing the wildwood to civility, or turning the forest primeval into the forest productive.²

English settlers who arrived in time to witness Indians clearing fields for agriculture simply adopted native methods. Beginning in September and continuing through March, colonists removed bark from larger trees, a process which caused the trees to wither and die within two to three years. Settlers then burned off the underbrush and planted between and around the trunks. Like Indians, English farmers discovered that the standing trees did little to inhibit the necessary light from reaching their crops. This technique of girdling and burning not only saved time, but also helped delay soil exhaustion. Even when stripped

of their bark, the trees continued to return valuable minerals to the field. Moreover, when the trees finally fell, the rotting wood from their trunks added important organic matter to the ground. Commenting on such benefits, William De Brahm explained that, "Although most new Fields remain for a long time lumbered with the bodies of Trees for one or two years, this [,] however [,] does not hinder the Planters from cultivating the clear Spots; mean while, the Places thus covered with the Bodies of Trees, improve in Goodness of Soil."³

While Englishmen enjoyed the conveniences of girdling, they soon realized that it created as many problems as it solved. Until the larger trees could be removed, fields could not be tilled with oxen- or horse-drawn plows and Englishmen had to adopt the Indian method of breaking up the ground with hoes and other hand implements. According to William Byrd, girdling and burning also wasted or "always cause[d] a damage to the good wood" which otherwise might be used for fencing or building material. Moreover, Byrd believed, the process made only limited use of the nitrogen-rich ash left over after the burn. When initially cleared, a field remained "rich enough of itself without such fertilizer" and leaving the ashes behind only squandered another potentially valuable commodity. In addition, dying trees had the annoying habit of falling on crops, sometimes destroying an entire season's work. Holes left behind when the roots gave way soon became unsightly pits which contained little or no topsoil, collected water, and lent an uneven character to the field.⁴

Such difficulties reminded Englishmen of their limited success in civilizing the forest and forced them to the logical conclusion that

their methods were little better than those of the "savage" woods dwellers. But unlike Indians, settlers possessed the necessary technology to remedy those problems and during the eighteenth century, colonists in the Southeast and elsewhere developed more efficient methods. Using metal axes, they felled larger trees "about a yard from the ground," a height which seemed to keep the stumps from sending out new shoots.⁵ Colonists then split the trunks into usable planks and chopped up the stumps for firewood. The remaining underbrush could then be burned in the accustomed manner and the ashes transported to other, older fields which needed the nitrogen. The remaining tangle of underground root systems still restricted the use of draft animals, but fields cleared in this fashion became accessible to the plow in only a few years.⁶

Although they benefited from metal technology, southern colonists would have found it difficult to clear the forest if they had not also enjoyed the advantage of an adequate labor force. Not all southerners owned them, but slaves greatly aided in conquering the wildwood. Colonists with sizeable estates and many slaves sometimes rented them to smaller planters when new fields had to be carved from the forest.⁷ During the early phases of clearing, black men and adolescents performed the laborious tasks of felling and splitting the larger trees. Once those trees came down, the men resumed other duties while women and children "cut down the brushes and Shrubs with Hoes and Hatchets" or hauled firewood. Burning a new field proved too risky for women and children, so colonists often delayed that part of the operation until after dark when the men had completed their other duties. As De Brahm

described it, "at Sun-set all Slaves leave their fields and retire to their Cottages to rest an hour; then all hands are turned out to lopping and fireing, which they continue until 9 o'Clock at night." The numerous small fires employed in clearing the fields afforded the convenient advantage of providing light for the whole process. Given the importance of slave labor in clearing the forest, the shift to more complex methods in the eighteenth century probably owed as much to the increased importation of Africans as to the inefficiency of girdling and burning.⁸

Aided by European technology and African labor, southern colonists found it relatively easy to clear land that had been too heavily forested for the Indians' stone tools. In contrast to the natives, Englishmen preferred to farm densely wooded areas, believing the abundance of natural vegetation offered proof of the soil's fertility. While traveling through the Indian villages of the Yadkin Valley, Lawson saw the nearby oaks and chestnuts and concluded that "the Savages do indeed still possess the Flower of Carolina, the English [in the coastal plain] enjoying only the Fag-end of that fine country." Mark Catesby echoed those sentiments in 1731 when he reported that some of the most coveted acreage lay in "Oak and Hickory land; these Trees, particularly the latter, being observed to grow on good land."⁹

However vague they might appear, such notions had a sound basis in ecological fact. The huge oaks and hickories required the mixed clay soils of the eastern piedmont or the darker humic ground common to the foothills and mountains. The giant trees also needed more moisture than the pines of the coastal plain and wherever hardwoods flourished, prospective farmers could be assured of adequate rainfall. The

abundance of moisture meant that rivers in oak and hickory forests overflowed every spring, depositing even richer alluvial soil along their banks. Noting the dense foliage along Virginia's major rivers, Hugh Jones believed the best tobacco land could be found "where fine timber or grapevines grow." Grain also seemed to thrive in such soil. As Governor Drayton observed, "whenever large rivers penetrate through these lands, there the adjacent soil is of excellent quality, favoring the growth of the heaviest timber; and is capable of producing from fifty to seventy bushels of Indian corn ... to each acre."¹⁰

Covered with pines, scrubby oaks, myrtles, and cabbage palmettos, the sandier soils of the outer coastal plain at first seemed less attractive. Most early explorers condemned such ground as unfit for any cultivation. But in a region as topographically diverse as the Southeast, even this apparently "barren land" sometimes showed promise. Although they ran slower and deeper than the streams farther inland, coastal plain rivers periodically flooded the surrounding area, laying down alluvial soil which mixed with the sand to produce a dark gray mould. The flatter, low-lying terrain meant that such land often lay under water for most of the year. Known as "bottomland swamps," these narrow strips of more fertile land sprouted large laurel oaks and other wetlands trees which caught the eyes of English farmers. Milder temperatures near the sea also offered a longer growing season, increasing the region's agricultural potential.¹¹

In the late seventeenth century, South Carolina settlers discovered that such conditions proved ideal for rice, a nutritious grain which flourished in the tropical climates of Asia and West Africa. Clearing

heavily-forested southern swamps for rice required special techniques. The creek or river which produced the quagmire first had to be dammed or diverted so that colonists and slaves could work on dry ground and so the fires could burn unimpeded. Most rice-growers preferred to begin clearing in late winter when streams ran lower and cooler temperatures reduced the risk of snakebite in the reptile-infested swamps. Once the winter sun had dried the soil, clearing proceeded as usual. Settlers and slaves cut down the larger trees and fired the cane and underbrush. They then hauled away the usable timber and ashes, leaving the trunks to rot. The remaining cane stems had to be dug out by the roots, since fire made them sprout profusely the following spring. When the weather warmed sufficiently, colonists sowed rice between the logs and released the dammed or diverted rivers to provide the necessary irrigation.¹²

Although rice adapted well to the bottomlands, those who grew the plants eventually came to prefer the steamy tidal swamps and marshlands farther east. The rivers there rose with every high tide and could be controlled with dikes. But colonists paid a high price for this convenience. These larger, wetter swamps sprouted huge cypress trees which had to be cut, split, and hauled away before the ground could be planted. In addition, the dense tangle of marsh grasses and other undergrowth often had to be burned several times before planters uncovered the "wet, deep, miry Soil" or "black greasy Mould" they coveted.¹³

Metal technology, slave labor, and the increasing demand for farmland in both the piedmont and coastal plain soon changed the complexion of the southern landscape. As early as 1648, Governor William Berkeley of Virginia reported "many thousand Acres of clear land ...

where the wood is all off it." Completely freed of fallen trunks, the land supported "neer upon a hundred and fifty Plowers, with many brave Yoak of Oxen" who together produced "excellent Wheat, Barley, Rye, Beans, Peas, [and] Oates." Throughout the Southeast, the demand for bottomland and tidal swamps led colonists to remove the timber along major streams. Joel Gascoyne's map of South Carolina drawn in 1682, described the territory along the lower Ashley River and the entire region between Stono and Edisto Rivers as "land taken up" and at least partially cleared. Edward Crisp, who charted Charles Town and the adjacent area almost thirty years later, took care to list each landholder along the major waterways. His map shows English holdings extending to the upper reaches of the Ashley and Cooper Rivers and along the major tributaries. Where no names appeared, Crisp drew trees, indicating that the settled strips along the streams had already been cleared. As immigration from Europe escalated during the eighteenth century, much of the Southeast came to resemble Hugh Jones's 1724 description of Virginia. Perhaps still fearful of the uncharted wildwood, Jones characterized the colony as "one continued forest," but happily noted "patches of some hundred acres here and there cleared."¹⁴

The most immediate effect of such deforestation was to reduce the amount of land available to the already diminishing animal populations. By 1731 Mark Catesby had discovered that black bears "fly the Company of Man, their greatest Enemy, and as the Inhabitants advance in their Settlements, the bears &c. retreat further into the woods." Although colonists avidly sought bears for meat and skins, the beasts' disappearance from settled regions also resulted from the high value placed on

oak and hickory regions. Dependent on the mast-bearing trees and fish resources of the older forests and river bottomlands, the once ubiquitous bears vanished as colonists moved into what appeared to be promising farmland. Larger carnivores, who needed vast, contiguous areas of unbroken "climax" forests, soon followed bears into the backcountry. By the mid-eighteenth century, wolves and panthers could be found only in the "deserts and uninhabited parts" of the western piedmont and mountains. Other creatures residing in the eastern forests also suffered. Acres of potential pigeon roosts and turkey habitat fell to the settlers' axes and plows. Animals relocating to avoid colonists still found themselves at the mercy of Indian hunters who sought pelts and meat to exchange with traders. Along with market hunting, habitat destruction became a major factor in the decline of game animals.¹⁵

Agricultural clearing did not always prove detrimental to southeastern wildlife. The most valuable animal, the whitetailed deer, probably benefited from deforestation. Once their fields had been exhausted of nutrients (sometimes in as little as three years), colonists moved on to clear fresh ground, leaving the old plots to begin the long process of forest succession. The annual grasses, weeds, herbs, and pioneer trees which invaded the old fields provided a ready supply of browse for whitetails. Under "pristine" conditions, deer would still have required dense cover to escape predators. But with wolves and panthers driven farther west, the herds suffered fewer losses from their natural enemies. Whitetail populations continued to decline due to the depredations of Indians and colonists, but the combination of

abandoned fields and the absence of predators worked to ensure the survival of the species.¹⁶

Other grass- and seed-eating animals flourished on former agricultural sites. Increased numbers of ruffed grouse, quail, and other upland birds gradually replaced wild turkeys and pigeons on colonial tables. With fewer predators to check them, rabbit and mice populations expanded to pest proportions, invading cultivated fields and storehouses. Some twenty to fifty years after abandonment, old fields again became suitable for other forms of wildlife. By then, however, other woodlands had already been cleared, a process which created a continuous cycle of increasing the number of herbivores and driving carnivores farther west.¹⁷

Even casual observers could note the obvious fluctuations in southeastern animal populations, but only those involved with the land on a day-to-day basis observed and understood the more subtle environmental changes that accompanied settlement. One such man was Landon Carter, one of the wealthiest planters in Virginia. At the time of his death in 1778, Carter held title to more than fifty thousand acres, much of it cleared bottomland along the Rappahannock River. Like most of the so-called "great planters," Carter spent many of his waking hours inspecting his holdings, keeping detailed records of the land and everything it produced. Fascinated with and dependent upon the fickle southern climate, Carter paid particular attention to temperature, rainfall, wind, and storms. By 1770 he had become convinced that Virginia's temperature patterns had undergone a fundamental change. As he described it, "this climate is so changing [that] unless it returns

to his former state Virginia will be no Tobacco colony." The spring, Carter believed, now remained "cold even into the summer" and when the seasons changed, temperatures soon became "too hot ... for any [crops] to stand." Constantly concerned about the state of his tobacco and other cash crops, Carter may have overstated the seriousness of the changes he perceived. The fluctuating temperatures seem to have had little effect on his agricultural output. Moreover, his advanced age (early sixties) and failing health may have increased his sensitivity to cold and dampness. But Carter's intricate knowledge of the landscape and meticulous record-keeping might also have alerted him to the climatic implications of deforestation.¹⁸

Modern plant ecologists are well aware of the influence of forests on temperature. In densely wooded areas such as the bottomlands and swamps colonists preferred, the crowns of the trees form an almost unbroken canopy which controls and moderates air temperature. The canopy intercepts incoming solar radiation and, since the green foliage does not warm as rapidly as the soil and ground litter, summer temperatures remain lower on the ground than at the tops of the trees. During the cold months, the canopy thins, but the trees still restrict the sun's heat from rising off the soil and ground litter, keeping average winter readings higher. This effect is even more pronounced in the southern coastal plain where pines, cedars, hollies, and other evergreens provide thicker winter cover. Clear-cutting for agriculture, whether done in the colonial period or in the twentieth century, creates more severe temperature fluctuations. Without the forest canopy to act as a mediator, summers grow hotter and winters colder. Thus the colder

springs and warmer summers Carter feared probably resulted not from any drastic change in Virginia's climate, but rather from the new ways in which deforested plantation tracts reacted to traditional weather patterns.¹⁹

Carter's observations also convinced him that Virginia's frosts now came earlier and stayed longer than ever before, a trend he attributed to the fluctuating temperatures. But this problem, too, resulted in part from deforestation. Within any standing forest, the earliest and latest frosts occur in small openings and low-lying concave areas. At night, these regions rapidly radiate heat to the atmosphere. The continuous, upward flow of warm air creates a constant draft which not only cools the cleared patches, but also attracts cold air from the surrounding forest. Known as "frost pockets," such areas are slow to sprout new trees and modern foresters often find it difficult to reseed them because the lower temperatures interfere with sprouting and flowering. Although Carter did not realize it, his fields became giant frost pockets within the forests of the surrounding landscape, sending much of the accumulated daytime heat back to the atmosphere. Consequently, he complained that it was often "too cool to plant early" and that "the latter crops can't get ripe before the frosts come."²⁰

Once the shading effect of the forest canopy had been eliminated, the surface soil warmed quickly during the summer and soon dried out completely. During the first two or three years after clearing, the warming trend proved beneficial to crops. Gradual heating caused organic material to decay faster, releasing nutrients into the field. The effect was especially evident in the darker soils of the oak and

hickory regions where the sun's radiation helped release nutrients stored in the thick layers of raw humus. This seemingly increased fertility further justified colonists' faith in heavily forested regions which, when newly-cleared, revealed "a stratum of rich black mould."²¹ In later years, however, the intense heat of the southern summer created problems for colonial farmers. Lacking the necessary humus to absorb and retain ground water, fields dried to a hard packed surface which resisted even the most efficient plows and hardiest draft animals. The ground water that did accumulate after a rain evaporated quickly and only increased the hardening effect. Carter soon discovered that, like the sun, "prodigious rains" "baked the ground excessively," making the short, hot summers drier than in times past.²²

During winter and early spring, deforestation seemed to create the opposite effect. Carter spoke often of "the excessive wetness of the winter," noting that the "land runs into cohesion with every little moisture." For the most part, wetter winters were only a seasonal illusion. In the long run, removing the forest cover from plantation tracts speeded evaporation and kept soil drier throughout the year. Winter and early spring appeared wetter because, without broadleaf trees to regulate ground temperatures, the soil froze to a greater depth than in the surrounding forests. As fields warmed during the temperate winter days, the land became muddy and difficult to till. Since the ground usually froze solid again at night, most of the moisture remained trapped in the soil to be released once more the following day. The lack of shade also meant that the infrequent snows melted more rapidly, adding still more water to the miry ground. When the warmer

temperatures of late spring finally ended the messy cycle of freezing and thawing, fields could no longer retain the ground water and it soon evaporated or ran off into nearby streams.²³

The annual spring thaw also increased runoff from wooded areas, but there the forest itself helped regulate the flow. Newly-budding broadleaf trees combined with thick evergreens to break up and scatter the spring rains over a broader plain. In addition, humus and accumulated ground litter not only trapped moisture, but also held the topsoil in place. In cleared fields, however, rains fell unimpeded and carried topsoil into adjacent streams, filling them with sediment. John Bartram, William's father, and himself a well-known naturalist, witnessed the results of such erosion many times during his travels in the southern and mid-Atlantic colonies. By the mid-eighteenth century, he could remember a time some "20 years past" when "the rain sunk more into the earth and did not wash and tear up the surface (as now)." Once deposited in the streambed, sediment reduced the carrying capacity of streams and rivers. Without beaver dams to trap debris and settle it out in ponds, the flow rate increased. Smaller streams rose to flood level with every spring freshet while rivers flooded more often and caused greater damage. As John Bartram wrote, "the rain runs most of it [soil] off on the surface," carrying with it "sand and clay which it bears away with the swift current down to brooks and rivers whose banks it overflows."²⁴

Agricultural clearing intensified other effects of the storms which brought the floods. One of the chief ecological functions of the standing forest is to reduce the effects of wind on the surrounding

countryside. In wooded areas, the crowns of larger trees catch and dissipate the violent gusts of winter and spring so that vegetation near the ground remains protected from the icy blasts. But if no forests stand in their way, winds can gather speed over level terrain and cause extensive damage to exposed fields. More than once Carter found his winter fodder "blown into stems" by such tempests. In 1775, the anonymous author of American Husbandry, a treatise on New World agriculture, urged those settling in the Ohio Valley to preserve a stand of trees as shelter from the northwest wind. Under no circumstances, the writer warned, should those farmers repeat the mistakes of southern planters who had "attack[ed] all the timber around their houses with such undistinguishing rage, as not to leave themselves ... a tree within sight."²⁵

The climatic changes associated with deforestation were local variations most easily observed in and around plowed fields. But not all timber cutting resulted directly from the desire for open farmland. Southeastern colonists and the English Crown regarded the American forest as both enemy and friend. The dense woods harbored wild creatures (human and otherwise) and stood in the way of agriculture; yet at the same time the forests promised to create a lucrative market in timber products. Unlike the gold and silver the Spanish retrieved from Latin and South America, trees could be procured with the most basic tools and a comparatively small labor force. In contrast to fur traders, would-be lumbermen needed no guns, liquor, or blankets to trade with Indians. Trees stood free for the taking.²⁶ Among Englishmen already accustomed to local wood shortages in their homeland, the ready

availability of "faire, straight, tall, and as good timber as any can be" engendered dreams of a wood supply to rival that of the heavily-forested Baltic countries. The author of one promotional tract boldly predicted that American trees would soon "finde a speedy Market, since the decay of Timber is a defect growne universall in Europe, and the commodity such a necessary Staple, that no civill Nation can be conveniently without it." The Jamestown colonists wasted little time in trying to fulfill such prophecy. The first ships to leave Virginia for England carried pines, oaks, and other trees to be used in the construction of houses and vessels.²⁷

Optimism and ambition notwithstanding, it soon proved much too costly to ship whole trees or freshly cut logs across the Atlantic. The cargo simply weighed too much and took up space that could be devoted to other high-profit items such as tobacco and furs. In the Southeast, the lumber industry first developed locally as an outgrowth of agricultural clearing. In addition to farmland, newly-arriving colonists required some sort of temporary shelter, both for themselves and their servants or slaves. Wood from the cleared plots quickly found its way into such structures. Thomas Nairne's instructions for building a "plantation" in South Carolina clearly reflected the link between agriculture and the production of finished lumber.

If anyone desires to make a plantation, in this Province, out of the Woods, the first thing to be done is, after having cutt down a few Trees, to split Palissades, or Clapboards, and therewith make small Houses or Hutts, to shelter the Slaves. After that, whilst some servants are cleaning the land, others are to be employed in squaring or sawing Wall-plats, Posts, Boards, and Shingles, for a small House for the Family, which usually serves for a Kitchin afterwards, when they are in better circumstances to build a larger [dwelling].²⁸

Early settlers who followed Nairne's instructions sawed or hewed their building materials by hand, but those who demanded finished lumber in quantity soon resorted to more efficient methods. As early as 1650, promotional writers urged that "the Saw mill may be taken into consideration" so that "Timber for building houses, and shipping may be more speedily prepared." In the Southeast and elsewhere, the term "saw mill" applied to almost any sort of lumber production, ranging from a simple "pit," where planks were sawn by hand, to water-powered mills like those of England. Water mills required a substantial investment in capital and labor and usually belonged to large landholders or merchants with sufficient funds to finance such an operation. Colonists of lesser means might pool their resources to build a water wheel and then divide the profits among the investors.²⁹ For large landowners, a saw mill proved doubly advantageous. It not only provided lumber for the plantation, but also gave slaves another task to perform in the off-season when crops needed less attention. As the author of American Husbandry explained it, "The whole culture of tobacco is over in the summer months; in the winter the negroes are employed in sawing and butting timber, threshing corn, clearing new land; and preparing for tobacco."³⁰

Although much less productive than modern lumber yards, waterpowered colonial mills might still turn out several hundred board feet of finished wood a day. Such comparatively efficient production eventually helped create the timber export business early explorers and colonists had envisioned. Since it weighed less and took up less space than freshly cut logs and tree trunks, finished lumber could be shipped

at a cheaper rate. Moreover, colonists discovered a ready market for wood products much closer to home. In the West Indies the clearing of vast tracts for sugar plantations created a wood shortage so severe that colonists in Barbados once tried to annex the island of St. Lucia in order to gain access to a new supply of timber. The close proximity of a Caribbean market further cut shipping costs so that by the mid-eighteenth century, timber leaving the major Southeastern ports of Wilmington, Charles Town, and Savannah went "largely to the West Indies."³¹

Unlike agricultural clearing, which placed an equal bounty on every tree standing in the way of the plow, the export market required wood to suit the specific needs of the buyer. For southern colonists, such demands meant selectively cutting certain trees in greater numbers. Because their export business relied heavily on rum, molasses, and raw sugar, Caribbean merchants needed a continuous supply of materials for constructing barrels and hogsheads in which to ship their merchandise. The staves, or narrow strips for the bodies of such containers, usually came from the strong, durable, and slightly pliable oaks common to eastern America. Any oak could be cut into staves, but southeastern colonists preferred to harvest white oak because it grew larger than most species and afforded more staves per tree. Some southerners still refer to the trees as "stave oaks," modern testimony to their role in the Caribbean trade.³²

In deforested parts of the West Indies, white oak was also in demand as a building material. Its dense, hard wood proved especially suitable for framing and rafters. White oak logs could be riven into

siding for the dwellings, known to colonists as "clapboard." By 1800 the trees had been so extensively used for siding that one colonist could define "Clap-boards" as "thin pieces of four feet long, riven generally out of white oak, and one edge thicker than the other." Together with the high value farmers placed on its habitat, commercial demand for white oak gradually led to shortages of larger trees in settled regions. Traveling through the Southeast in the early nineteenth century, the French naturalist Francois André Michaux noted that white oak was "less employed than formerly in building only because it is more scarce and costly."³³

In addition to white oak, West Indian coopers required more pliable wood which could be bent into hoops and fitted around the ends of barrels to hold the staves in place. Few trees proved better suited for that purpose than the various species of hickories which grew alongside oaks in the southern uplands. Since hickory wood hardens as it ages, hoops could be fashioned only from the more pliable saplings and coopers seldom used wood from trees more than twelve feet tall. Moreover, merchants found it difficult to lay in a store of saplings because cut trees seemed particularly prone to attack by insects and decay. Unlike some other broadleaf species, hickories do not normally sprout a second time from the same root; by selectively and continuously cutting the saplings, colonial lumbermen effectively slowed the regeneration process. Like larger white oaks, small hickories became "scarce in all parts of the country which [had] been long settled."³⁴

Colonists who cleared bottomlands and tidal swamps discovered a market for two other trees: baldcypress and Atlantic white cedar.

Because both species flourish in damp, low-lying areas, they produce wood which easily withstands repeated wetting and drying. Colonists also noticed that cedar and cypress logs proved "extraordinarily light and free to rive," traits which, combined with their durability, made them excellent roofing material. As John Lawson wrote of white cedar, "The best Shingles for Houses are made of this Wood, it being no strain to the Roof and never rots." Like the production of oak staves and hickory hoops, shingle-making began as a plantation industry. Landowners with access to the prized trees taught their slaves to rive shingles in winter when they had fewer crops to tend and were already engaged in clearing the woods for new fields. During the late seventeenth and early eighteenth centuries, most of the shingles produced in this manner were put to use by the landowner or sold locally to those who lacked the trees, slaves, or need to rive their own. About 1750, however, southerners began to step up production and ship a great portion of their shingles to the West Indies.³⁵

The shift to commercial production in the Southeast resulted primarily from the depletion of cedar in the Middle Colonies, the earliest suppliers to the Caribbean. Traveling in New York in the mid-eighteenth century, the Swedish naturalist Pehr Kalm found many swamps "already quite destitute of cedars, having only the young shoots left." Such scarcities stemmed in part from the cedar's peculiar habits of regeneration. The trees grow best in swampy ground, yet they require a dry, exposed seedbed in order to sprout. Most swamps produce thick stands of trees which shade the soil, meaning that cedars gain a toehold only after the canopy thins, either from a sudden recession of the

impounded waters or, more commonly, fire. But in order to create appropriate conditions for a white cedar forest, such fires must occur only when the water table is high enough to keep cedar seeds (which are encased in tiny cones) from burning. Because they depend on some natural clearing agent, white cedars are, like pines, typical of the early stages of forest succession and eventually give way to a broadleaf forest of bays and other hardwoods. As Kalm discovered, heavy selective cutting of the sparsely distributed stands had the effect of "extirpating them entirely."³⁶

As cedars vanished from the northern forests, the shingle industry began a gradual migration southward until the Carolinas finally joined New York, New Jersey, and Pennsylvania as major suppliers to the West Indies. Southerners took to their new role in the trade with vigor. Planters advertising land for sale tried to attract buyers with promises of "seadar and sypress swamps" which might supplement their incomes. In North Carolina, such land could be found in quantity to the north of Albemarle Sound in the vicinity of Great Dismal Swamp. Together with the availability of trees, the region's comparatively high population density made it a center of shingle production. Also rich in raw material, the Cape Fear Valley offered the convenience of a larger slave population and it too became important in the trade. In those and other low-lying areas of the coastal plain, southeastern colonists repeated the scenario Kalm observed in New York, adding cedar and cypress to the list of diminishing trees.³⁷

Although much of the timber cut for export in the Southeast eventually found its way to the West Indies, colonial lumbermen did not rely

exclusively on the Caribbean market. Southeastern merchants also sent white oak boards north to New England shipwrights, increasing shortages of that valuable building material. But the tree most in demand at both British and New England shipyards was southern live oak. Its water-resistant wood made even better shiptimber and large landowners in the coastal plain soon added "live-oaking" (the practice of cutting the larger trees for market) to their winter agendas.³⁸ Since it grew only in a narrow band across the dunelands and barrier islands, the live oak quickly fell victim to selective cutting. The shift to cotton production in the late eighteenth century took an even greater toll as South Carolinians removed the trees to plant valuable sea-island cotton. Like most of their species, live oaks grow slowly and are typical of the latter stages of forest succession. Once destroyed, the trees seldom replaced themselves; by 1800 live-oakers found it increasingly "difficult to procure sticks of considerable size in the Southern States."³⁹

Valuable as they might be, however, neither oaks, hickories, nor cedars could measure up to what Lawson described as "the most useful Tree in the Woods," the longleaf pine. "Fine-grained and susceptible of bright polish," longleaf pine planks proved ideal for ceilings, floors, and interior walls. Strong and durable, it also made excellent deck planking for English and colonial ships. Most important, the trees seemed inexhaustible, stretching from southern Virginia across the rest of the Southeast in an unbroken hundred-mile-wide band.⁴⁰

Since colonial farmers shied away from the sandy soils in which the trees flourished, pine logs could not be acquired as a convenient

byproduct of agricultural clearing. Procuring finished pine lumber in quantity required special techniques best suited to large estates which housed many slaves. During winter, when the sap reached its lowest ebb, planters of sufficient means set up temporary camps in the longleaf forests. William Bartram witnessed one such operation along Savannah River. Written in his always poetic style, Bartram's description calls to mind modern logging camps of the Pacific Northwest. The slaves, he reported, stood "mounted on the massive timber logs, [while] the regular strokes of their gleaming axes re-echoed in the deep forests." The "timber landing" to which the slaves brought the felled trees rested on a bluff sixty to seventy feet above the stream. Slaves rolled logs off the high embankment into the river, roped them together in rafts, and floated them some fifty miles to the sawmills of Savannah. Wherever large streams intersected the longleaf forests, colonists set up similar operations. John Collet's map of North Carolina, drawn in 1770, shows most of the sawmills situated along the Cape Fear, Neuse, and their major tributaries--perfect locations for tapping the colony's plentiful supply of longleaf pines.⁴¹

Colonists and the Crown not only valued pines for their lumber, but also for their thick, straw-colored sap, known to Englishmen as "resin" or "turpentine." Englishmen found hundreds of uses for pine sap. Spirits of turpentine, the volatile liquid constituent of the resin, provided fuel for lamps. It also had a wide variety of medicinal uses. Applied externally, its natural heating properties helped relieve sore joints and muscles; taken internally in small doses, it served as a laxative and diuretic. Those who could afford it used spirits of

turpentine to drive fleas from their stables and bedrooms. Rosin, the solid part of the sap, might be fashioned into candles or blended with lye to produce medicinal soap.⁴²

But Englishmen most valued pines for two other products: tar and pitch. Before the advent of petroleum lubricants, soldiers greased the wheels of army transport wagons and field artillery with pine tar. Farmers used it as a preservative for fence posts and applied it to seed corn to deter birds and rodents. Water that had been allowed to stand on tar proved an effective remedy for coughs and respiratory diseases in both livestock and humans. During the colonial period, however, the Crown sought tar mainly for its uses in shipbuilding. Rope used as rigging first had to be coated with tar to prevent weathering and fraying. Pitch, an even heavier, stickier substance obtained by boiling down tar, provided a protective coating for the hulls of wooden ships. Because of their importance to the maritime industry, tar, pitch, and the crude resin or turpentine which produced them came to be known as "naval stores."⁴³

Before colonization, England relied primarily on the Baltic countries to supply the Royal Navy with tar and pitch. Largely self-sufficient, those nations demanded payment in bullion rather than trade goods, meaning that England ran a permanent deficit in the Baltic trade. The expansive pinelands of the Southeast promised to correct the imbalance, and investors in the Jamestown colony urged settlers to make immediate use of their piney resources. When he arrived in Virginia with the "second supply," Christopher Newport brought with him a number of Poles and "Dutchmen" to instruct colonists in the manufacture of tar

and pitch. After Virginia became a Crown colony in 1624, Charles I continued to call for the production of naval stores, demanding in 1632 that colonists send samples of their tar and pitch to England for inspection. Charles II went even further, authorizing Governor William Berkeley to ship three hundred tons of tobacco to England duty-free if the governor could also send over a like amount of tar, pitch, and other commodities.⁴⁴

Despite such encouragement from across the Atlantic, Virginia's naval stores industry never measured up to English expectations. In part, the failure stemmed from the success of tobacco agriculture. The high profits made from tobacco exports during the early years of colonization led to the neglect of other commodities, prompting Charles I's famous description of Virginia as a colony "built upon smoke." But the slow development of tar and pitch production also has an ecological explanation. The loblolly and Virginia pines growing near Jamestown and in the surrounding vicinity produced only a thick resin which, while it contained "turpentine in abundance," required much time and effort to distill. Moreover, both species grew best in old Indian fields or other cleared areas, meaning that, at the time of colonization, pure stands suitable for large-scale production were sparsely distributed. Writing to the director of the Virginia Company in 1620, Governor George Yeardley wondered if naval stores would ever become staple commodities because "the Trees (for ought that we cann yet understand) doe grow soe dispersedlie as they are nott woorth the fetchinge together."⁴⁵

Not until the mid-seventeenth century, when colonists settled farther south, did England begin to reap the benefits of the pinelands.

In the Carolinas, colonists encountered the pure unbroken band of longleaf pines perfect for commercial exploitation. Those trees produced a thinner resin which, as William Byrd explained in 1728, "abound[ed] more with Turpentine and consequently Yield[ed] more Tarr, than either the Yellow [loblolly] or the White Pine."⁴⁶ In addition, the milder winters common to the southern coastal plain meant that valuable resin flowed up to "6 mo[nth]s. longer than in Virginia and the more Northern plantations." Although Virginia continued to export naval stores throughout the eighteenth century, most of the tar and pitch exported to England and the West Indies came from the Carolinas and Georgia. By 1722, competition from Carolina naval stores had decreased the price of Baltic tar from fifty to twelve shillings per barrel.⁴⁷

Like the other forest industries, naval stores production was a seasonal activity, dependent on slaves and usually practiced in conjunction with agriculture. To acquire raw turpentine (resin), southeastern colonists employed a technique known as "boxing." In winter, when they had fewer demands on their time, colonists and slaves cut large rectangular notches, called "boxes," in the largest longleaf pines. In spring, when the sap began to rise, it flowed out from the heartwood and collected on the flat bottom edge of the box. From there, John Brickell noted, "the Negroes with Ladles take it out and put it into Barrels."⁴⁸

Separating resin into spirits of turpentine and rosin required that raw sap be placed in large copper kettles, one part resin to four parts water. The entire mixture then had to be boiled until it separated into a "thin and clear Oil like Water" (spirits of turpentine) and the solid rosin which remained at the bottom of the vats. Since the distillation

process demanded much labor and had to be done in spring when slaves had other duties to perform, most early colonists chose not to produce the finished products. Instead, they shipped the barrels of raw sap to England for distillation. As Brickell remarked, "The Rosin is very scarce in these parts, few giving themselves the trouble." Not until the late eighteenth century did southerners begin to distill their own spirits and rosin in quantity.⁴⁹

Although raw turpentine production did not require that trees be cut down, the process created other ecological problems. Most of the sap accumulated in July and August, the height of the fire season in the coastal plain. Rarely more than twelve inches from the ground and filled with volatile resin, the boxes became especially susceptible to lightning fires or blazes kindled through "the carelessness of travelers and wagoners." Without thick bark to retard the flames, the fires burned through to the heartwood, either consuming the whole tree or damaging it so severely that it soon died. Destructive wildfires in turpentine "orchards" could easily be identified by the thick black smoke of burning resin, an ominous signal that the owner of the trees would be out of business for the season.⁵⁰

To reduce the risk of wildfire, some southerners practiced a technique known as "raking the faces." Periodically during the fire season and once or twice in winter, colonists or their slaves raked twigs, dead needles, and other debris from around the bases of boxed trees. These small cleared circles served as miniature fire breaks which prevented stray flames and sparks from igniting the boxes. In the late eighteenth century, as more colonists began to distill spirits of

turpentine and rosin, southerners added a new twist to the technique. Once the orchard had been raked, colonists sometimes set light ground fires designed to consume ground litter and render the site less susceptible to an uncontrolled blaze. Although the practice helped protect larger pines, it proved disastrous for young trees. Not yet fire-resistant, seedlings and small saplings perished along with the ground litter. A winter burn might also destroy the seed crop, crippling the forest's ability to reproduce itself.⁵¹

Even if they escaped damage from wildfire, boxed trees seldom survived for long. When the pines stopped producing resin in quantity, colonists moved on to tap other trees, leaving the dry boxes behind. Over several years, the cuts themselves might rob the trees of enough nutrients to kill them. But before that could happen, other forces usually took over. In much the same way as they collected sap, abandoned boxes often filled with rainwater, increasing the likelihood of attack by fungi and decay. Boxed trees also attracted bark- and wood-boring beetles. Traveling through the Southeast in 1804, Michaux found that such insects had left "extensive tracts of the finest pines ... covered only with dead trees."⁵²

Pitch and tar production exacted an even greater toll. During the early years of colonization, the Crown urged Virginia settlers to learn the "East Country" method of distilling tar, a technique used in the Baltic countries. The East Country method called for bark to be removed from standing trees to a point eight feet above the ground. The trees then had to be left undisturbed for at least a year until the barked

area became saturated with sap, whereupon the trees were felled and the pitchy lower trunks burned to produce tar.⁵³

Although widely regarded as the best means for procuring high-quality tar, the East Country method required time and energy that southeastern colonists preferred to devote to agricultural commodities such as tobacco and rice. Consequently, southerners settled on another, less demanding technique. Colonists or their slaves first sought a slightly elevated mound or knoll on which they dug a circular pit. Four to six feet away, they scooped out another, shallower depression connected to the first by a narrow ditch. Known as a "kiln," the entire structure was lined with clay to facilitate the flow of tar. During winter, colonists sent their slaves into the pine forest to gather dead, dry pine boughs called "light wood." They placed the wood in the pit and covered it with clay or sod, leaving small openings near the bottom of the woodpile. The "tar-burners" then set the highly volatile wood on fire but, because the holes at the base of the kiln afforded only a slight draft, the pile smoldered for weeks. Tar, a byproduct of the slow combustion, collected at the center of the pit and flowed through the ditch to the receptacle where it could be ladled into barrels for export or boiled into pitch.⁵⁴

Kiln tar proved much inferior to that extracted by the East Country method. British naval authorities complained that American tar tended to rot the very ropes it was designed to protect. Tar from the Southeast also retained clay residue from the kilns which made it less suited for medicinal purposes. Despite the Crown's continuing efforts to discourage them, southerners found the kilns too convenient to

abandon. Kilns could be fired in winter, allowing slaves to tend crops during the warmer months. Kilns might also be stocked with trees destroyed by turpentine. John Brickell reported that colonists often sent their slaves into abandoned turpentine orchards to split the dead trees into usable light wood. Likewise, smaller branches and residue from pines cut for lumber and those toppled by wind or ice could be salvaged for the kilns.⁵⁵

Although colonists thought them more efficient, kilns consumed wood at an alarming rate. In 1722 a British official estimated that South Carolinians annually exported sixty to seventy thousand barrels of tar and pitch. By 1753 North Carolina's yearly exports totaled 61,528 barrels of tar and 12,052 barrels of pitch. Since it took almost a full cord of light wood to make a barrel of tar and one third to one half again as much to produce pitch, settlers in each colony may have processed up to 75,000 cords of pine per year. That amount can best be visualized as a stack of wood four feet high, four feet wide, and 113 miles long.⁵⁶

Like white cedars, longleaf pines do not regenerate as fast as some other species. The trees produce abundant seed crops only every three to four years and up to 90 percent of those usually fall victim to squirrels, turkeys, and other animals. While in its "grass stage," the longleaf is also particularly sensitive to competition from other plants, and seedlings are often crowded out by perennial grasses and herbs. Colonists further restricted pine reproduction by choosing only the largest trees for their sawmills, turpentine orchards, and kilns. Such trees generally grew only in older pine forests where smaller

hardwoods (harbingers of the next stage of forest succession) had already moved in beneath the lofty conifers. Cutting pines reduced competition for the sprouting oaks and hickories, "releasing" them to dominate the site.⁵⁷

Most colonists, however, probably remained unaware of such changes. The vastness of the pinelands and the seasonal nature of lumbering and the naval stores industry effectively reduced the threat of shortages. Instead of diminishing, exports of pine lumber and naval stores increased toward the end of the eighteenth century, making the "produce of the woods" important commercial staples.⁵⁸ Southerners did not begin to realize the implications of such unrestrained production until the mid-nineteenth century when improved overland transportation made it economically feasible to tap trees farther inland and copper stills eliminated some of the labor involved in turpentine distillation. By 1850 the formerly pure longleaf forests of northeastern North Carolina had given way to small tracts of oak mingled with stands of loblolly pine. The still visible mounds of ancient tar kilns gave silent testimony to colonial exploitation, prompting one nineteenth-century observer to note that "the distribution of no tree has been more affected than that of the long-leaf pine by the transformation from a wilderness to a civilized country."⁵⁹

In addition to supplying the colonial market with lumber and naval stores, southeastern settlers cut trees to meet their own needs. Like their Caribbean counterparts, southerners required staves, clapboard, shingles, and planking. Those with access to large, forested tracts relied on white oak, cypress, cedar, and longleaf pine. But the

comparatively high prices of such woods forced colonists of lesser means to use inferior materials. In North Carolina, inland settlers cut the smaller, more porous scarlet oaks for staves and clapboard. In the Virginia piedmont, colonists built their houses with spongy loblolly planks, accepting the inconvenience of buckling floors as a tradeoff for less expensive boards. Throughout the Southeast, settlers found myriad uses for other trees. They constructed dugout canoes from bald cypress and fashioned buckets and pails from white cedar. Posts made from cabbage palmetto proved highly resistant to the ravages of sea worms and became the preferred material for docks and wharves. During the Revolutionary War, southerners also used soft palmetto posts to build forts, discovering that the wood "close[d] on the passage of the [musket or cannon] ball, without splitting."⁶⁰

Most colonists, however, relied on the forest to supply less exotic needs. For Englishmen fearful of the wilderness and its untamed residents, the chief symbols of civility were the fences that surrounded their fields. Due to its communal nature, Indian agriculture required no fixed boundaries and during the early years of colonization, fences helped distinguish well-kept English fields from the tangled (though highly productive) Indian plots. In England, farmers often used hedges to mark off their fields, but southeastern colonists found such enclosures impractical. Hedges took too long to grow and could not be moved to new fields when the plots no longer produced. Stone walls, permanent fixtures of the English and later the New England countryside, proved equally unwieldy. Besides, as Mark Catesby pointed out, southerners

would be foolish to ignore "the Facility of making wooden Fences in a Country abounding in Trees."⁶¹

Southeastern settlers preferred the "worm" or "Virginia rail" fence. Constructed without posts by laying three or more split rails atop one another at sharp angles, the fences stretched in a zigzag pattern around cultivated fields. Over the course of several years enough rails to supply a large estate could consume many trees. But the temporary nature of colonial fences initially worked to conserve wood. Since they needed to stand only until the field became exhausted, fences could be constructed from any timber that resisted weathering for about five years. Colonists in the coastal plain relied on pine, even employing valuable longleaf rails when they could be acquired in sufficient quantity. Farther inland, southerners built their fences of oak, black walnut, or chestnut, eschewing hickory because it became "quite rotten and spoiled in three years." When colonial farmers moved on to a new field, those fences still in good repair could be dismantled and assembled at the new site. Moreover, spreading the demand for fencing among several varieties of trees helped limit selective overcutting of a single species.⁶²

English visitors to the Southeast decried such seemingly haphazard fencing practices, arguing that the ready availability of wood offered all the more reason to erect permanent enclosures.⁶³ During the mid-eighteenth century, continuing complaints and the often destructive habits of wandering livestock prompted colonial lawmakers to pass mandatory fencing regulations. The laws generally required fences three to five feet high around all cleared ground, whether it produced crops

or lay fallow. According to North Carolina's law, "the peace and harmony of every neighbourhood" depended on such "good and sufficient fences." In the backcountry, away from the watchful eye of the local authorities, colonists often ignored the regulations, but farther east, in more densely settled areas, planters now had to erect fences that outlasted the field's productivity. These permanent structures called for water- and rot-resistant woods such as cypress, cedar, and white oak, placing an even greater demand on those diminishing species.⁶⁴

Although southerners required lumber for building and rails for fencing, the vast majority of timber cut for local use went to heat their houses and cook their food. Throughout the Southeast, early settlers and promotional writers marveled at the availability of wood "proper for fireing." Blessed with abundant forest resources, colonists shunned other fuels. As early as 1701 Lawson reported the discovery of coal in piedmont Virginia and believed similar deposits might be found in the Carolinas. Yet he saw no real need for such resources, noting that the "Plenty of Wood (Which is much the better Fuel) makes us not requisite after Coal-Mines." Unlike Indians, who relied almost exclusively on deadfalls, colonists cut their firewood from the standing forest. In summer, when only the cooking fires needed stoking, settlers sent their children or younger slaves to cut and gather wood from forested plots reserved especially for that purpose. In winter, when they needed it most, colonists augmented supplies from their woodlots with timber cut during agricultural clearing.⁶⁵

Some of the German colonists who immigrated to the Southeast burned their wood in cast iron stoves which consumed the fuel slowly and

efficiently. Englishmen, however, preferred open fireplaces which (as modern wood-burners know) sent much of the warm air they generated up the chimney. On larger estates, the spacious, drafty rooms of the "big house" proved especially difficult to heat. In addition, the landowner had to provide heat for slave quarters and fuel for cooking fires, creating a staggering demand for firewood. During the colder-than-usual winter of 1770; Landon Carter took time to reflect on the requirements of his several estates. Restating his belief that Virginia's climate had changed, he noted that

We now have full 3/4 of the year in which we are obliged to keep constant fires; we must fence our ground with rails[,] build and repair our houses with timber and every cooking room must have its fire the year through. Add to this the natural deaths of trees and the violence of the gusts that blows them down and I must think that in a few years the lower parts of this Colony will be without firewood.⁶⁶

Like his predictions about Virginia's climate, Carter's observations concerning the availability of firewood reflected local conditions, not a large-scale decline in timber resources. Farther inland, vast tracts of timber still stood untouched. Even on Carter's plantations, plenty of trees remained intact. The problems he sensed, like the shortages associated with commercial lumbering, resulted from heavy selective cutting. Cordwood cut from the seemingly infinite supply of pines resisted fire when green and when allowed to season it burned so fast that it constantly had to be replaced with fresh fuel. Consequently, colonists located their woodlots in hardwood forests where they could obtain various species of oak, or preferably, hickory. Those woods produced "an ardent heat," leaving "a heavy, compact and long-lived coal."⁶⁷ Cutting such trees for fuel only added to

scarcities created by the demand for staves, hoops, clapboard, and shiptimber. Carter saw two possible solutions. In contrast to Lawson seventy years earlier, Carter hoped colonists would be "happy in discovering mines of coal." Failing that, he could only wish for some efficient method of burning the pines which covered his old fields.⁶⁸

The immediate solution to local wood shortages proved much easier and ecologically less sound than either of Carter's proposals. Colonists who lacked a ready supply of wood simply bought it from those who had more. In coastal towns and thickly settled regions, local merchants developed a lucrative firewood business. Inland settlers cut the timber and floated it down rivers to commercial sawmills where, instead of cutting it into planks, sawyers split it into usable cordwood and hauled it overland to urban markets. The growth of the trade can be charted through legislation designed to regulate the sale of wood. By 1784, all four southeastern colonies had passed laws defining a standard cord of marketable firewood as a stack eight feet long, four feet broad, and four feet high. The developing firewood market only extended the destructive demand for timber farther inland. As the author of American Husbandry wrote in 1775, "In the management of their woods, they [southerners] have shown the same inattention to futurity as their [northern] neighbors; so that in the old settled parts of the provinces, they begin to fear a want of that useful commodity, and would have felt it long ago, had they not such an immense inland navigation to supply them."⁶⁹

The extensive use of rivers to transport timber and firewood had other ecological implications. To save labor and expense, colonists

often removed trees from the adjacent banks and slopes so that (as William Bartram discovered) the logs could be rolled or dragged into the streams. In much the same way as it affected agricultural fields, eliminating the forest canopy caused water temperatures to grow warmer and increased evaporation. Removing timber from the drainage basin also meant that rainwater ran off more rapidly at all seasons and that soil dried out quicker. Rivers might rise during spring floods, but overall the basin became drier, causing the water level in major streams and their tributaries to drop. Silt accumulated from increased erosion added to the effect, raising the level of the streambed and making waterways shallower than ever before.⁷⁰

Such fluctuations in temperature and water levels proved disastrous for fish populations. Some smaller streams no longer ran deep or cool enough to attract perch, trout, and other inland species. Moreover, the water which powered colonial sawmills first had to be collected behind log or stone dams which restricted spawning runs of saltwater fish. Even if no mill dams stood in their way, migrating fish sometimes had to negotiate permanent logjams created by rafts of timber which broke apart on their way to market. European fishing techniques compounded the problem. Like Indians, colonists took fish with weirs, herbal poisons, and spears or harpoons. However, lower water levels and stream obstructions in settled regions probably made it easier to concentrate more fish within a smaller area where they could be killed in quantity.⁷¹

Recognizing the potential depletion of a valuable resource, colonial governments responded with legislation similar to that prompted by

the fur trade. In 1680 Virginia established an "off-season" during which no fish could legally be taken with harpoons or gigs. South Carolina outlawed fish poisoning in 1726.⁷² Legislators also attempted to strike at the root of the problem by forcing those who built dams or otherwise obstructed streams to provide passageways for spawning fish. But, as John Bartram noted, "the english lives chiefly on meat and fowl" and the timber industry proved much too valuable to give up in favor of sturgeon and alewives. One South Carolina statute designed to limit the effects of stream obstructions carefully explained that nothing in the stated regulations should "be construed to prevent the proprietors of lands on the said creek from erecting mills and building mill dams across the same." Writing in 1766, John Bartram only knew that fish "abounded formerly when ye Indians lived much on them & was very numerous[;] & now there is not ye 100[th] or perhaps ye 1000[th part of the] fish to be found."⁷³

Initial efforts to control other problems created by deforestation came not from colonial legislatures, but from the Crown. Feeling the pinch of wood scarcities and running short of shiptimber, the English government attempted to preserve the best American wood for its own use. Using a conservation technique long employed in England, the Crown commissioned surveyors or "foresters" to emblazon the most useful American trees with an inverted-v. English officials first applied this "Broad Arrow policy" (so named because of the shape of the markings) to New England white pines valued as masts for ships. The Broad Arrow came to the Southeast in 1729 where foresters used it chiefly to protect the dwindling supply of live oak.⁷⁴

Although the English government eventually intended to harvest the trees it reserved, the Broad Arrow might have slowed selective cutting in the Southeast if the Crown had been able to administer it. But, like most other mercantile legislation, the laws proved virtually impossible to enforce. The West Indian market was too close and New England smugglers too numerous and crafty for the King's agents. The steady renewal of such regulations until the American Revolution suggests their ineffectiveness. Because those who ignored the Broad Arrow appeared in Admiralty Court without benefit of a jury, the policy became a sore point with colonial merchants and, instead of aiding the Royal Navy, only contributed to the growing rift between England and America.⁷⁵

Most colonists thought the Crown overly cautious in its concern for American trees, but the British government could sometimes be as cavalier as colonists about the future of the southern timber supply. In 1704, in an effort to encourage naval stores production, Parliament offered a bounty of ten shillings on each barrel of tar and pitch produced in America. That same bill made it illegal to cut or destroy "a pitch pine tree or a tar tree" under twelve inches in diameter not within a fence or enclosure. The statute also called for a fine of ten pounds for setting woods fires in turpentine orchards without first giving public notice. But the act applied only to New England, Rhode Island, New York, and New Jersey. Less thickly settled and abundantly supplied with longleaf pines, the Southeast seemed to need no such protection. Besides, Carolina settlers were just beginning to fulfill the Crown's ambitions for the pinelands and, like colonial legislators, Parliament did not wish to discourage the growth of the industry.⁷⁶

Not until 1799, when the fledgling United States Navy faced the spectre of a prolonged commercial war with France, did American authorities seek to curb selective cutting in the Southeast. Empowered by Congress to purchase and preserve lands that contained timber suitable for ships and naval stores, Presidents Adams and Jefferson bought two islands off the Georgia coast, both of which contained valuable supplies of oak and pine. Later laws sought similar protection for timberland acquired by way of the Louisiana Purchase in 1803 and the Florida Cession in 1819, indications of growing anxiety over trends established during the colonial period.⁷⁷

Like the measures designed to protect fur-bearing animals, such concern came too late to affect the ways in which colonists used the woodlands. Long before the Louisiana Territory and Florida officially became part of English America, the forest ecology of the upper Southeast had been drastically altered. By selectively cutting oak, hickory, cedar, and other timber, colonists had removed many of the trees which had first attracted settlers to the region. Even the pinelands, once described by William Strachey as "infinite," had already begun to shrink. The wolves and panthers which frightened early explorers had begun to move farther west in search of undisturbed habitat. Sturgeon, alewives, and other ocean-going fish no longer ran the rivers and creeks in such abundance. Agricultural clearing had created local variations in weather which made the temperate climate seem less attractive and had increased the chances for damage by floods or wind.⁷⁸

Unlike the destruction of wildlife, in which colonists and Indians shared, the new forest ecology was primarily the work of Europeans (and their slaves), spawned by an inherent desire to civilize the wildwood. But civility involved more than driving out wild creatures and wild men. For Englishmen, the Southeast would remain a wilderness until it became a mirror image of the European countryside. In English terminology, the land had to be "cultivated."⁷⁹ It had to yield Old World crops and become home to Old World animals. Clearing the forest and reaping its benefits constituted only half the battle. To win their war with the wildwood and its "bestial" inhabitants, colonists had to replace the seemingly unstructured Indian way of life with the systematic subsistence patterns of Europe. Such a shift would bring even greater ecological change, but colonists thought that a small price to pay for converting the forest primeval into the forest productive.

CHAPTER V
THE FIRST "NEW SOUTH"

The first Europeans to settle in the Southeast believed it would be relatively easy to transplant Old World agriculture in the colonies. Promotional writers told of a warm climate and rich soil which promised to yield exotic crops and quick wealth for colonial planters. The Roanoke colonists planted sugar cane, oranges, and lemons alongside such traditional English favorites as wheat, barley, and oats. At Jamestown, the first settlers sowed their gardens with lemons, pineapples, olives, and other tropical delicacies. Even when early experiments with such crops failed, promotional writers continued to hold out hope for exotic species. Noting that sugar cane did not seem to flourish along the North Carolina coast, Thomas Harriot wondered if the roots might have been damaged in transport or if colonists had arrived too late in the year to set the delicate plants. He saw no reason for concern, however, since similar crops grew well "in the South part of Spaine and Barbary," regions blessed with "the same climate" as the south Atlantic coast.¹

Those who stayed longer in the Southeast soon learned otherwise. The southern climate not only proved ill-suited to tropical fruit, but for most other crops familiar to Englishmen. Forced to subsist on fish and wild game as their provisions dwindled, the Jamestown colonists eventually came to realize that not just their livelihood but their very

survival hinged on developing a system of subsistence agriculture. Chronic shortages of supplies between 1607 and 1612 taught the colony's leaders a hard lesson: Englishmen had to eat before they could sell.²

Fortunately for Virginians and other colonists, the southern climate provided its own subsistence crop, one which Indians had grown for centuries--corn. American corn offered several important advantages over traditional European grains. Unlike wheat and barley which grew best in mixed clay and humic soils, corn flourished in the sandy loam of the coastal plain. Ecologists also recognize corn as a viable "pioneer crop," meaning that it grows well on partially cleared land, a prime consideration for settlers who initially planted between stumps and fallen trees. Most important, corn could be quickly harvested, husked, and pounded into meal with the aid of a simple mortar and pestle. Wheat, barley, and other European grains required threshing and usually had to be ground with elaborate water-powered stone wheels.³

Realizing that corn might effectively reduce the threat of food shortages, the Jamestown colonists learned the basics of its cultivation from the natives. By 1613, Alexander Whittaker could write that, in the best Indian tradition, Virginians "set corn from the beginning of March until the end of May, and reape or gather [it] in Julie, August, and September." Colonists settling farther south also relied on corn. Noting the abundance of "Indian corn or Maize" grown by Carolina settlers, John Lawson described it as "the most useful Grain in the World," adding that "had it not been for the Fruitfulness of this Species, it would have proved very difficult to have settled some of the Plantations in America."⁴

The initial shift from Old World grains to corn set the tone for agriculture in the colonial Southeast. During the later seventeenth and early eighteenth centuries, southern farmers concentrated less on accepted European theories and more on what their experience in the New World taught them. In addition to corn, colonists soon learned to cultivate other indigenous crops, such as beans, squash, and potatoes. The European foodstuffs they did transplant were primarily vegetables which flourished in temperate, not tropical, climates. Alexander Whittaker noted that a number of Old World delicacies thrived in Virginia, but instead of lemons, olives, and oranges, he listed peas, cabbages, and carrots. By the mid-eighteenth century, promotional literature also reflected the change in European attitudes. Like Harriot two hundred years earlier, the author of American Husbandry knew that the Southeast lay in the same latitude as "Barbary, Syria, Lesser Asia, ... and the southern provinces of Spain." But he also warned that "the weather is changeable, and the changes are sudden; in winter, frosts come on with very little warning; and [sometimes] after a warm day." Like Indians, colonists had learned that climate and the changing seasons dictated subsistence patterns.⁵

Although European settlers faced the same climatic restrictions as their Indian counterparts, most early colonists hoped to do more than simply survive from season to season. The same European economic system that required deerskins, timber, and naval stores also encouraged the development of cash crops for export. For Indians, farming had remained an end in itself. For the first colonists, subsistence only laid the basis for commercial agriculture. Dreams of agricultural profits did

not die with the first frost-bitten fruit trees and sugar cane. The southern climate might not favor oranges and lemons, but the land produced other exotic staples, many of which did not grow in the northern latitudes of New England or the mother country.⁶

The Roanoke colonists discovered that the coastal Indians already grew one crop which might be of value in Europe. Harriot described it as "an herbe" of "precious estimation" among the natives. He recommended the plant for export on the basis of its supposed therapeutic value. Once "dried and brought into powder," Harriot reported, the herb could be burned to produce medicinal smoke that purged "superfluous fleame and other gross humors," leaving those who used it "notably improved in health." Indians called the plant "uppewoc"; Englishmen knew it by its Spanish name, "tobacco." Thanks to Harriot's treatise and similar claims for the plant's medicinal properties, New World tobacco (most of which initially came to England from Spanish vessels captured by the Queen's privateers) became a fashionable social habit among Englishmen of sufficient means to purchase it.⁷

Virginians searching for a cash crop also recognized the possible merits of tobacco. When John Rolfe's experiments in 1612 produced a milder, better tasting strain of the weed, American tobacco quickly emerged as a "poor man's luxury," enjoyed by virtually all classes of Englishmen. Early shipments of tobacco brought such immense profits that in 1616 Virginia Governor Thomas Dale found it necessary to decree that those who planted the crop must also grow two acres of corn for their families and male servants--a wise decision given the settlers'

tendency to neglect subsistence crops in favor of exotic exports. Even with that restriction, however, the tobacco business boomed. By 1627, Virginians were exporting 500,000 pounds of the weed annually. Tobacco's success owed as much to its ecological adaptation to the southern climate as to the high prices it brought in England. Like corn, tobacco could be grown in almost any soil and thrived in hills between stumps and downed trees. Unlike lemons and oranges, tobacco required neither extended periods of tropical heat nor regular drenching rains. In 1617, during the height of the tobacco boom, colonists successfully grew the crop in "the market-place, and streets, and all other spare spaces" in and around Jamestown.⁸

Ironically, the ease with which tobacco could be grown and marketed eventually worked against southern farmers. Virginia planters flooded the English market, turning the tobacco boom into a tobacco glut. By 1645 prices for American tobacco had fallen by 85 percent and the downturn continued well into the 1680s. The stagnated market created serious problems for Europeans settling farther south. Migrating Virginians, who first settled the Albemarle region of North Carolina, discovered that the new colony's lack of deep harbors increased shipping costs and further eroded profits. When colonists from Barbados founded South Carolina in 1664, they faced a similar dilemma. South Carolina lay too far north to produce West Indian sugar with which the settlers were familiar and the new settlement had been founded too late to take advantage of the tobacco boom. More than a half century after the Jamestown colonists planted fruit trees, southerners still searched for viable export crops.⁹

In the South Carolina low country and along the southern coast of North Carolina, the solution proved to be rice. Southeastern Indians had gathered several species of wild American rice, but did not grow it as a subsistence crop. South Carolinians probably learned domestic rice cultivation from their slaves, many of whom had either grown the crop or seen it grown along the rivers of West Africa. Slaves knew how to plant the grain by making small impressions with their heels and how to separate the husks from threshed rice by "fanning" it in the wind. Nurtured by African labor and know-how, rice grew well in the semi-cleared bottomlands and tidal swamps. More shallow-rooted than either corn or tobacco, rice plants easily took hold in soil which contained the stumps and roots of the natural vegetation. And since the delicate rice plants had to be tilled by hand anyway, colonists seldom worried about clearing fallen timber to make way for plows and draft animals. By the mid-eighteenth century, rice had become so important to South Carolina's economy that colonists there "reckon[ed] it as much their staple commodity, as sugar is to Barbados and Jamaica or Tobacco to Virginia and Maryland."¹⁰

The Barbadians who settled South Carolina also brought seeds for what would become the colony's other major export crop: indigo. Like rice, indigo grew wild in parts of the Southeast, but the species best suited for making the deep blue dye Englishmen coveted came from the West Indies. Experiments with the West Indian variety began immediately, but colonists did not cultivate the crop in earnest until the 1740s when a series of commercial wars with France cut off the supply of indigo from the French West Indies. Even then indigo might

not have developed into a suitable cash crop had it not been for the efforts of a recent immigrant from the Caribbean named Eliza Lucas Pinckney. Well versed in the methods of cultivation used on her father's estate in Antigua, she grew several crops of indigo solely for seed and distributed it among neighboring planters. In 1745, the British government took a hand in encouraging the crop, offering a bounty on indigo produced in the Southeast. Within another ten years, indigo production had become so profitable that Alexander Garden, a Charles Town doctor and naturalist, thought it pointless to introduce any new crops into South Carolina. Garden feared that planters had been so caught up in the "golden days of indigo" that the commodity might soon go the way of Virginia tobacco and be worth only half its current price.¹¹

Although tobacco, rice, and indigo emerged as the most important export crops, southeastern farmers sold other commodities outside the colonies. Surplus corn often went to the West Indies. Colonists settling the inner coastal plain piedmont, where suitable soil abounded, eventually exported wheat and small quantities of oats, barley, and rye. The mother country also encouraged settlers to grow hemp, which could be used to make rigging for the Royal Navy. Rope exports, however, remained limited because "cordage" production required many slaves who could be more profitably employed in rice or tobacco. As William Byrd explained it, hemp "thrives very well in this clymate, but labour being much dearer than in Muscovy [the chief supplier of commercial hemp], as well as the freight, we can make no earnings of it." Other fibers proved equally difficult to export. Flax grew well in the piedmont, but

the high cost of overland transportation prevented its being sold abroad in quantity. Cotton, which would become so important to the economy of the nineteenth-century South, gained a toehold during the colonial period, but until the invention of the cotton gin, planters grew it primarily for domestic use.¹²

In sharp contrast to their attitudes toward thick forests and uncut woodlands, Englishmen professed a fondness for groves of trees that reflected human habitation, especially orchards and vineyards. In 1710, Thomas Nairne reported that South Carolinians had transplanted a number of such delicacies, including "Grapes from the Maderas, and elsewhere ... apples, Pears, Quinces, Figs ... [and] peaches."¹³ The most intriguing orchards, however, were developed from both imported and indigenous mulberry trees on which southerners tried to raise silkworms. Colonists in Virginia experimented with worms as early as 1610, but the comparatively high profits to be made from tobacco diverted farmers' interests to that commodity. Only in youthful Georgia, where the colony's founders sought to make silk the principal staple, did the worms get an extensive trial. Georgia exported more than one thousand pounds of raw silk in 1767, but as rice culture and slave labor spread into the colony silk production diminished to a cottage industry. Throughout the Southeast, field crops carried the day.¹⁴

The wide variety of crops grown in the Southeast and the region's varying topography created a corresponding diversity in European settlement patterns. In the Virginia tidewater, deep rivers and rich alluvial soil helped perpetuate a society dominated by "great planters" such as William Byrd and Landon Carter. Their ancestors, among the first

immigrants to the New World, laid claim to thousands of acres of fertile bottomland along the James, York, Rappahannock, and Potomac rivers, perfect for producing corn for subsistence and tobacco for export. The rivers also provided an easy means of transport for the colony. Most of the wealthiest Virginians preferred to build their "home plantations" along the major waterways a few miles downstream from the head of navigation. Plantation wharves constructed at such strategic sites guaranteed the planters access to the "great ships" which brought slaves to work the vast plantation tracts and took tobacco and grain to England or the West Indies. Men like Byrd and Carter served as merchants for the rest of the tidewater community, selling slaves and finished European goods to colonists of lesser means.¹⁵

The South Carolina coastal plain also had its share of riverside estates. Although most of that region's great planters generally held fewer acres than their Virginia counterparts, the commercial production of rice and indigo required substantial investment in land and slaves. In 1751 Governor James Glen noted that a rice planter needed a minimum of thirty slaves to produce a profitable market crop. On Edisto Island, in the heart of rice country, a 1732 survey of land holdings revealed that the wealthiest planters held title to several thousand acres, including rice swamps, indigo fields, and woodlands for lumber and naval stores. The extension of rice culture into Georgia produced similar settlement patterns. James Wright, governor of the colony, grew rice and indigo on eleven plantations, comprising over 19,000 acres. Wright's close friend, John Graham, held title to more than 26,000 acres in the new colony.¹⁶

Not all those who settled in the southeastern coastal plain built huge houses or held title to vast estates. The shifting sand banks and shallow inlets along the North Carolina coast effectively closed that colony to settlers arriving by sea. Moreover, the nature of the region's major waterways tended to discourage the growth of an elite planter class like that of Virginia or South Carolina. Interlaced with treacherous sand bars and often choked with the thick undergrowth of tidal swamps, most of North Carolina's rivers proved ill-suited for traffic in tobacco and slaves. Those who immigrated to the colony from Virginia farmed small plots and sent small quantities of surplus produce north to the planter-merchants of the tidewater. Only along the lower Cape Fear, North Carolina's one suitable outlet to the sea, did planters hold large tracts and export rice like their neighbors to the south. Otherwise, coastal North Carolina remained an isolated and rustic colony of small farms, a "valley of humiliation" between the wealthy and often proud planters of Virginia and South Carolina.¹⁷

The subsistence-oriented farmers of northeastern North Carolina sometimes incurred the wrath of the Virginia gentry. While surveying the boundary between the two colonies in 1728, William Byrd concluded that "'tis a thorough Aversion to Labor that makes people file off to North Carolina" where "they loiter away their Lives like Solomon's Sluggard," with barely enough food to ensure their survival from harvest to planting.¹⁸ Within fifty years, however, the very sort of subsistence farmers Byrd detested far outnumbered the great planters of the coastal plain. Between 1730 and 1770, an almost continuous stream of colonists poured into the southern piedmont and foothills. Some of the

settlers were former indentured servants or late-arriving English colonists who could find no suitable land in the coastal plain. But most of the immigrants came from the Middle Colonies, primarily Pennsylvania. Lured by cheaper land and the promise of a comfortable subsistence, they traveled the "Great Wagon Road" that linked the Yadkin Valley with Maryland and Pennsylvania. The new colonists took up residence in the sandhills, pine barrens, and forested uplands of the piedmont, regions known to coastal planters as "Back Parts," "Back Settlements," or "the backcountry." By 1776, more than a quarter million colonists inhabited the backcountry from western Maryland south to Georgia.¹⁹

According to one contemporary observer, the migrants represented "a mix'd Medley from all Countries, and the Off Scouring of America." Scotch-Irish, Palatine Germans, Welsh, Swiss, and English Quakers all carved out small, ethnically homogenous neighborhoods in the inland forests. They spoke a wide variety of European dialects, and travelers in the region frequently commented on the odd phrases and shrill accents that marked the "true backwoodsman's" speech. Equally intriguing (and often offensive) to travelers from the coastal plain was the backwoodsman's apparent lack of concern for his own safety and survival. Backcountry settlers farmed small plots of corn and other subsistence crops, augmenting their diet with deer, bear, and wild turkey. In late winter or early spring, the colonists sometimes ran short of grain and, like the Indians, had to rely solely on wild foods. Travelers in the backcountry noted other similarities between the white settlers and the natives. Many colonists went barefoot or wore moccasins. They wore

their hair long and greased their bodies to protect them from insects. Just as the earliest explorers had compared Indians to animals, the Anglican minister Charles Woodmason, who toured the backcountry in 1768, found the colonists as wild as the deer they hunted.²⁰

The contrasting settlement patterns and varying dialects that characterized the colonial Southeast suggest that European colonists were culturally and linguistically as diverse as the region's earliest Indian inhabitants. Moreover, almost every crop grown for subsistence or export either grew wild or had been domesticated by the natives. Thus, in some ways, the "new South" created by European settlement closely resembled the "old South" of the Indians. Only a few colonists, however, paid lip service to such similarities. Most European settlers believed their system of agriculture brought new order and stability to the southeastern landscape. Writing in 1751, Governor James Glen found reason to thank God that South Carolina no longer lay in "its uncultivated condition, overgrown with woods, overrun with wild beasts, and swarming with native Indians." Instead, Glen continued, the region could now be regarded "as an undoubted part of the British dominions, as one of the fairest provinces belonging to our Imperial Crown."²¹

The change Glen perceived had less to do with the types of crops colonists grew than with how they grew them. To take advantage of the Southeast's many resources, Indians had moved from region to region, gathering or harvesting the available foods. Colonists preferred to remain in one location and bring the land's resources to their farms. Toward that end, southern farmers divided their arable land into several separate fields, each of which produced a specific food or commercial

staple. Colonists planted their crops in straight rows, leaving about six feet of ground between each plant and a like distance between the rows. Like Indians, settlers first had to plant in hills to avoid fallen trees. But once the stumps and roots decayed sufficiently, colonists plowed them under or dragged them away so that the crops stood alone "like the rows of trees in an orchard." This system of monoculture (one crop per field) meant that colonial farmers needed much more land than their Indian counterparts. Monoculture also made for an orderly landscape and, in the minds of colonists, provided a neat and civilized alternative to the disheveled multi-crop Indian fields.²²

Although monoculture appealed to the settlers' sense of civility, the new practice created a variety of ecological problems. Large orderly plots of corn and other subsistence crops not only provided food for colonists, but also for creatures of the nearby forests. John Brickell reported that bears became so fond of colonists' potatoes that the beasts "seldom fail[ed] to destroy and root out" any field they discovered. Deer found newly-sprouting corn and grain fields so appealing that some colonial farmers set rows of sharpened sticks inside their fences. Invading whitetails who vaulted the enclosures impaled themselves on the spikes, providing colonists with another source of venison and skins.²³

Smaller pests called for other tactics. Noting that "crows and squirrels do great damage to crops of corn," the Virginia Assembly in 1734 required taxpayers in certain counties to present local authorities with a number of crows' heads or "squirrel's scalps" proportionate to the colonists' taxable wealth. Those who failed to meet their quota had

to make up the difference in tobacco--one pound for every head or scalp they could not produce. Both crows and squirrels could be most easily captured when young and some planters organized special hunts during the spring nesting season. In 1770, Landon Carter set aside one April Sunday solely for the capture of young crows, offering each of his slaves an extra half pound of meat for every six heads they procured. County justices who collected the trophies from such hunts were under strict orders to bury the heads, lest some unscrupulous taxpayer try to turn in the same scalps more than once.²⁴

Squirrels and crows plagued colonial farmers at all seasons, but other marauders appeared only at harvest time. Lured from the forests by ripening fruit, thousands of Carolina parakeets arrived in early autumn to sample the wares of colonial orchards. Although such invasions could be disastrous, most colonists found it easy to destroy parakeets because the birds refused to scatter when settlers fired their guns into the flocks. Alexander Wilson, a Scottish naturalist and friend of William Bartram, once fired into a flock of parakeets along the Kentucky River. "Showers of them fell," he reported, "yet the affection of the survivors seemed rather to increase; for after a few circuits around the place they again alighted near me, looking down at their slaughtered companions with such manifest symptoms of sympathy and concern as entirely disarmed me." Parakeets survived in the Southeast throughout the colonial period but, doomed by such remarkable sociability, they, too, eventually went the way of the passenger pigeon. Writing in the early twentieth century, one ornithologist

listed "slaughter by agriculturalists" as the primary cause of the parakeet's disappearance.²⁵

Even more destructive than parakeets were the great flocks of bobolinks that descended on Carolina rice fields during their late summer migrations. Arriving when the immature rice was still "soft and milky," the birds gorged themselves until they could barely fly. Because bobolinks came at predictable seasons, rice planters could sometimes prepare for the onslaught by purposely retarding the growth of their plants. Before the rice began to mature and well in advance of the expected invasion, planters flooded their fields with what they described as "intermediate water." The sudden dousing forced the plants to sprout "water roots" and set the field's overall growth back about ten days. If properly timed, the process prevented rice from reaching the milky stage until the bobolinks had moved on.²⁶

If that technique failed, colonists went after the birds with guns. Like parakeets, bobolinks often refused to abandon their feeding grounds in the face of gunfire and could be killed by the hundreds. Fattened on rice, the birds proved a tasty seasonal addition to the planter's table, prompting Mark Catesby to note that "rice-birds" were "esteemed in Carolina the greatest delicacy of all other birds." Bobolinks apparently never faced the threat of extinction, but such "hunts" by settlers and their slaves significantly reduced the size of the flocks.²⁷

Indian farmers, too, had suffered the depredations of birds, squirrels, deer, and bears, but native fields had remained relatively free of insect pests. Regular burning of farmland and the surrounding

forests helped destroy eggs and larvae. Moreover, the smaller Indian plots had proved only slightly more attractive to adult insects than foliage in adjacent woodlands. Colonists, however, preferred to clear away remnants of old crops with plows, turning under the stubble in an effort to replenish the soil. Consequently, a number of indigenous insects found the larger colonial fields to be ideal habitats and their populations increased to pest proportions. Landon Carter frequently complained of damage from grasshoppers, noting that they seemed to prefer "the cleanest ground" of his oldest and best-kept tobacco fields. On one occasion, Carter reported, "millions" of grasshoppers destroyed a twenty-acre turnip field in the space of "one night and a day." Hornworms, the larvae of the sphinx moth, also ravaged tobacco crops, while a wide variety of weevils and caterpillars frequently destroyed rice and other grains. As Carter noted, such infestations were enough to make planters wonder if insects might be "judgments ... of the great Creator."²⁸

Not all the pests flying or crawling around colonial farms came from surrounding fields and forests. A number of troublesome Old World animals accompanied colonists across the Atlantic. Black rats, frequent passengers in the holds of European ships, first came ashore at Jamestown in 1609 where they immediately destroyed the colonists' winter supply of grain. The prolific rodents multiplied so fast that by 1737 John Brickell found rats "in great plenty all over the Province, and as mischievous in these parts, as in any part of the World, destroying Corn, Fruit, and many other things." The common house mouse, another stowaway on European vessels, became equally well established by the

early eighteenth century. Insects, too, made the transatlantic trip. The honeybee, one of the more harmless imports, became so closely identified with colonial farmers that southern Indians labeled it "the white man's fly" and considered its approach an ominous harbinger of encroaching European settlement. Cockroaches, long the scourge of Old World houses, also followed colonists into the Southeast.²⁹

Of far greater concern to southern farmers, however, was the introduction of the Hessian fly, a tiny, two-winged insect resembling a miniature daddy-long-legs spider. Allegedly brought to Long Island in 1776 in straw bedding used by Hessian mercenaries, the fly's larvae soon proved a serious menace to New World wheat. By 1803, Hessian flies had moved into the Southeast, destroying "whole fields" of wheat in piedmont Virginia. Eventually southerners learned to sow a strain of Mediterranean wheat which, according to one Tennessee farmer, proved "less liable to be damaged by the fly" than other species. Winter wheat, planted just before frost in the temperate Southeast, was also "fly-resistant" since the adult insects died with the onset of cold weather. But despite such measures, the Hessian fly followed migrating southern settlers into Texas and the Great Plains where it remained a serious threat throughout the nineteenth century.³⁰

Southern wheat crops also suffered from several imported Old World fungus parasites collectively known to colonists as "rust." The most destructive of these fungi, "stem rust," grew on wheat stems and leaves where it consumed much of the water and nutrients needed by the developing kernels. As a result, kernels shriveled to half their normal size and were often blown out with the chaff during threshing. By the

mid-eighteenth century, New England wheat farmers had discovered that their rust problems resulted in part from the barberry bush, an imported ornamental shrub. The bush served as an intermediate host for the fungus, allowing its spores to survive the winter and infect maturing wheat the following spring. Several New England colonies passed laws calling for eradication of the barberries, a campaign undertaken again by the United States Department of Agriculture in the early twentieth century.³¹

But southern farmers found no such botanical scapegoat. Barberries only grew across the northern half of America and because the southern winter seldom produced temperatures severe enough to kill the fungus, rust needed no other intermediate host. Consequently wheat sown in fall was almost as likely to suffer from rust as the summer varieties. Always interested in any natural phenomenon that threatened his crops, Landon Carter spent much time and energy trying to understand wheat rust. Each time the fungus struck his fields he advanced a new theory, attributing it on different occasions to soil, insects, or some "constitution of air." Perhaps aware of the barberry discovery in New England, Carter watched for rust on neighboring plants, especially blackberries. There he observed a related, but different, fungus (known to botanists as "blackberry rust") and developed still another theory. Noting that the rust seemed to appear on the blackberries overnight, Carter thought the disease might "be owing to some peculiar quality in the night air which receiving the rays of the sun so immediately upon it, it does as through a lens or burning glass scorch the leaves up." For all his efforts, however, Carter apparently never discovered a means

of effectively controlling rust. Like other southern farmers, he had to accept European parasites as the inevitable ecological consequence of growing European crops.³²

For colonists like Carter who resided in the south Atlantic coastal plain, another, more serious threat to their well-being came from Old World parasites carried by indigenous mosquitoes. European settlers felt the effects of the microorganisms in the form of "intermittent agues and bileous distempers"; modern scientists recognize the ailments as malaria and yellow fever. Mosquitoes capable of carrying both diseases flourished in the Southeast long before colonization, but the insects remained relatively harmless until the arrival of Europeans. Explorers may have introduced a mild form of malaria (Plasmodium vivax) into the Southeast during the early sixteenth century. Although not as lethal as some of the other introduced viruses, periodic attacks of malaria weakened Indian bodies, making the natives even more susceptible to smallpox, measles, and other Old World pathogens. By the mid-seventeenth century, colonists and Indians suffered from a much more virulent strain of malaria (Plasmodium falciparum) which probably came to the Southeast in the blood of slaves imported from West Africa.³³

Europeans settling in the Southeast not only introduced the troublesome parasites, but also provided their carriers with ideal habitats. Just as corn and tobacco crops lured grasshoppers and hornworms, flooded rice fields created acres of new breeding grounds for anopheles mosquitoes. The huge vats of water used to process indigo and the ponds behind mill dams proved equally attractive to the winged pests. Eliza Lucas Pinckney noted that the warm season in South

Carolina was "Extreamly disagreeable" due to "much thunder and lightning [which increased the pools of standing water], and mosquitoes and sand flies in abundance." During his journey through South Carolina, John Bartram reported that planters of sufficient means hung "muschata curtains" as protection against the "thousands of those hungry vermin that infested all their lodgings." The fine mesh worked well, Bartram observed, but the tiniest hole in the mesh allowed the bugs to "torment us all by piercing 100 holes in our skin before morning." Although colonists never fully understood the causes of malaria and yellow fever, some Englishmen made a tenuous connection between the disease and the watery breeding grounds of the mosquitoes. David Ramsay, a South Carolinian who published a history of the region in 1808, thought it "no matter of surprise that fevers prevail in places contiguous to fresh and especially stagnant water." He believed that "Every Carolinian who plants a field--builds a house--fills a pond--or drains a bog, deserves well of his country." Where such action had been taken, Ramsay concluded, "Bilious remitting autumnal fevers have for some time past evidently decreased."³⁴

Had southerners been forced to tend their own rice fields and indigo operations they might have scarcely remained healthy enough to bring in the harvest. But most colonists who possessed sufficient land to produce those crops in quantity also owned enough slaves to work the tracts. Because many of those slaves came from tropical regions of West Africa, they enjoyed greater resistance to both malaria and yellow fever. Modern studies link resistance to malaria to the "sickle-cell trait," a hemoglobin characteristic common to certain races that inhabit

malarious environments. Since the sickle-cell trait can be passed along genetically, newly-arriving slaves and their offspring fared much better than their masters around the miry rice fields. Immunity to yellow fever depends completely on acquired rather than inherited resistance. Slaves born in West Africa were likely to have been exposed to the disease during childhood, a time during which the body is best equipped to fight off the malady. If an African child survived such an initial episode (usually with only mild sickness), he remained safe thereafter, whether he stayed in West Africa or labored on a South Carolina rice plantation.³⁵

If their crops survived the various pests and their slaves bore up under the summer onslaught of mosquitoes, coastal plain planters heavily engaged in growing staples soon encountered another ecological consequence of commercial agriculture: soil exhaustion. Depleting the soil had also been a problem for Indians who had been forced to relocate when their fields no longer produced. The great planters of the coastal plain, however, exhausted their ground much more rapidly because they farmed larger plots and grew labor-intensive crops for export. Rice, which yields more food per acre than any other grain, also requires more nitrogen and phosphorus than any other. The other major staples were only slightly less demanding. Dr. John Mitchell, an English horticulturalist who traveled extensively in the colonies, described tobacco and indigo as "rank and poisonous weeds, which only grow on rotten soils and dunghills, such as fresh woodlands and will not thrive in any others." Intensely devoted to monoculture, southern farmers usually ignored the Indian practice of planting nitrogen-fixing legumes

in their corn fields. Consequently, maize, which had fed millions of Indians for centuries, also wore out the soil. As Mitchell explained it, "At the same time, they [colonists] are obliged to plant Indian Corn, which, by its great substance and large spreading root, exhausts the substance of the earth, as much as their staple commodities; and both together deprive the people of the very necessaries of life."³⁶

Regular plowing of single-crop fields only compounded the problem. Using draft animals, colonists could break up or "stir" the soil over an entire field, a practice which, when combined with extensive hand-hoeing by slaves, effectively killed the weeds and grasses growing between the neat rows of crops. But by creating more orderly fields colonists with plows also destroyed the dense layer of ground cover that kept rain from washing away the topsoil. The tall, widely-spaced agricultural plants which replaced the natural vegetation provided only minimal cover and by continually breaking up the sod between the rows colonists greatly increased the chances of severe erosion. Early colonists also tended to plow straight up and down hilly tracts, a practice which could turn a newly-sown field into a series of deep gullies with the first spring rains. In sharp contrast to explorers who marveled at the fertility of tangled Indian fields, Landon Carter discovered that "the over Richness of any soil, or its sowness as it is called, is lowered and cured by, cropping anything on it and early and frequent dressing of it with the plow."³⁷

The simplest remedy for soil exhaustion was the same one used by southeastern Indians--migration to new, preferably heavily-wooded, land. William Tatham, who published a treatise on tobacco agriculture in 1800,

noted that tobacco planters were "continually cutting down new ground, and every successive spring presents an additional field, or opening for tobacco." Likewise, the author of American Husbandry described tobacco planters as "more solicitous for new land than any other people in America." Interpreting these and similar comments, Avery Odell Craven, an early twentieth-century historian of southern agriculture, argued that planters in colonial Virginia and Maryland established a way of life "based upon the exploitation of the soil's natural fertility." Craven concluded that "Abandonment took place on a wide scale" and that "Expansion was the only escape," expansion which led to southern designs on western territory and ultimately, the Civil War.³⁸

Although Craven's argument eventually found its way into the historiography of the Old South, the very nature of colonial agriculture makes it difficult to apply his ideas throughout the Southeast. A great many farmers in the backcountry tended subsistence plots by hand or grew only small quantities of the major staples. In those regions, colonial agriculture probably had little more impact than Indian farming. Even on large plantations, continuously growing staples did not always lead to widespread soil exhaustion. Bottomland tracts, preferred by most Virginia planters, benefited from spring floods which annually brought fresh deposits of alluvial topsoil. Rice fields, which might have been quickly depleted of nitrogen and phosphorus, also recouped some of their fertility at every flooding.³⁹

Economics and geography also affected a planter's ability to relocate. Fluctuating tobacco prices sometimes meant that even if a planter opened new lands to cultivation he might never recover the cost

of his labor and investment when he sold the new crop. The ever-increasing slave population might be more profitably employed in tending other crops or the production of lumber and naval stores. Moreover, most new land lay well to the west of established settlements and far from the navigable rivers which linked tidewater planters with the merchants of England. Many planters did procure vast tracts of such "wild lands," but not for the purpose of planting them in tobacco. Instead, great planters found it more profitable to speculate in western lands, renting or selling the forested acres as advancing European settlement pushed up land prices in the region. During the eighteenth century, land speculation became one of the chief means through which planters maintained their wealth, social standing, and aristocratic way of life.⁴⁰

Unable or unwilling to move west, a number of wealthy southerners experimented with crop rotation. Most commonly, planters in the Virginia tidewater sowed exhausted tobacco fields with grain. As Hugh Jones noted, "when land is tired of tobacco, it will bear Indian corn, or English wheat, or any other European grain or seed, with wonderful increase." Although less demanding than tobacco, such grains prospered for only a short time because they, too, took minerals from the soil. But such experiments eventually led some southerners to sow nitrogen-fixing plants on their worn out lands. Landon Carter discovered that wheat planted on a former pea field grew "20 times better than that sown in the Tobacco ground." Carter was also one of several planters who experimented extensively with imported, nitrogen-fixing ground cover such as clover and alfalfa. Over the space of several years, clover not

only restored a measure of the land's fertility, but the plant's many "roots and fibres" kept the soil "in a state of adhesion" and helped control erosion.⁴¹

Toward the end of the colonial period, some of Virginia's most noteworthy planters used other methods to combat soil exhaustion. Better plows which cut deeper into the soil made it possible to build up ridges in fields to check erosion. Contour-plowing on hillsides helped keep upland tracts from washing away. George Washington filled eroded gullies on his land with trash and straw and then covered them with topsoil for planting. Washington was also among the first to apply river mud to his fields in an attempt to revive them.⁴²

Colonial farmers depleted the soil to a greater degree than their Indian counterparts, but the same market that demanded export crops and the same obsession with efficiency that encouraged single-crop fields also motivated southern planters to recover depleted tracts. Soil exhaustion became an endemic problem in the Southeast and, as Craven contends, it sometimes compelled colonists to clear new land from the forested frontier. But in keeping with the region's varying topography and agricultural diversity, the extent of soil exhaustion depended on a number of factors, including the varieties of crops grown, natural replenishment of depleted ground, and a planter's willingness to experiment.⁴³

Like Indian farming, colonial agriculture altered the composition of the southern forest. Abandoned tracts provided an ideal environment for old-field trees. Since colonial fields were larger and more thoroughly cleared than Indian plots, the patchwork effect became more

pronounced. Depending on topography and soil composition, abandoned farmland might sprout stands of sassafras or eastern red cedar. But the most common old-field trees in the colonial Southeast were loblolly pines. Unlike its delicate cousin, the longleaf pine, the loblolly usually produces an abundant seed crop which is carried by wind into open fields and clearings. Robert Beverley discovered that if a Virginia planter cleared land along the major tidewater rivers, "he will certainly find that the Pine is the first Tree that will grow up again, tho' perhaps there was not a Pine in that Spot of Ground before." John Mitchell condemned loblolly pines as "the most pernicious of all weeds," noting that "they have a wing to their seed, which disperses it everywhere with the winds, like thistles, and in two or three years forms a pine thicket, which nothing can pass through or live in." By the time Francois Andre Michaux visited Virginia in the early nineteenth century, he found that "this species exclusively occupies lands that have been exhausted by cultivation, and amid forests of Oak, tracts of 100 or 200 acres are not infrequently seen covered with thriving young pines." Just as the diminishing longleaf forest attested to the importance of the naval stores industry, flourishing loblolly thickets became a legacy of colonial agriculture.⁴⁴

Southern farmers might have been able to stay soil exhaustion and keep the pernicious pines out of their fields had they made extensive use of the European practice of manuring. From 1611, when English ships brought "one hundred Kine and other Cattell" to Jamestown, colonists seldom lacked for livestock and animal fertilizer. By 1614 Virginia boasted "two hundred neate cattle, as many goates, and infinite hogges."

Thirty-five years later Governor William Berkeley estimated the number of cattle at twenty thousand with an additional eight thousand sheep and goats; the swine he simply described as "innumerable." Farther south, where milder winters helped sustain the grass supply, colonists witnessed a similar explosion in the livestock population. In 1682 Joel Gascoyne noted that in the Carolinas "Cattel ... begins to be plentiful, and Hoggs of a prodigious increase," while Thomas Nairne reported in 1710 that "South Carolina abounds with black Cattle, to a Degree much beyond any other English colony."⁴⁵

In spite of this seemingly inexhaustible supply of manure, colonists found it difficult to apply animal fertilizer to their fields because of the way in which they managed the herds. Both cattle and hogs convert a relatively low percentage of the food they eat into meat suitable for human consumption. Like modern ranchers, European settlers found it too expensive to feed their animals solely on corn or other grains and depended on natural forage. Due to the difficulties involved in clearing woodlands for pasture, most southerners simply branded their animals and turned them into the surrounding forest. As John Brickell described it, "The Planters make Penfolds adjacent to their Habitations, wherein they milk the Cows every Morning and Evening; after which, they turn them into the Woods, where they remain feeding all Day." Since hogs only had to be rounded up for autumn slaughter, they required even less supervision. Occasionally a planter might pen stock for a short time on an exhausted field, but most of the manure remained scattered throughout the southeastern forests.⁴⁶

Although this system of "woods ranching" freed settlers from the laborious task of clearing and enclosing pastureland, animals suffered from inefficient management. Peter Purry, a South Carolina colonist, noted that "The Cattle of Carolina are very fat in Summer, but as lean in Winter, because they can find very little to eat, and have no cover to shelter them from the cold Rains, Frosts, and Snows." During the severe winter of 1730, Purry reported, "almost 10,000 horned Cattle died of Hunger and Cold." Poor husbandry notwithstanding, cattle, hogs, and other livestock continued to thrive in the Southeast and colonists gradually developed a lucrative meat trade with the West Indies. In the backcountry farmers erected "cow-pens," a group of temporary cabins and rough-hewn enclosures in which to collect neighborhood stock for counting and branding. Like the later cow-towns of the Old West, southeastern cow-pens sometimes developed into frontier settlements where meat merchants came to purchase stock. After acquiring a suitable herd, the buyer then made arrangements to have his cattle or hogs driven to one of the coastal towns, usually Charles Town or Norfolk, for slaughter and sale. According to the author of American Husbandry, a colonist "falling to the business of breeding cattle" might find the profit from his labor "exceeding great."⁴⁷

The growth of woods ranching in the Southeast meant that cattle and hogs now shared forests and fields with indigenous animals. John Brickell witnessed "great Drovers" of cattle "feeding promiscuously on the Savannahs amongst the deer" and reported "great Numbers" of wild livestock breeding in the woods. In much the same way as colonial crops attracted birds and insects, wandering cattle and hogs attracted

predators. Omnivorous black bears soon developed a taste for young pigs. Wild cats, panthers, and eagles sometimes took lambs and calves. Even more dangerous were the packs of gray wolves which stalked the herds at night and sometimes invaded cow-pens. Given their pathological fear of the animals, English settlers probably exaggerated the extent of the wolf's depredations. But since livestock provided a plentiful and easily accessible food source, wolf populations might indeed have increased during the early years of colonization. Even if the animals were no more plentiful than before, livestock attracted the packs to settled regions, making the predators seem more numerous and fueling settlers' imaginations. Perhaps overstating his case, one Englishman reported that the wolf "by devouring them [cattle] oftentimes goes share with the Planter."⁴⁸

Southerners dealt with wolves in the same way they sought to control crows and squirrels: by placing a price on their heads. Colonists seeking the rewards employed a variety of techniques to kill the marauding beasts. Some hunters set traps rigged with guns so that a wolf taking the bait discharged the weapon and, in effect, committed suicide. In his inimitable style, William Byrd II told of settlers who dug "abundance of Wolf-Pits, so deep and perpendicular, that when a Wolf is once tempted into them, he can no more scramble out again than a Husband who had taken the leap can scramble out of Matrimony." The Virginia Assembly also enlisted Indians in the cause, first rewarding the natives with trade goods and later (after most of the tidewater tribes had been subjugated) assigning them a set number of wolves' heads to be delivered as tribute. Attempting to reduce the number of wolves

in the backcountry, colonial legislators imposed fines on hunters who left skinned deer carcasses in the forest. As one North Carolina statute explained it, the rotting meat attracted "wolves, bears, and other vermin which destroy the stocks of the inhabitants of this province."⁴⁹

Like other hunting regulations such laws proved difficult to enforce. Long accustomed to traveling great distances in search of game, Indians frequently delivered wolves' heads from distant parts of the colonies, animals that had been no threat to herds in settled regions. The Virginia Assembly finally decreed that county authorities should question the natives about where wolves were taken and only then determine whether native hunters should be rewarded. Clerks who dispensed the bounties were instructed to remove the ears from every head they received to make sure the government did not pay twice for the same wolf.⁵⁰

But in spite of such difficulties, the increased hunting pressure (combined with deforestation and habitat destruction) eventually produced the desired effect. In 1724, Hugh Jones reported "no danger of wild beasts in traveling." Bears, he noted, had been exterminated "for the sake of their flesh and skins," while wolves were now "much destroyed by virtue of a law which allows good rewards for their heads." Fourteen years later John Brickell wrote that those same beasts were disappearing from North Carolina due to "Planters continually destroying them as they hunt and travel in the Woods."⁵¹

If ranching contributed indirectly to the decline of the wolf population, livestock had a more immediate impact on forest vegetation.

Cattle, hogs, sheep, and goats all graze selectively, eating more palatable plants first. In the coastal plain savannahs, cattle completely destroyed a number of perennial herbs. Goats roaming the longleaf pine forests ate the tufts of pine seedlings, further restricting longleaf regeneration. In some pine regions, cattle selectively browsed the undergrowth of oak and other hardwoods, effectively forestalling forest succession. Hogs, however, did the most damage in the pine forests. They not only fattened themselves on the none-too-plentiful longleaf mast, but also dug out the spongy, tender roots of the seedlings. In certain regions of the South, forest-reared hogs are still known as "piney-woods rooters," a term which probably originated during the colonial period.⁵²

The most dramatic destruction of vegetation by livestock occurred in the canebrakes of the pocosins and bottomlands. Because cane did not become dry and brittle in winter, it made excellent forage. As one colonist noted, the plant "bears a long green leaf in winter, on which cattle delight much to feed; and where that is plentiful, cattle keeps themselves in very good plight, till grass springs again." The tender stems which sprouted in mid-summer made the most palatable forage and by feeding selectively on such new growth, cattle might destroy an entire stand of cane in as little as four years. Hogs, too, foraged in the canebrakes, seeking out the tender nodules of the plant's root system. Subjected to such heavy grazing and rooting, the once abundant cane lands began to disappear. Writing in 1802, Governor John Drayton of South Carolina told his readers that "At the first settlement of this state, the vallies of the middle and upper country, then in the

possession of the Indians, encouraged a plentiful growth of cane. But since the whites have spread themselves over the same, with their herds of cattle and hogs, the canes in these narrow swamps and vallies, are kept so closely cut down, by the continual browsing of cattle, as to have nearly extirpated them."⁵³

Under certain conditions, woods ranching might also affect the structure of forest soils. Cattle grazing selectively tended to congregate along streams, in grassy clearings, and under shade trees. Such "patch grazing" resulted in the trampling of many seedlings and woody plants growing on the forest floor. If cattle continued to return to the favored area, their hooves compacted the topsoil, destroying its crumblike structure and reducing its capacity to absorb rainwater. During intense storms and prolonged periods of rain, heavily grazed patches became subject to sheet erosion which took away much of the topsoil and curtailed the growth of ground cover. Such effects were most visible in the piedmont where hilly terrain accelerated the process. By trampling the soil and browsing the lower branches of trees cattle could reduce a sizeable tract of flourishing woodlands to a patch of bare soil and scraggly trees. While traveling through an upland Virginia oak forest, Francois André Michaux saw forests that exhibited "a squalid appearance, occasioned not only by the sterility of the soil, but by the injury they are constantly sustaining from the cattle that range through them at all seasons, and which in winter are compelled, by the want of herbage, to subsist upon the young sprouts and the shoots of the preceding year."⁵⁴

Seeking to improve the often meager forest range, southern farmers turned to a tactic used by southeastern Indians: seasonal burning. In tidewater bottomlands, planters fired low-lying areas to regenerate cane and marsh grasses for forage. Those with large holdings might also set ground fires in small areas to facilitate the growth of other grasses. The most extensive burning, however, took place in the backcountry where "the herder with forty acres and four hundred head of cattle" became a fixture of the pastoral economy. For many of the Scotch-Irish immigrants who settled the region, burning to improve livestock range was a long-standing cultural tradition. In Europe, their ancestors had fired oak forests and heathlands. After observing the ways in which Indians used fire, the settlers adapted broadcast burning to the open pine woods and savannahs of the Southeast. John Brickell reported that colonists in the North Carolina piedmont set fires every March "to burn off the old Grass in their Fields and Woods, as the Heath is burnt off the Mountains of Ireland, by the Farmers in those Places."⁵⁵

Seasonal burning by Europeans produced many of the same effects as Indian-set fires. But because colonists set fires systematically and burned greater expanses of woods, changes in the forest pattern were more striking. For colonists raising livestock (as for Indians hunting deer) the most important result of the fires was the new growth that flourished after the burn. Bluestem and other native grasses provided high-quality forage, enabling colonists to drive their animals through the woods to market or to the coveted grazing grounds of canebrakes and savannahs. Open woodlands made it easier for ranchers to maneuver their horses among the herds and to walk barefoot (or in moccasins) through

the forest in search of stray cattle and hogs. Like Indians, woods ranchers found that regular burning reduced the hordes of insects that plagued colonists, crops, and cattle. Seasonal ground fires also worked to discourage predators. The thickets of berries that sprang up after the burn attracted marauding bears into areas where they might be killed quickly and in quantity. And since wolves preferred older forests, they were less likely to venture into the newly-burned, open terrain. The grassy forest floor even helped livestock see and avoid deadly rattlesnakes and copperheads that would otherwise have remained hidden in thick underbrush.⁵⁶

Although widespread burning offered cattlemen a number of advantages, it also increased the odds of wildfire. While traveling in Virginia in 1759 Andrew Burnaby witnessed a "great fire" which forced colonists to clear wide firebreaks in the woods adjacent to their farms. William Stephens, Secretary and later President of the Georgia colony, reported that one fire kindled by settlers burning the woods raged for more than five days, destroying a number of houses and outbuildings. To protect themselves from wildfire, some colonists removed all trees and undergrowth near their houses, creating a "yard" of packed clay which served as a private firebreak. Some older houses in rural parts of the southern piedmont still have "dirt yards" which serve as modern reminders of the dangers inherent in extensive woodsburning.⁵⁷

Colonial governments sought a more systematic remedy to the problem of wildfire. By the end of the eighteenth century, all four southeastern colonies had legislation governing controlled burning. Noting that "the frequent burning of the woods" proved "extremely

prejudicial to the soil" and "destroyed fences and other improvements," the North Carolina legislature in 1777 made it unlawful for any resident to set a woods fire without first giving notice to his neighbors. Adjacent property owners had to be informed two days in advance of the burn and those firing the woods were required to keep the blaze from crossing property and fence lines. By 1782, colonists caught violating the law faced a penalty of £25 sterling for each offense, the stiffest "fire fine" recorded during the colonial period and a stern warning to careless backcountry burners.⁵⁸

Such legislation eventually worked to give woodsburning a social as well as an ecological function. On the date appointed for the burn, neighbors from a particular region gathered en masse to watch the blaze. Men and boys cleared all combustible material from around enclosed fields to prevent the flames from engulfing fences and nearby buildings. Once the fires had been set, colonists armed with brushy pine boughs beat back any flames that came close to their houses and barns. Women provided food for the entire gathering and the event took on the air of a church social. As one historian of the Old South has suggested, men, women, and children seemed equally entranced by "the inherently dramatic and fascinating power of fire." For isolated backcountry settlers who seldom saw their neighbors, the early spring burn became an eagerly anticipated ritual that ranked only slightly behind corn shuckings and quilting bees as a source of entertainment.⁵⁹

European observers frequently criticized such continual woodsburning, arguing that colonists would be better served by planting pastures and hayfields. Penning cattle in pastures and feeding them hay

in winter would not only improve the quality of the herds, but also allow colonists to use manure that collected in the enclosures. Promotional writers urged colonists immigrating to the Southeast to "bring with them several Sorts of Seeds of Grass, [such] as Trefoil, Clover-Grass, all sorts of Sanfoin, and common Grass, and especially those that have arose and sprung in a warm climate, that will endure the heat of the Sun." Some travelers even took it upon themselves to improve southern pastures. While preaching in the Carolina backcountry, Charles Woodmason distributed "Clover, Timothy, Burnet, and other grass seeds" along with Bibles, books, and medicine.⁶⁰

In spite of such efforts, most southern cattlemen neglected to plant extensive pastures. Only on large plantations, where planters sought nitrogen-fixing cover to prevent erosion and soil exhaustion did imported grasses get a systematic trial. Noting that much rangeland produced only broomsedge and other dried grasses in winter, John Mitchell told his English readers that southern pastures were "covered with a tall rank weed, more like Bent than pasture grass which is dry as a stick and as yellow as straw insomuch that nothing will taste it." Southerners also ignored the possibility of turning promising marshland into meadows, prompting Mitchell to observe that "The hay they mow is nothing but the three square rush" and the marshes are "covered with nothing but Reeds, Rushes, and Flags." Concluding his long tirade on the sad state of southern pastures, Mitchell warned colonists that "The riches of England proceed from the plenty of grass, and the poverty of the colonies from the want of that original source both of plenty and wealth."⁶¹

Mitchell and other critics of colonial methods failed to realize that even without regular planting, European grasses were already taking over in the Southeast. American grasses, while well adapted to the forage habits of deer and buffalo, could not withstand heavy selective feeding by cattle, sheep, and goats. Annual species disappeared when grazed too closely and perennials suffered from trampling. Old World grasses, which had evolved in a pastoral setting in Europe and came to America in the digestive tracts of imported livestock, fared much better. Many colonists discovered that the more they allowed cattle to graze their wooded pastures, the better the range became. Governor John Drayton (who, unlike Mitchell, remained in the Southeast long enough to understand the process) explained that "in general, the operations of the scythe give way to other pursuits; while flocks and herds graze pasture grounds which have never been regularly laid down for pasturage; but nevertheless originate many species of good grass."⁶²

Not all seeds carried by livestock proved so beneficial. Intermixed with the fodder and hay the beasts ate on board English ships were many European weeds that quickly gained a toehold in the Southeast. Much like Old World grasses, such weeds had adapted ecologically to European pastoralism. The weeds easily withstood the pressures of livestock and produced myriad seeds which clung to the coats of grazing animals or traveled on the wind into cleared fields. Indian farmers had suffered little from indigenous weeds because the natives' multi-crop fields produced dense ground cover which restricted the growth of competing plants. But in the orderly, furrowed colonial fields weeds soon became a nuisance. Plaintain, dock, dandelions, nettles, and many

other species well known to European farmers moved in alongside tobacco, wheat, and corn.⁶³

Crabgrass, perhaps the most prevalent and most annoying of the imported plants, proved a fickle friend. At first cattlemen welcomed it due to "the excellence of its fodder," but because crabgrass matured during the growing season, it frequently took up residence in agricultural fields where it might choke out an entire crop. Rice planters suffered most from the crabgrass invasion. During his journey through South Carolina John Bartram found that "ould rice fields, after they have been planted some years, is so full of grass that it is next to impossible to keep the rice clean." The planters' only alternatives were either to flood the fields for several years to kill the grass or turn the former rice swamp into pasture. Even on the generally smaller subsistence farms of North Carolina, uninvited crabgrass and other weeds became a chronic problem, prompting the author of American Husbandry to conclude that "There is no greater defect in the husbandry of this province than the foulness of the crops with weeds."⁶⁴

By the end of the eighteenth century, the system of agriculture and woods ranching that brought Old World crops, livestock, grasses, and weeds to the Southeast had spread into the Appalachians and the eastern Mississippi Valley. Ecologically this new frontier followed the patterns set during the colonial period. Indians died from infectious diseases and traded beaver pelts and deerskins with the earliest settlers. Forests fell to make room for farmers, who first grew corn for subsistence and later produced tobacco, wheat, and other crops for export. But east of the mountains, colonial agriculture was changing.

New technology, in the form of the cotton gin, had already begun to transform the Carolina and Georgia piedmont into integral parts of the "Cotton Kingdom." Farther north, in the Virginia piedmont, a system of mixed farming based on tobacco, wheat, and dairy products gradually replaced subsistence plots and woods ranching. Driven by population pressure, the search for fresh land, and simple wanderlust, southerners moved into the Deep South where rice, cotton, and sugar cane emerged as major staples. Two hundred years after Englishmen planted lemons and oranges at Jamestown, southern agriculture had spread across an area of North America roughly equal in size to Western Europe.⁶⁵

No matter how great an area southern farmers occupied, they faced many of the same problems as their colonial ancestors. Extensive cultivation of cotton exhausted soil, forcing those planters who could afford it to import expensive Peruvian guano for use as fertilizer. Deforestation and the continuous planting of "row crops" turned fields into miry ditches. In spite of experiments by colonial planters, many southerners continued to plow straight up and down hilly tracts. As one resident of Louisville, Kentucky wrote in 1797, "the handy work of Man has instead of improving destroy'd the works of Nature and made it a detestable place."⁶⁶

Such comments, however, were the exception rather than the rule. Pests, parasites, soil exhaustion, and weeds had long been prominent features of European pastoralism and offered irrefutable evidence that colonists had succeeded in their attempt to transplant Old World agriculture in the Southeast. Accepting environmental problems as inevitable, most southerners preferred instead to emphasize what they

regarded as positive changes. They pointed to the presence of livestock and the decline of wolves. They praised the introduction of cash crops and the demise of the foreboding forest. Most of all, they stressed their new system of husbandry, which seemed better organized and more appealing than Indian agriculture. When Charles Woodmason took grass seed to the Carolina backcountry in 1768, he did so as part of an effort to "make the countryside wear a New face," a face which reflected civility and a higher degree of social organization.⁶⁷

From an ecological standpoint, however, the colonial system was much less sophisticated than that of the natives. Colonists replaced tangled Indian plots with fields devoted to a single crop. By eliminating predators, settlers made cattle and hogs the dominant woodland animals. By systematically burning the forests and sowing (accidentally or otherwise) European grasses, southern cattlemen destroyed countless native plants, allowing the new arrivals free reign. Civilizing and organizing the southeastern landscape really meant reducing the infinite numbers of indigenous plants and animals to several easily manageable species.

In that process of simplification lay the source of the colonists' environmental problems. A fundamental tenet of modern ecological theory holds that ecosystems are capable of self-maintenance and self-regulation. Therefore all such systems tend to resist change and seek balance. As one ecologist phrased it, "populations [both plant and animal] tend to modify the physical environment making conditions favorable for other populations until an equilibrium ... is achieved." Ecologists also know that the simplest and newest ecosystems are the

most unstable. In those systems, various plants and animals are only beginning to regulate each other. Populations tend to increase or decline rapidly, making for instability.⁶⁸

Before the arrival of colonists, both the natural ecosystem and the ecosystem as modified by Indians had developed over long periods and reflected a high degree of complexity and equilibrium. Within the natural system, varying patterns of topography, temperature, moisture, and fire determined forest types and regulated forest succession. The availability of prey dictated the number of predators, and predators, in turn, kept prey populations in check. Seasonal subsistence patterns and the lack of metal tools similarly limited the Indians' exploitation of the forest. The natives' system of multi-crop agriculture also helped return minerals to depleted soil, thereby checking and, for the moment, delaying the inevitable process of exhaustion.

Colonial agriculture simplified such relationships and consequently brought rapid change. Single-crop fields made it easier for squirrels, crows, and indigenous insects to obtain food, and their populations expanded to pest proportions. Imported organisms found the system even more inviting. Hessian flies and wheat rust attacked well-laid-out grain fields, while rats and mice invaded storage bins. The invisible parasites that carried malaria and yellow fever found suitable hosts in mosquitoes and among colonists whose bodies lacked the capacity to repel the microorganisms. The practice of monoculture returned few minerals to the soil and plowing further reduced fertility. The elimination of wolves allowed livestock populations to explode, spreading European grasses and weeds into plowed fields. As Woodmason noted, the

countryside did indeed wear a "New face," a face whose expression not only reflected civility, but also bespoke the arrival of an ecologically unstable new South.

CHAPTER VI

REMEMBERING THE COLONIAL PERIOD, SURVIVING THE TWENTIETH CENTURY

The new South described by Woodmason and other late eighteenth-century observers differed markedly from that seen by the earliest explorers. Sturgeon, herring, and alewives, which had attracted the attention of sixteenth-century sailors, no longer came up the rivers in incredible numbers. The great flocks of Carolina parakeets and passenger pigeons, which had darkened the autumn sky, were fast becoming a memory. The ingenious and industrious beavers, admired for their engineering skills, had disappeared from the streams of the coastal plain and piedmont. Buffalo and elk no longer grazed the savannahs. Whitetailed deer, once so numerous that early colonists had compared South Carolina to an English hunting preserve, now needed the protection of colonial game laws. Black bears, whose flesh had kept William Byrd's surveying party well-fed and yearning for their wives, sought refuge in the undisturbed forests of the foothills and mountains. Wolves, panthers, and bobcats, whose nighttime serenade had chilled the blood of English explorers, had been hunted to the brink of extinction in the settled regions.

The landscape had also undergone a stunning transformation. Acres of bottomland forests had been removed to make way for corn, tobacco, and rice. In and around the cleared patches, local summers had grown hotter and winters colder. Unimpeded winds shredded crops, and the

runoff from plowed fields increased the chances of damaging floods. Once the fields had been exhausted, loblolly pines moved into the cleared areas, enhancing the patchwork appearance of the southern woods. In other areas, selective cutting of oak, hickory, white cedar, and bald cypress had effectively removed many of the trees early explorers had found so attractive. Under pressure from lumbering and naval stores production, the vast open longleaf pinelands had already begun to give way to tracts of scrubby oak and hardier loblolly pines.

Even more dramatic than the disappearance of indigenous plants and animals was the decline in southeastern Indian populations. Devastated by Old World diseases, some of the smaller bands had vanished completely or joined with other, more populous nations. Even those groups that maintained a degree of cultural identity found their way of life drastically altered. Shortages of game, brought on by commercial hunting, sometimes led to starvation and malnutrition. Throughout the eighteenth century, chronic outbreaks of smallpox, measles, influenza, and pneumonia continued to decimate native villages, making it increasingly difficult for Indians to pursue their seasonal activities. Writing of the Catawbas in 1802, Governor John Drayton reported that

When South Carolina was first settled by white inhabitants, this nation mustered fifteen hundred fighting men. About the year 1743, it could only bring four hundred warriors into the field; composed of refugees from various smaller tribes ... [including] the Watteree, Chowan, Congaree, Nachee, Yamasee, and Coosa.

At present, sixty men can scarcely be numbered in the list of their warriors, or two hundred persons in the whole of their nation. And these are scattered about in small villages; and are entirely surrounded by white inhabitants.¹

But the transition from old South to new involved more than the removal of indigenous animals, plants, and humans. It also entailed

bringing in new species from across the Atlantic. When colonists replaced Indians, livestock supplanted deer, elk, and buffalo. Along with domestic animals came European grasses, weeds, and a more systematic system of woodsburning. Old World crops moved in alongside indigenous food plants, bringing Old World pests and plant diseases to the Southeast. Labor-intensive agriculture led to increased soil exhaustion and sheet erosion, problems virtually unknown to Indian farmers. Little by little colonists replaced the forest primeval with the simplified ecological relationships of Europe.

When he sat down to write the history of Virginia in 1705, Robert Beverley described such environmental changes as "Alterations," sadly telling his readers, "I can't call them Improvements." Like his remarks about the demise of Indians and game animals, Beverley's comments reflect the guilt associated with conquest and an emerging nostalgia for "noble savages" and precontact America. But Beverley also laid bare the essence of the ecological transformation of the Southeast. Europeans had come to America to civilize and improve. They had succeeded only in decimating the original inhabitants (plant, animal, and human) and spoiling the land's natural beauty. By 1705 Beverley could not help but wonder what had gone wrong with such a seemingly noble enterprise.²

The answer to his riddle lies in the relationship between two English words of Greek origin. One of the words, "ecology," Beverley would not have recognized. But he probably had some understanding of its sister term, "economics." Both words derive from the Greek oikos, meaning "house" or "place to live." When followed by the Greek suffix logos, meaning "discourse or study," the word becomes "ecology" which

suggests knowledge or understanding of organisms "at home" in the natural environment. "Economics" attaches the Greek suffix nemein, literally "to deal out" or "manage." Reduced to their simplest definitions, the two terms are almost inseparable. The way in which organisms live at home ultimately reflects the ways in which man (the organism with the highest degree of control over the natural world) chooses to use the "homeland." Viewed from this perspective, the question becomes not simply "How did European colonization change the ecology of the Southeast?" but "How were the 'alterations' Beverley perceived related to European ideas about the land and its uses?"³

The first explorers to see the Southeast came looking for "commodities," a term which reveals much about the economic system of which Europeans were a part. Simply defined, commodities were articles of value, objects which might be exchanged either for other worthwhile goods or for gold and silver. Explorers' notions about commodities grew out of what one historian has labeled the "European world-economy," so named because it was larger than any legally-defined European state.⁴

The European world-economy had its origins in the decline or "crisis" of European feudalism, a crisis triggered in part by ecological change in Western Europe. Beginning in 1347, one quarter to one third of the European population perished from bubonic plague, an Asian disease carried by Mongol invaders to the city of Caffia in the Crimea. In the wake of that demographic debacle, demand for agricultural and manufactured goods diminished and production slowed. Climatic change also contributed to the crisis. During the fourteenth and early fifteenth centuries, longer and more severe winters in northern Europe

made crop failures more common. Food shortages led to malnutrition and malnutrition increased the risk of disease. With domestic demand stagnated, money (in the form of precious metal) flowed away from northwestern Europe. Military expenditures added to the drain on bullion. The beginning of the Hundred Years War between 1335 and 1345 pushed western European states toward a "war economy" which resulted in an increase in taxes. With money in short supply, international and domestic trade contracted. During the first half of the fifteenth century, most of Western Europe stood mired in a severe recession.⁵

After 1460, the interrelated ecological, demographic, and monetary crisis began to ebb. Although plague and other infectious diseases continued in sporadic, chronic outbreaks, the epidemic Black Death subsided and Europe began to recover. Between 1450 and 1620, the European population nearly doubled. The discovery of silver and gold in the Spanish colonies of South and Central America augmented the European money supply, which together with the population increase, made the sixteenth century a period of general economic expansion. The rapid population growth filled up much of Western Europe's usable land and increased demand for food and manufactured goods. With more money in circulation and demand increasing, the European economy underwent a "Price Revolution" in which the cost of food and clothing rose at a rate unequalled until the late twentieth century.⁶

The changing ecology and economy of Western Europe fostered corresponding changes in ideas about land and its uses, changes which had far-reaching implications for colonial America. Medieval political theorists had recognized an individual's right to own and use land as a

right founded on moral necessity. Experience simply showed that private ownership of resources stimulated production and promoted order within society. But those who owned land had an obligation to use it to meet the essential needs of the community. Such ideas grew out of a basic belief that everything in the temporal world was somehow linked to the spiritual realm; even the most ordinary actions (property ownership included) had a deep significance. As the medieval philosopher Thomas Aquinas wrote, "The temporal goods by which God's providence are conferred on man are his indeed so far as relates to property, but in their use they should belong not only to him but also to others who can be supported from what is superfluous to him." In medieval society, such theories took practical form in the relationship between tenant and landlord. Landowners served as "political functionaries" who protected their tenants and preserved the social order. In return, tenants paid rent in crops and labor. The amount of payment was simply the amount needed to maintain both tenant and landlord at their customary standard of living.⁷

The rapidly developing European economy shattered such notions about "private property." Nowhere was the transformation more visible than in the practice of "enclosure," a movement which reached its peak in England during the late fifteenth and sixteenth centuries. Caught in spiraling inflation and chronically short of cash, English landlords fenced off or "enclosed" land that had formerly been available to tenants for communal grazing and agriculture. Landowners used the fenced plots for grazing sheep to satisfy the booming English wool trade or to grow food crops for sale to the expanding population. The

enclosure movement forced countless tenants out of the countryside, creating a landless class of city-dwellers who now had to purchase food, clothing, and other necessities from producers.⁸

But food and other resources did not pass directly from producers to consumers. Urbanization and the new commercial agriculture brought an unprecedented increase in what economists call "market transactions." Greater distances and more complex domestic trade patterns created a need for "middlemen" who acquired goods from producers and sold the items in the cities. The volume of such market transactions may have increased as much as twenty-fold between 1460 and 1600, giving merchants and money-handlers a new and more prominent place in the developing economy. The proliferation of middlemen further altered concepts of natural resources. The earth's bounty no longer existed to benefit the entire community. Instead, resources became "commodities," articles under the control of a single individual or group of individuals who intended to sell the goods at a profit.⁹

Profits from such transactions accumulated as "capital," defined by economists as "the materials necessary for production, trade, and commerce, including tools, equipment, goods in process, means of transporting goods, and money." In all its forms, accumulated capital can be plowed back into the process of exchange so that it becomes not only a source of immediate profit but also the source of further accumulation. Every economic system, feudalism included, relies on some physical means of production and consumption of resources. But resources create capital only within a society that allows such resources to become commodities that are owned, stored, and eventually sold. The owners do

not serve as political functionaries (like medieval landlords), but as economic functionaries who facilitate the transition from resource to capital. As one modern historian of the European economy described it, "by the beginning of the seventeenth century the persistence of change had brought an end to that equilibrium between people and land, labor and repose, peasant and lord, king and kingdom, production and consumption, custom and circumstance, that had made even the late Middle Ages appear a part of a timeless order." The new economy was one of profit-seeking and accumulation of goods, a system that can aptly be called "capitalism."¹⁰

The emergence of capitalism in Western Europe was both a catalyst for and a result of overseas exploration. The constant outflow of bullion from Europe prompted Portuguese explorers to search for gold in West Africa and to look for a more direct route to the silk and spice dealers of Asia. During the early sixteenth century, Spanish explorers and conquistadores fanned out over tropical America, developing the gold and silver mines that helped fuel economic expansion. Spices, silks, precious metals, and jewels were primarily the playthings of the upper classes. The rest of Europe's expanding population needed food, clothing, and fuel; the search for those goods helped sustain Atlantic expansion.¹¹

Thus, when the first Europeans arrived in the Southeast, they came with fixed ideas regarding the value of various resources. DeSoto's party searched for gold and silver, quintessential commodities due to their intrinsic worth and usefulness in acquiring other articles. When the quest for precious metals proved fruitless, Englishmen turned their

attention to other New World wares. Some of those commodities, such as fish, were also available in Europe and became valuable because they could increase existing food supplies. Other goods, such as timber and furs, were valuable because they were scarce in Europe and had to be imported from Muscovy or the Baltic nations. Englishmen also took an interest in products indigenous only to the New World, such as corn and tobacco, or in African and Asian commodities that might be transplanted and acclimatized in America, particularly sugar, rice, and silkworms.¹²

The transformation of the European economy not only determined which commodities were valuable, but also in what quantity those items should be acquired. During the seventeenth century, England's involvement in the European world-economy led that nation's merchants and investors to develop a new doctrine of economic freedom. The argument had its roots in the "theory of the balance of trade" which, in its simplest form, held that if more goods were bought than sold, the difference had to be made up in payment of specie. During the early 1600s, that notion translated into an effort to develop England's domestic resources, sell finished products abroad, and increase the importation of gold and silver. Such theories fit well with the developing rivalry among European nations. Economic theorists encouraged English merchants not to compete with each other, but to join in a cooperative effort to outsell the Dutch, French, and Spanish. At the same time, most theorists cautioned against buying foreign goods, making accumulation of specie the measure of domestic wealth.¹³

During the latter decades of the seventeenth century, however, the truism of a favorable balance of trade evolved into a more complex

definition of prosperity. By the 1670s some English theorists were extolling the virtues of domestic spending even for expensive foreign goods. Such exotic items, the new argument held, excited the acquisitive instincts of consumers, prompting them to work harder in an effort to increase their purchasing power. The result of such intense labor could only be sustained economic growth which drew its momentum not from favorable trade balances, but from the desire to acquire material goods. As one Englishman observed, "The main Spur to Trade, or rather to Industry and Ingenuity, is the exorbitant Appetites of Men, which they will take pains to gratifie ... for did Men content themselves with bare Necessaries, we should have a poor World." This shift to a more favorable view of domestic consumption provided a perfect justification for tapping New World resources. The more exotic or useful products the colonies produced, the wealthier England would become. The goal became unlimited exploitation. As another Englishman explained it, "Desire and Wants increase with Riches ... A Poor man wants a Pound; a Rich man an hundred."¹⁴

Early plans for colonization already reflected the developing doctrines of private property, capitalism, and economic freedom. Queen Elizabeth's "Letters Patent" of 1584 granted to Sir Walter Raleigh the right to "have holde occupy and enjoye" such regions as his colonists might discover "with all prerogatives, commodities, [j]urisdiccions ... both by sea and land." When the Crown renewed its interest in colonization in 1604, similar rights went to the Virginia Company of London, an organization funded by merchants who sought control over those same commodities. The company provided ships and supplies to

establish Jamestown and sent Englishmen to Virginia as employees. Likewise in 1663, John Colleton and several other members of the English court became "Proprietors" over Carolina. They hoped to relocate other American and West Indian colonists in the subtropical region and to collect profits both from land rents and from any goods those settlers might produce. A hundred years before Robert Beverley tried to explain the "alterations" English colonists had made in Virginia, the Southeast (like Asia, Africa, the Caribbean, and Latin America before it) had been inexorably drawn into the European world-economy. In the words of Marshall Sahlins, a modern anthropologist, it was an economy that had "erected a shrine to the Unattainable: Infinite Needs."¹⁵

Despite the wording of colonial charters, the expanding world-economy did not roll unimpeded into a forest filled only with potential commodities. Europeans discovered a land already altered by several millennia of human habitation, a forest already occupied by people with their own ideas about property and resources. To most Europeans, the southeastern Indian economy looked ridiculously simple. The natives did not enclose land, nor did they buy and sell commodities like their visitors from across the Atlantic. Robert Beverley, who often professed fondness for Indian ways, found the system attractive, believing it to be a communal society where humans lived together in harmony without the vices normally associated with private ownership and free enterprise. Beverley thought the natives' way of life owed much to the Southeast's natural bounty. In 1705, with most of Virginia's Indians subjugated, he described native land use with the same nostalgic rhetoric he reserved for the early landscape. "They [Indians] claim no

property in Lands," Beverley wrote, "but they are in common to a whole Nation. Everyone Hunts and Fishes, and gathers Fruits in all places. Their labour in tending Corn, Pompions, Melons, ec. is not so great that they need quarrel for room, where the Land is so fertile, and where so much lyes uncultivated."¹⁶

Like many European descriptions of native life, Beverley's assessment was only generally correct. Dependent upon the ecosystem for survival, Indians had to acquire and, at least for a time, "own" its resources. Access to resources depended on several factors, including the ability to establish and maintain a village within traveling distance of hunting, fishing, and planting grounds. Villages might be moved when firewood, game, or other resources became depleted, but as long as the settlements remained in a particular locale, they had to be defended against enemies and maintained against the elements. Successful defense and maintenance of a village, for however short a period, implied sovereignty over the region. In similar fashion, agricultural fields provided resources only if natives burned, planted, and kept such areas free from marauding animals. The produce then became the property of the village whose residents did the tending and harvesting, suggesting that accessibility and use of a particular field implied ownership.¹⁷

Southeastern Indians probably attached similar claims to hunting and fishing territories. During the late 1890s, James Mooney discovered that the Cherokees remembered a time when they had hunted "all the country about the head of Catawba river." As game became scarce in the region, the Cherokees moved farther west and "loaned" the territory to Catawba Indians. When Catawba hunters arrived in the region, however,

Cherokees again claimed hunting rights and a bloody battle ensued. Eventually the two groups settled the dispute by reaching an agreement which allowed Catawbas to occupy the region east of Catawba River and Cherokees an area west of Broad River. Land between the two streams remained neutral territory.¹⁸

Cherokee oral tradition provides no fixed date for the incident but does reveal that Catawbas won the battle, because they used guns against Cherokee warriors equipped only with Indian weapons. The use of guns suggests that the dispute took place well after the initial contact between Catawbas and English traders. Therefore the Indians might already have been influenced by European notions about property and sovereignty. Moreover, the negotiated settlement might have stemmed from both groups' efforts to preserve enough land to secure their share of a dwindling supply of deer. Even so, the conflict between Cherokees and Catawbas illustrates a key point regarding Indian land tenure. Indians could hunt and fish a given area only with the consent of other Indians. If other natives refused to agree, then the territory had to be defended and came under the jurisdiction of a particular village or group of villages. Game and fish, like agricultural produce, became the property of those who invested the necessary time and labor to acquire them.¹⁹

The notion that labor and use determined ownership extended not only to lands used by villages, but to personal property as well. Individual natives, male and female, made and owned the clothes they wore. Indian men and boys owned their bows, arrows, and war clubs. Burial customs clearly reflected the value assigned to individual

possessions. Observing the funeral of one southeastern chieftain, James Adair reported that the attending Indians dressed the deceased "in his finest apparel." In the tomb, they then placed the dead man's "trusty hiccory bow, with a young panther's skin, full of arrows, along side of him, and every other useful thing he had been possessed of." The custom of interring personal goods with the dead probably served both a religious and a secular purpose. The practice provided the deceased with items he might need in the afterlife and prevented potential heirs from squabbling over articles left behind. Indians, like Europeans, understood the notion of personal property and attached value to material possessions.²⁰

Beverley and his fellow colonists sometimes failed to recognize such concepts because, unlike the developing capitalist system of Europe, the native economy did not encourage unrestricted accumulation of goods. Indeed, Indian society stressed completely opposite values: day-to-day subsistence and generosity. Always confident that they could obtain whatever they needed simply by moving throughout the forest, Indians saw no need to enclose the land and hoard its resources. Europeans often marvelled at the natives' willingness to share the fruits of their labor with other members of their village or even complete strangers. As James Adair explained it, Indians were "neither able nor desirous to obtain anything more than a bare support of life; they could not credit their neighbors beyond a morsel of food, and that they liberally gave, whenever they called." John Lawson who, like Robert Beverley, often avowed his affinity for Indian life, used the native system to criticize European values. The Indians, Lawson told

his fellow Englishmen, "are really better to us than we are to them, they always give us Victuals at their Quarters, and take care we are armed against Hunger and Thirst; We do not do so by them, (generally speaking) but let them walk by our Doors Hungry and do not often relieve them."²¹

The Indians' belief in sharing was part of the larger practice of "gift-giving," an all-important social institution that allowed for the transfer of goods between individuals. An Indian might donate a bow, animal skin, food, or even labor to another native without demanding an immediate and specific amount in return. At some other time, perhaps months later, the recipient offered articles of equal worth to his benefactor. This system of barter helped preserve order and harmony within villages. Once provided with a "gift" of goods or labor, Indians were socially obligated to respond in kind. Exchanges between Indian nations served a similar peace-keeping function. A chieftain who offered goods to a rival leader expected equivalent compensation. If the process broke down, war might soon follow. As Englishmen discovered at Roanoke, southeastern Indians were long accustomed to trading with their neighbors, but it was a system different from that which developed in Europe. Articles were not sold for profit, but exchanged on the basis of reciprocity.²²

Due to the reciprocal nature of gift-giving, the Indian economy originally produced no merchants like those of Europe. While Europeans encouraged and rewarded those who accumulated capital, Indians most revered good hunters and brave warriors. Such men commanded respect because they best exemplified what native society defined as

"achievement," namely comfortable subsistence and survival for one's self and family. John Lawson explained it best when he noted that Indians "find something Valuable in themselves above Riches. Thus, he that is a good Warriour is the proudest creature living; and he that is an expert Hunter, is esteemed by the People and himself." In contrast, Lawson continued, "a great Dealer [merchant] amongst the Indians, is no otherwise respected and esteemed than as a Man that strains his Wits and fatigues himself to furnish others with Necessaries of Life." Those "others" lived "much easier and enjoy[ed] more of the World than he himself [the merchant] does with all his Pelf."²³

Lawson arrived at his understanding of the Indian economy well over a century after Englishmen landed at Roanoke and at a time when the natives no longer seemed to pose a serious threat to European colonization. Early settlers, however, were less inclined to recognize the virtues of Indian society. Having discovered a land rich in resources, the first colonists faced a serious legal and moral dilemma: how to justify the acquisition of potential commodities from land already occupied by another people. Robert Gray, author of a 1609 tract promoting colonization in Virginia, posed the problem in its most troubling form when he asked, "By what right or warrant we can enter into the land of these Savages, take away their rightfull inheritance from them, and plant ourselves in their places, being unwronged or unprovoked by them?"²⁴

For the answer to that perplexing question, colonists relied not only on economic theorists but also on theologians. All church-going Englishmen knew that God had originally given Adam power to control all

creatures, commanding him in Genesis 1:28 to "replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth." Likewise, Adam received "every herb bearing seed, which is upon the face of all the earth, and every tree, in which is the fruit of a tree yielding seed." Adam, however, had forfeited some of those rights when he rebelled against God by sampling the forbidden fruit. To punish Adam's sin, God made some soils rocky and infertile. Wild animals became fierce and domestic beasts refused to submit to the yoke. Fleas, flies, and other bothersome insects emerged to torment man at all seasons.²⁵

Only after the purifying Flood did God see fit to restore man's favored position, promising Noah that "Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things." But, due to Adam's Fall, such mastery of the natural world no longer came easily. Soils could only be made productive through arduous labor. Vicious beasts had to be slain and domestic animals whipped or otherwise forced into their proper subservient roles. Nature again existed solely to serve man, but only if he exerted to the fullest his ascendancy over plants and animals.²⁶

The Biblical dictum to subdue the earth went a long way toward justifying colonists' intended takeover of southeastern resources. Because Indians did not use the land to its capacity nor lay up great stores of goods, the natives did not enjoy the God-given, distinctly human right of dominion over nature and were little better than the animals who roamed the southern forests. Just as the image of the

Indian as a man-beast helped facilitate trade, it also provided Englishmen with what seemed a perfect rationale for bringing their system of land use into the Southeast. As Robert Gray wrote in answer to his own question, "Although the Lord hath given the earth to the children of men, the greater part of it is possessed and wrongfully usurped by wild beasts, and unreasonable creatures or by brutish savages." Colonists had only to look at the nature of native subsistence to conclude that southeastern Indians fell into the latter category. For while the natives modified the forest, used, and even exchanged its products, Indians did not work the land as God commanded. Accordingly, Gray concluded, the natives had "no particular property in any part or parcell of the country, but only a general residencie there, as wild beastes have in the forest." Throughout the colonial period, Gray's argument or some similar variation became the theoretical justification for replacing Indian subsistence patterns with those dictated by the European market.²⁷

Thus when colonists met Indians, two distinct economies (or systems for using the landscape) confronted each other. One sprang from the ecological and economic transformation of Europe and drew impetus from a divine command. The other grew out of generations of experience in a land rich in resources and reflected an inherent need to preserve social harmony. One stressed private property, individual accumulation, and the profitable sale of commodities. The other, while it recognized the concept of property, emphasized survival and reciprocal exchange of goods. In 1705, when Beverley noted the "alterations" in the Virginia environment, he seemed convinced that the European system had won hands

down. As he explained it, Indians had enjoyed "the natural Production" of the country "without the Curse of Industry, their Diversion alone, and not their Labour, supplying the Necessities." English colonists, Beverley continued, had made "inordinate and unseasonable use" of the land, thereby bringing about unsightly changes.²⁸

From Beverley's perspective, such an argument must have made perfect sense. In keeping with their ideas about private property, colonists had enclosed land to grow staple crops. As a result, soil had been exhausted and climates had changed. Englishmen had required beaver pelts and deerskins for the international market. Beaver and deer had begun to disappear. Lumber sold to the West Indies and naval stores shipped to Britain were already depleting southern forests. The argument appears watertight. But Beverley's remarks about English exploitation must be read with care. Although critical of his fellow colonists, Beverley was himself part of the economic system he held responsible for changing the landscape. (He owned a large plantation in Gloucester County, Virginia and an additional six thousand acres in King and Queen County.) Perhaps cognizant of his own role in bringing about the distasteful "alterations," Beverley saw such changes solely as the results of European ideas and institutions, an interpretation that sets a trap for the modern historian. The connection between European expansion and the ecological transformation of the southern forest cannot be denied, but it provides only a simplistic and one-dimensional explanation for environmental change. To ascribe the destruction of wildlife, deforestation, and soil exhaustion entirely to the triumph of a capitalist "world-economy" is to dehumanize the process. Economic

"catch phrases" such as "private property," "accumulation," and "the transition from feudalism to capitalism" tend to obscure human motives and rule out cultural interaction, implying that ecological change resulted from abstract forces which, once set loose in America, quickly steamrolled the landscape and its original inhabitants into submission.²⁹

The early history of the Southeast suggests otherwise. Economic and theological justifications notwithstanding, Old World capitalism did not become New World capitalism simply by crossing the Atlantic. Despite their differing ideas about the use of resources, Europeans and Indians at first found much common economic ground. The natives initially welcomed European trade goods with the same enthusiasm explorers and early colonists expressed for exotic New World commodities. Introduced to metal goods in the form of nails and spikes from wrecked Spanish vessels, Indians at Roanoke Island were eager to obtain utensils which might make life easier. But Indian demand for such items did not result only from their recognition of superior technology. Due to the value the natives attached to ornamental personal property, Englishmen also had to supply Indians with "prestige goods," such as combs, mirrors, and earbobs. The initial goodwill between colonists and natives also owed much to the Indians' long tradition of gift-giving, a custom which immediately helped facilitate the exchange of goods. In its early stages, trade was as much a product of New World institutions as of Old.

The natives' demand for trade goods and the increased use of guns may have been destined to increase depredations on wildlife, but intercultural commerce might not have depleted the game supply so rapidly had

it not been for a peculiar feature of the American environment: the absence of Old World disease organisms. Unable to counter the lethal microbes with traditional remedies, Indians died by the thousands, a demographic debacle that inclined the natives to find a prominent place in the European system. But even when Indians began to supply colonists with commodities for the world market, the trade still reflected much of the natives' precontact way of life. Indians used guns in conjunction with the age-old technique of fire-hunting, a practice which greatly enhanced the effectiveness of European weapons. Perhaps the most striking remnant of precontact subsistence patterns was the lack of restraint with which the natives pursued fur-bearing animals and medicinal plants. For generations before Europeans arrived in the Southeast, Indians had taken whatever they needed from the forest. They saw no need to hold back simply because the nature and purpose of the hunt had changed. In its final and most ecologically-devastating form, the Indian trade was not just a consequence of Old and New World economic institutions, but the outgrowth of a complex pattern of cultural interaction between Indians, colonists, and the environments in which both groups lived.

Interplay between Old World and New also shaped forest industries and agriculture, activities in which Indians were less directly involved. Europeans were not always able to acquire and sell the commodities they sought in the Southeast. High shipping costs made it impractical to ship whole trees or unfinished lumber to England, forcing southerners to develop a market with the West Indies. Virginia colonists initially hoped to produce naval stores, but discovered that

the sparsely distributed loblolly and Virginia pines around Jamestown made such an enterprise difficult. Settlers who came to the Southeast hoping to grow citrus and sugar cane soon found the climate better suited to corn, tobacco, rice, and indigo. European attitudes about commodities and exporting resources grew out of the burgeoning Old World economy, but New World climates, forests, and soils determined which products southern colonists sold abroad.

The southeastern environment played a more subtle, but perhaps more important, role in transforming European economic institutions into the system of plantation agriculture and slave labor which enabled colonists to market those products. Virginia provides a dramatic case in point. The organizational scheme of the first Jamestown colony closely resembled that of a feudal military expedition, led by "gentlemen" and staffed by "slothful servants" and "ne're do wells" like those who made up the armies of England. In part, this "military model" reflected the Virginia Company's ideas about the prospect of using Indian labor to produce New World commodities. Farther south, Spanish colonists had successfully enslaved Indians to work the gold mines and haciendas of Latin America. Englishmen also hoped to use Indian workers, although unlike the brutal, "godless" Spanish, the Jamestown colonists planned to introduce tractable natives to the "gentle government of England."³⁰

In Virginia, however, the settlers had the ill luck to come ashore in a region controlled by the Powhatan Confederacy, described by Edmund S. Morgan, a careful student of the Virginia colony, as "a more powerful, more extensive, and more effective Indian government than existed anywhere else on the Atlantic coast." Englishmen initially had little

hope of putting those natives to work either through gentle government or with more persuasive military action. Without a suitable native workforce, the Jamestown colonists faced a severe labor problem. In Europe neither gentlemen nor footsoldiers ordinarily grew their own food and, once in the New World, those who made up the colonizing expedition lacked both the motivation and skills to plant the necessary subsistence crops. The lethal tidewater climate turned the labor problem into a labor crisis. Typhoid, dysentery, salt poisoning, and other diseases killed English immigrants almost as fast as European viruses killed Indians. Even when John Rolfe's tobacco experiments provided Virginians with a suitable commodity, the unfriendly environment and the lack of a compliant native population left the colony without the necessary labor to grow the crop in quantity.³¹

Englishmen did not give up in their efforts to use Indian workers. The so-called "massacre" of 1622, which in English eyes offered proof of the natives' bestial nature, provided colonists with a perfect excuse for forcefully subduing the Indians and putting them to work. But even after the Virginia natives had been subjugated (by disease as well as encroaching settlement and sporadic warfare), enslavement proved difficult. Indian males were not predisposed toward field labor and, being expert woodsmen, had the annoying habit of escaping into the forest. Throughout the seventeenth and early eighteenth centuries, Virginians bought and sold Indian slaves for local use, but like the later slave merchants of South Carolina, Virginians probably found it more profitable to ship Indian slaves to other colonies or the West Indies, where

the natives were less likely to run away. Once subjugated, local natives were more useful as deerskin suppliers and wolf-killers.³²

As it became apparent that colonists would have to work their own fields, the Virginia Company abandoned the "semi-military work gangs" for a new system of labor, one that exhibited many of the trappings of emerging European capitalism. The new policy began in 1618. Planters who had come to Virginia before 1616 received a hundred acres of land (in fee simple), while newly arriving settlers received fifty acres for themselves and an additional fifty for every other person whose passage they paid. The Company also provided for "tenants" to be brought to Virginia at Company expense to work company lands. Obligated to the Company for seven years, the tenants were to work as "sharecroppers," paying half their produce as rent. In addition, the Company encouraged its members to set up their own "private plantations" in the colony, to be manned by tenants and servants who would make up the cost of their passage in labor. With this new system of private ownership and indentured labor, the Virginia Company hoped to bring enough European workers to the colony to turn the profits its London investors had envisioned in 1604.³³

But even after this change in policy, the New World environment continued to dictate the pace and nature of economic expansion. Between 1618 and 1624 almost four thousand immigrants came to Virginia. But because so many newcomers succumbed to disease (and an additional 347 died in the 1622 Indian uprising), the colony's population increased by only five hundred and labor became more precious than ever before. With land plentiful and the tobacco boom in full swing, those able to acquire

laborers could turn a substantial profit. However, the "winners" in the tobacco boom were not the Virginia Company's London investors, but its officers in Virginia. By charging exorbitant prices for supplies and by falsifying records, merchants and government officials parlayed initial grants of land and laborers into sizeable estates. With its potential profits siphoned off by unscrupulous entrepreneurs, the Virginia Company, that stepchild of the European world-economy, collapsed in 1624. From that point on, the colony was the province of royal officials and, for the moment, private enterprise reigned supreme. Still faced with an acute labor shortage, planters bought and sold European servants as commodities and even used the laborers as gambling stakes. By 1630, the hostile environment, an exotic southeastern crop, and the availability of land had combined to produce a powerful mutant of European capitalism, an American system that, in Edmund Morgan's words, already "treated men as things."³⁴

That system received its final definition over the next hundred years. As Virginians spread out along the waterways, the high mortality rate declined. Farther upstream rivers ran swifter and purer, lowering the risk of typhoid, dysentery, and salt poisoning. The successful cultivation of corn helped curb malnutrition and transplanted European fruit trees furnished settlers with the necessary vitamins to ward off scurvy and other deficiency diseases. With the chances of early death significantly reduced and the population increasing, the demand for land skyrocketed. Colonists of sufficient means scrambled to acquire fertile bottomland, purchasing rights to acres formerly granted to servants who had died before their terms of indenture ended. By 1675, Virginians had

laid claim to more than 2,350,000 acres along the York, Rappahannock, James, and Potomac rivers.³⁵

Freed servants and newly-arriving immigrants found it increasingly difficult to procure unclaimed tracts and were forced to rent small plots from the large landowners. Even those who did manage to settle unclaimed land often became indebted to the larger planters. As tobacco prices dipped during the post-boom years, those who produced only a small quantity of the weed found it more difficult to sell their crops directly to English merchants. The high costs of transporting tobacco overland to ships waiting in tidewater rivers made it more feasible for smaller inland planters to sell their harvest to large landowners who, being seated along the waterways, could better afford to market the crop. In this fashion, the great planters took on their roles as local merchants, using their ties to the commercial houses of London to acquire clothing, food, and farm implements. These goods the planters then furnished to their smaller neighbors on credit, eventually exacting payment from future harvests. By the second quarter of the eighteenth century, the most successful of those planter-merchants had used the returns from such sales to build huge baronial estates with manor houses to rival those of England.³⁶

By the 1730s, most of those great planters had abandoned indentured labor in favor of black slaves imported directly from Africa or by way of the West Indies. A number of factors influenced the growth of slavery in Virginia. English statesmen and economic theorists sought new ways of putting the nation's poor to work at home, a movement which restricted the flow of indentured labor across the Atlantic. While the

number of white servants dwindled, the availability of black slaves increased. In 1698 Parliament forced the Royal African Company (a joint-stock company originally chartered in 1663) to give up its monopoly on the African slave trade. As individual merchants and entrepreneurs took control of the trade, the number of slaves brought from West Africa increased four-fold, allowing southerners to purchase black labor more easily and cheaply than in times past. The slave trade, like colonization itself, developed out of the transformation of the European economy and the associated doctrines of capitalism and economic freedom.³⁷

Plantation slavery was, however, a New World phenomenon, born out of the peculiarities of the southern environment. Like white servants, black slaves solved the planter's fundamental dilemma of how to grow commodities in a region where land was plentiful and labor scarce. And like servants, Virginia's slaves initially worked mainly in the production of tobacco, that distinctly New World crop that had intrigued Englishmen since the 1580s. The substitution of slaves for servants paralleled other ecological changes wrought by colonists. During the first half of the seventeenth century, when Virginia's climate killed off immigrants by the thousands, planters were reluctant to buy slaves for fear of losing them to disease and malnutrition. Servants cost only half as much and if they could be kept alive for the terms of their indenture, they provided a better return on the planter's investment. But as colonists developed the necessary subsistence crops and learned to cope with the hostile climate, laborers lived longer and slaves, who served a lifetime "indenture," became a better economic risk.³⁸

Virginians who put together large estates during the early eighteenth century found that the use of slaves allowed them to maximize production as never before. Unlike white servants, slaves were not subject to English laws governing the length of their work day. Masters had to allow their slaves only enough time to eat and sleep. Moreover, children born to slaves became the property of the master, making black women a valuable investment for the large landowner. Slave population figures for Virginia clearly reflect the three-way link between lower mortality, larger estates, and the increased use of African labor. In 1671, when Virginians were laying claim to the rich bottomlands, the two thousand slaves in the colony constituted only 5 percent of its total population. By 1708, the number of Africans stood at twelve thousand, about 20 percent of the total. From the 1730s on, slaves consistently made up 40 to 50 percent of the population and became the backbone of the agricultural workforce.³⁹

In one curious sense, colonial Virginia had come full circle. Originally organized along the lines of the feudal economy, the colony had, under the influence of southeastern climate and geography, become the domain of private enterprise during the seventeenth century. By the mid-eighteenth century, however, Virginia again resembled feudal Europe, with a landed aristocracy exacting service from white tenants, smaller freeholders, and black slaves. Yet the system still bore the earmarks of capitalism. Planters used land as a source of private income, not as a means of meeting community needs. Moreover, the accumulation of "capital," whether in the form of land, slaves, tobacco, or European

goods sold to neighbors, determined a planter's economic status with his peers.⁴⁰

With some variation, the plantation system worked its way into the other southern colonies. Indian slaves, indentured servants, and Africans were all put to work in South Carolina fields during the colony's formative years. But the development of rice as an agricultural staple and the Africans' resistance to mosquito-borne diseases worked to make black slavery the most cost-effective form of labor. As rice culture spread north along the lower Cape Fear and south into Georgia, manor houses and large fields tended by Africans became the symbols of wealth and status. Like the Indian trade, the plantation system and slavery clearly reflected the interaction between Old World institutions and the New World environment. Colonial agriculture was a recognizable variation on the values of the European world economy; it was also a distinctly American and, more specifically, a southern system spawned in part by the very climate and resources Europeans crossed the Atlantic to exploit.⁴¹ European economics helped transform southeastern ecology, but the reverse is also true.

Born out of an ongoing dialectic between Europeans, Indians, Africans, and the land itself, the colonial economy proved better suited to produce commodities than even the most farsighted explorers or economic theorists could have envisioned. Indians were the best hunters and woodsmen so they became the chief procurers of furs and skins. The natives could be paid off with kettles, blankets, guns, and rum--valuable items within Indian culture, but worth considerably less than pelts and leather to Europeans. Slaves were equally important to

the system. Throughout the Southeast, African labor enabled southerners to clear extensive tracts of land that had been too heavily forested for Indian farmers. With an adequate supply of slaves, a planter could also develop a profitable business in lumber and naval stores. As Governor Drayton wrote of South Carolina in 1802, were it not for slaves,

the extensive rice fields which are covered with grain would present nothing but deep swamps, and dreary forests; inhabited by panthers, bears, wolves, and other wild beasts. Hence, the best lands of this state, would have been rendered useless; while the pine lands, from their barren natures, although they might maintain the farmer, would have done⁴² little towards raising the state to its present importance.

Most southerners, Drayton included, regarded the changes wrought by colonists, Indians, and slaves as "improvements," believing that Europeans had successfully subdued a wildwood inhabited by "bestial savages" and had made both land and people more productive. Everywhere the "new face" on the countryside seemed to connote new efficiency. And therein lay the answer to Robert Beverley's initial question about environmental change. Caught up in the developing world-economy and driven by the divine command to conquer the earth through strenuous labor, colonists had demanded that the Southeast provide them with commodities. Due to the unique characteristics of the southern environment (the absence of Old World diseases, the subtropical climate, the need for labor) and the interaction of cultures, Indians and Africans had been drawn into the colonial economy, allowing those commodities to be produced quickly and in quantity.

But ecologically, the colonial system was grossly inefficient because it depleted the very resources that fed it. It was a system that could function well only as long as southerners enjoyed an infinite

supply of land. Beverley explained it best when he reported that English colonists "sponge upon the Blessings of a Warm Sun, and a fruitfull soil, and almost grutch [begrudge] the pains of gathering in the Bounties of the Earth." That "sponging" could not go on forever. When colonists finally used up the supply of fresh land, only depopulated, deforested, and depleted tracts would remain. Indeed, as Beverley noted, those changes, the results of a wasteful system, could more appropriately be called "alterations," not "improvements."⁴³

Toward the end of the colonial period, Englishmen on both sides of the Atlantic had begun to heed such warnings and sought to restrain that system of land use. Colonial legislators closed hunting seasons and outlawed the most destructive techniques for taking game. Similar laws defined where and how colonists could fish. Fire laws set limits on seasonal burning. Parliament forbade the unrestricted cutting of live oak and other valuable trees. Private individuals also joined in the effort to replenish the land. Some planters sowed nitrogen-fixing clover on worn-out fields, while other farmers filled eroded ditches with hay and other organic matter. But in spite of their sensitivity to environmental problems and their well-intentioned legislation, neither colonists nor their governments could hold back the cycle of economic expansion and ecological destruction. As southerners crossed the Appalachians into the Ohio Valley and Deep South, those regions began a similar and equally dramatic metamorphosis.

It is a scenario with which modern Americans are all too familiar. The nature of economic expansion has, of course, changed drastically since Europeans first set foot in the Southeast. The draft animals and

plows of colonial planters have given way to the diesel-powered machinery, pesticides, and chemical fertilizers of agribusiness. Hand axes and water-powered sawmills have been replaced by power saws and sophisticated lumber yards capable of reducing an entire forest to planks or paper in a matter of days. Factories have tainted air and water until fish and wildlife not only succumb to the hunter's weapons, but also to chemical spills and acid rain. Phobias of nuclear winter and the melting of polar ice caps have supplanted Landon Carter's fears of a colder Virginia climate.

Such problems are threatening enough to make twentieth-century southerners long for the simplicity of the earlier era. And yet a careful observer is struck by the parallels between the modern ecological "crisis" and the nature of ecological change in the colonial Southeast. The voices of modern conservation organizations still echo the stinging rhetoric of colonial critics such as Robert Beverley, John Lawson, and Dr. John Mitchell. Even more remarkable are the continuing efforts of government officials to curb environmental damage by setting aside vast tracts of so-called "wilderness" or otherwise regulating the ways in which Americans use their resources. In the meantime, other lands are regularly clear-cut by lumbermen or exhausted by farmers growing agricultural staples. Such similarities exist because Americans have yet to resolve the basic conflict between "ecology" and "economics." As Wendell Berry, a student of the modern environmental crisis has observed, "The economy is still substantially that of the fur trade."⁴⁴

In concluding a study of the origins of that economy and the accompanying ecological problems, it is tempting to suggest that Americans abandon free enterprise and profit-seeking in favor of a system more like that of Indians. Tempting ... but foolish. Such an argument would provide little in the way of a corrective to modern problems. Given the long history of the development of capitalism and the cultural and environmental interaction which produced the American system, even a partial step toward an economy based primarily on subsistence seems unlikely. But even more important, a plea for a return to precolonial values would reflect a faulty vision of Indian life. The natives did not protect nature. They used its bounty. Some of their practices, such as planting corn and beans together, made efficient use of resources. Other techniques, such as fire-hunting and regular woodburning, sometimes proved detrimental to plant and animal populations. Long before the arrival of colonists, Indians sensed a serious tension in their relationship with nature--a tension which found expression in the countless rituals practiced in conjunction with hunting, farming, and gathering wild plants. The lesson of the colonial period is not that Indians conserved and colonists wasted, but that, since his arrival in North America, man has been alienated from the natural world. An economy that labeled resources "commodities" and stressed accumulation increased that estrangement by pushing both Englishmen and Indians toward a social norm of exploitation.

Colonists, like Indians, tried to ease the strain between themselves and the ecosystem. Instead of rituals, English governments relied on conservation laws, the essence of which have endured until the

present. Those laws failed and continue to fall short because they rest on essentially the same premise as the acquisitive economy: the separation of man from the environment. Closed hunting seasons, fire laws, and restrictions on lumbering all reflected a basic belief that for nature to survive, Englishmen (as well as their Indian and African partners) had to leave it undisturbed--at least temporarily. According to one modern environmentalist, such laws embody a "Terrarium View of the World: nature always at a distance, under glass." Terrariums are, however, always small because it proves impractical to cordon off more than a miniscule segment of land and resources. Colonial governments found it equally difficult to enforce their regulations. Laws could perhaps curb the slaughter of deer or the cutting of oak in settled regions, but outside the purview of local authorities, the destruction of game and forests went unchallenged. Instead of reducing the tension between man and his environment, such legislation only widens the gulf, forcing Americans into a paradoxical relationship with the land. Legislators have, in effect, been entrusted with saving man from himself. While the economy exploits, governments conserve.⁴⁵

Resolving this paradox does not mean abandoning conservation, but rather assimilating it into a new environmental ethic, one which allows for both preservation and use. The blueprint for such an ethic lies not in Indian society, but within nature itself, in that elusive entity Henry Wadsworth Longfellow labeled "the forest primeval." Such a forest depends on use. Plants use sunlight; deer and other herbivores use plants; carnivores use herbivores. Yet the system is never depleted. Indeed, interaction between organisms, in the form of food chains and

energy flow, is critical to the maintenance of the woodlands. But one crucial factor differentiates ecological use of resources from economic use. Within the forest, some energy is always returned to the land to start the cycle over again. An ecosystem is efficient because it spends energy to reproduce itself.

In contrast, Americans have been forever obsessed with another brand of efficiency, the "efficiency" of the colonial period, still defined by modern dictionaries as "the power of producing the intended effect in relation to cost in time, money, and energy." English traders offered Indian hunters guns, allowing the natives to take more deer with less effort. Colonists used the "kiln method" for producing tar and pitch because it enabled them to make additional use of trees already damaged by turpentine or those toppled by wind and ice storms. Planters neglected to pen their cattle and make use of manure because the beasts could more easily maintain themselves by foraging in the woods. At almost every turn, energy seemed to be saved. But in ecological terms such energy was actually lost because it was not returned to the system. Consequently deer and pine trees disappeared and soils became infertile. The colonial economy was not reproductive, but only productive and, ultimately, destructive.

If Americans are to survive the twentieth century, they must continue to use the forest as an ecological yardstick for measuring the reproductive efficiency of their economic system. Preserving plants and animals remains critical, but for a different reason. Instead of putting nature away "under glass" for safe-keeping, Americans must look to it as a cultural model. Comparing rates of erosion or soil fertility

between forests and farmland, for example, is an indispensable aid in determining the ecological consequences of agriculture. Only by studying patterns of regeneration and forest succession in undisturbed areas can lumbermen decide how many trees to cut from forests they intend to use. In short, looking to "the forest primeval" means not asking simply, "How much can the land produce," but "How much can it produce dependably for an indefinite time?"⁴⁶

Before the arrival of Europeans, Indians had little reason to ask such a question. They simply took what they needed, protected from the spectre of overuse by an economy that did not encourage accumulation. At first colonists, too, ignored the issue because they enjoyed a seemingly infinite supply of land. Not until the late eighteenth century, when their carelessness threatened to undermine profits, did planters attempt to replenish their fields with clover or fill eroded ditches. Only then did colonial governments take up the cause of conservation. Modern Americans can no longer afford the luxury of such delays. Most of the nation's land is in use and its acquisitive economy in high gear. Our very survival depends on studying the ecosystem and redefining our place in the system of energy exchange. Only man and nature working together can develop a suitable environmental ethic which will guarantee the survival of wildlife, ensure the growth of forests, and provide a lasting supply of fertile soil for agriculture. Perhaps Edwin Muir, the twentieth-century Scottish poet, expressed it best in his poem, "The Island":

Men are made of what is made,
The meat, the drink, the life, the corn,
Laid up by them, in them reborn.
And self-begotten cycles close

About our way; indigenous art
And simple spells make unafraid
The haunted labyrinth of the heart
And with our wild succession braid
The resurrection of the rose.⁴⁷

It is a lesson most colonists never learned. Their twentieth-century heirs must do better.

[Notes to pages 2-13.]

NOTES

GOING TO THE WOODS

1. Gary B. Nash, ed., The Private Side of American History: Readings in Everyday Life, 2 vols. (New York: Harcourt, Brace, Jovanovich, 1983), 1:1, 2.

2. Gary B. Nash, Red, White, and Black: The Peoples of Early America (Englewood Cliffs, N.J.: Prentice-Hall, 1974), 4.

3. Ibid., 1. James Axtell, The European and the Indian: Essays in the Ethnohistory of Colonial North America (New York: Oxford University Press, 1981), 4-6.

4. Quotations from: Nancy O. Lurie, quoted in Axtell, European and Indian, 8; and Nash, Private Side, 2.

5. This definition of an ecosystem is from Eugene P. Odum, Fundamentals of Ecology (Philadelphia: W.B. Saunders Company, 1971), 8.

6. Carl Ortwin Sauer, Sixteenth-Century North America (Berkeley: University of California Press, 1971), xi.

7. K.G. Davies, The North Atlantic World in the Seventeenth Century, (Minneapolis: University of Minnesota Press, 1974), see especially, xi-xii.

8. Axtell, European and Indian, 13-14.

9. Ibid., 15.

10. Henry David Thoreau, Walden (New York: W.W. Norton and Company, 1951), 105.

IN SEARCH OF "THE FOREST PRIMEVAL"

1. Quotations from: Henry Wadsworth Longfellow, "Evangeline" and "The Song of Hiawatha," in The Complete Poetical Works of Henry Wadsworth Longfellow, ed. Horace E. Scudder (Boston: Houghton Mifflin Company, 1882), 71, 113.

2. Quotations from: Francis Parkman, Montcalm and Wolfe (Boston: Little Brown and Company, 1890), 334 and Francis Parkman, quoted in Gordon M. Day, "The Indian as an Ecological Factor in the Northeastern Forest," Ecology 34 (1953), 329.

3. Frank Heyward, History of Industrial Forestry in the South (Seattle: University of Washington, College of Forestry, 1958), 8.

4. For an account of early Spanish expeditions along the south Atlantic coast, see Carl Ortwin Sauer, Sixteenth-Century North America (Berkeley: University of California Press, 1971), 47-76.

5. The strategic importance of Santa Elena and the struggle for it are detailed in Sauer, Sixteenth-Century North America, 189-227. For an account of the demise of the Spanish Jesuit mission on the Chesapeake, see Clifford M. Lewis and Albert J. Loomie, The Spanish Jesuit Mission in Virginia (Chapel Hill: University of North Carolina Press, 1953). This work contains documents, a narrative summary, and translations.

6. John White, Mark Catesby, John and William Bartram, Francois André Michaux, and several others were professional naturalists who studied the environment for its own sake. "Commodities of the country" is a phrase that appears in several early English accounts, including a piece written by either Gabriel Archer or Christopher Newport, "The Description of the Now Discovered River and Country of Virginia; With the Likelihood of Ensuing Riches by Englands Ayd and Industry," Virginia Magazine of History and Biography 14 (1907), 376. The authorship of this piece is still open to debate. In the text I refer to it as Newport's expedition or voyage. Many of the ideas expressed here and elsewhere about the European search for commodities and the explorers' limited experience are drawn from William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 20-25. Cronon's book is the best environmental history available for the colonial period and I have relied on it extensively for basic treatments of ecological theory and the perspectives of English colonists.

7. Quotations from: A Fidalgo of Elvas, "True Relation of the Vicissitudes that Attended the Governor Don Hernando DeSoto," in Edward Gaylord Bourne, ed., Narratives of the Career of Hernando DeSoto 2 vols. (New York: A.S. Barnes, 1904), 1:50; and Ralph Lane, "Ralph Lane to Richard Hakluyt the Elder and Master H_____ of the Middle Temple," 3 September 1585, in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: The Hakluyt Society, 1955), 1:208.

8. Quotation from: John Lawson, Lawson's History of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 165. See also Erhard Rostlund, Freshwater Fish and Fishing in Native North America (Berkeley: University of California Publications in Geography, 1952), 73-74.

9. Quotations from: [Gabriel Archer?], "Now Discovered River," 374; Ralph Hamor, A True Discourse of the Present Estate of Virginia, and the success of the affaires there till the 18 of June 1614 (London: John Beale, 1615), 21; [Archer?], "Now Discovered River," 376; and Alexander Whittaker, Good Newes From Virginia (London, 1613), 42. For an account of sturgeon runs along the east coast, see Rostlund, Freshwater Fish, 73.

10. Elvas, "True Relation," in Bourne, Narratives, 1:223.

11. Robert Beverley, The History and Present State of Virginia (1705), ed. Louis B. Wright (Chapel Hill: University of North Carolina Press, 1947), 153. Beverley lifted parts of this and several other passages verbatim from the notes of John Banister, a seventeenth century Virginia naturalist who died before his work could be published. The lack of organization and frequent Latin phrases in Banister's work sometimes make it difficult to cite. In this and the following chapters, I have elected to quote Beverley who, although he plagiarized Banister, also observed many of the same phenomena. For a discussion of the two works, see Joseph and Nesta Ewan, eds., John Banister and His Natural History of Virginia, 1678-1692 (Urbana: University of Illinois Press, 1970), 118-27. Parts of Banister's notes also turn up in the writings of other Virginians, including William Byrd II.

12. Quotation from: William Strachey, The Historie of Travell into Virginia Britannia, ed. Louis B. Wright and Virginia Freund (London: Hakluyt Society, 1953), 128. See also Peter Matthiessen, Wildlife in America (New York: Viking Press, 1959), 114-15.

13. Quotation from: Strachey, Historie of Travell, 127. Lawson, Lawson's History, 148. These descriptions are two of the more restrained accounts of passenger pigeons. The following passage, written by William Byrd II reflects the kind of rhetoric the incredible flocks often inspired. "In their [the pigeons'] Travels they make such vast Havok among the Acorns and Berries of all Sorts, that they waste whole Forests in a short time, and Leave a Famine behind them for most Creatures; and under Some Trees where they light, it is no Strange thing to find the Ground covered three inches thick with their Dung." Byrd

also took note of the seasonal variations in pigeon travels, explaining that "the most remarkable thing in their Flight, as we are told, is that they never have been observed to return to the Northern Countries the same way they came from thence, but take quite another Route, I suppose for their better subsistence." (William Byrd II, Histories of the Dividing Line (1728), ed. William K. Boyd (Raleigh: North Carolina Historical Commission, 1929), 216). See also Mark Catesby, The Natural History of Carolina, Florida, and the Bahama Islands, 2 vols. (1747; reprint, Ann Arbor: University Microfilms International, 1977), 1:23; and A.W. Schorger, The Passenger Pigeon: Its Natural History and Extinction (Madison: University of Wisconsin Press, 1955), 268-69.

14. Quotations from: [Gabriel Archer?], "A Relayton of the Discovery of Our River Etc.," in Edward Arber, ed., Travels and Works of Captain John Smith, 2 vols. (Edinburgh: John Grant, 1910), 1:xli. (Arber ascribes authorship of this tract to Archer, although it might have been written by Newport); Peter Purry, "A Description of the State of Carolina," (1731) in B.R. Carroll, ed., Historical Collections of South Carolina, 2 vols. (New York: Harper and Brothers, 1836), 2:134. Elvas, "True Relation," in Bourne, Narratives, 1:71. Lawson, Lawson's History, 156-57. Again I have chosen some of the more believable accounts of wild turkeys. Some colonists reported turkeys which weighed more than sixty pounds, a weight which would make them twice the size of today's wild birds. Purry, however, estimated their weight at about thirty pounds. Like his work on the passenger pigeon, A.W. Schorger's The Wild Turkey: Its History and Domestication (Norman: University of Oklahoma Press, 1966) provides a wealth of information on the turkey's natural history.

15. Quotations from: Lawrence C. Wroth, ed., The Voyages of Giovanni da Verrazzano, 1524-1528 (New Haven: Yale University Press, 1970), 134-35; Strachey, History of Travell, 126; Hamor, True Discourse, 20; Thomas Ashe, "A Compleat Discovery of the State of Carolina," (1682) in Carroll, Historical Collections of South Carolina, 2:72; and Thomas Harriot, "A Briefe and True Report of the Newfound Land of Virginia," (1588), in Quinn, Roanoke Voyages, 1:331.

16. Quotation from: William Byrd II, The Natural History of Virginia or the Newly Discovered Eden, ed. Richmond Croom Beatty and William J. Mulloy (Richmond: The Dietz Press, 1940), 54. Some evidence indicates that English colonists may have mistaken the larger whitetail bucks for elks. For an example, see John Lederer, The Discoveries of John Lederer (London, 1672), 21. However, Peter Matthiessen concludes that elk ranged as far south as Georgia and probably strayed into the coastal savannahs. (Matthiessen, Wildlife in America, 62-63). Byrd's surveying party found a pair of elkhorns near present day Surry County, North Carolina. (Byrd, Dividing Line, 236).

17. Quotations from: Arthur Barlowe, "Discourse of the First Voyage, 1584-85," in Quinn, Roanoke Voyages, 1:100; and Lawson, Lawson's History, 119. William Byrd II, "A Journey to the Land of Eden," The Writings of Colonel William Byrd of Westover in Virginia Esqr. (New York: Doubleday, Page, and Company, 1970), 311-12. The best argument

in support of the buffalo's presence in the Southeast is Erhard Rostlund, "The Geographic Range of the Historic Bison in the Southeast," Annals of the Association of American Geographers 50 (1960), 395-407. At its maximum, Rostlund argues, the bison's range extended to the coast of Georgia and to a line eighty or ninety miles from the coast in the Carolinas.

18. Quotations from: Byrd, Dividing Line, 52; and Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:330. Lawson, Lawson's History, 126. For references to other indigenous furbearers, see Hamor, True Discourse, 20-21; and Beverley, History and Present State, 153.

19. Quotation from: Strachey, History of Travell, 125. Harriot was one of several who recorded the Indians' fondness for bear meat. (Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:356).

20. Quotations from: Byrd, Dividing Line, 250, 252.

21. Quotations from: Lawson, Lawson's History, 122, 22. The wolf has long been a fixture of the darker side of English folklore. The expression, "keeping the wolf from the door" is but one example of such mythology. For an explanation of this view of wolves, see Roger Caras, North American Mammals: Fur-Bearing Animals of the United States and Canada (New York: Gallahad Books, 1967), 72-73. In fairness to Lawson, his account of the dangers to settlers from howling beasts is one of the more balanced and accurate descriptions. He also took care to point out that wolves were "not Man-slayers, neither is any Creature in Carolina unless wounded." (Lawson, Lawson's History, 122).

22. Quotations from: Hamor, True Discourse, 20-21. One of the best examples of the tendency simply to list less important species is Harriot's catalog "Of Beastes," in Quinn, Roanoke Voyages, 1:355-57.

23. Ralph Lane, "Ralph Lane to Richard Hakluyt," in Quinn, Roanoke Voyages, 1:208. Lane noted that Virginia needed "horses and kine in some reasonable proportion." Strachey, History of Travell, 79-80. Strachey reported that the Indians bred no "Cattell nor bring up tame poultry, albeit they have great store of Turkeys, nor keepe byrds, Squirrels, nor tame Partridges, swan, duck, nor Geese." Most Europeans thought Indian dogs to be wolves, captured as pups and domesticated. For an example, see Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:357. However, other evidence suggests that Indian dogs were just that--a species of domestic dog. See Glover M. Allen, "Domesticated Dogs of the American Aborigines," Bulletin of the Museum of Comparative Zoology, Harvard University (1920), 431-517; and Mark Mastromarino, "Cry Havoc and Let Loose the Dogs of War: The Military Use of Dogs in Colonial America," Department of History, College of William and Mary, 1983.

24. The first black rats to reach the Southeast came ashore in 1609 at Jamestown. See John Smith, "The Proceedings of the English Colony in Virginia," in Arber, Travels and Works, 1:154-55. As late as

1737, John Brickell reported that "House-mice ... and all other kinds of Mice are scarce here." See John Brickell, The Natural History of North Carolina (1737; reprint, Murfreesboro, N.C.: Johnson Publishing Company, 1968), 130. The first colonists to New England also noted the lack of European rodents. See Cronon, Changes in the Land, 24. Some woodlands mice, such as whitefooted deer mice, are native to the Southeast, but they seldom ventured into Indian or European dwellings.

25. "Ralph Lane to Richard Hakluyt," in Quinn, Roanoke Voyages, 1:208. Indians would soon become painfully aware of the absence of such Old World diseases.

26. Calvin Martin, Keepers of the Game (Berkeley: University of California Press, 1978), 48-49. See also Calvin Martin, "Wildlife Diseases as a Factor in the Depopulation of the North American Indian," Western Historical Quarterly 7 (1976), 47-62. The health problems which confronted the first colonists at Jamestown are detailed in Carville V. Earle, "Environment, Disease, and Mortality in Early Virginia," in Thad W. Tate and David L. Ammerman, eds., The Chesapeake in the Seventeenth Century: Essays on Anglo-American Society (Chapel Hill: University of North Carolina Press, 1979), 96-125.

27. Quotations from: Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:383; [Archer?], "Now Discovered River," 375; John Smith, "A Map of Virginia, With a Description of the Countrey, the Commodities, People, Government, and Religion," in Arber, Travels and Works, 1:47-48. For information on this and other "climatic fallacies," see Sauer, Sixteenth-Century North America, 279-80.

28. Quotations from: Barlowe, "Discourse of the First Voyage," in Quinn, Roanoke Voyages, 1:106; Lawson, Lawson's History, 36-37; and John Gerar William De Brahm, De Brahm's Report of the General Survey in the Southern District of North America, ed. Louis De Vorsey, Jr. (Columbia: University of South Carolina Press, 1971), 105. Examining the fertile bottomland along James River, Newport's party found it "slimy in touch and sweet in savor." ([Archer?], "Now Discovered River," 375-76). For other accounts of richer soil farther inland, see "The Expedition of Batts and Fallam, 1671," in C.W. Alvord and L. Bidgood, eds., The First Exploration of the Trans-Allegheny Region by the Virginians, 1650-1675 (Cleveland: Arthur Clarke, 1912), 189; and "Charleston, South Carolina as Described by an English Traveler," in H. Roy Merrens, ed., The Colonial South Carolina Scene: Contemporary Views, 1697-1744 (Columbia: University of South Carolina Press, 1977), 285-86.

29. Quotations from: Elvas, "True Relation," in Bourne, Narratives, 1:73; [Archer?], "Now Discovered River," 375; William Bartram, Travels of William Bartram, ed. Mark Van Doren (New York: Dover Publications, 1955), 56; Barlowe, "Discourse on the First Voyage," in Quinn, Roanoke Voyages, 1:106; and William Hilton, "A Relation of a Discovery Lately Made on the Coast of Florida, 1664," in Alexander S. Salley, ed., Narratives of Early Carolina, 1650-1708 (New York: Charles Scribner's Sons, 1911), 47. Lawson, Lawson's History, 93. European

notes about sweet-smelling woods might seem exaggerated, but the species mentioned here are all aromatic and without competition from automobile exhausts and other modern pollutants, the woods may indeed have been quite fragrant.

30. Quotation from: Brickell, Natural History, 39. This information about the depletion of England's forests is taken from Keith Thomas, Man and the Natural World: A History of the Modern Sensibility (New York: Pantheon Books, 1983), 193; and Cronon, Changes in the Land, 20-21. Thomas argues that true shortages of wood in England were never more than local, but the vast forests of America must still have made a great impression on English explorers.

31. Quotations from: Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:329; and Whittaker, Good Newes, 44. For a contemporary account of the uses of various trees, see Lawson, Lawson's History, 93-103. A member of the laurel family, sassafras is an aromatic tree with a smell and taste somewhat like cinnamon. When boiled, the bark from its root produces a dark, pleasant-tasting tea which not only served as a supposed cure for many ailments, but also a general tonic. At the time the English founded Roanoke, sassafras root sold for twenty shillings a pound. See John Bakeless, The Eyes of Discovery (New York: J.P. Lippincott Company, 1950), 183; and Sauer, Sixteenth-Century North America, 226-27.

32. Quotations from: Edward Williams, Virginia: More Especially the South Part Thereof, Richly and Truly Valued (London: T.H. for John Stephenson, 1650), 1; and Beverley, History and Present State, 130. On the abundance of fruit trees near the Chesapeake Jesuit mission, see Lewis and Loomie, Spanish Jesuit Mission, 106. References to silkworm production appear in many early accounts and Europeans held out hope for such an industry throughout the eighteenth century. Seeing the larvae of tent caterpillars along the North Carolina coast, Harriot mistook them for silkworms (Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:336). For the persistence of the silk myth, see "A Review of Economic Conditions, 1749," in Merrens, Colonial South Carolina Scene, 173. Grapes native to the Southeast include the Lambrusca or fox grape, the Aestivalis or summer grape, and Rotundifolia, or muscadine. All these species as well as the prominent nuts and berries, are listed in Beverley, History and Present State, 130-34.

33. Hilton, "Discovery on the Coast of Florida," in Salley, Narratives of Early Carolina, 47.

34. This simplified explanation of associations is taken from John L. Vankat, The Natural Vegetation of North America (New York: John Wiley and Sons, 1979), 144-50. Due to a blight introduced from China around 1900, chestnut trees are no longer part of the westernmost association.

35. Ibid., 6, 54. Some vegetation scientists believe the almost infinite diversity in vegetation makes such classification impossible, a view I adopt below.

36. Eugene P. Odum, Ecology (New York: Holt, Rinehart, and Winston, 1963), 65-70. The idea that organisms are controlled by the weakest link in the ecological chain dates to Justus Liebig in 1840. While studying inorganic chemical fertilizers, Liebig discovered that crop plants suffered when any essential element remained in short supply, regardless of the amount the plants required. For a more detailed discussion of "Liebig's Law," see Eugene P. Odum, Fundamentals of Ecology (Philadelphia: W.B. Saunders Company, 1971), 106-07.

37. Quotation from: Francis Yeardley, "Narrative of Excursions into Carolina," (1654), in Salley, Narratives of Early Carolina, 25. On the Southeast's varying temperature patterns, see John M. Barry, The Natural Vegetation of South Carolina (Columbia: University of South Carolina Press, 1980), 3-12. For the general ranges of the cabbage palmetto and eastern hemlock, see Elbert L. Little, The Audubon Society Field Guide to North American Trees, Eastern Region (New York: Alfred A. Knopf, 1980), 314, 299.

38. Quotations from: George Percy, "Observations gathered out of A Discourse of the Plantation of the Southerne Colonie in Virginia by the English," (1606), in Arber, Travels and Works, 1:lxix; and Robert Horne, "A Briefe Description of the Province of Carolina," (1666), in Salley, Narratives of Early Carolina, 69. Barry, Vegetation of South Carolina, 182-90.

39. H. Roy Merrens, Colonial North Carolina in the Eighteenth Century (Chapel Hill: University of North Carolina Press, 1964), 43. Barry, Vegetation of South Carolina, 71.

40. Quotation from: Mark Catesby, Natural History, 1:iv. Barry, Vegetation of South Carolina, 97-114.

41. Quotation from: Strachey, Historie of Travell, 129. E. Lucy Braun, Deciduous Forests of North America (Philadelphia: The Blakston Company, 1950), 164-70, 195-220. Braun did most of her work prior to World War II. She gained the confidence of so called "backcountry people" who allowed her to search their land for uncut stands of each regional association. During the ensuing war, loggers destroyed much of what she saw in her field work, so that her 1950 book remains a valuable source for both pre-war woods and the colonial forest. For an explanation of Braun's field work, see Michael G. Barbour, et al., Terrestrial Plant Ecology (Menlo Park, Calif.: Benjamin/Cummings Publishing Company, 1980), 509.

42. Quotations from: Bartram, Travels, 39; and Walter Biggs (etc.), "A summarie and true discourse of Sir Francis Drakes West Indian voyage (Extract)," in Quinn, Roanoke Voyages, 1:300. For a discussion of fire as a regulatory factor, see Odum, Ecology, 73-74.

43. Quotation from: John White, "John White's Narrative of the 1590 Voyage," in Quinn, Roanoke Voyages, 2:613. White arrived in August, prime thunderstorm and lightning fire season in the coastal

plain. Indeed, while in the vicinity of Cape Lookout, North Carolina, his party encountered "very fowle weather with much rain, thundering, and great spouts." (White, "Narrative," in Quinn, Roanoke Voyages, 2:608). On the severity of natural fires in the Southeast, see Lawrence S. Barden and Frank W. Woods, "Characteristics of Lightning Fires in the Southern Appalachian Forests," Proceedings of the Tall Timbers Fire Ecology Conference 13 (1973), 356-57. In their study of natural fires in the Great Smoky Mountains National Park, Barden and Woods examined lightning-set fires from 1960 to 1971. They used five classifications to chart the severity of the fires, ranging from "crowning [the most severe] to spotting, running, creeping, and smoldering." Out of 185 lightning fires none was described as crowning or spotting, a fact they attribute to rain wetting the ground litter.

44. For early English references to pines in the coastal plain, see Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:363, 328. On the adaptability of pines to mineral soils, see E.V. Komarek, "Effects of Fire on Temperate Forests and Related Ecosystems: Southeastern United States," in T.T. Kozlowski, ed., Fire and Ecosystems (New York: Academic Press, 1974), 257. The original range of each major species of southern pine is detailed in Charles Mohr, Timber Pines of the Southern United States (Washington: Government Printing Office, 1897). A basic explanation of the importance of fire in maintaining pine forests can be found in Vankat, Natural Vegetation, 147; and Stephen H. Spurr and Burton V. Barnes, Forest Ecology (New York: The Ronald Press, 1973), 353.

45. Komarek, "Effects of Fire," in Kozlowski, Fire and Ecosystems, 262.

46. Quotation from: John Ogilby, America (London: Printed by the author, 1682), 206. For an eighteenth-century description of "pine barrens" and their limited grazing potential, see American Husbandry, ed. Harry J. Carman and Rexford G. Tugwell (New York: Columbia University Press, 1939), 270-71. On the relationship between longleaf pines and fire, see Komarek, "Effects of Fire," in Kozlowski, Fire and Ecosystems, 255-58; and Stephen J. Pyne, Fire in America: A Cultural History of Wildland and Rural Fire (Princeton: Princeton University Press, 1982), 143-60. See also Spurr and Barnes, Forest Ecology, 350-53. Spurr and Barnes attribute open pine lands to Indian burning, a point I consider in Chapter II.

47. Barry, Vegetation of South Carolina, 158-61. Komarek, "Effects of Fire," in Kozlowski, Fire and Ecosystems, 262.

48. Quotations from: Lederer, Discoveries, 21; Governor James Glen, "A Description of South Carolina," in Carroll, Historical Collections of South Carolina, 2:201; Hugh Meredith, An Account of the Cape Fear Country, 1731, ed. Earl Gregg Swem (Perth Amboy, N.J.: Charles F. Heartman, 1922), 17. For comments on the possibility of draining savannahs, see Edward P. Alexander, ed., The Journal of John Fontaine (Charlottesville: University Press of Virginia, 1972), 91. On the original range of savannahs, see Komarek, "Effects of Fire," in Kozlowski, Fire and Ecosystems, 261.

49. Quotations from: [Archer?], "Now Discovered River," 376; and Percy, "Observations," in Arber, Travels and Works, 1:lxii-lxiii. For information on blackberries sprouting after fire, see Henry J. Oosting, "The Comparative Effect of Surface and Crown Fires on the Composition of a Loblolly Pine Community," Ecology 25 (1944), 61-69, passim. On the importance of fire to white cedar, see Murray F. Buell and Robert L. Cain, "The Successional Role of Southern White Cedar, Chamaecypariis Thyoides, in Southeastern North Carolina," Ecology 24 (1943), 91. On fire and sassafras, Eyvind Thor and Gary M. Nichols, "Some Effects of Fire on Litter, Soil, and Hardwood Regeneration," Proceedings of the Tall Timbers Fire Ecology Conference 13 (1973), 320.

50. Quotation from: Byrd, Dividing Line, 90. On the shorter fire season in upland regions, see Komarek, "Effects of Fire," in Kozlowski, Fire and Ecosystems, 269-70; Barden and Woods, "Lightning Fires," 354-55; and Merrens, Colonial North Carolina, 192. On different pioneer species, Komarek, "Effects of Fire," 270, 276.

51. Quotations from: Catesby, Natural History, 1:iv; and Brickell, Natural History, 84. Ralph H. Hughes, "Fire Ecology of Canebrakes," Proceedings of the Tall Timbers Fire Ecology Conference 5 (1966), 149-57.

52. Quotation from: "A Gentleman's Account of his Travels in South Carolina and Georgia," in Merrens, Colonial South Carolina Scene, 120. On the edge effect, see Odum, Fundamentals, 157-58.

53. For a contemporary account of marsh bird habitat, see Beverley, History and Present State, 153. For parakeets, see Matthiessen, Wildlife in America, 114-15. Schorger, Passenger Pigeon, 54. Schorger, Wild Turkey, 224-25.

54. Leonard Lee Rue, The Deer of North America (New York: Crown Publishers, 1978), 7, 438-41.

55. Quotations from: Byrd, Dividing Line, 196-98. Rostlund, "Range of Historic Bison," passim.

56. On the importance of cover to smaller mammals, see Eleanor C.J. Horwitz, ed., Clearcutting: A View From the Top (Washington: Acropolis Books, Ltd., 1974), 29. For muskrat habitat, see Caras, North American Mammals, 274-75. For beaver and otters, Byrd, Natural History, 53-54.

57. Quotation from: Raymond F. Dassmann, Wildlife Biology (New York: John Wiley and Sons, 1964), 29. The food chain mentioned here is only one of many in a forested ecosystem and is intended to serve only as an example of the processes relating to energy flow.

58. The beaver's place in creating forest openings is explained in Caras, North American Mammals, 264; and in Jonathan L. Richardson, Dimensions of Ecology (Baltimore: The Williams and Wilkins Company, 1977), 134. On the impact of deer, see Spurr and Barnes, Forest

Ecology, 373-74. For the impact of small animals and a more general treatment of the interactions between wildlife and vegetation in the Southeast, see Robert S. Campbell, "Manipulating Biotic Factors in the Southern Forest," in Norman E. Linnartz, ed., The Ecology of Southern Forests, 17th Forestry Symposium (Baton Rouge: Louisiana State University Press, 1968), 64-65. See also William D. Boyer, "Longleaf Pine Seed Predators in Southwest Alabama," Journal of Forestry 62 (1964), 481-82.

59. On insects and wind damage in supposedly "virgin" forests, see Spurr and Barnes, Forest Ecology, 476. For changes created by storms, see Charles Moehring, "Climatic Elements in the Southern Forest," in Linnartz, Ecology of Southern Forests, 13-14. On the effects of salt spray and coastal winds, see Barbour, Terrestrial Plant Ecology, 577. In 1682, Samuel Wilson noted that "Near the Sea the Trees are not very large, [and] they grow pritty neare together." (Samuel Wilson, "Account of the Province of Carolina," (1682), in Salley, Narratives of Early Carolina, 170). He may have been describing a stunted live oak forest. For information on the stability of climax forests, see Odum, Ecology, 88.

60. This short treatment of the paleoecology of the Southeast is based on fossil pollen analyses. The information included here is most accessible in Richardson, Dimensions of Ecology, 128-30. For a more detailed, technical treatment, see W.A. Watts, "Post Glacial and Interglacial Vegetation History of Southern Georgia and Central Florida," Ecology, 52 (1971), 676-90.

61. Spurr and Barnes, Forest Ecology, 293-95. One of the better short discussions of the difficulty in reconstructing past ecosystems can be found in Karl W. Butzer, Archaeology as Human Ecology: Method and Theory for a Contextual Approach (Cambridge: Cambridge University Press, 1982), 19-20.

62. Butzer, Archaeology as Human Ecology, 20.

63. Odum, Fundamentals, 513-14.

SUBSISTENCE AND SURVIVAL

1. For discussions of the archaeological debate over man's arrival in the Southeast, see John A. Wathall, Prehistoric Indians of the Southeast (Tuscaloosa: University of Alabama Press, 1980), 20-37; Charles M. Hudson, The Southeastern Indians (Knoxville: University of Tennessee Press, 1976), 36-38; and Albert Cowdrey, This Land, This South: An Environmental History (Lexington: University Press of Kentucky, 1983), 11-12. Cowdrey's book came to my attention after all the research and most of the writing for this chapter had been completed. His chapter on Indians confirms some of what follows, but Cowdrey's focus is the nineteenth- and twentieth-century South and he offers few details of the Indians' relationship to the natural world.

2. Quotation from: Charles M. Hudson, ed., Four Centuries of Southern Indians (Athens, Ga.: University of Georgia Press, 1975), 3.

3. Quotation from: James Adair, A History of the North-American Indians, Their Customs &c. (1775), ed. Samuel Cole Williams (Johnson City, Tenn.: The Watauga Press, 1930), 405. Hudson, Four Centuries, 3.

4. Paleo-Indian hunting techniques have been detailed in many works. Originally, the information included here appeared in C. Vance Haynes, Jr., "Elephant-hunting in North America," Scientific American 214 (July 1966), 104-112; and Joe Ben Wheat, "A Paleo-Indian Bison Kill," Scientific American 216 (January 1967), 44-52.

5. The role of Paleo-Indians in wiping out mammoth and bison has also received much attention. For the original assessment, see Paul S. Martin, "The Discovery of America," Science 179 (1973), 969-74. For a discussion of strongly limiting predator-prey relationships, see Eugene P. Odum, Ecology (New York: Holt Rinehart, and Winston, 1963), 101-03.

6. Martin, "Discovery," 973.

7. Hudson, Southeastern Indians, 51-53.

8. Both weeds and cultivated crops share a "weedy tendency" or an ecological adaptation to open or disturbed habitats. The only difference between weeds and crops is that the crops are wanted, the weeds are not. For an explanation, see J.G. Hawkes, "The Ecological Background of Plant Domestication," in Peter J. Ucko and G.W. Dimbley, eds., The Domestication and Exploitation of Plants and Animals (London: Gerald Duckworth and Company, 1969), 18-19.

9. This brief summary of the introduction of tropical plants into North America is based on Walton C. Galinat, "The Evolution of Corn and Culture in North America," Economic Botany 19 (1965), 350-57; Lawrence Kaplan, "Archaeology and Domestication in American Phaseolus (Beans)," Economic Botany of California Press, 1967), 121-44. For a less technical treatment, see Hudson, Southeastern Indians, 292-94.

10. Quotation from: Robert Beverley, The History and Present State of Virginia (1705), ed. Louis B. Wright (Chapel Hill: University of North Carolina Press, 1947), 143. On the growing season in the Southeast, see Hudson, Southeastern Indians, 20-21.

11. On the importance of agriculture in increasing Indian populations, see William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 42. On limiting factors as applied to humans, see Eugene P. Odum, Fundamentals of Ecology (Philadelphia: W.B. Saunders Company, 1971), 106-07. Much has been written about pre-colonial Indian populations in North America. For a general discussion of the debate about Indian numbers, see Francis Jennings, The Invasion of America (New York: W.W. Norton and Company, Inc., 1975), 15-31. The figures cited here are for the Virginia-Maryland tidewater and are quoted in Henry F. Dobyns, Their Number Become Thinned: Native Population Dynamics in Eastern North America (Knoxville: University of Tennessee Press, 1983), 40, 44. Some scholars have found reason to question Dobyns's estimates of the Indian populations of Florida and the Deep South. (See Daniel K. Richter's review of Dobyns's work in William and Mary Quarterly, 3d ser. 41 (1984), 649-53. However, the figures Dobyns cites for the tidewater seem to be drawn from William C. MacLeod, The American Indian Frontier (New York: Alfred A. Knopf, 1928), 176, 546, and his estimates are not out of line with more reliable figures for coastal New England. See Cronon, Changes in the Land, 42. Dobyns gives the figures in square kilometers. I have converted them to Indians per square mile for the purpose of comparison with the 1790 census. The 1790 figures are from: Bureau of the Census, United States Department of Commerce, Historical Statistics of the United States 2 vols. (Washington: Government Printing Office, 1975), 1:32, 36.

12. Quotation from: William Strachey, The Historie of Travell into Virginia Britannia, ed. Louis B. Wright and Virginia Freund (London: Hakluyt Society, 1953), 39.

13. George P. Marsh, The Earth as Modified by Human Action: A New Edition of Man and Nature (New York: Scribner, Armstrong, 1874). William C. MacLeod, "Conservation Among Primitive Hunting Peoples," Scientific Monthly 43 (December 1936), 562. I developed this brief historiographic overview of Indians as conservationists after reading two distinctly different essays: Calvin Martin, "The Indian and Ecology," in Calvin Martin, Keepers of the Game: Indian-Animal Relationships and the Fur Trade (Berkeley: University of California Press, 1978), 157-88; and Christopher Vecsey, "American Indian Environmental Religions," in Christopher Vecsey, ed., American Indian Environments (Syracuse: Syracuse University Press, 1980), 1-37.

14. Wilbur R. Jacobs, Dispossessing the American Indian: Indians and Whites on the Colonial Frontier (New York: Charles Scribner's Sons, 1972), 30. Wilcomb E. Washburn, The Indian in America (New York: Harper and Row, 1975), 11. Vecsey, Indian Environments, 4-7.

15. James Mooney, Myths of the Cherokee and Sacred Formulas of the Cherokees (Nashville: Cherokee Heritage Books, 1982), 250-52.

16. Charles M. Hudson, "The Cherokee Concept of Natural Balance," The Indian Historian 3 (1970), 51-54.

17. Quotations from: Alexander Longe, "A Small Postscript on the Ways and Manners of the Nashon of Indians called Charikees," ed. David H. Corkran, Southern Indian Studies 21 (October 1969), 12; and William Byrd II, Histories of the Dividing Line, ed. William K. Boyd (Raleigh: North Carolina Historical Commission, 1929), 194. John Lawson, Lawson's History of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 222-23.

18. Quotations from: William Bartram, Travels of William Bartram, ed. Mark Van Doren (New York: Dover Publications, 1955), 285; and Mooney, Myths of the Cherokee, 425. For a contemporary account of the Green Corn Festival, see Longe, "Small Postscript," 14.

19. This interpretation of environmental religion is that offered by Vecsey, Indian Environments, 22-23. On man's inability to exist in total harmony with nature, see Odum, Fundamentals, 510-16.

20. Quotations from: Lawson, Lawson's History, 252, 253. On seasonal variation in the southern deciduous forest, see John L. Vankat, The Natural Vegetation of North America (New York: John Wiley and Sons, 1979), 132. On Cherokee cold and warm seasons, see Hudson, Southeastern Indians, 270.

21. Quotations from: Bartram, Travels, 400; Lawson, Lawson's History, 216, 217; and Beverley, History and Present State, 177. Bartram also told of a dispute between a surveying party and a group of Indians during which the natives proved the surveyor's compass to be wrong and their knowledge of the territory to be correct. The surveyors eventually accepted the correction and offered the Indians trade goods as compensation. (Bartram, Travels, 58-59.)

22. Quotation from: Byrd, Dividing Line, 116. While among the Cherokees, Lieutenant Henry Timberlake noted that the soil was "so remarkably fertile, that women alone do all the laborious tasks of agriculture." (Lieut. Henry Timberlake, Lieut. Henry Timberlake's Memoirs, 1756-1765, ed. Samuel Cole Williams (Johnson City, Tenn.: Watauga Press, 1927), 68.) On the complementary sex roles among southeastern natives, see Hudson, Southeastern Indians, 260-72. A better discussion of the division as it pertained to forest travels (although not specifically about the Southeast) is Anthony F.C. Wallace, The Death and Rebirth of the Seneca (New York: Vintage Books, 1972), 28-30.

23. For firsthand accounts of fishing with wooden and stone weirs, see Lawson, Lawson's History, 221-22; and Timberlake, Memoirs, 69. For a secondary treatment, see Erhard Rostlund, Freshwater Fish and Fishing in Native North America (Berkeley: University of California Publications in Geography, 1952), 88-101.

24. Quotation from: Lawson, Lawson's History, 222. For accounts of Indians using hooks and lines, see Strachey, Historie of Travell, 82; and Hudson, Southeastern Indians, 284.

25. Quotations from: Lawson, Lawson's History, 221; and John Smith, "A Map of Virginia with a Description of the Countrey, the Commodities, People, Government, and Religion," in Edward A. Arber, ed., Travels and Works of Captain John Smith, 2 vols. (Edinburgh: John Grant, 1910), 1:68.

26. Quotation from: Adair, North-American Indians, 232. For information on the introduced horse chestnut and similar properties of the red buckeye, see Elbert L. Little, The Audubon Society Field Guide to North American Trees, Eastern Region (New York: Alfred A. Knopf, 1980), 585, 587. On the nature of the poison, see Rostlund, Freshwater Fish, 127-28.

27. For a discussion of the possibility of Indians learning to poison fish on their own, see Rostlund, Freshwater Fish, 127-28.

28. Quotation from: Adair, North-American Indians, 432. On fish poisoning as a social event, see Rostlund, Freshwater Fish, 128.

29. Quotations from: John Smith, "Map of Virginia," in Arber, Travels and Works, 1:61; and William Byrd II, The Natural History of Virginia or the Newly Discovered Eden, ed. Richmond Croom Beatty and William J. Mulloy (Richmond: The Dietz Press, 1940), 92-93. Apparently Byrd was the only writer to describe the "fire break" used to keep the rest of the forest from burning. For contemporary accounts of the ways in which Indians cleared new fields, see Adair, North-American Indians, 434-35; and Lawson, Lawson's History, 71.

30. Quotation from: Adair, North-American Indians, 436. For descriptions of Indian planting, see John Smith, "A Map of Virginia," in Arber, Travels and Works, 1:62-63; and Thomas Harriot, "A Briefe and True Report of the New Found Land of Virginia," (1588), in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: Hakluyt Society, 1955), 1:341-42. A good secondary study of native agricultural techniques is G. Melvin Herndon, "Indian Agriculture in the Southern Colonies," North Carolina Historical Review 44 (1967), 283-97. A shorter, but still valuable, summary of southeastern Indian farming can be found in Lewis Cecil Gray, History of Agriculture in the Southern United States to 1860, 2 vols. (Washington: Carnegie Institute, 1933), 1:3-9.

31. Quotation from: Lawson, Lawson's History, 189. For other accounts of the communal nature of Indian agriculture and the lack of fences, see Bartram, Travels, 400-01; and John Brickell, The Natural History of North Carolina (1737; reprint, Murfreesboro, N.C.: Johnson Publishing Company, 1968), 344. For similar descriptions of New England Indian fields, see Cronon, Changes in the Land, 44.

32. Quotation from: Adair, North-American Indians, 439. On the complementary nature of corn and beans and the development of hardier seeds, see Kaplan, "Archaeology and Domestication," 365-67. On the advantages of planting corn in hills, see Paul Weatherwax, Indian Corn in Old America (New York: Macmillan and Company, 1954), 70. The lack of erosion in Indian fields is discussed in Herndon, "Indian Agriculture," 287.

33. Quotation from: Brickell, Natural History, 237. A good, non-technical explanation of the effect of agriculture on the energy flow can be found in Raymond F. Dasmann, Wildlife Biology (New York: John Wiley and Sons, 1964), 35-37. For the importance of burning in releasing nitrogen, see P.J. Viro, "The Effects of Forest Fire on Soil," in T.T. Kozlowski, ed., Fire and Ecosystems (New York: Academic Press, 1974), 39. Thomas Harriot also took an interest in the burning of old fields, noting "they neuer fatten with mucke, dounge, or any other thing." Instead, he reported, Indians let the old crops dry and then "burne them into ashes." In contrast to Brickell, Harriot believed the method to be of little use because the natives were "careless of" planting "where the ashes lie." (Harriot, "Briefe and True Report," in Quinn, Roanoake Voyages, 1:341-42). However, as I point out below, such inefficient management was generally typical of Indian subsistence.

34. On old field succession in the southern piedmont, see W.D. Billings, Plants and the Ecosystem, 3d ed. (Belmont, Calif.: Wadsworth Publishing Company, 1978), 105-06; and Stephen H. Spurr and Ronald V. Barnes, Forest Ecology (New York: The Ronald Press, 1973), 491. My descriptions of horseweed, white aster, and broomsedge are taken from R.E. Wilkinson and H.E. Jaques, How to Know the Weeds, 2d ed. (Dubuque, Iowa: William C. Brown Company, 1972), 190-91, 164, 21; and United States Department of Agriculture, Agricultural Research Service, Common Weeds of the United States (New York: Dover Publications, 1971), 400, 36. Broomsedge appears bluegreen at first, but turns reddish brown when dry. Many Europeans saw such old fields in various stages of succession. Some of the more picturesque accounts are: Adair, North-American Indians, 439; Lawson, Lawson's History, 28; and "The Expedition of Batts and Fallam," in C.W. Alvord and L. Bidgood, eds., The First Explorations of the Trans Allegheny Region by the Virginians, 1650-1675 (Cleveland: Arthur Clark, 1912), 189. For a later account, see Governor John Drayton, A View of South Carolina (1802; reprint, Spartanburg, S.C.: The Reprint Company, 1972), 72.

35. Quotation from: Lawson, Lawson's History, 84. The most interesting and well-researched work on the relationship between buffalo migrations and Indian agriculture is Erhard Rostlund, "The Geographic

Range of Historic Bison in the Southeast," Annals of the Association of American Geographers 50 (1960), 395-407. I have summarized his argument here.

36. For a contemporary account of the natives' summer diet, see John Smith, "Map of Virginia," in Arber, Travels and Works, 1:68. On seasonal migrations and Indian health, see Carville V. Earle, "Environment, Disease, and Mortality in Early Virginia," in Thad W. Tate and David L. Ammerman, eds., The Chesapeake in the Seventeenth Century: Essays on Anglo-American Society (Chapel Hill: University of North Carolina Press, 1979), 106-07. James Adair was one European who recognized the threat to Indian crops from wildlife, noting that maturing corn was watched by older women who "fret at the very shadow of a crow, when he chances to pass on his wide survey of the fields; but if pinching hunger should excite him to descend, they soon frighten him away with their screeches." (Adair, North-American Indians, 438.)

37. Hudson, Southeastern Indians, 274-81. For archaeological evidence concerning seasonal exploitation of game, see Bruce D. Smith, "Middle Mississippian Exploitation of Animal Populations: A Predictive Model," American Antiquity 39 (1974), 274-91.

38. On black bears in the southern forest, see Roger A. Caras, North American Mammals: Fur-Bearing Animals of the United States and Canada (New York: Gallahad Books, 1967), 56. For information on deer behavior during the rut, see Leonard Lee Rue III, The Deer of North America (New York: Crown Publishers, 1978), 260-80, especially 267-72; and Caras, North American Mammals, 437-38.

39. Quotations from: John Smith, "Map of Virginia," in Arber, Travels and Works, 1:70; and Lawson, Lawson's History, 5.

40. Quotations from: Hudson, Southeastern Indians, 275; and Ralph Hamor, A True Discourse of the Present Estate of Virginia, and the successe of the affaires there till the 18 of June 1614 (London: John Beale, 1615), 20. On deer overpopulation, see Rue, Deer of North America, 330-40. For the role of wolves in limiting deer populations, see Paul Errington, Of Predation and Life (Ames, Iowa: Iowa State University Press, 1967), 223-24. Bobcats still exert some influence on deer herds of the southern Appalachians. See Frank B. Barrick, "Deer Predation in North Carolina and Other Southeastern States," in Whitetailed Deer in the Southern Forest Habitat: Proceedings of a Symposium at Nacagdoches, Texas, March 25-26, 1969 (Forest Service, United States Department of Agriculture: Southern Forest Experiment Station, 1969), 28-29.

41. A good discussion of the debate over predator-prey dynamics and animal population ecology can be found in Jonathan L. Richardson, Dimensions of Ecology (Baltimore: Williams and Wilkins, 1979), 346-58. (Richardson offers a basic summary of predator-prey theory on 363.)

42. Quotation from: John Smith, "Map of Virginia," in Arber, Travels and Works, 1:70. For accounts of larger deer herds farther

west, see Strachey, Historie of Travell, 124; and Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:355.

43. Quotation from: John Smith, "Map of Virginia," in Arber, Travels and Works, 1:70. On the importance of bear grease and oil to southeastern Indians, see H.B. Battle, "The Domestic Use of Oil Among Southern Aborigines," American Anthropologist 24 (1922), 173. For an account of the dangers of bear-hunting, see Adair, North-American Indians, 331.

44. For a contemporary account of Indians taking passenger pigeons, see Lawson, Lawson's History, 43. On the role of Indians in limiting the numbers of passenger pigeons, see A.W. Schorger, The Passenger Pigeon: Its Natural History and Extinction (Madison: University of Wisconsin Press, 1955), 137-38.

45. On turkey-hunting, see Bruce D. Smith, "Predictive Model," 289; and A.W. Schorger, The Wild Turkey: Its History and Domestication (Norman: University of Oklahoma Press, 1966), 380-81.

46. Quotations from: Lawson, Lawson's History, 100-01; Bartram, Travels, 57; and Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:350. For additional information on the uses of oil drawn from nuts, see Battle, "Use of Oil," 173-74.

47. Quotation from: Lawson, Lawson's History, 181. On Indian uses of maple sap and vermilion, see Lawson, Lawson's History, 107, 17, 181.

48. Quotation from: Timberlake, Memoirs, 85. On materials for bows and houses, see Lawson, Lawson's History, 105-06, 187. Another, earlier account of canoe-building can be found in Arthur Barlowe, "Discourse of the First Voyage," in Quinn, Roanoke Voyages, 1:104-05.

49. Quotations from: Lawson, Lawson's History, 187; and Brickell, Natural History, 287. Beverley, History and Present State, 176. Both Brickell and Beverley referred to the wood used for fires as "pitch pine." However, the modern pitch pine grows only at higher elevations in the Southeast. The Englishmen probably used the term to describe longleaf pine from which tar and pitch were extracted.

50. Quotations from: Mark Catesby, The Natural History of Carolina, Florida, and the Bahama Islands, 2 vols. (1747; reprint, Ann Arbor: University Microfilms International, 1977), 1:ii; and John Smith, "Map of Virginia," in Arber, Travels and Works, 1:67.

51. Quotations from: Lawrence C. Wroth, ed., The Voyages of Giovanni da Verrazzano, 1524-1528 (New Haven: Yale University Press, 1970), 134; George Percy, "Observations Gathered Out of a Discourse of the Plantation of the Southerne Colonie in Virginia by the English," (1606), in Arber, Travels and Works, 1:lxii; John Smith, "A True Relation of such occurrences and accidents of noate as hath happened in Virginia," in Arber, Travels and Works, 1:16; Byrd, Dividing Line, 223;

and John Gerar William De Brahm, Report of the General Survey in the Southern District of North America, ed. Louis De Vorsey, Jr. (Columbia: University of South Carolina Press, 1971), 80.

52. Quotations from: Hu Maxwell, "The Use and Abuse of the Forests by the Virginia Indians," William and Mary College Quarterly Magazine, 2d ser., 19 (October 1910), 73-103. Since 1910, a number of works have noted the benefits of Indian burning, including Gordon M. Day, "The Indian as an Ecological Factor in the Northeastern Forest," Ecology, 34 (1953), 329-46; and Calvin Martin, "Fire and Forest Structure in the Aboriginal Eastern Forests," The Indian Historian, 6 (1973), 38-42. For a brief discussion of the varying effects of fire, see Stephen J. Pyne, Fire in America: A Cultural History of Wildland and Rural Fire, (Princeton: Princeton University Press, 1982), 20-33; and Vankat, Natural Vegetation, 45-56.

53. For varying amounts of potential fuel in southern forests, see Pyne, Fire in America, 145-46.

54. It is impossible to know exactly how often Indians burned southern forests. As the cited accounts indicate, explorers spotted fires all over and at different times of the year. However, settlers who learned woodburning from the Indians practiced it annually, indicating that yearly fires were the rule among the natives. For an example, see Byrd, Dividing Line, 228. Accounts from explorers and colonists also describe burning as an annual or semi-annual practice. I have tried to gauge the frequency of the fires in terms of the type of forest burned, an idea discussed in Emily W.B. Russell, "Indian-set Fires in the Forests of the Northeastern United States," Ecology 64 (1983), 80-83. On burning as a local phenomenon, see Day, "Indian as an Ecological Factor," 342. For a dissenting view, see Calvin Martin, "Fire and Forest Structure," 54. Martin argues for widespread Indian burning, claiming that the practice helped spare forests from devastating wildfire. However, as I point out below, such long-term management would have been completely out of character for Indians. The abundance of oak forests discovered by colonists in the South also make such widespread burning seem unlikely. See Russell, "Indian-set Fires," 85.

55. Quotation from: De Brahm, General Survey, 80, 81. De Brahm's account describes both Indian fires and those set by settlers.

56. Spurr and Barnes, Forest Ecology, 239-40.

57. Quotation from De Brahm, General Survey, 80. For an account of the effects of burning on deer browse, see Paul A. Schrauder and Howard Miller, "The Effects of Seasonal Burning on Deerfood and Cover," in White-tailed Deer in the Southern Forest Habitat, 83. On deer feeding selectively and showing preference for certain foods, see D.R. Klein, "Food Selection by North American Deer and Their Response to the Over-utilization of Preferred Plant Species," in Animal Populations in Relation to their Forest Resources, British Ecological Symposium 10 (Oxford: Blackwell Scientific Publications, 1970), 25-46. For a more

general statement about the time needed to bring back species forced out by a lack of fires, see E.V. Komarek, "Effects of Fire on Temperate Forests and Related Ecosystems," in Kozlowski, Fire and Ecosystems, 268-69.

58. Russell, "Indian-set Fires," 85-86.

59. Quotations from: Lawson, Lawson's History, 19; and De Brahm, General Survey, 81. Lawson also noted that fleas were particularly abundant around places where Indians dressed deerskins because the tiny insects could hide in the thick deerhair. (Lawson, Lawson's History, 187.) Two of the more enlightening and entertaining accounts of burning by southern farmers are: Hilliard Henson, "Why Incendiary Fires in the Southern Appalachians?," American Forests 48 (1942), 419; and H.L. Stoddard, Sr., "The Use of Fire in Pine Forests of the Deep Southeast," Proceedings of the Tall Timbers Fire Ecology Conference 1 (1962), 31-42.

60. Quotation from: John Smith, "The Proceedings and Accidents of the English Colony in Virginia," in Arber, Travels and Works, 2:427. De Brahm noted that the grassy forest floor created by burning allowed Indians "to discover the Impressions of their Enemies Tracts in the new burnt Ground," a practice at which the natives became so adept that they could "distinguish and follow all Tracts, be it of a White Man, Negroe, Indian; or be it of a Bear, Wolf, or Deer, Horse, or Cow." (De Brahm, General Survey, 81).

61. Quotations from: Percy, "Observations," in Arber, Travels and Works, 1:1xii; Byrd, Dividing Line, 218.

62. Lawson, Lawson's History, 20-21.

63. Quotations from: Edward Kimber, A Relation of a Journal of a Late Expedition to the Gates of St. Augustine in Florida, 1744 (Boston: C.E. Godspeed and Company, 1935), 26; and Byrd, Dividing Line, 228.

64. E.V. Komarek, "Effects of Fire," 253. Spurr and Barnes, Forest Ecology, 487-88. See also Roy Komarek, "Comments on Fire and the Natural Landscape," Proceedings of the Tall Timbers Fire Ecology Conference 13 (1973), 3.

65. Quotations from: Hugh Jones, The Present State of Virginia (1724), ed. Richard L. Morton (Chapel Hill: University of North Carolina Press, 1956), 55; and John Smith, "Map of Virginia," in Arber, Travels and Works, 1:68.

66. Calvin Martin, "Ethnohistory: A Better Way to Write Indian History," Western Historical Quarterly 9 (January 1978), 46-47.

VANISHING INDIANS, VANISHING ANIMALS

1. Quotation from: Lawrence C. Wroth, ed., The Voyages of Giovanni da Verrazzano, 1524-1528 (New Haven: Yale University Press, 1970), 134. Gary B. Nash, "The Image of the Indian in the Southern Colonial Mind," William and Mary Quarterly, 3d ser., 29 (1972), 199-201.
2. Nash, "Image," 210.
3. Wroth, Voyages, 134.
4. Nash, "Image," 205.
5. Ibid.
6. Arthur Barlowe, "Discourse of the First Voyage, 1584-85," in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: Hakluyt Society, 1955), 1:100, 103.
7. Ibid, 1:102.
8. On Indian perceptions of metal goods and their value in native society, see James Axtell, The European and the Indian: Essays in the Ethnohistory of Colonial North America (New York: Oxford University Press, 1981), 253. On the natives' early encounters with Spanish ships, see Barlowe, "Discourse of the First Voyage," in Quinn, Roanoke Voyages, 1:104, 111.
9. Quotation from: Barlowe, "Discourse of the First Voyage," in Quinn, Roanoke Voyages, 1:101. Axtell, European and Indian, 254-56.
10. Charles M. Hudson, The Southeastern Indians (Knoxville: University of Tennessee Press, 1976), 316. Axtell, European and Indian, 258.
11. Thomas Harriot, "A Briefe and True Report of the Newfound Land of Virginia," (1588), in Quinn, Roanoke Voyages, 1:371, 372, 330-31.
12. "The Tiger Journal of the 1585 Voyage," in Quinn, Roanoke Voyages, 1:191.
13. Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:381.
14. Quotation from: Ibid. On the spread of infectious diseases in previously unexposed populations, see Alfred W. Crosby, "Virgin Soil

Epidemics as a Factor in the Aboriginal Depopulation of America," William and Mary Quarterly, 3d ser., 33 (1976), 284-93.

15. A Fidalgo of Elvas, "True Relation of the Vicissitudes that Attended the Governor Don Hernando DeSoto," in Edward Gaylord Bourne, ed., Narratives of the Career of Hernando DeSoto, 2 vols. (New York: A.S. Barnes, 1904), 1:66.

16. Quotation from: Garsillasco de la Vega, The Florida of the Inca, ed. and trans. John Grier Varner and Jeanette Johnson Varner (London: Thomas Nelson and Sons, Ltd., 1951), 325. See also George R. Milner, "Epidemic Disease in the Postcontact Southeast: A Reappraisal," Mid-Continental Journals of Archaeology 5 (1980), 43-44.

17. Quotation from: John Smith, "The Generall Historie of Virginia, New England, and the Summer Isles," in Edward Arber, ed., Travels and Works of Captain John Smith, 2 vols. (Edinburgh: John Grant, 1910), 2:747. On the probability of typhus as the agent of depopulation at Roanoke, see Henry F. Dobyns, Their Number Become Thinned: Native American Population Dynamics in Eastern North America (Knoxville: University of Tennessee Press), 21. For a discussion of typhus aboard Drake's vessel, see Henry F. Dobyns, "An Outline of Andean Epidemic History to 1720," Bulletin of the History of Medicine 37 (1963), 504-05.

18. Quotation from: Maryland Gazette, June 28, 1764, quoted in John Duffy, Epidemics in Colonial America (Baton Rouge: Louisiana State University Press, 1953), 230. The symptoms of louse-borne typhus are described in Encyclopedia Britannica, 11th ed., s.v. "typhus."

19. Dobyns, Number, 11-16.

20. Quotation from: Thomas B. Robertson, "An Indian King's Will," Virginia Magazine of History and Biography 36 (1928), 193. Dobyns, Number, 15.

21. Quotations from: John Lawson, Lawson's History of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 5, 24; John Archdale, "A New Description of that Fertile and Pleasant Province of Carolina," (1707), in B.R. Carroll, ed., Historical Collections of South Carolina, 2 vols. (New York: Harper and Brothers, 1836), 2:89; and Robert Beverley, The History and Present State of Virginia (1705), ed. Louis B. Wright and Virginia Freund (London: Hakluyt Society, 1953), 232.

22. Beverley, History and Present State, 282.

23. Quotations from: William Byrd II, Histories of the Dividing Line, ed. William K. Boyd (Raleigh: North Carolina Historical Commission, 1929), 116; Dr. John Milligan, "A Description of the Province of South Carolina," (1763), in Carroll, Historical Collections of South Carolina, 2:516; and Governor John Drayton, A View of South Carolina (1802; reprint, Spartanburg: The Reprint Company, 1972), 92-93.

24. Quotations from: Archdale, "New Description," in Carroll, Historical Collections of South Carolina, 2:89; and Lawson, Lawson's History, 5. On the percentage of mortality associated with smallpox and acquired immunity, see Crosby, "Virgin Soil Epidemics," 292-94.

25. Duffy, Epidemics, 164-77, passim. Dobyms, Number, 16-17. Crosby, "Virgin Soil Epidemics," 293.

26. Duffy, Epidemics, 186-88, 197-200. Dobyms, Number, 269-70.

27. Dobyms, Number, 18-24.

28. Quotation from: James Adair, A History of the North-American Indians, Their Customs, &c., ed. Samuel Cole Williams (Johnson City, Tenn.: The Watauga Press, 1930), 138. On the relationship between viral infections and diabetes, see Dobyms, Number, 23.

29. William Byrd II, "A Journey to the Land of Eden," in The Writings of Colonel William Byrd of Westover in Virginia, Esqr., ed. John Spencer Bassett (New York: Doubleday, Page, & Company, 1970), 318.

30. A readily accessible account of the various diseases encountered by European settlers can be found in Albert E. Cowdrey, This Land, This South: An Environmental History (Lexington: University Press of Kentucky, 1983), 25-26. On the consequences of the lack of support services during Indian epidemics, see Shepard Krech, "disease, starvation, and North Athapaskan social organization," American Ethnologist 5 (1978), 710-32. The role of cool winds in the spread of smallpox is described in J.M. May, Studies in Disease Ecology (New York: Hafner Publishing Company, 1961), 12.

31. Duffy, Epidemics, 27-30.

32. Quotation from: Lawson, Lawson's History, 133. For a description of seneca root, see Byrd, Dividing Line, 159-60.

33. On the value of the concomitant treatments, see Virgil J. Vogel, American Indian Medicine (Norman: University of Oklahoma Press, 1970), 223. James Adair was one trader who professed a fondness for Indian treatment of snakebite (Adair, North-American Indians, 246).

34. Quotations from: John Smith, "A Map of Virginia With a Description of the Countrey, the commodities, People, Government, and Religion," in Arber, Travel and Works, 1:74; and John Gerar William De Brahm, De Brahm's Report of the General Survey in the Southern District of North America, ed. Louis DeVorse, Jr. (Columbia: University of South Carolina Press, 1971), 107. For the treatment of colic and constipation, see Lawson, Lawson's History, 91, 96. On rheumatism and arthritis, see Lawson, Lawson's History, 236 and Vogel, American Indian Medicine, 207.

35. Quotation from: Lawson, Lawson's History, 5. The role of sweating in causing pneumonia and other bronchial ailments is explained in Krech, "disease, starvation," 715.

36. Alexander Longe, "A Small Postscript on the Ways and Manners of the Nashon of Indians called Charikees," ed. David H. Corkran, Southern Indian Studies 21 (October 1969), 26.

37. Axtell, European and Indian, 250.

38. Quotations from: [Gabriel Archer?], "The Description of the Now Discovered River and Country of Virginia, With the Likelihood of Ensuing Riches by Englands Ayd and Industry," Virginia Magazine of History and Biography 14 (1907), 376; and Adair, North-American Indians, 246.

39. Quotations from: Lawson, Lawson's History, 237; and Adair, North-American Indians, 346. For an account of the Cherokees and Catawbas giving up sweating and bathing, see De Brahm, General Survey, 107.

40. Paul Chrisler Phillips, The Fur Trade, 2 vols. (Norman: University of Oklahoma Press, 1961), 1:165-67.

41. Ibid, 167-68. Verner W. Crane, The Southern Colonial Frontier, 1670-1732 (Ann Arbor: University of Michigan Press, 1929), 110-11. Crane describes the beginning of the plantation trade in South Carolina. No doubt the Virginia trade had similar origins.

42. Phillips, Fur Trade, 173-74.

43. Quotation from: Lawson, Lawson's History, 184. Crane, Southern Frontier, 110.

44. Crane, Southern Frontier, 112-13. Hudson, Southeastern Indians, 438. On the role of the slave trade in weakening interior tribes, see Richard L. Hahn, "The 'Trade Do's Not Flourish as Formerly': The Ecological Origins of the Yamasee War of 1715," Ethnohistory, 28 (1982), 344.

45. Quotations from: Joel Gascoyne, A True Description of Carolina (London, 1682), 4; William Byrd II to Mark Catesby, June 27, 1737, in Marion Tinling, ed., The Correspondence of the Three William Byrds of Westover, Virginia, 1684-1776, 2 vols. (Charlottesville: University Press of Virginia, 1977), 2:519; William Byrd to Charles Boyle, June 18, 1730, in Tinling, Correspondence, 1:431; and William Byrd II to Francis Otway, ca. August 1735, in Tinling, Correspondence, 2:453-54.

46. Quotations from: Smith, "Map of Virginia," in Arber, Travels and Works, 1:69; Mark Catesby, The Natural History of Carolina, Florida, and the Bahama Islands, 2 vols. (1747; reprint, Ann Arbor: University Microfilms International, 1977), 1:xxx; and Lawson, Lawson's History, 208. Hahn, "Trade Do's Not Flourish," 344.

47. Calvin Martin, Keepers of the Game: Indian-Animal Relationships and the Fur Trade (Berkeley: University of California Press, 1978), see especially 113-49.

48. Shepard Krech, ed., Indians, Animals and the Fur Trade: A Critique of Keepers of the Game (Athens, Ga.: University of Georgia Press, 1978).

49. Quotation from: Adair, North-American Indians, 232. The argument presented here is drawn from Charles M. Hudson, "Why the Southeastern Indians Slaughtered Deer," in Krech, Indians, Animals, 161.

50. Axtell, European and Indian, 254. Hahn, "Trade Do's Not Flourish," 344.

51. Quotations from: Lawson, Lawson's History, 214; and Axtell, European and Indian, 257.

52. On diseases and Indian children, see Dobyns, Number, 23-24; and Crosby, "Virgin Soil Epidemics," 292-94.

53. Hudson, Southeastern Indians, 321-23.

54. On the role of diseases in limiting the dissemination of traditional lore, see James H. Merrell, "The Indians' New World: The Catawba Experience," William and Mary Quarterly, 3d ser., 41 (1984), 543-44.

55. Quotations from: Milligan, "Description," in Carroll, Historical Collections of South Carolina, 2:516; and Edmond Atkin, Indians of the Southern Colonial Frontier, ed. Wilbur R. Jacobs (Columbia: University of South Carolina Press, 1954), 39. On the importance of finding a place in the colonial system, see Hudson, "Why Indians Slaughtered Deer," in Krech, Indians, Animals, 167-70. See also Merrell, "Indians' New World," 544.

56. Catesby, Natural History, 1:xi.

57. Quotation from Lawson, Lawson's History, 23. On the role of firearms in the Indian trade, see Axtell, European and Indian, 259-60.

58. Statistics are from Phillips, Fur Trade, 1:331. See also K.G. Davies, The North Atlantic World in the Seventeenth Century (St. Paul, Minn.: University of Minnesota Press, 1974), 170.

59. Quotations from: Byrd, Dividing Line, 292. One of the best short accounts of beaver breeding habits is John O. Whitaker, Jr., The Audubon Society Field Guide to North American Mammals (New York: Alfred A. Knopf, 1980), 459. A more detailed treatment can be found in Leonard Lee Rue III, The World of the Beaver (Philadelphia: J.P. Lippincott, 1964), 31-32.

60. Quotations from: Byrd, Dividing Line, 292; William Bartram, Travels of William Bartram, ed. Mark Van Doren (New York: Dover Publications, 1955), 231; and Drayton, View of South Carolina, 88. On the role of firearms in eliminating beaver, see Axtell, European and Indian, 260-61.

61. For an example of millers using beaver ponds, see Byrd, Dividing Line, 292. The ecological implications of the beaver's disappearance are discussed in Whitaker, Field Guide to Mammals, 460; and Cowdrey, This Land, This South, 48. See also Roger A. Caras, North American Mammals: Fur-Bearing Animals of the United States and Canada (New York: Gallahad Books, 1967), 261-64.

62. Quotation from: Byrd, Dividing Line, 294. On the uses of deerskins, see Crane, Southern Frontier, 111-12.

63. Quotations from: Lawson, Lawson's History, 8; Byrd, Dividing Line, 157; Thomas Ashe, "A Compleat Discovery of the State of Carolina," (1682), in Carroll, Historical Collections of South Carolina, 2:72; and Archdale, "New Description," in Carroll, Historical Collections of South Carolina, 2:94.

64. Axtell, European and Indian, 260. Quotations from: Catesby, Natural History, 1:xi; Beverley, History and Present State, 155; John Brickell, The Natural History of North-Carolina, (1737; reprint, Murfreesboro, N.C.: Johnson Publishing Company, 1968), 288.

65. Both traditional and the more expedient tanning techniques are described in Byrd, Dividing Line, 274. See also Hudson, Southeastern Indians, 266-67.

66. Quotations from: Lawson, Lawson's History, 58-59. On whitetail breeding habits, see Ernest Thompson Seton, Lives of Game Animals, 7 vols. (Boston: Charles T. Branford Company, 1953), 3:276. On Tuscaroras venturing into southern Virginia, see H.R. McIlwaine, et. al., eds., Executive Journals of the Council of Colonial Virginia, 6 vols. (Richmond: Dietz Press, 1925-66), 2:275. Merrell cites this source in "Indians' New World," 552. Professor Merrell and I discussed this passage from Lawson before the article appeared and I am indebted to him for this piece of corroborating evidence. He also referred me to the information on the Tuscaroras' involvement in the Virginia skin trade which is drawn from Thomas C. Parramore, "The Tuscarora Ascendancy," North Carolina Historical Review 59 (1982), 311.

67. I computed these averages from statistics for the Charles Town trade provided in Crane, Southern Colonial Frontier, 111. The numbers for Savannah are from Robert McClung, Lost Wild America (New York: William Morrow and Company, 1969), 165.

68. Quotations from: Benjamin Hawkins, "Letters of Benjamin Hawkins," Collections of the Georgia Historical Society 11 vols. (Savannah: The Georgia Historical Society, 1916), 9:73; "Talk From the

Indian Chief Mad Dog," Florida Historical Quarterly 13 (1935), 165. Byrd Dividing Line, 141.

69. Dr. Francis Le Jau, The Carolina Chronicle of Dr. Francis Le Jau, 1707-1717, ed. Frank J. Klingberg (Berkeley: University of California Publications in History, 1956), 134. This quotation from Le Jau became the basis for Hahn's article on the ecological origins of the Yamasee War (see note 44 above). I have tried to expand on Hahn's analysis by gathering evidence from the rest of the Southeast. However, Le Jau's statement remains the best expression of the economic implications of the growing shortage of deer.

70. Quotation from: William Waller Hening, ed., The Statutes at Large of Virginia, 13 vols. (Charlottesville: University Press of Virginia, 1969), 3:30. James Iredell, The Public Acts of the General Assembly of North Carolina (Newbern, N.C.: Martin and Ogden, 1804), 40. Thomas Cooper and David J. McCord, eds., The Statutes at Large of South Carolina, 10 vols. (Columbia, S.C.: A.S. Johnston, 1836-39), 4:310.

71. Hening, Statutes of Virginia, 5:60-63. Iredell, Public Acts, 364. Cooper and McCord, Statutes of South Carolina, 4:719, 5:124.

72. Quotations from: Iredell, Public Acts, 69; and Hening, Statutes of Virginia, 3:462-63. Cooper and McCord, Statutes of South Carolina, 5:125.

73. Francois André Michaux, "Travels of Francois André Michaux," in Reuben G. Thwaites, ed., Early Western Travels, 1748-1846, 32 vols. (Cleveland: Arthur Clark, 1904), 3:290. On the scarcity of bears around English settlements, see Catesby, Natural History, 1:xxv-vi.

74. Quotations from: Milligan, "Description," in Carroll, Historical Collections of South Carolina, 2:482; Drayton, View of South Carolina, 88; and Bartram, Travels, 231.

75. Quotations from: Archdale, "New Description," in Carroll, Historical Collections of South Carolina, 2:94; Andrew Burnaby, Travels Through the Middle Settlements in North America, in the Years 1759 and 1760; With Observations Upon the State of the Colonies (London: T. Payne, 1775), 77; and Governor John Drayton, The Carolinian Florist (1802; reprint, Spartanburg: The Reprint Company, 1972), 109. Bartram, Travels, 371.

76. Quotations from: Lawson, Lawson's History, 256; and Beverley, History and Present State, 156. Nash, "Image," 224-26.

77. Eugene P. Odum, Fundamentals of Ecology (Philadelphia: W.B. Saunders Company, 1971), 511.

78. Quotations from: Bartram, Travels, 263-64.

THE FOREST PRODUCTIVE

1. Keith Thomas, Man and the Natural World: A History of the Modern Sensibility (New York: Pantheon Books, 1983), 194-95.

2. Quotations from: Edward Williams, Virginia: More especially the South Part Thereof, Richly and Truly Valued (London: T.H. for John Stephenson, 1650), 4; and Joel Gascoyne, A True Description of Carolina (London, 1682), 2. On the appeal of open fields, see Thomas, Man and the Natural World, 194.

3. Quotation from: John Gerar William De Brahm, Report of the General Survey in the Southern District of North America, ed. Louis De Vorse, Jr. (Columbia: University of South Carolina Press, 1971), 94. For a contemporary account of the link between Indian and colonial clearing practices, see James Adair, A History of the North-American Indians, Their Customs &c., ed. Samuel Cole Williams (Johnson City, Tenn.: The Watauga Press, 1930), 434-35. Similar techniques and their ecological implications are described in William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 116-17.

4. Quotation from: William Byrd II, The Natural History of Virginia or the Newly Discovered Eden, ed. Richmond Croom Beatty and William J. Malloy (Richmond: The Dietz Press, 1940), 92-93. Cronon (Changes in the Land, 116-17) notes the problems of falling trees in New England. No doubt southeastern colonists faced the same troubles.

5. Quotation from: Hugh Jones, The History and Present State of Virginia (1724), ed. Richard L. Morton (Chapel Hill: University of North Carolina Press, 1956), 77.

6. Contemporary accounts of this "new" method of clearing can be found in: De Brahm, General Survey, 92-94; Thomas Nairne, A Letter from South Carolina Giving an Account of the Soil, Air, Product, Trade, Government, Laws, Religion, People, Military Strength, Etc. of that Province (1710; reprint, Ann Arbor: University Microfilms International, 1980), 49; and "An Interview with James Freeman," in H. Roy Merrens, ed., The Colonial South Carolina Scene: Contemporary Views, 1697-1744 (Columbia: University of South Carolina Press, 1977), 44.

7. On the relationship between so-called large and small planters in the South, see Eugene D. Genovese, Roll Jordan Roll: The World the

Slaves Made (New York: Vintage Books, 1972), 7-25. Thanks to the work of Frank Owsley, most accessible in his Plain Folk of the Old South (Baton Rouge: Louisiana State University Press, 1949), students of the colonial and antebellum South are now more aware of yeoman farmers and so-called "poor whites" as important components of the social system. I develop that distinction in more detail in Chapter V. In this chapter, I have used "planter" and "farmer" interchangeably, recognizing only the need to differentiate between large and small landholders. Colonists, themselves, probably used the terms in similar fashion. As Thomas Nairne wrote in 1710, "A Planter is a common Denomination for those who live by their own and their Servants Industry, improve their Estates, follow Tillage or Grasing, and make those commodities which are transported from hence to Great Britain and other places." (Nairne, Letter, 43).

8. Quotation from: De Brahm, General Survey, 93-94.

9. Quotations from: John Lawson, Lawson's History of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 54; and Mark Catesby, The Natural History of Carolina, Florida, and the Bahama Islands, 2 vols. (1747; reprint, Ann Arbor: University Microfilms International, 1977), 1:iv.

10. Quotations from: Jones, Present State of Virginia, 77; and Governor John Drayton, A View of South Carolina (1802; reprint, Spartanburg, S.C.: The Reprint Company, 1972), 10. On the soil and water resources of oak-hickory regions, see John L. Vankat, The Natural Vegetation of North America (New York: John Wiley and Sons, 1979), 148-50.

11. De Brahm was one eighteenth-century writer who extolled the region's agricultural potential, noting that "the general Opinion [of the soil's infertility] as yet is grounded on bad Philosophy; for there is no land ever so sandy, rocky, stiff, or boggy, but what can be rendered useful for Cultivation to the ingenious and industrious, especially in Climates near the Tropickes." (De Brahm, General Survey, 72-73).

12. For a contemporary account of the clearing techniques, see Hugh Meredith, An Account of the Cape Fear Country 1731, ed. Earl Gregg Swem (Perth Amboy, N.J.: Charles F. Heartman, 1922), 20-21. On the origin of rice culture in South Carolina, see Peter H. Wood, Black Majority: Negroes in Colonial South Carolina from 1670 through the Stono Rebellion (New York: W.W. Norton and Company, 1975), 35-37.

13. Quotation from: Governor James Glen, "A Description of South Carolina," (1761), in B.R. Carroll, ed., Historical Collections of South Carolina, 2 vols. (New York: Harper and Brothers, 1836), 2:201. On the use of land farther east, see Alice R. Huger Smith, A Carolina Rice Plantation of the Fifties (New York: William Morrow and Company, 1936), 13-18.

14. Quotations from: Governor William Berkeley, "A New Description of Virginia," in Peter Force, comp., Tracts and Other

Papers Relating Principally to the Origin, Settlement, and Progress of the Colonies in North America, from the Discovery of the Country to the Year 1776, 4 vols. (Washington: Peter Force, 1836-46), 2:Tract VII, 14; Gascoyne, True Description (map is included as a frontispiece to the work); and Jones, Present State of Virginia, 56. Edward Crisp, "A Compleat Description of the Province of Carolina," (1711), Library of Congress, Geography and Map Division. The exact number of acres cleared in the Southeast during the colonial period is difficult to gauge. De Brahm supports the notion of extensive clearing along major rivers, noting that in 1764, "all Lands upon and along the Sea Coast, upon and between Navigable Streams and Rivers are occupied, and at this time become private property." (De Brahm, General Survey, 72).

15. Quotations from: Catesby, Natural History, 1:xxv; and Andrew Burnaby, Travels Through the Middle Settlements in North America in the Years 1759 and 1760; With Observations Upon the State of the Colonies (London: T. Payne, 1775), 10-11. On the effects of deforestation on the species mentioned here, see Jonathan L. Richardson, Dimensions of Ecology (Baltimore: The Williams and Wilkins Company, 1977), 40; and Peter Matthiessen, Wildlife in America (New York: Viking Press, 1959), 69. On carnivores, see W.W. Ward, "Clearcutting in the Northeastern Hardwood Forests," in Eleanor C.J. Horwitz, ed., Clearcutting: A View From the Top (Washington, D.C.: Acropolis Books, Ltd., 1974), 72-73.

16. Charles W. Ralston, "Clearcutting of Public Forests in the Southern Pine Region," in Horwitz, Clearcutting, 29.

17. Richardson, Dimensions, 140.

18. Quotations from: Landon Carter, The Diary of Colonel Landon Carter of Sabine Hall, 1752-1778, ed. Jack P. Greene, 2 vols. (Charlottesville: University Press of Virginia, 1965), 1:433, 2:634-35. On the meticulous records kept by planters like Carter, see Gerald W. Mullin, Flight and Rebellion: Slave Resistance in Eighteenth-Century Virginia (New York: Oxford University Press, 1972), 20.

19. David M. Moehring, "Climatic Elements in the Southern Forest," in Norman E. Linnartz, ed., The Ecology of Southern Forests, 17th Forestry Symposium (Baton Rouge: Louisiana State University Press, 1968), 10. See also Mark J. Schroeder and Charles S. Buck, "Fire Weather," United States Department of Agriculture Handbook No. 360 (Washington: United States Department of Agriculture, Forestry Service, 1970), 30. For similar climatic changes in colonial New England, see Cronon, Changes in the Land, 122. Cronon ascribes these changes to general deforestation. However, it seems more probable that in the South the effects resulted primarily from agricultural clearing (as explained below).

20. Quotations from: Carter, Diary, 2:635. On "frost pockets," see Moehring, "Climatic Elements," 10.

21. Quotation from: American Husbandry, (1775), ed. Harry J. Carman and Rexford Tugwell (New York: Columbia University Press, 1939), 164. Ward, "Northeastern Hardwood Forests," in Horwitz, Clearcutting, 66-68.
22. Quotations from: Carter, Diary, 1:162. For another example of such problems, see Carter, Diary, 1:459.
23. Quotations from: Carter, Diary, 1:462. On moisture content in deforested areas, see Ralston, "Southern Pine Region," in Horwitz, Clearcutting, 95.
24. Quotations from: John Bartram, in Jared Eliot, Essays Upon Field Husbandry in New England, (1758-62), ed. Harry J. Carman and Rexford G. Tugwell (New York: Columbia University Press, 1934), 204. Cronon cites this as evidence for New England (Changes in the Land, 147), although Bartram wrote to describe his experiences in the Middle Colonies and the South. The role of forests in preventing runoff and erosion is discussed in Joseph Kittredge, Forest Influences (New York: McGraw-Hill, 1948), 271; and Richard Lee, Forest Hydrology (New York: Columbia University Press, 1980), 280-81.
25. Quotations from: Carter, Diary, 1:381-82; and American Husbandry, 226. For an example of Carter's trouble with the "northwest wind," see Carter, Diary, 2:634.
26. Cronon, Changes in the Land, 109. See also K.G. Davies, The North Atlantic World in the Seventeenth Century (Minneapolis: University of Minnesota Press, 1974), 193.
27. Quotations from: Williams, Virginia Richly Valued, 4; and Thomas Harriot, "A Briefe and True Report of the Newfound Land of Virginia," (1588), in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: Hakluyt Society, 1955), 1:363. On early timber exports from Virginia, see Berkeley, "New Description," in Force, Tracts, 2:Tract VII, 5; and William Strachey, The Historie of Travell into Virginia Britannia, ed. Louis B. Wright and Virginia Freund (London: Hakluyt Society, 1953), 130.
28. Quotation from: Nairne, Letter, 49. On the expense of shipping American timber to Europe, see Robert G. Albion, Forests and Sea Power (Cambridge, Mass.: Harvard University Press, 1926), 240.
29. Quotation from: Williams, Virginia Richly Valued, 5. On colonial sawmills, see Cronon, Changes in the Land, 119; and H. Roy Merrens, Colonial North Carolina in the Eighteenth Century (Chapel Hill: University of North Carolina Press, 1964), 100. Merrens notes that the Scottish Highlanders who settled the piedmont often pooled their resources to establish a sawmill and then divided the profits.
30. Quotation from: American Husbandry, 163-64.

31. Quotation from: Ibid., 163. For a contemporary account of sawmill production, see De Brahm, General Survey, 94. See also Cronon, Changes in the Land, 119. The growth of the West Indian lumber market can also be charted through colonial legislation fixing the dimensions of the various timber products and laws providing for timber inspection. For a discussion of such legislation, see J.P. Kinney, "Forest Legislation in America Prior to March 4, 1789," Cornell University Agricultural Experiment Station Bulletin, 370 (1916), 386-88.

32. On the need for staves and the use of white oak, see Davies, North Atlantic World, 193; and Merrens, Colonial North Carolina, 102-03. The tree's reputation as a "stave oak" is described in Elbert L. Little, The Audubon Society Field Guide to North American Trees, Eastern Region (New York: Alfred A. Knopf, 1980), 383.

33. Quotations from: William Tatham, William Tatham and the Culture of Tobacco, ed. G. Melvin Herndon (Coral Gables, Fla.: University of Miami Press, 1969), 32; and Francois André Michaux, The North American Sylva; Or a Description of the Forest Trees of the United States Canada, and Nova Scotia, trans. J. Jay Smith, 3 vols. (Philadelphia: Rice, Rutter, and Company, 1865), 1:9. Although not published in the United States until 1865, Michaux's work was based on his and his father's (Andre Michaux) travels in North America between 1785 and 1806. Those travels enabled them to view many of the timber shortages resulting from colonial lumbering.

34. Quotation from: Michaux, North American Sylva, 1:90.

35. Quotations from: Lawson, Lawson's History, 98. On the southern shingle industry, see Merrens, Colonial North Carolina, 105.

36. Quotation from: Pehr Kalm, Travels in North America (1753-70), ed. Adolph B. Benson, 2 vols. (New York: Peter Smith, 1964), 1:300. Cronon also cites this in his discussion of overcutting white cedar in New England (Cronon, Changes in the Land, 113). On white cedar regeneration in the South, see Murray F. Buell and Robert L. Cain, "The Successional Role of Southern White Cedar, Chamaecyparissus Thyoides, in Southeastern North Carolina," Ecology, 24 (1943), 91-94.

37. Quotation from: "Thomas Smith to Burrell Massinerd, London, 7 November, 1705," in Merrens, Colonial South Carolina Scene, 23. On the southerly migration of the shingle industry, see Merrens, Colonial North Carolina, 105-06.

38. Albert E. Cowdrey, This Land, This South: An Environmental History (Lexington: University Press of Kentucky, 1983), 53-54.

39. Quotation from: Michaux, North American Sylva, 1:30-31.

40. Quotations from: Lawson, Lawson's History, 100; and Michaux, North American Sylva, 3:91. The original distribution of longleaf pine

is described in Merrens, Colonial North Carolina, 99; and Charles Mohr, Timber Pines of The Southern United States (Washington: Government Printing Office, 1894), 30-31.

41. Quotation from: William Bartram, Travels of William Bartram, ed. Mark Van Doren (New York: Dover Publications, 1955), 257. John Collet, "A Compleat Map of North Carolina from an actual survey by Capt. Collet, Governor of Ft. Johnston," Library of Congress, Geography and Map Division.

42. Colonists used "turpentine" primarily in reference to the sap or gum of pines. As explained here, "spirits of turpentine" is the proper name for the distilled product. Today, foresters call the sap "resin" or "crude turpentine." For the uses of spirits of turpentine and rosin, see Thomas Gamble, Naval Stores: History, Production, Distillation, and Consumption (Savannah: Review Publishing and Printing Company, 1921), 29-30. This book is a collection of articles published by the Weekly Naval Stores Review (Savannah, 1890-1920) while Gamble served as editor.

43. Sinclair Snow, "Naval Stores in Colonial Virginia," Virginia Magazine of History and Biography, 72 (1964), 75-76.

44. Ibid., 78-82.

45. Quotations from: Charles I, quoted in "Virginia in 1626-27," Virginia Magazine of History and Biography, 16 (1908), 35; Michaux, North American Sylva, 3:77; and Susan Myra Kingsbury, ed., The Records of the Virginia Company of London, 4 vols. (Washington: Government Printing Office, 1906-35), 3:586.

46. William Byrd II, Histories of the Dividing Line, ed. William K. Boyd (Raleigh: North Carolina Historical Commission, 1929), 90.

47. Quotation from: Edward Randolph, "Letter of Edward Randolph to the Board of Trade, 16 March 1698/99," in Alexander S. Salley, ed., Narratives of Early Carolina, 1650-1708 (New York: Charles Scribner's Sons, 1911), 208. On the impact of Carolina naval stores on the Baltic trade, see Francis Yonge, "A View of the Trade of South-Carolina With Proposals humbly Offer'd for Improving the Same," (1722), in Merrens, Colonial South Carolina Scene, 69-70.

48. Quotation from: John Brickell, The Natural History of North Carolina (1737; reprint, Murfreesboro, N.C.: Johnson Reprint Corporation, 1969), 265. Brickell also offers a description of the "boxing" process.

49. Ibid., 267. Gamble, Naval Stores, 18.

50. Quotation from: Michaux, North American Sylva, 3:82. Brickell reported seeing abandoned boxed trees struck by lightning (Brickell, Natural History, 26). For a secondary account of the effects

of the fires, see Norman R. Hawley, "Burning in a Naval Stores Forest," Proceedings of the Tall Timbers Fire Ecology Conference 3 (1964), 83-84. One of the more interesting features of naval stores production is the lack of change in the techniques used to tap the trees. Not until the mid-nineteenth century, when metal cups took the place of boxes, did production practices begin to differ significantly from those used in the colonial period. The risk of fire and methods for coping with it (described below) remained unchanged.

51. Hawley, "Burning," 84. On the detrimental effects of controlled burning, see Mohr, Timber Pines, 62.

52. Quotation from: Michaux, North American Sylva, 3:82. On the problems of insects and fungi in turpentine orchards, see Mohr, Timber Pines, 72. See also A.W. Schorger and H.S. Betts, "The Naval Stores Industry," United States Department of Agriculture Bulletin No. 229 (Washington: Government Printing Office, 1915), 25-27.

53. Snow, "Naval Stores in Colonial Virginia," 78-79.

54. For a contemporary description of tar kilns, see Brickell, Natural History, 265-66.

55. On the problems with southeastern tar, see Governor Robert Johnson, "A Governor Answers a Questionnaire, 1719/20," in Merrens, Colonial South Carolina Scene, 65. On the convenience of kiln production, see Brickell, Natural History, 265; and Michaux, North American Sylva, 3:83-84.

56. Statistics are from Yonge, "View of the Trade," in Merrens, Colonial South Carolina Scene, 69; and Gamble, Naval Stores, 21. The estimate of the amount of light wood required for one barrel is from Mohr, Timber Pines, 67-68. I computed the amount of pine processed yearly, basing my estimate on the dimensions of a standard cord of wood.

57. Thomas C. Croker, Jr., "Ecology of an Ideal Forest Community in the Longleaf-Slash Pine Region," in Linnartz, Ecology of Southern Forests, 77. See also Ralston, "Southern Pine Region," in Horwitz, Clearcutting, 86-87.

58. Quotation from: American Husbandry, 240. Merrens, Colonial North Carolina, 99.

59. Thomas Ashe, Forest Products of Eastern North Carolina (Raleigh, 1894), 18.

60. Quotation from: Michaux, North American Sylva, 3:2. On settlers' use of scarlet oak, see Lawson, Lawson's History, 94; on loblolly pine boards, Michaux, North American Sylva, 3:91; on cedar buckets and cypress boats, Lawson, Lawson's History, 98-99.

61. Quotation from: Catesby, Natural History, 1:xvi. On English hedges and stone walls, see Cronon, Changes in the Land, 119-20.

62. On the "Virginia rail" fence, see Lillian M. Willson, Forest Conservation in Colonial Times (St. Paul, Minn.: Forest Products History Foundation, 1948), 11. For contemporary accounts of fencing materials, see Lawson, Lawson's History, 100; and Michaux, North American Sylva, 1:67-69, 2:85. De Brahm reported that on large estates, a single slave might be required to split as many as "100 Rails a day" for fencing. (De Brahm, General Survey, 94).

63. For an example, see American Husbandry, 259.

64. Quotation from: James Iredell, The Public Acts of the General Assembly of North Carolina (Newbern, N.C.: Martin and Ogden, 1804), 245. On other fencing legislation and the effects of such laws on the timber supply, see Willson, Forest Conservation, 11.

65. Quotations from: Brickell, Natural History, 265; and Lawson, Lawson's History, 84. On woodlots and gathering firewood, see De Brahm, General Survey, 94.

66. Quotation from: Carter, Diary, 1:382. In 1777, Carter reported that a single snowy day made it difficult for his slaves to gather wood and threatened to create a shortage. Such problems may indicate that his estates never had an overly abundant supply of firewood. (Carter, Diary, 2:1084). On the differences between German woodstoves and English fireplaces, see Cronon, Changes in the Land, 120.

67. Quotation from: Michaux, North American Sylva, 1:91.

68. Quotation from: Carter, Diary, 1:382.

69. Quotation from: American Husbandry, 189. On the growth of the firewood trade and the corresponding legislation, see J.P. Kinney, The Development of Forest Law in America (New York: John Wiley and Sons, 1917), 380-82.

70. Lee, Forest Hydrology, 111-29. De Brahm noticed that some rivers dammed for sawmills "disappeared two or three years after being chosen, and left the Mills dry." He attributed it to the ground soaking up the water, but it more likely resulted from heavy lumbering within the drainage basin. (De Brahm, General Survey, 165).

71. Cowdrey, This Land, This South, 53-54.

72. Ibid., 57.

73. Quotations from: John Bartram, "Diary of a Journey Through the Carolinas, Georgia, and Florida From July 1, 1765 to April 10, 1776," Transactions of the American Philosophical Society, new ser., 23,

pt. 1 (December 1942), 55; Thomas Cooper and David J. McCord, eds., The Statutes at Large of South Carolina, 10 vols. (Columbia, S.C.: A.S. Johnston, 1836-39), 5:278-79; John Bartram, "Diary," 55.

74. Cronon, Changes in the Land, 110-11. Cowdrey, This Land, This South, 53-54.

75. Cowdrey, This Land, This South, 54.

76. Kinney, Development of Forest Law, 392. Willson, Forest Conservation, 19-20.

77. Kinney, Development of Forest Law, 237-40.

78. Quotation from: Strachey, Historie of Travell, 130.

79. Thomas, Man and the Natural World, 254-55.

THE FIRST "NEW SOUTH"

1. Quotation from: Thomas Harriot, "A Briefe and True Report of the Newfound Land of Virginia," (1588), in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: The Hakluyt Society, 1955), 1:336. On the crops first planted at Jamestown, see [Gabriel Archer?], "The Description of the Now Discovered River and Country of Virginia; With the Likelyhood of Ensuing Riches By Englands Ayd and Industry," Virginia Magazine of History and Biography 14 (1907), 375-76.

2. On the failure of early crops at Jamestown, see Lewis Cecil Gray, History of Agriculture in the Southern United States to 1860, 2 vols. (Gloucester, Mass.: Peter Smith, 1958), 1:17-18. Recent studies indicate that colonists' tales of starvation might have been exaggerated in order to force England to send more supplies. Disease also contributed to the mortality rate. For a discussion of starvation, disease, and possible exaggerated reports, see Carville V. Earle, "Environment, Disease, and Mortality in Early Virginia," in Thad W. Tate and David L. Ammerman, eds., The Chesapeake in the Seventeenth Century: Essays on Anglo-American Society (Chapel Hill: University of North Carolina Press, 1979), 96-125.

3. For a contemporary account of the advantages of corn, see John Lawson, Lawson's History of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 76. On corn as a pioneer crop, see Gray, History of Agriculture, 1:161.

4. Quotations from: Alexander Whittaker, Good Newes From Virginia (London, 1613), 23; and Lawson, Lawson's History, 76.

5. Quotation from: American Husbandry (1755), ed. Harry J. Carman and Rexford Tugwell (New York: Columbia University Press, 1939), 154. On the other European and American food crops grown by colonists, see Lawson, Lawson's History, 78; and Whittaker, Good Newes, 23.

6. For a comparison of southern staples with those of New England and the mother country, see K.G. Davies, The North Atlantic World in the Seventeenth Century (Minneapolis: University of Minnesota Press, 1974), 141-44. See also, Gray, History of Agriculture, 1:21-24.

7. Quotations from: Harriot, "Briefe and True Report," in Quinn, Roanoke Voyages, 1:344-45. On the capture of tobacco prizes by English privateers, see Davies, North Atlantic World, 145.

8. Quotations from: Davies, North Atlantic World, 145; and John Smith, "The Proceedings and Accidents of the English Colony in

Virginia," in Edward A. Arber, ed., Travels and Works of Captain John Smith, 2 vols. (Edinburgh: John Gant, 1910), 2:535. For a short secondary account of the early tobacco boom, see Edmund S. Morgan, "The First American Boom: Virginia 1618 to 1630," William and Mary Quarterly, 3d ser., 18 (1971), 169-98.

9. On the tobacco glut and the search for commodities in South Carolina, see Davies, North Atlantic World, 192. For a brief statement of the impact of geography on the settlement of North Carolina, see H. Roy Merrens, Colonial North Carolina in the Eighteenth Century (Chapel Hill: University of North Carolina Press, 1964), 19-20.

10. Quotation from: Governor James Glen, "A Description of South Carolina," in B.R. Carroll, ed., Historical Collections of South Carolina, 2 vols. (New York: Harper and Brothers, 1836), 2:265. On the origin of rice and the importance of slaves to its cultivation, see Peter H. Wood, Black Majority: Negroes in Colonial South Carolina from 1670 through the Stono Rebellion (New York: W.W. Norton and Company, Inc., 1974), 35, 59-62.

11. Quotation from: Dr. Alexander Garden to Charles Whitworth, 27 April 1757, in James Edward Smith, ed., A Selection of the Correspondence of Linnaeus and Other Naturalists, 2 vols. (New York: Arno Press, 1928), 1:383. See also Alexander Garden to John Ellis, 6 May 1757, in H. Roy Merrens, ed., The Colonial South Carolina Scene: Contemporary Views, 1697-1744 (Columbia, S.C.: University of South Carolina Press, 1977), 213. For a short discussion of the development of indigo in South Carolina and Eliza Lucas Pinckney's role in encouraging its cultivation, see Gray, History of Agriculture, 1:73-74, 290-92. See also Davies, North Atlantic World, 191-92.

12. Quotation from William Byrd II to Sir Hans Sloane, 31 May 1737, in Marion Tinling, ed., The Correspondence of the Three William Byrds of Westover, Virginia, 1684-1776, 2 vols. (Charlottesville: University Press of Virginia, 1977), 2:513. For a brief survey of the other commodities mentioned here, see Gray, History of Agriculture, 1:169-71.

13. Quotation from: Thomas Nairne, A Letter from South Carolina Giving an Account of the Soil, Air, Product, Trade, Government, Laws, Religion, People, Military Strength, Etc. of that Province (1710; reprint, Ann Arbor: University Microfilms International, 1980), 9. On the English affinity for orchards, see Keith Thomas, Man and the Natural World (New York: Pantheon Books, 1983), 204-05.

14. For a contemporary account of silk production in Georgia, see William Stephens, The Journal of William Stephens, 1741-1743, ed. E. Merton Coulter, 2 vols. (Athens, Ga.: University of Georgia Press, 1958), 2:87-89. Statistics from: Gray, History of Agriculture, 1:187-88.

15. On the importance of geography for settlement patterns in the Virginia tidewater, see Gerald W. Mullin, Flight and Rebellion: Slave Resistance in Eighteenth-Century Virginia (New York: Oxford University Press, 1972), 4-5. William Byrd II once noted that his Westover plantation lay "two miles above where the great ships ride." (Mullin, 5.) See also Carl Bridenbaugh, Myths and Realities: Societies of the Colonial South (New York: Atheneum, 1970), 2-3. The role of great planters as regional merchants is discussed in Aubrey C. Land, "Economic Base and Social Structure: The Northern Chesapeake in the Eighteenth Century," in T.H. Breen, ed., Shaping Southern Society: The Colonial Experience (New York: Oxford University Press, 1976), 241-42. Land's article originally appeared in Journal of Economic History 25 (1965), 639-54.

16. All statistics and descriptions are from Bridenbaugh, Myths and Realities, 57-58.

17. Quotation from: George Brown Tindall, America: A Narrative History (New York: W.W. Norton and Company, 1984), 100. On settlement patterns in North Carolina, see Merrens, Colonial North Carolina, 19-20, 27.

18. William Byrd II, Histories of the Dividing Line (1728), ed. William K. Boyd (Raleigh: North Carolina Historical Commission, 1929), 92.

19. Bridenbaugh, Myths and Realities, 120-21, 128-29.

20. Richard Hooker, ed., The Carolina Backcountry on the Eve of Revolution (Chapel Hill: University of North Carolina Press, 1953), 6-7, 61. For an overview of life in the backcountry, see Bridenbaugh, Myths and Realities, 119-96.

21. Quotation from: Governor James Glen, "An Attempt Towards an Estimate of the Value of South Carolina," (1751), in Merrens, Colonial South Carolina Scene, 178. For a general discussion of the similarities between Indian and colonial subsistence, see Nancy O. Lurie, "Indian Cultural Adjustment to European Civilization," in James M. Smith, ed., Seventeenth-Century America (Chapel Hill: University of North Carolina Press, 1959), 33-60.

22. Quotation from: "An Interview with James Freeman," in Merrens, Colonial South Carolina Scene, 45. As Merrens notes in his introduction, this piece is "one of the more credible and charming specimens of promotional literature." (Merrens, 39.) I have relied on it for the description of colonial fields included in this paragraph.

23. Quotation from: John Brickell, The Natural History of North Carolina (1737; reprint, Murfreesboro, N.C.: Johnson Reprint Corporation, 1969), 111. On deer traps, see Robert Beverley, The History and Present State of Virginia (1705), ed. Louis B. Wright (Chapel Hill: University of North Carolina Press, 1947), 308-09.

24. Quotations from: William Waller Hening, ed., The Statutes at Large of Virginia, 13 vols. (Charlottesville: University Press of Virginia, 1969), 8:389. This is a continuation of the original statute passed in 1734. Landon Carter, The Diary of Colonel Landon Carter of Sabine Hall, 1752-1778, ed. Jack P. Greene, 2 vols. (Charlottesville: University Press of Virginia, 1965), 1:390.

25. Quotations from: Alexander Wilson, quoted in Peter Mathiessen, Wildlife in America (New York: Viking Press, 1959), 115; and Frank M. Chapman, quoted in Mathiessen, 181. For a contemporary account of parakeets invading colonial orchards, see Mark Catesby, The Natural History of Carolina, Florida, and the Bahama Islands, 2 vols. (1747; reprint, Ann Arbor: University Microfilms International, 1977), 1:11.

26. Quotations from: Catesby, Natural History, 1:14; and Alice R. Huger Smith, A Carolina Rice Plantation of the Fifties (New York: William Morrow and Company, 1936), 29.

27. Quotation from: Catesby, Natural History, 1:14. The South Carolina legislature also encouraged the killing of "rice birds" with bounties. See Albert E. Cowdrey, This Land, This South: An Environmental History, (Lexington: University of Kentucky Press, 1983), 49. On the effects of such hunting, see Mathiessen, Wildlife in America, 125.

28. Quotations from: Carter, Diary, 1:435, 2:721, 1:435.

29. Quotations from: Brickell, Natural History, 130; and Thomas Jefferson, Notes on the State of Virginia (1787), ed. William Peden (Chapel Hill: University of North Carolina Press, 1955), 72. On black rats at Jamestown, see John Smith, "Proceedings," in Arber, Travels and Works, 1:154-55. A good general account of the "pest invasion" is Alfred Crosby, "Ecological Imperialism: The Overseas Migration of Western Europeans as a Biological Phenomenon," Texas Quarterly 30 (1978), 15-18.

30. Quotations from: United States Department of Agriculture, Third Report of the United States Entomological Commission (Washington: Government Printing Office, 1883), 199, 227, 221. On the introduction of Hessian flies into New England, see William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 153.

31. Frederick Wallman, Plant Diseases: An Introduction for the Layman (Garden City, N.Y.: The Natural History Press, 1971), 13. United States Department of Agriculture, Plant Diseases: The Yearbook of Agriculture, 1953 (Washington: Government Printing Office, 1953), 329-31. On "rust" and the barberry in New England, see Cronon, Changes in the Land, 154-55.

32. Quotations from: Carter, Diary, 2:694, 698-99. On the range of the European barberry, see R.E. Wilkinson and H.E. Jaques, How to

Know the Weeds, 3d ed. (Dubuque, Iowa: William C. Brown Company, 1979), 67. For the life cycle of rust in the Southeast, see Plant Diseases: Yearbook 1953, 330-31. On blackberry rust, see Joseph C. Arthur, The Plant Rusts (Uredinales) (New York: John Wiley and Sons, Inc., 1929), 35.

33. F.L. Dunn, "On the Antiquity of Malaria in the Western Hemisphere," Human Biology 37 (1965), 385-93. Wood, Black Majority, 86-87. Henry F. Dobyns, Their Number Become Thinned: Native Population Dynamics in Eastern America (Knoxville: University of Tennessee Press, 1983), 23, 34. Philip Curtin, "Epidemiology and the Slave Trade," Political Science Quarterly, 83 (1968), 210. Darrett B. Rutman and Anita H. Rutman, "Of Agues and Fevers: Malaria in the Early Chesapeake," William And Mary Quarterly, 3d ser., 33 (1976), 36-37, 40.

34. Quotations from: Eliza Lucas Pinckney, The Letterbook of Eliza Lucas Pinckney, 1739-1762, ed. Elise Pinckney (Chapel Hill: University of North Carolina Press, 1972), 40; John Bartram, "Diary of a Journey Through the Carolinas, Georgia, and Florida from July 1, 1765, to April 10, 1776," Transactions of the American Philosophical Society, new ser., 23, Pt. 1 (December 1942), 21; and David Ramsay, The History of South Carolina, from its first settlement in 1670 to the year 1808 (1809; reprint, Newberry, S.C., 1858), 2:36, 42. On South Carolinians' beliefs about the causes of malaria and yellow fever, see Wood, Black Majority, 72-76.

35. The best summary of African resistance to malaria and yellow fever is Wood, Black Majority, 88-91. I have condensed his argument here. On the importance of slave labor in allowing crops to be grown in malarious environments, see Rutman, "Agues and Fevers," 56.

36. Quotations from: Dr. John Mitchell, The Present State of Great Britain and North America (London: T. Beckett and P.A. de Hondt, 1767), 149, 138, 139-40. On rice, monoculture, and corn, see Cronon, Changes in the Land, 150.

37. Quotation from: Carter, Diary, 1:256. A good, non-technical treatment of plowing and soil exhaustion is Raymond F. Dasmann, Wildlife Biology (New York: John Wiley and Sons, Inc., 1964), 36-37. For a comparison of colonial plowing and Indian hand-hoeing, see G. Melvin Herndon, "Indian Agriculture in the Southern Colonies," North Carolina Historical Review, 44 (1967), 287.

38. Quotations from: William Tatham, William Tatham and the Culture of Tobacco (1800), ed. G. Melvin Herndon (Coral Gables, Fla.: University of Miami Press, 1969), 6; American Husbandry, 164; and Avery Odell Craven, Soil Exhaustion as a Factor in the Agricultural History of Virginia and Maryland, 1606-1860 (Urbana: University of Illinois Press, 1926), 162.

39. The debate about the extent of soil exhaustion in the colonial and antebellum South goes back at least to Frederick Jackson Turner and his "frontier thesis." I developed this short ecological critique based on my understanding of the demands of the various crops grown in the Southeast and the region's overall agricultural diversity.

40. Craven's arguments have come under attack from a number of economic and agricultural historians. More recent scholars believe Craven did not fully understand the diversity inherent in plantation life and the economic feasibility (or lack thereof) of moving to new lands. I developed this short critique after reading Edward C. Papenfuse, "Planter Behavior and Economic Opportunity in a Staple Economy," Agricultural History 46 (1972), 297-311; and Warren C. Scoville, "Did Colonial Farmers Waste Our Land?," Southern Economics Journal 20 (1973), 178-81. On planters' acquisition of western lands for speculation, see Land, "Economic Base," in Breen, Shaping Southern Society, 238-40.

41. Quotations from: Hugh Jones, The Present State of Virginia (1724), ed. Richard Lee Morton (Chapel Hill: University of North Carolina Press, 1956), 77; Carter, Diary, 1:424; and American Husbandry, 320-21. For examples of Carter's use of clover, see Carter, Diary, 1:246, 156, 207.

42. Craven, Soil Exhaustion, 87-88. Cowdrey, This Land, This South, 59. Although Craven notes such efforts, he believes them to be the exception rather than the rule. Like Cowdrey, I have chosen to emphasize the ways in which planters tried to cope with soil exhaustion.

43. Some scholars now believe that the extent of soil exhaustion in the colonial and antebellum South is almost impossible to measure. For a summary, see Cowdrey, This Land, This South, 75-77.

44. Quotations from: Beverley, History and Present State, 134; Mitchell, Present State of Great Britain and the Colonies, 152, 153; and Francois André Michaux, The North American Sylva: Or a Description of the Forest Trees of the United States, Canada, and Nova Scotia, trans. J. Jay Smith, 3 vols. (Philadelphia: Rice, Rutter, and Company, 1865), 3:90. On forest succession in old fields, see W.D. Billings, Plants and the Ecosystem, 3d ed. (Belmont, Calif.: Wadsworth Publishing Company, 1978), 105-06; and Stephen H. Spurr and Burton V. Barnes, Forest Ecology (New York: The Ronald Press, 1973), 491. Landon Carter once found a runaway slave hiding in a thicket of red cedars on the edge of a cleared field. (Carter, Diary, 1:289-90).

45. Quotations from: John Smith, "Proceedings and Accidents," in Arber, Travels and Works, 2:509; Ralph Hamor, A True Discourse of the Present Estate of Virginia, and the success of the affaires there till the 18 of June 1614 (London: John Beale, 1615), 23; Governor William Berkeley, "A New Description of Virginia," in Peter Force, comp., Tracts and Other Papers Relating Principally to the Origin, Settlement, and

Progress of the Colonies in North America, from the Discovery of the Country to the Year 1776, 4 vols. (Washington: Peter Force, 1836-46), 2: Tract VII:13; Joel Gascoyne, A True Description of Carolina (London, 1682), 2: and Nairne, Letter, 13.

46. Quotation from: Brickell, Natural History, 51. On cattle, hogs, and the need for forage, see Arnold Stricken, "The Euro-American Ranching Complex," in Anthony Leeds and Andrew P. Vayda, eds., Man, Culture, and Animals (Washington: American Association for the Advancement of Science, 1965), 223. Landon Carter was one planter who realized the value of manure and sought to recover it. Carter, however, believed his cattle bred more often if he allowed them to roam the woods and therefore penned them only occasionally. (Carter, Diary, 2:697.)

47. Quotations from: Peter Purry, "A Description of the Province of South Carolina," (1731) in Carroll, Historical Collections of South Carolina, 2:132; American Husbandry, 241. On cowpens and the growth of the southern colonial livestock trade, see Rudolph Alexander Clemen, The American Livestock and Meat Industry (New York: Ronald Press, 1923), 34-35.

48. Quotations from: Brickell, Natural History, 52; and "A Gentleman's Account of His Travels, 1733-34," in Merrens, Colonial South Carolina Scene, 113. For a contemporary account of other predators, see Lawson, Lawson's History, 121-22. On the role of available food in governing the size of wolf populations, see David Mech, The Wolf: The Ecology and Behavior of an Endangered Species (Garden City, N.Y.: The Natural History Press, 1970), 42-43; and Cronon, Changes in the Land, 132.

49. Quotations from: Byrd, Dividing Line, 94; and James Iredell, The Public Acts of the General Assembly of North Carolina (Newbern: Martin and Ogden, 1804), 70. For an example of Virginia's "wolf laws" see Hening, Statutes at Large, 1:199, 3:141. For laws concerning Indians and wolves, Hening, Statutes at Large, 2:236, 274. South Carolina passed similar legislation, requiring Indians to bring in wolf, bear, bobcat, and catamount skins. See Cowdrey, This Land, This South, 49.

50. For an example of the problem with Indians bringing in "distant wolves," see Hening, Statutes at Large, 2:236. The process of removing ears is described in Hening, Statutes at Large, 6:153.

51. Quotations from: Jones, Present State of Virginia, 85; Brickell, Natural History, 265.

52. On selective livestock feeding and the damage to grasses and herbs, see Robert S. Campbell, "Forest Grazing in the Southern Coastal Plain," Proceedings of the Society of American Foresters (1947), 262-64. The effects of livestock grazing or rooting in pine forests are detailed in Charles Mohr, Timber Pines of the Southern United States (Washington: Government Printing Office, 1897), 62; and W.D. Boyer,

"Grazing Hampers Development of Longleaf Seedlings in Southwestern Alabama," Journal of Forestry 65 (1967), 336-38. On the origin of the "piney-woods rooter" see Stephen J. Pyne, Fire in America: A Cultural History of Wildland and Rural Fire (Princeton: Princeton University Press, 1982), 147.

53. Quotations from: "Interview with James Freeman," in Merrens, Colonial South Carolina Scene, 49; and Governor John Drayton, A View of South Carolina (1802; reprint, Spartanburg, S.C.: The Reprint Company, 1972) 62. For the effects of cattle and hogs feeding in canebrakes see Ralph H. Hughes, "Fire Ecology of Canebrakes," Proceedings of the Tall Timbers Fire Ecology Conference 5 (1966), 153.

54. Quotation from: Michaux, North American Sylva, 1:18. On "patch-grazing," trampling, and erosion see Campbell, "Forest Grazing," 264; Vinson L. Duvall and Norman E. Linnartz, "Influences of Grazing and Fire on Vegetation and Soil of Longleaf Pine Bluestem Range," Journal of Range Management, 20 (1967), 246; and E.A. Johnson, "Effects of Farm Woodland Grazing on Watershed Values in the Southern Appalachian Mountains," Journal of Forestry, 50 (1952), 109-13. For a more general treatment, see Spurr and Barnes, Forest Ecology, 233-34.

55. Quotations from: Pyne, Fire in America, 147-48; and Brickell, Natural History, 84. On burning in Europe, see Pyne, Fire in America, 148. Landon Carter regularly fired his marshes and canebrakes. (Carter, Diary, 1:372.)

56. H.L. Stoddard, "The Use of Fire in the Pine Forests of the Deep Southeast," Proceedings of the Tall Timbers Fire Ecology Conference, 1 (1962), 32-34.

57. Quotation from: Andrew Burnaby, Travels Through the Middle Settlements in North America, in the Years 1759 and 1760; With Observations on the State of the Colonies (London: T. Payne, 1775), 148. Stephens, Journal, 1:175-81. On the history and use of dirt yards in the southern piedmont, see Merle C. Prunty, "Some Geographic Views of the Role of Fire in the Settlement Process," Proceedings of the Tall Timbers Fire Ecology Conference 4 (1965), 165-66.

58. Quotation from: Iredell, Public Acts, 246-47. On fire legislation in the other southeastern colonies, see J.P. Kinney, "Forest Legislation in America Prior to March 4, 1789," Cornell University Agricultural Experiment Station Bulletin, 370 (1916), 370; and Lillian M. Willson, Forest Conservation in Colonial Times (St. Paul, Minn.: Forest Products History Foundation, 1948), 8.

59. Frank Owsley, Plain Folk of the Old South (Baton Rouge: Louisiana State University Press, 1949), 110-11. For another interesting treatment of the psychology of woodburning, see Hilliard Henson, "Why Incendiary Fires in the Southern Appalachians?" American Forests, 48 (1942), 419.

60. Quotations from: Brickell, Natural History, 259; and Woodmason, in Hooker, Carolina Backcountry, 63.

61. Quotations from: Mitchell, Present State of Great Britain and the Colonies, 153-54, 154-55.

62. Quotation from: Drayton, View of South Carolina, 142. For a discussion of range improvement under grazing, see Campbell, "Forest Grazing," 264-65. Cronon notes similar trends in New England. See Cronon, Changes in the Land, 142.

63. Thomas J. Muzik, Weed Biology and Control (New York: McGraw Hill, 1970), 3-4. Crosby, "Ecological Imperialism," 3-4. I arrived at this list of European imports by cross-checking European species listed in Wilkinson and Jaques, How to Know the Weeds with weeds noted in Governor John Drayton, The Carolinian Florist (1802; reprint, Spartanburg, S.C.: The Reprint Company, 1972). Many species had become so widespread in South Carolina that Drayton thought them native to North America.

64. Quotations from: Drayton, View of South Carolina, 61; John Bartram, "Diary of a Journey," 22; and American Husbandry, 259.

65. One of the better short accounts of the evolution of the "row crop empire" in the Old South is Cowdrey, This Land, This South, 66-75.

66. Moses Austin, quoted in Cowdrey, This Land, This South, 67.

67. Woodmason, in Hooker, Carolina Backcountry, 63.

68. Quotation from: Eugene P. Odum, Fundamentals of Ecology, (Philadelphia: W.B. Saunders Company, 1971), 257. Ecologists know the trend toward stabilization as "homeostasis." For a discussion, see Odum, 33-35, 221.

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1. Quotation from: Governor John Drayton, A View of South Carolina (1802; reprint, Spartanburg, S.C.: The Reprint Company, 1972), 93-94.

2. Quotation from: Robert Beverley, The History and Present State of Virginia (1705), ed. Louis B. Wright (Chapel Hill: University of North Carolina Press, 1947), 156.

3. Eugene P. Odum, Fundamentals of Ecology, (Philadelphia: W.B. Saunders Company, 1971), 3, 510-11. New Webster's Dictionary of the English Language, 8th ed., s.v. "ecology," "economics."

4. Quotation from: Immanuel Wallerstein, The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century (New York: Academic Press, 1974), 15.

5. For a discussion of the origins of the plague epidemic, see Robert Gottfried, The Black Death: Natural and Human Disaster in Medieval Europe, (New York: The Free Press, 1983), 36-37; and William H. McNeill, Plagues and Peoples (Garden City, N.J.: Anchor Books, 1976), 147-50. On the implications of the epidemic for the European economy, see Harry A. Miskimin, The Economy of later Renaissance Europe, 1460-1600 (Cambridge: Cambridge University Press, 1977), 20. Wallerstein, Modern World-System, 22.

6. On the European population increase, see Miskimin, Economy of later Renaissance Europe, 23. For an explanation of the Spanish discovery of gold and the "Price Revolution," see Ralph Davis, The Rise of the Atlantic Economies (Ithaca: Cornell University Press, 1973), 98-107.

7. Quotations from: Thomas Aquinas, Summa Theologica, quoted in Paschal Larkin, Property in the Eighteenth Century (New York: Howard Fertig, 1969), 5; and Larkin, Property, 7.

8. On the relationship between private property and enclosure, see E.K. Hunt, Property and Prophets: The Evolution of Economic Institutions and Ideologies (New York: Harper and Row, 1981), 19-20. See also, Miskimin, Economy of later Renaissance Europe, 78.

9. Hunt, Property and Prophets, 19. For a discussion of the increase in "market transactions," see Davis, Rise of Atlantic Economies, 98.

10. Quotations from: Hunt, Property and Prophets, 21; and Joyce Oldham Appleby, Economic Thought and Ideology in Seventeenth-Century England (Princeton: Princeton University Press, 1978), 3. Marxist economists, who define capitalism in terms of an industrial system which relies on wage labor, will find reason to disagree with my definition. But for the purposes of differentiating between the early modern and feudal economies, it seems better to focus on the accumulation of the physical trappings of capitalism instead of the complex set of social relationships. For a brief discussion of capitalism as it applies to the world economy see Wallerstein, Modern World System, 16.

11. Wallerstein, Modern World System, 42.

12. For a discussion of the commodities mentioned here and their place in the world-economy, see K.G. Davies, The North Atlantic World in the Seventeenth Century (Minneapolis: University of Minnesota Press, 1974), 141-43.

13. Appleby, Economic Thought, 158-64.

14. Quotations from: Dudley North, quoted in Appleby, Economic Thought, 169; and John Houghton, quoted in Appleby, 171. Appleby's argument concerning the development of new ideas about economic freedom can be found in 158-98.

15. Quotations from: "Letters Patent to Walter Raleigh," 25 March 1584, in David B. Quinn, ed., The Roanoke Voyages, 2 vols. (London: Hakluyt Society, 1955), 1:82; and Marshall Sahlins, Stone Age Economics (Chicago: Aldine-Atherton, 1972), 39. For a discussion of the formation of the Virginia Company and its relationship to the world-economy, see Davis, Rise of Atlantic Economies, 83-84. On the organization of the Carolina colony, see Peter H. Wood, Black Majority: Negroes in South Carolina from 1670 through the Stono Rebellion (New York: W.W. Norton and Company, 1975), 13-14. A good general treatment of European economic ambitions as they applied to the New World is Louis B. Wright, The Dream of Prosperity in Colonial America (New York: New York University Press, 1965), see especially 1-18.

16. Quotation from: Beverley, History and Present State, 225. Economic anthropologists differ on the question of whether or not economic principles used to describe market economies of the Western World can be applied to non-western societies. "Formalists" suggest that such principles are useful as descriptive devices; "substantivists" argue that they are not. Two articles which delineate the basic issues of the debate are: David Kaplan, "The Formal-Substantivist Controversy in Economic Anthropology," Southwestern Journal of Anthropology 24 (1968), 228-51; and Scott Cook "The 'Anti-Market' Mentality Reexamined," Southwestern Journal of Anthropology 25 (1969), 378-406.

From an historian's point of view, a formalist approach is preferable because it at least provides a basis for comparing Indian and European ideas about resources. To adopt the substantivist view would seem to rule out the possibility for economic and cultural interaction, a point I argue below. William Cronon's Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 220-21, provides a good non-technical summary of the debate and was the initial point of reference for the articles mentioned here.

17. Southeastern Indian ideas about land tenure are still debated by historians and anthropologists alike. Here I have used what might be termed an ecological definition of ownership, a conclusion I reached after reading John Phillip Reid, A Law of Blood: The Primitive Law of the Cherokee Nation (New York: New York University Press, 1970), 123-41. Reid focuses on the Cherokees after contact but suggests that before the arrival of Europeans, Indians understood the social concepts of property and sovereignty.

18. This incident is recorded in James Mooney, Myths of the Cherokees and Sacred Formulas of the Cherokees (Nashville: Cherokee Heritage Press, 1982), 380-81 and in Reid, Law of Blood, 134-35.

19. Mooney, Myths of Cherokees, 381. Reid, Law of Blood, 135. For a more general statement about the importance of labor in determining ownership, see Charles M. Hudson, The Southeastern Indians (Knoxville: University of Tennessee Press, 1976), 311-12.

20. Quotation from: James Adair, A History of the North-American Indians, Their Customs Ec., ed. Samuel Cole Williams (Johnson City, Tenn.: The Watauga Press, 1930), 182. On the secular and religious importance of the burial ceremony, see Reid, Law of Blood, 144.

21. Quotations from: Adair, North-American Indians, 462; and John Lawson, Lawson's history of North Carolina (1714), ed. Francis Latham Harris (Richmond: Garrett and Massie, 1937), 256. See also Reid, Law of Blood, 124-25.

22. One of the best treatments of gift-giving in non-market economies, although not specifically American Indians, is Sahlins, Stone Age Economics, 149-84. See also, Hudson, Southeastern Indians, 310-11.

23. Quotation from: Lawson, Lawson's History, 208-09.

24. Quotation from: Robert Gray, A Good Speed to Virginia (1609), quoted in Gary B. Nash, "The Image of the Indian in the Southern Colonial Mind," William and Mary Quarterly, 3d ser. 29 (1972), 210.

25. Quotation from: Gen. 1:28-29. For a discussion of English perceptions of this passage, see Keith Thomas, Man and the Natural World: A History of the Modern Sensibility (New York: Pantheon Books, 1983), 17-18.

26. Quotation from: Gen. 9:3. Thomas, Man and the Natural World, 18.
27. Quotations from: Gray, Good Speed, quoted in Nash, "Image," 210; and Gray, quoted in W. Stitt Robinson, Jr., Mother Earth: Land Grants in Virginia, 1607-1699 (Williamsburg: 350th Anniversary Celebration Corporation, 1957), 3.
28. Quotations from: Beverley, History and Present State, 156.
29. For an account of Beverley's land holdings, see Wright, ed., History and Present State, xiv.
30. Edmund S. Morgan, "The Labor Problem at Jamestown, 1607-18," American Historical Review, 76 (1971), 597-99, 607-09.
31. Ibid., 599, 610-11.
32. J. Leitch Wright, Jr., The Only Land They Knew: The Tragic Story of the American Indians in the Old South (New York: The Free Press, 1981), 94-95. Morgan, "Labor Problem," 600.
33. Edmund S. Morgan, "The First American Boom: Virginia 1618 to 1630," William and Mary Quarterly, 3d ser. 18 (1971), 169-70.
34. Quotation from: Ibid., 198. I have summarized Morgan's argument from 169-98.
35. Edmund S. Morgan, American Slavery American Freedom: The Ordeal of Colonial Virginia (New York: W.W. Norton and Company, 1975), 215-21. Statistics are from 220.
36. Ibid., 222-34. See also Glenn T. Trewartha, "Types of Rural Settlement in Colonial America," Geographical Review, 36 (1946), 587-89.
37. Gary B. Nash, Red, White, and Black: The Peoples of Early America (Englewood Cliffs, N.J.: Prentice-Hall, 1974), 162.
38. Morgan, American Slavery, 297-300.
39. Ibid., 309-10. Slave population statistics are from Gerald W. Mullin, Flight and Rebellion: Slave Resistance in Eighteenth-Century Virginia (New York: Oxford University Press, 1972), 15-16.
40. Economic historians continue to debate the nature of the plantation economy. On the feudal characteristics of the plantation system, see James A. Henretta, The Evolution of American Society, 1700-1815: An Interdisciplinary Analysis (Lexington, Mass.: D.C. Heath and Company), 57-67, 225. For an argument which focuses more on evidence of capitalism, see James T. Lemon, "Early Americans and their

social environment," Journal of Historical Geography, 6 (1980), 115-31. Other articles useful in understanding the unique nature of the colonial economy (although they focus more on New England and the Middle Colonies) are: Cole Harris, "The simplification of Europe overseas," Annals of the Association of American Geographers 67 (1977), 469-83; James Henretta, "Families and Farms: Mentalite in Preindustrial America," William and Mary Quarterly, 3d ser., 35 (1978), 469-83; and Carole Shammas, "How Self-Sufficient Was Early America?," Journal of Interdisciplinary History 13 (1982), 247-72. I have tried to synthesize these arguments into an interpretation which defends neither feudalism nor capitalism, but reflects the interaction of European institutions with the New World environment.

41. Henretta, Evolution of American Society, 225.

42. Quotation from: Drayton, View of South Carolina, 146-47.

43. Quotation from: Beverley, History and Present State, 319.

44. Wendell Berry, The Unsettling of America: Culture and Agriculture (San Francisco: Sierra Club Books, 1977), 6. I am indebted to Dr. Jeff Boyer, Department of Anthropology, Appalachian State University, for this source.

45. Quotation from: David Budbill, quoted in Berry, Unsettling, 28.

46. Berry, Unsettling, 7.

47. Edwin Muir, Collected Poems (New York: Oxford University Press, 1965), 249.

BIBLIOGRAPHY

I. Primary Sources

- Adair, James. A History of the North-American Indians, Their Customs, &c. Edited by Samuel Cole Williams. Johnson City, Tenn.: The Watauga Press, 1930.
- Alexander, Edward P., ed. The Journal of John Fontaine. Charlottesville: University Press of Virginia, 1972.
- Alvord, C.W. and L. Bidgood, eds. The First Exploration of the Trans-Allegheny Region by the Virginians, 1650-1675. Cleveland: Arthur Clarke, 1912.
- Arber, Edward, ed. Travels and Works of Captain John Smith. 2 Vols. Edinburg: John Grant, 1910.
- [Archer, Gabriel?]. "The Description of the Now Discovered River and Country of Virginia; With the Likelihood of Ensuing Riches by Englands Ayd and Industry." Virginia Magazine of History and Biography 14 (1907): 373-78.
- Atkin, Edmond. Indians of the Southern Colonial Frontier. Edited by Wilbur R. Jacobs. Columbia: University of South Carolina Press, 1954.
- Bartram, John. "Diary of a Journey Through The Carolinas, Georgia, and Florida From July 1, 1765 to April 10, 1776." Transactions of the American Philosophical Society. New Ser. 23. Part 1 (December 1942): 13-55.
- Bartram, William. Travels of William Bartram. Edited by Mark Van Doren. New York: Dover Publications, 1955.
- Beverley, Robert. The History and Present State of Virginia. 1705. Edited by Louis B. Wright. Chapel Hill: University of North Carolina Press, 1947.
- Bourne, Edward Gaylord, ed. Narratives of the Career of Hernando DeSoto. 2 Vols. New York: A.S. Barnes, 1904.
- Brickell, John. The Natural History of North Carolina. 1737. Reprint. Murfreesboro, N.C.: Johnson Publishing Company, 1968.

- Burnaby, Andrew. Travels Through the Middle Settlements in North America in the Years 1759 and 1760, With Observations Upon the State of the Colonies. London: T. Payne, 1775.
- Byrd, William II. Histories of the Dividing Line (1728). Edited by William K. Boyd. Raleigh: North Carolina Historical Commission, 1929.
- _____. The Natural History of Virginia or the Newly Discovered Eden. Edited by Richmond Croom Beatty and William J. Mulloy. Richmond: The Dietz Press, 1940.
- _____. The Writings of Colonel William Byrd of Westover in Virginia, Esq. New York: Doubleday, Page, and Company, 1970.
- Carman, Harry J. and Rexford G. Tugwell, eds. American Husbandry. New York: Columbia University Press, 1939.
- Carroll, B.R., ed. Historical Collections of South Carolina. 2 Vols. New York: Harper and Brothers, 1836.
- Carter, Landon. The Diary of Colonel Landon Carter of Sabine Hall, 1752-1778. Edited by Jack P. Greene. 2 Vols. Charlottesville: University Press of Virginia, 1965.
- Catesby, Mark. The Natural History of Carolina, Florida, and the Bahama Islands. 2 Vols. 1747. Reprint. Ann Arbor: University Microfilms International, 1977.
- Collet, John. A Complete Map of North Carolina from an actual survey by Capt. Collet, Governor of Ft. Johnston. Library of Congress, Geography and Map Division.
- Cooper, Thomas and David J. McCord, eds. The Statutes at Large of South Carolina. 10 Vols. Columbia, S.C.: A.S. Johnston, 1836-39.
- Crisp, Edward. "A Complete Description of the Province of Carolina." 1711. Library of Congress, Geography and Map Division.
- De Brahm, John Gerar William. De Brahm's Report of the General Survey Of the Southern District of North America. Edited by Louis De Vorsey, Jr. Columbia: University of South Carolina Press, 1971.
- Drayton, Governor John. A View of South Carolina. 1802. Reprint. Spartanburg, S.C.: The Reprint Company, 1972.
- _____. The Carolinian Florist. 1802. Reprint. Spartanburg, S.C.: The Reprint Company, 1972.
- Eliot, Jared. Essays Upon Field Husbandry in New England. Edited by Harry J. Carman and Rexford G. Tugwell. New York: Columbia University Press, 1934.

- Ewan, Joseph and Nesta, eds. John Banister and His Natural History of Virginia, 1678-1692. Urbana: University of Illinois Press, 1970.
- Force, Peter, Comp. Tracts and Other Papers Relating Principally to the Origin, Settlement, and Progress of the Colonies in North America, From the Discovery of the Country to the Year 1776. 4 Vols. Washington, D.C.: Peter Force, 1836-46.
- Gascoyne, Joel. A True Description of Carolina. London, 1682.
- Georgia Historical Society. Collections of the Georgia Historical Society. 11 Vols. Savannah: The Georgia Historical Society, 1916.
- Hamor, Ralph. A True Discourse of the Present Estate of Virginia, and the success of the affaires there till the 18 of June 1614. London: John Beale, 1615.
- Hening, William Waller, ed. The Statutes at Large of Virginia. 13 Vols. Charlottesville: University Press of Virginia, 1969.
- Hooker, Richard, ed. The Carolina Backcountry on the Eve of Revolution. Chapel Hill: University of North Carolina Press, 1953.
- Iredell, James. The Public Acts of the General Assembly of North Carolina. Newbern, N.C.: Martin and Ogden, 1804.
- Jefferson, Thomas. Notes on the State of Virginia. 1787. Edited by William Peden. Chapel Hill: University of North Carolina Press, 1955.
- Jones, Hugh. The Present State of Virginia. 1724. Edited by Richard L. Morton. Chapel Hill: University of North Carolina Press, 1956.
- Kalm, Pehr. Travels in North America. Edited by Adolph B. Benson. 2 Vols. New York: Peter Smith, 1964.
- Kimber, Edward. A Relation of a Journal of a Late Expedition to the Gates of St. Augustine in Florida, 1744. Boston: C.E. Godspeed and Company, 1935.
- Kingsbury, Susan Myra, ed. The Records of the Virginia Company of London. 4 Vols. Washington: Government Printing Office, 1906-35.
- Lawson, John. Lawson's History of North Carolina. 1714. Edited by Francis Latham Harris. Richmond: Garrett and Massie, 1937.
- Le Jau, Dr. Francis. The Carolina Chronicle of Dr. Francis Le Jau. Edited by Frank J. Klingberg. Berkeley: University of California Publications in History, 1956.
- Lederer, John. The Discoveries of John Lederer. London, 1672.

- Lewis, Clifford M. and Albert J. Loomie, eds. The Spanish Jesuit Mission in Virginia. Chapel Hill: University of North Carolina Press, 1953.
- Longe, Alexander. "A Small Postscript on the Ways and Manners of the Nason of Indians called Charikees." Edited by David H. Corkran. Southern Indian Studies, 21 (October 1969): 3-49.
- McIlwaine, H.R., et. al., eds. Executive Journals of the Council of Colonial Virginia. 6 Vols. Richmond: Dietz Press, 1925-66.
- Meredith, Hugh. An account of the Cape Fear Country, 1731. Edited by Earl Gregg Swem. Perth Amboy, N.J.: Charles F. Heartman, 1922.
- Merrens, H. Roy, ed. The Colonial South Carolina Scene: Contemporary Views, 1697-1744. Columbia: University of South Carolina Press, 1977.
- Michaux, Francois André. The North American Sylva; or a Description of the Forest Trees of the United States, Canada, and Nova Scotia. Translated by J. Jay Smith. 3 Vols. Philadelphia: Rice, Rutter, and Company, 1865.
- Mitchell, Dr. John. The Present State of Great Britain and North America. London: T. Beckett and P.A. de Hondt, 1767.
- Nairne, Thomas. A Letter from South Carolina giving an Account of the Soil, Air, Product, Trade, Government, Laws, Religion, People, Military Strength, Etc. of that Province. 1710. Reprint. Ann Arbor: University Microfilms International, 1980.
- Ogilby, John. America. London: Printed by the author, 1682.
- Pinckney, Eliza Lucas. The Letterbook of Eliza Lucas Pinckney, 1739-1762. Edited by Elise Pinckney. Chapel Hill: University of North Carolina Press, 1972.
- Quinn, David B., ed. The Roanoke Voyages. 2 Vols. London: The Hakluyt Society, 1955.
- Ramsay, David. The History of South Carolina, from its first settlement in 1670 to the year 1808. 1809. Reprint. Newberry, S.C., 1858.
- Salley, Alexander S., ed. Narratives of Early Carolina, 1650-1708. New York: Charles Scribner's Sons, 1911.
- Smith, James Edward, ed. A Selection of the Correspondence of Linnaeus and Other Naturalists. 2 Vols. New York: Arno Press, 1928.
- Stephens, William. The Journal of William Stephens, 1741-1743. Edited by E. Merton Coulter. 2 Vols. Athens, Ga.: University of Georgia Press, 1958.

- Strachey, William. The Historie of Travell into Virginia Britannia. Edited by Louis B. Wright and Virginia Freund. London: Hakluyt Society, 1953.
- "Talk From the Indian Chief Mad Dog." Florida Historical Quarterly. 13 (1935): 165-66.
- Tatham, William. William Tatham and the Culture of Tobacco. Edited by G. Melvin Herndon. Coral Gables, Fla.: University of Miami Press, 1969.
- Thwaites, Reuben G., ed. Early Western Travels, 1748-1846. 32 Vols. Cleveland: Arthur Clark, 1904.
- Timberlake, Lieut. Henry. Lieut. Henry Timberlake's Memoirs, 1756-1765. Edited by Samuel Cole Williams. Johnson City, Tenn.: The Watauga Press, 1927.
- Tinling, Marion, ed. The Correspondence of the Three William Byrds of Westover, Virginia, 1684-1776. 2 Vols. Charlottesville: University Press of Virginia, 1977.
- Vega, Garsilasco de la. The Florida of the Inca. Edited and Translated by John Grier Varner and Jeanette Johnson Varner. London: Thomas Nelson and Sons, Ltd., 1951.
- "Virginia in 1626-27." Virginia Magazine of History and Biography. 16 (1908): 30-38.
- Whittaker, Alexander. Good Newes from Virginia. London, 1613.
- Williams, Edward. Virginia: More Especially The South Part Thereof, Richly and Truly Valued. London: T.H. for John Stephenson, 1650.
- Wroth, Lawrence C., ed. The Voyages of Giovanni da Verrazzano, 1524-1528. New Haven: Yale University Press, 1970.

II. Secondary Works

- Albion, Robert G. Forests and Sea Power. Cambridge, Mass.: Harvard University Press, 1926.
- Allen, Glover M. "Domesticated Dogs of the American Aborigines." Bulletin of the Museum of Comparative Zoology, Harvard University (1920): 431-517.
- Appleby, Joyce Oldham. Economic Thought and Ideology in Seventeenth-Century England. Princeton: Princeton University Press, 1978.

- Arthur, Joseph C. The Plant Rusts (Uredinales). New York: John Wiley and Sons, Inc., 1929.
- Ashe, Thomas. Forest Products of Eastern North Carolina. Raleigh, N.C., 1894.
- Axtell, James. The European and the Indian: Essays in the Ethnohistory of Colonial North America. New York: Oxford University Press, 1981.
- Bakeless, John. The Eyes of Discovery. New York: J.P. Lippincott Company, 1950.
- Barbour, Michael G., et. al. Terrestrial Plant Ecology. Menlo Park, Calif.: Benjamin/Cummings Publishing Company, 1980.
- Barden, Lawrence S. and Frank W. Woods. "Characteristics of Lightning Fires in the Southern Appalachian Forests." Proceedings of the Tall Timbers Fire Ecology Conference. 13 (1972): 345-61.
- Barry, John M. The Natural Vegetation of South Carolina. Columbia: University of South Carolina Press, 1980.
- Battle, H.B. "The Domestic Use of Oil Among Southern Aborigines." American Anthropologist. 24 (1922): 171-82.
- Berry, Wendell. The Unsettling of America: Culture and Agriculture. San Francisco: Sierra Club Books, 1977.
- Billings, W.D. Plants and the Ecosystem. 3d ed. Belmont, Calif.: Wadsworth Publishing Company, 1978.
- Boyer, William D. "Grazing Hampers Development of Longleaf Seedlings in Southwestern Alabama." Journal of Forestry. 65 (1967): 336-38.
- _____. "Longleaf Pine Seed Predators in Southwest Alabama." Journal of Forestry. 62 (1964): 481-84.
- Braun, E. Lucy. Deciduous Forests of North America. Philadelphia: The Blakston Company, 1950.
- Breen, T.H., ed. Shaping Southern Society: The Colonial Experience. New York: Oxford University Press, 1976.
- Bridenbaugh, Carl. Myths and Realities: Societies of the Colonial South. New York: Atheneum, 1970.
- British Ecological Symposium 10. Animal Populations in Relation to their Forest Resources. Oxford: Blackwell Scientific Publications, 1970.

- Buell, Murray F. and Robert L. Cain. "The Successional Role of Southern White Cedar, Chamaecypariss Thyoides, in Southeastern North Carolina." Ecology. 24 (1943): 85-93.
- Butzer, Karl W. Archaeology as Human Ecology: Method and Theory for a Contextual Approach. Cambridge: Cambridge University Press, 1982.
- Campbell, Robert S. "Forest Grazing in the Southern Coastal Plain." Proceedings of the Society of American Foresters. (1947): 262-70.
- Caras, Roger. North American Mammals: Fur-Bearing Animals of the United States and Canada. New York: Gallahad Books, 1967.
- Clemen, Rudolph Alexander. The American Livestock and Meat Industry. New York: Ronald Press, 1923.
- Cook, Scott. "The 'Anti-Market' Mentality Reexamined." Southwestern Journal of Anthropology. 25 (1969): 378-406.
- Cowdrey, Albert E. This Land, This South: An Environmental History. Lexington: University Press of Kentucky, 1983.
- Crane, Verner W. The Southern Colonial Frontier, 1670-1732. Ann Arbor: University of Michigan Press, 1929.
- Craven, Avery Odell. Soil Exhaustion as a Factor in the Agricultural History of Virginia and Maryland, 1606-1860. Urbana: University of Illinois Press, 1926.
- Cronon, William. Changes in the Land: Indians, Colonists, and the Ecology of New England. New York: Hill and Wang, 1983.
- Crosby, Alfred W. "Ecological Imperialism: The Overseas Migration of Western Europeans as a Biological Phenomenon." Texas Quarterly. 30 (1978): 10-22.
- _____. "Virgin Soil Epidemics as a Factor in the Aboriginal Depopulation of America." William and Mary Quarterly. 3d ser. 33 (1976): 284-93.
- Curtin, Philip. "Epidemiology and the Slave Trade." Political Science Quarterly. 83 (1968): 190-216.
- Dassmann, Raymond F. Wildlife Biology. New York: John Wiley and Sons, 1964.
- Davies, K.G. The North Atlantic World in the Seventeenth Century. Minneapolis: University of Minnesota Press, 1974.

- Davis, Ralph. The Rise of the Atlantic Economies. Ithaca: Cornell University Press, 1973.
- Day, Gordon M. "The Indian as an Ecological Factor in the Northeastern Forest." Ecology. 34 (1953): 329-46.
- Dobyns, Henry F. "An Outline of Andean Epidemic History to 1720." Bulletin of the History of Medicine. 37 (1963): 493-515.
- _____. Their Number Became Thinned: Native Population Dynamics in Eastern North America. Knoxville: University of Tennessee Press, 1983.
- Duffy, John. Epidemics in Colonial America. Baton Rouge: Louisiana State University Press, 1953.
- Dunn, F.L. "On the Antiquity of Malaria in the Western Hemisphere." Human Biology. 37 (1965): 385-93.
- Duvall, Vincent L. and Norman E. Linnartz. "Influences of Grazing and Fire on Vegetation and Soil of Longleaf Pine Bluestem Range." Journal of Range Management. 20 (1967): 241-47.
- Encyclopedia Britannica. 11th ed. S.V. "typhus."
- Errington, Paul. Of Predation and Life. Ames, Iowa: Iowa State University Press, 1967.
- Gamble, Thomas. Naval Stores: History, Production, Distillation, and Consumption. Savannah: Review Publishing and Printing Company, 1921.
- Galinat, Walton C. "The Evolution of Corn and Culture in North America." Economic Botany. 19 (1965): 350-57.
- Genovese, Eugene D. Roll Jordan Roll: The World the Slaves Made. New York: Vintage Books, 1972.
- Goodwin, Gary. Cherokees in Transition. Chicago: University of Chicago Publications in Geography, 1975.
- Gottfried, Robert. The Black Death: Natural and Human Disaster in Medieval Europe. New York: The Free Press, 1983.
- Gray, Lewis Cecil. History of Agriculture in the Southern United States to 1860. 2 Vols. Washington: Carnegie Institute, 1933.
- Hahn, Richard L. "The 'Trade Do's Not Flourish as Formerly': The Ecological Origins of the Yamasee War of 1715." Ethnohistory. 28 (1982): 340-58.
- Harris, Cole. "The simplification of Europe overseas." Annals of the Association of American Geographers. 67 (1977): 469-83.

- Hawley, Norman R. "Burning in a Naval Stores Forest." Proceedings of the Tall Timbers Fire Ecology Conference. 3 (1964): 81-87.
- Haynes, C. Vance, Jr. "Elephant-hunting in North America." Scientific American, 214 (July 1966): 104-12.
- Henretta, James A. The Evolution of American Society, 1700-1815: An Interdisciplinary Analysis. Lexington, Mass.: D.C. Heath and Company, 1973.
- _____. "Families and Farms: Mentalite in Pre-industrial America." William and Mary Quarterly. 3d ser. 35 (1978): 469-83.
- Henson, Hilliard. "Why Incendiary Fires in the Southern Appalachians?" American Forests. 48 (1942): 419.
- Herndon, G. Melvin. "Indian Agriculture in the Southern Colonies." North Carolina Historical Review. 44 (1967): 283-97.
- Heyward, Frank. History of Industrial Forestry in the South. Seattle: University of Washington College of Forestry, 1958.
- Horwitz, Eleanor C.J., ed. Clearcutting: A View From the Top. Washington: Acropolis Books, 1974.
- Hudson, Charles M., ed. Four Centuries of Southern Indians. Athens, Ga.: University of Georgia Press, 1975.
- _____. "The Cherokee Concept of Natural Balance." The Indian Historian. 3 (1970): 51-54.
- _____. The Southeastern Indians. Knoxville: University of Tennessee Press, 1976.
- Hughes, Ralph H. "Fire Ecology of Canebrakes." Proceedings of the Tall Timbers Fire Ecology Conference. 5 (1966): 194-57.
- Hunt, E.K. Property and Prophets: The Evolution of Economic Institutions and Ideologies. New York: Harper and Row, 1981.
- Jacobs, Wilbur R. Dispossessing the American Indian: Indians and Whites on the Colonial Frontier. New York: Charles Scribner's Sons, 1974.
- Jennings, Francis. The Invasion of America. New York: W.W. Norton and Company, 1975.
- Johnson, E.A. "Effects of Farm Woodland Grazing on Watershed Values in the Southern Appalachian Mountains." Journal of Forestry. 50 (1952): 109-13.

- Kaplan, David. "The Formal-Substantivist Controversy in Economic Anthropology." Southwestern Journal of Anthropology. 24 (1968): 228-51.
- Kaplan, Lawrence. "Archaeology and Domestication in American Phaseolus (Beans)." Economic Botany. 19 (1965): 358-68.
- Kinney, J.P. "Forest Legislation in America Prior to March 4, 1789." Cornell University Agricultural Experiment Station Bulletin 370. 1916.
- _____. The Development of Forest Law in America. New York: John Wiley and Sons, 1917.
- Kittredge, Joseph. Forest Influences. New York: McGraw-Hill, 1948.
- Komarek, Roy. "Comments on Fire and the Natural Landscape." Proceedings of the Tall Timbers Fire Ecology Conference. 13 (1973): 3-7.
- Kozlowski, T.T., ed. Fire and Ecosystems. New York: Academic Press, 1974.
- Krech, Shepard. "Disease, starvation and North Athapaskan social organization." American Ethnologist. 5 (1978): 710-32.
- _____. ed. Indians, Animals and the Fur Trade: A Critique of Keepers of the Game. Athens, Ga.: University of Georgia Press, 1978.
- Larkin, Paschal. Property in the Eighteenth Century. New York: Howard Fertig, 1969.
- Lee, Richard. Forest Hydrology. New York: Columbia University Press, 1980.
- Leeds, Anthony and Andrew P. Vayda, eds. Man, Culture, and Animals. Washington: American Association for the Advancement of Science, 1965.
- Lemon, James T. "Early Americans and their social environment." Journal of Historical Geography. 6 (1980): 115-31.
- Linnartz, Norman E., ed. The Ecology of Southern Forests. 17th Forestry Symposium. Baton Rouge: Louisiana State University Press, 1968.
- Little, Elbert L. The Audubon Society Field Guide to North American Trees, Eastern Region. New York: Alfred A. Knopf, 1980.

- Longfellow, Henry Wadsworth. The Complete Poetical Works of Henry Wadsworth Longfellow. Edited by Horace E. Scudder. Boston: Houghton-Mifflin Company, 1882.
- MacLeod, William C. "Conservation Among Primitive Hunting Peoples." Scientific Monthly. 43 (December 1936): 562-66.
- _____. The American Indian Frontier. New York: Alfred A. Knopf, 1928.
- McClung, Robert. Lost Wild America. New York: William Morrow and Company, 1969.
- McNeill, William H. Plagues and Peoples. Garden City, N.J.: Anchor Books, 1976.
- Marsh, George P. The Earth as Modified by Human Action: A New Edition of Man and Nature. New York: Scribner, Armstrong, 1874.
- Martin, Calvin. "Ethnohistory: A Better Way to Write Indian History." Western Historical Quarterly. 9 (1978): 40-56.
- _____. "Fire and Forest Structure in the Aboriginal Eastern Forests." The Indian Historian. 6 (1973): 38-42.
- _____. Keepers of the Game. Berkeley: University of California Press, 1978.
- _____. "Wildlife Diseases as a Factor in the Depopulation of the North American Indian." Western Historical Quarterly. 7 (1976): 47-62.
- Martin, Paul S. "The Discovery of America." Science. 179 (1973): 969-74.
- Mastromarino, Mark. "Cry Havoc and Let Loose the Dogs of War: The Military Use of Dogs in Colonial America." Department of History, College of William and Mary, 1983.
- Matthiessen, Peter. Wildlife in America. New York: Viking Press, 1959.
- Maxwell, Hu. "The Use and Abuse of the Forests by the Virginia Indians." William and Mary College Quarterly Magazine. 2d ser. 19. (October 1910): 73-103.
- May, J.M. Studies in Disease Ecology. New York: Hafner Publishing Company, 1961.
- Mech, David. The Wolf: The Ecology and Behavior of an Endangered Species. Garden City, N.Y.: The Natural History Press, 1970.

- Merrell, James H. "The Indians' New World: The Catawba Experience." William and Mary Quarterly. 3d ser. 41 (1984): 537-65.
- Merrens, H. Roy. Colonial North Carolina in the Eighteenth Century. Chapel Hill: University of North Carolina Press, 1964.
- Milner, George R. "Epidemic Disease in the Postcontact Southeast: A Reappraisal." Mid-Continental Journals of Archaeology. 5 (1980): 38-56.
- Miskimin, Harry A. The Economy of later Renaissance Europe, 1460-1600. Cambridge: Cambridge University Press, 1977.
- Mohr, Charles. Timber Pines of the Southern United States. Washington: Government Printing Office, 1897.
- Mooney, James. Myths of the Cherokee and Sacred Formulas of the Cherokee. Nashville: Cherokee Heritage Books, 1982.
- Morgan, Edmund S. American Slavery American Freedom: The Ordeal of Colonial Virginia. New York: W.W. Norton and Company, 1975.
- _____. "The First American Boom: Virginia 1618 to 1630." William and Mary Quarterly. 3d ser. 18 (1971): 169-98.
- _____. "The Labor Problem at Jamestown, 1607-18." American Historical Review. 76 (1971): 595-611.
- Muir, Edwin. Collected Poems. New York: Oxford University Press, 1965.
- Mullin, Gerald W. Flight and Rebellion: Slave Resistance in Eighteenth-Century Virginia. New York: Oxford University Press, 1972.
- Muzik, Thomas J. Weed Biology and Control. New York: McGraw-Hill, 1970.
- Nash, Gary B. "The Image of the Indian in the Southern Colonial Mind." William and Mary Quarterly. 3d ser. 29 (1972): 197-230.
- _____, ed. The Private Side of American History: Readings in Everyday Life: Vol. 1, To 1877. New York: Harcourt, Brace, Jovanovich, 1983.
- _____. Red, White, and Black: The Peoples of Early America. Englewood Cliffs, N.J.: Prentice-Hall, 1974.
- Odum, Eugene P. Ecology. New York: Holt, Rinehart, and Winston, 1963.
- _____. Fundamentals of Ecology. Philadelphia: W.B. Saunders Company, 1971.

- Oosting, Henry J. "The Comparative Effect of Surface and Crown Fires on the Composition of a Loblolly Pine Community." Ecology. 25 (1944): 61-69.
- Owsley, Frank. Plain Folk of the Old South. Baton Rouge: Louisiana State University Press, 1949.
- Papenfuse, Edward C. "Planter Behavior and Economic Opportunity in a Staple Economy." Agricultural History. 46 (1972): 297-311.
- Parkman, Francis. Montcalm and Wolfe. Boston: Little, Brown, and Company, 1890.
- Parramore, Thomas C. "The Tuscarora Ascendancy." North Carolina Historical Review. 59 (1982): 307-326.
- Phillips, Paul Chrisler. The Fur Trade. 2 Vols. Norman: University of Oklahoma Press, 1961.
- Prunty, Merle C. "Some Geographic Views of the Role of Fire in the Settlement Process." Proceedings of the Tall Timbers Fire Ecology Conference. 4 (1965): 161-68.
- Pyne, Stephen J. Fire in America: A Cultural History of Wildland and Rural Fire. Princeton: Princeton University Press, 1982.
- Reid, John Philip. A Law of Blood: The Primitive Law of the Cherokee Nation. New York: New York University Press, 1970.
- Richardson, Jonathan L. Dimensions of Ecology. Baltimore: The Williams and Wilkins Company, 1977.
- Richter, Daniel K. Review of Their Number Became Thinned: Native Population Dynamics in Eastern America, by Henry F. Dobyns. William and Mary Quarterly. 3d ser. 41 (1984): 649-53.
- Robinson, W. Stitt, Jr. Mother Earth: Land Grants in Virginia, 1607-1699. Williamsburg, Va.: 350th Anniversary Celebration Corporation, 1957.
- Rostlund, Erhard. Freshwater Fish and Fishing in Native North America. Berkeley: University of California Publications in Geography, 1952.
- _____. "The Geographic Range of the Historic Bison in the Southeast." Annals of the Association of American Geographers. 50 (1960): 395-407.
- Rue, Leonard Lee. The Deer of North America. New York: Crown Publishers, 1978.
- _____. The World of the Beaver. Philadelphia: J.P. Lippincott, 1964.

- Russell, Emily W.B. "Indian-set Fires in the Forests of the Northeastern United States." Ecology. 64 (1983): 78-88.
- Rutman, Darrett B. and Anita H. "Of Agues and Fevers: Malaria in the Early Chesapeake." William and Mary Quarterly. 3d ser. 33 (1976): 31-60.
- Sahlins, Marshall. Stone Age Economics. Chicago: Aldine-Atherton, 1972.
- Sauer, Carl Ortwin. Land and Life. Berkeley: University of California Press, 1967.
- _____. Sixteenth-Century North America. Berkeley: University of California Press, 1971.
- Schorger, A.W. The Passenger Pigeon: Its Natural History and Extinction. Madison: University of Wisconsin Press, 1955.
- _____. The Wild Turkey: Its History and Domestication. Norman: University of Oklahoma Press, 1966.
- Schorger, A.W. and H.S. Betts. "The Naval Stores Industry." U.S. Department of Agriculture Bulletin No. 229. Washington: Government Printing Office, 1915.
- Schroeder, J. and Charles S. Buck. "Fire Weather." U.S. Department of Agriculture Handbook No. 360. Washington: U.S. Department of Agriculture, Forestry Service, 1970.
- Scoville, Warren. "Did Colonial Farmers Waste Our Land?." Southern Economics Journal. 20 (1973): 178-81.
- Seton, Ernest Thompson. Lives of Game Animals. 7 Vols. Boston: Charles T. Branford Company, 1953.
- Shammas, Carole. "How Self-Sufficient Was Early America?." Journal of Interdisciplinary History. 13 (1982): 247-72.
- Smith, Alice R. Huger. A Carolina Rice Plantation of the Fifties. New York: William Morrow and Company, 1936.
- Smith, Bruce D. "Middle Mississippian Exploitation of Animal Populations: A Predictive Model." American Antiquity. 39 (1974): 274-91.
- Smith, James M., ed. Seventeenth-Century America. Chapel Hill: University of North Carolina Press, 1959.
- Snow, Sinclair. "Naval Stores in Colonial Virginia." Virginia Magazine of History and Biography. 72 (1964): 75-93.

- Spurr, Stephen H. and Burton V. Barnes. Forest Ecology. New York: The Ronald Press, 1973.
- Stoddard, H.L. Sr. "The Use of Fire in Pine Forests of the Deep Southeast." Proceedings of the Tall Timbers Fire Ecology Conference. 1 (1962): 31-42.
- Tate, Thad W. and David L. Ammerman, eds. The Chesapeake in the Seventeenth Century: Essays on Anglo-American Society. Chapel Hill: University of North Carolina Press, 1979.
- Thomas, Keith. Man and the Natural World: A History of the Modern Sensibility. New York: Pantheon Books, 1983.
- Thor, Eyvind and Gary M. Nichols. "Some Effects of Fire on Litter, Soil, and Hardwood Regeneration." Proceedings of the Tall Timbers Fire Ecology Conference. 13 (1973): 317-29.
- Thoreau, Henry David. Walden. New York: W.W. Norton and Company, 1951.
- Tindall, George Brown. America: A Narrative History. New York: W.W. Norton and Company, 1984.
- Trewartha, Glenn T. "Types of Rural Settlement in Colonial America." Geographical Review. 36 (1946): 568-96.
- Ucko, Peter J. and G.W. Dimbley, eds. The Domestication and Exploitation of Plants and Animals. London: Gerald Duckworth and Company, 1969.
- U.S. Department of Agriculture. Plant Diseases: The Yearbook of Agriculture, 1953. Washington: Government Printing Office, 1953.
- _____. Third Report of the United States Entomological Commission. Washington Government Printing Office, 1883.
- _____. Agricultural Research Service. Common Weeds of the United States. New York: Dover Publications, 1971.
- _____. Forest Service. Whitetailed Deer in Southern Forest Habitat: Proceedings of a Symposium at Nacagdoches, Texas, March 25-26, 1969. U.S. Department of Agriculture: Southern Forest Experiment Station, 1969.
- U.S. Department of Commerce. Bureau of the Census. Historical Statistics of the United States. 2 Vols. Washington: Government Printing Office, 1975.
- Vankat, John L. The Natural Vegetation of North America. New York: John Wiley and Sons, 1979.

- Vecsey, Christopher. American Indian Environments. Syracuse: Syracuse University Press, 1980.
- Vogel, Virgil J. American Indian Medicine. Norman: University of Oklahoma Press, 1970.
- Wallace, Anthony F.C. The Death and Rebirth of the Seneca. New York: Vintage Books, 1972.
- Wallerstein, Immanuel. The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century. New York: Academic Press, 1974.
- Wallman, Frederick. Plant Diseases: An Introduction for the Layman. Garden City, N.Y.: The Natural History Press, 1971.
- Washburn, Wilcomb E. The Indian in America. New York: Harper and Row, 1975.
- Wathall, John A. Prehistoric Indians of the Southeast. Tuscaloosa: University of Alabama Press, 1980.
- Watts, W.A. "Post Glacial and Interglacial Vegetation History of Southern Georgia and Central Florida." Ecology. 52 (1971): 676-90.
- Weatherwax, Paul. Indian Corn in Old America. New York: MacMillan and Company, 1954.
- Wheat, Joe Ben. "A Paleo-Indian Bison Kill." Scientific American. 216 (January 1967): 44-52.
- Whitaker, John O. The Audubon Society Field Guide to North American Mammals. New York: Alfred A. Knopf, 1980.
- Wilkinson, R.E. and H.E. Jaques. How to Know the Weeds. 3d ed. Dubuque, Iowa: William C. Brown Company, 1972.
- Willson, Lillian M. Forest Conservation in Colonial Times. St. Paul, Minn.: Forest Products History Foundation, 1948.
- Wood, Peter H. Black Majority: Negroes in Colonial South Carolina from 1670 through the Stono Rebellion. New York: W.W. Norton and Company, 1975.
- Wright, J. Leitch, Jr. The Only Land They Knew: The Tragic Story of the American Indians in the Old South. New York: The Free Press, 1981.
- Wright, Louis B. The Dream of Prosperity in Colonial America. New York: New York University Press, 1965.

VITAE

Timothy Howard Silver

Born in Marion, North Carolina, March 13, 1955. Graduated from Hugh M. Cummings III Senior High School, Burlington, North Carolina, June 1973. B.A. Appalachian State University, Boone, North Carolina, 1977. M.A. Appalachian State University, Boone, North Carolina, 1979.

In September 1980, the author entered the Ph.D. program in the Department of History, College of William and Mary where he served as an intern in archival management and a teaching intern.

His published work includes:

"Tolerance of the Intolerant: J.A.C. Chandler and the Ku Klux Klan at William and Mary," (With John M. Craig) South Atlantic Quarterly (Spring 1985).

"Prelude to Conflict: Explorers, Indians, and Environment in Precolonial Charles City County." Chapter to be published in a forthcoming history of Charles City County, Virginia.

The author is currently an Assistant Professor of History at Appalachian State University.