MANAGING CULTURALLY SIGNIFICANT AGRICULTURAL LANDSCAPES IN THE NATIONAL PARK SYSTEM

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CHAPTER ONE INTRODUCTION

PURPOSE

Agriculture has played an immensely important role in this nation's history. It has shaped landscapes and communities of extraordinary interest, and agrarian values permeate our culture even in today's urban society. Agriculture and ranching are the most widespread of several traditional rural uses which include forestry, mining, and fishing, that have resulted in diverse historic rural landscapes. Agriculture is a peculiar combination of nature and culture, and a farm is simultaneously an ecosystem, a social system, and an economic system. Agricultural landscapes reflect the dependance of farms on natural processes and the traditions of those working and living on the land. Agricultural landscapes have a particular significance in the culture of the United States and it is appropriate that they are featured throughout the national park system.

The purpose of this manual is to assist park managers in assessing the cultural significance of agriculture in their parks and in the development of appropriate and realistic management solutions that preserve those aspects of agriculture that are characteristic and significant. The manual is intended to have flexibility enough to allow for regional differences and site-specific circumstances, but at the same time, provide a framework within which the National Park Service may manage agricultural resources with relative consistency.

Agricultural land in the national park system is often leased to local farmers to manage subject to conditions to preserve the cultural and natural integrity of the landscape. But the face of agriculture has changed unrecognizably in the past fifty years. As a result, modern agricultural methods, and the scale and capital intensity of farming are increasingly incompatible with traditional agricultural landscapes, as farmers respond to new government policies and regulations, streamlined production methods, increasing land prices, property taxes, and overhead costs while receiving ever decreasing marginal returns for their products. Farming landscapes reflect fundamental changes in agriculture from a subsistence to a market economy, from pioneer to settled land use, from labor-intensive to highly mechanized operations, from mixed enterprises to specialization, from small to large-scale systems, and from

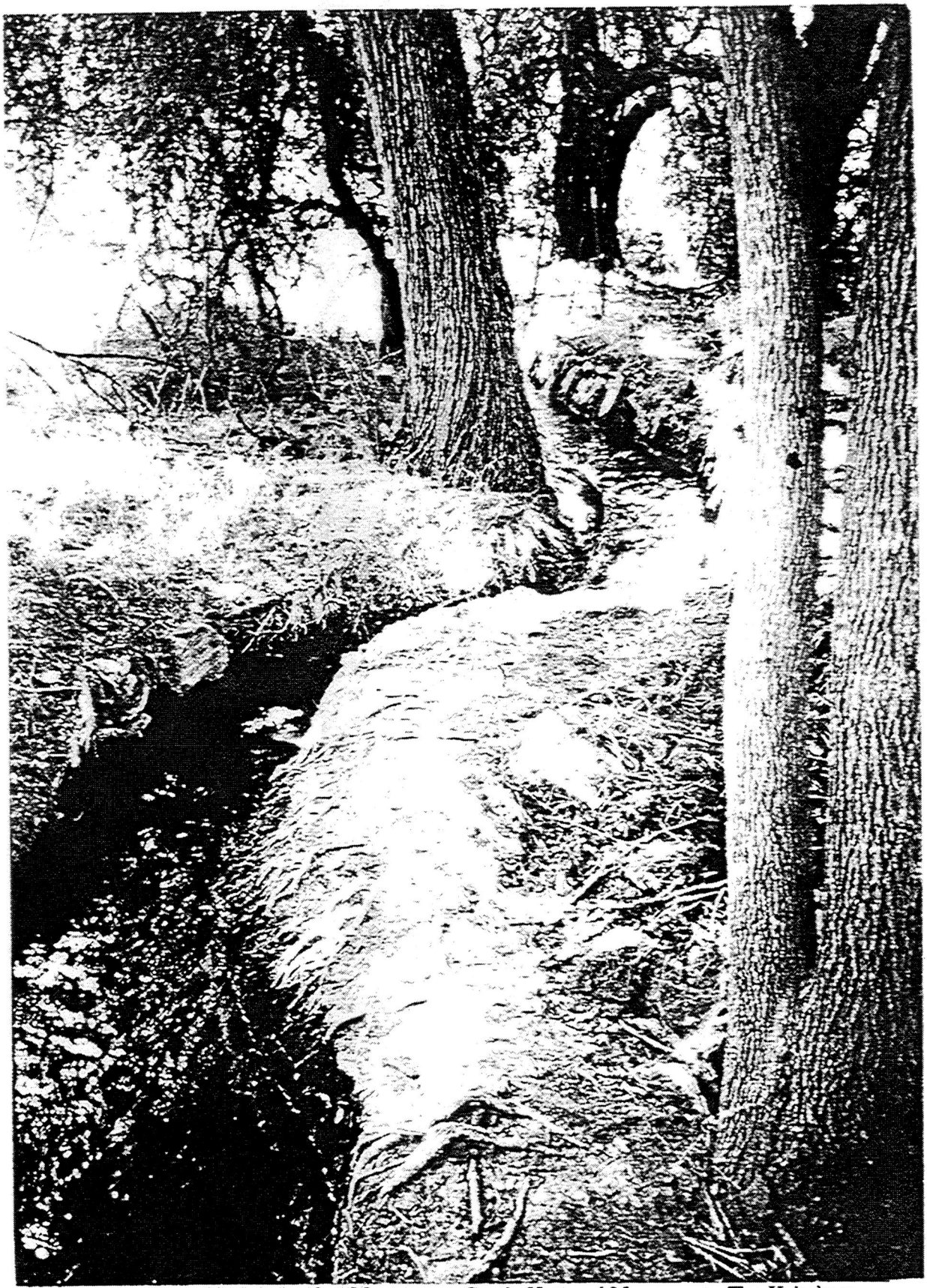


Figure 1:1 The irrigation canal at Montezuma Castle National Monument. The Hohokam Indians settled this area before 500 AD. They were skilled farmers and used irrigation extensively. The park includes a 24 acre field that was irrigated by the Hohokams.

family to corporate ventures. In 1790, the first United States census found that at least 96 percent of the population was rural. Even in 1900, 61 percent of Americans lived in rural areas, mostly on family farms.[1] But today, less than two percent of the population are farmers and, for many of those, farming has become a part-time rather than a full-time occupation.

Chapter one describes the study method and the selection procedure for sites representative of the rich history and the diversity of agriculture in the United States. In chapter two, the cultural significance of agriculture in the national park system is discussed. Chapter three reviews the changes that have affected agriculture and in chapter four the impact of various laws, regulations, and support programs on agriculture and agricultural landscapes are considered. In chapter five, alternatives for the proprietorship of agricultural resources and related tenure issues are discussed, and in chapter six, issues affecting the management of agricultural landscapes are reviewed. Finally, chapter seven outlines a proposed procedure for designing an agricultural program.

METHOD

The study began by identifying and arraying all parks in the national park system where agriculture is a significant component of a cultural landscape. This step was based on published information and discussions with National Park Service regional officers. This overview provided an understanding of the various types of cultural significance represented in agricultural landscapes and provided an array of sites from which to select a representative sample. A study of the agricultural regions of the country and how these related to physiographic regions, to agriculture in prehistory, to agricultural settlement histories, and to the ethnic traditions of each region was also carried out.

Landscapes from thirty units of the national park system were selected as a study sample (Figure 1:2). These were chosen to provide examples of agricultural landscapes that meet at least one of the criteria for significance for eligibility for the National Register of Historic Places in American History, Architecture, Archaeology, Engineering, and Culture (Table 1:1). Sites represent the diversity of agriculture in the United States, and were selected from each of the field areas of the national park



Figure 1:2. Parks Selected for Study

1. Antietam NB
2. Blue Ridge Pkwy - Roanoke Gap
3. Blue Ridge Pkwy - Adney Gap
4. Blue Ridge Pkwy - Orchard Gap
5. Blue Ridge Pkwy - Galax
6. Blue Ridge Pkwy - Blowing Rock
7. Booker T. Washington NM
8. Brices Cross Roads NBS
9. Buffalo NR - Boxley Valley
10. Great Smoky Mountains NP - Cades Cove
11. Canyon de Chelly NM
12. Chickamauga and Chattanooga NMP
13. Cowpens NB
14. Cuyahoga Valley NRA
15. Delaware Water Gap NRA
16. Ebey's Landing NHR
17. Eisenhower NHS
18. Gettysburg NMP
19. Grant Kohrs Ranch NHS
20. Hubbell Trading Post NHS
21. Minute Man NHP
22. Monocacy NB
23. Montezuma Castle NM
24. Natchez Trace Parkway
25. Pea Ridge NMP
26. Point Reyes NS
27. Saratoga NHP
28. Shiloh NMP
29. Sleeping Bear Dunes NL
30. Stones River NB

Table 1:1

Criteria for Significance of Agricultural Landscapes

National Register Criteria for Significance	Criteria for Significance applied to Agricultural Landscapes	Examples (principle criterion in plain type)
Criterion A Properties associated with events that have made significant contributions to the broad patterns of history.	A 1. Landscapes where agriculture played an important role in prehistory, in the settlement history, or in the subsequent development of the area.	Grant Kohrs NHS Hubbell Trading Post NHS Cades Cove, Great Smoky Mountains NP Delaware Water Gap NRA Sleeping Bear Dunes NL Cuyahoga NRA *Canyon de Chelly NM* *Montezuma Castle NM*
	A 2. Landscapes where an historic agricultural event took place, such as the introduction of an innovative practice, machine, breed of livestock, or crop variety.	Point Reyes NS. *Grant Kohrs NHS* *Hubbell Trading Post NHS.* (Green Springs NM)
	A 3. Agricultural landscapes which were the setting for an historical event not having to do with agriculture.	Antietam NB Brice's Crossroads NB Chickamauga & Chattanooga NMP Cowpens NB Gettysburg NMP Minute Man NHP Monacacy NB Pea Ridge NMP Saratoga NHP Shilo NMP Stones River NB
Criterion B Properties associated with the lives of persons significant in our past.	B1. Landscapes associated with a person who played an important role in agricultural history, or in the agricultural development of the area.	Booker T. Washington NM *Hubbell Trading Post NHS* *Grant Kohrs NHS*
	B 2. An agricultural landscape that was associated with a historically significant political leader, writer, artist, or other important figure.	Eisenhower NHS (Lyndon Johnson Ranch ---) (Carl Sandberg Home ---)
Criterion C Properties embodying the distinctive characteristics of a type, period, or method of construction (or agriculture), possessing high artistic values or representing a significant distinguishable entity whose components lack individual distinction.	C1. Landscapes that embody distinctive vernacular agricultural systems or a recognizable, locally distinctive development of that system, or a more recent agricultural technology or specialization representative of the region.	Canyon de Chelly NM Boxley Valley, Buffalo NR. Ebey's Landing NHR *Sleeping Bear Dunes NL* *Cuyahoga NRA* *Delaware Water Gap NRA*
	C 2. Landscapes where agriculture was part of an historic designed landscape; agricultural landscapes designed for research, or for the demonstration of "good" farming.	Blue Ridge Parkway Natchez Trace Parkway (Moses Cone MP)
Criterion D Properties that have yielded or are likely to yield information important to prehistory or history.	D 1. Landscapes that have yielded or are likely to yield information important to agricultural prehistory or history.	Montezuma Castle NM *Canyon de Chelly NM* *Shilo NMP* *Natchez Trace Parkway*

system (Table 1:2). Eight groups of landscapes, based on the four National Register criteria for significance are as follows:

A 1. Landscapes where agriculture played an important role in the prehistory, in the settlement history, or in the subsequent development of the area.

A 2. Landscapes where an historic agricultural event took place, such as the introduction of an innovative practice, machine, breed of livestock, or crop variety.

A 3. Agricultural landscapes which were the setting for an historical event not having to do with agriculture.

B 1. Landscapes associated with a person who played an important role in agricultural history, or in the agricultural development of the area.

B 2. Agricultural landscapes associated with a historically significant political leader, writer, artist, or other important figure.

C 1. Landscapes that embody vernacular agricultural systems or a recognizable, locally distinctive development of that system, or a more recent agricultural technology or specialization representative of the region.

C 2. Landscapes where agriculture was part of an historic designed landscape, or agricultural landscapes designed for research, or for the demonstration of "good" farming.

D 1. Agricultural landscapes that have yielded or are likely to yield information important to prehistory or history.

Because the scope of the study was so broad and the geographical area covered so large, time for historical research was limited. Therefore the availability of published data was a practical consideration in choosing study areas.

The history of agriculture in the area of each park was researched with emphasis on the historical period. The landscape characteristics that related to the cultural significance of agriculture were identified. The significance and integrity of these features were assessed and the changes in agriculture since the historic period, including off-farm changes, such as marketing and transportation, and on-farm changes, such as scale, mechanization, labor intensity, tenure, and

Park Selection by Field Area

Table 1:2

Field Area and Cluster	Parks Selected for Study (see Figure 1:2)	Other Parks with Agriculturally Significant Landscapes
Pacific West Field Area Columbia Cascades Cluster	Ebey's Landing NHR	Fort Vancouver NHS North Cascades NP John Day Fossil Beds NM
Pacific West Field Area Pacific Great Basin Cluster	Point Reyes NS Montezuma Castle NM	Golden Gate NRA
Intermountain Field Area Colorado Plateau Cluster	Canyon de Chelly NM Hubbell Trading Post NHS	Aztec Ruins NM Capitol Reef NP
Rocky Mountain Cluster	Grant-Kohrs Ranch NHS	
Southwest Cluster		Lyndon B. Johnson NHP Pecos NHP San Antonio Missions NHP
Midwest Field Area Great Plains Cluster	Buffalo NR Pea Ridge NHP	Ozark National Scenic Riverways Pipestone NM
Great Lakes Cluster	Cuyahoga Valley NRA Sleeping Bear Dunes NL	Lincoln Boyhood NM
Southeast Field Area Appalachian Cluster	Blue Ridge Parkway (5 areas) Chickamauga & Chattanooga NMP Cowpens NB Great Smoky Mountains NP Stones River NB	Cumberland Gap (Hensley)
Gulf Coast Cluster	Natchez Trace Parkway Brices Cross Roads NB Shiloh NMP	Virgin Islands NP
Atlantic Coast Cluster		Fort Caroline NM Jimmy Carter NHS Timucuan Ecological & Historical Preserve Kennesaw Mountain NB
Northeast Field Area Chesapeake Cluster	Booker T. Washington NM Delaware Water Gap NRA Eisenhower NHS Gettysburg NMP	Colonial NHP Fredericksburg/Spotsylvania NMP George Washington Birthplace NM Appomatox Courthouse
New England Cluster	Minute Man NHP Saratoga NHP	Marsh Billings Weir Farm NHS
National Capital Field Area National Capital Cluster	Antietam NB Monacacy NB	Piscataway Park Manassas NHP

specialization were summarized. An example of a summary of changes is shown in Table 1:3 for Saratoga National Historic Park. Trends in the development (or abandonment) of agriculture were also identified and their implications reviewed.

Current management practices were studied in the context of changes in agriculture and discussed with park managers. Particular attention was given to assessing the impacts that change in agriculture had had on the resources of the parks. Cultural landscape management involves identifying the type and degree of change that can occur while maintaining significant features.[2] Significant characteristics of agricultural landscapes are often ephemeral and/or biotic in nature, and it is important to consider how these features are managed.

A short report was prepared for each park which summarized the role that agriculture played in the history of the park, the significant features of the agricultural landscape and the changes in agriculture in the area since the historic period. The proposed procedure for designing an agricultural program was based on an overview of the agricultural management issues at the thirty parks selected and was tested in three parks, namely the Hubbell Trading Post National Historic Site, Cowpens National Battlefield, and Delaware Water Gap National Recreation Area.

SCOPE AND DEFINITION OF TERMS

In this study, "agricultural landscapes" are defined as lands used for farming or ranching. They often are regionally distinctive and characteristic of different farm enterprises including irrigated systems, crop and truck farms, dairying and other livestock operations, and top- and small-fruit farms. Until the turn of the century, in humid areas of the country, farms were usually diversified, with crops and livestock forming an integrated system that often included fruit and nut orchards, woodlots, and vegetable gardens. Examples of these types of enterprises are included, but landscapes where vegetation has been modified by hunter-gatherers to improve grazing, and farming enterprises that are very localized or specific to a region, such as cranberry bogs, aquaculture, reindeer ranching and mink farming are not.

"Culturally significant" agricultural landscapes are those that meet the eligibility requirements for the National Register of Historic Places. These cultural landscapes may date from prehistoric or historic periods. In the past, agriculture has

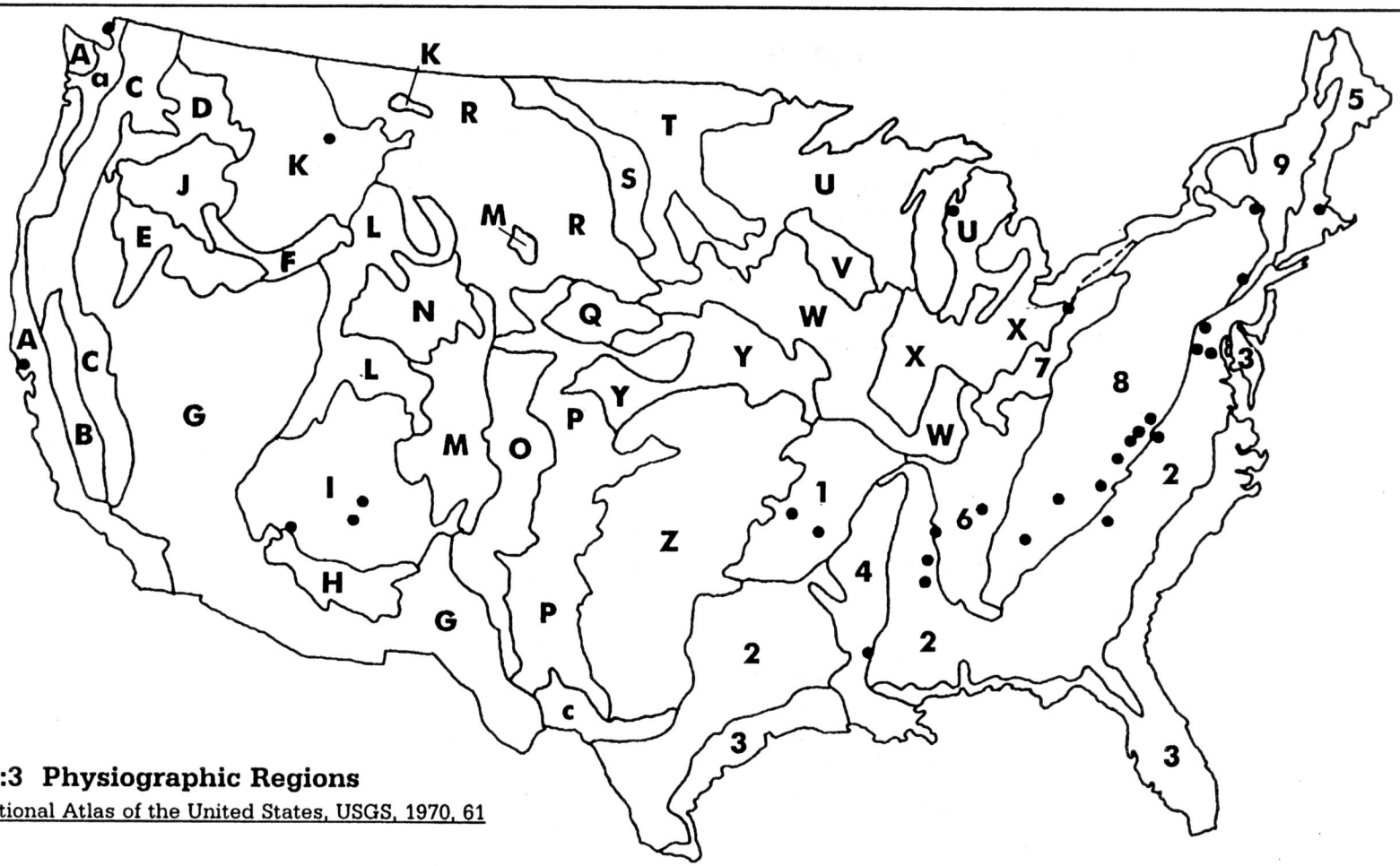


Figure 1:3 Physiographic Regions

Source: National Atlas of the United States, USGS, 1970, 61

Pacific Mountain Division

A Coastal Ranges
a Puget Williamette Lowland
B Central Valley of California
C Cascade, Klamath, Sierra Nevada Ranges

Intermountane Division

D Columbia Basin
E Harney-Owyhee Broken Lands
F Snake River Lowland
G Basin and Range Area
H Upper Gila Mountains
I Colorado River Plateaus

Rocky Mountain Division

J Blue Mountains
K Northern Rocky Mountains
L Middle Rocky Mountains
M Southern Rocky Mountains

Interior Division

N Wyoming-Big Horn Basins
O Rocky Mountain Piedmont
P High Point
Q Nebraska Sand Hills
R Upper Missouri Basin Broken Lands
S North-Central Lake-Swamp-Moraine Plains
T Dakota-Minnesota Drift
U North-Central Lake-Swamp Moraine Plains
V Southwest Wisconsin Hills
W Middle Western Upland Plain
X East-Central Drift and Lake-bed Flats
Y West-Central Rolling Hills
Z Mid-continent Plains and Escarpments
c Stockton-Balcones Escarpment
7 Middle Western Upland Plain

Eastern Highland Division

1 Ozark-Ouachita Highlands
6 Eastern Interior Uplands and Basins
8 Appalachian HIghlands
9 Adirondack-New England Highland

Gulf Atlantic Division

2 Gulf-Atlantic Rolling Plain
3 Gulf-Atlantic Coastal Flats
4 Lower-Mississippi Alluvial Plain
5 Lower New England

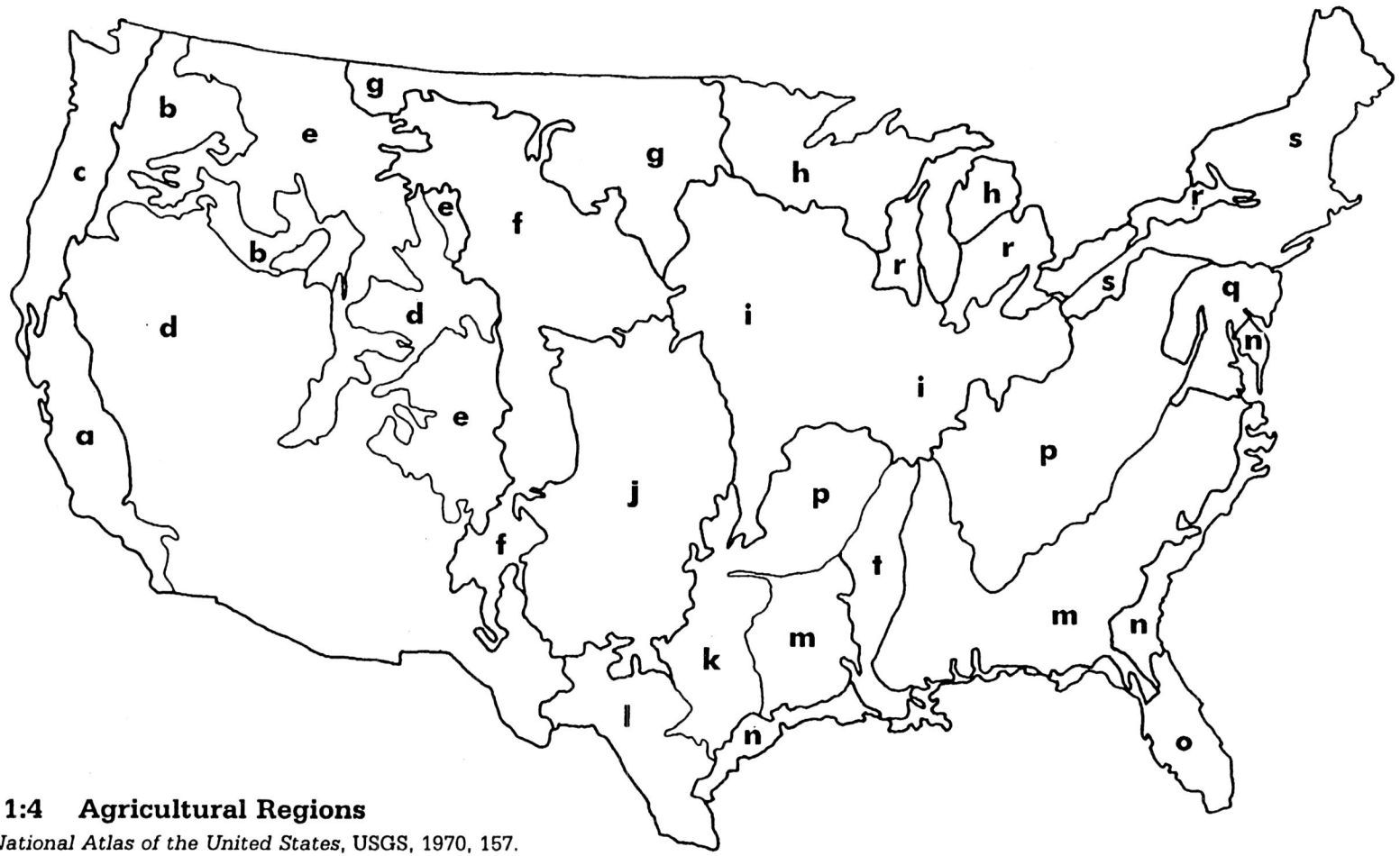


Figure 1:4 Agricultural Regions

Source: *National Atlas of the United States*, USGS, 1970, 157.

a California Subtropical Fruit, Truck, and Specialty Crop Region
b Northwestern Wheat and Range Region
c Northwestern Forest, Forage, and Specialty Crop Region
d Western Range and Irrigated Region
e Rocky Mountain Range and Forest Region
f Western Great Plains Spring Wheat Region
g Northern Great Plains Spring Wheat Region
h Northern Lake States Forest and Forage Region
i Central Feed Grains and Livestock Region
j Central Great Plains Winter Wheat and Range Region
k Southwestern Prairies Cotton and Forest Region
l Southwestern Plateaus and Plains Range and Cotton Region
m South Atlantic and Gulf Slope Cash Crop, Forest, and Livestock Region
n Atlantic and Gulf Coast Lowland Forest and Truck Crop Region
o Florida Subtropical Fruit, Truck Crop, and Range Region
p East and Central General Farming and Forest Region
q Northern Atlantic Slope Truck, Fruit and Poultry Region
r Lake States Fruit, Truck, and Dairy Region
s Northeastern Forage and Forest Region
t Mississippi Delta Cotton and Feed Grains Region

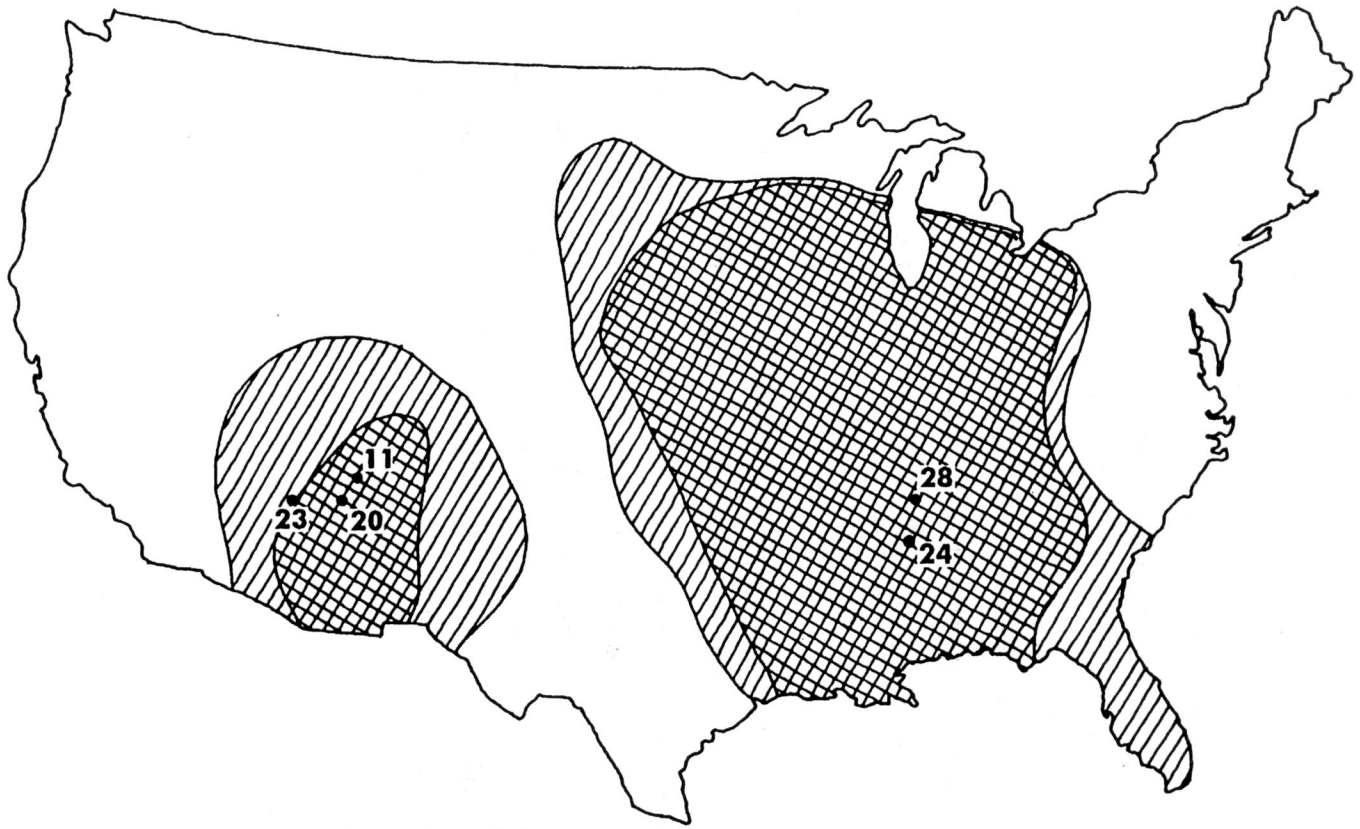


Figure 1:5 Principal Native American Farming Cultures

Source: *National Atlas of the United States of America, USGS, 1970, 129.*

Early South Western Farmers

500 B.C. - 500 A.D.

Hohokam
Basket Maker
Atrisco
Mogollon
Miller
Illinois Hopewell

Southern Western Farmers

500 A.D. - 1300 A.D.

Sevier
Anasazi
Mimbres
Jornada
Hohokam
Sinagua
Hakataya
Patayan

Eastern Village Farmers

Valley Woodland
Western Hopewell
Marksville
Trayville
Deptford
Ohio Hopewell
Adena
Copena
Swift Creek

Early Mississippi Cultures

Freemont
Nebraska
Highland
Mississippi
Late Baytown
Coles Creek
Mill Creek
Old Village
Swift Creek
Napier
Hiawassee Island
Weedem Island
Aztali
Early Custer
Glade
Smoky Hill
Washita
St. Johns

11. Canyon de Chelly NM
20. Hubbell Trading Post NHS
23. Montezuma Castle NM
24. Natchez Trace Parkway
28. Shiloh NMP

of Mexican-derived crops. Irrigation was crucial to Native Americans in the arid regions of the Southwest. At Montezuma Castle National Monument, the Hohokam Indians first settled the site before 500 A.D. and probably developed the first irrigated agriculture there. Historians believe the Sinaguans, who were dryland farmers of the mid-11th century, moved into the area and adopted the Hohokam irrigation practices (Figure 1:1). By 1400 the valley had been abandoned, though it was later settled by the Yavapai and Spanish and again later by Apaches and European settlers. At Canyon de Chelly National Monument, the irrigation techniques were not as highly developed since there was no constant supply of water as there was from Montezuma Well. Permanent farms were not established until the Anasazi settled the canyons in 330-750 A.D. They practiced simple irrigated agriculture, essentially spreading the flood water from the wash to grow crops of beans, corn, squash, and cotton.

In several other areas of the country, there was a great elaboration of village Indian life between A.D. 500 and 1300. "Long experience with maize and other domestic crops and the leisure made possible by this, led to the flowering of culture in the Mississippi-Ohio valleys and the Southeast, climaxing in such great middle Mississippi ceremonial centers as Etowah, Moundville, Spiro, and old Village Cahokia with their well-developed stone carving, shellwork, textiles, pottery and other arts and crafts".[6] Some fine examples of prehistoric Indian mounds can be found in Shiloh National Military Park. The mounds functioned as homesites, as well as ceremonial and burial mounds. Villages were located on river terraces and farms on the fertile flood plains of the Tennessee River. The Natchez Trace was an important trading route for the Natchez, Chickasaw, and Choctaw Indians. Several notable sites along the route include the Emerald, Boyd, Bynum, Pharr, and Bear Creek Mounds, as well as rock shelters, a stone quarry, and burial sites.

SETTLEMENT HISTORY

Settlement of the United States by Europeans spread from the eastern seaboard and the Southwest. Figure 1:6 shows the chronological frontiers of settlement. The agriculture practiced by different immigrants was a reflection of:

- the traditions of agriculture in their country of origin;
- local regional constraints of climate, terrain and soil;

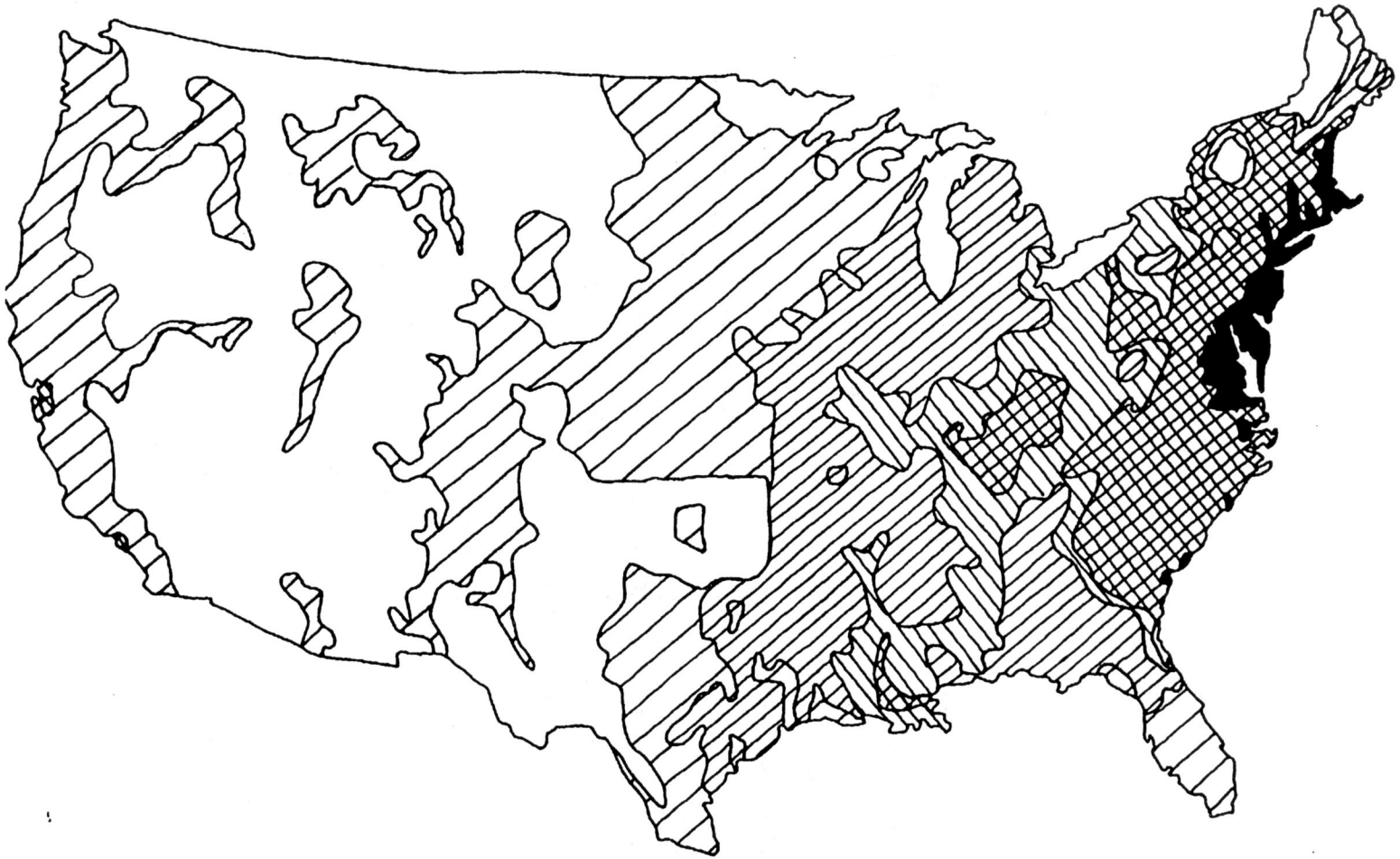


Figure 1:6 Sequence of Land Settlement by Europeans 1675 - 1890

Source: *National Atlas of the United States of America*, USGS, 1970.

Before 1675

1675 - 1800

1800 - 1820

1820 - 1856

1850 - 1890

After 1890

- practices learned from Native Americans and immigrants from countries other than their own.

As a result, each region tends to have characteristic agricultural systems. Agricultural landscapes representative of early farming systems, of the settlement history, or of distinctive developments in that region, may be significant for preservation and interpretation. If traditional practices are still used, a site may have ethnographic value and measures to preserve the continuity the culture be appropriate.

The sequence of settlement in the United States is well-illustrated in the national park system, and there are interesting examples of agricultural landscapes that illustrate the western movement of the frontier. As the Revolutionary War began in 1775, the farmers at Minute Man National Historic Park were running out of land to cultivate, and their sons were looking elsewhere for land to farm. But the Hudson Valley near Saratoga National Historic Park was still on the frontier, and sparsely settled. At the time, the area around Cowpens National Battlefield in South Carolina was even more sparsely settled. The land was used as extensive range for large herds of cattle before being displaced by more intensive, settled farming. Cades Cove, in Great Smoky Mountains National Park, was first settled in the early 1800s by people of Scotch-Irish descent.[7] They practiced farming much as they had in upland areas of Scotland, Wales, and Ireland, using the valley bottoms for growing crops and for winter grazing for their livestock. Mountain top pastures were cleared for summer grazing.[8] The shore of Lake Michigan around Sleeping Bear Dunes National Lakeshore was developed for a different reason. Settlers came in about 1840 to exploit the hardwood-hemlock forest growing close to the lakeshore, at first for fuel wood for steamships but later for lumber. Farming was a secondary occupation and, because the soils were poor, never thrived. At Grant-Kohrs Ranch National Historic Site in Montana, the "Frontier Cattle Era" in the settlement history of the Western states is interpreted. The Hubbell Trading Post National Historic Site dates from about the same period but in this case the relationship between the European trader and the Navajo Indians in the area is of particular interest.

ETHNIC TRADITIONS

Figure 1:7 shows areas of the United States where people of various ethnic origins make up the largest percentage of the population (rarely the majority). Differences in the agricultural traditions of people from all the major groups that settled the US, influenced the development of agricultural systems peculiar to each area. At the time of the Revolutionary War, the ranching practices of cowpen keepers in South Carolina were principally of British origin, and it was not until ranching spread west into Texas that the influence of Hispanic practices became more obvious. The barns built by German settlers in the area around the Delaware Water Gap National Recreation Area are distinctive. Hispanic settlers with a long tradition of irrigated agriculture, much of which was derived from the Moors, influenced the irrigation practices of Native Americans in the Southwest, particularly in San Antonio and at other Mission sites. Hispanic practices relied more on the storage of water, but also employed devices, such as the Persian Wheel, to lift water from rivers into gravity distribution systems.

AGRICULTURAL REGIONS

As agriculture has become more specialized, one or two enterprises tend to dominate the agricultural economy in an area. Figure 1:4 shows the major agricultural regions of the US. As demands and technology change, so do agricultural regions. For instance, in the late 1800's, synthetic dyes were developed which contributed to the collapse of indigo as an economic crop in the Southeast. Mechanization led to the collapse of rice in the Low Country of South Carolina and Georgia. The spread of pests may also cause sweeping changes in regional agriculture. The Cotton Belt once occupied the region marked as the South Atlantic and Gulf Slope Cash Crop/Forest/ Livestock region on Figure 1:4 until, in the first decades of this century, the boll-weevil devastated the cotton industry. Development of efficient pumping systems and center-pivot irrigation have made irrigated farming possible in many regions, but these systems may not be sustainable and future changes are inevitable if groundwater resources are exhausted.

Change in one type of agriculture may destroy evidence of the agriculture of an earlier period. But change may also bring about an important new period of history. Therefore, a technological advance, a new market, a new variety of crop, a pest, or a

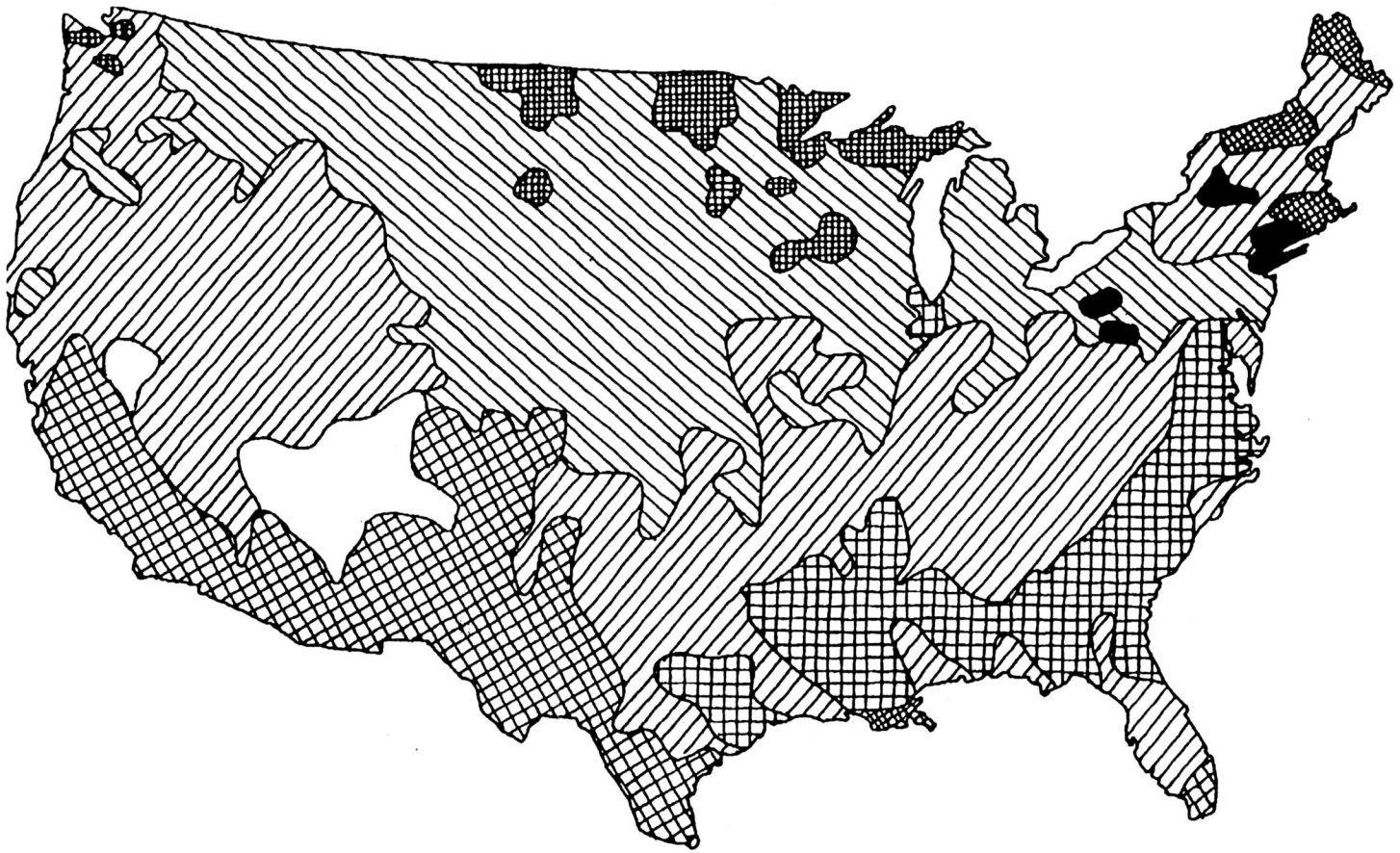


Figure 1:7 Predominant Ethnic Ancestry - 1980

Source: *National Atlas of the United States* USGS, 1970, p. 55

new breed of cattle might all be historically important. Consider the case of the farms now part of the Cuyahoga Valley National Recreation Area in Ohio. The construction of the Ohio and Erie Canal in 1827, which linked Lake Erie to the Ohio River and thence the Gulf of Mexico, and then the railroad in the 1880s, resulted in a loss of the competitive advantage of proximity to local markets in Cleveland, and Akron, which farmers in the valley had previously enjoyed. As a result, farmers from further afield could supply Cleveland and Akron with perishable produce, and the agricultural economy in the valley declined.

CONCLUSIONS

Agricultural landscapes represent both the history and the prehistory of the United States. They give us insight into the lives and traditions of the first Americans and those who followed. Farming is constrained by terrain, by soils, and by climate which gives farming landscapes distinctive regional characteristics. It is their local or regional distinctiveness that lends significance to vernacular landscapes. But continuity of occupancy is also important in preserving the cultural traditions evident in ethnographic landscapes.

Agriculture has shaped the lives of many Americans, and agrarian values continue to influence our politicians, writers, poets, and artists. The association of agriculture with these Americans gives significance to otherwise ordinary farming scenes. Historic events also took place on ordinary farmland and may give an agricultural landscape great significance. The characteristic openness of farmland has made it suitable for all sorts of events, military maneuvers, revival meetings, state fairs, and rock concerts. Productive farmland was strategically extremely important in many military campaigns.

The inventiveness of Americans has been as evident in agriculture as in any other field of endeavor. These inventions may give a landscape significance. The adoption of innovations and the resourcefulness of farmers have made change a defining characteristic of American agriculture. Ironically, change is one of the principal causes of loss of integrity of historic resources, and it has led to serious difficulties in managing culturally significant agricultural landscapes.

NOTES

1. Fite, Gilbert C., 1981. *American Farmers: The New Minority*. Bloomington: Indiana University Press. p.8

2. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.93.

3. The National Register of Historic places defines a Rural Historic Landscape as; "a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features".(*National Register Bulletin* 30, p.2) The Register classifies small landscapes without buildings as sites and large landscapes with buildings as districts.

4. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28.

5. USGS, 1970. *National Atlas of the United States of America*. Washington, DC: U,S, Department of the Interior, p.129.

6. Ibid.

7. Shields, A. Randolph, 1977. *The Cades Cove Story*. Gatlinburg, TN: Great Smoky Mountains National History Association.

CHAPTER TWO
AGRICULTURAL LANDSCAPES IN THE NATIONAL PARK SYSTEM

AGRICULTURE AND THE MISSION OF THE NATIONAL PARK SERVICE

The National Park Service Organic Act of 1916 mandated that the National Park Service "shall promote and regulate the use of federal areas known as national parks, monuments and reservations... to conserve the scenery and the natural and historic objects and the wildlife therein .. to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[1] The General Authorities Act of 1970 affirmed that, although all units in the National Park System were "distinct in character", they were "united through their inter-related purposes and resources into one national park system as cumulative expressions of a single national heritage." It is also stated that the management of parks must not be "in derogation of the purposes and values for which these various areas have been established."

The preservation of agricultural landscapes was not a priority in the first parks. In fact, some of the early parks were created to protect natural and scenic landscapes from exploitation by farmers. But cultural sites have long been a part of the national park system, though at first "political and military themes predominated".[2] As historic and military parks were added to the system, the National Park Service found itself responsible for landscapes that were historically farmed. As the role that agriculture has played in the cultural history of the country became clear, and as the deeply held agrarian values of many Americans were voiced in efforts to protect farming communities and landscapes all over the country, the National Park Service has become more involved in the protection of rural landscapes, both in the park system and elsewhere, through it's role as keeper of the National Register of Historic Places.

AGRICULTURE AND THE WAY WE LOOK AT HISTORY

While the early efforts of the National Park Service focused on the preservation of natural, scenic landscapes, historic preservation was focused on structures that were unique, rare, unusual , or stylistic, or were associated with famous persons or events. The majority of these resources were in urban areas.Preservation also tended to be focused on single structures or small groups of structures and not on the settings of larger groups of structures and objects. However, "new scholarship has changed

dramatically the way we look at the past". History is now seen "to encompass not only great men and events, but also ordinary people and everyday life".[3] The setting is now reconised as important and rural landscapes reflecting the "day- to-day occupational activities of people engaged in traditional work such as mining, fishing and various types of agriculture" are eligible for the National Register.[4] The National Park Service has recognized these changes for some time and places more emphasis on the preservation of:

- landscapes, settings, and biotic cultural features as they relate to structures;
- ordinary, working resources in addition to unique or stylistic resources;
- resources that show evolution rather than single events;
- ethnographic resources.[5]

THE NATURE OF FARMING

Nature and Culture

Agricultural landscapes are cultural expressions that show human response to the constraints of nature and involve the management of natural resources. The spatial pattern of farms and farming communities and connections between them is also affected by natural features such as terrain, but also by various political, economic, and technological factors, such as proximity to market, or the constraints imposed by irrigation systems. The essential link between natural and cultural resources in agricultural landscape is frequently referred to in both the natural and cultural resource guidelines and rightly so.[6] The cultural environment is "a world both natural and social", and agriculture epitomizes this duality.[7]

The management of natural resources is based on management zones as established in a park's General Management Plan. Agriculture may not be conducted in "natural zones", and agriculture is permissible only in "cultural zones" or in "special use zones." In cultural zones, agricultural activities must "conform to those practiced during the historic period" or "contribute to the maintenance of an historic scene."3 The primary management objective in cultural zones is to protect and foster appreciation of the cultural resources.[8] Five reasons are given for agricultural use, including preservation of cultural landscapes.[9] Among the other reasons is wildlife habitat enhancement. The inclusion of wildlife habitat as justification for agricultural use draws attention to the fact that agricultural land is important habitat for many species of animals and plants.

The edge habitat between woodland and agricultural land is valuable for several game species and, in the Delaware Water Gap National Recreation Area, the preservation of agricultural land is of concern to hunters.

Agricultural management responds to natural constraints but can also have far-reaching impacts on natural resources. Runoff can pollute water resources, several agricultural weeds are invasive exotic species, and pesticides may threaten wildlife. Therefore guidelines deal with the management of different issues and categories of natural resources, some of which are particularly important in developing a management program for agriculture; vegetation, freshwater resources, soil, integrated pest management, endangered species, and exotic species. Grazing and agricultural uses are discussed as specific uses that impact natural resources.[10]

Change

The dynamic nature of agricultural landscapes and the need to accommodate change in many situations, especially in vernacular and ethnographic landscapes is recognized in National Park Service guidelines. Natural systems are in a state of continual successional change, and agricultural systems are subject to regular disturbances. Agricultural landscapes contain biotic features that grow and die, but they are also subject to changing demands and methods. Farming is steeped in cultural tradition, and yet has become a business in which progressiveness is much admired. Perhaps the most difficult problems in developing appropriate approaches for the management of culturally significant agricultural landscapes are the changes in both social and economic systems that have resulted in fundamental changes in farming. As a result of these changes, it is extremely difficult to manage farmed landscapes using methods that are historically accurate, environmentally acceptable, and economically viable at the same time.

Destructiveness

Agriculture has caused considerable destruction of natural resources in this country, and consequently, there has always been some ambivalence towards agriculture among conservationists. Many of the early settlers in the United States had been landless and were certainly not skilled farmers. Their farming practices therefore were, more often than not, ill-conceived and frequently resulted in severe erosion. Even

skilled farmers used practices that were not appropriate on soils that were more erodible, and with rainfall much more intensive than in Europe. The widespread use of the moldboard plow and the practice of fall plowing were cases in point. The moldboard plow buries all crop residues which otherwise would give some protection from erosion, and fall plowing leaves soil unprotected throughout the winter. Worse still, most farmers from the start had an eye for profit and many adopted specialized cash cropping systems that were not ecologically sustainable at the time.

The National Park Service is mandated to leave resources "unimpaired" for the enjoyment of future generations, and therefore destructive farming practices are not acceptable. Agriculture inevitably changes nature and impacts the environment ; it involves regularly recurring ecological disturbances; but it need not result in impairment of the environment if the system that can be continued indefinitely without causing environmental damage. Farming practices in Appalachia in the 1930s were causing serious erosion problems, but although the designers of the Blue Ridge Parkway wanted the landscape to be a "Museum of Managed American Countryside", an important goal of the park was to help educate mountain farmers in more sustainable farming methods. In this respect, the farming scenes along the parkway represent designed landscapes, and there was no intent to depict the wretchedness of Appalachian farm life as it really was. To have done so would have been contrary to the mandate of the National Park Service.

Components of Agricultural Landscapes

The components of agricultural landscapes include circulation systems of farm tracks, public roads,and droveways; boundaries, including hedgerows, fences, and windbreaks; vegetation that is related to land use in characteristic ways, such as riparian vegetation, or woodland located on steep or unproductive land; and farmsteads and various other farm buildings, structures such as windmills or devices for handling livestock, and objects including machinery and irrigation equipment. These components are often clustered in locally or regionally distinctive ways. Many of the components of agricultural landscapes are living organisms, both plants and animals. They mature ,grow old, and die. They change seasonally. Crops are planted, grow, and are harvested.As a result, agricultural landscapes are constantly changing and can never be

quite as they appeared at a particular moment in history. The management of the biotic components of farming is one of the challenges of this manual.

AGRICULTURE AS A THEME IN THE NATIONAL PARK SYSTEM.

In 1994, the National Park Service adopted a revised "thematic framework" which responded to "a Congressional mandate to ensure that the full diversity of American history and prehistory is expressed in the National Park Service's identification and interpretation of historic properties".[11] This replaced the previous framework, first adopted in 1936, in which American history was "conceived in terms of stages in American progress".[12] The old framework comprised 34 themes or main subject headings in American history, divided into hundreds of "subthemes" which in turn were divided into "facets" or specific topics. Agriculture was one of the 34 themes in the framework and emphasized "the development of various farming techniques and the varieties of crops, livestock and implements employed over time and in differing regions".[13] Otherwise, the topic of agriculture was fragmented under many different subheadings.

Now agriculture is recognized not only as a setting for historic structures or events, but also for it's contributions " to the broad patterns of US history," in representing "some great idea or ideal of the American people" or an "outstanding way-of-life or culture".[14] The new thematic framework includes eight categories, each representing a significant aspect of the human experience (Figure 2:1). These categories are not mutually exclusive. "People, time and place" are common to all eight categories, and agriculture clearly falls within every one. The framework is intended to link "disciplines to provide a structure for both capturing the complexity and meaning of human experience, and making that past a coherent and integrated whole".[15]

CULTURAL RESOURCE MANAGEMENT PROGRAM

Cultural landscapes are one of the five categories of cultural resources types recognized by the National Park Service.[16] There are four types of cultural landscapes namely, historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.[17] These landscape types are not mutually exclusive. The agricultural landscapes in this study include examples of all four types.

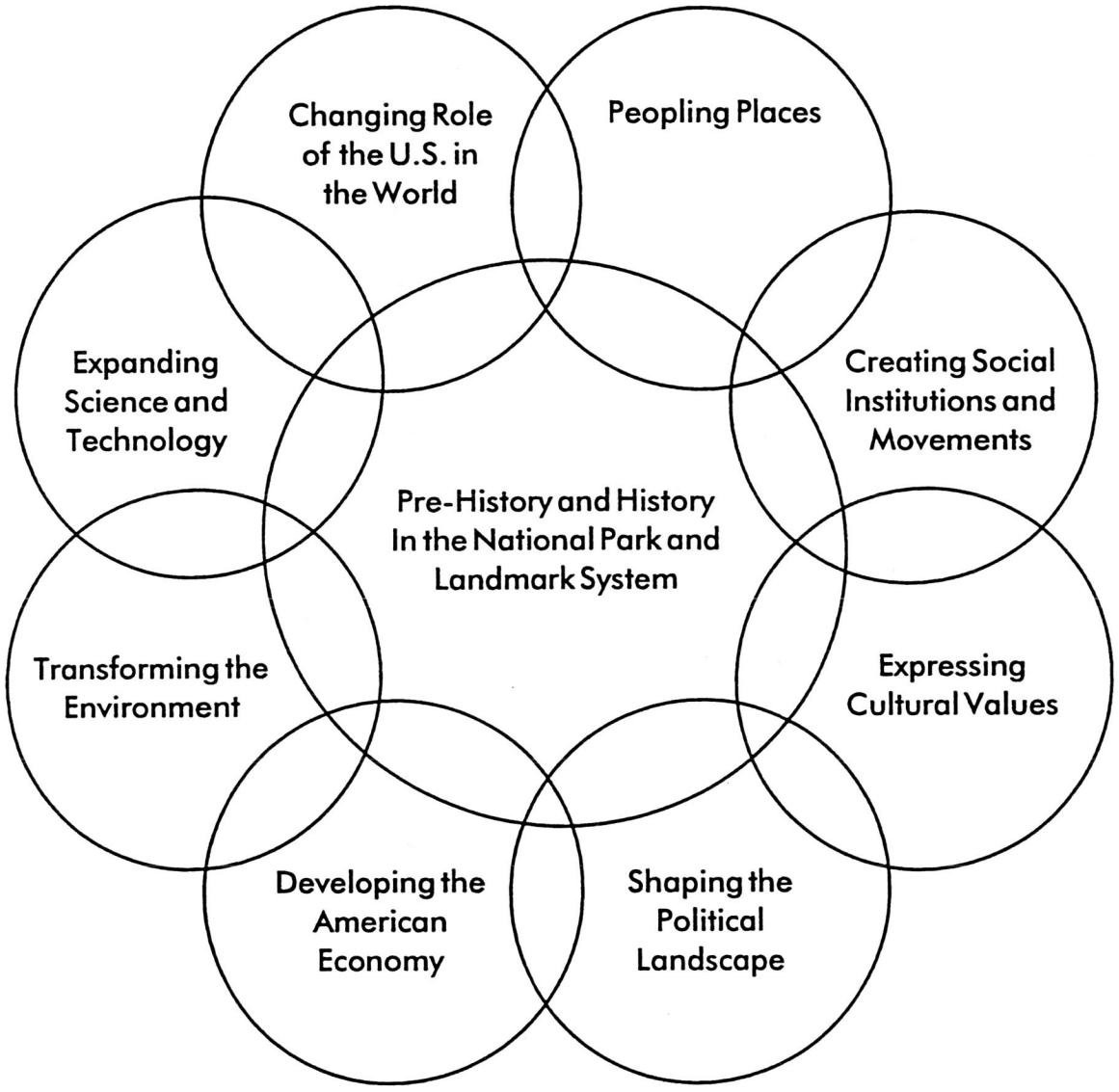


Figure 2:1 Pre-History and History in the National Park and Landmark System
(*NPS* 1994, 3)

Agricultural landscapes contain other types of cultural resources which may affect landscape management, including archaeological resources, historic or prehistoric structures, museum objects, and ethnographic resources. The presence of potential archaeological resources may disallow agricultural uses that involve soil disturbance as the significance of archaeoligical resources depends on their capacity to reveal information. Thus, tillage agriculture is not permissible in areas of some parks including the Delaware Water Gap National Recreation Area, Montezuma Castle National Monument, and Cowpens National Battlefield. All parks are required to have an archeological overview and assessment.

Agricultural landscapes may contain historic or sometimes, prehistoric structures. The procedures for the management of historic and prehistoric structures have been established for much longer than those for cultural landscapes and are generally well understood. Partly because of this understanding, there is a tendency to modify and apply the same procedures to landscapes, but there are some fundamental differences. Structures are usually built for permanence and managed to prevent decay. In contrast, farming landscapes are managed to adapt to and accommodate change. Decay is part of the natural cycle. The primary intent of the Cultural Resource Management Program is to "minimize the loss of historic material." Secondary concerns are to "maximize the expression of historic character, integrate site development and natural processes, sustain life ways of ethnic groups, increase knowledge of human behavior, and to support the interpretation of park resources."[18] Clearly the loss of historic material is of primary importance for the preservation of structures and objects, but agricultural landscapes have to do with less tangible things, traditions and life ways, and they are ephemeral in nature and subject to continual change. For agricultural landscapes therefore, which tend to contain rather little historic material of a lasting nature, many of the secondary concerns take on great importance.

SIGNIFICANCE, INTEGRITY AND AGRICULTURAL CHANGE

Like other cultural resources, agricultural resources are a combination of tangible cultural features and intangible qualities and values. To have significance, a cultural resource must not only be associated with something noteworthy in the past, "it must manifest that association in its physical substance."[19] In other words, it must have both significance and integrity. The landscape characteristics that collectively give a

landscape significance are "the tangible evidence of the activities and habits of the people who occupied, developed, used, and shaped the land to serve human needs". This poses a difficulty in many agricultural landscapes. Compared with built landscapes, the investment in structural capital improvements that have lasting "physical substance" is relatively low on farms, while 'working' capital in livestock, machinery etc., is high. Also, many of the physical components of an agricultural landscape are living organisms, including crops,hedgerows, orchards, and farm animals; they are biotic features which require regular, sustained management to retain their integrity. There may be little "physical substance" that has survived. The integrity of biotic agricultural resources cannot be evaluated as one would a structure, in part because growth and decay are fundamental to natural systems. But farms are not only natural systems; they are socio-economic systems too; and so while the living components of agriculture are growing, maturing, being harvested, dying and decaying, the social and economic conditions that shape the landscape are also changing. Farmers are resourceful people. When a change is necessary, it is taken care of without delay. Therefore agricultural landscapes that have been farmed continuously since the historic period, probably reveal very little of their original physical form. If "integrity is the past revealed in physical form", these landscapes could be seen as having little integrity.[20]

However, integrity varies from resource to resource. Because change is a recognized characteristic of farming, it may have been less destructive of the integrity of an agricultural landscape than of a designed landscape or of an historic structure. In fact changes may in some cases may themselves be significant. The inevitability of change is recognized in the statement that "landscape management involves identifying the type and degree of change that can occur while maintaining the character defining features", and that, "in a landscape significant for the pattern of use that has evolved, physical change may be essential for the continuation of the use... The focus should be on perpetuating the use while maintaining the general feeling and character of the historic period, rather than on preserving a specific appearance".[21] Landscapes significant for the pattern of use are likely to be vernacular or ethnographic landscapes, and in these cases, "change itself is a significant factor and must be considered in assessing integrity."[22] In several park units in this study, perpetuating agricultural use is as important as preserving a specific appearance. In a farming valley on the Buffalo National River, where the objective is to preserve a "harmonious relationship between the

private agricultural community and the historic scene," the construction of some new appropriately designed farm buildings or even residences is not viewed as a loss of physical integrity.

The criterion by which a landscape is judged to be significant will therefore be an important factor in assessing whether change can occur without loss of integrity. At Ebey's Landing National Historic Reserve, for instance, the reserve was established to protect the cultural resources that reflect the unique way the area developed for farming. Some changes in farming are seen as quite acceptable without loss of integrity but unfortunately, changing conditions are threatening the very survival of farming. The intense demand for both land and the limited ground water as the population of Whidbey Island grows, is limiting the ability of farmers to compete.

The criteria for assessing the integrity of historical resources used by the National Register of Historic Places were developed primarily for buildings, structures and objects, but Firth has adapted these evaluation criteria to apply to biotic cultural resources which are such important components of agricultural landscapes.[23] The seven criteria are location, design, setting, materials, workmanship, feeling and association. Firth suggests that location applies to the distribution of cultural resources, fences, boundaries, and farmsteads. Design is interpreted as the spatial and temporal organization of the farm, routines of cultivation and harvest, how rotations are managed, grazing regimes and other cycles in the agricultural calendar. It is also important to think of the peculiar combination of ecological, social, and economic organization that is apparent in the "design" of a farmed landscape. The third criterion, "setting," refers to land forms, streams, natural vegetation, wildlife, and the biotic and abiotic cultural features of the farm. The fourth criterion, "materials", when applied to cultural resources includes the species and age composition of plant and animal communities on the farm. Plants on a farm are a mixture of native and exotic species and cultivars. In some cases a particular cultivar, variety, or breed might be a significant feature of a site, for instance, Angus cattle at the Eisenhower Farm. The fifth criterion, "workmanship," applied to biotic cultural features can be thought of as management in the following general categories: regeneration, including breeding of livestock; cultivation and care, including plowing, cultivation, thinning crops or timber, and feeding livestock; protection of plants and animals from pests, predation, foul weather, etc.; and harvest and use.

The sixth criterion, "feeling," refers to the ability of cultural resource to evoke a sense of the past. Firth emphasizes the importance of sounds and smells, and also rhythm of farming activities in managing biotic cultural features. The last criterion, "association," must show a clear relationship between the resources and the people and events of a historic period.

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PERIOD OF SIGNIFICANCE

The period of significance is the date or period during which an agricultural landscape was created, developed, or adjusted to an innovative or distinctive technology, or was associated with important events, persons,or activities. The period may be very short. Some battles for instance lasted for only a few hours. When dealing with living features in the countryside, seasonal change may alter the appearance of the landscape to such an extent to make it difficult to understand the course of events. Late in the summer, crops and other vegetation greatly increase the cover in the landscape and would have blocked some troop movements from view. This may not be apparent at other times of the year and make it difficult for visitors to understand.

Other landscapes have longer periods of significance. At the Eisenhower National Historic Site it extends beyond the period of Eisenhower's occupancy. The farm buildings include an 1887 barn that was part of an earlier working farm. The historic period at the Hubbell Trading Post National Historic Site spans about ten years from about 1900 to 1910. Parks which have long historical periods, that may even span different agricultural systems, include Cuyahoga National Recreation Area, Delaware Water Gap National Recreation Area, Ebey's Landing National Reserve. The period of significance at Booker T. Washington National Monument is not limited to the date of his birth. The monument also celebrates Washington's life and accomplishments. He was a resident at the Virginia plantation where he was born for only nine years, but his childhood on the plantation, during which he lived in slavery, certainly shaped his values and philosophies which became so significant later in his life.

A cultural resource may also have more than one period of significance because it may have more than one association; the frontier cattle era at Grant-Kohrs Ranch National Historic Site is one, but later developments in breeding and irrigation also have

significance. Ethnographic landscapes are linked not only to past but to living traditions and therefore cultural continuity rather than a specific time period is important.

AUTHORIZATION FOR AGRICULTURE IN PARK LEGISLATION

Authorization for agriculture in the legislation of a park, depends upon recognition of the significance of agriculture at the time the park was created, bearing in mind that "the perception of significance may also change as time passes".[24] "Agricultural uses and activities are authorized in parks in accordance with the direction provided by a park's enabling legislation and general management plan".[25] In only one of the 30 parks studied was agriculture the principal reason for the creation of the park. That was the Grant-Kohrs Ranch National Historic Site, authorized in 1972 "to provide an understanding of the frontier cattle era of the nation's history." In other parks, agriculture was an important contributing factor. Ebey's Landing National Reserve, for instance, "commemorate[s] the exploration of the Puget Sound area...and the settlement by Colonel Isaac Neft Ebey." Agriculture is an integral part of this area's settlement history and contributes to it's "scenic beauty and historic integrity." The intent of the Eisenhower National Historic Site was "to preserve significant cultural resources and features...to reflect the character of the Eisenhower National Historic Site at the time of donation to the National Park Service," but there is no specific mention of agriculture. The legislation authorizing Montezuma Castle National Monument identifies the unusually large limestone sink, but does not recognize the significance of prehistoric agriculture or the irrigation canal (Figure 2:2).

In several cases Congress saw farming as an integral part and appropriate use of the landscape, and believed that farmers should continue to reside on and own the land. Continuity of use and occupancy was evidently seen as important. At Point Reyes National Seashore, the dairy ranches were considered so important they warranted the creation of a "pastoral zone" covering approximately 17,000 acres that enabled them to continue to be operated. The park at first was not permitted to buy parcels of more than 500 acres without the owner's permission. Similarly at Buffalo National River, some areas were intended by Congress to remain in private ownership in their existing agricultural use. At Ebey's Landing National Reserve, the preservation of agriculture is clearly part of "protecting a rural community which provides an unbroken record from nineteenth century exploration and settlement to the present time." The "historical

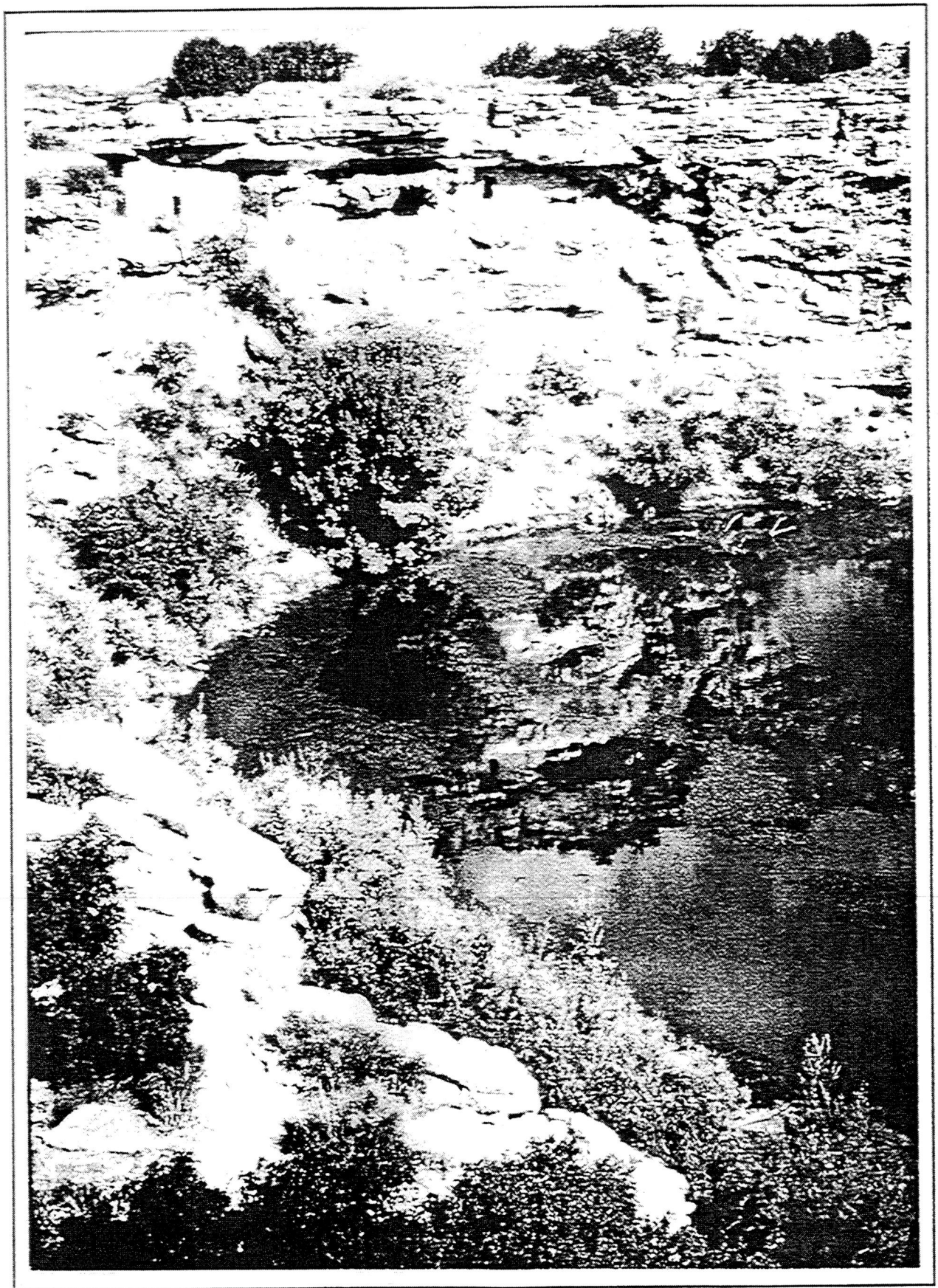


Figure 2:2 Limestone sinkhole at Montezuma Castle National Monument that supplies the irrigation canal. The legislation authorizing the park identifies the sink and the prehistoric cliff dwellings, but not the irrigated fields.

reserve" designation provides an alternative to fee-simple acquisition in order that the present owners may be allowed to continue to own, reside on, and farm their land. Instead of acquiring full title to farms, scenic easements, development rights, or other interests can be acquired in conjunction with other landuse control techniques.

In some parks, it is clear from the legislation or from the Congressional hearings that agriculture was to be allowed to continue although it may not have been considered historically significant in its own right. In establishing Sleeping Bear Dunes National Lakeshore, the park was forbidden to condemn any commercial properties, including working farms and orchards in existence before 1964. In other parks there is also a strong implication that farming should continue, even if it is not specifically mentioned in the legislative history. At Minute Man National Historic Park, for instance, the preservation of historic sites along the route of the battle, was, presumably intended to include farmsteads and farmland.

Many of the battles of both the Revolutionary and Civil Wars took place on farmland, yet the preservation of agriculture is rarely mentioned in the legislation of these parks, although the preservation of the scene as it was at the time of the battle is authorized in several cases. The legislation for Shiloh National Military Park for instance, passed in 1894, directed the Secretary of War to restore the fields to their condition at the time of the battle. Agricultural leasing was seen as an appropriate mechanism for managing agricultural land in these early military parks. The legislation for Gettysburg National Military Park, authorized in 1895, specified that land in the park could be leased "either to owners or other persons for agricultural purposes." This specific authorization to lease land for agricultural use is unusual.

The preservation of agriculture is not specifically mentioned in the legislation for the Blue Ridge Parkway or the Natchez Trace Parkway. The Natchez Trace Parkway was intended "to commemorate the intangible elements of the Natchez Trace story rather than to protect specific cultural resources." But the designers of both parkways saw agriculture as providing scenic variety along the roads. Along the Blue Ridge Parkway agricultural uses, fences, and views (which often included agricultural land), were actually specified on the "Park Land Use Maps" (Figure 2:3). The General Management Plan for the Natchez Trace Parkway, states that "fields provide visual



Figure 2:3 Farmstead covered by a scenic easement agreement on the Blue Ridge Parkway. Although farm buildings on parkway land were taken down or moved onto adjacent land, parkway designers wished to preserve scenes of farm life such as this.



Figure 2:4 The John Oliver Cabin at Cades Cove in the Great Smoky Mountains National Park, where pioneer life in the Southern Appalachians is interpreted.

variety, openings for distant views and create scenes suggestive of traditional regional agriculture."

ASSESSMENT OF THE CULTURAL SIGNIFICANCE OF AGRICULTURE

The procedure used to assess the cultural significance of agricultural landscapes in the national park system uses the same the four criteria used to assess the eligibility of rural landscapes for inclusion on the National Register of Historic Places. For agricultural landscapes, the four criteria were broken down into eight categories of cultural significance as shown in Table 1:1. The category into which each park falls is shown in Table 2:1.

CRITERION A

Properties associated with events that have made significant contributions to the broad patterns of history.

A 1. Landscapes where agriculture played an important role in prehistory, in the settlement history, or in the subsequent development of the area.

There are prehistoric agricultural resources in the national park system that illustrate some of the earliest farming systems of the First Americans on the continent. The best preserved are structures, for irrigation or storage for instance (Figure 1:1). There are also historically irrigated landscapes, mostly in the Southwest, some of which are important ethnographic landscapes in that they show continuous evolution of prehistoric or historic farming traditions to the present day. The farming in the bottom of the canyons at Canyon de Chelly National Monument is an example.

Agriculture was essential for the subsistence of early settlers, and there are examples of land "improved" for farming by early pioneers preserved in parks throughout the country. Cades Cove in the Great Smoky Mountains National Park is a farming valley in the Southern Appalachians settled by pioneers (Figure 2:4). Although the farmland and farmsteads in the Cove inform us of the lives of the early settlers, their impact on the landscape extended beyond the valley floor. The settlers used the woodland for fuel and timber and they also cleared summer pastures for their livestock on the mountain saddles and ridges.

Table 2:1
Agricultural Significance of Selected Parks and Type of Ownership Envisioned by Congress

#	PARK (see Table 1:1 for Field Area and Cluster)	DATE AUTHORIZED	AGRICULTURAL SIGNIFICANCE								OWNERSHIP ENVISIONED BY CONGRESS		
			A1	A2	A3	B1	B2	C1	C2	D1			
			Prehistory, settlement, or development history	Association w' historic event (ag)	Associated w' historic event (non-ag)	Associated w' important person (ag)	Associated w' important person (non-ag)	Locally distinctive or ethnographic	Historic designed landscape	Information on prehistory	Private	Public/Private	Public
1	Antietam NB	1890			✓								✓
2	Blue Ridge Parkway-Roanoke Gap	1962[1]							✓			✓	
3	Blue Ridge Parkway - Adney Gap	1936[1]							✓			✓	
4	Blue Ridge Parkway - Orchard Gap	1938[1]							✓			✓	
5	Blue Ridge Parkway - Galax	1939[1]							✓			✓	
6	Blue Ridge Parkway - Blowing Rock	1940[1]							✓			✓	
7	Booker T. Washington NM	1956				✓							✓
8	Brice's Cross Roads NBS	1929			✓						✓		
9	Buffalo N.R Boxley Valley	1972	✗					✓			✓		
10	Cades Cove GSMNNP	1926	✓										✓
11	Canyon de Chelly NM	1931						✓			✓		
12	Chickamauga & Chattanooga NMP	1890			✓								✓
13	Cowpens NB	1929			✓								✓
14	Cuyahoga Valley NRA	1974	✓	✗				✗				✓	
15	Delaware Water Gap NRA	1965	✓					✗					✓
16	Ebeys Landing NHR	1978	✗					✓			✓	✓	
17	Eisenhower NHS	1969					✓						✓
18	Gettysburg NMP	1895			✓								✓
19	Grant Kohrs NHS	1972	✓	✗		✗							✓
20	Hubbell Trading Post NHS	1965	✓	✗		✗							✓
21	Minute Man NHP	1959			✓								✓
22	Monacacy NB	1934			✓								✓
23	Montezuma Castle NM	1906	✗							✓			✓
24	Natchez Trace Parkway	1934[2]	✗						✓	✗		✓	✓
25	Pea Ridge NMP	1956			✓								✓
26	Point Reyes NS	1962		✓									✓
27	Saratoga NHP	1938	✗		✓							✓	
28	Shiloh NMP	1894			✓					✗			✓
29	Sleeping Bear Dunes NL	1970	✓									✓	
30	Stones River NB	1927			✓								✓

[1]For the Blue Ridge Parkway, the construction date of each section is shown.
[2]For the Natchez Trace Parkway, this was the date of the survey.

✓ Principal Significance
✗ Other Significance

Although subsistence farming was a necessity for most settlers, given the opportunity, they quickly adopted systems that yielded cash profits. The story of one such entrepreneur, Conrad Kohrs, is vividly told at the Grant Kohrs National Historic Site. This park has the distinction of being one of very few that was created specifically to commemorate a period in the history of farming and ranching. Before buying the ranch, Kohrs had been a butcher, trading in livestock with settlers as they moved west. The ranch grew rapidly to a scale never before envisioned or equalled since, even by corporate ventures. In the 1890s Kohrs owned 25,000 acres but controlled more than ten million acres of grazing land in four states and extending into Canada.

Agricultural landscapes in the Cuyahoga Valley National Recreation Area are culturally significant for several reasons. They illustrate the role of farming in the settlement history of the area, and the development brought about by the construction of the canal (Figure 2:5). Nearby, the first public land survey was carried out by Moses Cleveland and, following the development of the railroad in the 1850s, the cities of Cleveland and Akron became a center for the manufacture of agricultural machinery. It was also the site for some of the earliest agricultural fairs in the region. The Grant Kohrs Ranch, like many other of the culturally significant agricultural landscapes in the national park system, also meets more than one criterion for significance from different historical periods. Although the principal focus of interpretation at the park is the frontier cattle era in the West, the ranch later became a center for the improvement of the bloodlines of both cattle and saddle horses. Conrad Kohrs was the first to bring registered stock into the region. The ranch is also an important site for the display of late nineteenth century irrigation technology (Figure 2:6).

The early settlers in the northern peninsular of Michigan, in the vicinity of what is now Sleeping Bear Dunes National Lakeshore, were not there to farm. The forests on the lakeshores provided an abundant and convenient source of fuel for steamers plying the lakes; they were also exploited for lumber. But both steamers and the logging encampments required provisioning and some farms in the area met those needs. For instance, David Henry Day established a large farm to supply his company's ships on Lake Michigan. Thus agriculture may owe it's

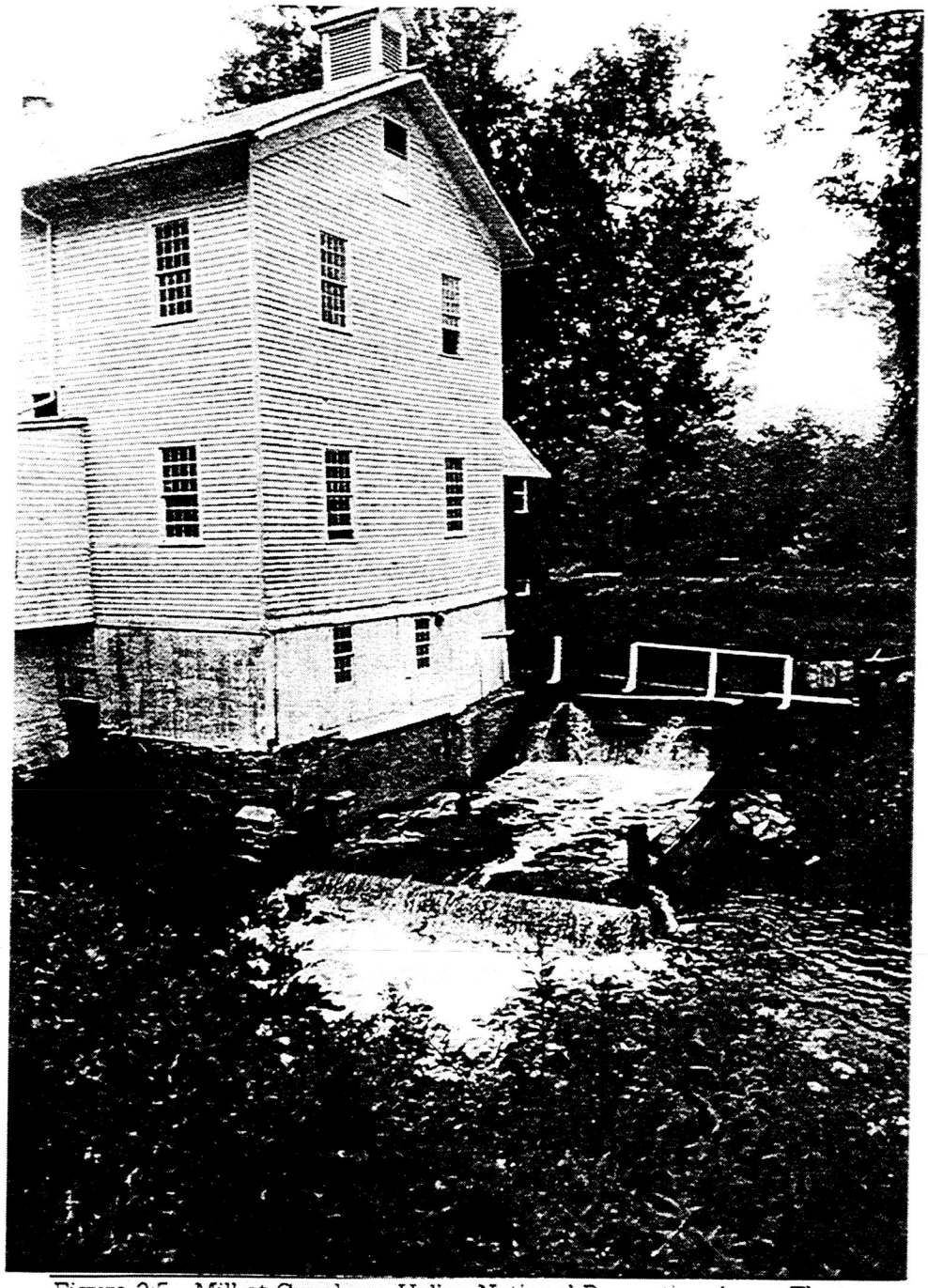


Figure 2:5 Mill at Cuyahoga Valley National Recreation Area. The water mill is no longer functional, but the business still operates as a feed mill. The mill and the adjacent canal represent an important period in the agricultural history of the area.

cultural significance as a "supporting role" in the development history of an area. Day's farm became a model in the area and he is recognized as a pioneer agriculturalist in the region (Figure 2:7). Later the area became famous for the production of cherries, and Day is credited with having planted the first cherry orchard. Features associated with Day therefore could also be seen as being significant through association with a person who played an important role in agricultural history (see B1).

Several periods in history are evident in the agricultural landscapes in the Delaware Water Gap National Recreation Area. The Historic Resources Study lists properties in the park that are eligible for the National register under ten contexts, one of which is agriculture; others, such as European settlement are inseparable from agriculture. Although Native Americans had first migrated into the area about 10,700 years ago, it was not until the about 900 AD that the Minsi Indians in the Valley adopted a sedentary lifestyle and began growing crops on the benches along the river. The area was known to European traders by the mid seventeenth century, but serious settlement did not begin until the early 1700s. Settlers, mostly Dutch, German, and English, farmed the areas that had been cleared and then abandoned by the Indians. Clemensen suggests that it was between 1840 and 1915 that agriculture "came of age in the valley", but it was also during this period that farmers began to rent accommodation to summer vacationers.[26] It was the river and the scenic combination of farmland and forest that attracted painters like George Inness and subsequently large numbers of vacationers to the area, and the importance of agriculture began to decline. Landscape characteristics must reflect the period in which the events took place, but when that period is long, as is the case at Delaware Water Gap, characteristics that show the continuity of farming traditions and the changing role of farming in the valley are important.

An agricultural enterprise, such as dairying, may have been crucial to an area's development. Dairy barns, milking facilities, storage and enclosure systems are important landscape characteristics of dairying. The significance of the Grant-Kohrs Ranch is the staggering scale of the frontier era ranching enterprise and components that illustrate how rangeland was managed for cattle, how the



Figure 2:6 The Kohrs-Manning Flume at the Kohrs Ranch National Historic Site where the ditch crosses Cottonwood creek.

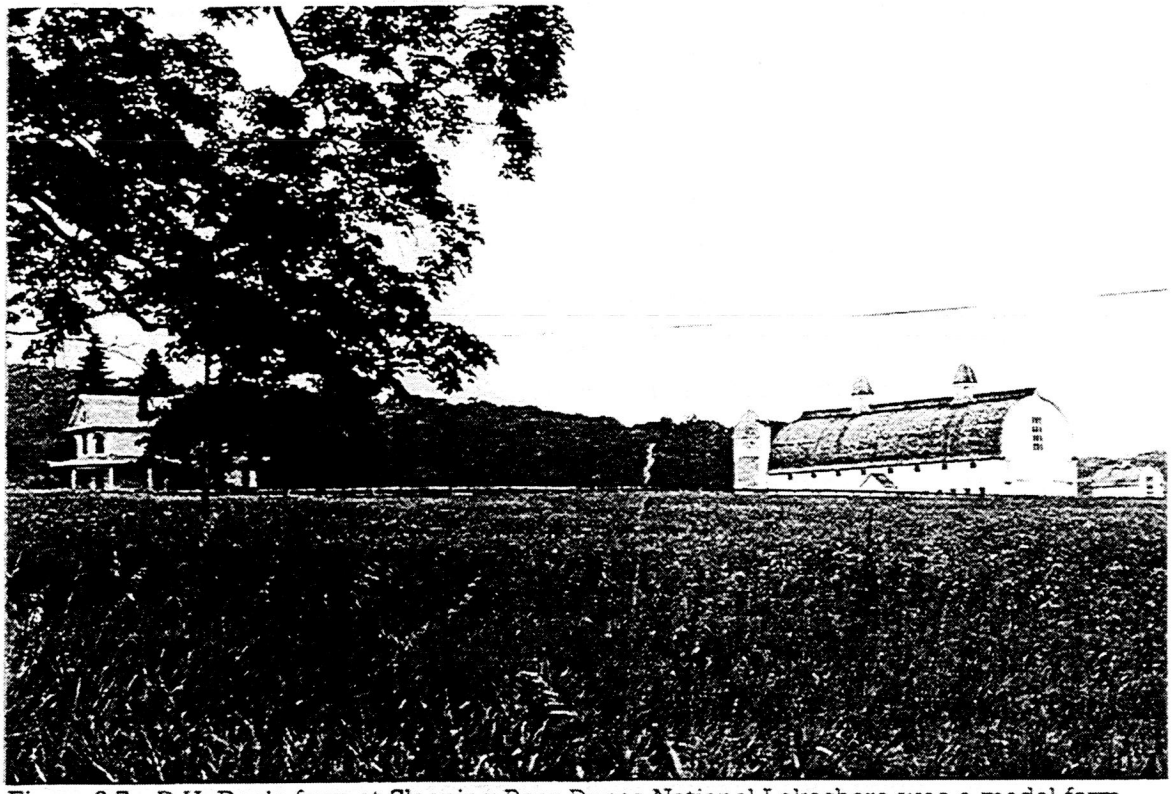


Figure 2:7 D.H. Day's farm at Sleeping Bear Dunes National Lakeshore was a model farm operation that was never economically successful. At its peak, the farm had a herd of 200 Holsteins and 400 hogs (Haswell and Alanen 1993, 60).

cattle were watered, overwintered, branded, and rounded-up and how the ranch hands lived are all important landscape characteristics

If a particular agricultural system such as irrigation was a significant factor in the development history of the area, the various landscape characteristics that made it possible are important features to identify. The irrigation system at the Hubbell Trading Post begun in 1902, enabled John Lorenzo Hubbell to grow a high-quality alfalfa hay for his wagon teams (Figure 2:8). The system involved the construction of a large lake and a canal several miles long that included flumes and reverse siphons, and also provided irrigation water for the Navajo community of Ganado. The irrigation canals, flumes, and siphons, and the irrigated hay meadows on Conrad Kohrs's ranch are characteristics representative of an important later period in the history of the ranch (Figure 2:6).

A 2. Landscapes where an historic agricultural event, activity, or innovation took place.

An innovation might have been a genetic improvement in crop varieties or livestock breeds; it may have involved techniques to make land more productive, such as drainage or irrigation; it may have been an improved or more efficient method of production such as mechanization; or it may have been a method of getting a product to market more quickly or without spoiling. The innovation should have been adopted widely or, if only in the locality, it should have been essential to the local culture, and in shaping a characteristic, and locally distinctive landscape. Events may have occurred on a specific date or over a much longer period.

There are examples of parks where an event occurred that either changed the direction of American agriculture or had a major impact in it's development. At a time when most Native American irrigation practices involved spreading floodwater, the permanent water supply and distribution system developed by the Hohokam Indians at Montezuma Well (part of Montezuma Castle National Monument) pointed the way to more reliable irrigation systems. There are other sites where a technology was demonstrated for the first time in the region, such

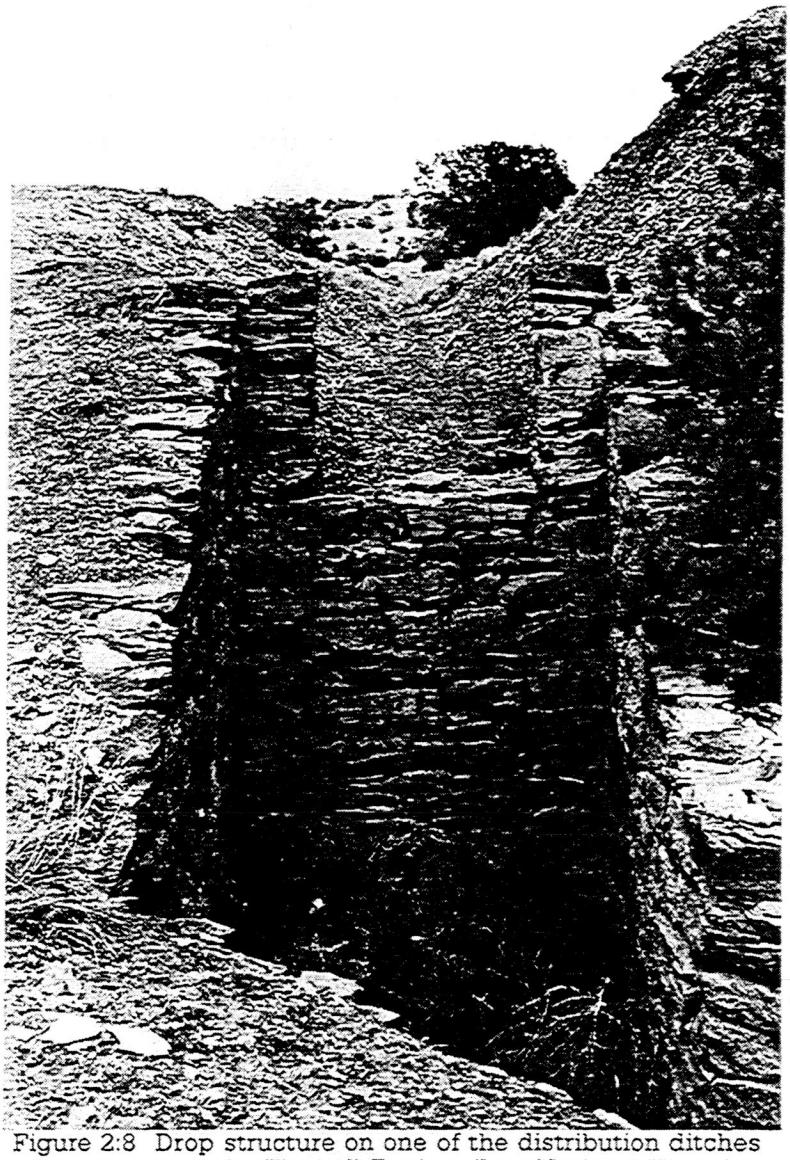


Figure 2:8 Drop structure on one of the distribution ditches near the Hubbell Trading Post National Historic Site, which made irrigated agriculture possible at the Trading Post and in the Navajo community of Ganado.

as Lorenzo Hubbell's use of alfalfa meadows graded for irrigation and mechanization. At Green Springs National Monument (not one of the study sites) the first reaper designed by Cyrus McCormick was tested in the 1840s.Other sites demonstrate the early application of large scale commercial agriculture, for example the dairy ranches at Point Reyes National Seashore. At a time when most dairy farmers in the country were milking only 20 cows, all of the ranchers at Point Reyes were milking more than 100 cows each. This was made possible by the private wharfs on each ranch from which dairy products could be shipped directly to market in San Francisco, and by the use of migrant labor.

Landscape characteristics must reflect their role in the specific agricultural event, activity, or innovation, and must reflect the period in which the events took place. On the dairy ranches at Point Reyes National Seashore for example, the size and construction of the huge dairy barns and features that demonstrate how cows were milked and dairy products processed are important characteristics. At Grant Kohrs ranch, the railroad is an important landscape feature which fundamentally changed the management of the ranch by eliminating the need for the cattle drives to market, which had taken up to six months. At the Hubbell Trading Post the various features of the irrigation system are essential to understand the operation.

A 3. *Agricultural landscapes which were the setting for an historical event not having to do with agriculture.*

In some parks agriculture is significant not in itself, but in having been the setting for an historic event. These include both Revolutionary War and Civil War battlefields. As setting, agriculture was involved in a general way, but certain characteristics of the agricultural landscape may have been essential to the location, actions, or outcome of the event. Landscape features that influenced the location of an event include Stewart's Hill at Mannassas, which provided a vantage point for the Confederate command of the battle. The strategic importance of agriculture in provisioning the armies was fundamental to the conduct of most military campaigns. The openness of the farmland was an important locational factor not only for military engagements, but for revival meetings, agricultural fairs, and other events.

Individual agricultural features may have influenced the actions or outcome of a military event; fields-of-fire may have been blocked by a woodlot; a hedgerow may have provided cover for advancing troops; an erosion gully may have obstructed the movement of artillery pieces; a farmstead may have been used as a field hospital; or fence rails may have been used to build camp fires. In many of the battlefield parks, specific agricultural features are mentioned in historical accounts. At Stones River National Battlefield, the dense thickets of red cedar and the jagged limestone outcroppings made it difficult to maneuver artillery pieces. At Chickamauga and Chattanooga National Military Park, the open understory of the forest, which resulted from the browsing of livestock, enabled the artillery men to see through the woods. The openness of the woodland was also an important factor enabling the use of cavalry in the Revolutionary War battle at Cowpens National Battlefield. That openness resulted from the burning practices of Native Americans followed by extensive cattle ranching by early settlers and would have given the landscape a savanna-like appearance.

Some agricultural landscapes which are significant as the setting for an historic event, have other significance in agricultural history. For instance, Saratoga National Historic Park was the setting for the 1777 Revolutionary War Battle, but one of the American generals, Philip Schulyer played an important role in the subsequent development of the area as an agricultural innovator. The nearby town of Stillwater became an important center for textile manufacture in the early nineteenth century, based largely on the production of wool on farms in the area. The Champlain Canal which runs through the park, and which opened in 1823, also was an important factor in both the agricultural and industrial development of the area.

CRITERION B

Properties associated with the lives of persons significant in our past.

B1. Landscapes associated with a person who played an important role in agricultural history, or in the agricultural development of the area.

The Booker T.Washington National Memorial owes it's historical significance to being the birthplace and childhood home of Booker T Washington. Later in his life, Washington went on to found the Tuskeegee Institute (now

University) and to have a profound effect on the education, and particularly the agricultural education of African Americans. Other roles range from developing a new irrigation system (John Lorenzo Hubbell), improving the blood lines of beef cattle (Conrad Kohrs and Conrad Warren at their Montana ranch), breeding a new variety of wheat, or organizing a sharecroppers' strike.

Significant landscape characteristics are those having to do with the specific role the person played in agricultural history, or in the agricultural development of the area. At the Booker T Washington National Monument, the landscape features that inform us directly of the role of Washington in education will be limited, but his philosophy of life, his work ethic, and his strongly held agrarian values such as his belief in self reliance began to develop in his childhood as a slave.

B 2. *Agricultural landscapes associated with a historically significant political leader, writer, artist, or other important figure.*

Although significance under this criterion need not be directly related to agricultural use, agrarianism or the agricultural setting of the property should have been important to that person's philosophy, way-of-life, peace-of-mind, or creativity. An example selected for this study is the Eisenhower Farm adjoining the Gettysburg National Military Park. For Eisenhower, the farm to which he retired symbolized an aspect of America which he held dear. Farming was also a hobby that he greatly enjoyed and the beautiful and historic rural setting provided a place where he could entertain guests from all over the world.

It is important to identify those landscape characteristics that illustrate what aspect of farm life was important to the person. This might have been a general love of farming and farm country, a belief in agrarian values such as the dignity of hard work and the importance of self sufficiency, or appreciation of the beauty of landscapes shaped by farming.

CRITERION C

Properties embodying the distinctive characteristics of a type, period, or method of construction (or agriculture), possessing high artistic values or representing a significant distinguishable entity whose components lack individual distinction.

C1. Landscapes that embody a vernacular agricultural system or a locally distinctive development of that system, or landscapes that feature continuity of traditional use and occupancy

Farmland, farmsteads and other ordinary agricultural and non-agricultural features may collectively make up a vernacular landscape of significance. The Cultural Landscape Report for Boxley Valley at Buffalo National River notes that "the valley is a collection of tangible cultural features that exemplify the traditional Ozark Mountains Valley Settlement Pattern".[27] These landscapes should have distinctive unifying characteristics, even if individual components lack distinction.When there has been continuity of traditional use and occupation since the area was settled, these may qualify as "ethnographic landscapes associated with contemporary groups and typically used or valued in traditional ways".[28] Landscape characteristics that illustrate the traditional role of farming in the community, and distinctive patterns and recurring arrangements of landscape elements should be identified. Local distinctiveness is an important criterion in identifying agricultural features in this category.

Continuity of traditional use and occupancy may be an important criterion for the cultural significance of ethnographic landscapes.At Canyon de Chelly National Monument, the Navajo have lived and farmed in the canyons for about 300 years. Unfortunately flooding often makes it impossible to enter or leave the canyons which are also quite remote, and very few families continue to reside on their farms. Due to attempts to confine the flow of the wash, it has lowered it's bed making it difficult for farmers to irrigate their land using traditional methods, and 'improved" methods have proven to be unsatisfactory. In the park system, a few farmsteads have been occupied by descendants of farming families since the historic period of the park. Some of the farms at Point Reyes National Seashore and at Gettysburg National Military Park fall into this group. At Delaware Water Gap National Recreation Area there are records of correspondence between

William Penn and one of the farm families still in residence. This is an exceptional case in that park because continuity of occupancy on other farms was broken by the purchase of property for the construction of the Tocks Island Dam which was never built. Most of the farmers in the valley had vacated their properties before the dam project was deauthorized and consequently the area does not qualify as an ethnographic landscape. Nor does it have a viable agricultural community or economy, but the park is mandated to keep 20 percent of the land "open" in order to preserve the "unique blend" of natural, cultural, and scenic features. At Ebey's Landing National Historical Reserve, the importance of continuity of use and occupancy of the farms on Whidbey Island is emphasized by the policy of purchasing only conservation easements to the farmland, thus allowing farmers to retain ownership and to continue to reside on their farms.

C 2. *Landscapes where agriculture was part of an historic designed landscape; agricultural landscapes designed for research, or for the demonstration of "good" farming.*

All farms are designed landscapes. They are functional economic systems and the design is constantly adapted and modified as conditions change. However, the term "historic designed landscape" is defined as a "deliberate artistic creation reflecting recognized styles," and therefore does not include working farms.[29] In the National Register Guidelines, the term "designed landscape" is used for the work of a professional designer. These may be landscapes designed as a model, demonstration, or research farm. The agricultural landscapes selected for this study are part of the scene designed for the visitors to the Blue Ridge and the Natchez Trace Parkways. The designers of the Blue Ridge Parkway actually identified views that they considered to be important to enhance the diver's experience. A park in this category but not selected for this study is the Moses Cone Memorial Park. Here the industrialist Moses Cone designed and built miles of carriage roads. These were carefully sited to take advantage of views including farm scenes on his estate. It is important to identify landscape characteristics that are featured in the original design or are true to the intent of the design, whether that intent be for pleasure, research or demonstration.

CRITERION D

Properties that have yielded or are likely to yield information important to prehistory or history.

Extant landscape features may provide important archaeological evidence or clues. These include such features as hedgerows, sunken road traces, drainage ditches, etc. The prehistoric irrigation canal and irrigated fields at Montezuma Castle National Monument built before 500 A.D. (Figures 1:1 and 2:2) provide us with important information about the farming system of the Hohokam Indians. It must be remembered however, that agriculture and particularly deep tillage systems, can destroy underground archaeological resources. When selecting a management strategy for an agricultural landscape, it is important to consider potential damage of archaeological evidence. At Montezuma Castle National Monument, soil disturbance caused by cultivation may make continued use of irrigated fields for tillage crops inappropriate.

NOTES

1. National Park Service, 1988. *Management Policies*. p.1:1
2. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.6.
3. Ibid., p.2.
4. *National Register Bulletin* 30, p.2.
5. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.6.
6. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
   National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28.
7. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.6.
8. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77, p.1:2.
9. Ibid.
10. Ibid.
11. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.1.
12. Ibid., p.2.
13. National Park Service, 1987. *History and Prehistory in the National Park Service and the National Historic Landmark Program*. pp.1-12.
14. National Park Service, 1988. *Management Policies*. p.2:3.
15. National Park Service, 1994. *Cultural Resource Management Policies*. NPS 28, p.4.

16. The Cultural Resource Management Guideline (NPS-28, 1994, 8-9), lists five categories of cultural resource 'types' as follows: (1) archaeological resources, (2) cultural landscapes, (3) historic structures, (4) museum properties, and (5) ethnographic resources. Cultural landscapes are divided into four types as follows: (1) historic designed landscape, (2) historic vernacular landscapes, (3) historic sites, and (4) ethnographic landscapes. The guideline notes that these landscape types are not mutually exclusive.

17. Ibid., p.94.

18. Ibid., p.7.

19. Ibid., p.9.

20. Ibid., p.11.

21. Ibid., p.93.

22. Ibid., p.96.

23. Firth, Ian J.W. 1985. SER 82, *Biotic Cultural Resources: Management Considerations for Historic Districts in the Southeast Region, Atlanta, GA*:NPS Southeast Region. p.10.

24. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.80.

25. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77, p.3:60.

26. Clemensen, A. Burle. 1995. *Historic Resource Study: Delaware Water Gap National Recreation Area*. National Park Service

27. National Park Service, 1985. *Land Use Plan, Cultural Landscape Report: Boxley Valley*. Buffalo National River, Harrison, AR. p.1.

28. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.94.

29. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, Chapter7.

CHAPTER THREE
AGRICULTURAL CHANGE IN THE UNITED STATES

Adaptability and rapid response to change is a defining characteristic of American agricultural history. In this chapter, changes in agriculture and how they affect the feasibility of historically accurate management of culturally significant agricultural resources are examined. Farmers have always prided themselves on their self-reliance and resourcefulness in adapting to changes, and today, progressive farmers are admired in their communities. As newer and apparently more efficient modes of manipulation and management of farm resources developed, the face of farming changed profoundly. Every aspect of farming has been affected by continuous improvement and adjustments. Management solutions for agricultural landscapes in the national park system must not compromise the historic integrity of cultural resources, but as much of the agricultural land is managed by commercial farmers, it is prudent to consider the constraints under which modern farmers operate.

THE BEGINNING OF FARMING

During the period between about 500 B.C. and 500 A.D., maize agriculture and settled village life began to develop in Southwestern and Eastern U.S.. The gradual evolution of agricultural societies, and features of permanent settlement and sedentary farming such as the development of irrigation practices in the arid regions of the Southwest are particularly interesting. At Montezuma Castle in Arizona, the earliest irrigation systems were built by the Hohokam Indians before 500 A.D. In the mid-eleventh century, the valley was settled by the Sinaguan Indians who were skilled dryland farmers but nevertheless adopted the Hohokam irrigation systems.

The earliest occupation of Canyon de Chelly and the neighboring canyons had probably occurred around 2500 B.C. This occupation was sporadic, but by 350-750 A.D., the Anasazi had become semi-sedentary. It is not known with any certainty whether there was irrigation in the prehistoric period, but sheet water flooding of fields probably was practiced.[1] About 1300 A.D., the canyons were abandoned and it was not until about 1700 A.D. that they were again occupied, this time by the Navajo. Navajo irrigation was not elaborate, probably only flooding of fields and limited ditch irrigation.[2] It is interesting that, although theirs' was a subsistence

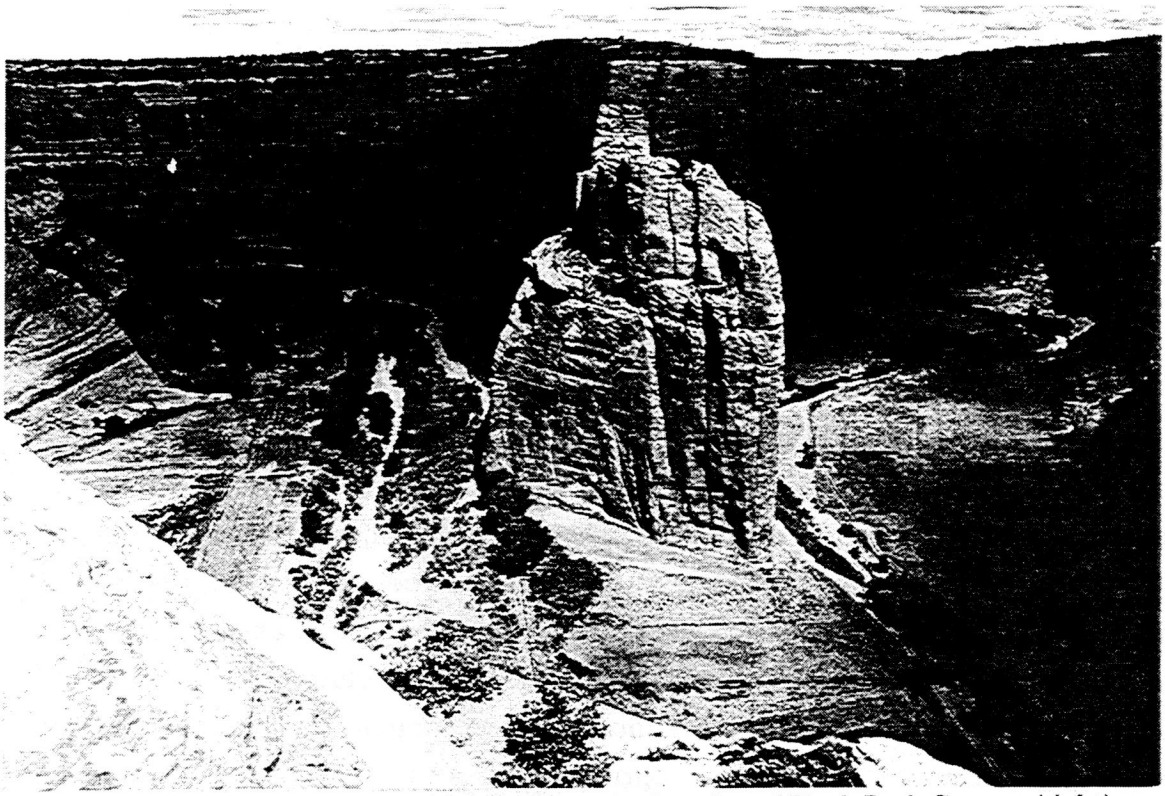


Figure 3:1 Orchards and agricultural fields at the junction of Black Rock Canyon (right) and Canyon del Muerto (left) at Canyon de Chelly National Monument. The Navajo farmers in the Canyon traded peaches for sheep from farmers outside the Canyon.

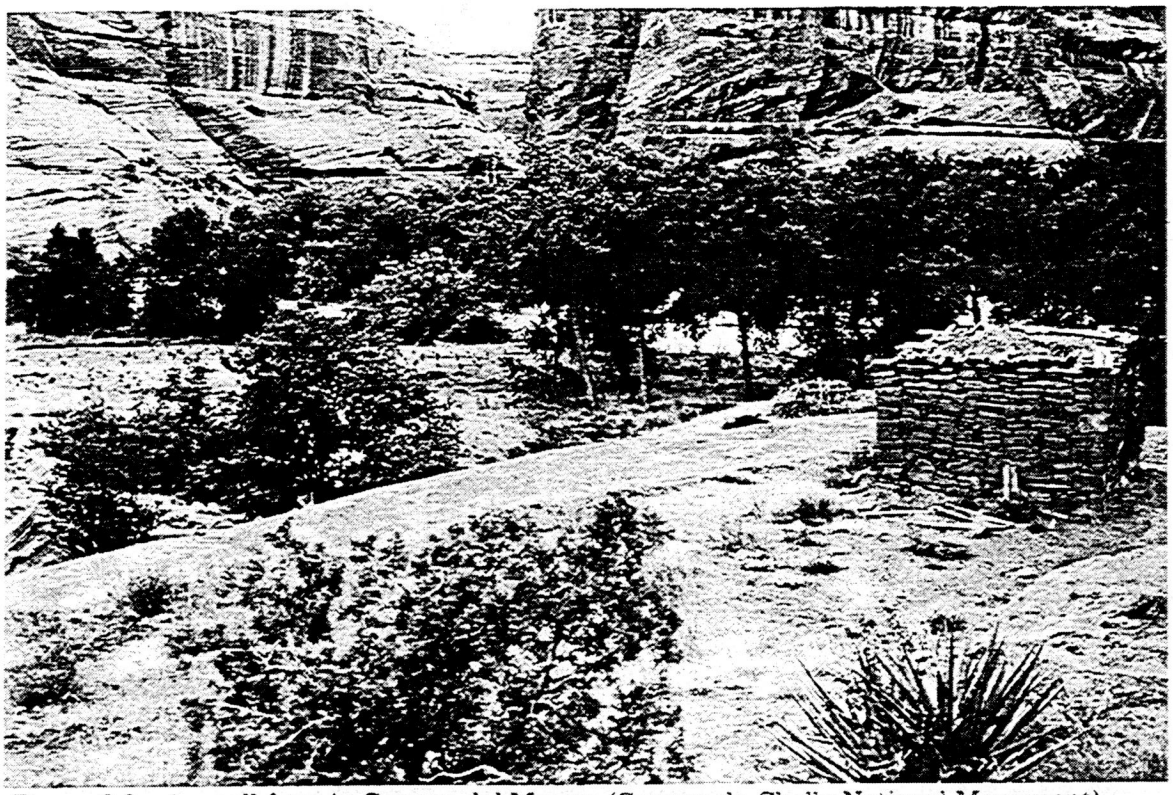


Figure 3:2 A small farm in Canyon del Muerto (Canyon de Chelly National Monument). The rock slope to the left of the hogan was used to dry peaches as evidenced by the pits at the base of the slope. A field of corn is seen in the middle distance on the left. An orchard is to the right of the frame.

agricultural economy, specialization began to emerge among the Navajo as a barter trade developed between the farmers in the canyons who grew peaches, and farmers on higher ground who raised sheep (Figures 3:1 and 3:2).

SUBSISTENCE FARMING AND CONSTRAINTS TO A MARKET ECONOMY

Most of the early European settlers were landless, often disfranchised, lured to the New World by the prospect of free or very nearly free land. They had little experience with managing soil to maintain its productivity. Many came from cities and had more experience dealing in a cash economy than subsistence-oriented rural societies. They came to the United States expecting to profit from farming, as did corporate ventures, like the Virginia Company. Innumerable acts were passed in the first years of the Colonies that had to do with exporting, first tobacco, then indigo, and later cotton. Although individual settlers were intent on profit and speculation, most families could do little more than provide subsistence for themselves. Because of the demand for summer and winter feed for draft animals and other livestock, much of the land on the farm was preempted by their subsistence needs. As a result, these farms were mixed enterprises that produced a great variety of crops and livestock. Two major factors constrained the development of cash agriculture: access to markets and shortage of labor.

Access to Markets

Most farms were extremely remote and many miles from a market. Roads were often impassable. It is hardly surprising that there was more trans-Atlantic trade than internal trade in the Colonies, and most of that was not food but tobacco, indigo, cotton, and lumber. Farmers who were able to get their products to a market thrived, and their operations often grew. Livestock could be driven on the hoof. Even at the time of the Revolutionary War, in the area where the Battle of Cowpens was fought, cash farming or more correctly, ranching was being practiced in the Low Country and Piedmont of South Carolina. Farmers grazed their cattle in the open woodlands. The battlefield takes its name from the pens in which the free-range cattle were collected before being driven to market in Campden, South Carolina.

Some livestock drives were very long. Until 1881, when the railroad reached Deer Lodge Valley, Montana, hands from Conrad Kohrs's ranch made a two

thousand mile drive to market every year. "The Sun River cattle were driven west across the Divide to the Bitterroot. Here (Kohrs) would buy any marketable cattle he could find from the ranchers. Throwing the herds together, ranchers would drive south through Ross' Hole, the Big Hole, south to Soda Springs, Idaho, then east across the Snake River, into Wyoming. They either followed the Immigrant Road or drove south and followed the old Cherokee Trail east to Cheyenne or Pine Bluff or North Platte. The trip took from five to six months to reach the rail head of the Union Pacific".[3]

The Natchez Trace (Figure 3:3) that followed Indian trading routes between Nashville and Natchez became an important route for farmers in Central Tennessee and the Ohio Valley to get their various products to market. They rafted their wares down the Tennessee and Ohio Rivers to the Mississippi and then returned on foot overland by way of the Natchez Trace. Thus, the Trace played an important role in the development of cash agriculture in the region. In the Cuyahoga Valley, the close proximity of downtown Cleveland made it possible for farmers to specialize in dairying and perishable vegetables.

An example of the benefits of access to a market are the dairy ranches at Point Reyes on the Pacific coast, north of San Francisco which owed their success to the California Gold Rush of 1849. The influx of people created a huge demand for dairy products in San Francisco and the ranches were able to supply the city with butter and cheese via schooners that sailed directly from private docks on the point. By 1861, one tenant farmer had 600 dairy cattle, and in 1879 one partnership had 20 tenants, each with a dairy herd of between 150 and 170 cows.

Other exploitive enterprises initially had little to do with farming. Early settlers came to the area of the north Michigan peninsular, where Sleeping Bear Dunes National Lakeshore is now located, to cut the timber along the lakeshore, but soon some of the farmers were supplying provisions to the logging camps and to the steamers on the lake. Later, some of the shipping companies started their own farms to supply their ships.



Figure 3:3 The old Natchez Trace

Labor

The second major constraint was labor. Most farmers had only their families and perhaps a draft animal or two to rely on. It was essential to plan farm operations to make effective use of this labor. If a family planted more than a few acres of one crop, it would result in an impossible labor demand at harvest and at certain other times in the growth cycle. The labor requirements of a specialized farm could not be met even by a very large family. The alternative was to own slaves, which was not possible or legal in most areas. Hiring labor was usually feasible only in areas where immigrant labor was available (as it was at Point Reyes).

Other Constraints

There were two other constraints which were only taken seriously by the more skilled farmers. The first was the problem of maintaining soil fertility. The sale of a cash crop represents a drain of nutrients from a farm ecosystem that will eventually exhaust the soil. This process may be rapid for greedy crops like tobacco and cotton. Until the development of synthetic nitrogenous fertilizer, the only way to maintain soil fertility was by careful use of animal manures and crop residues and by the inclusion of legumes in crop rotations. The problem was exacerbated by erosion of topsoil. Rainfall in Northern Europe and particularly in the British Isles is much less intensive than in the U.S., and tillage land is less prone to erosion. Poor and inappropriate farming practices led many planters and farmers to abandon their exhausted and eroded land and move further West.

Another constraint was the problem of pest control. Until the development of agricultural chemicals, there were no effective measures to control the build-up of weeds or insect pests other than by rotation of crops and cultivation. Integrated rotations, which included both crops and grazing animals, greatly improved weed control because many weeds that flourish in tillage crops cannot compete with grass or are not tolerant of being grazed. Even today, with an extraordinary array of chemicals available, the best control of some tillage weeds, such as Johnson grass, is to include a two year grazing break in a rotation.

MIXED ROTATIONAL FARMING

The system of mixed rotational farming that evolved in many temperate regions of the world, including parts of North America and Northern Europe, in the nineteenth century was remarkably sustainable and made efficient uses of resources. It was a low input system that included both livestock and crops, and fully exploited the potential of livestock manure and crop residues that would otherwise be wasted. It maintained soil structure and fertility. The system also achieved a reasonable level of pest and weed control through rotation. The many enterprises on the farm demanded labor at different times and made for effective use of a limited labor supply, but the scale of a mixed rotational farm was limited by the amount of labor available, which in most cases consisted of only the farm family.

The system allowed for the cash sale of some produce without draining soil nutrients. The secret lay in the inclusion of legumes into the rotations, usually as clover in grass leys, and in the scrupulous conservation of manure and crop residues. However, farm families until the middle of this century, maintained a high level of self sufficiency in the food and energy used on the farm, and required very little cash. Chickens, pigs, and at least one milk cow were to be found on most farms throughout the country, principally for the subsistence of the family.

THE FULL DEVELOPMENT OF A MARKET ECONOMY IN AGRICULTURE

Although mixed rotational farming was a sophisticated technology that made effective use of the resources available, it was labor-intensive, and had built-in scale limitations. At the turn of the twentieth century, farm families continued to produce much of their own needs and agriculture had not yet developed fully as a market economy. But early in the century several important changes occurred that were to change the face of agriculture. The development of highly mechanized, specialized, large scale, capital intensive farming systems, and the realization of a fully developed market economy came hand in hand.

Improvements in Transportation

The first development was improved transportation. The Champlain Canal connected directly with the Erie Canal which opened in 1825, and enabled farm produce from the Midwestern states to reach Eastern markets. Farmers in the

Hudson Valley near the Saratoga Revolutionary War battlefield through which the canal passes, were suddenly faced with competition from farmers who could produce grain more cheaply. Similarly, farmers in the Cuyahoga Valley derived little benefit from the opening of the Ohio and Erie Canal because they were already so close to urban markets in Cleveland and Akron. But those markets were now opened to farmers from further afield. Canals were rapidly superseded by the railroads as a means of shipping agricultural products. The construction of the railroad to Deer Lodge Valley made it possible for cattle from the Grant-Kohrs Ranch to be shipped quickly to the stockyards in Chicago (Figure 3:4). Cattle reached the market in peak condition which had not been the case after the long overland drives that had been necessary. Refrigerated rail cars, first introduced in 1868, increased the range of potential markets for perishable farm produce, and enabled growers of tender crops to ship them to colder regions of the country. For instance, the farmers on Whidbey Island,Wa., once enjoyed the advantage of a mild, early spring, enabling them to sell perishable crops like strawberries at premium prices. But today early strawberries can be shipped cheaply from areas with a climate more suited to early crops, and the farmers at Ebey's Landing National Historical Reserve can no longer grow strawberries profitably.Improved roads and efficient trucks also had a profound effect on marketing and, as a result, specialization on the farm. We see today an extraordinary regional specialization in agriculture, with products being shipped nationwide from regions where they can be produced at the lowest cost.

Mechanization

Humans supplemented their workforce first with draft animals, then with water and wind to power gristmills, sawmills and drainage pumps. The steam engine was generally too heavy for field work and, although it was used occasionally, it's main application was powering stationary machines such as threshers, cotton gins, and mills. But larger and more sophisticated agricultural machinery did not wait for the internal combustion engine or the light tractor. In the 1840's, Cyrus McCormick tested his new reaper on a farm in Green Springs, Virginia.[4] The combine harvester, originally pulled by teams of as many as 60 mules, pre-dated the tractor. There was also a four-bottom plow known as the "horse-killer" for obvious reasons. The first gasoline tractor was introduced in 1892, but a successful light tractor did not appear on the market until 1926.[5] At first it could do little more than pull things

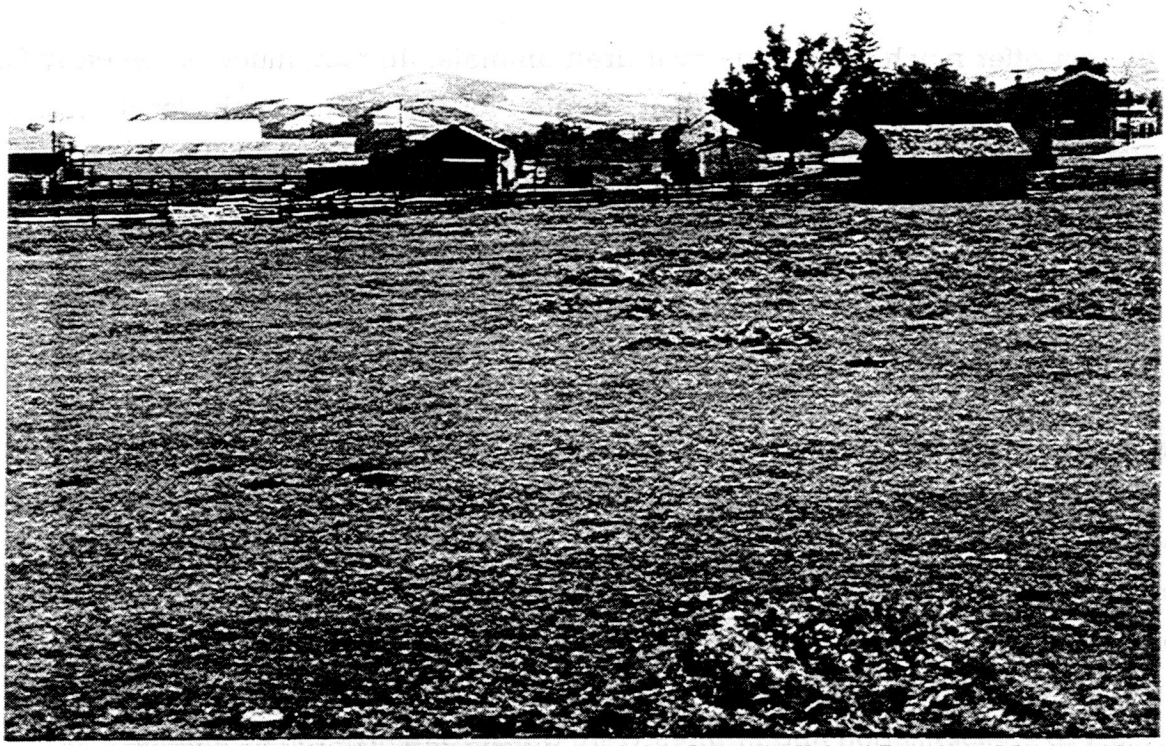


Figure 3:4 The Northern Pacific Railroad reached the Conrads Kohrs' Ranch in Montana in 1883. Previously cattle had to be driven to railheads at Cheyenne or Pine Bluff.



Figure 3:5 One of the operational dairy ranches at Point Reyes National Seashore which were able to specialize due to direct access via schooner to markets in San Francisco.

and did not offer much advantage over draft animals. In fact, much of the early farm machinery was horse-drawn equipment adapted for the tractor by the local blacksmith. But, hydraulic systems and power take-offs enormously increased the versatility of the farm tractor and it's ability to replace human labor. The tractor quickly became faster and more powerful, enabling the farmer to grow larger areas of one crop and still be able to complete field operations in a timely manner. The tractor not only reduced the demand for labor on the farm; it made specialization possible.

Fertilizers and Pesticides

The manufacture of synthetic nitrogenous fertilizers and the development of an astonishing array of herbicides, arachnicides, insecticides, and fungicides (collectively known as pesticides), enabled farmers to dispense with livestock and legumes as a means of maintaining soil fertility. It also meant that there were other effective methods of weed and pest control besides rotation. There were no longer any obstacles to specialization and farmers were quick to realize the economic advantages of larger scale production. As has already been noted, farms and farming regions in the US show a high degree of specialization. In a few of the areas selected for this study, the historic enterprise was also specialized. Examples include Conrad Kohrs's cattle empire centered on his ranch in Montana; large scale cattle ranching in South Carolina at the time of the Revolutionary War in the vicinity of the Cowpens battlefield; and the dairy ranches on Point Reyes, California which specialized unusually early because of the accessible market in San Francisco (Figure 3:5).

Irrigation

As new markets emerged in arid regions, the development of irrigation technology made cash agriculture feasible. This is illustrated at the Hubbell Trading Post National Historic Site. John Lorenzo Hubbell claimed a piece of land in Navajo territory in 1890 for which he received patent in 1917. He had a series of 25 trading posts throughout the region. He quickly built up a reputation for dealing fairly with the Navajo and his business thrived. In order to grow high-quality hay for his wagon teams, Hubbell developed a sophisticated irrigation system, most of which still exists today (Figure 3:6). The irrigation system included a 270 acre lake and several miles of distribution canals, which incorporated flumes and a reverse siphon where it

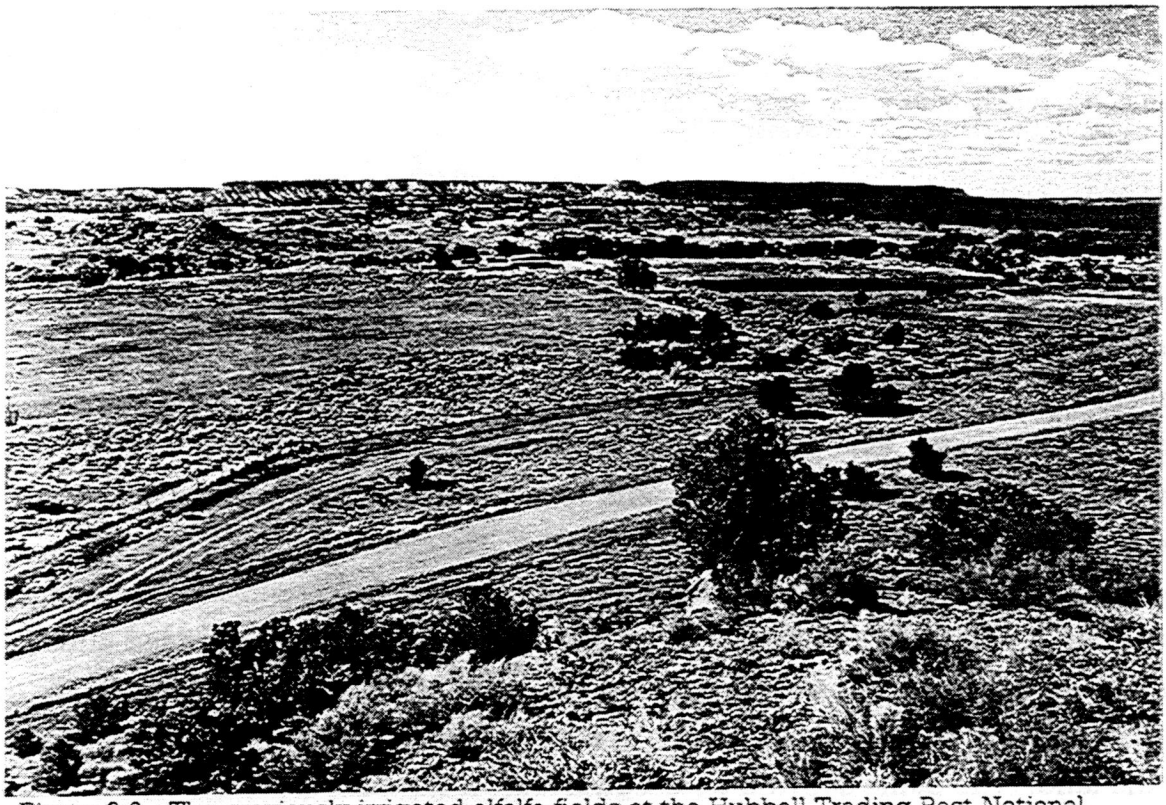
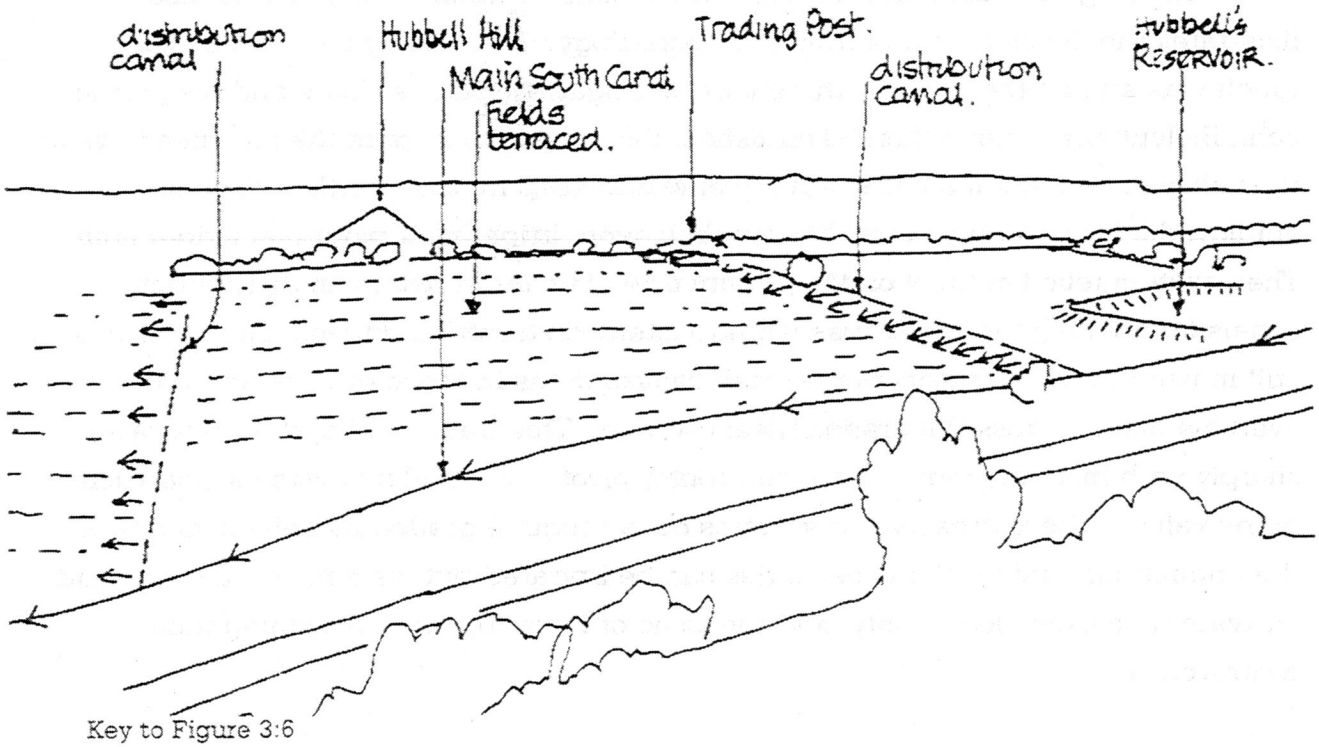


Figure 3:6 The previously irrigated alfalfa fields at the Hubbell Trading Post National Historic Site. From Red Point looking North.



Key to Figure 3:6

crossed the Colorado wash. The system also served the Navajo farmers (the lake was built on Navajo land and the whole system was eventually given to the community in return for water rights). The Navajo used traditional techniques to irrigate on their land, but Hubbell built lateral distribution channels from the main canal and constructed a holding reservoir which he could fill on the days he was entitled to take water, even if his crops did not need it immediately. It was also necessary for Hubbell to make another innovation because he was not using water to irrigate tillage crops as were the Navajo farmers. He was irrigating alfalfa, a perennial forage crop, which prevented him from spreading the water over the land by 'leading' it along furrows made with a hoe. The fields had to be graded almost level to allow water to spread evenly over them without disturbing the alfalfa. To do this Hubbell used a land "plane" which was probably a large wooden frame dragged over the land. The plane showed up irregularities in the surface, which could then be levelled by mule-drawn scrapers.

The irrigation used at the Grant-Kohrs Ranch National Historic Site also illustrates the development of irrigation technology. In the early days, when the ranch was still on the frontier, there was no irrigation. But, as Kohrs and his partner, John Bielenberg became more established, they began to irrigate the hay meadows in the valley to give them a better supply of winter keep for their cattle. They also employed a land plane as they, like Hubbell, were irrigating a perennial fodder crop. Their system relied entirely on the gravity flow of water in two main distribution canals from which the water was led into lateral distribution ditches. The system is still in use today. Irrigators place small canvas dams in these ditches and the overflow floods across the graded meadow land. This traditional system contrasts sharply with more modern pressurized center-pivot and traveling systems elsewhere in the valley. These pressurized systems do not require graded meadows, and now the undulating land on the valley sides can be irrigated but, as a result, the demand for water has exceeded supply, and the issue of water rights is becoming more controversial.

SPECIALIZATION AND LARGE-SCALE AGRICULTURE

As a result of the changes described, farmers found that mixed rotational farming was no longer strictly necessary. They could concentrate on growing

whatever cash crop best suited their soil and circumstances. As farmers became more specialized, they were able to realize economies of scale and there was now a real incentive to enlarge their operations to remain competitive.

Increased Scale - Tillage Crops

Not all farm enterprises are scale-sensitive, but most of the tillage crops that can be highly mechanized are, notably small grains, corn, and soybeans. A farmer needs more than 1,000 acres of these crops to make a living and, as a result, millions of small farmers went out of business. Some specialty crops are not scale-sensitive, but more efficient machinery could change that situation. The mechanization of cotton is an interesting example. In the 1940s, cotton was still a labor-intensive crop because picking was difficult to mechanize and once developed, the machinery was extremely expensive. Many of the producers were very small and could not afford a mechanical harvester. In 1949 in North Carolina, 73 percent of cotton producers farmed less than ten acres and fewer than one percent owned more than 100 acres.[6] In 1945, a cotton picker cost $2,674 and a tractor $1,250 and Fite quotes a South Carolina farmer as saying that a picker "cost as much as 100 acres of land." Yet by 1960, almost 100 percent of the cotton farmers in the Delta counties of Arkansas, Louisiana and Mississippi had mechanized, and during the 1960s the great majority of farmers in the old Cotton Belt who grew any substantial acreage of cotton, followed suit.[7] Smaller producers who could not justify the capital investment in machinery quickly went out of business.

Increased Scale - Livestock Enterprises

Scale economies have also had a profound impact on livestock enterprises. As early as 1830, farmers in and around Caves Code in Great Smoky Mountains began to specialize in beef cattle, and some herds were very large. At the turn of the century, every farm had a few hens and other fowl, but it is now unusual to see chickens scavenging in the farmyard. Today both layers and broilers are confined in buildings that hold several thousand birds each. Until quite recently, dairying was the mainstay for many small farmers. It was a difficult enterprise to mechanize completely, and milking was a particularly labor intensive operation. At the time of the Civil War, almost all farmsteads included at least one milking cow. A farmer who had a ready market for milk might have milked 20 cows, and this was a big herd. At

Sleeping Bear Dunes National Lakeshore, the Day Farm, which was owned by Northern Transportation Company to supply their logging camps and the crews of their steamers, owned a herd of 20 cows, the largest dairy herd in the region.[8] Today, a modern dairy farm with an automated milking parlor, can milk several hundred cows each day (Figure 3:7). Many dairy farmers milk more than 400 cows, but larger dairies milk as many as 1,000. A bigger herd enables farmers to milk round the clock in shifts and makes more efficient use of the capital invested in the parlor and supporting facilities. According to a cooperative extension agent in Catoosa County, Georgia, in which portions of the Chickamauga and Chattanooga National Military Park are located, there is now a 600-cow-dairy near the park and most small dairy farms have gone out of business.

The impact of scale changes on a dairy farm are enormous. Cows walking to and from the parlor twice a day will destroy the grass within a radius of perhaps 100 yards of the parlor. For that reason, it is usual to house cows in covered loafing yards or free stalls and to deliver feed to them. With such a large concentration of animals, specialized buildings, pit silos, stainless steel refrigerated tanks, roads for sixteen wheeler tankers and, of course a system to deal with the very large quantities of manure are necessary.

The dairy ranches at Point Reyes National Seashore were always large and specialized, but the average herd size of 150 to 200 cows is no longer economically viable, and farmers are having to enlarge their operations to stay competitive. It is difficult to modernize these historic ranch complexes to accommodate the necessary changes without destroying the integrity of the buildings. Increasing herd size also poses problems for range management and puts enormous pressures on water resources. As a result, some of the ranchers have switched from dairy to beef cattle, which require far less labor and make much better use of the available range. Another farmer raises replacement heifers for other dairy farms. Like beef cattle, heifers (young dairy cows before bearing their first calf) do not have to visit the milking parlor.

A dairy farm on the Monacacy National Battlefield is shown in Figure 3:8. The sequence of development of this farm is clearly visible. The oldest dairy barn with a single tower silo as a later addition can be seen on the right. At the far left of



Figure 3:7 Cows being milked in a double-herringbone parlor at I Ranch at Point Reyes National Seashore.

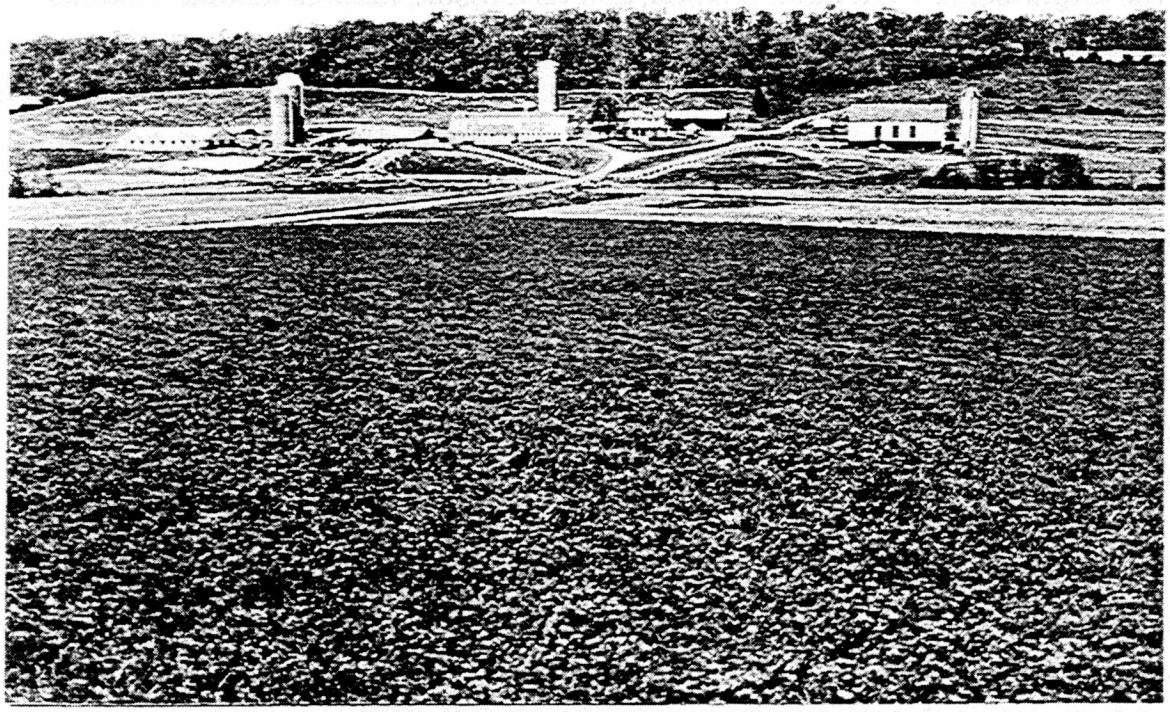


Figure 3:8 Dairy farm at Monacacy National Battlefield. The oldest dairy barn is on the right and the newest is on the left. Note that the volume of the old barn is about 90% storage for hay. The modern barn contains no storage space whatsoever, is one story, and has a low pitched roof.

the farmstead is a modern dairy barn with a polyethylene covered pit silo. To the right of the pair of silos is a loafing yard and shed for the cows. In the center of the complex is a dairy barn and silo from an intermediate date and the farmhouse, behind which is a machine shed. Note that most of the land in the foreground and middleground is unfenced and is used to grow forage crops for ensiling or feeding directly to the cows. This relatively small enterprise will probably not remain competitive unless it grows substantially. If preserving this landscape as it was during the Civil War has social value, then these material changes represent a loss of integrity.

Field Sizes

At the turn of the century, a mixed rotational farm was typically divided into roughly rectangular fields of five acres or less. Every field was fenced to allow livestock to be included in rotations. Such was the case at Gettysburg National Military Park. The 1860 Census shows the average farm size in the county was 109 acres. Much of the battlefield was still privately owned until the 1950s and 1960s and, in order to make mechanical field operations more efficient, fields were enlarged. But the larger fields were more erodible and as a result, farmers installed extensive contour tillage systems (Figure 3:9). To make the best use of machinery, the contour strips must be reasonably long and terraces and grass waterways precisely graded. In part because extensive tillage systems are intolerant of small inconsistencies in soil type (wet patches, etc.), the park and the Soil Conservation Service installed 83,000 ft. of subdrains. Some of the natural drainage courses were replaced by graded grass waterways. Together, these agricultural 'improvements' resulted in a serious loss of historic landscape integrity. It is a sad irony that the crops for which the changes were made can no longer be grown profitably because of damage by deer, the population of which has increased due to protection from hunters in the park.

The field pattern on the valley floor at Cades Cove in Great Smoky Mountains National Park has also been considerably modified to make large scale haying and grazing feasible (Figure 3:10). An analysis of the changes in field boundaries show that there is very little relationship between the farm boundaries at the time of purchase and the permits today, except where they run along natural boundaries like



Figure 3:9 These contour tillage systems at Gettysburg National Military Park have destroyed the historic field pattern.



Figure 3:10 Cades Cove in the Great Smoky Mountains National Park. Reorganization of the field ditches and field boundaries resulted when SCS (NRCS) made conservation plans for the permittees.

streams. A considerable amount of land in the Cove has grown up in woodland. Even within the loop road on the valley floor, the woodland increased from ten percent in 1936 to 23 percent by 1991.[9]

Obstacles to Large Scale

While the scale of modern farming continues to increase, it has been impossible for farmers in some areas to respond by getting bigger. Sometimes this is because steeply rolling topography offered only small patches of workable land. This is true of most of the farmed areas along the Blue Ridge Parkway, the upland areas along the Natchez Trace Parkway, and land around the Chickamauga and Chattanooga National Military Park. In areas that were glaciated, the soil types may be highly variable and patchy, some with very poor drainage, and these inconsistencies make high speed, extensive tillage operations difficult. Large scale farming never developed at Minute Man National Historic Park or at the Cuyahoga Valley National Recreation Area because of a combination of topographic and soil constraints, and a fragmented pattern of land tenure.

Given the extraordinary increase in the scale of individual farm enterprises in the US, it is surprising that the scale of commercial agriculture has actually become smaller in two parks since the historic period. The first of these is the Grant-Kohrs Ranch National Historic Site. This ranch reached its peak size in 1890 when Conrad Kohrs owned 25,000 acres but his cattle grazed over ten million acres in four states and Canada. The vastness of this enterprise is hard to comprehend and interpret. As the acreage of range land that Conrad Kohrs controlled grew smaller, he and later Conrad Warren, gradually made the enterprise more intensive. The second is Cowpens National Battlefield. At the time of the Revolutionary War, the Cowpens area was used for grazing cattle over huge areas at very low stocking rates. Subsequently, the area was settled by small general farmers. With the exception of some large scale peach orchards, farms in the area have remained small. In both cases, therefore, the change has been due to a gradual intensification of agriculture which made smaller scale operations viable at first, but which are no longer large enough to support a family.

IMPACTS ON THE FARM

Specialization and large scale were made possible by various innovations, which have resulted in fundamental changes in storage, operating, and handling systems on farms. These changes have changed the function and appearance of many familiar features of the farm.

Farm Buildings

Until recently, feeding and mucking-out operations on the farm were done by hand. Some handling systems, such as hay storage were arranged vertically. Hay was kept loose in the loft of the barn and thrown down to animals below. Concentrate feeds (grains, cakes, pellets, etc.) were often stored in the loft as well and delivered via wooden chutes. Livestock was usually bedded on straw, and the straw and manure forked out onto the dung heap whence eventually it was spread on the fields. Today most handling systems are linear, powered by a tractor. For instance, on a dairy farm, a tractor and feed hopper passes through a free-stall shed along a feed passage depositing feed on each side for the cows. Then the tractor, outfitted with a rubber scraper, passes along the rear of the stalls pushing manure toward a slurry lagoon. The barn is designed with multiple openings and swinging gates which the tractor can push open. The design, siting, and configuration of farm buildings have all changed to accommodate mechanization. In a modern dairy, the cows come to the milker, not the reverse as was the case in older dairy barns. In a carousel parlor, the milker has to move very little as the cows stand on a rotating carousel. In a herringbone parlor, the milker has to move along a short passage. In either case, one person can milk 40 to 100 animals per hour depending upon the sophistication of the equipment. After milking, the cows return to free stalls, to a loafing yard, or to pasture.

Silage and Silos

Most dairy farms once used tower silos to ensile corn which was cut green and then chopped. Tower silos were first introduced into the US in 1873, but few new tower silos have been built since the 1970s, as in-ground or pit silos are more cost-effective. Pit silos are essentially wide trenches dug into a hillside. These can be filled with chopped vegetation and then covered with black polyethylene sheeting, which is almost always kept in place with used automobile tires (Figure 3:11). Some

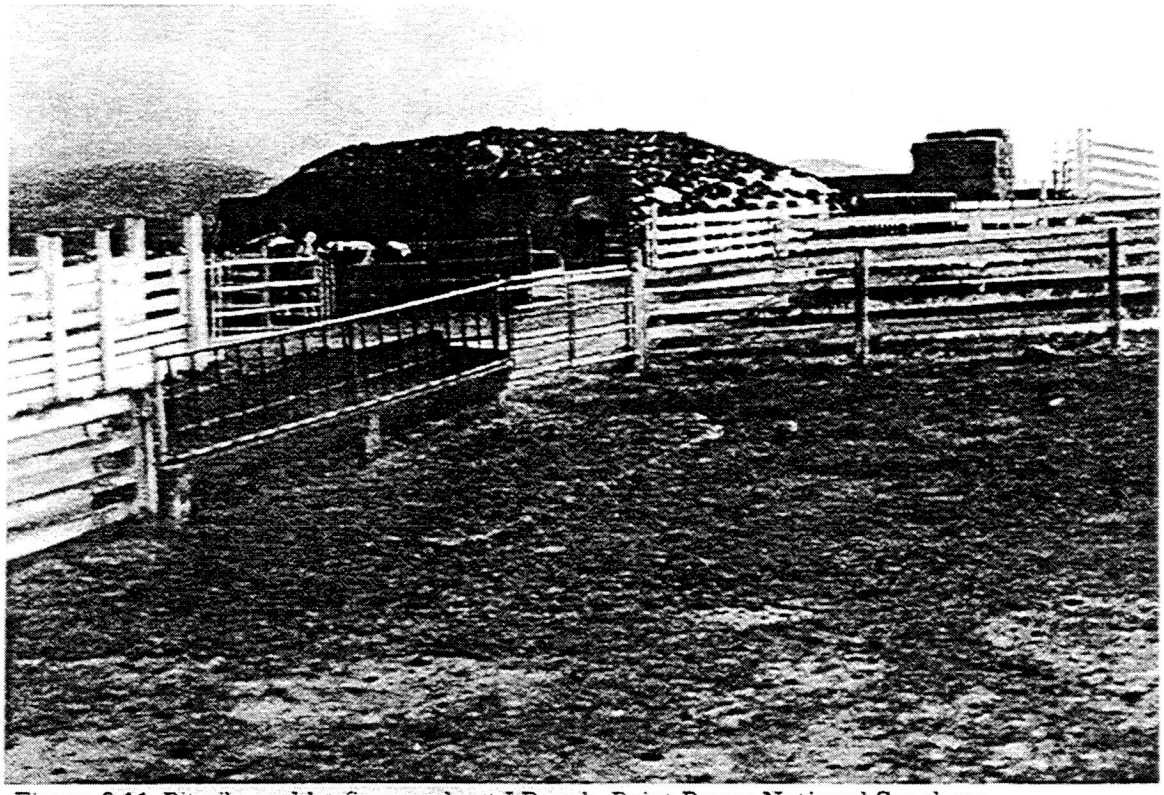


Figure 3:11 Pit silo and loafing yards at I Ranch, Point Reyes National Seashore.

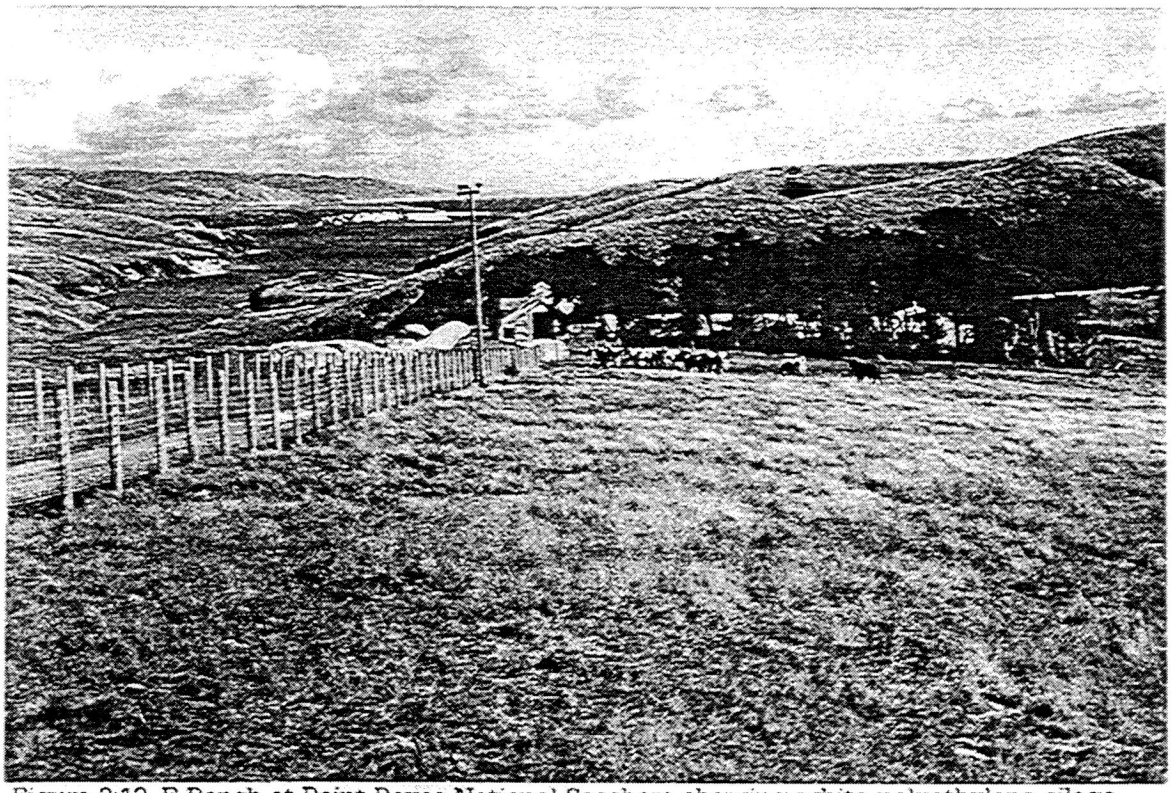


Figure 3:12 E Ranch at Point Reyes National Seashore showing white polyethylene silage stockings to the left of the ranch buildings. Drakes Estero is in the distance.

of the dairy ranches at Point Reyes National Seashore now have pit silos and others use white silage stockings (Figure 3:12). As herd sizes increase, dairy farmers need more silage for winter feed. At Point Reyes National Seashore supplemental feed is now needed to carry the cows over the dry summer months, and it has become necessary to impose a restriction of 1,500 total acres of crops grown for ensiling since this was not an historic use, and instead some farmers have to buy alfalfa hay.

Until the introduction of silage, which is both bulky and highly nutritious, livestock were usually fed either hay or corn fodder and a concentrate grain in the winter. Some hay was made from small grains such as oats, cut green. Corn that is grown for silage has a very different appearance than corn grown for grain and dry fodder. Corn to be ensiled is cut before the ears are fully formed and while the whole plant has a high protein content. Only a short stubble remains after harvest. Corn that is to be fed as fodder is either shocked (Figure 3:13) in the field or left standing and cut as needed. These were the corn stalks mentioned in accounts of the Civil War battles at Shiloh and Pea Ridge. In these cases, the historic cultivation method may be as important as the crop itself. In some areas, natural vegetation provided winter fodder. For instance, the canebrakes at Cowpens were considered excellent winter fodder for cattle.

Hay

Hay was either stacked in the fields or stored loose in the loft of the barn. There have been many devices invented for handling hay. In 1864 a harpoon for lifting hay was patented by E.L. Walker. But the introduction of hay balers brought the greatest change. The first of these was stationary and was patented by P.K. Dederick in 1872. There is a stationary baler at the Hubbell Trading Post National Historic Site. These made handling and stacking hay much easier, but the density of bales was much greater than that of loose hay. As a result, care must be taken not to overload barn haylofts. Figure 3:14 shows a nineteenth century barn at Ebey's Landing National Reserve. The load of baled hay caused the floor of the hayloft to collapse, popping out the gable of the barn. It is to prevent overloading that, at Gettysburg National Military Park, those leasing historic barns must follow guidelines on loading hay.

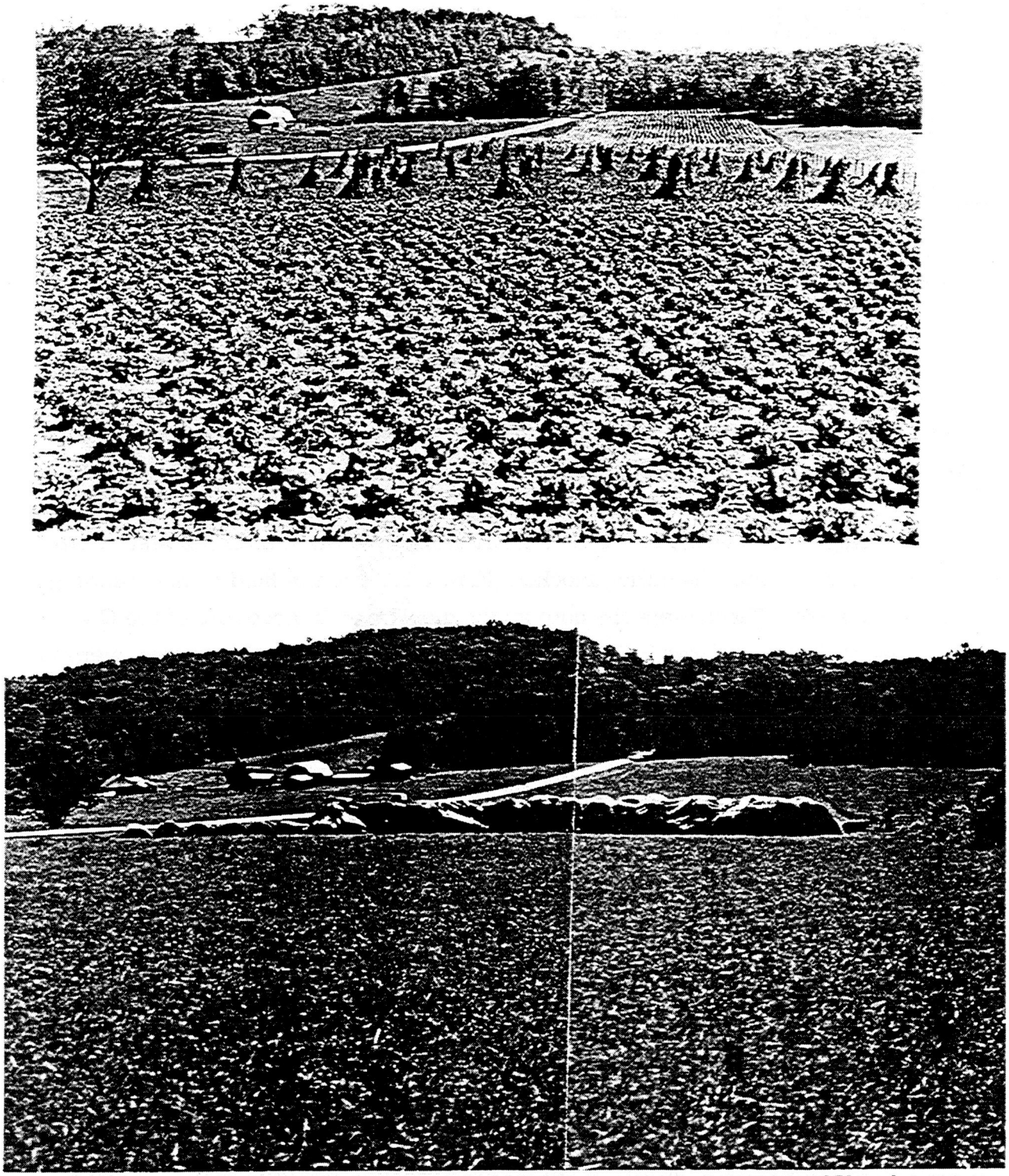


Figure 3:13 Comparative views on the Blue Ridge Parkway taken in September 1953 and June 1993 at Volunteer Gap looking north. Notice that by 1993, hay has replaced shocked corn for fodder. The round hay bales are being stored outside on pallets covered with black polyethylene sheeting.



Figure 3:14 The historic Arnold Barn at Ebey's Landing National Reserve has partially collapsed under the weight of hay bales.

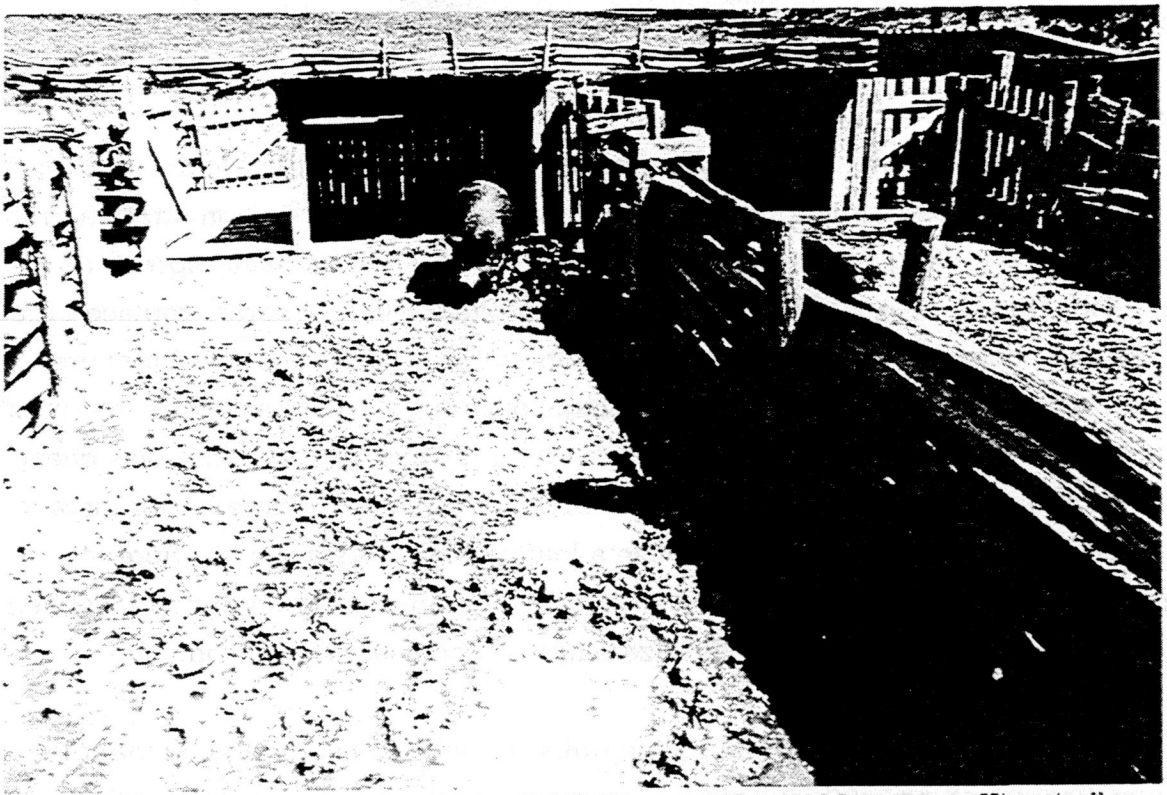


Figure 3:15 Hogs are enclosed at Booker T. Washington National Monument. Historically, they would have been confined only when being fattened.

During the 1960s, round balers that rolled hay instead of packing it into rectangular bales, were widely adopted. Round balers made it feasible for one person to cut, turn, bale, and store hay. In fact several farmers who were interviewed complained that farming has become a lonely occupation. The round baler also has serious implications for the future of traditional two story barns. Because the hay is rolled, it sheds water like a thatched roof and, in most climates, the amount of wasted hay may be acceptable when bales are stored outside (Figure 3:12). Even in high rainfall areas, such as the Blue Ridge, where waste is greater, farmers prefer to build open-sided sheds into which they can run a tractor loaded with a large bale. The heavy weight of these bales is a problem in two story barns. One farmer on the Blue Ridge Parkway explained, "You've got to have a strong floor because the tractor weighs about 3 tons, and then a round bale is from 850 to 1250 pounds." As a consequence, two story barns are no longer used for hay storage, unless a farmer continues to make some rectangular bales. Fortunately, most horse owners still prefer small, rectangular bales which can be fed by hand.

Manure

Horses, mules, and other draft animals were usually stabled year-round so they could quickly be readied for work. They were usually bedded on straw and this, together with the dung was forked onto a manure heap before being spread on the fields. Cleaning the barn and stables was tiring work. When tractors replaced draft animals and concrete floors replaced dirt floors in barns, solid farmyard manure and the old muck-spreader wagons became things of the past. Farmers could not justify the labor cost of handling farmyard manure when nitrogenous fertilizer was cheap. At the living history farm at Booker T. Washington National Monument for instance, the horses are no longer stabled, but use a loafing shed. As a result, there is insufficient manure to maintain the productivity of crops as there would have been in the historic period, and synthetic fertilizers have to be used in addition.

On modern dairy farms and swine units, manure is nearly always handled as a slurry, hosed and scraped out of buildings and concrete yards into a settling lagoon. After a period of decomposition, effluent water is sometimes discharged into a second lagoon or an artificial marsh system. Some farmers pump slurry from the

lagoon to irrigate their fields. Local and state requirements for treating farm effluents are rapidly becoming more stringent, and the cost of treatment is rising.

Confined Livestock Operations

Livestock operations are becoming increasingly intensive. Dairy, feeder, and layer operations typically have large numbers of animals confined in buildings or, in the case of cattle, in yards. Caged-layer chickens, broiler chickens, pigs, veal calves, and even larger dairy herds are kept completely indoors. These operations are designed for minimum input of labor, they are capital-intensive and are sensitive to economies of scale. The concentration of animals may be very large. Not only has the disposal of manure become a problem, but the smell causes complaints from local residents especially when buildings are cleaned out.

The presence of large, confined feeder operations in the vicinity of some parks is causing concern about water pollution. For instance, water quality in the tributaries of the Buffalo National River is lower than in the main-stem of the river. This is attributed in part to effluents discharged from feeder hog and poultry operations in the area. Confined livestock operations, including dairies with large herds, are specifically excluded from the park. Today it is becoming unusual to see farm animals except beef cattle and pleasure horses in the countryside. Sheep are rarely confined, but the problem of predators, particularly dogs, has become so acute that sheep are not a viable enterprise in many areas. Sheep were important on farms along the Blue Ridge Parkway in the 1930s but most farmers interviewed said roving dogs made them give up on sheep.

Fencing

Fencing has changed drastically, both in function and in method of construction since the historic period of most parks. Fences today enclose livestock rather closing them out. At the Virginia tobacco plantation where Booker T. Washington spent his childhood, hogs were allowed to forage in the woods, although they were probably confined in pens for fattening. Today, however, the hogs on the living history farm are enclosed (Figure 3:15). Fite notes that Southern states began passing fencing laws in the 1860s, but that they were not effective or widely enforced until well into the twentieth century. Farmers fenced in crops to prevent damage

from livestock. The freely ranging livestock made it impossible for farmers to improve their breeds. The extreme uniformity of most dairy herds and purebred beef herds seen today is a recent phenomenon. Open range also meant that woodland was heavily browsed giving it a very open appearance, often with a distinct browse line (Figure 3:16). In a few cases, this openness was an historic feature of significance in parks, as at Chickamauga and Chattanooga National Military Park, and Cowpens National Battlefield.

Wooden rail fences, post-and-rail, post-and-board, and jack-leg fences are usually built in increments of ten to twelve feet and can follow an irregular boundary. Rail 'worm' fences and jackleg fences can be built on rocky or frozen ground, as worm fences have no posts, and the posts of jackleg fences do not penetrate the ground. Many parks still maintain some types of historic fencing. The jackleg fences at Grant-Kohrs Ranch National Historic Site are a good example of a historic fence type that is still functional (Figure 3:17). In most parks however, the traditional fences are no longer functional. This applies particularly to the worm rail fences, many miles of which could once be seen along the Blue Ridge Parkway and in many other parks where they were used historically. These fences were often built of chestnut and had a long life expectancy, but with the disappearance of the chestnut, maintaining these fences is a problem. Some parks, including Gettysburg National Military Park use treated lumber but many others do not. At Stones River National Battlefield, locust or red cedar poles are cut from the park's woodland for fencing. This is also being considered at Pea Ridge National Military Park.

The introduction of wire revolutionized fencing. The Glidden patent on barbed wire was issued in 1874. Barbed wire not only had an extraordinary impact on range management in Western states but on farm management in the rest of the country. Wire fences are tightened between braced posts that may be up to several hundred yards apart. Consequently, fences must be installed in a series of long straight runs. Between the posts it is sufficient to have light posts or only spacers to keep the wires evenly separated. Historic field boundaries often went around irregularities which may be difficult to avoid using modern, high tensile wire fencing. The technology used for temporary fencing on farms has also seen tremendous advances in the last 20 years. This has mostly been in response to intensive grazing systems in which

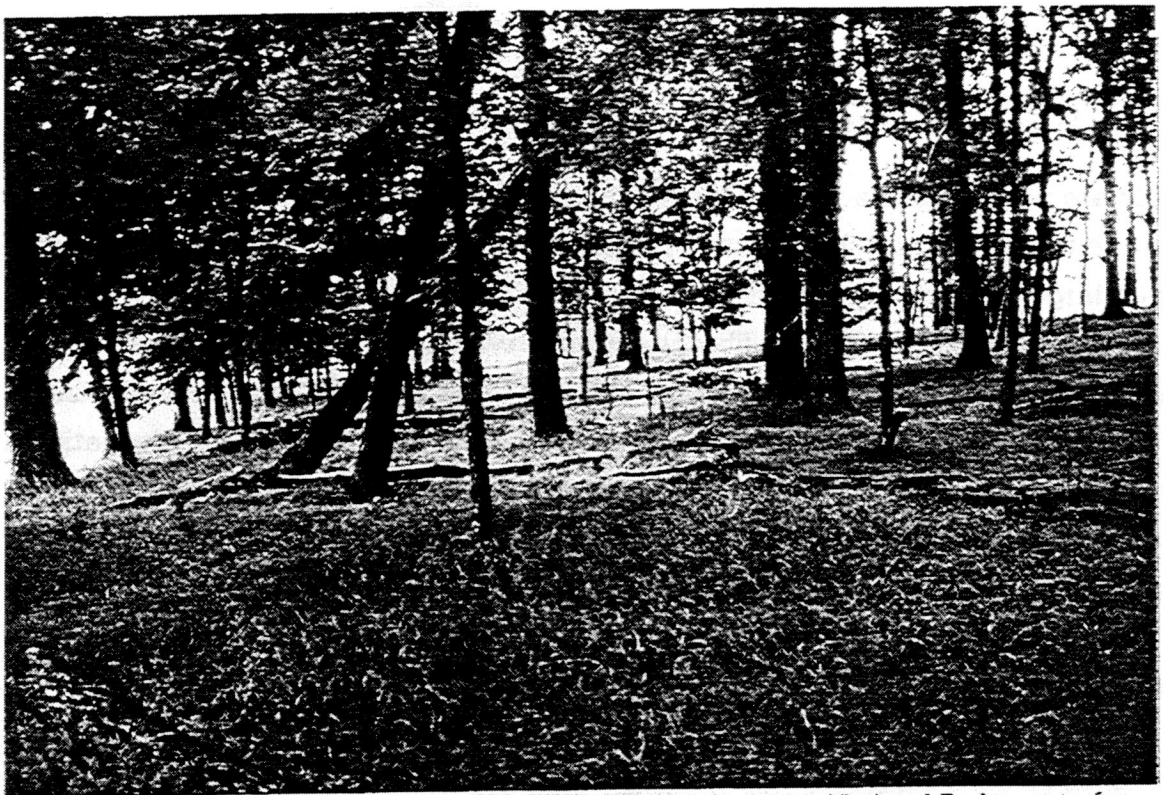


Figure 3:16 Woodland at Cades Cove in Great Smokey Mountains National Park, west of Hyatt Lane. The vigorous grass in the herb layer shows the effects of past grazing and continued browsing. Cattle no longer have access to this woodland, but browsing by deer keeps the understory clear.



Figure 3:17 Jack-leg fences at Grant Kohrs Ranch National Historic Site. These fences withstand frost-heave and snow-drifting well and are both historically correct and functional.

animals are pastured in a relatively small area of fresh grass each day. This allows the forage to recover rapidly. Electric fencing accomplishes this by "folding" animals across a large pasture. Often only a single strand of woven nylon and wire tape is used. It is strung between slim fiberglass posts which can be pushed into the ground by hand. In most parks, farmers still use large pastures, but recently an application has been received from a farmer in Boxley Valley of the Buffalo National River to subdivide a large pasture into paddocks. Small paddocks are sometimes fenced with permanent fencing with water tanks in each paddock, or with temporary electric fencing and a moveable water tank.

Watering Livestock

One of the problems with permanent watering places is that cattle, which are habitual animals, wear paths across the pastures to the tanks. These paths also tend to radiate from mineral blocks so that at least one park, Buffalo National River, requires that blocks be moved regularly. Watering livestock is a serious problem in several parks because of concerns about water pollution. In hot weather, when cattle or horses are permitted access to streams or ponds, they will loaf in the water, especially in the shade. As a result some parks, including Boxley Valley at Buffalo National River (Figure 3:18) and Cades Cove in Great Smoky Mountains National Park, now require that farmers fence off riparian zones. This presents the problem of how to water the cattle. In some cases, it is possible to collect water at a spring or small stream and pipe it downslope to a water tank as is done at Point Reyes National Seashore (Figure 3:19). Or it may be possible to pump ground water into a tank. In remote areas, windmills were used for this purpose and occasionally still are. Solar-powered pumps may also be feasible in some areas.

IMPACTS ON FARMING COMMUNITIES

Rural Depopulation

As farms grew in size and machines were substituted for labor, many farmsteads were abandoned, and rural populations dwindled. These problems can be seen frequently in areas adjacent to parks. Empty farmsteads are a particularly serious problem in parks where farming is marginal. At Sleeping Bear Dunes National Lakeshore, the poor sandy soils are very unproductive and support no viable farming enterprises. As a result, the park has had to assume the responsibility for managing



Figure 3:18 A pasture in Boxley Valley on the north bank of the Buffalo National River. A new fence (arrowed) has recently been constructed to create a riparian buffer along the river.

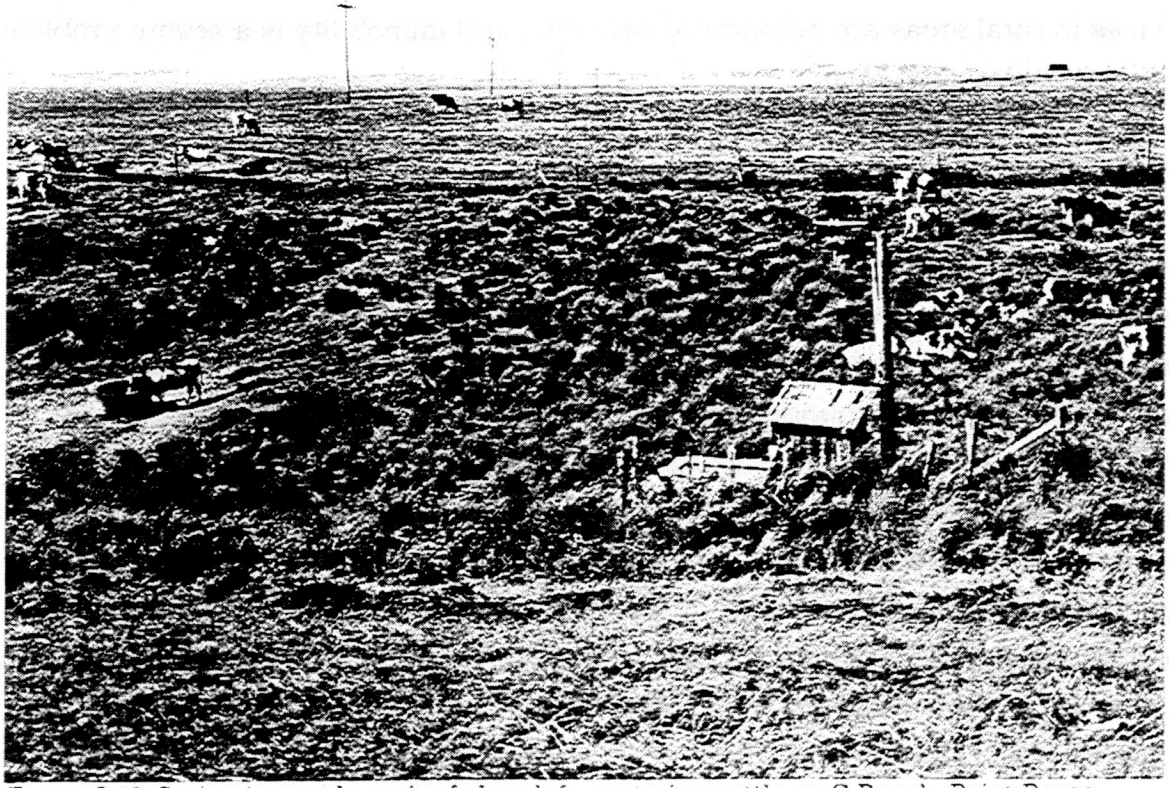


Figure 3:19 Spring box and gravity-fed tank for watering cattle on C Ranch, Point Reyes National Seashore

most of the previously farmed land in the park (Figure 3:20). As a rural community loses population, it loses not only it's vitality but also services and institutions. In some areas, there is an influx of new non-farming residents. These newcomers may hold very different values from the farming community, and in some cases have taken steps to stop farming practices that are seen as undesirable.

Rural depopulation has caused the collapse of many rural institutions such as the Grange, rural cooperatives and social organizations. Some, including the Farm Bureau are still active, but rely increasingly on activities such as providing insurance for non-farm rural residents.Rural depopulation has caused the collapse of countless rural businesses and services. It is surprising but delightful to see a traditional feed-mill still operating in the Cuyahoga Valley National Recreation Area, but it is one of a rapidly dwindling number in the nation (see Figure 3:21). Farmers routinely have to drive long distances to get a part for a tractor, because there is no longer that critical mass of farming in the area to keep an farm machinery dealer in business. Health services in rural areas are notoriously deficient, and immobility is a severe problem for some, particularly the elderly.

CONCLUSIONS

Labor efficiency, specialization, and economies of scale are three factors that have changed the face of farming in America. Mechanization, and changes in handling and storage systems have made most traditional management techniques obsolete and many previously functional components of agricultural landscapes defunct. Some of these changes have resulted in agricultural systems that are unsustainable and some that are polluting. Many of the principles of sustainable agriculture are based on the model of mixed rotational farming, which achieves weed and pest control without excessive use of chemicals, utilises manure and residues to minimize synthetic fertilizers and non-point pollution, and relies on economies of integrated use rather than striving for economies of scale. The agricultural systems in many of the parks during their historic periods were often loosely based on the principles of mixed rotational farming. However there are several obstacles to the use of the model for farm management today.



Figure 3:20 Farmers adjacent to the park at Sleeping Bear Dunes National Lakeshore are struggling to make a living on the poor sandy soils. Many of the farm buildings are in disrepair and are likely to collapse within ten years.

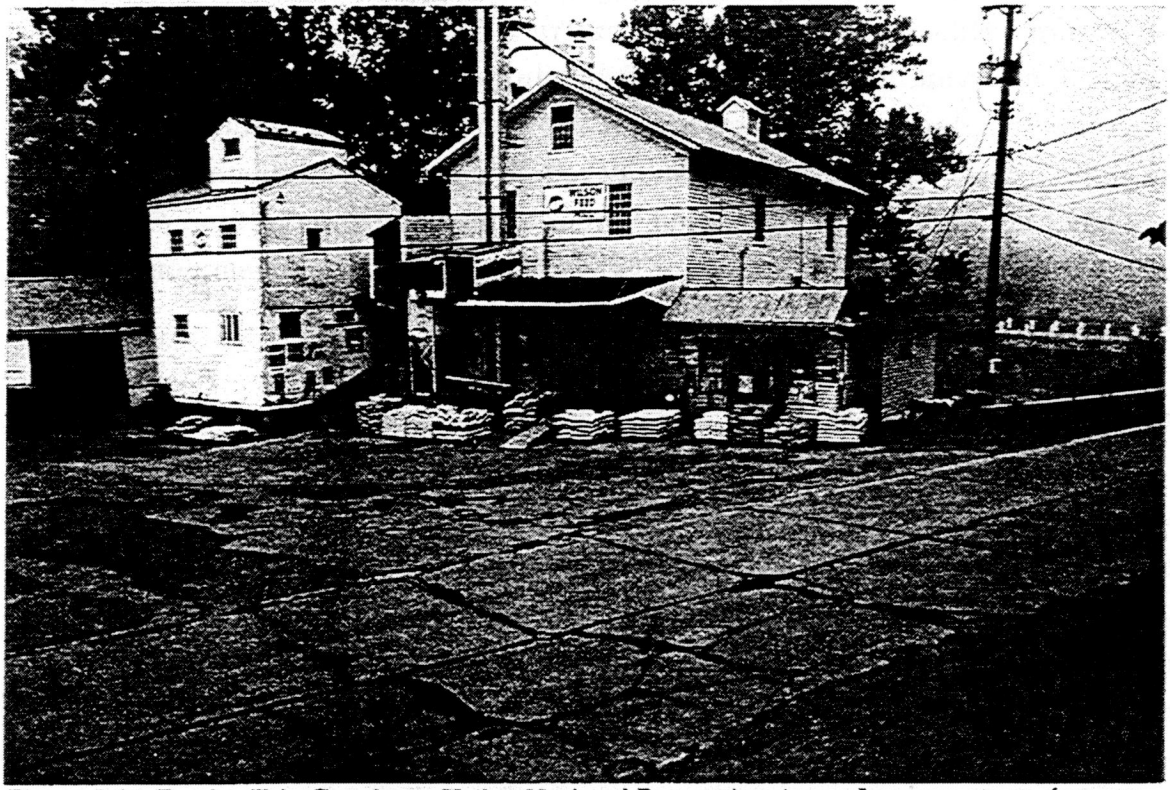


Figure 3:21 Feed mill in Cuyahoga Valley National Recreation Area. In some areas, farmers no longer have access to agricultural suppliers and services.

Specialization and Economies of scale

The most serious disincentive to mixed rotational farming is that economies of large scale production methods cannot be fully realized. In an industry where marginal returns are tiny, this is usually critical. Large scale production can be achieved by an independent farmer only by specializing. But specialized systems are inherently unstable and, for that reason, corporations involved in farming diversify their interests. Mixed rotational farming systems have built-in diversity, but independent farmers, with limited access to capital, cannot hope to diversify and be competitive with a farmer who specializes in one enterprize.

Lack of Alternative Crops to Use in Rotations

Regional specialization means farmers can grow profitably only those crops or livestock that are well-suited to the region. As a result, only a few crops are economically viable, and farmers sometimes cannot find several crops to rotate. The situation has made it difficult to lease some farmland in the parks. An example is the Mississippi Hills Section of the Natchez Trace Parkway where the price for soybeans, a crop that has been grown widely in the past, has been so depressed that the park has had to assume several of the leases. An added disincentive to rotational farming is that each crop usually requires specialized machinery and the capital cost may be too high for a small farmer to mechanize more than one crop. Livestock enterprises also require either heavy front-end capital investment in livestock or many years to breed an economically viable size herd.

Livestock in Rotations

Only a rotation which includes both livestock and crops allows a farmer to take advantage of efficiencies of integration, such as the use of animal manures on crops, grazing as a technique to control arable weeds, and less reliance on expensive agricultural chemicals for pest control. But in fully integrated rotational systems, every field must be fenced, and the cost will be a serious disincentive for many farmers. As a result, fully integrated rotational systems are rare, and have given way either to specialized systems or drastically simplified crop rotations. Some farmers, for instance will rotate hay with tillage crops as neither require fencing. As a result, in the Delaware Water Gap National Recreation Area all fences have been taken down as rotations no longer include livestock. The reintroduction of grazing would present

present two obstacles. The first is how to ensure that the livestock do not pollute the river. This could be prevented, but would require fenced riparian buffers. The second is that there are few resident farmers left in the valley who could keep an eye on the cattle. Similarly, rotations at Gettysburg National Military Park no longer include animals, and as a result, fencing has been taken down in some parts of the battlefield. Timothy or alfalfa grown for hay is rotated with corn, sorghum or small grains for ensiling, and field paterns have changed as a result.

In spite of the constraints discussed above, the principles of mixed rotational farming provide the most valuable guidance in seeking management solutions for agricultural resources in many units of the national park system. The principles promote responsible and sustainable farming, and generally are more appropriate in historic parks than specialized, large scale systems.

NOTES

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CHAPTER FOUR
REGULATION AND SUPPORT OF AGRICULTURE

Among the most important agents of change in agriculture are government price support programs, and various environmental laws and regulations. Until recently, the farming industry faced little regulation. Although it might be assumed that farmers would have adopted sustainable long-term systems, this was not always the case. In fact poor farming practices were common because of the perception of limitless land. Although the limited supply of prime farmland is now well understood, and farming practices are closely scrutinized by the Natural Resources Conservation Service, farming methods have also changed, with the result that problems of water pollution, erosion, and the contamination of the environment by agricultural chemicals have become inherently more difficult to control. Nuisances such as smells and noise are more problematic particularly in urbanizing areas. As a result, agriculture is now quite highly regulated.

Farming is an atomistic industry, that is each producer is too small to be able to influence total production or the price of a product. American farmers are extraordinarily industrious, efficient, and competitive, but they are also independent souls and not inclined to act together to affect prices. On the other hand, farmers know that they can affect their own production costs and they will adopt a new technology in the hope that they can reduce costs and improve their individual competitiveness. The combination of ever-smaller marginal returns for their products and the economic instability brought about by specialization, made the economic livelihood of farmers extremely precarious and led directly to federal price supports in agriculture. These supports vary from year to year, and sometimes make long-term planning impossible. While price supports have enabled some smaller farmers to remain in business, they have been unpopular with those farmers who are best able to compete.

ENVIRONMENTAL LAWS AND REGULATIONS

In 1850, about 80 percent of the land area of the US was government owned.[1] Until the turn of the century most of the laws which had to do with agriculture were designed to promote, encourage and, in some cases, regulate the settlement of the land. The best known of these laws is the 1862 Homestead Act in which Congress

offered 160 acres of the public domain to any person who would pay a $10 registration fee and live on the land for five years. There were also a series of Reclamation Bills, many of which were specifically about building water supply reservoirs and distributing water rights. In 1902 the chairman of the committee overseeing the first Reclamation Bill assured Congress that no one individual would receive more water than was needed to irrigate 160 acres.[2] This assurance was not honored. By 1920, it was necessary to impose restrictions that kept some government lands in public ownership.[3]

Before 1870 the calls for conservation were mostly from a few individuals, but by 1872 the government had set aside 2 million acres as Yellowstone National Park, marking the first wave of resource conservation in the United States. But this action was taken in large part because Congress saw the land as having little agricultural value.[4] However, even semi-arid range land was being utilized by ranchers in Western states, and with the introduction of barbed wire in the 1880's, cattlemen began to fence vast areas of public land. The Taylor Grazing Act of 1934 was enacted by Congress to regulate grazing on public lands, but it had little effect for another 40 years as the Bureau of Land Management was under funded and had no enforcement authority.[5] In 1905, Congress created the US Forest Service to manage and protect forest reserves using the principles of sustainable yield and multiple use. Although Yellowstone National Park had been set aside in 1872 it was not until 1916 that Congress saw the need to create a park authority when the National Park Service Organic Act was passed. At this time agriculture across the United States was developing at an astonishing rate.

Protection of the Quality of Food

The government began to regulate the safety of food in 1906 when the Pure Food and Drug Act and the Meat Inspection Act were passed. The Pure Food and Drug Act impacted the practices of dairy farmers and the design of dairy barns. Changes to the buildings on the historic dairy ranches at Point Reyes National Seashore were required to meet health regulations. When the main products of these ranches were butter and cheese, a by-product was a large amount of skim-milk. Traditionally, this was fed to hogs but regulations effectively outlawed hogs on dairy farms, and all facilities for hogs were closed. Sanitary dairy barns with concrete

floors were also required, and some of the ranches built new barns rather than adapting the old. Very few dairy farms in national parks have survived. Generally regulation of the livestock industry, particularly dairying, has placed more of a burden on the small farmer than on large operators. Today, the use of antibiotics and other drugs for dairy, meat, and egg producing animals is also closely regulated. Marketing regulations for dairy and meat products have made direct sales difficult and this option is no longer practical for most small farmers.[6]

The Protection of Wildlife

Congress also turned it's attention to protecting wildlife, and some measures affected agriculture. The earliest efforts to protect wildlife were to set-aside habitat often for a particular species. The Waterfowl Refuge Lands were purchased with money from duck hunting licenses. The 1937 Federal Aid in Wildlife Restoration Act, levied a federal tax on the sale of guns and ammunition to purchase land for wildlife refuges.[7] In fact, the use of Wildlife Refuges is only partially restricted for other uses if the Department of the Interior finds such uses compatible with the purposes of each unit. Unfortunately, guidelines for the use of refuges have not been developed and a 1986 Fish and Wildlife Service study showed that one of five refuges were contaminated with chemicals, much of it originating from adjacent farmland.[8]

The federal government has primary responsibility for managing migratory species, endangered species and wildlife on federal land. States are responsible for the management of all other wildlife.[9] It is clear that the focus of these early measures was to protect game species of wildlife. But even today, only ten percent of government wildlife dollars are spent to study or benefit nongame species, which make up nearly 90 percent of the country's wildlife. Between 1960 and 1980, several pieces of environmental legislation were enacted starting with the Wilderness Act of 1964, which affected agriculture only marginally. As with previous wildlife protection legislation, the focus was on setting aside land to protect wildlife species, but the focus shifted from the protection of single species and their habitats to whole communities and ecosystems. The Endangered Species Act of 1973 (amended in 1982 and 1988) is under constant threat of repeal, especially in circumstances where wildlife conservation requires the protection of large tracts of habitat which have an

economic value for crops, ranching or other uses. This is seen as an infringement of private property rights.

Canada, the United States and Mexico have signed agreements to limit habitat destruction and to prevent over-hunting of migratory waterfowl. Since 1972, the estimated breeding population of North American ducks has dropped 38 percent because of drought in the breeding areas and degradation and destruction of wetland and grassland habitats by farmers.[10] Wetlands near cropland are also exposed to pollution from pesticides and other chemicals in irrigation runoff. In recent years the loss of wetlands to agriculture has slowed dramatically as a result of the Swampbuster and the Wetlands Reserve Programs. The current administration estimates the current rate of loss at 31,000 acres per year, which is 80 percent less than in the late 1970s and early 1980s.[11] In addition, the 1996 Farm Bill authorized $197.5 million for ten year voluntary contracts for farm conservation plans that address soil, water and wildlife habitat concerns.[12] The Wildlife Habitat Incentives Program also provides for cost-sharing assistance for landowners to improve wildlife habitat.

The National Park Service and its permittees are required under the Endangered Species Act to ensure that their activities will not jeopardize the existence of any endangered or threatened species. These activities include farming, and guidelines specifically list wildlife impacts as a consideration for agricultural use.[13] Adverse impacts have led to the withdrawal of some agricultural permits along the Blue Ridge Parkway and restrictions being placed on permits in several other parks.

Most agricultural weeds are exotic species and some spread into adjacent natural areas. Wild fauna and flora may be threatened by competition from introduced exotic species, and care must be taken to prevent invasion of natural zones in parks. Executive Order 11987 (Exotic Organisms) requires federal agencies to "restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own or lease." To this end, guidelines specifically address the problem of exotic species.[14]

Erosion control

Erosion control also demanded the attention of the federal government in the 1930s.The Soil Conservation Service (SCS), was created in 1935, largely in response to acute erosion caused by poor farming practices. This agency, working through local offices in each county, had immediate success in reducing erosion. Since its creation in 1935, the Soil Conservation Service has been promoting soil and water conservation on farms, mostly through demonstrations and cost-share programs for diversions, terraces, etc. The Soil Conservation Service, recently reorganized as the Natural Resources Conservation Service (NRCS), estimates that there are more than 334 million acres of highly erodible farmland in the country of which 118 million acres are cropland. One in every four acres of cropland is classified as "highly erodible." In the past, by allowing farmers to include highly erodible cropland in their base acreage without requiring soil protection, some USDA farm programs have actually promoted soil erosion and over production of surplus commodities.[15] Highly erodible land is defined as land whose potential erosion is more than eight times the rate at which the soil can maintain continued productivity. More recently, the NRCS have also been implementing the Conservation Reserve Program. This effort to reduce erosion and restore overworked cropland has the double benefit of reducing crop surpluses.

The effectiveness of efforts to control erosion was greatly increased by the "conservation compliance" provisions of the 1985 Food Security Act which deny USDA farm benefit payments in event of non-compliance. The Sodbuster provision denies USDA benefits to farmers who plow highly erodible land, and the Swampbuster provision denies benefits if wetland is converted to cropland. Farmers must have developed and applied an approved conservation plan to all highly erodible fields by January 1, 1995, or risk losing their benefits. Conservation plans normally include a range of "Best Management Practices" (BMPs) for erosion control. Price support benefits, are being phased out over seven years under the 1996 Farm Bill, and it remains to be seen whether, as the incentives for farmers to comply are reduced, conservation farming suffers a serious setback. The Environmental Quality Incentive Program is targeted to assist farmers with difficult soil conservation and water quality problems and may prove to be an effective alternative.

Government set-aside programs have also caused significant changes in the landscape of some parks and on adjacent lands. Various programs to encourage farmers to plant trees on highly erodible land resulted in the cropland adjacent to the Mississippi Hills area of the Natchez Trace Parkway being planted in loblolly pine (Figure 4:1). This has had two serious consequences. First, the adjacent farmers who signed up for a set-aside program (the Conservation Reserve Program in this case) no longer wished to lease the farmland along the parkway. As a result, the park found it increasingly difficult to lease land in this region and has had to assume the responsibility of managing some of the land. Second, since the land adjacent to the parkway is forested, leaving only the parkway land in agriculture, the park boundaries have become visually very prominent and the visitor has the impression of driving a corridor with broad grass shoulders.

Water Pollution Control

There are four major sources of water pollution from agricultural land. The first is soil eroded from farmland. Mineral sediments reduce light penetration, kill stream organisms and clog lakes, and nutrients or pesticides attach to eroded soil particles. The second source is fertilizers, pesticides or animal manures that run off farmland into surface water or are leached out of the soil into groundwater (Figure 4:2). Thirdly, there are effluents from animals confined in buildings, or in loafing yards. The fourth source of pollution is from livestock with direct access to streams where they drink but then are inclined to loaf in shady areas. With the exception of some discharges from confined animal units, these are all "non- point" sources of pollution.

The Clean Water Act of 1969 has not been effective in controlling non-point agricultural pollution. It has been estimated that agriculture is responsible for 64 percent of the total pollutants entering streams and rivers.[16] Non-point pollution is covered in Section 319 of the Clean Water Act, but participation by farmers in Section 319 programs is entirely voluntary. The federal government may provide states with funds to address non-point pollution problems and for the demonstration of Best Management Practices (BMPs). Both the Conservation Reserve Program and the Wetland Reserve Program are intended to reduce non-point source water pollution, but the most effective programs have been the conservation compliance provisions of the 1985 Food Security Act.

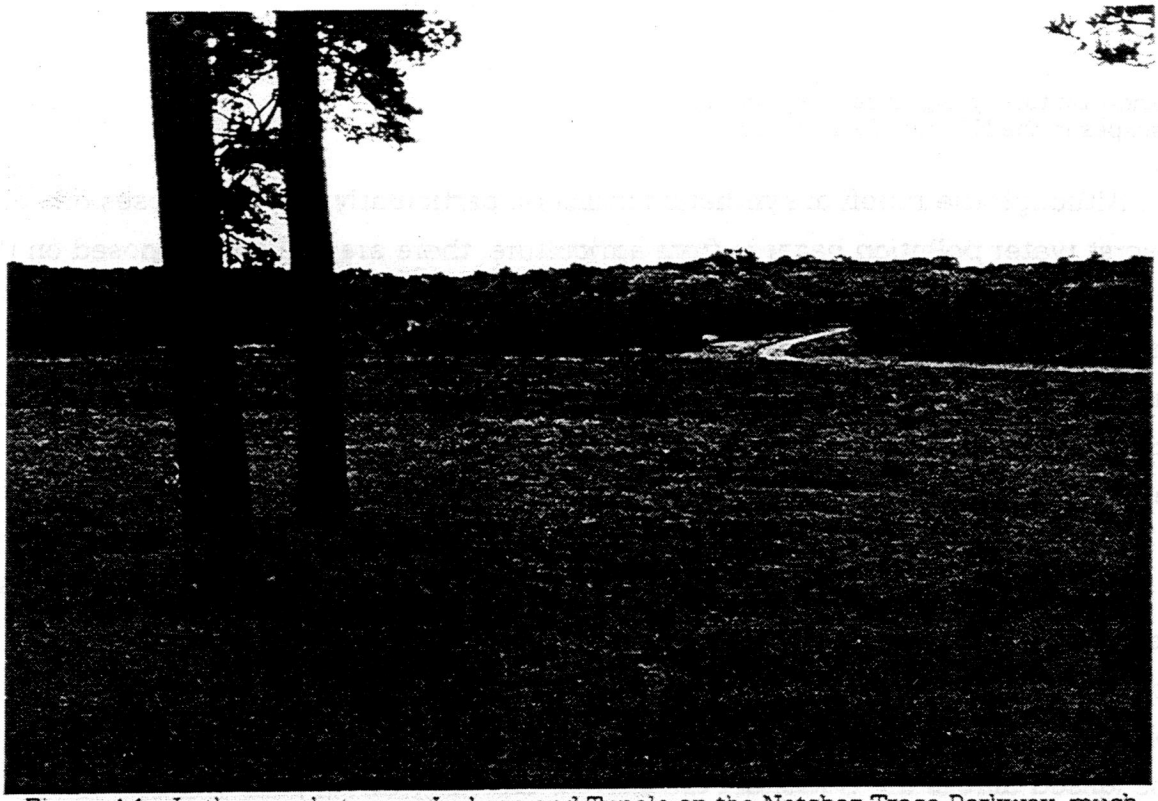


Figure 4:1 In the area between Jackson and Tupelo on the Natchez Trace Parkway, much of the adjacent farmland is growing up in pine which makes the park boundary obvious and sometimes visually intrusive.



Figure 4:2 Grant-Kohrs Ranch National Historic Site. There is concern that calves confined in these enclosures with direct access to Cottonwood Creek are causing pollution problems.

Although the runoff of synthetic fertilizers, particularly nitrogen, poses one of the worst water pollution hazards from agriculture, there are no limits imposed on the use of fertilizers. The supposition that farmers will apply only what is necessary is not always true. The European Community (EC) has been experimenting with controls on the use of nitrogenous fertilizers in "Nitrate Sensitive Areas", but it is not yet clear how successful this program has been. The American Farm Bureau Federation is opposed to any legislation that would regulate the use of fertilizers.[17]

The Safe Drinking Water Act of 1974 requires EPA to establish drinking water standards. Most farms have privately owned wells and these are not required to meet federal drinking water standards. However, farm wells in national parks that are federally owned must meet these standards. If they do not, the farmstead may not be leased unless the National Park Service can provide piped water service. The National Park Service are under additional pressure to comply with all pollution control standards by Executive Order 12088 which specifically directs appropriate action be taken to "prevent, control or abate environmental pollution" on federal properties.

The Wild and Scenic Rivers Act of 1968 established the Wild and Scenic River System. Provisions of this act require measures to protect the rivers from non-point source pollution. Some rivers are administered by the National Park Service and where there is a conflict between this act and National Park Service legislation, the more restrictive provisions apply.[18] The Delaware River in the Delaware Water Gap National Recreation Area and the Buffalo National River which includes the Boxley Valley historic district are both part of the Wild and Scenic River System. In both parks, managers are taking steps to protect against non-point source pollution from farming activities.

Use of Pesticides

The Environmental Protection Agency (EPA) under the provisions of the 1972 Federal Insecticide, Fungicide and Rodenticide Control Act (FIFRA), were able to ban some pesticides that were causing the most serious environmental hazards. This action directly affected farmers. The USDA estimates that less than 2 percent of pesticides applied by air or ground spraying reach their target. Concentrations of

slowly degradable fat-soluble insecticides (most notably the chlorinated hydrocarbons) can be biologically amplified thousands or millions of times in food webs.[19] The US Fish and Wildlife Service estimates that pesticides pose a danger to about 20 percent of the endangered and threatened species in the United States. The FIFRA requires that all commercial pesticides be approved for general or restricted use by the EPA. The law required testing of 600 active ingredients in pre-1972 pesticide products to determine whether they posed health risks, but so far less than ten percent have been evaluated.[20] The National Academy of Sciences has noted that both the laws regulating pesticide use and their enforcement are inadequate.[21]

Integrated Pest Management (IPM) techniques do not rule out the use of pesticides, but recommend them only as a last resort, as a part of an overall program using cultivation and biological methods in proper sequence and with proper timing. Each crop and its pests are evaluated as an ecological system. "The aim...is not eradication...but maintenance at just below economically damaging levels".[22] IPM can reduce pest control costs by 50 to 90 percent. One problem is that "farmers get most of their information about pest control from pesticide sales people and from county farm agents, few of whom have adequate training in IPM".[23] Only $16 million or one percent of USDA's budget is spent on IPM research while pesticide companies spend $1.7 billion annually on research and development. Environmentalists advocate placing a two percent sales tax on pesticides to fund IPM research and education, setting up an IPM demonstration on at least one farm in every county; setting up a government-backed crop loss insurance for those who use IPM; and phasing out subsidies for farmers who rely on pesticides once IPM methods have been tried and proven.[24] Some states have taken important steps in the development of IPM as part of a drive toward more sustainable farming. For instance, Iowa taxes fertilizers and pesticides and uses the revenues to support research into sustainable agriculture.[25] Under the 1996 Farm Bill, the National Natural Resources Conservation Foundation was established. This private foundation sponsors and advances innovative solutions in sustainable agriculture.

The National Park Service has committed to IPM throughout the park system, and the use of pesticides in parks is restricted (see Chapter 6).

Protection of Agricultural Workers and Park Visitors

The Occupational Safety and Health Act of 1970 established safety standards for workers. This act will to have minor impacts on agricultural management in a few parks. For instance, dwarf fruit trees rather than standard trees may be required if the fruit will be picked by farm workers. If the fruit is to be picked by visitors, the park could be liable for injuries under the Federal Tort Claims Act which requires landowners to take reasonable care to avert harm to visitors. The same act is used as justification for banning the use of electric fencing to confine farm animals in some parks, for fear of incurring liability claims due to the potential failure of heart pacemakers.

GOVERNMENT SUPPORT PROGRAMS

In 1914 the Cotton Futures Act was passed by Congress. It was the first intervention by the federal government in the marketing of farm products.[26] Farming continued to be plagued by destructive boom-bust cycles, but nothing much else happened until the 1930s when over-production severely depressed the price of many farm products, some to below the cost of production, causing extreme hardship for farm families. In order to maintain farm income, price supports and production controls for the principal agricultural commodities were introduced in 1933 when Franklin Roosevelt signed the Agricultural Adjustment Act into law. This Act survived without any fundamental modification to become the basis of agricultural policy until the 1996 Farm Bill, which phases out supports and controls.

Programs to support farm income

Government agriculture programs are primarily the result of the extraordinary ability of US farmers to produce enormous surpluses of crops, thereby depressing the prices. The Agricultural Adjustment Act "included direct government payments to individual farmers for reducing acreage, government loans on surplus crops..., support of farm crop prices at parity level, and establishment of acreage allotments and market quotas on basic crops...".[27] The focus of the act was to assure a reasonable living for farmers, tenants and farm workers, although in 1937 the President's Commission on Tenancy reported that the act was not benefitting either the tenant or the small farmer but "provided welfare for the rich and a market system for the poor".[28]

In the 1970s a global food shortage led the government to adopt a policy of "unleashing" agriculture from government controls. The 1973 Consumer Protection Act resulted in gross overproduction, lower prices for farm products and a national farmers' strike. This led directly to the passage of the 1977 Agriculture Act which continued the national government's role of providing price supports for major crops that were in substantial surplus. The Act also extended the Food for Peace foreign aid program, introduced in 1954 to direct some surplus agricultural products to needy countries. Congress has extended the Food for Peace program periodically since 1954.[29]

Until the 1996 Farm bill was passed, it was governmental policy to maintain a level of purchasing power for farmers comparable to that during a period that was favorable for agriculture. "Parity" supported price levels were determined by Congress and actual parity prices for specific crops determined each year by USDA, depending on supply and demand.[30] Price supports have generally ranged from 60 to 90 percent of parity. Since 1938, the purpose of the government's intervention in agriculture was not only to address the economic hardships of farmers, but also to assure a stable supply of food. The so-called "ever-normal granary" system provided for the accumulation of reserves of basic farm products by the government during periods of over-supply as a means of maintaining price levels.[31] The policy resulted in huge surpluses.

Government price supports for various crops have had an impact on agriculture in some parks. Farmers in the Natchez Trace Parkway - Delta Region, for instance, routinely plan their plantings based on the government's guaranteed prices. Wheat prices are published in September to allow fall planting, but prices for feed grains and other spring-planted crops may not be published until the end of February. As a result, the National Park Service had to modify the deadline for farmers to submit their cropping plans until after the commodity prices have been published. If the published price it is not acceptable to the farmer, it is difficult for park managers to require that crop to be used in a rotation.

Many of the recent USDA agricultural programs were designed to reduce surplus production and have environmental benefits. The Acreage Conservation Reserve (ACR) was one such program. Each year when USDA determined target prices, a target acreage was specified for each crop. For instance in 1994, cotton producers were required to reduce acreage by eleven percent of their crop acreage base. However, the environmental benefits of the ACR program were small because there was no mechanism for setting aside the most environmentally sensitive land. The 1996 Farm Bill "establishes conservation priority areas where significant water, soil, and related natural resource problems exist" and is generally intended to "improve the flexibility and efficiency of conservation programs".[32]

Conservation Compliance programs

The 1985 Food Security Act was a landmark in that it included a number of conservation provisions (which have been discussed under the heading " erosion control") and compliance was required for a farmer to remain eligible for farm support benefits. There was also financial support for specific conservation activities. The Conservation Reserve Program (which remains in the 1996 Farm Bill) essentially pays farmers a rental to withdraw highly erodible cropland from use and to plant it with permanent cover. Under the 1996 Farm Bill, up to 36.4 million acres can be controlled in the Conservation Reserve Program. The bill also allows early release for owners who entered into a contract before 1995 but lands with "high environmental value" are not eligible for early release.[33] Annual payments are based on a bid submitted by the farmer or tenant in his application. Farmers who have leased farmland are eligible to sign up, but owners and tenants are supposed to share rental payments "on a fair and equitable basis ".[34] The 1990 Farm Bill extended the concept of the Conservation Reserve Program to include wetlands. The program authorized USDA to restore wetland through permanent or long-term easements.

The Farms for the Future Program was authorized in the 1990 Farm Bill "to help states and local communities fund the purchase of agricultural conservation easements...to limit urban development while keeping land in agriculture."[35] However, very little money was appropriated for the program and it was not effective. The program has been superseded by the Farmland Protection Program in which USDA will join with state or local governments to purchase conservation easements.

$35 million has been authorized but whether appropriations are made in the future remains to be seen.[36]

NOTES

1. Miller, G. Tyler, 1994. *Living in the Environment*. Belmont, CA: Wadsworth Publishing Company. p.34.
2. Taylor, Paul. 1975. "The Battle for Acreage Limitation" in *The People's Land*. Peter Barnes, ed. Emmaus, PA: Rodale Press.
3. Plano, J.C. and M. Greenberg, 1985. *The American Political Dictionary*. NY, NY: Holt, Reinhart and Winston. p.446.
4. Miller, G. Tyler, 1994. *Living in the Environment*. Belmont, CA: Wadsworth Publishing Company. p.35.
5. Ibid., p.36.
6. The protection of food crops from pesticide residues is covered under the Federal Insecticide, Fungicide, and Rodenticide Act which requires that all pesticides be registered and used in accordance with the instructions.
7. Migratory Birds Hunting Stamp Act, 1934.
8. Miller, G. Tyler, 1994. *Living in the Environment*. Belmont, CA: Wadsworth Publishing Company. p.441.
9. Ibid., p.423.
10. Ibid., p.441.
11. USDA. 1995. "Improving and Protecting Water Quality in Georgia." Fact Sheet. p.11.
12. Warman, Tim, 1996. "Whatever Happened to the Farm Bill." *American Farmland*, Winter. p.7.
13. National Park Service, 1991. *Natural Resource Management Guideline - NPS-77*. p.3:62.
14. Ibid., p.2:1.
15. USDA. December 1986. "What Conservation Compliance Means to You." Fact Sheet.
16. Miller, G. Tyler, 1994. *Living in the Environment*. Belmont, CA: Wadsworth Publishing Company. p.595.
17. AFBF (American Farm Bureau Federation), 1995. *Farm Bureau Policies for 1995*. St. Louis, MO: AFBF. p.95:284.
18. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77, p.A:16.
19. Miller, G. Tyler, 1994. *Living in the Environment*. Belmont, CA: Wadsworth Publishing Company. p.625.
20. Ibid., p.627.
21. Ibid.,p.627.
22. Ibid., p.632.

23. Ibid., p.632.

24. Ibid., p.633.

25. Ibid., p.388.

26. Rasmussen, Wayne D., 1960. *Readings in the History of American Agriculture.* Urbana, IL: University of Illinois Press. p.306.

27. Plano, J.C. and M. Greenberg, 1985. *The American Political Dictionary*. NY, NY: Holt, Reinhart and Winston. p.444.

28. Ford, Arthur. 1973. *Political Economics of Rural Poverty in the South*. Cambridge, MA: Ballinger Publishing Co. p.92.

29. Plano, J.C. and M. Greenberg, 1985. *The American Political Dictionary*. NY, NY: Holt, Reinhart and Winston. p.431.

30. Ibid., p.433.

31. Ibid., p.430.

32. USDA, 1996. Summary of Farm Bill. p.1.

33. Ibid.

34. USDA, 1987. "Conservation Reserve in the 1985 Farm Bill." Fact Sheet.

35. *American Farmland*, 1995. Winter, p.10.

36. The most influential group lobbying on behalf of farmers is the American Farm Bureau Federation. Each year the Farm Bureau publish it's policies towards agricultural regulations and supports, which are a useful guide to the farming industry's position on these issues.

CHAPTER FIVE
PROPRIETORSHIP AND MANAGEMENT OF AGRICULTURAL RESOURCES

Farmlands in the national park system that are government owned are mostly managed under special use permits or leasing agreements with local farmers who will have reasonable expectations of profit. There are also lands that are federally owned, but that are still farmed under use and occupancy reservations.[1] There is some privately owned farmland in the national park system and land for which the government owns an easement but not the full title. Agricultural management by park staff is not common. Several park managers suggested that it is not cost-effective for parks to get into farming, because of the specialized equipment needed, the expertise required, and the labor demands placed on park staff by the need for timely attention to agricultural operations, including pest control and meeting the round-the-clock needs of livestock.

MANAGEMENT BY PARK STAFF

Non-farming operations

There are only a few units where National Park Service staff manage agricultural resources using farming operations, but several where staff maintain the open appearance of agriculture by mowing or burning. At Saratoga National Historic Park, most of the land that was open farmland, or which had been cleared before the battle for fields-of-fire are being managed by the park using a combination of burning and mowing, but park staff do not carry out any agricultural operations such as hay making, although a few hay meadows in the southern end of the park are let under special use permits. Until recently at Cowpens National Battlefield, the park staff were managing the core area of the battlefield by mowing. Now a local farmer has a hay permit for some of the land, but other areas still have to be mowed by park staff. Natchez Trace Parkway staff has had to assume responsibility for managing some of the farmland due to lack of demand for permits, but do not carry out any farming operations. Parkway staff normally mows, but burning is being evaluated as an alternative.

At the Hubbell Trading Post National Historic Site and the only agriculture is a small patch of corn that is grown behind the Hubbell residence by the park staff. However, the irrigation system that Hubbell created may soon be functional again

and the park will have to decide how best to manage the irrigated fields. No farming is practiced at Montezuma Castle National monument, but park staff use water from the Montezuma Well to irrigate an area that was used historically for farming but is now mowed regularly as a grass picnic area.

Living History farms

"Living history" farms managed by park staff were at one time more common than they are today. There was one at Gettysburg National Military Park and another at Chickamauga and Chattanooga National Military Park. There is today a small living history farm at Booker T. Washington National Monument, where an ex-farmer is employed as a farm manager. Tilled land includes about 1.5 acres of historic crops, and a vegetable garden. On the remainder of the farmland, livestock is pastured and hay is made using modern machinery under contract with a local farmer. At the Oconaluftee visitor center in the Great Smoky Mountains National Park, a small living history farm is also maintained by park staff with volunteer assistance provided by the local chapter of Future Farmers of America (FFA). In future, living history farms should probably all be managed under cooperative agreements with volunteer organizations, historical societies or community farm organizations. It should be noted that money received as part of a Living History Program may be retained by the park.

Farming operations

At Grant-Kohrs National Historic Site, the park employs a local rancher to manage a small cow/calf operation but seasonal labor is used for other tasks. The beef enterprize consists of about thirty five cows and a Hereford bull. The scale today is tiny compared to the early Conrad Kohrs operation and is not intended to be a living history farm. The hay meadows are let on a special use permit on a year-to-year basis, but the park hires seasonal labor to irrigate the hay meadows, which yield two crops each year.

COOPERATIVE AGREEMENTS

A park can enter into cooperative agreements for "living exhibits and interpretive demonstrations", and is allowed to sell, at fair market value, the products of living-history operations.[2] At Cuyahoga National Recreation Area there is a 150

acre living-history demonstration farm that is operated by the Western Reserve Historical Society, partly on land was not acquired by the park, and partly on land that was acquired by the Society from the National Park Service under a land exchange agreement. The park also had plans for several other demonstration farms including a family 'full-spectrum' mixed farm, and an 'alternative lifestyle' farm. Although these are on hold at present, they would probably be managed under cooperative agreements if they are realized. No other cases of cooperative agreements were discovered.

There is a potential for more extensive use of cooperative agreements for managing agricultural resources. Groups of local residents may wish to start community farms under cooperative agreements. A volunteer or youth organization could have a cooperative agreement to manage a farm as a permanent educational summer camp. Retired farmers associations might take on the management of farms as retreats for their members. Educational institutions might have cooperative agreements to manage farms and forest as part of environmental education centers, which could be for local use or for residential courses, if disused buildings could be adapted for residential accommodation. When a group assumes responsibility for managing a farm, the cooperative agreement should be conditional on hiring a full-time or part-time farm manager.

CONTRACT FARMING

Examples of contract farming in the national park system are surprisingly few. At Booker T. Washington National Monument, the park contracts with a local farmer to make hay. The park provides some small machinery (a mower, a square baler, and a forty-five horsepower tractor) and the farmer provides a round baler. The hay for one feeding season, 400-500 small rectangular bales and 20-30 big round bales, is stored for use by the park. The arrangement works well. In the Great Smoky Mountains National Park, 300-400 acres of open land at Cataloochee that was once part of the agricultural program is no longer farmed because it is so remote. The park contracts to have it mowed once each year. Contract mowing is probably quite common but a systematic survey was not carried out.

SPECIAL USE PERMITS

Terms: temporary, short-term, and revocable

Special use permits are widely used for agricultural land in the national park system. Officially, these permits are issued on a temporary basis, for short periods. Special use permits are not supposed to provide any long term interest in the land; nor are they to be used as a substitute for formal leases.[3] Special use permits can be issued on a short term (not to exceed one year) or long term (not to exceed five years).[4] Special use permits are suject to five restrictions as follows: (1) the permit must in fact be revocable; (2) the use authorized must be temporary and for lands and facilities temporarily not needed for park purposes; (3) the permitted use cannot violate or circumvent any relevant statute; (4) the activity may not be in derogation of the values and purposes for which the park was established; and (5) the government must receive fair market rental value for the use of the lands.[5] In practice, special use permits are clearly being used for permanent uses and most farmland let in this way could hardly be described as "lands temporarily not needed for park purposes."

Terms to ensure good farming

Park resource managers are required to determine the potential impacts of special uses and whether these are in derogation of park values.[6] In a few cases, agriculture has statutory authorization in the legislation of the park, but in other parks, the manager needs to determine whether agricultural use is permissible. In all cases, the resource manager recommends permitting conditions and mitigating measures to be taken by the permittee, and is also responsible for monitoring the permitted uses. If a permittee does not abide by the conditions of a permit, it can be terminated or renewal can be denied. Permits can be terminated with only 24 hours notice, although this happens extremely rarely. Nevertheless, the short-term nature of special use permits does not encourage long-term investment in the land.

Selection of permittees

Parks use various methods to solicit interest in permits, from advertizing to word-of-mouth. Advertizing for bids can give park managers an idea of fair market value, but it is an expensive and costly process and many parks rely on negotiation with farmers who have expressed interest in the past. The methods used to advertise for and to select permittees to farm in national parks will affect the type of farmers

chosen. At Gettysburg National Military Park vacant permits are advertised through local farming organizations. The highest bid need not be accepted and as a result the manager of the program noted that "we have weeded out absentee and here-today-gone-tomorrow farmers." This method of advertising, however, will tend to favor the full-time commercial farmer over the part-time farmer, who may be the more suitable permittee. The relative suitability of different types of farmers is discussed more fully in Task 3:1 in Chapter 7.

Permits contiguous with adjacent farmland

At Minute Man National Historic Park vacant permits are first offered to adjacent farmers. The park prefers to have permittees who live close to the park "even if someone six miles down the road is a better farmer". On the Natchez Trace and the Blue Ridge Parkways, it has also always been policy to let permits to adjacent farmers whenever possible. If land cannot be let to the adjacent owner, there is a distinct visual break at the parkway boundary and the continuity with the surrounding landscape is lost. However, along the Natchez Trace Parkway, the removal of some of the roadside fences has made it necessary for the permittee to fence the park boundary if the privately owned land is to be grazed, which also results in a visual interruption (Figure 5:1). The parkway is finding it increasingly difficult to find adjacent permittees and in some regions, the park cannot find any farmers prepared to take on the permits. In other areas however, some older farmers have kept their permits almost as a tradition. Indeed it was found that, even after a permittee had died, a spouse would continue to sign up in the permittee's name. Some adjacent farmers along the parkway do not wish to give up their permits on retirement and they rent their own land and the parkway land to the same operator. The park has realized how important it is to foster this proprietary interest in the land and to allow subleasing "if the land is contiguous with other farmland also owned and subleased by the permittee." Along the Blue Ridge Parkway, sub-leasing of permits is not allowed although it probably does occur on a casual basis. Although the Blue Ridge Parkway have little difficulty finding permittees, it has become increasingly difficult to let land to directly adjacent farmers. Park managers also prefer to let leases to fewer, well-proven permittees who they can trust to do a good job. Scale economies have made it advantageous for some permittees to take on several permits.



Figure 5:1 This view is at approximately MP 407(W) on the Natchez Trace Parkway, showing land leased for hay with a fence on the park boundary and pasture beyond. The contrast between the broomsedge-free hay meadow and pasture is unfortunate.

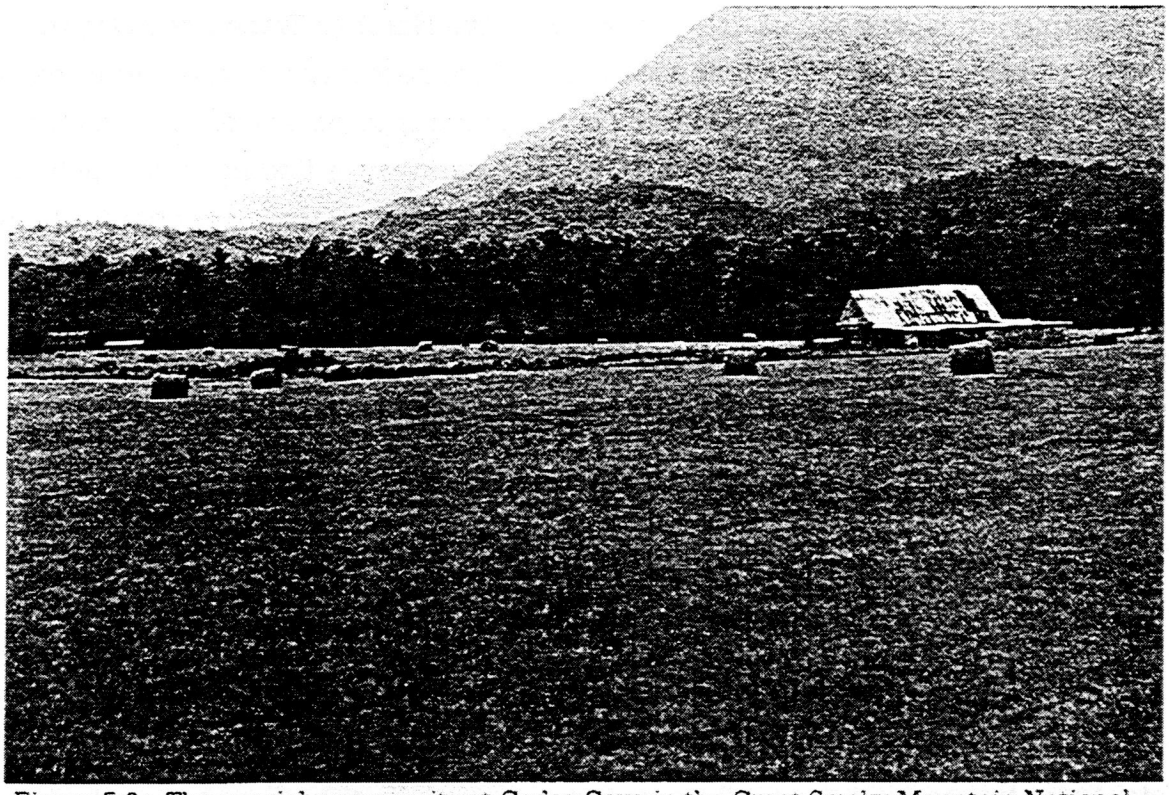


Figure 5:2 The special use permits at Cades Cove in the Great Smoky Mountain National Park are large, as they are discrete economic units, not farmed as part of a larger unit outside the park.

Size of Special Use Permits

The size of special use permits varies considerably. In most parks, agricultural permits are small and are farmed as part of a much larger acreage outside the park, ideally contiguous with the permitted land. The farmer benefits by increasing the scale of his operation with a very small increase in fixed costs. However, if significantly different management techniques are required by the park, the farmer can no longer realize scale economies. In the past small tracts were often let to adjacent farmers but as the number of farms dwindles, one farmer will often take several permits. The "Agricultural Management Subzone" on the Natchez Trace Parkway covers about 5,500 acres of farmland which is let under special use permits. The parkway passes through five distinct physiographic regions in its 440 miles length and the farming enterprises and the size of permits vary. Generally permits do not exceed fifteen acres, mostly farmed as part of much larger units. Unlike along the Blue Ridge, the Natchez Trace Parkway did not acquire any farms in their entirety and therefore most permits are for strips of land along the road.

On the Blue Ridge Parkway, only the larger tracts where the rental fees are more than $25 (based on a variable rate for different uses) are let under special use permits. The larger special use permits are about one hundred acres, and tend to be farms that were acquired in their entirety instead of only the corridor width. All the tracts where the estimated rental fee is less than $25 are let under letters of agreement at no charge. In all there are a total of approximately 400 special use permits and letters of agreement along the Blue Ridge Parkway.

In some parks, permits are quite large and may be farmed as discrete units, not as part of a larger farm outside the park. The temporary nature of special use permits makes them unsuitable for whole farms, but they are used nevertheless. At Cades Cove in the Great Smoky Mountains National Park, there are three special use permits and one horse concession. The largest permit is 868 acres and the smallest 170 acres (Figure 5:2). These are discrete enterprises and the permittees do not own farms outside the valley. One permittee is resident in a non-historic structure in the valley, another resides in the park housing area. The dairy ranches at Point Reyes National Seashore are also discrete units let under special use permits that cover about 15,000 acres of farmland. There are between thirty-five and forty permits but

the largest are nineteen grazing permits each of which cover several hundred acres. Generally, both grazing and silage land is included in the grazing permits. The historic ranch buildings are leased separately. Although the permits at Point Reyes are large, the ranchers are under pressure to expand their operations to remain competitive, but, because they do not have home farms outside the park, they have little opportunity to expand except by acquiring another ranch within the park.

The special use permits at the Delaware Water Gap National Recreation Area are also large. The average size of permit is 143 acres but, as these are held by only seven farmers, the average holding is 429 acres. Some of these are managed as discrete units by resident farmers, but most of the farmsteads on the river terraces were demolished for the Tocks Island Dam before it was deauthorized, and the land is farmed by absentee farmers, who have home farms outside the park. 4,500 acres of the park are managed through twenty-one special use permits. Three thousand acres are planted in a variety of row crops including field corn, sweet corn, soy beans, rye, oats, and wheat as well as vegetables and fruit on a ninety acre truck farm. The remaining 1,500 acres are not in agricultural use, but are maintained by the farmers as open space and wildlife habitat.

At Gettysburg National Military Park, permittees generally have their own farms outside the park. Most of the 2,560 acres of parkland in the agricultural program is managed through sixteen special use permits, averaging 160 acres. This is close to the 169 acre average farm size in Adams county as recorded in the 1990 Census. However, with their own land most farmers are farming considerably larger acreage, and three permittees are known to farm at least 1,000 acres each. As the farms within the park are no longer discrete economic units, they are not under pressure to expand.

Length of Permits: security of tenure

Guidelines specify that "Special use permits are issued as short term, not to exceed one year, or long term, not to exceed five years".[7] Although special use permits are revocable and strictly only for temporary use, the permittees in most parks take it for granted that a permit will be renewed as long as conditions are met. However their temporary nature makes the use of special use permits inappropriate

for letting farmland to tenants who are expected to steward the resource with long-term commitment. Farmers of national park land will often be hesitant to invest capital in a venture or to adopt a new enterprise because of the lack of long term security of tenure. This may even affect selection of crops that are grown. For instance, at Grant Kohrs Ranch where alfalfa was grown historically, farmers are unwilling to risk the high capital investment of replanting alfalfa every five years when their permits run for a maximum of five years and can be revoked at short notice. Clearly a farmer who only has a one to five year permit is unlikely to invest in maintaining buildings and other improvements. This especially applies to farms that are let as discrete economic units within a park, as is the case at Point Reyes National Seashore, and at Cades Cove in the Great Smoky Mountains National Park, and where the need for pollution control demands major capital improvements to fence riparian areas or to provide a pipe system to watering troughs. In these cases, the National Park Service is likely to have to pay unless land is let on longer permits or leases. At Cades Cove, the special use permits are for five year terms, and generally the negotiated price remains in effect for the whole period. Five year permits are also used at Gettysburg National Military Park and on the Natchez Trace Parkway , but must be renewed annually. The permits at Saratoga National Historic Park, are mostly for three year terms but some are only for one year. Farmers have asked for longer terms to justify investments in lime and fertilizer and the park is considering using five year permits. In the Cuyahoga Valley National Recreation Area, most of the eight special use permits are for only one year terms, although the park has one five year permit.

Rental Fees

The requirement that the government "must receive fair market rental value for the use of the lands" let under special use permits is interpreted differently in various parks. An appraisal is not required as it is for leases, but some parks take fair market value to mean that each and every time a permit is let, it must be advertised and the highest bid accepted. Shiloh National Military Park actually gave up using special use permits because of the cost of advertising. Although advertizing for bids can be useful to assess the rental values, the requirement is that a "fee comparability study" be made prior to issuing a permit.[8] Guidelines state that the fee should be comparable to that charged for similar facilities in the local community, and should

take into account both the restrictions placed on the permit and services provided by the park (e.g. fencing). As a result, the rental fees charged for agricultural land vary greatly from $1 per acre to about $30. Some variations in fee would be expected based on different soil productivity, but it is rarely used as a criterion. An exception is the Natchez Trace Parkway, where the special use permit fees are based on the soil productivity category indicated in the NRCS soil survey and on "crop usage".

The rental fee at Stones River National Battlefield is only $50 for approximately seventy-seven acres which is about $.65 per acre. The permit was put out to bid, but only one was received, and the extremely low rent is indicative of the difficulty of farming in this urban fringe area. Had the park been leasing the land and required to have an appraisal, it is doubtful that an appraiser would have put such a low value on the land, which might have prevented the park finding a lessee. Therefore it was probably a wise decision to use a special use permit that did not require an appraisal.

Some parks intentionally keep rents as low as possible because of the real or perceived difficulty of attracting good permittees if rental fees are too high. The annual rental charges for special use permits at Minute Man National Historic Park are $16.40 per acre. Charges are based on the going rate in the area but the park manager adjusts the rate by allowing for conditions or restrictions, to keep them as low as possible. If there are particular problems, the superintendent may waive fees entirely, or charge only a nominal sum. The rental fees for permits at Saratoga National Historic Park are all about $5 per acre. The park tries to keep rents low, reflecting the low productivity of the land, but permittees are informed that rents may increase if yields improve substantially. This could be a disincentive to good farming.

In some parks there are different fees for tillage and grazing. At Cades Cove in the Great Smoky Mountains National Park, the price paid for haying is only $6.40 per acre. For a combination of grazing and haying the rate is $20 per acre. It might seem that pricing grazing permits at three times the price of haying permits is an attempt to reduce grazing in the valley. However the $6.40 price for haying was the result of competitive bidding and the $20 rate for grazing was agreed at an earlier date by negotiation. Until recently, the price of all special use permits in the Cove

was by negotiation. On the Blue Ridge Parkway, the rental fees for special use permits are computed by a formula as follows: pasture maintained by permittee, $0.50 per animal unit month; hay, $3 per acre; row crops, $6 per acre; and orchards, $90 per acre. It is not known why the fee for orchards is so high, but it cannot have encouraged the preservation of that use. If the total estimated fee is less than $25, the parkway waive it entirely and a permit is issued as a letter of agreement renewed annually. At Gettysburg National Military Park, the annual rental fee is $11.25 per acre for cropland or $11 per animal unit for grazing (approximately $5.50 per acre).

Most parks are prepared to negotiate adjustments in rental fees in event of crop failure or damage. At Gettysburg National Military Park, the fee for cropland is reduced when deer damage is serious. In 1993, $10,451 of the total cropland rental fee of $20,612 was waived because of damage to crops. The annual cost of administering the croplands is about $25,000. Even without the damage waiver therefore, the program is costing money although the park estimates that it saves money in maintenance costs .

HISTORIC PROPERTY LEASING

"Historic buildings, cultural landscapes or vistas of historical significance, including fields, row crops, orchards, and pastures maybe assigned to others to occupy and to manage through an historic property lease."[9] Very little farmland land is let under lease agreements.[10] One of the few parks using short-term agricultural leases is Pea Ridge National Military Park. There are about six hundred acres of agricultural land which are let to three farmers. One lessee has only thirty-eight acres, and therefore the average size of the other two leases is more than 280 acres, large tracts by park standards. Two of the lessees have farms adjacent to the park.

Fair market value: attracting bids from farmers

Leases must be offered competitively and the park must receive at least a fair market value based on an appraisal. Fees may be adjusted for investments required of the lessee. At Pea Ridge National Military Park, leases are let for a five year period, all beginning and ending the same year. Sealed bids are required with a minimum bid of $15 per acre. The park accepts the highest bids for each field. Parks

that use short-term leasing for farmland appear to have difficulty attracting bids. The leases might be considerably more attractive if let on longer terms, or if a farmhouse was included with the land. At Pea Ridge, there is concern that the park received only four bids during the last bidding process, but there are no farmhouses available. In the early 1980s, the farmland at Saratoga National Historic Park was let under one year special use permits. In the mid 1980s, it was decided to try historic leasing. The land was assessed and bids were invited. However, due to the poor soils and the weedy condition of many of the fields, the only bids received were for the fertile bottomland along the Hudson River which were let on seven year, short-term leases; but the problem of attracting bids continued and leasing was discontinued, although two are still in existence. Instead the park began using special use permits again but for three year terms.

Length of leases: security of tenure and the incentive to invest

NPS policy is that the terms of historic property leases "will be the shortest time needed for the proposed use, taking into account lessee investments... and other relevant factors."[11] The Department of the Interior allow ninety-nine year leases, but it has been the practice in parks to restrict the duration of historic leases to much less than is allowed by law. Because the historic property leasing program permits the lessee to bear the expense of making vacant structures habitable, it is important to make it worthwhile for the tenant to invest in the property. The annual rental for long term leases can be reduced to offset these costs. It is also likely that "the fix-up costs for the lessee will be considerably less than a government contract for rehabilitation, especially if the lessee can do much of the work using his or her own labor."[12] In terms of giving the tenant security of tenure, ninety-nine year leases are theoretically almost as satisfactory as owning land, but residents of Boxley Valley of the Buffalo National River expressed a strong preference for ownership with restrictions over long-term leases. Pride of ownership, the desirability of passing land onto children and cultural continuity were cited as reasons.[13] Some of the properties in the valley are let on historic leases, but the park has been trying to lengthen the terms of leases to twenty or fifty years to give the lessees more security of tenure.

Agricultural use guides

When farmland is let under a historic property lease a "site specific agricultural use guide" is required. The conditions contained in these use guides are very similar to those attached to special use permits. Each unit of land must be considered individually, and eight topics must be addressed for proposed pasture and six topics for cropland uses.[14] Any land to be leased "must be surveyed for archaeological material and, if found, evaluated for National Register eligibility".[15] In some parks this process could be expensive and extremely lengthy and may discourage use of the leasing program for farmland. The leases at Pea Ridge National Military Park have agricultural use guides attached as required. At the time of the Civil War, farmland at Pea Ridge was divided into small fields with mixed crops and grass. Today all the land is large hay meadows, and tillage is not allowed without approval.

Separation of Buildings and Land

There are many historic farm buildings in the park system that are leased, but usually separately from the land. One exception is the Eisenhower Farm, where buildings and land are let together under a historic lease. But at the adjacent Gettysburg National Military Park, farm buildings but not farmhouses, are let under the same special use permits as the land. The historic dairy ranch buildings at Point Reyes National Seashore are leased under the historic property leasing program, but most of the land is let under special use permits. The explanation is that the conditions imposed on the use of the rangeland are so different from those imposed on the use of the buildings. In the Cuyahoga Valley National Recreation Area, there are currently three historic farmsteads under long term historic property leases, and these do not include agricultural land. The length of the Cuyahoga leases varies from twenty to fifty years which are among the longest terms used in the national park system. Apparently, the only agricultural lease for farmland was terminated recently due to the lessees inability to fulfill the conditions of his lease. All of the farmland in the Cuyahoga Valley National Recreation Area is now let under special use permits. There are several farmsteads that are vacant at present. For those, three options are being considered; 1) to rehabilitate them for park use; 2) to lease them separately from the land, under the historic leasing program or; 3) return them to private ownership with deed restrictions.

One drawback to separating farmland from buildings is that it reduces the opportunities for claiming a tax credit for the rehabilitation of historic farm buildings as income-producing structures. The argument can be made that farm buildings with farmland do have an agricultural use even if they are only used for storage; but if they are let separately that argument cannot be made and the only income-producing opportunities for farm buildings would involve adaptive reuse for some non-agricultural venture. In the Boxley Valley Historic District of the Buffalo National River, a recent sell-back provided for the conversion of an old saw-mill structure and an adjacent store into a craft shop. These could qualify for a tax credit, as might a plan to convert a mill and adjacent farmstead into an educational facility with sleeping accommodations in one of the barns.

MEMORANDA OF AGREEMENT

Memoranda of agreement are rarely used for farmland, but may replace special use permits where there are more complex conditions attached to the use of the land. Memoranda of agreement are used at Shiloh National Military Park, Antietam National Battlefield, Chickamauga and Chattanooga National Military Park and Monacacy National Battlefield. Some managers were unsure why memoranda were used rather than special use permits, but it was probably because rather specific management requirements were anticipated for these battlefields. Memoranda of agreement, like special use permits, usually run for five years but, unless a farmer is not fulfilling the conditions of the agreement, renewal is taken for granted.

At Shiloh National Military Park, there are 272 acres in the agricultural program. Eight farmers have memoranda of agreement which cover 19 fields. Three of these farmers are members of the same family so they often share equipment. They mostly grow hay in the park, but also small grains, alfalfa, lespedeza, and milo. Most of the agreement holders have farms of their own within ten miles of the park.

Advertizing

Until recently, the Shiloh National Military Park had been letting farmland under special use permits, but memoranda of agreement were adopted to avoid having to advertise permits in the Commerce Business Daily, which was costing the park almost as much as permits brought in. But park managers are not satisfied

with memoranda of agreement either, attributing the difficulty of attracting responsible farmers to having to accept the highest bid, and currently the park is evaluating alternative approaches to letting farmland. No other park manager said they felt obliged to accept the highest bid, although competitive bids are required for leasing farmland. Few park managers where special use permits are used, feel obliged to accept the high bid, or even to go through the bidding process. Apparently the need to advertise permits, leases, or agreements and whether or not there is an obligation to accept the high bid are questions that are interpreted differently in each park.

Attracting bids

Memoranda of agreement are also used at Chickamauga and Chattanooga National Military Park. At that park, the average size of the agreements is 169 acres and the farm land is managed entirely in hay production. In 1993, the park began letting the agreements on the basis of competitive bids, but only three bids were received, which is causing some concern about the future of the program. The park manager thinks that there would have been more bidders had the tracts been smaller. His reasoning was that smaller tracts would have attracted bids from part-time farmers, who now easily outnumber full-time farmers in the area. He suggested forty acres would be an appropriate size.

Length of agreement

Memoranda of agreement are generally for five year periods. At Chickamauga and Chattanooga National Military Park, they used to be renewed annually but now run for five years, with a one year trial period for new agreements. At Monacacy National Battlefield, Antietam National Battlefield, and at Shiloh National Military Park, the memoranda of agreement also run for five years, but unless the farming is bad, renewal is taken for granted. As for other mechanisms, the short-term nature of memoranda of agreement does not encourage long-term sustainable agriculture. The choice between long-term instruments that provide the security of tenure to encourage investment and stewardship, and short-term instruments that are revocable at short notice in case of non-compliance and do not require anticipation of future intrusive uses, is a difficult decision.

LETTERS OF AGREEMENT OR AUTHORIZATION

"Letters of agreement" are only used on the Blue Ridge Parkway for parcels where the estimated rental is less than $25 and the fee is waived. Letters of agreement are not a specifically authorized mechanism for letting land. Guidelines specifically mention letters of authorization, and memoranda of agreement, but not letters of agreement.[16] A letter of authorization allows prescribed activities, but only for minor, short-term, non-repetitive and specific activities, which hardly applies to agricultural uses. It is not be used as a "shortcut in place of a more appropriate permitting form or format."[17] Normally there is no fee for the activities that take place with a letter of authorization. The letters of agreement used by the Blue Ridge Parkway, which should probably more properly be called letters of authorization, run for only one year and can be revoked at any time. Many agreements are for tracts of less than one acre.

REVENUES FROM PERMITS AND LEASES

Parks are allowed to keep the revenue from special use permits only if there is specific legislation authorizing it. This authorization is seen as an important and necessary step to be taken in many parks. The proceeds from historic property leasing may be used by the park for routine preservation maintenance, stabilization, cyclic maintenance, and various administration expenses, but the surplus has to be returned to the treasury.[18]

USE-AND-OCCUPANCY RESERVATIONS

When acquiring land for national parks, if there is a resident on the land, it is common practice to grant that person a use-and-occupancy reservation if requested, either for life or for a fixed term. Agricultural uses may be required or permitted as a part of use-and-occupancy reservations.[19] In return for the reservation, a deduction is made from the purchase price of the property. In Minute Man National Historic Park, both term and life use-and-occupancy reservations are used. Life reservations appear to be more commonly used for residential properties than for agricultural properties where term reservations are more common, usually for either twenty-five years as at Buffalo National River, or for twenty years, as at Sleeping Bear Dunes National Lakeshore. Two of the dairy ranches at Point Reyes National Seashore are also still held under use-and-occupancy reservations, which run until the year 2005.

Negotiated conditions, non-compliance, and unanticipated change

Perhaps the worst problem with use-and-occupancy reservations far agricultural properties is that conditions have to be negotiated at the time of purchase when the extent and nature of future changes may not be anticipated. At Minute Man National Historic Park there are twenty five use-and-occupancy reservations, either term or life. The conditions do not allow new structures or additions to existing structures without approval; nor may existing trees be removed. But no conditions are placed on agricultural uses or methods which can sometimes change dramatically. It is extremely difficult to prevent the holder of a use-and-occupancy reservation from taking an action that was not specifically forbidden in the reservation.

Another problem is that, in event of non-compliance with the conditions of the reservation, the park would have to purchase the unexpired interest in the property, and this would require the appropriation of funds, which may not be possible. In one park, a use-and-occupancy reservation holder has built new farm buildings but the park has chosen to take no action until the reservation expires when the structures can be removed. In Boxley Valley of the Buffalo National River, one holder of a use-and-occupancy reservation is not complying with the terms of the reservation which forbids more than a certain number of abandoned vehicles around the farmstead (Figure 5:3). In this case, the park has some leverage because the property is eligible for sell-back to the farmer, and negotiations will not be initiated until he is in compliance. For most parks, however, this is not an option. In cases involving the demolition of historic structures and other actions that are irreversible, non-compliance is more serious. There are also a number of use-and-occupancy reservations at Sleeping Bear Dunes National Lakeshore most of which are for twenty years and will end shortly.[20] However, only two of the farms under use-and-occupancy reservations are still being actively farmed. This illustrates the difficulty of perpetuating agricultural use when no economically viable enterprize can be found.



Figure 5:3 A farm in Boxley Valley of the Buffalo National River. Sale of this farm will only be negotiated if the farmer removes the inoperable vehicles and other junk.



Figure 5:4 The deeply incised channel of the wash in Canyon del Muerto (Canyon de Chelly National Monument) caused by channel confinement. This makes it impossible to spread water onto adjacent farmland.

PRIVATE OWNERSHIP

Although there are privately owned inholdings in many parks, most units in the national park system are in some form of ownership by the federal government. Ownership may be in full fee, or it may only be for certain interests in the land. Adjacent to some parks, the government has purchased the development rights to farmland but the owner of the land still holds the right to reside on and use land for agriculture. Undesirable uses of the land can also be prevented by restrictions placed on the deed by the seller at purchase and occasionally the government has purchased the full fee and then resold the land with deed restrictions.

In some parks, it was the intent of Congress that farmland should remain in private ownership. At Point Reyes National Seashore, it was originally intended that the historic ranches should remain in private ownership. The National Park Service was not permitted to purchase parcels of land of more than five hundred acres without the consent of the owner "so long as it remains in its natural state, or is used exclusively for ranching and dairying purposes." Ranching and dairying were also restricted to "as presently practiced in the area." However, all the ranches were purchased between 1963 and 1976 and Section 4 was repealed in April 1970. Today the ranches are operated under reservations of use-and-occupancy, historic property leases, and special use permits.

Ownership by Native American Tribes

The canyons that make up Canyon de Chelly National Monument are owned by the Navajo Nation. The role of the National Park Service is limited to protecting the cultural resources in the canyons and to providing visitor services. The decision has been made not to attempt to freeze the agriculture in the canyons in time but to allow it to evolve as is appropriate for an ethnographic landscape. One of the objectives is to "allow for, and where desirable, encourage traditional activities such as farming and grazing."[21] The purpose of the monument emphasizes the importance of commemorating Navajo traditions both past and present. Unfortunately, a well-intentioned joint project carried out during the 1920s and 1930s by the Indian Irrigation and Agricultural Service and the Soil Conservation Service to promote more progressive farming methods, has made irrigation of farmland in the canyons on which the agriculture entirely depends, extremely difficult. The project involved

confining the wash which, as a result, lowered it's channel making it impossible for farmers to spread water onto adjacent farmland without upstream structures and lateral distribution channels which quickly silt up (Figure 5:4).

Private Ownership: Sell-back with deed restrictions

At Cuyahoga Valley National Recreation Area, there are a number of vacant farmsteads in the park. One alternative that the park is considering is to sell-back these farmsteads subject to deed restrictions, but the arrangement would cover only buildings and not farmland. However, within the boundary of the Buffalo National River, some of the land was designated as "private use zones" where it was intended that the federal government should acquire only the development rights to the land. These private use zones covered about 9,400 acres and included Boxley Valley, a farming community in the upper section of the river. For various reasons, most of the farms were acquired in full fee.[22] Some residents did retain use-and-occupancy reservations, but others vacated their farms and the farming community in the valley began to collapse. Only six landowners held out and agreed to sell only "scenic easements" as they were called. Recently, the National Park Service has begun correcting earlier actions by offering to sell back land to the original owners subject to deed restrictions or, if they are no longer interested, to other purchasers. There are already signs that the vitality of the rural community is reviving.

As with use-and-occupancy reservations it is difficult to write restrictions that anticipate future changes, but which are not so restrictive as to make farming impossible. The "scenic easements" that were acquired from the six landowners who had held out against full-fee purchase were rather loosely worded and do not restrict some undesirable uses. The deed restrictions on the properties that are being sold back are more specific, particularly with regard to farming enterprises that are permissible, farming methods, and the maintenance of historic structures.

Boxley Valley is an example of an ethnographic landscape.[23] As such, continuity of use and community is important and justifies leaving the land in private ownership. The Cultural Landscape Report lists the following policies for Boxley Valley which illustrate a liberal attitude to change appropriate for the preservation of ethnographic landscapes;

·Maintain and rehabilitate existing houses, and allow some new ones
·Allow haying, grazing, orchards, and crops
·Allow a community store, bed-and-breakfast operations, and horse rentals
·Permit harvesting in woodlots
·Preserve historic structures through continued private use and appropriate maintenance
·Allow modern building materials in new construction (Figure 5:5)
·Maintain most fields through agricultural use
·Establish forested strips along riverbanks; allow brush clearing in channel and minor bank stabilization actions
·Establish buffer areas, and in most cases, fence to keep livestock out of the Buffalo River and its major tributaries[24]

Private ownership: purchase of easements

Along the Blue Ridge Parkway, it was clearly not possible to purchase all land visible from the road. Therefore, scenic easements were purchased for some of the land adjoining the parkway corridor. This was the first use of scenic easements in the United States. In general, the district rangers do not think that these have been a success because they were vaguely written and contain too many loopholes, allowing owners to use poor farming practices, not to maintain buildings or to stop farming altogether. As with use-and-occupancy reservations and deed restrictions, it is difficult to write restrictions when contracts are being negotiated that anticipate future undesirable changes but which are not so restrictive as to make farming impossible. The park also tends to have problems when scenic easements change hands. Although the original landowner may have understood the park's goals, the new owners may not be sympathetic to these goals and do their best to break the terms of the easement. As was noted earlier, the scenic easements that were acquired from the six landowners in Boxley Valley, did not restrict some undesirable but unforseen uses, for instance the siting of satellite dishes. Along the Natchez Trace Parkway there are few properties that are still in private ownership, but in which the National Park Service have acquired a scenic easement. These too were loosely worded, and woodland has been allowed to grow up on some tracts, despite conditions that the land should remain in agriculture. While it is feasible to prevent undesirable uses with restrictions, it may not be possible to require certain uses as a

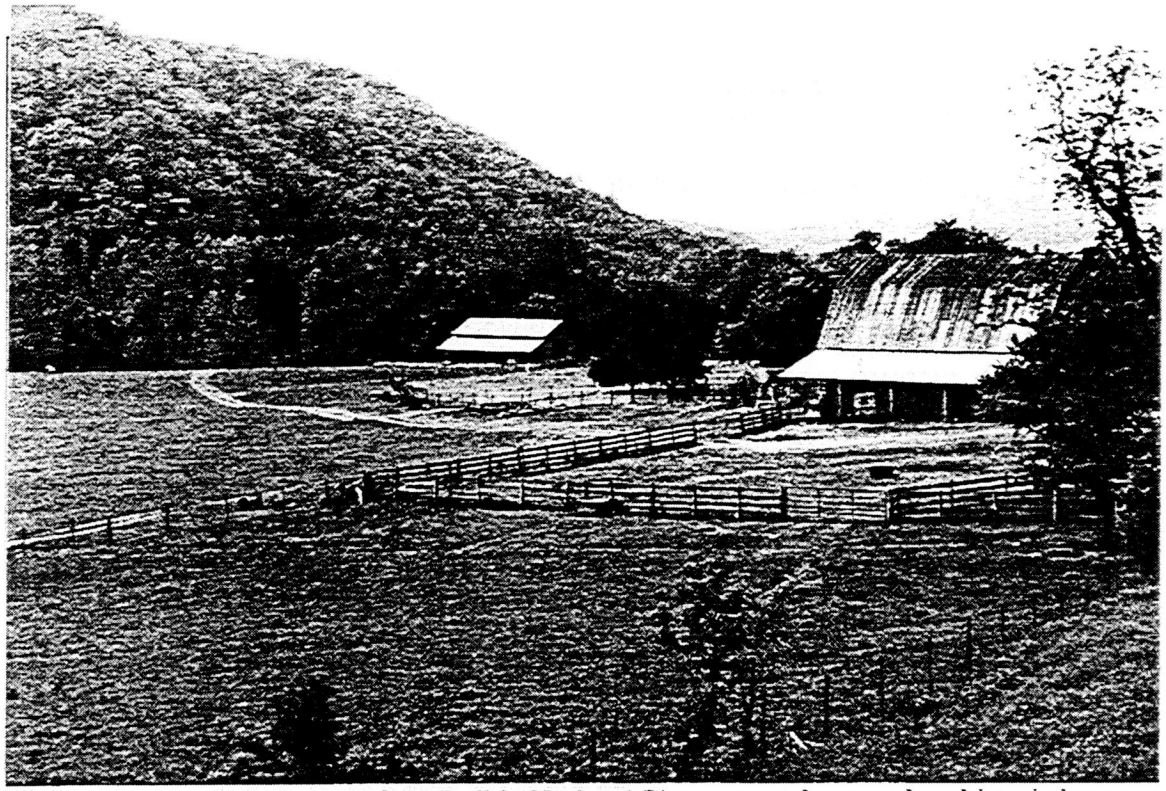


Figure 5:5 In Boxley Valley of the Buffalo National River, a new barn and an historic barn on one of the 'old' scenic easement properties. Under the terms of these easements, the owners are not required to maintain barns, but many are doing so. This old barn is used only for storage of small equipment. The newer barn was designed to satisfy the design guidelines for new construction in the valley.



Figure 5:6 The owner of this farmstead at Sleeping Bear Dunes National Lakeshore recently applied to the park for permission to demolish the buildings and house and to construct a new farmstead. This is a privately owned property with a restrictive covenant. In spite of the denial of the application, the owner has demolished the small barn to the right of the frame.

condition of an easement. If there is no economically viable agricultural use, it is almost impossible to enforce such a requirement.

At Ebey's Landing National Historic Reserve, alternatives to fee simple acquisition in partnership with the local planning authority have been explored. The Comprehensive Plan for the reserve envisions the purchase of only 150-200 acres of land in fee simple for interpretive facilities, and the acquisition of 2,000-2,500 acres in critical areas in fee simple or combinations of development rights, scenic easements, and architectural controls.[25] The plan recognizes that the problem centers around the basic issues of land use, growth management, and governmental control, and attempts to provide for a balanced approach to preservation and development, private interests and public welfare. As is the case in Boxley Valley of the Buffalo National River, the intent is to preserve the continuity of agricultural use but not to freeze the landscape in time. The most effective mechanism has been the purchase of restrictive easements on farmland. Development rights on approximately 1330 acres have been acquired. In some cases, it has been necessary to purchase the full title and then resell the property to an adjacent farmer with a deed, restricting the use of the land to agriculture only.

At Sleeping Bear Dunes National Lakeshore, there are approximately 526 acres of privately owned land that are subject to scenic easements. Restrictions include the subdivision of property, the construction or moving of buildings, or the felling of trees over two inches in diameter. Recently, one farmer who applied to demolish some farm buildings, was denied, but went ahead and demolished the buildings anyway (Figure 5:6). The park has also had difficulty controlling the construction of new farm buildings by owners of land with scenic easements. There are no restrictions on farming practices. At present, only 407 acres of land in this category are being farmed, but problems may arise with scenic easements if there are no conditions placed on agricultural development. Not only may new large scale 'industrialized' agricultural operations be developed but also quasi-agricultural uses may slip in. These could include horticultural enterprises requiring climate-controlled buildings, plant nurseries, boarding kennels, boat storage buildings, etc. These uses tend to be more serious in marginal farming areas as near Sleeping Bear Dunes

National Lakeshore where farmers are desperate to find alternative profitable enterprises.

PARTNERSHIPS WITH THE NATIONAL PARK SERVICE

In many cases, grass-roots preservation efforts led to the initial preservation of parks. By 1923, for instance, the Saratoga Battlefield Association, a local organization had acquired three of the farms that made up part of the battlefield. New York State then started to acquire land, and in 1938, the US Congress created Saratoga National Historic Park. More recently, some of the residents of Green Springs, a farming valley in Louisa County, Virginia, nominated the valley as a rural historic district and it was recognized as a National Landmark in 1974. Many landowners donated scenic easements to Historic Green Springs Inc., a local land trust. The National Park Service offered to assist in the administration of the landmark and now holds the development rights to 6,000 acres of 14,000 acres in the Green Springs Valley. A further 2,000 acres of development rights are held by the State of Virginia or Historic Green Springs Inc. This, however, remains as it began, a grass-roots conservation effort.

Local concern for the future of Whidbey Island also resulted in a partnership between the local planning authority and the National Park Service to create the Ebey's Landing National Historic Reserve in 1978. The reserve comprises 17,470 acres of which 5,500 acres are in farmland. Local concern was aroused when a 1970 report by the Bureau of Outdoor Recreation declared Whidbey Island as having potential for recreational development.

Local public concern for and involvement the protection of parks varies considerably. One park with active local support is the Point Reyes National Seashore. The Marin County Agricultural Land Trust (MALT) vigorously supports the National Seashore Protection Bill which would make money available for the purchase of the development rights on 135,000 acres of rural land that adjoins the Point Reyes National Seashore and the Golden Gate National Recreation Area. The Trust has been active for some years, accepting gifts of easements in return for income tax relief for the donor. These efforts are important not only to protect the coastline from inappropriate development, but also to ensure a critical mass of farms in the area,

without which the historic ranches on Point Reyes would be difficult to operate economically. Only in a few parks have local or regional land trusts been active in protecting the parks from adjacent intrusions. Some miles from Sleeping Bear Dunes National Lakeshore, the American Farmland Trust has been active in trying to save cherry orchards, but these activities are not close enough to impact the park itself.

Community farms and community supported agriculture have potential for innovative partnership arrangements with the parks. In the case of tenure by a community farm organization, the day-to-day management of the farm would have to be overseen by one, preferably full-time person with whom the park management could liaise. In the case of community supported farms in which local people buy shares entitling them to weekly fresh produce, the tenancy would be let to a farmer in the usual way.

Volunteers

Many parks enjoy active participation from local volunteer groups. These include individuals and a number of organizations including Future Farmers of America (FFA), 4H, the Boy Scouts, and the Youth Conservation Corps. The potential for using volunteer labor on highly mechanized farms is limited, but as leases are taken by part-time farmers, there could be more farming tasks available for volunteers. Volunteer labor from the local chapter of FFA is used on the pioneer farmstead at the Oconaluftee visitor center in the Great Smoky Mountains National Park. At Gettysburg National Military Park, the FFA has assumed responsibility for replanting and maintaining an orchard. Many potential uses for and sources of volunteers have yet to be tapped. The use of the National Guard is possible in National Military Parks, and Chickamauga and Chattanooga National Military Park is considering the use of National Guard units to help clear invasive exotic vegetation in woodland

Sadly, many parks cannot boast of much local concern for the parks' futures. In a great many of the adjacent rural counties there is no planning or zoning. Only in a handful is there a local land trust that is active in protecting the rural resources adjacent to the parks. In some cases, the development that has already taken place on adjacent land has severely reduced the integrity of the parks. One of the worst

cases is Stones River National Battlefield in Tennessee where urban-fringe uses sprawl around the battlefield. Unfortunately, agriculture is rarely in a position to compete economically with urban development, and this problem is made worse in parks where agricultural enterprises are marginal because of poor soils (Sleeping Bear Dunes National Lakeshore), shortage of irrigation water (Ebey's Landing National Historic Reserve), fragmented farmland (Cuyahoga National Recreation Area) or a generally depressed agricultural economy (Brice's Cross Roads National Battlefield).

CONCLUSIONS

If the task of managing agricultural resources by park staff is not cost effective and too burdensome, some arrangement to have the land managed by contractors or local farmers will be necessary. The proposed procedure for designing an agricultural program (Chapter 7), involves the selection of an appropriate tenure mechanism for one of six management scenarios (Table 7:1). These six scenarios are based the viability of farming in the area, and the practicality of farmers residing on and developing a strong sense of ownership of the land. Each mechanism for proprietorship tends to be best suited to one or more scenarios. The choice of tenure mechanism depends on diverse criteria including:

- the potential profitability of farming
- the presence of a farmhouse and farm buildings with the land
- the need for capital investment in the buildings or land
- the restrictiveness of conditions of use
- the importance of security of tenure, a sense of ownership, and willingness to invest
- the acceptability of change of various sorts
- the need to anticipate future unacceptable changes
- the size of tracts available and relative to the economic scale of desired uses

Ultimately the choice of instrument depends on striking a delicate balance between the need to nurture commitment to stewardship of park resources by *long-term* agreements, and the protection of the resources from bad farming practices by agreements that are revocable in the *short-term*.

NOTES

1. National Park Service, 1991. *Natural Resource Management Guideline.* NPS 77, p.3:66.
2. National Park Service, 1994. *Cultural Resource Management Guideline.* NPS 28, p.141.
3. National Park Service, 1982. *Historic Property Leasing Guidelines.* NPS 38, p.17:1.
4. National Park Service, 1986. *Special Park Uses Guideline.* NPS 53, p.4:3.
5. Ibid., p.1:4.
6. National Park Service, 1991. *Natural Resource Management Guideline.* NPS 77, p.3:101.
7. National Park Service, 1986. *Special Park Uses Guideline.* NPS 53, p.4:3.
8. Ibid., App. p.16:3.
9. National Park Service, 1991. *Natural Resource Management Guideline.* NPS 77, App. p.16:3.
10. Criteria set out in Policy on Historic Property Leases and Exchanges must be met (Special Directive 82-12 cited in NPS 38, 1982, p.1).
11. National Park Service, 1988. *Management Policies*, p.5:15.
12. National Park Service, 1985. *Land Use Plan, Cultural Landscape Report: Boxley Valley.* Buffalo National river, Harrison, AR. p.40.
13. Ibid.
14. National Park Service, 1982. *Historic Property Leasing Guidelines.* NPS 38, p.3:2-3.
15. Ibid., p.5:4.
16. National Park Service, 1991. *Natural Resource Management Guideline.* NPS 77, p.3:17.
17. Ibid., p.3:17.
18. National Park Service, 1982. *Historic Property Leasing Guidelines.* NPS 38, p.14:2.
19. National Park Service, 1991. *Natural Resource Management Guideline.* NPS 77, p.3:61.
20. The Lakeshore was authorized in 1970 and acquisition followed soon after.
21. The *Joint Management Plan* (1989) This plan was never officially adopted but the objectives are consistent with the purpose of the monument.
22. National Park Service, 1985. *Land Use Plan, Cultural Landscape Report: Boxley Valley.* Buffalo National River, Harrison, AR. p.1:8.
23. National Park Service, 1994. *Cultural Resource Management Guideline.* NPS 28.
24. National Park Service, 1985. *Land Use Plan, Cultural Landscape Report: Boxley Valley.* Buffalo National River, Harrison, AR. p.1:11.
25. National Park Service, 1980. *Comprehensive Plan: Ebey's Landing National Historical Reserve.* Seattle, WA. Section ii.

CHAPTER SIX
MANAGEMENT ISSUES AND CONDITIONS FOR AGRICULTURAL USE

INTRODUCTION

The impacts of changes in agriculture in the United States were described in general terms in Chapter 3, and have been summarized on Table 6:1, together with some implications for management. Many of the management issues related to agricultural use in the national park system have arisen due to changes in the agricultural economy and agricultural methods over the last century. As a result of some of these issues, it has been necessary to impose conditions on agricultural use which vary from park to park . The conditions, which are attached to agricultural leases, memoranda of agreement, special use permits or letters of agreement, are necessary to make agricultural use consistent with the management of both the natural and cultural resources and to promote sustainable farming practices. Sometimes conditions are seen by farmers as being unnecessarily restrictive, and may discourage them from taking up permits. Fourteen groups of conditions were identified and are listed on Table 6:2 with examples of parks where they are used.[1]

Farming practices that have unacceptable environmental impacts cannot be allowed in parks. However, sometimes measures to make a practice acceptable can result in loss of historic integrity. At Gettysburg National Military Park, measures to make large-scale tillage operations feasible without excessive erosion have changed the historic field pattern. Conservation practices including contour cropping are acceptable on the Blue Ridge Parkway, but not because these techniques were commonly used by Appalachian farmers in the 1930s. The designers intended that the farms along the parkway should demonstrate appropriate farming techniques including contour cropping, rather than an historically accurate picture of poor farming and poverty. This was part of Stanley Abbots's "Managed American Countryside" concept for the parkway. Contour cropping, seen at Adney Gap (Figure 6:1), is rare along the Blue Ridge Parkway today. This is because fewer permits are farmed by the adjacent landowner, and fewer tillage crops are being grown. As a result, much of the cropland today is not on the contour, but parallel to the road and farmers must use techniques such as no-till to control erosion (Figure 6:2).

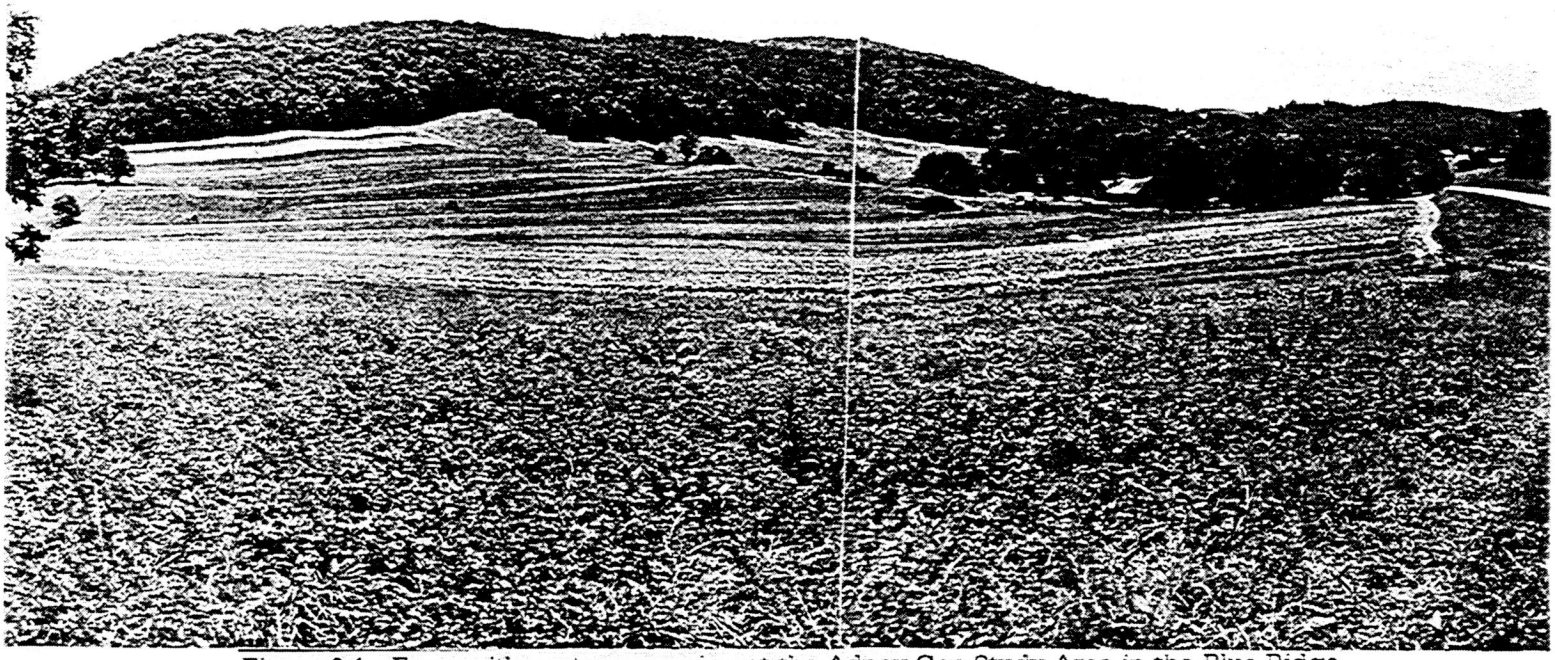


Figure 6:1 Farm with contour cropping at the Adney Gap Study Area in the Blue Ridge Parkway. This farm is owned entirely by the NPS which makes it feasible to practice contour tillage.



Figure 6:2 Contour cropping is no longer possible here in Section 11P of the Blue Ridge Parkway, as the adjacent farmer no longer farms the land within the park boundary. As a result, crops are parallel to the road and the park boundary is visually prominent.

TABLE 6:1. Change in Agriculture

Agent of Change	Changes	Result	Impact on Integrity	Implications for Management
- Mechanization - Biocides - Synthetic Nitrogen - Fertilizers	- Labor efficiency - On-farm specialization - Abandon draft animals - Larger scale	- Abandon rotational systems - Simplification of crops - monoculture - Faster machines, larger field units. -Many redundant buildings (storage for draft animals, stables, etc. - Rural depopulation	- Loss of rotational features - Loss of diversity of crops - Loss of hedges-piping of ditches - Loss of buildings - Loss of institutions	- Return to labor intensive rotational systems may be impractical. -Management of some features (hedges, ditches, etc.) too labor intensive to be practical
- New methods of handling (mostly high-speed, linear)	- In winter, livestock fed and cleaned with tractor equipment - haystacks replaced by square bales, round bales	- Traditional 2-story barn defunct - Barn storage of hay unnecessary - Loss of traditional features of field operations	- Loss of historic buildings - Loss of historic features - New, non-conforming buildings	- Integration of new buildings - Space requirements for new buildings - Justification of maintenance of defunct buildings
- New method of storage	- Hay stacks replaced by silos (tower), replaced by pit silos	- Loss of barns, then tower silos	- Loss of historic buildings	- Inground (pit) silos replace tower silos
- Development of regional marketing, refrigeration, transportation, storage	- Regional agricultural specialization	- Further on-farm specialization	- Further loss of features of mixed rotational farms	- Gross simplification of agricultural ecosystems - High-input, unsustainable farming
- New irrigation system and deep wells	- Previously unirrigated lands in production - Small scale irrigation defunct	- Abandonment of small scale irrigation canals and fields - Obliteration of historic pattern by center pivot - Increased demands on groundwater	- Loss of historic irrigation systems - Loss of irrigation canals - Obliteration of historic landscapes	- Scale considerations and configuration constraints make new irrigation systems incompatible with traditional irrigated landscapes
- Mechanization	- High speed large equipment incompatible with difficult terrain	- Highly dissected terrain out of use	- Abandonment - land grows up in forest in humid areas	- Difficult to find farmers to work small isolated tracts
- Introduction of intensive grazing systems	- Higher stocking rate with rotational grazing	- Reorganization of fields. Loss of hedges, intensive grassland management	- Loss of historic enclosure patterns	- Modern high tensile and movable electric fencing makes paddock grazing feasible and more efficient grassland management
- Selection of high performance crops and animals	- Loss of 'old' varieties of crops, fruit, and breeds of livestock	- Loss of genetic diversity	- Loss of old crop varieties - Loss of old livestock breeds	
- Miscellaneous technical advances	- Wood preservatives	- Farm timber purchased no longer cut on-site	- Woodlots defunct - Local sawmills gone	- Difficult to obtain authentic historic fencing and other farm timber
- Second homes; urban pressure	- Rise in development value of land	- Second homes - Right to farm issues - Trespass - Urban intrusions - Uncontrolled dogs	- Loss of farmland - Urban intrusions	- Critical mass of farms - Right to farm - Sheep and other livestock may be impractical

TABLE 6:2
Examples of Conditions Placed on Agricultural Uses in Parks

Condition	Park Codes
1. Conditions to protect natural resources, to protect environmental quality, to promote sustainable farming and good agricultural practices.	**(refer to Figure 1:2)**
1:1 Farm Conservation Plan and BMPs	
SCS conservation plans	9,15,24
Strip cropping	18
Soil conservation practices	14,15,19,24,25,27
1:2 Crop Rotation and Cover Crops	
Crop rotation	15,18
Cover crops on fallow fields	18,21
1:3 Lime and Fertilizer	
Regular soil testing	
yearly	10
2 yearly	15,24
less often	18,25
Maintain pH between certain limits	2-6,21,26
Apply fertilizer as per soil test	15,24
Notice of application of fertilizer or lime	24,25,27
Log of fertilizer and lime use	21,27
Fertilizer to be applied by certain date	25
No fertilizer requirement	10
1:4 Pesticides and Hazardous Materials	
Obtain and maintain a license to apply pesticides	21
Permission to use pesticides/prior approval necessary	10,14,21,26,27
Report of pesticide use	15,18,21,27
No storage of hazardous materials	18,19
1:5 Pest Control	
Weed and pest thresholds	12,28
Mow field edges to control weeds	18
Crop management association	15
Cropland must be part of field scouting program	15
Wild hog or deer control	10,14
1:6 Range and Pasture Management	
Rotation of livestock	10
Limitation on winter pasturing of livestock	2-6
Supplementary feeding of livestock in winter/drought	19
No confined animals	9
1:7 Riparian Buffers	
Fence off riparian buffers	9,10
15' berms along river to be maintained	14
1:8 Reseeding and Brush Removal	
Approval required	25,26,27
1:9 Disease Control Among Livestock	
Livestock to be inpected for disease	10
Dead animals must be removed promptly	10
2. Conditions to protect wildlife.	
Earliest or latest dates for mowing specified	14
Farmer required to manage open areas for wildlife habitat	15
3. Condition to maintain or to protect trees or hedgerows from damage	
Ban on felling trees	18,25,26
Mow to edge of tree branches - not to trunk	10
Fell only trees that interfere with agriculture	10
Only fallen trees may be used (with approval)	21
Hedgerow management	15
4. Conditions to prevent open fields from growing up in brush or trees.	
Mow or disc by specified date or subject to charge	24,25
Mow a minimum of once per season	10,18,21
Permission before signing up for set-aside program	18
5. Conditions to protect visual quality (see also Conditions to Protect from Commercialism)	
Fields to be mowed to maintain uniformity	25
No storage of disused vehicles and equipment	9,15,21
Control weed growth in fencelines	21
Satellite dishes require NPS approval	9
6. Condition to disguise non-historic agricultural features.	
Storage of bales out of sight or in buildings	10
Removal of bales from land	18
Machinery to be removed promptly or left out of sight	10,18,19
7. Conditions to protect the integrity of fields of fire or historic views.	
Tall crops may not be grown	28
8. Conditions to maintain historic buildings and other improvements, fences, etc.	
Improvements on property to be maintained	26
Lessee responsible for damages	14,15,26
No alteration to buildings allowed	14,21
Historic fencing responsibility of NPS	18,19
No changes to fences without approval	18
No tillage within 3' of fences	21
9. Conditions to prevent construction of new buildings or fences.	
No new buildings permitted	2-6,9,18,19,25,26
No temporary buildings permitted	15
10. Conditions to protect historical monuments or archaeological resources.	
No road construction	26
Archaeological sites off limits	15,18,19,27
Archaeological objects to be turned over to NPS	15,18,19,21,27
No changes to landforms	21
Limits on surface disturbance	9,15,18,27
No operations within specified distance of monument	12
Maximum depth tillage	27
11. Conditions to protect from commercialism.	
No advertising signs	9,15,18,19
Use of commercial vehicles restricted	2-6,24
12. Conditions to reduce fire hazard.	
General precautions	14,15,18,19,25,26
Permission to burn required	21
13. Conditions affecting access for farm machinery.	
Limitations on accessing farmland from parkway	2-6,24
14. Conditions permitting public access to or hunting on farmland.	
Hunting and fishing permitted	15
No gates may be locked	18
Public use of designated trails	9

In many cases, growing an historically accurate tillage crop would result in excessive erosion unless a conservation practice is used. In cases where such practices would have resulted in an unacceptable loss of integrity, some parks including Pea Ridge National Military Park and Chickamauga and Chattanooga National Military Park, have chosen to grow hay which, although not the historic crop, prevents excessive erosion.

ECONOMIC VIABILITY OF AGRICULTURAL USE

Specialization and scale

The natural resource management guidelines consider agriculture and grazing separately, but in this manual the uses have not been separated because, in traditional rotational farming systems, grazing and tillage agriculture are integrated.[2] In contrast, most modern systems are specialized and, together with their large scale, make them incompatible with the management of many agricultural landscapes in the national park system. Some enterprises and operations are more sensitive to economies of scale than others. Generally labor intensive, specialty crops that are difficult to mechanize are less scale-sensitive than crops that can be fully mechanized at every phase of production. Farmers who grow scale-sensitive crops such as corn, soybeans, cotton and small grains need large, fast machinery, big fields, wide gateways, and sometimes contour tillage systems which may not be compatible with preserving the cultural landscapes of a park. Changes to accommodate a larger scale of farming has reduced the integrity of some historic landscapes, but larger scale farming along the Natchez Trace Parkway in the Delta Region has not reduced the cultural integrity of the landscape as the continuity of use is more significant than a particular pattern of use.

The parcels of agricultural land in most parks are too small to be of interest to a commercial farmer, especially if subject to conditions that prevent the land being farmed in the same way as the farmer's own land. The viability of agriculture in some areas surrounding parks has been severely reduced because farms have not been able to expand. This may be the result of fragmentation due to urbanization or second home development. Steep terrain or unproductive soils may also effectively limit the availability of farmland in an area, again making it difficult for farmers to expand. These problems have affected the viability of agriculture in the vicinity of the

Blue Ridge Parkway, Sleeping Bear Dunes National Lakeshore, and Cuyahoga Valley National Recreation Area.

Farmers who are in scale-sensitive livestock enterprises such as dairying are also under pressure to get bigger. This may result in unacceptable environmental impacts due to large numbers of animals confined in buildings or yards close to the milking parlor. Traditional dairy barns are not adaptable for modern milking parlors or for larger herds. The historic buildings on the dairy ranches at Point Reyes National Seashore are obstacles to expansion . As dairying has changed from a labor intensive to a largely automated enterprise, dairy farms have almost disappeared from the national park system.

Factors affecting the economic viability of agriculture in the area as a whole are important, and because many agricultural enterprises are so scale sensitive, most farmers that lease agricultural land will farm a much larger acreage outside the park. In the national park system, agricultural landscapes vary in size from gardens to large farms and ranches. The plantation on which Booker T. Washington was born was 107 acres in extent and supported several families, it is too small to provide a livelihood for a single farm family today.

Critical mass

The loss of farms to below a certain critical mass severely threatens the economic viability of farming in an area, as farmers no longer have access to agricultural services. The loss of farmland is usually caused by urbanization, but greatly increased labor efficiency on modern farms will also cause severe farm depopulation and possibly the collapse of farming communities and rural institutions. Loss of critical mass was probably the major cause of the closure of a milk plant at Galax, VA., which resulted in most of the rest of the dairy farmers along that section of the Blue Ridge Parkway going out of business.

Agriculture has fallen below a critical mass in the areas of Stones River National Battlefield, Ebey's Landing National Historic Reserve,and Cuyahoga Valley National Recreation Area, although the latter is fortunate in still having a traditional feed mill within its boundaries (Figure 3:17). It is also a concern at Point Reyes

National Seashore. The loss of critical mass of agriculture is blamed for the small number of bids or applications being received from farmers for leases, special use permits, or memoranda of agreement at Chickamauga National Military Park, Pea Ridge National Military Park, and Stones River National Battlefield.

Expectation of profit

The profitability of growing certain crops is largely dependent on government programs, which vary from year to year depending upon which crops are in surplus. It will be a serious disincentive for a farmer to grow a historic crop if the support price for that crop is low. This also means that farmers have difficulty planning their operation from year to year because the choice of crops often depends on the commodity prices which, for feed grains and some other crops, may not be published until February. Some parks, including the Natchez Trace Parkway require farmers to submit a cropping plan each year. Recently the date for submitting crop plans was changed from January 1 to March 1, to allow farmers to find out commodity prices and set-aside requirements for various crops before committing themselves to a crop plan. As the price of supports for farm commodities are phased out over the next seven years (as mandated by the 1996 Farm Bill), some farmers may benefit by being able to plan more effectively while other less competitive farmers may fail through lack of support payments.

Even with USDA support programs, there may be no profitable crops that a farmer can grow in a certain areas of the country . This problem has become acute in the Mississippi Hills Region of the Natchez Trace Parkway where it has become difficult to find permittees for farmland. In other less serious cases, it has made it difficult or impossible for farmers to meet requirements for crop rotations. As a result most of the "rotations" that are seen in the national park system are rotations of one tillage crop and hay, but even these simple rotations may be unpopular. A specialized tillage farmer for instance, probably owns no haymaking equipment and may have to contract out the haymaking operation.

In other cases,the choice of crops may be severely limited by a pest problem. Deer damage makes feed corn uneconomic for farmers at Gettysburg National Military

Park. Deer also cause severe damage to sweet corn at Cuyahoga Valley National Recreation Area.

In some parks, farmers are hesitant to give up their permits even when profitability is low. On the Natchez Trace Parkway, some permittees have been holding their land, but not farming it in the hope that crop prices will improve. The problem has become so acute that the park had to introduce a new condition whereby, if a farmer does not plant a crop, he must have his land mowed by October 30 or the park will do it and bill the permittee $30 per acre. At Minute Man National Historic Park, if the permittee does not crop the land, it must be mowed "at least once" during the growing season.

Unproductive land

Soils with very low productivity may severely reduce the viability of agriculture. The sandy soils at Sleeping Bear Dunes National Lakeshore for instance have an extremely low productivity and, in consequence it has become necessary for the park to use mowing to maintain an appearance of agriculture in some areas. Some of the soils where the Natchez Trace Parkway cuts through the Black Belt Prairie near Tupelo, are so erodible that only flat gently sloping terrain is workable. In several other parks, including the Blue Ridge Parkway, the steepness of the terrain is a major constraint to agriculture.

Accessibility and remoteness

Farmsteads or farmland in the parks may be inaccessible due to river crossings, frequent flooding or remoteness. Farmers at Canyon de Chelly National Monument who have to use the bed of the wash as an access road into the canyons, cannot get to their land when the wash is in flood and, during dry periods, access is risky due to the quicksand. Farmland on the islands in the Delaware River at the Delaware Water Gap National Recreation Area can only be reached when the water level is low enough to ford the river. Some of the farmland along the Buffalo National River can only be reached by fording the river which may put severe constraints on the timing of farm operations. Some areas of farmland are so remote that they cannot be operated economically. This was the reason the farmland at Cataloochee in the Great Smoky Mountains National Park was withdrawn from that park's agricultural

program. In the same park, Cades Cove is also remote from other farming areas. In consequence, agricultural permittees in the cove do not have their own land outside the park. The permits in the cove are their only holdings and therefore, must be large enough to provide an economic livelihood for a family.

In other parks, farmers who live outside the park may have long distances to travel and bring equipment if the park is remote. The home farms of some of the farmers who lease land at Delaware Water Gap National Recreation Area are more than forty miles from the park. This lessens their competitiveness, and the park finds it difficult to maintain the mandated 20 percent of open land. The ban on accessing farmland from the Blue Ridge and Natchez Trace Parkways can involve farmers in much longer trips on unrestricted roads.

Competition from urban uses

Urbanization poses several problems for agriculture. The loss of critical mass was discussed earlier. Scale sensitive enterprises that need large acreage of land are rarely economic in an urbanizing area. Dairy farms until quite recently relied on proximity to an urban market, were difficult to mechanize and therefore were not scale sensitive. But today, dairy farmers on the urban fringe are having difficulty finding sufficient affordable land in close proximity to their own farms to enable them to expand to an economic size. This problem has affected dairying in the vicinity of Chickamauga and Chattanooga National Military Park and Stones River National Battlefield. Other farmers sell off land to generate capital and this exacerbates the situation.

At Sleeping Bear Dunes National Lakeshore, rapidly rising property taxes were mentioned as being responsible for the loss of farms in the area. Unless farmers are eligible for a tax program based on existing-use valuation, property taxes may become prohibitively high in urbanizing areas. Most states have such programs, but they are usually conditional on ten year commitments to remain in farming which some farmers may be unwilling to give. Also, some states require that farmers be in a designated agricultural district to qualify for property tax concessions, and consequently not all farmers may be eligible.

Complaints and lawsuits from non-farming residents in rural areas about smells, noise and other nuisances caused by farming have led many states to enact "Right-to-Farm" legislation to protect pre-existing farming uses. As urbanization proceeds and, as the number of farms approaches a minimum critical mass, problems are compounded and farming becomes impractical. Urban pressures are most acute in the parks that are within easy commuting range of large urban areas such as the Roanoke Valley section of the Blue Ridge Parkway; the Natchez Trace Parkway close to Nashville, Tupelo, Jackson, and Natchez; the Cuyahoga Valley National Recreation Area which essentially connects the cities of Akron and Cleveland; and Monacacy battlefield on the edge of Frederick, Maryland.

Competition from recreational uses and "edge effect"

Development pressures also occur in areas where second homes are in demand. The areas around the Delaware Water Gap National Recreation Area and around Sleeping Bear Dunes National Lakeshore have long been popular for second homes. Some, like Ebey's Landing National Historic Reserve were once favorite vacationing places, but are close enough to urban areas to have become year-round residential communities. On the Blue Ridge Parkway, recreational development threatens agricultural resources adjacent to the Parkway particularly in the vicinity of Fancy Gap and Blowing Rock and elsewhere where the parkway is close to the escarpment of the Blue Ridge. The area in the vicinity of Montezuma Well in the Verde Valley in Arizona is also popular for retirement homes.

The parks themselves have been partially responsible for creating a demand for recreational development and the "edge-effect" is seriously impacting the viability of farming immediately outside some parks. There is a premium for land adjacent to national parks for residential use, and along the highways approaching parks for commercial use. This has spawned boom towns such as Gatlinburg on the edge of the Great Smoky Mountains National Park. This "edge effect" is of great concern in parks where the rural setting is important to the park's integrity. In some cases, if the landscape in the historic period was wooded and it is usually possible and appropriate to screen the site with woodland. Again, the Great Smoky Mountains National Park provides the example of Cades Cove, which is protected from intrusions by the sheer size of the forested park that surrounds the cove. The Battle of the

Cowpens was fought in an area of open woodland which makes it appropriate to screen the park from the rural residences and small farms that surround the park today with a wooded buffer. The west side of Saratoga National Historic Park can also be screened from adjacent development, but on the east side of the battlefield, it's quite inappropriate and impractical to screen the historically important views of the Hudson Valley from the redoubts overlooking the river (Figure 6:3). At Grant Kohrs National Historic Site and Montezuma Castle National Monument, woodland is not the climax vegetation type and screening with woodland is not an option, nor is it inappropriate.

Along the parkways, the problem of adjacent development is exacerbated by deed reservations that were granted at the time of acquisition to allow access to adjacent farmland that had been fragmented or cut off by the construction of the road. Unfortunately, the reservations were usually not limited to access for agricultural purposes and, as a result owners of adjacent farmland with access reservations can develop the land for urban uses with parkway access. Land, with frontage on the parkway and easy access, commands premium prices on the market. Some of these reservations have been extinguished on the Blue Ridge Parkway but many more exist. The same problem is found on the Natchez Trace Parkway although in most sections, the development pressures are not as serious as on the Blue Ridge. The visual effect of the development of adjacent farmland is that it leaves only a narrow strip of agriculture with no connection to the rural landscape beyond. The designers of both parkways intended that farmland should be part of the broader landscape. A further problem is that, in order to screen the development on adjacent land, farmland may be withdrawn from the parkway agricultural program and allowed to grow up in forest, creating a tunnel effect and reducing the diversity of the landscapes along the road.

Availability of water

Agricultural productivity depends not only on productive soil but also on the availability of water. Because of lack of water for irrigation, farmers may not be able to grow specialist crops even if a demand exists. At Ebey's Landing National Historic Reserve, residential development has increased the demand for high-value irrigated crops and horticultural produce, but the demand cannot be met because the



Figure 6:3 The view from the Great Redoubt at Saratoga National Historic Park across the Hudson River. This is a strategic view that should not be screened, but the National Park Service has very little control over how land is used in the valley beyond.

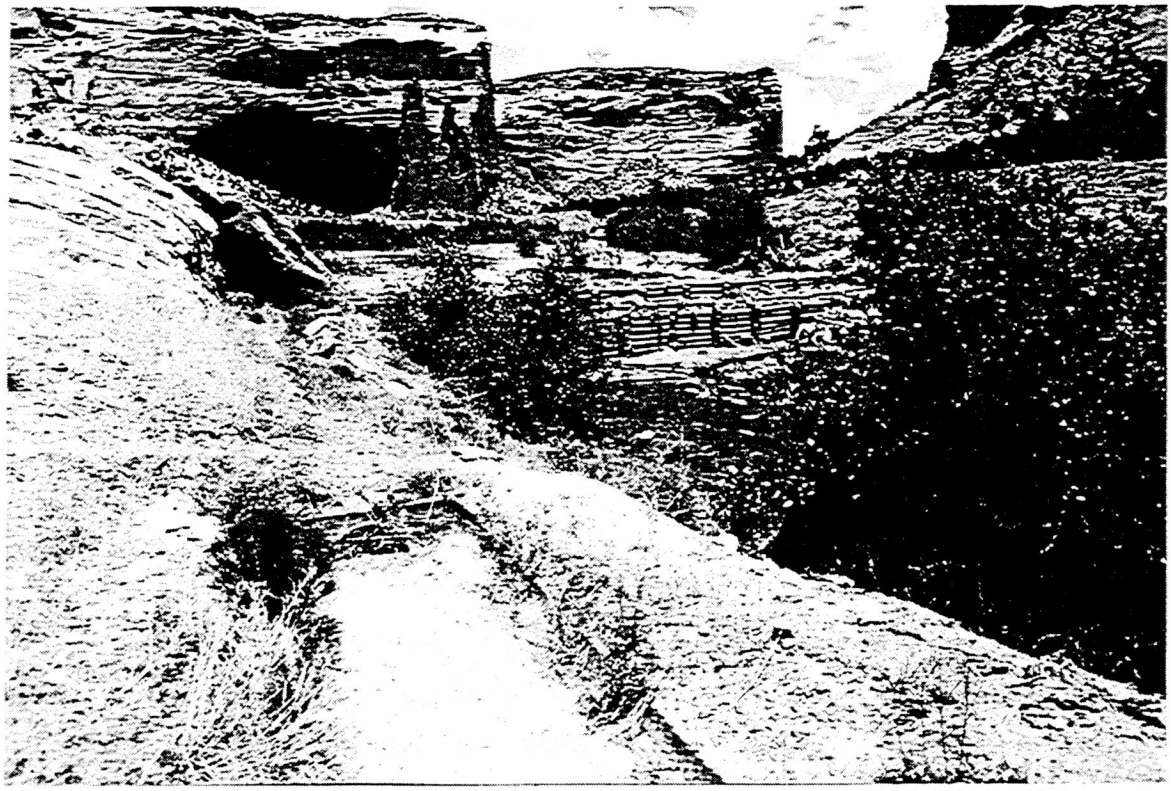


Figure 6:4 Log and rock rib weir in Canyon del Muerto (Canyon de Chelly National Monument). Note that the irrigation canal is silted almost to the soffit of the pipe from the diversion gate.

development also makes competing demands on limited ground water resources. Already the future of dairying on Whidbey Island is doubtful because of the insufficient supply of groundwater to meet the needs of the dairy farmers. At Canyon de Chelly National Monument, irrigation has been made difficult due to the lowering of the channel of the wash. Dams and canals, both of which are subjects to siltation are now necessary to channel water onto the land (Figure 6:4). Until recently historically irrigated hay meadows at Hubbell Trading Post National Historic Site, could not be farmed because the irrigation dam had been breached. The dam and distribution canals have recently been reconstructed, but there is now increased demand for water from the local community. If this problem can be resolved, a demand still exists in the area for irrigated alfalfa hay which was the historic crop at the trading post. It is rather unusual to find cases where historic crops remain economically viable today. At Grant Kohrs National Historic Site, the rapidly increasing demand for irrigation water from local ranchers has resulted in the demand for water rights far exceeding supply. The park must continue to use their water rights or risk losing them. The increased demand for irrigation water is caused partly by the widespread use of pumped irrigation systems which deliver water under pressure and makes more land irrigable than by using traditional gravity-fed systems.

VIABILITY OF HISTORIC AGRICULTURAL USES

Farming methods

Park service guidelines point out that historic farming methods may be impractical due to their labor intensity, and that many elements in a historic farming scene may not be compatible with modern agricultural practices or economies.[3] This point has been illustrated in an array of situations in the parks studied, and is a critical factor in designing an agricultural management program.

Due to the expense or difficulty of confining livestock, water pollution potential, a perceived danger to visitors, or damage to historic objects, grazing has often been replaced by mowing for hay. Functionally, mowing achieves similar results as grazing, but there may be important visual differences. By mowing instead of grazing, the browse line, which is a feature of most grazed landscapes, is not seen. Grazing animals can reach into tight corners, between closely spaced trees, under the lower strand of fencing wire, and around fence posts. As a result, the edges of a

grazed pasture look much different than those of a mowed hay meadow. This difference is also apparent when cattle have access to a woodland edge where grass gradually gives way to leaf litter. At Cowpens National Battlefield (Figure 6:5), the historic landscape was an open grassy savanna, grazed by cattle, but the park is now managed by haying and mowing. A sharp edge with a clear distinction between open grassland and closed woodland is emerging which is not historically accurate.

Mechanization and labor efficiency

The sight of modern machinery or the marks of mechanization in a historic scene may reduce it's integrity. In most parks where haying is practiced, but where hay bales were not part of the historic scene, there is a condition covering the timely removal of bales from the fields. At Chickamauga and Chattanooga National Military Park, bales must be gone within a week. Permittees at Cades Cove in the Great Smoky Mountains National Park store their hay in several barns that exist in the valley, but they are also permitted to store round bales outside if they are placed out of sight of the visitors on the tour road. In parks such as the Natchez Trace Parkway that do not have a precise historic period, removal of bales is not be required. Many parks require that machinery not be left on the land, but if the farmer is in the process of completing an operation, the machinery must be stored out of sight of visitors.

Mixed farming

Issues arising from specialization and large scale operations have been discussed, but the number of different farm operations, the number of people involved, the number of crops, types of animals and farm buildings, have all fallen drastically and the small scale patchwork pattern of activities has given way to uniformity. While it may be feasible and even economically viable for a farmer to grow a historically authentic crop, it is most unlikely that the diversity of crops and livestock present on a mixed general farm could be raised profitably.

Historic crops and livestock

It may be difficult to decide whether a crop or farm animal is significant enough to justify raising it. At Shiloh National Military Park, for instance, it was decided that growing cotton in Sarah Bell's cotton field did not justify the



Figure 6:5 Older hardwood trees and savanna in the vicinity of the Washington Light Infantry Monument at Cowpens National Battlefield. This is one of the few areas of the battlefield that may approximate the historic scene.



Figure 6:6 Winter wheat in Seay Field, Shiloh, National Military Park, April 13, 1994. In 1882, this field would likely have been fallow with residues of various crops. Note that this field extended further south, but it probably will not be cleared as the land is steep sloping.

environmental problems it would cause. In the case of an historic crop which was rotated, it would only be in it's historic location for one year in three or four. However, the peach orchard at Shiloh is significant enough to have involved the park in considerable efforts to keep it healthy in spite of damage form deer and other pests. The same is true of the peach orchard at Gettysburg National Military Park. It must also be decided in the case of orchards, whether a dwarf tree is acceptable or if standard rootstocks must used, or if it important to use an heirloom variety. Is the identical historic variety mix of fruit trees necessary, or can some simplification be allowed to enable a farmer to sell larger batches of one variety? Lessees of historic properties may be required to grow historic crops "on the occasion of formal programs commemorating historic events".[4]

Only native species may be used in natural zones of parks, but in cultural zones, historically appropriate exotic species are permissible.[5] Historic crops are identified in a park's cultural landscape report but they must also be environmentally acceptable.[6] If an historic crop is susceptible to pest infestation, a case might be made for a non-historic substitute. In some cases, an historically appropriate crop need not be used in a cultural zone if it can be justified. For instance, at Shiloh National Military Park, on the dates of the battle, (April 6-7, 1862) the land would have been fallow awaiting spring plowing (Figure 6:6). Only the remnants of the previous year's crops would have been evident, such as corn stalks and cotton. Corn would not have obscured fields of fire, impeded maneuvers, or provided cover. Therefore, on land where it is important to keep the field of fire visible, management requires planting only low-growing crops or grasses. The guideline also notes the desirability of perpetuating the use of historic varieties and breeds to promote genetic variety, and allows for the introduction of "non-native species that are a desirable part of the historic scene".[7] Most agricultural crops are exotic species but fortunately crop species are rarely invasive. However many agricultural weeds are also exotic species and some are invasive. In cultural landscapes, exotic species should be evaluated according to their cultural and/or historic significance and ethnological value.

In parks where sheep rearing was an historic use, problems with dogs attacking sheep makes it a risky venture with little expectation of profit. At Pea

Ridge National Military Park in Arkansas, there were more than twice as many sheep as cattle in the county in 1860, but there are almost no sheep left today. The same holds true for several areas along the Blue Ridge Parkway where sheep had been numerous. When the parkway was built, there were over 24,000 sheep in Floyd County, VA., but by 1987, there were only 575.

Other biotic features

"Plant and animal communities associated with human settlement and use are considered biotic cultural resources and can reflect social, functional, economic, ornamental or traditional uses of the land."[8] Biotic cultural resources may make up systems, such as hedges separating the fields of a farm, or features such as individual trees. Existing vegetation that contributes to the historic character of a cultural landscape should be identified, maintained, and perpetuated as appropriate, using methods that promote the health and vigor of the vegetation. Individual specimen plants are not usually pertinent to agricultural landscapes, although orchards do fall under this heading. Standards require that historic varieties are used, or that substitute plants match the historic varieties in visual, functional, and horticultural characteristics.

Historic use of farm buildings

As agriculture has changed so too has the use of farm buildings. They may have been made redundant by change of use or change of scale. Many historic farm buildings in the park system are let under the historic leasing program and conditions attached may be quite specific. Some have to do with what can be stored or how much can be stored in buildings because of fire hazard, overloading or other concerns. Most conditions require that no changes be made without prior approval. New buildings, temporary or otherwise, are not allowed without prior approval.

Historic fences, gates, and field boundaries

Modern fencing technology usually demands long straight runs that allow high tensile wire to be stretched tightly. Consequently the use of a modern fencing system may require adjustments in the configuration of fields, which may be more harmful to the integrity of a resource than the fence itself. The importance of using historic field configurations and fence types will vary from park to park.

At Gettysburg National Military Park the reconstruction of historic fences is carried out by the park staff at National Park Service expense but the farmers are responsible for maintaining the fences. On the Natchez Trace Parkway, the farmers fence the land and assume liability for them, but modern fencing systems are allowed. Four strands of barbed wire on metal or wooden posts spaced ten to twelve feet apart and cut off to a height of fifty four inches is standard practice. The parkway does not provide fences, even roadside fences as is the case in some sections of the Blue Ridge Parkway, where most of the sections of historic rail fences that are still functional are maintained by park personnel.

In a number of parks grazing has replaced tillage farming. Various non-historic paraphernalia will be needed to handle livestock. Guidelines specify what development structures (fences, cattleguards, corrals, loading chutes, water troughs, windmills, pest control structures, loafing sheds, etc.) are permissible and in what circumstances, and these must be itemized on a plan.[9]

Integration of farm and forest

During the historic period of most parks, woodland and farmland were managed together, and farmers made heavy demands on timber from their woodlands for fencing posts, for farm buildings, for gates and hurdles, and for fuel. Today most farmers no longer cut fence posts and other farm timber from their own woods and few rely on wood to heat their homes. Farmers not only relied heavily on woodland for farm timber and fuel, but also to turn out their livestock to fend for themselves by browsing and, in the case of hogs, rooting in the woodland. These practices had a major impact on the appearance and both the species and age composition of farm woodlands. On privately owned land, a few farmers may still permit livestock to browse and to shelter in woodland, but most manage woodland and farmland separately. Nature conservation concerns have led the National Park Service to exclude all woodland from their leases and permits except for a few small areas for shelter. This change in management of has resulted in much less visibility through woodland. In some battlefields, including Chickamauga and Chattanooga National Military Park, Cowpens National Battlefield, and Shiloh National Military Park, this visibility was an important historic characteristic. Visibility has been further reduced by the vigorous growth of exotic vegetation, notably privet.

In a few cases, commercial exploitation of lumber was an important historical use. It was the raison d'etre for the first settlements near Sleeping Bear Dunes on Lake Michigan, and commercial lumbering enjoyed a brief heyday in the history of the Boxley Valley of the Buffalo River. Only one of the study parks, the Buffalo National River, actually permits felling trees in woodlots, although it is being considered at Delaware Water Gap National Recreation Area. Farmers in all other parks are forbidden to fell trees of more than a certain diameter, although sometimes the use of fallen timber for firewood is allowed.

RESPONSIBLE MANAGEMENT OF NATURAL RESOURCES

The *Natural Resource Management Guideline* lists considerations which it are of "foremost" importance to review when agricultural use in a park is being considered.[10] These include various resources, such as freshwater and marine resources, and issues, such as erosion control and the use of exotic species.[11]

Soil conservation and erosion control

In "cultural zones" agricultural landscapes may be managed to reflect "a scene that prevailed during the historic period", but the National Park Service is required to "Conserve soil resources, to the extent possible, consistent with maintenance of the historic or cultural scene and prevent soil erosion ".[12] Guidelines also suggest that practices that have been developed to reduce erosion should be "carefully considered." Unfortunately some measures to reduce erosion such as contour cropping and terracing may fundamentally change the pattern of an historic agricultural landscape, and obliterate many of its characteristic features. Other measures involve trade-offs, as is the case for "no-till" which requires the use of an herbicide for weed control. Guidelines also require consideration of conservation practices, including crop rotation, seasonal grazing, lime and fertilizer requirements, of any adverse impacts of mechanical equipment, and of problems of runoff, siltation, and pesticide use.

The Delaware Water Gap National Recreation Area and some other parks require Soil and Water Conservation Plans prepared by NRCS. They are already required by USDA for highly erodible soils and should have been fully implemented by 1995 in order for farmers to remain eligible for USDA benefits. The conservation plans

at Delaware Water Gap National Recreation Area specify conservation tillage as a requirement. On the Natchez Trace Parkway, however, conservation tillage is a practice for which farmers can receive an incentive. NRCS plans must be evaluated critically because some conservation practices such as contour tillage may be inconsistent with the configuration of historic landscapes. However, guidelines state that, in parks where the general agricultural scene is being preserved without a precise historic date or period, most conservation practices are acceptable.[13]

Grazing

Grazing is used widely in the park system as it will keep an historically farmed landscape open at low cost. Grazing is a major activity in the national park system for various purposes, one being "pasturing to maintain an historic scene".[14] Grazing was an integral part of many traditional agricultural systems.[15] The guideline states that, if continuation of grazing would conflict with public enjoyment or would interfere with the function of the natural ecosystem, it will be eliminated. Because of the potential damage to natural resources, a goal to remove all grazing cattle from Cades Cove in the Great Smoky Mountains National Park was adopted.[16] However, the goal was not achieved presumably because grazing was judged to be the most practical management alternative to achieve the multiple objectives of the park.

Crop rotation

On specialized farms, agricultural crops are monocultures often at a very large scale, and guidelines suggest critical evaluation of these.[17] The related issues of scale and crop rotation should be considered. If units of a crop are quite small and are rotated with other crops and grassland, the system will be inherently more stable and sustainable than a large area of one crop. Most parks that permit farmers to grow tillage crops, including Gettysburg National Military Park, require crop rotation. These rotations however are not fully "integrated" rotations that include livestock, although they may include hay. At Gettysburg, an eight year cycle is normally required, typically two to three years of corn (or a substitute forage crop such as sorghum), one year of oats, one year of wheat and three to four years of hay. On the Natchez Trace Parkway rotations are required if row crops are grown for more than two years. A problem for some farmers is that there are no crops to rotate that will

give a reasonable economic return. Parks that permit tillage crops also commonly require cover crops on fields that would otherwise lie fallow over the winter.

Water pollution: Non-point sources from farming

Non point source pollution from agriculture is notoriously difficult to control, and can have serious adverse impacts on water quality including both freshwater and marine resources. The National Park Service seeks to restore, maintain and enhance the quality of all surface and ground water within parks, consistent with the Clean Water Act. The Clean Water Act has been quite effective in reducing point-source pollution, but it is generally agreed that it has not been effective in controlling non-point sources. Compliance with Section 319 of the act is voluntary for farmers, but the requirement for farmers to implement farm conservation plans prepared by the NRCS to be eligible for USDA farm support programs are having good results.

Guidelines set specific conditions for the use of pesticides and fertilizers. The danger of runoff pollution from excessively heavy applications of fertilizers is exacerbated by soil erosion. Soil erosion control will not only reduce sediment pollution but also the potential hazard of agricultural fertilizer as a non-point source of water pollution. Control measures therefore focus on appropriate application of fertilizers and pesticides and on reducing soil erosion. The potential for fertilizer, pesticide, and sediment runoff from tillage land adjacent to the river at Delaware Water Gap National Recreation Area, requires that the park managers take steps to protect this Wild and Scenic river from pollution. Heavy use of fertilizer typical of modern farming practice may be inconsistent with objectives and be "unnecessary to preserve an historic scene."[18]

Soil testing is a condition attached to agricultural leases or special use permits in almost every park. Some are required annually. Tests are intended to determine the need for soil amendments and fertilizer. This is not only to avoid the pollution hazard from excessive applications of fertilizer, but also to ensure adequate applications for sustaining soil productivity. On the Natchez Trace Parkway, the National Park Service have soil tests carried out annually and farmers are required to act on the recommendations. At Chickamauga and Chattanooga National Military Park, the park also takes soil samples annually and establishes soil amendment

requirements for the following year. In common with several other parks, a minimum pH of 6.0 is required. At Pea Ridge National Military Park, park personnel take soil samples every three years. If the tests indicate a need for lime, the farmer applies it in one application, but the recommended fertilizer requirements are made up by incremental applications each year. Fertilizer is much more mobile in the soil than is lime and is therefore susceptible to runoff and leaching if applied in excessively large doses. The Great Smoky Mountains National Park is one of the few parks that does not require regular soil testing, but authorization is required before fertilizer is applied. No requests for authorization have been received in the last four years. There is no minimum pH requirement and applications of lime do not require authorization.

Water pollution: grazing management and watering livestock

If grazing is used in a park unit, grazing management plans are required as part of the Resource Management Plan, and regional review and approval is required. Grazing management plans should include alternative practices such as rotational and seasonal grazing to reduce adverse impacts on natural resources. Problems of pollution from livestock using streamside corrals was identified by park managers at Grant-Kohrs National Historic Site. Where commercial grazing permits are used, such problems must be prevented by eliminating streamside or lakeside pastures and associated watering sites wherever possible."[19]

The increasing costs of meeting some environmental regulations is a real concern particularly for dairy farmers. The effluent from dairy units can be classified as point-source pollution and, under the Clean Water Act, a farmer is responsible for constructing costly mitigation measures, although cost-sharing is usually available. On tillage farms, USDA program benefits may be denied farmers who do not comply with conservation requirements on highly erodible land. However, cost-sharing is available for mitigation measures that require capital expenditure which lightens the financial burden considerably. Short-term permits will be encourage farmers to invest in capital improvements to meet regulations.

The prevention of overgrazing is an essential component of non-point source pollution control on rangeland and pastures. Stocking rates are specified on grazing management plans, and the rates permissible for grazing cattle vary considerably.

This variation is to be expected in areas with very different climate, and topography. At Gettysburg National Military Park where rainfall is distributed fairly evenly through the year on 725 acres in pasture, a stocking rate of two acres per animal unit is used. The allowable stocking rate at Point Reyes National Seashore, where summer months are dry, is six to ten acres per animal unit per year. The park employs a range management specialist who monitors range conditions in the pastoral zone, using measurements of residual dry matter as a guide. One of the most difficult problems facing the dairy ranchers at Point Reyes is how to make good use of all the available range when the cows tend to loiter around the milking barns. Ranchers have to give their cows supplemental feed during the dry summers.

At Cades Cove in the Great Smoky Mountains National Park, there is an overall stocking rate of 390 adult cattle or 500 cattle of all ages in the valley. Because farm units in the valley are discrete operations, and the permittees do not own farms outside the park, grazing permits are for year-round grazing. One farmer has a grazing permit for cattle on 868 acres, and the stocking rate is about 2.2 acres per adult animal. This farmer is a resident permittee and because of the tendency to feed cattle on fields close to the farmstead, there have been erosion problems as a result of trampling and loafing. The permittee of the horse concession in Cades Cove also has a grazing permit for the horses. A maximum stocking rate has not been specified in the grazing permit but the concession agreement limits the number of horses which can be kept, which effectively limits the stocking rate.

At Cades Cove the protection of the water quality in Abrams Creek is a high priority. Unfortunately, the creek goes dry during the summer which makes it difficult for farmers, whose cattle are watered in the creek, to follow fixed grazing regimes. But it also highlights the need to provide water troughs or alternative watering places so that cattle do not have to use the creek. This would allow an effective riparian buffer to be created. However,when riparian trees become established, they will change the historic spatial configuration of the valley floor (Figure 6:7).

To maintain the historically open valley floor, periodic coppicing of riparian vegetation would be a possibility. Riparian buffers to protect streams and rivers from agricultural pollution are being implemented in several parks including the

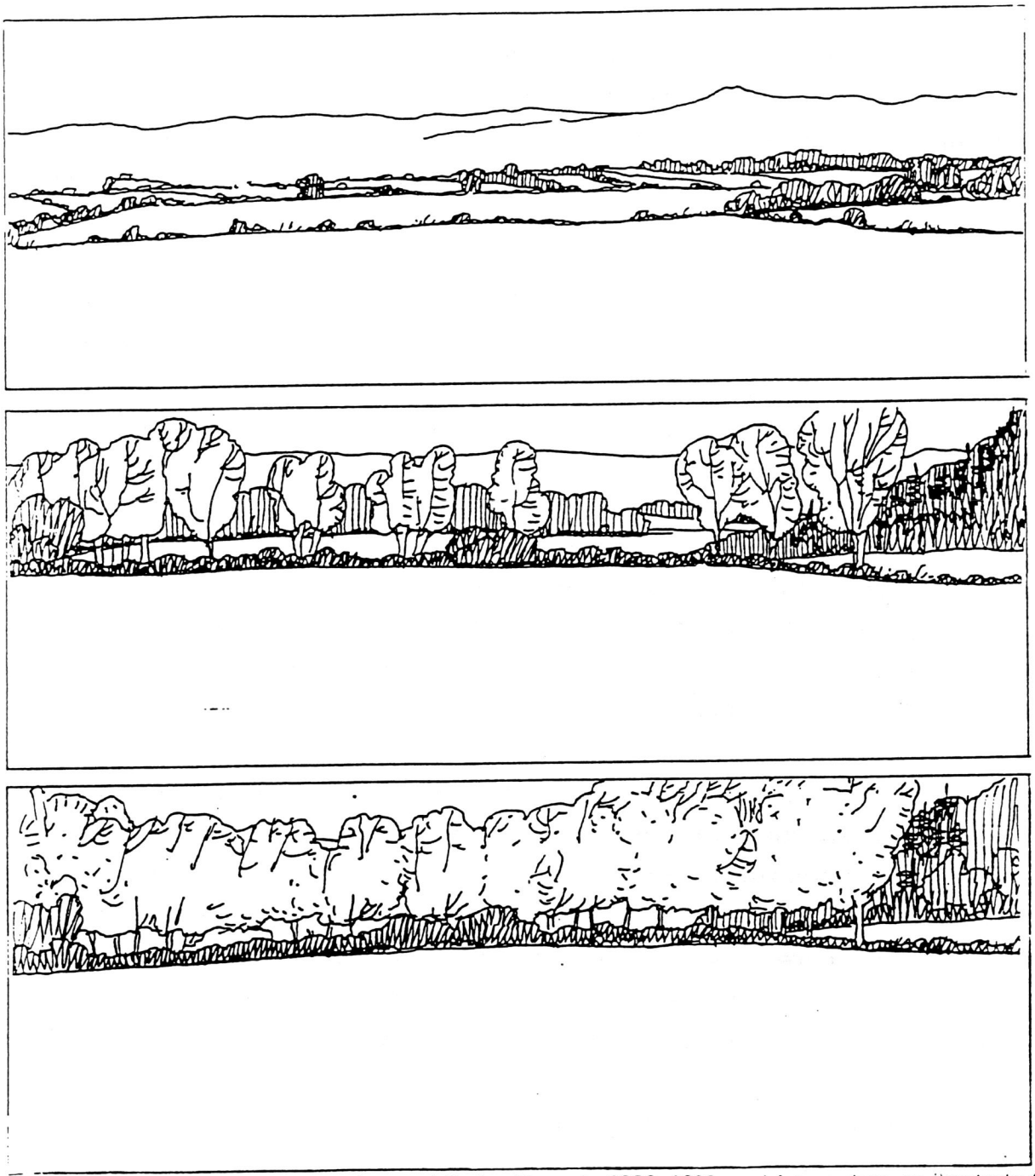


Figure 6:7 Three comparative views of Cades Cove, in 1936, 1992, and future date, to illustrate the effect of riparian trees growing up to obscure the distant horizons completely.

agricultural zones along the Buffalo National River. This condition is attached to leases and as a deed restriction on lands that are being sold-back. Although the riparian buffers may change the spatial character of the valley somewhat and reduce the visibility of the river, they are probably reasonable compromises to protect water quality.

The enclosure of riparian areas, the placement of water troughs and mineral supplements are important considerations in grazing management.[20] The siting of troughs and salt blocks is important because cattle and horses are so habitual in the routes they take to these places that worn tracks result which are susceptible to erosion

Pest control

Insecticides, fungicides, arachnicides, and herbicides are referred to collectively as pesticides. The need for pesticides is greatly reduced by rotational farming practices. But some crops, particularly those easily blemished, are extremely difficult to grow without using some pesticides, and the public are generally intolerant of blemished produce. Mixed rotational farming also gives effective weed control, but monocultures and extremely simplistic rotations require the use of herbicides, and so too do some conservation practices, such as no-till.

The National Park Service is firmly committed to a policy to protect the resources within parks in an effective and ecologically sound manner. An Integrated Pest Management policy has been adopted, and guidelines note that the widespread use of pesticides common on commercially operated farms is likely to be inconsistent with that policy, and also with historic management practices.[21] There is little doubt that a comprehensive and integrated array of pest management approaches is more effective and ecologically sound than simplistic chemical solutions, but farmers need to be convinced and educated by professionals who they respect. Fortunately, the USDA through the NRCS is promoting IPM although there may be skepticism among some local field agents .

IPM procedures to determine when pest control is appropriate and guidance on treatment options are given in the *Natural Resource Management Guideline*.[22] These

include indirect suppression, such as habitat modification, and direct suppression methods, including biological controls and mechanical techniques, which should be considered prior to chemical treatment. Guidance on the use of pesticides is quite specific. The regional office must review all proposed uses, and proposals for use must be resubmitted every year. Pesticide use must be logged and details of storage and disposal provided. All agricultural leases and permits limit the use of pesticides. Some parks require farmers to obtain and maintain a license to use pesticides.

Limitations on the use of agricultural chemicals, including agents such as defoliants for cotton, may reduce the competitiveness and economic viability of commercial farming enterprises. This is a potential problem in farming areas in the Mississippi Delta section of the Natchez Trace Parkway. Park managers are aware of the difficulty that commercial farmers in the area face in remaining competitive without pesticide use.

Farmers recognize that rapid response to pest infestation is essential. They also must be extremely observant and good diagnosticians. A problem that is particularly acute in some parks is that farmers who live many miles away cannot observe their crops or animals on a daily basis, nor can they respond quickly when infestations occur. Their response to this problem has been to use preventative sprays, but a preferable solution to the problem is to employ a crop scout who can check all permits daily and has expertise in diagnosing problems and recommending appropriate solutions. A condition attached to the special use permits at Delaware Water Gap National Recreation Area is that membership in a Crop Management Association Program is mandatory and that all cropland must be a part of a scouting program. The rental rate for permits includes a $6 per-acre fee for this service. The scouting program is particularly valuable at Delaware Water Gap National Recreation Area because it is estimated that about 80% of the land is farmed by absentee owners. A scouting service on the Natchez Trace Parkway is not seen as being necessary as most of the crop farmers are local residents. At Shiloh National Military Park, scouting is carried out by a park ranger trained in crop scouting.

The policy for disease control echoes that of integrated pest management. Preventative, sanitational, nutritional and cultural approaches to disease control must

be evaluated before resorting to agricultural chemicals.[23] Scouts can also play an important role in disease control, both for crops and animals. The need for scouting services increases as absenteeism among farmers increases, but scouts can also be used effectively in parks where small part-time or hobby farmers have limited diagnostic expertise or knowledge of pest control.

Native and feral animal pest control

"Native plants and animals may require management if they are detrimental to the management of cultural landscapes", but farmers are not permitted to initiate a control program without approval from the park.[24] Feral animals may also need to be controlled. Wild hogs are a problem at Cades Cove in the Great Smoky Mountains National Park. The culling of native species is allowable when "unnatural concentrations" occur as is common with white-tailed deer in many parks. However, before control proceeds, damage must be documented and the historic, ethnographic and natural conditions must be understood. Removing the cause of overabundance is a preferred measure, and other alternatives must be evaluated before direct reduction by culling is considered.[25] Deer are a problem for farmers in several parks including Cuyahoga National Recreation Area and Chickamauga and Chattanooga National Military Park. At Gettysburg National Military Park, damage from deer has become so serious that dairy farmers can no longer grow corn for ensiling and have experimented with less palatable (for the deer!), sorghum and milo as alternatives, only to find that deer quickly developed a taste for these. Consumptive use of native animal populations is not permitted, except where hunting is allowed in national recreation areas. Farmers in national parks may not kill and eat deer. The Meat Inspection Act prevents the sale of meat from wild game, including venison. This regulation is reinforced by the fact that wild game is the property of each state. Modification of these regulations could make control of white-tailed deer more practical.

Vegetation management: agricultural practices

In agricultural management, vegetation management involves two distinct goals; the first is to ensure that the crop is not stressed by lack of some limiting resource for growth; this involves applying the needed nutrients, insuring the availability of soil moisture, by irrigation in critical cases, and by using the correct

spacing of plants to optimize use of light ; the second related goal is to reduce competition for resources from weeds. Guidelines also list three important considerations; (1) the desirability of using native species and controlling the spread of exotic species; (2) where and when ecological succession can proceed and areas where routine agricultural operations (disturbances) are necessary; and (3) whether or not the target vegetation is to represent a fixed time period. Target vegetation should specify if non-native species are to be used.

Vegetation management: weed control

As with other pesticides, the use of herbicides must comply with guidelines and the use of integrated pest management is strongly encouraged.[26] Standards require that landscape management practices such as continuous cropping or grazing, that contribute to weed (and other pest) problems be identified. Overspecialization and abandonment of integrated rotational farming has tended to result in the build up of weeds on farms. Alternative practices such as the reintroduction of rotational grazing can control nuisance weeds in hay meadows and tillage crops more effectively than the use of herbicides. At Cades Cove in the Great Smoky Mountains National Park, and at Chickamauga and Chattanooga National Military Park, Johnson grass has become a problem weed in hay meadows. This is a direct result of overspecialization. If these meadows were grazed, Johnson grass would soon disappear as it is intolerant of repeated grazing. At Cades Cove Johnson grass has become a nuisance weed only on land that is used exclusively for haying. Park managers doubt if the low returns from the hay would justify the cost of herbicide use. On grazed tracts Johnson grass presents no problem but, because this permittee has no livestock, control by grazing is not an option. Unfortunately the disincentives to adopt integrated rotational farming, notably the cost of fencing, are such that that option for controlling weeds is often not feasible (Figure 6:8).

At Chickamauga and Chattanooga National Military Park, the conditions attached to leases specify a weed threshold for hay meadows. At Shiloh National Military Park, there are threshold levels for both weeds and pests and if the thresholds are exceeded, the scout informs the farmer who is required to take appropriate action.

Vegetation management: wildlife habitat

Vegetation on farms provides habitat for wildlife and it's role as a source of food, for cover and nesting, and for roosting are important management considerations. A condition attached to special use permits in Delaware Water Gap National Recreation Area is a requirement to manage hedgerows (Figure 6:9). These must be cut in rotation, at least one fifth being cut each year, but allowing larger, older trees to grow up at approximately two hundred foot intervals. The permittee is responsible for either removing the cut material or using it to construct brush shelters for wildlife. These hedgerows, which are between thirty and forty feet wide, also act as erosion and sediment barriers preventing polluted runoff flowing into the Delaware River.

Agricultural landscapes are characterized by open fields and large amounts of edge habitat.[27] In some parks farmers are not permitted to mow close to woodland edges to protect this habitat. Increase in edge habitat can have positive and negative impacts on wildlife. Some "habitat interior" species do not adapt well to highly fragmented agricultural landscapes with a high edge-to-area ratio.

Rare and endangered species that rely on agricultural habitat

Protecting native flora encompasses many actions including weed control, habitat protection, and control of exotic species. But it is important to remember that the extensive agricultural modifications in the last century led to the spread of native species of both plants and animals to some areas where they were previously unknown but have now become indigenous. If farming is abandoned, and the area grows up in woodland, these species may become rare. To meet the requirements of the Endangered Species Act, some permits have been withdrawn from agricultural use on the Blue Ridge Parkway near Galax, VA., in order to protect the endangered bog turtle and Gray's lily. Both species are found in wet meadows. Some of the meadows that were historically drained, were included in the agricultural program but have been withdrawn to allow wetland species to become reestablished. Now the challenge is to find a management regime that perpetuates the wet meadows and prevents the eventual shading out of wet meadow species.



Figure 6:8 On this land at Cades Cove in the Great Smoky Mountains National Park, Johnson grass is effectively controlled by grazing cattle. On permits that are used only for hay, Johnson grass has become a nuisance weed.



Figure 6:9 Hedgerow at Delaware Water Gap National Recreation Area. This acts as cover for wildlife and as an erosion barrier.

The protection of wildlife, particularly rare and endangered species, can require modifications in the management of farmland. At Cades Cove in the Great Smoky Mountains National Park, it is required that hay be cut a minimum of once annually, but not before June 1. This is to allow wildflowers to seed, ground nesting birds to complete nesting or fawns to be sufficiently grown to flee. The restriction does not unduly inconvenience farmers as the grass still contains a high level of nutrients at the beginning of June. At Chickamauga and Chattanooga National Military Park, hay must be cut twice, the first time before June 30 when the hay is still nutritious. At Sleeping Bear Dunes National Lakeshore however, one reason that haying leases were discontinued was that a condition requiring that hay not be made until after August 15. Soil productivity is low in the area and the grass had lost most of its nutritive value by this late date. Alternatives strategies were tried, such as front-mounted bars on tractors to flush nesting birds before they were cut down, but they were not effective.

The concept of having farmers assume the task of managing land to be kept open for non agricultural uses has potential but is used rarely. The Delaware Water Gap National Recreation Area is an exception. 4,500 acres of open land are let to farmers under special use permits, but of these 1,500 are not used for agriculture. They are maintained for open space or wildlife habitat. One permit for instance, contains 257 acres of farmland and 217 acres of fields to be maintained for "wildlife habitat improvement". The permittees also must allow the public to hunt over their land (hunting is permitted in most National Recreation Areas). Farmers tolerate this as they know that, if hunting was disallowed an increased level of deer damage would inevitably result.

Environmentally sensitive areas

Detailed guidance for the protection of wetlands and other sensitive hydric habitats is given in the Flood Plain Management and Wetlands Protection Guideline.[28] The definition of wetland is that used by the US Fish and Wildlife Service. The restoration of wetland that had been drained historically for agriculture has occurred on sites along the Blue Ridge Parkway, and in Minute Man National Historic Park. Guidelines note that "while (agriculture) may achieve landscape management objectives in the short run, such disruption could result in long-term

impacts that are inconsistent with National Park Service mandates", and that "agriculture should be excluded from habitat of threatened or endangered species and other sensitive areas."[29]

MANAGING CHANGE OF BIOTIC CULTURAL RESOURCES

Any disturbance in a landscape sets in motion a series of successional changes. Agricultural practices are disturbances that occur on a regular basis, and understanding ecological succession in is clearly a critical consideration in drawing up effective management strategies for agricultural landscapes. This includes situations where non-agricultural methods such as burning are to be used. In managing vegetation in cultural landscapes, the "the overall pattern of vegetation is the primary concern", but change inherent in ecological succession must be recognized.[30] In woodlots, succession is usually allowed to proceed without the drastic disturbance of harvesting.[31] Examples of harvest or removal of timber are very rare in the national park system, and a good case would have to be made for it. In Boxley Valley of the Buffalo National River, harvest of woodlots is permitted but has not been carried out.

AESTHETIC ISSUES AND CONSIDERATIONS

The importance of minimizing unnatural sounds, artificial light, and unnatural smells when managing agricultural landscapes is noted in management guidelines.[32] There has been concern from residents about lights and noise from a small rodeo in Boxley Valley of the Buffalo National River, but park managers feel that the rodeo is reasonable part of a viable rural community.

Some conditions attached to leases and permits are designed to achieve a certain desired visual quality, usually one of tidiness and uniformity. Many parks forbid the storage of abandoned vehicles or machinery on the land. Some require farmers to control weed growth in fencelines. This may be necessary to prevent fences from becoming infested with woody growth, and clean fence lines are also often seen as a sign of good farming. However, the desire of park managers to present an appearance of good management can result in agricultural landscapes that are too manicured. Some parks impose conditions specifying that fields be managed to achieve a uniform appearance, although historically a uniform appearance was unlikely.

CONDITIONS FOR AGRICULTURAL USE

Commercial uses

Policy does not allow commercial ventures in national parks. As a result there are restrictions on advertising, the use of commercial vehicles on some roads, and the sale of produce and other commercial activities. This has made it difficult for farmers to sell their products direct to the public even where a demand exists. Direct retail sales of farm produce, particularly high value produce such as fruit, vegetables, eggs and honey have much higher profit margins that bulk sales. In few cases, it also makes it feasible for a farmer to derive some "value-added" benefits from direct sales. A producer of small fruits for instance may find it more profitable to sell jams and jellies rather than fresh fruit. Most farm products have rather low profit margins and therefore need to be produced in large quantities to be profitable, but most farmers in the parks cannot benefit from the economies of large scale production and must seek economically viable products with higher profit margins. Opportunities to add-value and increase profit margins should be encouraged. A farmer who produces hay may find it profitable to board horses to make use of the hay directly, rather than selling his hay in bulk. But horse boarding may be disallowed as a commercial activity.

Some parks, although not officially permitting commercial sales have been tolerant of minor infringements. For instance at Cades Cove in the Great Smoky Mountains National Park, a resident permittee until recently sold honey from his apiary on a small roadside stand; but that was all he sold. There is a fear that a farm stand selling products from local farms will start selling produce from further afield and then, perhaps begin to sell other goods. There is a successful farm stand in the Delaware Water Gap National Recreation Area, which also sells a reasonable amount of produce from other sources. There are other examples of farm stands in national parks which are popular with the public; Minute Man National Historic Park is one example (Figure 6:10). Some stands are immediately outside the park boundary as at the Cuyahoga Valley National Recreation Area (Figure 6:11). Other parks have adopted liberal policies ; the Buffalo National River for instance, allows farm stands in Boxley Valley where the intent is to preserve a viable rural community. In contrast, the Blue Ridge Parkway is very strict in enforcing conditions that ban

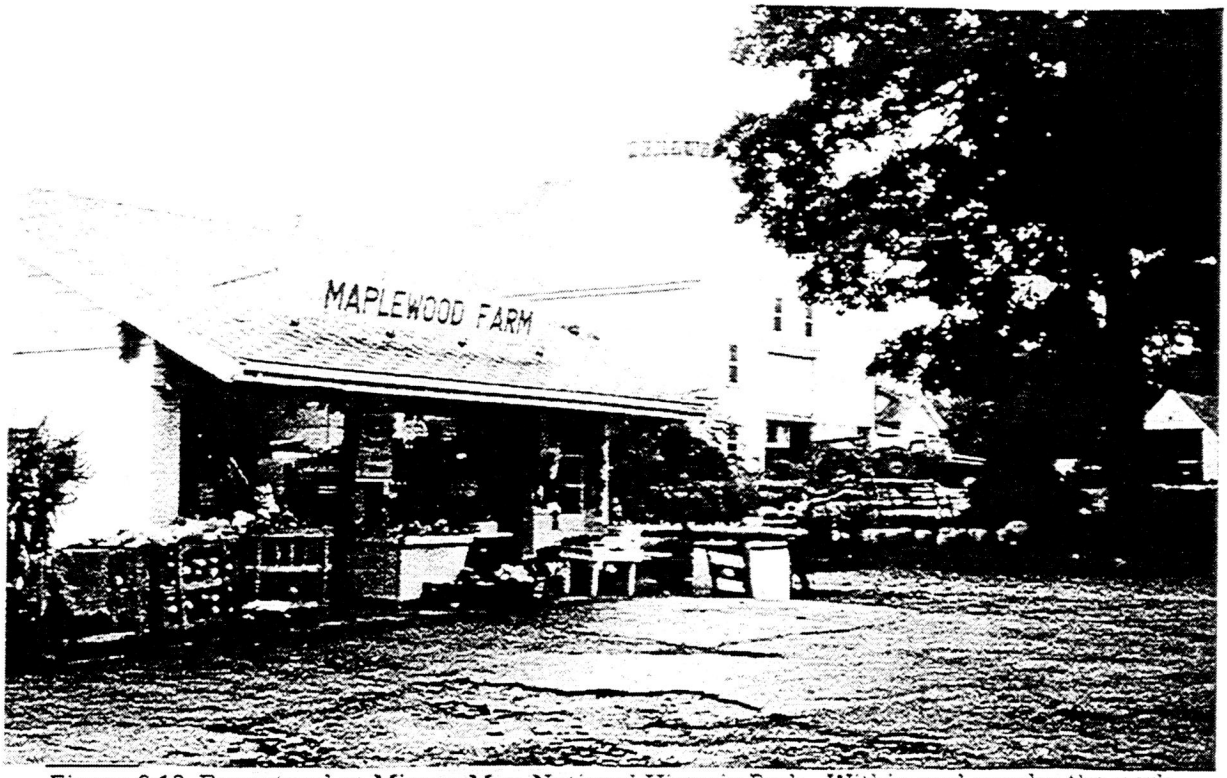


Figure 6:10 Farmstand at Minute Man National Historic Park. Within and nearby the park are several roadside stands that sell pumpkins, squash, and sweet corn, as well as cider, honey and firewood.



Figure 6:11 The Szalays are full-time farmers in Cuyahoga Valley National Recreation Area. They lease land from the park and sell corn and other vegetables at their roadside stand located just outside the park's boundaries.

commercial activities. Park managers at Sleeping Bear Dune National Lakeshore have unsuccessfully tried to remove a farm stand from the park.

In the Delaware Water Gap National Recreation Area and Sleeping Bear Dunes National Lakeshore, there are historic precedents for farm tourism which could be a viable commercial venture for farming families, and the National Park Service might consider drafting guidelines to permit and to promote these ventures.

In historic structures, commercial ventures such as farmstands are usually frowned on, but other visitor services may be permissible. Under the Historic Property Leasing Program, lessees may apply to the park to provide visitor services in a historic structure at their own initiative. If the park initiates the use of an historic building for visitor services, usually a concessions contract or permit will be negotiated.[33]

Conditions affecting access for farmers

Farmers along the Natchez Trace and Blue Ridge Parkways are normally not allowed to access their land from the motor road. On the Natchez Trace, this is not so much to avoid farm machinery on the parkway as to avoid damage to the road prism and shoulders. The condition poses no problems for adjacent owners but may for permittees who live further from the park. It is true that "Road ruts created by machinery can be an intrusion and can last longer than expected," but park managers must try to accommodate the needs of farmers for convenient access.[34]

Visitors and tourists

Farmers are generally very tolerant of inconveniences posed by visitors. One farmer said that a few of his cabbages were sometimes stolen along the Blue Ridge Parkway, but he thought tourists were less inclined to throw trash on his land than local people. However, as the number of tourists increase, the inconvenience for farmers becomes greater. During the fall in Cades Cove in the Great Smoky Mountains National Park, it is almost impossible for farmers to get to their land due to bumper-to-bumper tourist traffic on the roads.

Health and safety

The potential danger farm machinery, agricultural chemicals, livestock, and trees in woodlots and orchards, to both visitors and workers must be considered. Farming is an extremely dangerous occupation for the farmer, but can pose some safety hazards to the public, both real and perceived. The danger from grazing animals needs to be better understood. Bulls of course should never be kept in pastures to which the public has access, but steers are rarely aggressive. They will sometimes chase or crowd dogs, which may alarm visitors especially when the dog is on a leash. Cows may be quite aggressive when they perceive possible danger to their calves. Generally however, steers, dry cows, and heifers can be kept in pastures without danger to the public, but warnings against entering a field with a dog, even if it is on a leash, should be posted. The potential danger from cattle has been used as a reason not to use grazing as a management tool in some parks. At Cowpens National Battlefield, for instance, where cattle grazing was the historic land use, a small beef steer enterprise, or dairy heifers grazed under contract with a local farmer, seem to offer great advantages to the park over the present mowing and haying practices.

In the Galax study area of the Blue Ridge Parkway, electric fencing is shown on some of the parkway land use maps. This must be one of the few examples of electric fencing being a historically accurate fencing type in the park system. Electric fencing is a source of some disagreement among park managers.[35] In a few parks electric fencing is used quite extensively while others do not permit its use because of the potential hazard to visitors wearing heart pacemakers. The use of electric fencing is likely to become more common on commercial farms in the near future as more intensive grazing systems are adopted. Although it is not appropriate in some parks, electric fencing is inconspicuous and flexible and may offer some useful management alternatives.

CONCLUSIONS

In order to meet the guidelines for the management of cultural and natural resources, conditions are necessarily imposed on agricultural use. Only in a very few cases have these conditions made farming impractical, and although others may cause some inconvenience to farmers, these are usually minor, and the lower rental fees

charged as a result of conditions easily offset any financial loss. Different approaches to ensure good farming are seen in different parks. Recently, the Natchez Trace Parkway instituted a program of incentives to encourage good farming practices. These take the form of a reduction in rental fees. Permittees may be charged at the lower rate established for hay if no-till techniques are used for crops. The program covers several practices including reduced tillage, crop interplanting, winter cover crops, and green manure crops. The USDA Agricultural Research Service have been very supportive of the program. In contrast, the Delaware Water Gap National Recreation Area requires farmers to use conservation practices as a condition of their permits but, as a result the rental fees are lower than on the Natchez Trace Parkway. In both parks, managers are well aware of the difficulties that farmers have in meeting some of the required conditions, and although both programs have the same goal, to promote conservation farming, each has been designed to suit local circumstances.

NOTES

1. Note that this table is intended to help locate examples of different types of conditions. The table does not include all conditions present in every park studied.
2. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
3. Ibid.
4. National Park Service, 1982. *Historic Property Leasing Guidelines*. NPS 38, p.3:1.
5. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77, p.2:1.
6. Ibid.
7. Ibid.
8. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.108.
9. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
10. Ibid., p.3:62.
11. Ibid.
12. Ibid., p.2:125.
13. Ibid.
14. Ibid., p.3:4.
15. Grazing is considered separately from other agricultural uses in NPS 77. It includes uses such as grazing for trail stock and issues such as grazing trespass which are not concerns of this study.

16. Great Smoky Mountains National Park, 1943.
17. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
18. Ibid.
19. Ibid., p.2:50.
20. Ibid.
21. Ibid., p.2:218.
22. Ibid.
23. Ibid.
24. Ibid., p.2:32.
25. Ibid.
26. Ibid.
27. Ibid.
28. National Park Service, 1992.
29. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
30. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28.
31. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77.
32. Ibid.
33. National Park Service, 1982. *Historic Property Leasing Guidelines*. NPS 38, p.16:2.
34. National Park Service, 1986. *Special Park Uses Guidelines*. NPS 53, App. p.16:4.
35. The use of electric fencing is also discussed under "Protection of agricultural workers and park visitors" in Chapter four.

CHAPTER SEVEN
DESIGNING AN AGRICULTURAL PROGRAM

The *Cultural Resource Management Guideline* recommends four steps in designing a comprehensive program to managing cultural resources.[1]

Step 1. Objectives
- discovering the meaning of the resource
- protecting the resource
- supporting it's use and enjoyment

Step 2. Research
- identification of resource
- documentation and evaluation of resource
- registration of resource

Step 3. Planning
- consideration of treatment alternatives
- resource management plan

Step 4. Stewardship
- implementation of the planned treatment
- protection and management of the site
- management of visitors and visitor facilities

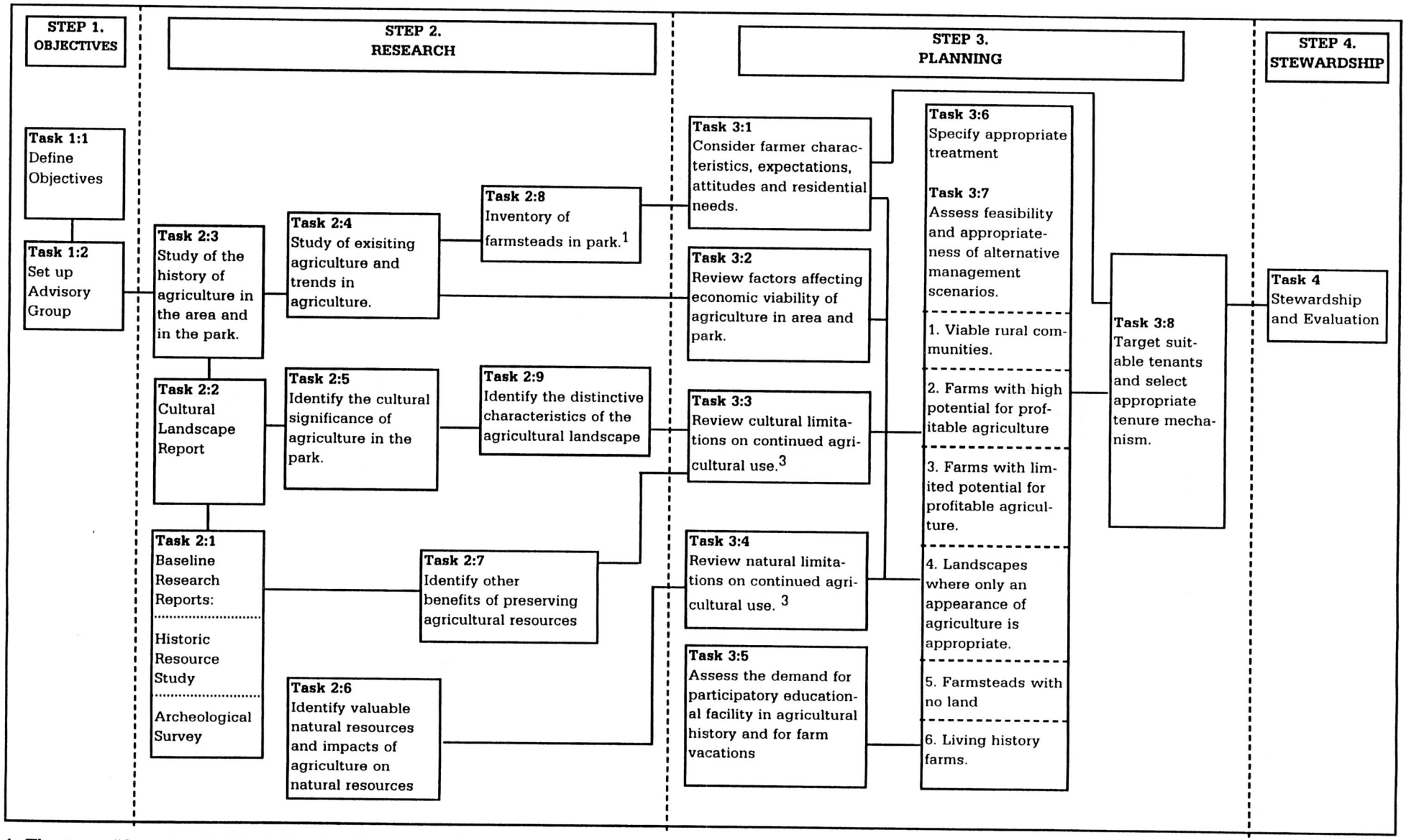
The focus of this chapter is on the tasks necessary for Steps 2 and 3, research and planning for an agricultural program, but to do this effectively, clear objectives must first be defined for the park and the practicality, feasibility, and effectiveness of alternative stewardship options must be anticipated during the planning stage. Thus, although it appears to be a linear process, it is in fact cyclical, and some research is necessary before objectives can be defined realistically. The four steps, each involving a number of tasks, are shown in Figure 7:1.

STEP 1 OBJECTIVES

TASK 1:1 DEFINE OBJECTIVES

In order to define objectives for managing culturally significant agricultural landscapes, it is important to clarify how agriculture gives meaning and context to the history of the park and how agricultural management will help visitors to understand that story. The role of agriculture in the significance of the park as a whole, and the characteristics and features of agriculture that define and substantiate that role should be defined. Agricultural landscapes are often vernacular expressions that inform us of the lives of ordinary people. The mundane

Figure 7:1 STEPS IN DESIGNING AN AGRICULTURAL PROGRAM



1. The term "farmsteads" includes farmhouses and other farm buildings, usually grouped together but not necessarily so.
2. This step is particularly important in ethnographic and vernacular landscapes.
3. Agricultural use usually involves the use of modern mechanical operations

activities of farm life are part of history and farming landscapes give substance to that history.

Objectives regarding the protection of resources should reflect not only the need to protect significant agricultural resources, but also other cultural and natural resources from any potentially damaging impacts of agricultural use. Identification of threats to the integrity of agricultural resources includes clarifying the impacts of past changes on the landscape and it's components. Farming landscapes that owe their significance to continuity of use and occupancy can usually accommodate considerable change, while others cannot. A particularly difficult problem in protecting agricultural resources arises from attempts to adapt them to modern, cost-effective agricultural management methods. The protection other cultural and natural resources from damaging agricultural impacts involves identifying potential problems which vary greatly from region to region and from enterprize to enterprize.

Objectives involving supporting the use and enjoyment of a park, focus on giving clarity and context to interpretative objectives. Educational opportunities and opportunities for community involvement may be realized through living history exhibits, community farms, and the participation of voluntary organizations. Agricultural management may also be important to maintain diversity of scenery or habitat for wildlife.

TASK 1:2 SET UP AN AGRICULTURAL ADVISORY GROUP

An agricultural advisory group of whom at least two members should be farmers, can usefully advise park managers on practical and economic aspects of agricultural management and provide contact with the farming community. The farmers should represent those typical of the area, whether their occupation is full-time or part-time, commercial or hobby. A cultural resource management specialist would represent the park, calling on other professionals from the park staff as appropriate. The local NRCS officer and the county Cooperative Extension Agent would be part of most groups. In some parks, a representative of a local land trust, conservation organization, historical society, volunteer organization or, if forest management is closely related to agricultural use, a forester could be included. For complex issues it might be necessary to set up specific working groups.

STEP 2 RESEARCH

Three research tasks, identification, documentation and evaluation, and registration are identified in the *Cultural Resource Management Guideline*.[2] National Register Bulletin 30, *Guidelines for Evaluating and Documenting Rural Historic Landscapes* gives a useful overview of the tasks in this step. Section 110 of the National Historic Preservation Act requires the National Park Service to identify and nominate to the National Register all cultural landscapes under it's jurisdiction that appear to be eligible.

TASK 2:1 BASELINE RESEARCH REPORTS

Various research studies are normally completed before more specialized studies such as a Cultural Landscape Report are undertaken. Archaeological overview, assessment , identification, and evaluation studies are particularly important when any land-disturbing farming operation such as tillage is planned. An ethnographic overview and assessment is important in parks where there has been continuity of agricultural use and occupation of the land and which may qualify as an ethnographic landscape. The initial identification of cultural landscapes occurs in the Historic Resource Study (HRS).[3] The HRS documents the development history and evolution of cultural landscapes and establishes their historic contexts, which are important to assessing the significance of features and characteristics that make up landscapes. The HRS should describe the existing condition of a cultural landscape sufficient to evaluate it's integrity and define appropriate National Register boundaries.[4] For the landscape as a whole to have significance, the features and characteristics that define historic context must be present and have integrity. A Cultural Resource Base Map summarizes all known historic sites and structures, cultural landscapes and archaeological and ethnographic resources. The administrative history of the park should be studied with particular attention to whether agricultural use is specifically authorized in the park legislation and to determine the intent of Congress regarding the use and tenure of agricultural resources in the park. This is particularly important in the case of vernacular and ethnographic landscapes where continuity occupancy may make private ownership an option.

TASK 2:2 CULTURAL LANDSCAPE REPORT

The Cultural Landscape Report (CLR) gives guidance on the treatment and use of a cultural landscape. It begins with a narrative of the development of the landscape in it's historic context. The social, natural, and economic factors that shaped the landscape should be clearly reflected in an interdisciplinary narrative, and should describe the resources that farmers wished to exploit and the natural constraints that they faced, how the landscape was shaped for their purposes and the distinctive patterns and features that emerged, and how these were adapted to changing technologies. A historic base map should be prepared for each significant historic period in the evolution of the landscape. The report should describe existing conditions, document and analyze the distinctive features and characteristics of the landscape, and assess their condition. Part Two of the CLR recommends treatment of the landscape and Part Three documents the actual treatments that have been carried out. If an HRS and a CLR have been completed, some of the following tasks may be unnecessary.

TASKS 2:3 & 2:4 STUDIES OF THE HISTORIC AND EXISTING AGRICULTURE IN THE PARK AND IN THE AREA

The history and development of agriculture in the region will define the context of agriculture in a park. It is necessary to understand the farming system, the organization of the farming community, and the rural economy during the historical period, and how they have developed since. Because local farmers are used in many parks to manage farms, it is important to understand existing farming systems and trends in agriculture in the area. This not only enables the park manager assess potential incompatibilities of current farming practices with park objectives, it also helps to identify the practicality of duplicating historic farming practices.[5] Tasks 2:3 and 2:4 are best carried out together on a comparative basis in order to asses the impact of change in farming since the historic period of the park. The following subject headings are divided into two parts. The first part (Task 2:3), addresses historic agriculture and the second (Task 2:4) addresses existing agriculture and trends in agriculture.

Agriculture economy - subsistence or cash

(1) The agricultural economy during the historic period should be described. Determine if it was a subsistence-based economy, almost all products being used for the sustenance of the farming family and their livestock. If it was a cash economy, determine what products were being sold.

(2) Today, subsistence farms have almost entirely given way to cash farming. Part-time and hobby farmers may raise some of their own food. Very few farm families rely on fuel, fence posts or other farm timber from their own woodlots.

Markets and transportation

(1) Ascertain what and where the markets were for farm products and how the farmer got the products to the market. Cattle and sheep may have been driven on the hoof, but for other products, proximity to a navigable river or the condition of roads may have been vitally important. The development of canals, railroads or other improvements in transportation may have affected the marketing of farm products and therefore agricultural development in the area.

(2) Markets today are often remote from the farm. Milk is no longer picked up in cans on roadside stands, but collected in bulk in refrigerated tankers. Changing markets for both agricultural products and services should also be considered. For instance, in areas that are urbanizing, the demand is increasing for high quality organic produce, hay for horses, and for services such as horse-boarding. Some of these enterprises can benefit from the patronage of park visitors.

Agricultural enterprises - mixed or specialized

(1) Determine whether the agricultural enterprise was mixed or specialized during the historic period. Most farms were mixed enterprises but as markets and economies developed, farmers began to specialize in crops they could grow best or livestock most suited to the region.

(2) Gradually, general, mixed-farming has given way to highly specialized farming systems. Some livestock farmers continue to grow feed for their animals, silage for dairy cows, hay for horses and beef cattle, but increasingly even these functions have become separate and specialized. There may be a few mixed general farms, but these tend to be run by older, retired or hobby farmers. Determine what inefficiencies in the use of resources and environmental problems have resulted from

specialization. For instance manure, which was essential to maintain soil productivity, tends to be treated as a waste product by specialized livestock enterprises.

Livestock and crops

(1) Determine what crops were grown and what livestock was kept on the farm and whether they were integrated and dependent one on another. Determine how much land was used to grow feed for the animals. Find out whether draft animals were kept and what crops and livestock were typical on farms in the area.

(2) On specialized farms, very few crops are grown (Figure 7:2). With the exception of dairy farmers, it is now rare to both grow crops and keep animals. Farm buildings used to house livestock or to store feed will be defunct on specialized tillage farms. Many crops such as buckwheat, flax,and oats that were grown historically are rarely seen, and others once common in an area have disappeared, such as rice in the Low Country of South Carolina, and cotton throughout the Southern Piedmont.

Management systems

(1) Determine what management system was used. Was cropland enclosed to protect it from freely ranging livestock, or was livestock enclosed? Ascertain what rotational system, if any, was used on the farms, whether animals were integrated into the rotation, and if so, how animal manures were used.

(2) Rotational systems have become much simpler if they are used at all. Today livestock and crops are very rarely integrated in rotational systems. Determine the implications in terms of maintaining soil fertility, different weed and pest control strategies and the need for fencing. Find out whether the switch to synthetic fertilizers has resulted in lower soil organic matter content. What are the implications in terms of soil erosion and water-holding capacity of the soil?

Configuration of fields, buildings, and woodland

(1) Determine if fields were arranged in a specific configuration to make rotations possible and if they were all enclosed. Determine the relationship between fields, woods, and buildings, and how they related to the topography. At Cades Cove in the Great Smoky Mountains National Park, Boxley Valley of the Buffalo National River and the Delaware Water Gap National Recreation Area, for instance, there is a

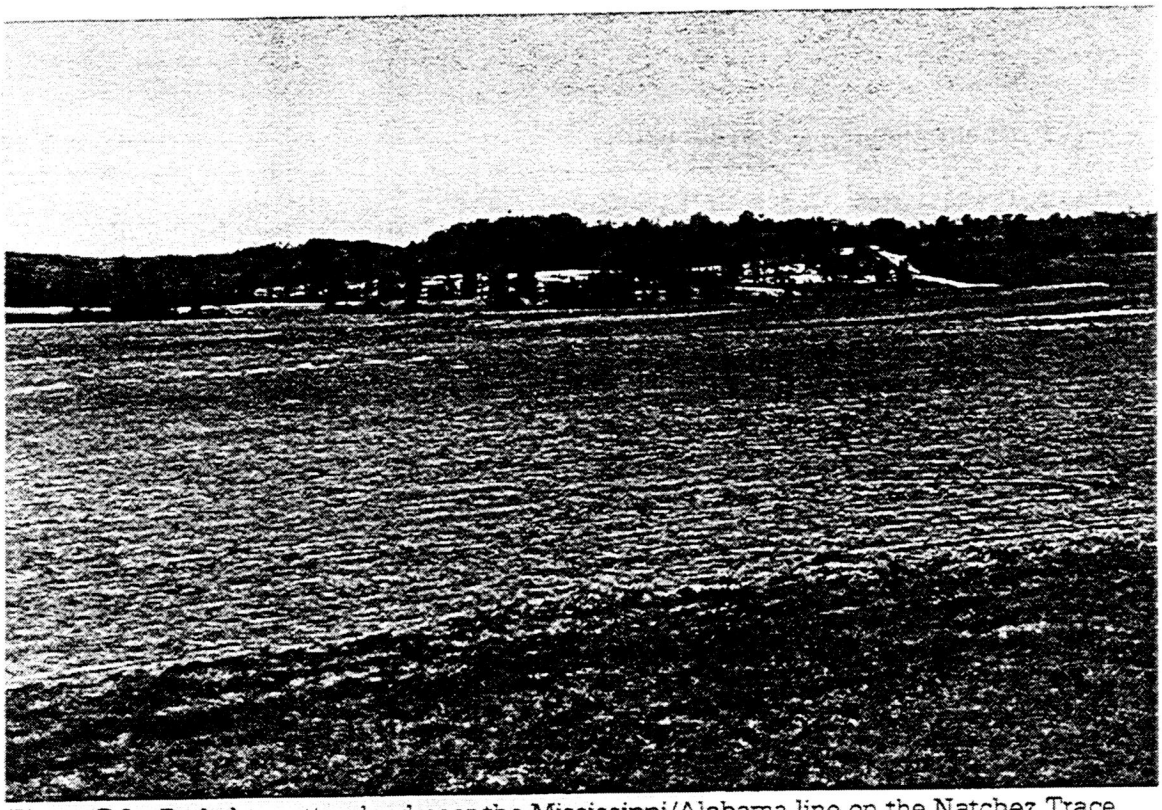


Figure 7:2 Red clay cotton land near the Mississippi/Alabama line on the Natchez Trace Parkway. This is a highly specialized enterprise, and the farmer has few crops that he can include in a rotation and from which he can expect a profit. The park boundary cannot be seen, because the farmer manages the parkway land and his own adjacent land as one unit.

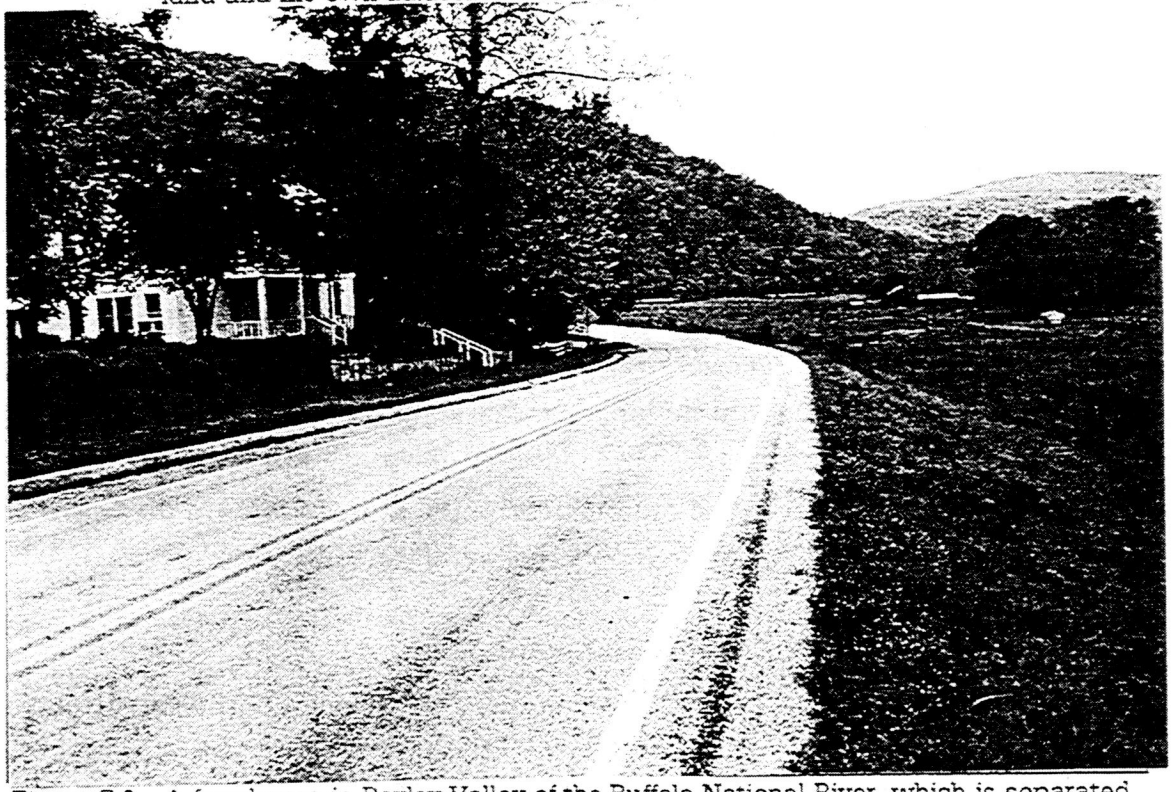


Figure 7:3 A farmhouse in Boxley Valley of the Buffalo National River, which is separated from the farmland on the valley floor by Highway 43.

similar pattern characteristic of valley farms. The valley floor is in farming, the road is at the foot of the valley sides and farmsteads are usually just upslope of the road (Figure 7:3). On the shoulders of the valley slopes, there was often pasture but most has grown up in woodland.

(2) Field configurations for tillage crops have been modified both for mechanical efficiency and to control erosion. Field arrangement is no longer closely tied to rotational systems as it often was in the past, and tends to be designed principally for soil conservation. In rolling terrain as fields became larger, farmers adopt contour tillage practices to reduce erosion problems.

Seasonal patterns of use

(1) Find out whether there were seasonal patterns of use on the farm. Some areas may have been used only for summer grazing as were the upland 'balds' at Cades Cove in the Great Smoky Mountains National Park. Livestock may have been excluded from meadows in early summer to make a hay crop. If so, find out where were they pastured or whether livestock were driven elsewhere during the summer. For instance, farmers at Canyon de Chelly would drive their sheep to the Chuska Mountains during the summer.

(2) Many of the traditional seasonal patterns of use on the farm have ceased, including the use of remote pastures for summer grazing. It has also become less common to pasture animals on hay meadows for part of the year or to turn animals into tillage fields after harvest to feed on the aftermath. This makes it unnecessary to fence hay meadows and tillage fields.

Scale

(1) Determine the size of farms and the limitations on their size. Find out if the size was limited by the availability of labor, or of suitable land. Was farm size average for the area?

(2) The scale of most agricultural enterprises has increased enormously as they have become more labor efficient. This trend effectively eliminates many enterprises from most parks. Not all enterprises are scale-sensitive and careful observation of the farming in the area of the park should reveal those that are not. Cow-calf beef breeders, small specialist produce operations, and horse farms are some exceptions. These small scale operations may be more appropriate for use in a

park than large scale enterprises. Then there are specialized spin-off activities from larger farms, such as raising replacement heifers for diary farmers which can be operated at a small scale.

Labor-roles, family and hired labor, labor intensity, mechanization

(1) Determine how the labor demands on the farm were met and what were the most labor-intensive tasks. Determine what were the roles of members of the farm family and if any hired hands were employed, seasonally or year-round. Determine if neighbors cooperated in some tasks and when were the 'crunch' periods. Find out what machinery and implements the farmer had and what draft animals were used.

(2) Machines have replaced labor on farms to such an extent that many are one person, often part-time, enterprises. Farm families are smaller and family members rarely work regularly on the farm. Off-farm employment is common. Specify what machines are typically present on farms and what roles they perform. Find out if any draft animals are still kept.

Inputs and outputs

(1) Determine what inputs were purchased for the farm and what was sold off the farm. On subsistence farms, inputs and outputs were minimal. Many farm families were self-sufficient in food, fuel, shelter, and clothing. Was this the case?

(2) Ecologically, modern agriculture is a very 'open' system. This means that there are many inputs and outputs from the system in contrast to more traditional farming systems where cycles tended to be more 'closed'. Park managers should familiarize themselves with the typical inputs used by farmers in the area and assess which if any of these are unacceptable and which could feasibly be avoided. Pesticides are imputs that are already restricted in the national park system.

Grazing regimes

(1) Determine what grazing regimes were used for livestock. Draft animals were often kept stabled year round. Find out if pastures and hay meadows were included in the rotational system. Discover if grazing animals were 'pastured out' at certain times of the year, in the woods or on remote pastures and if so, if they were

and what types of fodder and concentrate feeds were used. Where and how were these stored?

(2) Hay bales (round and rectangular) have replaced loose hay, and are often too heavy to store in barns. Corn is ensiled and not fed as dry fodder. Tower silos have been replaced by in-ground silos.

Buildings - functions and handling systems

(1) Specify what buildings were on the farm and how they related to the land. Determine how they were arranged, their functions, and their functional relationships. Farm buildings have four main functions:

·The storage of feed for winter or for drought periods. This was mostly fodder, bulky material with a low nutritive value such as hay, but also concentrate feeds such as grains.

·The confinement of animals for protection from inclement weather and for convenience. Work horses were usually kept stabled year-round to make the task of harnessing easier and quicker.

·Processing animals or crops. Milking cows, cooling the milk, packaging vegetables, drying grain, etc.

·Storage of machinery and equipment.

(2) The functions of modern farm buildings reflect the specialized nature of farming. Many older buildings will have lost their function because of specialization. Handling systems are automated and larger in scale, and other factors have made almost all traditional farm buildings redundant.

Buildings - construction and material

(1) Determine how buildings were constructed. Determine if materials were obtained on the farm or locally and which buildings, if any, were designed and erected by the farmer. What was date and the sequence of construction of the various buildings?

(2) The design, scale and construction methods for farm buildings has changed. Generally, large steel-frame sheds with high eaves, and low-pitch roofs replace wood-frame buildings with more traditional profiles. Identify newer buildings, construction methods and materials.

allowed free range or were herded or enclosed. Find out what the typical stocking rates were.

(2) Grazing regimes have become more intensive and specialized. Only one type, and often only one breed of animal is normally seen grazing together. The practices that farmers use for managing pastures, fencing types, facilities for watering livestock, and the shelter provided for livestock should be noted. When herd sizes increase, some practices may be unacceptable. These should be identified and alternatives discussed with the agriculture extension agent and selected farmers. Evidence of new intensive grazing systems and their impacts should be identified.

Enclosure and watering livestock

(1) Determine whether livestock were enclosed or exclosed and how this was done. Specify what types of fencing, gates, hedges, etc. were used to confine livestock and what materials were used for fencing. Discover whether timber for fencing was cut on the farm. Locate where livestock were watered, in a pond or stream, and determine if some fields could not be grazed because they had no water.

(2) More intensive grazing management may result in new fencing including temporary fencing and new watering facilities. Larger herds may cause pollution at watering places, in which case alternatives for watering livestock should be explored.

Overwintering arrangements for livestock

(1) Determine if it was necessary to house livestock during winter months and if so how it was done. Determine how feed and manure were handled. Find out if animals were confined in the buildings or if they had access to an outdoor loafing yard.

(2) Methods of housing livestock have changed. Some animals like beef cattle and sheep are rarely housed over-winter. Most other animals are kept in such large concentrations that they are housed year-round, as much for ease of handling as for their protection.

Storage methods

(1) Determine what fodder was fed to livestock in the winter and what storage methods were used. Find out if fodder was stored in buildings or in the field

Use of woodland

(1) Determine how the woodlands were used by the farmer and if the woodland was used for browsing by livestock, for fuel, or for farm timber. Find out what species of trees were used for various farm uses and whether woodlands were managed for a sustainable yield. Were trees grown and harvested from hedgerows and riparian zones?

(2) Woodland is rarely used for farm timber today. Farmers may allow livestock access to woodland but usually to only a small area for shade and shelter. Some farmers may be managing their woodland for commercial timber production which tends to result in even-age, single-species stands.

Land tenure and water rights

(1) Determine the system of land tenure and whether farmers were typically sharecroppers, tenants, or owner-occupiers. If the farmers were not owners, did they have any security of tenure? Find out if this arrangement was typical of the area at the time. Determine what water-rights were held if any.

(2) Small and medium size farms have become almost wholly owner-occupied. The pride of ownership is strong for many farmers. There has been a trend towards corporate ownership of large farms, often with full-time farm managers. Determine if water-rights are important.

Farming community and institutions

(1) Describe the characteristics of the farming community and how it related to the larger rural community. Discover which of the various farming institutions were active. How did the community handle education and how was education scheduled to fit in with the farming calendar?

(2) The number of farmers in most rural communities today is quite small and many farm institutions have collapsed. Ascertain what agricultural institutions are still active in the area.

Cooperation between farm families

(1) Determine how much cooperation occurred between farm families and how important it was. Find out what types of cooperation existed, such as sharing machinery and labor, or cooperative buying or selling.

(2) The need for the cooperative use of labor among farm families has tended to become less due to mechanization. However, park managers should try to find out if any patterns of cooperation in sharing machinery, in tending animals, or specialization in different processes within larger enterprises are common in the area. These arrangements may be important to the success of an agricultural program in a park.

Sustainability of the system and pest management

(1) Assess whether the historic agricultural system was sustainable. Discover what adverse environmental impacts it had. Did farmers rely on crop rotation to control pests? Was soil erosion was controlled, and what impact did farming have on water resources?

(2) The sustainability of many modern agricultural systems is suspect largely due to the extremely high levels of inputs. Smaller part-time farms may be able to achieve a higher degree of sustainability for various reasons. Rotational systems have been abandoned as a method of pest management. Determine what techniques are used today, and assess the sustainability of the system..

TASK 2:5 IDENTIFY THE CULTURAL SIGNIFICANCE OF AGRICULTURE IN THE PARK.

The cultural significance of agricultural landscapes in the context of the historical significance of the park as whole must be defined and evaluated. A prerequisite to Task 2:5 is to review the CLR and the HRS for the park if they exist. Throughout this procedure, it is of the utmost importance to keep in mind that the cultural environment is a "world both natural and social" and that agricultural landscapes are both socioeconomic and natural systems.

Agricultural landscapes show how Americans from diverse ethnic backgrounds have adapted the natural environment for their own use in many different circumstances are, and how these cultures have evolved. There are four

types of cultural landscapes recognized by the National Park Service, and agriculture may have played a role in any of them.[6] All are represented in this study. The category(ies) into which the agricultural landscapes in the park unit fall should be identified in this step, remembering that the types are not mutually exclusive and landscapes can be categorized under more than one heading.

- Historic Designed Landscapes
- Historic Vernacular Landscapes
- Historic Sites
- Ethnographic Landscapes[7]

Agricultural resources may also be archeological resources, historic structures, museum properties, or ethnographic resources, but not collectively linked or concentrated in an identifiable geographical area to qualify them as a landscape.[8]

Cultural significance

The agricultural landscape should be classified according to it's cultural significance based on four criteria used to assess the eligibility of historic rural landscapes for the National Register of Historic Places.[9] These four criteria when applied to agricultural landscapes give us eight categories of cultural significance. The assessment of the cultural significance and integrity of agricultural landscapes was discussed in Chapter Two.

TASK 2:6 IDENTIFY NATURAL RESOURCES AND ADVERSE IMPACTS OF AGRICULTURE ON NATURAL RESOURCES

Some natural features, attributes and constraints will impose distinctive characteristics on agricultural landscapes. The Hohokam Indians at Montezuma Well were looking for a reliable supply of irrigation water. The first European settlers in an area were likely looking for well-watered, productive soils. The battle of Saratoga was fought where it was because of the Hudson River and the bluffs that overlook it. The designers of the Blue Ridge Parkway were looking for magnificent scenic views and bucolic farming scenes. The natural features that made farming possible and those that posed limitations for agriculture should be identified.

Other natural resources and how these have been and are being impacted by agricultural uses should be identified. It is also important to identify adverse

designed landscape, and are justification for preserving and managing land in agriculture (Figure 7:4). At the Delaware Water Gap National Recreation Area, where driving for pleasure is a popular activity, the general management plan states that, if landscape management is not undertaken the "scenic and historic mix" of open land and forest will be lost.[10]

Community enhancement

In ethnographic landscapes, the natural resources in the park may have been used traditionally. The park may also have been involved with the local community in land and water management. At his trading post in Arizona, John Lorenzo Hubbell used irrigation water from an impoundment on Navajo land; the Navajo in the community also practiced irrigated farming but ceased doing so when the dam failed. It may be desirable to reestablish irrigated farming by initiating a community agricultural demonstration project in the park.

TASK 2:8 INVENTORY FARMSTEADS AND FARM BUILDINGS IN THE PARK

Because residing on the land and pride of ownership are such strong agrarian values, the availability of farm houses and farm buildings are important factors in targeting farmers to manage agriculture resources and devising tenure systems that give maximum security and sense of ownership. The expense of rehabilitating or restoring historic structures may be a major disincentive to potential tenants. Complete the following tasks when applicable:

- Identify farm buildings that contribute to the cultural significance of the landscape or of the park as a whole.
- Identify farm buildings that are listed on or eligible for the National Register.
- If buildings do not contribute to cultural significance, are they intrusions on the landscape or do they contribute to the agricultural function and the aesthetic qualities of the landscapes? If not, is there any reason why they should not be removed?
- Delineate the land (if any) that the buildings serve, or nearby land that they could serve. What is the spatial relationship of buildings to the land?
- Does the location of farmhouses give farmers a sense of ownership of the land they are working?



Figure 7:4 Steep pasture land, part of a "designated view" on the Blue Ridge Parkway near Blowing Rock. In this case, the pasture probably has no particular significance, but is important to allow a view of the distant mountains.



Figure 7:5 In the accounts of the Civil War battle at Stones River National Battlefield, the noise was so deafening that one soldier reported stuffing cotton in his ears. Today the permittee plants about 1.5 acres of cotton each year. The cotton field in this photograph is in the distance on the left.

- Identify the functions for which farm buildings were designed and whether they still function for those uses. If not, are there adaptive agricultural, income-producing, but appropriate uses for the buildings?
- Determine the liveability of farmhouses and measures needed to make livable with approximate cost estimates.
- List repairs necessary to meet the Secretary of Interior's standards with approximate cost estimates.
- Assess the amount of privacy available to a resident farm family. Would open-house days be required for historic buildings?
- For farm buildings listed on the National Register without land are there any adaptive income-producing, non-agricultural uses to which the buildings could be put? They must be income-producing to qualify for a tax credit.[11]

TASK 2:9 IDENTIFY THE DISTINCTIVE CHARACTERISTICS OF THE AGRICULTURAL LANDSCAPE

The identification of significant landscape characteristics can only be done with a full understanding of the cultural significance of the agricultural landscape as a whole. The following headings are the eight categories of significance for agricultural landscapes identified and discussed in more detail in Chapter two.

A 1. Landscapes where agriculture played an important role in the prehistory, in the settlement history, or in the subsequent development of the area

Where the landscape is significant because it illustrates agricultural practices in a prehistoric or historic period by Native Americans, resources may fall into several categories including archeological and ethnographic resources. Significant features of a prehistoric agricultural landscape would be those that show how it was possible to derive a livelihood through agriculture in that particular area. At Montezuma Well (Montezuma Castle National Monument) and at Canyon de Chelly National Monument, for instance, agriculture was feasible only with irrigation, and evidence of how this was done is particularly significant. At Montezuma Well, the well is itself, the irrigation canal and the irrigated fields together make up a landscape of extraordinary cultural significance. At Delaware Water Gap National Recreation Area the sites of Minisink Indian villages on the alluvial terraces of the Delaware River where, beginning in the late Woodland Age, Native Americans adopted a

sedentary way of life dependent on agriculture, are of significance in the agricultural history of the valley. The switch from a hunter-gatherer or a nomadic way of life to a sedentary agricultural life is usually characterized by the storage of surplus foods for use during cold or drought seasons and an increase in trade. Surplus agricultural produce was bartered with neighboring groups. Thus, evidence of storage systems or of trading are significant. At Canyon de Chelly National Monument, storage structures from the Anasazi occupation and historical evidence of the Navajo bartering peaches, which were grown in the canyons, for sheep raised outside the canyons are both significant features. Bartering is one of many traditional activities in the canyons. In the case of Canyon de Chelly National Monument which is owned by the Navajo Nation, the National Park Service encourages the Navajo "to pursue customary religions, subsistence and other cultural uses" of the canyons.[12] It is important therefore to define features of the landscape that demonstrate traditional subsistence uses bearing in mind that, although these may have changed, they should show cultural continuity.

Characteristics and features of agricultural landscapes that represent the early settlement history of a region might include those that:

- Attracted settlers to the area and suggested that an agricultural way-of-life would be possible;
- Shed light on the particular ideals and goals of the settlers. Was subsistence or profit their immediate aim? For example, contrasting two pioneer landscapes, Grant Kohrs Ranch National Historic Site was a specialized profit-making venture from the start while Cades Cove in the Great Smoky Mountains National Park was settled by subsistence farmers;
- Show how settlers prepared and modified the land for farming;
- Show how agriculture fit into the "survival strategy" of the farm family and community;
- Show how agricultural improvements were adapted to that particular site, perhaps showing the evolution of a distinctive local method, character or style, including the design, construction and layout of farm buildings;
- Show why the early system was eventually superseded by other systems. Features in this category require an understanding of how change has affected the landscape.

A 2. Landscapes where an historic agricultural event, activity or innovation took place

Farmers are always looking for a better way, and resourcefulness and innovation have long been admired in farming communities. Landscapes that include examples of agricultural innovation or inventiveness are demonstrating change and things to come. Innovations are diverse. They may be mechanical (a new handling system or a new seed-drill), managerial (a new system of rotation or grazing), economic (specialization), chemical (a new fertilizer), architectural (a new design of farm building). Features that characterize innovation in landscape will be similarly diverse.

- If the innovation has material form (e.g. a mechanical invention, or a farm building type), it may be appropriate to preserve as a museum object, or structure. This need does not necessarily preclude its use.[13]
- Landscape features that should be identified are those that were directly affected by or made possible by the innovation.

This category of agricultural significance is not well represented in the national park system. One example is at Green Springs National Monument where Cyrus McCormick tested his new reaper in the 1840s. Another important example can be seen at Point Reyes National Seashore where the development of large scale dairy ranches is a very early example of specialization in agriculture. It was made possible by the shipping of dairy products by schooner directly from private wharfs on each ranch. These wharfs, therefore, are significant features that should be preserved.

A 3. Agricultural landscapes which were the setting for an historical event not having to do with agriculture

Where agriculture was the setting for an historic event such as a battle, it is important to identify agricultural features that are essential to understand that event. The restoration of the historically correct configuration of woods and fields is mandated in the legislation of some of the battlefields. The visibility of enemy positions, fields-of-fire and other visual and spatial characteristics of a battlefield are usually important in understanding the conduct of battle. In those cases, the specific historic crops are usually not as important as openness or visibility. What are the

features of the agricultural landscape that affected the conduct of the historic event? In some battles, for instance, agricultural features such as farm roads, fences, walls, ponds, crops and orchards all played significant roles in the battle or were memorable enough to have been mentioned in historical accounts of the event (Figure 7:5).

Although all the examples of this category of landscapes in this study are battlefields, the identification of landscape characteristics is applicable to other sites which were a setting for an historic event. If the site was chosen specifically for an event, what were the characteristics and features that were important? Very different criteria were used to choose a site for an agricultural fair, a revival meeting, a political demonstration, or a battle. Agricultural use may have been a criterion itself or it might have been simply the characteristic openness of farmland.

B 1. Landscapes associated with a person who played an important role in agricultural history, or in the agricultural development of the area

Landscape characteristics that reflect the role of the person in agricultural history will be significant. As the roles are diverse, so too will be the characteristics. Significant at the Booker T. Washington National Monument might be those characteristics that illustrate how Washington's childhood experience on the plantation shaped his philosophy of education later in life. Significant to the agricultural history of the Hubbell Trading Post National Historic site are those characteristics that show how Hubbell developed the irrigation system.

B 2. An agricultural landscape that was the home place of a historically significant political leader, writer, artist, or other important figure

It is important to identify characteristics that illustrate what aspects of farming or farm life were important to that person. At Lyndon Johnson's ranch, these would include features that reflect Johnson's lifelong involvement in rural issues and his love of the countryside. Landscape characteristics significant at the Eisenhower Farm would be those to which Eisenhower attached most value during his retirement, including his herd of Angus cattle.

C 1. Landscapes that embody a vernacular agricultural system or a locally distinctive development of that system, or landscapes that feature continuity of traditional use and occupancy.

Agriculture has played an important role in the development of most regions of the US. In some areas a particular period in agricultural history may have special cultural significance. For instance, the Southern Piedmont was for years known as the Cotton Belt although, in much of the region today, cotton is rarely seen. But the culture of cotton has become part of the regional identity. Generally resources in this category will be vernacular landscapes in which characteristic, but ordinary features, are as important as unique features. Although one period may be more significant than others, change may be historically important in these landscapes. In the Cotton Belt for instance, the devastating impact of the boll weevil and the resulting changes are significant events. Characteristics and features of agricultural landscapes in this category might include:

- Economic or other factors that made a particular agricultural development feasible. For instance, at Cuyahoga Valley National Recreation Area, the proximity of markets for farm products in Cleveland and Akron, and the impact of the canal and railroad on the agricultural development of the valley, are important.

- Characteristic configurations of fields or other management units to make the particular farming enterprise possible.

- Typical agricultural "improvements" that were necessary to make the particular farming system or enterprise possible (Drainage structures, terracing, fences, buildings, etc.).

- Off-farm support facilities and institutions that were needed for the farming system such as grist mills, cotton gins, saw mills, and Grange halls.

- Farmstead features characteristic of the farming system or enterprise.

- Biotic cultural features characteristic of the farming system, such as hedgerows or orchards.

- Factors that caused the agricultural system to change or decline. Recreational pressures in the Delaware Water Gap area, caused farmers to adapt by offering farmhouse accommodation to vacationers or, in some cases, selling their farms for rural retreats.

C 2. Landscapes where agriculture was part of an historic designed landscape, or agricultural landscapes designed for research, or for the demonstration of "good" farming

In some cases, agriculture was part of the designed scene, as it is for instance on the Blue Ridge Parkway, the Natchez Trace Parkway and at the Moses Cone Memorial Park. In this category particular views or compositions of agricultural features which the designer wished to be seen should be identified. In some cases these may be described in the notes of the designer. The plans for the Blue Ridge actually identify views, but unfortunately the designers did not indicate what the viewer was supposed to look at. Sometimes, it was apparently a general farming scene but in other cases, agriculture was probably just the foreground for a distant panoramic view, in which case the agriculture provided contrast or context for the view and was a convenient method of view management (Figure 6:4). Any features of the agricultural landscape that were placed and specified by the designer to improve the scene are also significant. On the Blue Ridge Parkway, for instance, fencing types and plantings were specified and specimen trees that were to be preserved or planted were identified.

D 1. Landscapes that have yielded or are likely to yield information important to agricultural prehistory or history

A landscape will contain a huge amount of information about it's past that will help a landscape historian interpret it's history. Some is hidden below the ground. If there is evidence that a landscape will yield important cultural data, in this case to do with the agricultural use of the site, it should be preserved.

STEP 3 PLANNING

The planning stage of cultural landscape management involves the choice of treatment and development alternatives, and determination of the use to which the landscape should be put. Contemporary use of a cultural landscape is appropriate (1) if it does not adversely affect significant landscape features and (2) if it either follows the historic use or does not impede appreciation of it.[14]

TASK 3:1 CONSIDER FARMER CHARACTERISTICS, EXPECTATIONS, ATTITUDES, AND RESIDENTIAL NEEDS

The farming community until quite recently was remarkably uniform in terms of attitudes and expectations but today there is great variation, although many farmers continue to hold strong agrarian values. Over the last twenty years the number of part-time, hobby and gentleman farmers has increased dramatically, and even some commercial farming has become a part-time occupation. Family members will often have off-farm employment. The role of farm wives on most small owner-occupied farms has changed from sharing in most farm tasks, including field-work, to only occasionally being involved in farming activities. Under-employment of members of farm families is a problem in many rural areas. There are important differences between the farm enterprises run by part-time farmers and those run by full-time farmers, and for the purposes of managing agricultural land in the national park system, it is extremely important to consider the relative suitability of these different groups.

Part-time farmers include some who once had small, full-time operations but who did not wish or were not able to keep expanding and have had to take off-farm employment to meet the needs of the family. They also include individuals who have opted out of urban life and weekend farming enthusiasts. As a result, agricultural knowledge and commitment to farming among part-time farmers is highly variable. Also highly variable is the expectation of profit. Some farmers expect and need profits most years and will not tolerate sustained losses. Other part-timers may have low expectations of profit. Hobby and gentleman farmers also include a wide range of individuals. Hobby farmers generally are individuals with some farming experience and who enjoy the actual physical labor of farming. Gentleman farmers generally do not involve themselves in the day-to-day running of the farm, either employing a farm manager or contracting with a local farmer to carry out field operations. Their farms may be "show" enterprises with no regular sales (Figure 7:6). However, the sense of proprietorship is all important and the land must be close to the residence.

In the past, some park managers have been wary of letting land to part-time operators. But they will have little choice in the future. In some parks, it is surprising that there are not already more part-time, hobby, or gentleman farmers. At Minute

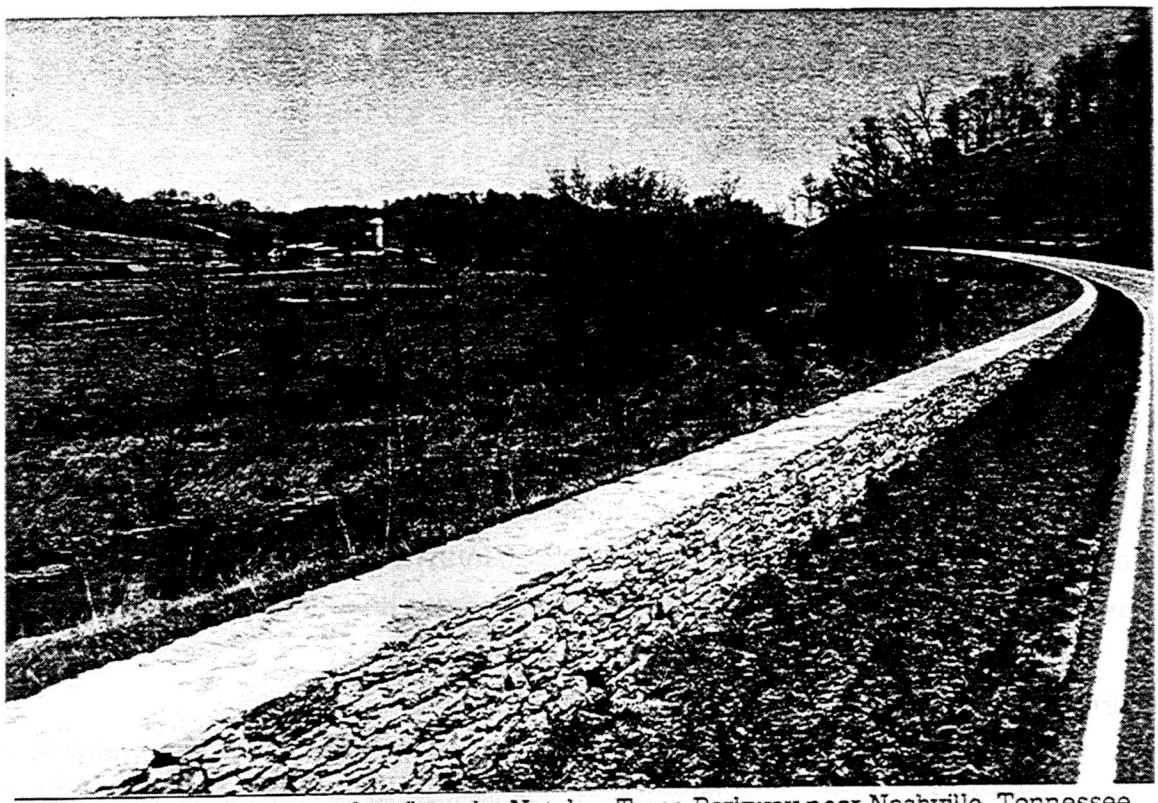


Figure 7:6 A "gentleman farm" on the Natchez Trace Parkway near Nashville, Tennessee. This was once a working dairy farm, but is now a horse farm with well-groomed paddocks and post-and-rail fences.



Figure 7:7 Field growing up at Cuyahoga Valley National Recreation Area. Only a hobby or part-time farmer would probably be interested in this land.

Man National Historic Park for instance, one might expect much of the land to be leased by residents who live adjacent to the park, who would have a strong sense of proprietorship and who wanted the land to graze a few horses or beef cattle and perhaps to make some hay. But in fact, much of the fertile bottomland is rented to commercial farmers who grow produce. In a few parks, part-time and hobby farmers have long been important in the agricultural community. For instance, at Cuyahoga National Recreation Area, the number of hobby farmers grew rapidly from 1913-1930 as an exodus from the city began (figure 7:7). Hobby farming was also common in the area around the Delaware Water Gap in the early decades of this century.

Consider the following:

- for some, farming is a way-of-life and residence on the land is central to that idea. So too is ownership or a sense of ownership. For this reason, an inventory of farmsteads in the park that are potentially available as residences should have been carried out in Task 2:8.

- security of tenure is generally regarded as a prerequisite for good stewardship and preservation of historic buildings. It is particularly important for those for whom farming is a way-of-life.

- a farm family may rely exclusively on profits from the farm and therefore have a high expectation of profit. At the other end of the scale a gentleman farmer may rely entirely on other sources of income and may even write off-farm losses against profitable non-farming ventures.

- farmers include full-time, part-time, casual operators, and gentleman farmers with extreme variations in labor input.

- expertise in farming varies greatly. Specialized farmers tend to have specialized knowledge. Older farmers, who have often run general farms, have a generalist's knowledge.

- Farmers will have different levels of wealth and ability to invest money in preservation of historic buildings. Their interest in, and concern for, preserving historic structures will also be highly variable.

- Farmers will vary widely in their attitudes to the environment and in their acceptance of conditions that require compliance with the principles of conservation farming.

- Some farmers work parcels of land that are widely scattered. Absentee farmers have different attitudes from farmers who reside on their land.

- There are many retired farmers who continue to farm as a hobby. They tend to have a high level of expertise in general farming.

- Farm family involvement varies. Some farm families, particularly those for whom farming is a way of life, are involved in the day-to-day operation of the farm. They may have off-farm jobs but still participate in farming.

- In the case of community farms, the expectations and attitudes of the group as whole will determine how a farm is run.

In the following Table 7:1, five types of farmers have been characterized generally in terms of several variables. It is extremely important to be aware of the array of characteristics of farmers when targeting suitable tenants. Park managers in this task should attempt to identify the type of farmer most suitable for the resource to be managed.

TASK 3:2 REVIEW FACTORS AFFECTING THE ECONOMIC VIABILITY OF AGRICULTURE IN THE AREA AND IN THE PARK

Most modern farms are extensive, using large areas of land with a low input of labor per acre. Most farm crops are scale-sensitive and can be grown profitably only by large operations. Some farms, mostly in close proximity to urban markets, are intensive operations usually producing quality fresh products with a high input of labor. The following factors may affect the viability of extensive and intensive operations differently.

- Access to market. Clearly farmers must have a market for their products and these markets must be accessible. Extensive farms have bulk sales but intensive operations may rely on direct sales with a higher profit margin per unit. Farm stands within or just outside a park boundary might be profitable for farmers in the park. Are they permissible?

- Access to agricultural services. The viability of farms in urbanizing areas may be reduced by lack of agricultural services. Many highly specialized farmers rely heavily on contractors and other services.

- Remoteness of the park. The distance of the park unit from a farmer's home base may be prohibitive. In some cases, as at Cades Cove in the Great Smoky Mountains National Park, and at Stones River National Battlefield, accessibility

Table 7:1 GENERALIZED CHARACTERISTICS OF TYPES OF FARMERS (Task 3:1)

Type of Farmer	Importance of availability of farmhouse in park	Importance of security of tenure	Expectation of profit	Personal Labor Input	Expertise in Farming	Interest in and resources for preservation of historic farmsteads	Tolerance of conservation provisions[1]
Full time commercial [2]	Low [5]	Medium	High	Full-time	High but often specialized	Low	Low
Part-time commercial [2]	Low [5]	Medium	Medium	Evenings/ Weekends	Medium-high probably more generalized	Low	Medium
Retired Commercial [3]	High	High	Low	Variable	High-probably generalized	Low/Medium	Medium
Part-time Hobby	High	High	Low	Evenings/ Weekends	Low	Medium/High	High
Gentleman Farmer [3]	High	Very High	Very Low	Casual, usually with full or part-time manager	Low-manager may have expertise	High	High
Community Farmer [4]	High [6]	High	High [7]	Very high	Low-supervisor may have expertise	Low/Medium	High

Notes:

1 Provisions to protect both cultural and natural resources.
2 'Commercial' farmer is used here for farmers who rely largely on their farm income for their livelihood.
3 'Gentleman' farmer is used here for farmers who do not rely on their farm income and for whom the farm is principally a residence in a rural setting.
4 A 'Community' farm is used here to mean a farm owned and operated by a community organization.
5 Assumes that farmers have residences on home farms close to park.
6 Residence for a supervisor. Residential accommodation for participants may also be desirable in more rural areas.
7 This is not a high expectation of cash profit but of farm productivity.

may be made difficult by heavy traffic, or by restrictions on the use of roads, as on the Blue Ridge Parkway.

- Land with low productivity may not be viable to farm. It may be inherently unproductive as is the case for much of the farmland at Sleeping Bear Dunes National Lakeshore. It may also be unproductive because water is not available for irrigation, as at the Hubbell Trading Post National Historic Site after the dam of the storage lake was breached. At Ebey's Landing National Historic Reserve scarcity of water limits the crops that can be grown.

- Farm size and fragmentation vs. scale-sensitivity of farm enterprises. Scale sensitive crop farms and enterprises such as dairying must be large to keep unit production costs low enough to be competitive. In some cases the additional land necessary to realize scale economies may not be locally available or it may be prohibitively expensive to purchase or rent. In very few cases in the park system are farms large enough to be operated individually at a profit.

- Critical mass, area fragmentation, and right-to-farm issues. In urbanizing areas the number of farms may fall below a critical level at which agricultural services are viable. Fragmentation caused by urban uses exacerbates this problem and residents adjacent to farms may bring nuisance suits for smell, noise or spray-drift problems against farmers.

- Real estate tax. Property taxes may become too high to justify farming. Most states do however have some kind of agricultural-use assessment for farmers who agree not to sell land for development for a specified period.

- Pests, predators, trespass etc. Crop losses due to pests may seriously reduce the viability of farming. Damage from deer is common in may parks and in some cases has made it impossible to grow some crops. In many areas of the country it is not feasible to raise sheep because of predation or worrying by dogs.

- Capital-intensity and labor-intensity. Only large specialized farmers will probably wish to use capital-intensive systems, and could only justify doing so on tracts with a high potential for profitable agriculture. Some labor-intensive uses may be more viable on smaller tracts in urbanizing areas.

NRCS personnel and farmers in the advisory group should be consulted in assessing the viability of alternative agricultural enterprises. Viability, to some extent, depends on the need and expectation of the farmer to make a profit. These needs and expectations vary widely and were considered in more detail in Task 3:1.

Managers of parks in urbanizing areas should be aware of the limited possibilities for economically viable agriculture. Nevertheless, profitable enterprises are possible but may not be consistent with the objectives of the park. The following points should be considered in urban-fringe areas.

- Community supported farms may be viable.
- Farms may need to rely on direct sales with higher profit margins.
- Small farms will need to focus on crops with high value or the possibility of value-added.
- Organically grown produce and freshness are two important qualities that command premium prices.
- Crops that are highly perishable, easily damaged, or which cannot be mechanized may have potential.
- Farmers may find pick-your-own operations are profitable for extremely labor-intensive crops.
- Ornamentals, herbs, and other specialist crops may be profitable.
- Some alternative crops may be economically viable but visually unacceptable. This is the case with Christmas trees on farms along the Blue Ridge Parkway.
- Some specialist and horticultural crops, such as escargots, mushrooms, and out-of-season produce require buildings or polyethylene covers for climate control which may be unacceptable.

- In areas with tourist pressures, farmers may be able to supplement income by providing accommodations for vacationers. Adaptive use of historic structures for tourist accommodation may also be feasible.

- In urban fringe areas, part-time and off-farm jobs are more readily available to supplement farm income than in rural areas.

- The pleasure horse population in urban fringe areas is high. Viable enterprises may include hay-making or horse boarding.

- In areas close to the shore, uses such as boat storage may result in adaptive but often inappropriate use of farm buildings.

TASK 3:3 *REVIEW CULTURAL LIMITATIONS ON CONTINUED AGRICULTURAL USE*

There are some cultural limitations on continued agricultural use. Consider the following:

- There is widespread recognition and concern that agriculture has, in the past been destructive to the environment and continues to be so. Concerns are likely to increase and the National Park Service is well served by having comprehensive natural resource management guidelines.

- Agricultural uses have destroyed many archaeological sites which might have yielded important information about past cultures. Agricultural management plans must ensure the protection of these sites.

- Agricultural characteristics that give substance to the cultural significance of the landscape may impose limitations on farming and limit the types of field operations that can be used.

- Restrictions are sometimes imposed on the timing of use, storage, and operation of machinery to preserve a "historic scene."

- Any requirement to grow a historic crop or to use a historic management technique may also be a limiting factor for viable agricultural use.

- Limitations on the construction of new buildings and the use of modern fencing methods can reduce the competitiveness of agricultural enterprises.

- Public opposition to the culling of deer and other nuisance wildlife species may reduce the viability of some crops.

- Accommodating park visitors and ensuring their health and safety may result in limitations on the use of electric fencing, and grazing livestock.

- If the historic period of a park is very short and specific, efforts to minimize the visual impact of change in the agricultural landscape may impose serious limitations on the use of efficient modern farming methods.

- If water rights are allowed to lapse, the viability of agriculture may be affected.

TASK 3:4 REVIEW NATURAL LIMITATIONS ON CONTINUED AGRICULTURAL USE

Vegetation, native animals, freshwater resources, soil resources, fire, integrated pest management, endangered and threatened species, exotic species, and hazardous waste management should all be considered with regard to agricultural use. The adverse impacts on natural resources that agriculture has had in the past should be reviewed and future trends be considered (Task 2:6). Consider the following:

- Guidelines for vegetation management in agriculture are most commonly to do with rotating crops, the use of historic crops and weed control. Crop rotation was once essential to weed and pest control on the farm but is severely limited by the few crops from which a farmer can expect to profit. The recent Farm Bill eliminates most federal restrictions on what crops farmers are allowed to grow but this is unlikely to increase the number of potentially profitable crops.

- Rarely can historic crops can be grown profitably and park managers should be fully aware of the limitations before requiring them to be grown.

- The protection of water resources is probably the most difficult environmental issue in agriculture. Problems include waste management from concentrations of animals, non-point source pollution from grazing animals, fertilizers, and pesticides, and damage to wetland and riparian zones by loafing cattle and horses. Limitations in parks may include: fencing-off fragile areas from grazing, provision of watering troughs for grazing animals, and limitations on the use of fertilizers and pesticides.

- The protection of soil resources, particularly soil erosion control, can involve measures such as no-till, contour terracing, and strip cropping. In some cases these may be destructive of historic field patterns.

- Guidelines for the use of pesticides in national parks are quite stringent and may be perceived by some farmers as imposing onerous limitations on agricultural use.

- Conditions may be imposed such as the timing of haying operations to protect ground-nesting birds. Farmers sometimes see those limitations as unreasonable.

- Many agricultural weeds and crops are exotic species. The control of exotic species is not likely to impose serious limitations on agricultural use.
- Unsustainable pumping of ground water or extraction of surface water is unacceptable.
- Limitations on stocking rates and conditions on seasonal use of pastures may be necessary to protect grazing land, but may be seen by some farmers as reducing the viability of farming.

Because farmers traditionally value their independence highly, they are likely to prefer restrictions on agricultural use that specify certain thresholds (such as density of pasture) to be maintained, rather than specific restrictions (such as stocking-rate) which may be seen as undue interference.

TASK 3:5 *ASSESS THE DEMAND FOR A PARTICIPATORY EDUCATIONAL FACILITY IN AGRICULTURAL HISTORY AND FOR FARM TOURISM AND FARM VACATIONS.*

Living-history farms were once more common in the national parks than today. Although they performed an educational function, they were extremely labor-intensive and most have been abandoned as not cost-effective. The viability of a living-history farm depends on a demand for a participatory educational facility in local cultural history and a demand from tourists. It is important therefore, to consult with school systems in the region to evaluate the need and to design the facility to meet curriculum requirements. Viability will also depend on the number of tourists who would be willing to pay to visit the farm, and the potential for offsetting most or all of the operating cost through user fees and sales. A historic farmstead with a high degree of integrity and the necessary land must be available. It is possible that a living-history farm could generate income and meet some labor demands by providing for residential farm vacations if a suitable accommodation could be provided. Farmsteads or other farm buildings in parks may have potential as environmental education facilities, farm vacation accommodation, or other adaptive uses.

TASK 3:6 *SPECIFY APPROPRIATE TREATMENT*

There are four treatment alternatives, preservation, rehabilitation, restoration or reconstruction. Preservation requires that a cultural landscape "is used as it was

historically or is given a new adaptive use that maximizes the retention of historic materials".[15] Various standards apply including avoiding the replacement of repairable features and retaining and preserving features that have "acquired significance". A culturally significant agricultural landscape which resulted from mixed rotational farming with small fields enclosed by fences might be given a new adaptive use of a cow-calf beef operation which could be compatible with the small field sizes. This would assume that the field pattern is a more significant feature in the landscape than the actual crops and livestock in the rotation.

Rehabilitation allows the improvement of "the utility or function of a cultural landscape through repair or alteration to make possible an efficient compatible use while preserving those portions or features that are important in defining it's significance." Thus, if the efficient use of a landscape for mechanized tillage involves enlarging the field sizes, it might be allowable if the loss of historic field boundaries does not represent a loss of integrity. If the individual boundaries or the pattern they create are significant, the use would not be appropriate. Rehabilitation is the treatment that would most often be appropriate for agricultural landscapes.

Restoration "accurately depicts the form, features and character of a cultural landscape as it appeared at a specific period or as intended by its original constructed design. It may involve the reconstruction of missing features and selective removal of later features". Because the accurate depiction of a historic agricultural landscape would require use, and because historically authentic uses are rarely feasible, the scope for restoration for contemporary uses is limited. In theory the restoration alternative would be the most appropriate for battlefields, but in most cases the practicality of management dictates rehabilitation.

Reconstruction of a non-surviving cultural landscape at a specific period as intended by the original constructed design is the fourth option, but is always a last resort measure and requires very good design documentation.[16] Unfortunately, it is rare for farmers to document the original constructed design, usually because the design of a farm evolves over time. For a farm, the term "constructed design" could be taken to mean the design of the original economic enterprise and management system and the form that the operation took on the ground. But very rarely would it have been constructed all at once, and when complete, the "original" design would

probably have changed considerably. A non-economic landscape such as a garden is more likely to be constructed in a short period of time and to the original design. A reconstruction must be full-scale, and not be miniaturized, but this need not mean that a whole farm enterprise must be preserved rather than part of the enterprise. In the case of most labor-intensive historic farming systems, it would not be practical to reconstruct a whole economic farm unit.

TASK 3:7 ASSESS THE FEASIBILITY AND APPROPRIATENESS OF ALTERNATIVE AGRICULTURAL MANAGEMENT SCENARIOS.

The feasibility of alternative agricultural management scenarios reflects economic viability, practicality, natural and cultural limitations, the expectations of the potential tenants, and the conditions and requirements of the National Park Service. The advisory group will play an important role in assessing feasibility of alternative scenarios and enterprises. Six scenarios are summarized in Table 7:2 and are as follows.

Scenario 1: Viable rural communities

In some parks there exist viable rural communities. Generally, the goal will be to sustain the social and economic viability of these communities by promoting the greatest possible autonomy and sense of ownership among residents. Private ownership may be appropriate and, as a prerequisite for this task, the intent of Congress with regard to owner/occupancy in the park should be reviewed (Task 2:1). In existing rural communities, some change is acceptable without adversely impacting the integrity of the landscape. These changes may include new agricultural uses and methods, adaptive reuse of existing buildings and the construction of some new buildings if necessary. In many areas of the country where agriculture continues to be economically viable, the rural community has collapsed because of labor efficiency and consequent depopulation. Farm families increasingly need to supplement farm income with off-farm employment or alternative on-farm income-producing enterprises. Requests from residents for appropriate commercial ventures with necessary signs should be accommodated when reasonable. Examples might include:

- Adaptive reuse of farm buildings for bed and breakfast, vacation accommodations, farm tourism, etc.

Table 7:2 ALTERNATIVE SCENARIOS FOR THE MANAGEMENT OF AGRICULTURAL RESOURCES

ALTERNATIVE AGRICULTURAL SCENARIO (see Task 3:7)	GENERAL CHARACTERISTICS & RESTRICTIONS ON USE	AVAILABILITY OF FARMHOUSES & BUILDINGS AND IMPLICATIONS (see Task 2:8)	SUITABLE TENANTS (see Task 3:8)	TENANCY MECHANISM (see Task 3:8)
SOCIALLY & ECONOMICALLY VIABLE RURAL COMMUNITIES [1]	Generally vernacular and ethnographic landscapes. High tolerance of change, adaptive use of farm buildings, new agricultural uses and methods.	**Absent** Consider new buildings and farm houses, carefully sited and designed. --- **Available** Adaptive reuse of defunct buildings and addition of some new buildings if needed.	Offer vacant farmsteads to offspring of local residents. May be full-time, part-time or hobby farmers. Every effort should be made to keep existing occupants in residence.	Ownership with easements and/or deed restrictions. Long leases (49-99 years). Maximum security of tenure and autonomy possible.
FARMS WITH HIGH POTENTIAL FOR PROFITABLE AGRICULTURE	Rarely profitable as self contained unit, but as additional land to nearby, privately-owned farm. Generally few restrictions on use.	**Absent** Suitable tenants will usually have residence outside park. Consider new buildings only, in exceptional cases. --- **Available** Allow adaptive reuse by reliable tenants and consider new buildings if absolutely necessary.	Local farmer needing additional land (full or part-time). Community farm [2] --- Full-time, part-time or hobby farmer with interest and means to preserve buildings to appropriate standards.[4]	Special use permits or memoranda of agreement. Full economic rent.
FARMS WITH LIMITED POTENTIAL FOR PROFITABLE AGRICULTURE	Limited potential may be due to natural constraints, small size, inaccessibility or restrictions on use. Profitability may be good but unreliable.	**Absent** No new buildings should be allowed. --- **Available** Tenure conditional upon restoring and maintaining buildings to appropriate standards. Suitable adaptive reuse encouraged.	Full-time or part-time local farmer needing additional land. Community farm[4] --- Full-time part-time or hobby farmer with interest and means to preserve buildings to appropriate. Standards.	Special Use permits or memoranda of agreement. Less than full economic rent. Leases (19-49 years) of land and buildings together
LANDSCAPES WHERE ONLY AN APPEARANCE OF AGRICULTURE IS APPROPRIATE	Includes landscapes where agriculture is impractical or undesirable for some reason, even if farming is economically viable.	**Absent** Not applicable --- **Available** Tenure of buildings conditional on restoration and maintenance (and maintaining agricultural appearance of land)	Agricultural tenant not appropriate. Burning, mowing, or grazing under contract or supervision by park staff. --- Resident with necessary interest, skills, and willingness to manage land in non-agricultural use.	Contract management or NPS staff maintenance --- Lease (19 - 49 years)
FARMSTEADS WITH NO FARMLAND	Adaptive reuse for suitable non-agricultural enterprise would have to be found.	**Absent** If land cannot be let for agriculture, non-agricultural management may be necessary[3] --- **Available** Encourage adaptive reuse subject to restoration and maintenance to appropriate standards.	Not applicable --- Anyone with imaginative, appropriate and viable proposal for adaptive reuse.	Not applicable --- Lease (19-49 years)
LIVING-HISTORY FARMS	Agricultural resources with high degree of significance and integrity and where a demand exists for participatory educational facility in agricultural history.	**Absent** If farmsteads are absent site is probably unsuitable for living history. --- **Available** Resident caretaker with accommodation for volunteers will be needed	Consider alternative scenarios --- Historical society, land trust, educational trust.	Not applicable --- Cooperative agreements or concession contracts

Notes
1 The rural economy would rely on both farm and non-farm enterprises and many residents would have off-farm employment.
2 Generally it is assumed these have some cultural value.
3 Non-agricultural uses might include grazing pleasure horses as well as techniques such as mowing or burning.
4 Suitable for community farm only if service buildings are available elsewhere.

- Direct sale of farm produce from carefully sited farm stands.
- Adaptive reuse of farm buildings for woodworking shops or similar ventures, particularly those that add value to locally produced resources.
- Community supported agriculture.

A delicate balance between imposing restrictions on uses and changes that may destroy the viability of the community and allowing uses and changes that will adversely impact the park must be struck. Agricultural developments that involve increased concentrations of animals, increased scale and speed of field operations, reduction in the diversity of farm enterprises, changes in grazing management, methods of watering livestock, and disposal of livestock effluents should be evaluated very critically. In the case of ethnographic landscapes, whether new agricultural uses will compromise the land use traditions of the culture should be considered.

The advantages of a resident and stable farming community are as follows:

- A sense of security of tenure and attachment the land fosters good stewardship.
- Willingness to make long-term economic investments in property improvements.
- Day to day attention to maintenance by resident farmers.
- Day to day supervision of livestock by resident farmers.
- Monitoring of pest infestation by resident farmers.
- Historic buildings are more likely to be used and maintained (Figure 7:8)

Disadvantages include:

- Farmers may have difficulty making a living without off-farm employment but employment opportunities may be scarce in remote rural areas.
- If park managers impose too many restrictions, farmers may find it impossible to compete.
- In the case of residential properties, residents are often bothered by trespassers because residences in a national park are not expected by visitors.



Figure 7:8 Empty farmstead at Delaware Water Gap National Recreation Area.



Figure 7:9 This leaseholder at Cuyahoga National Recreation Area sells herbs and produce direct to local restaurants. Her farm is little more than a large garden.

Ultimately, the feasibility of maintaining a viable rural community depends on residents finding profitable employment on or off the farm. It will be difficult to enforce a condition requiring agricultural use on a long lease, deed restriction or easement if there are no economically viable agricultural uses. Some owners or lessees may continue to operate with a low expectation of profit but only a few gentleman farmers will tolerate or be able to afford regular losses.

Scenario 2: Farms with a high potential for profitable agriculture

For various reasons discussed in Task 3:2 (Factors affecting the economic viability of agriculture) there are few farm units in the national park system that have a high potential for profitable agriculture. In most cases this is because units are too small. It is more usual to find parcels of farmland within a park being operated profitably by a farmer with a home base outside the park. Natural constraints or conditions imposed by the park to protect natural or cultural resources may further reduce profitability.

Because of the increasing scale-sensitivity of most farming enterprises, small farm units are not much sought after by commercial farmers. However, adjacent farmers who wish to increase the size of their own farms may be potential tenants, but in these cases they will wish to rent only the land and not the farmhouse. Generally, potential enterprises can be determined by identifying profitable farming operations in the immediate vicinity of the park. Consultation with the NRCS officer will assist in assessing whether the potential impact of such enterprises would be acceptable without derogation of the natural or cultural values of the park or destruction of the landscape characteristics identified in Task 2:9. Impacts on cultural resource categories other than cultural landscapes, notably historic structures and archaeological resources must be considered.[17]

Ultimately the willingness of farmers to take on agricultural permits at an economic rent will be the measure of the feasibility of this option. However, there should be a good understanding of the relative feasibility of alternative farming enterprises after discussions with the advisory group. The future feasibility and economic viability of farming should also be assessed. Enterprises that are becoming more scale-sensitive due to new developments in machinery or marketing methods should be avoided.

Scenario 3: Farms with limited potential for profitable agriculture

Small size, remoteness, unproductive soils or various other limitations identified in Tasks 3:2, 3:3, 3:4 may reduce the economic viability of farming. Units without a residence may be difficult to let at any more than a nominal rent. Farms in this category with a farmstead will be easier to let. Generally part-time, hobby or gentleman farmers who will be attracted by a residential farm will not be as concerned as commercial farmers about limitations on agricultural use. Few tenants in this category will be seeking to make mechanical field operations more efficient by changing field patterns and enlarging field sizes. The most difficult requests are likely to be from tenants who wish to start alternative enterprises. In urbanizing areas for instance, enterprises with the following characteristics will become more viable:

- Crops that are labor intensive and difficult to mechanize.
- Specialist crops with a high value.
- High value crops requiring climate controlled cultivation in glass houses under polyethylene or in buildings (Snails, mushrooms, out-of-season crops, cut-flowers etc.).
- Containerized ornamental plants.
- Other high value crops, mostly horticultural produce, requiring irrigation.
- Organically produced crops, free-range eggs, etc. that command significantly higher prices.
- Crops sold directly to consumers from roadside stands or by pick-your own arrangements.
- Crops grown directly for restaurants (Figure 7:9)
- Crops that are difficult or expensive to ship (e.g., cut flowers).
- Crops not sensitive to economies of scale in production.
- Hay in rectangular bales.

These uses may present a very different visual appearance than the historic agricultural uses and may not meet the interpretive objectives of the park. Park managers should carefully consider the criteria for permitting alternative agricultural enterprises, particularly intensive operations that require climate control or irrigation.

Scenario 4: Landscapes where only an appearance of agriculture is appropriate, practical, or desired, whether or not the farmland has potential for profitable agriculture.

4(a) Tracts without farmsteads

In situations where only an appearance of agriculture is appropriate, even if farming is economically viable, non-agricultural management will be necessary. Unproductive tracts without farmsteads will generally have to be managed in non-agricultural uses. If in Tasks 2:5 & 2:7 it has been determined that the landscape should have the appearance of farmland, management alternatives to achieve the specific characteristic desired should be considered, including burning, mowing, or non-agricultural grazing.

Burning

Fire management may be used to "restore or maintain an historic scene".[18] In most cases, burning maintains only the openness of agriculture and no other features. However, where the spatial configuration of open land is the most important feature, burning can be cost-effective.

Advantages:

- Cost effective if a burn control crew can be summoned at short notice from other tasks when weather conditions are right.

Disadvantages:

- Timing has to be good, otherwise unacceptable risks to adjacent property and other features in the park.
- Fire may not control some resistant woody species which then require other treatment to eradicate.
- Fire may reduce thatch which may itself suppress woody vegetation. Evidence for this has been found at Saratoga National Historic Park (Figure 7:10)
- Requires mowed or cultivated firebreaks which may be confusing features for park visitors.

In most cases, the fire should be stopped at the edge of woodland but if visual penetration into the woods is a historic feature, burns can be planned to penetrate woodland margins. Moister conditions within the wood will prevent fire spreading deeper into the woodland if burns are correctly timed.

Mowing

Mowing is usually considerably more expensive than burning except for small tracts and, in most cases does not give as good control of woody species. The frequency of cuts is important and selective cutting of susceptible areas may save time. On dry, unproductive sites with a short growing season, a cut every five years may suffice. If necessary, as at Sleeping Bear Dunes National Lakeshore, field edges can be mowed more frequently, as they tend to be prone in invasion (figure 7:11). In more humid areas with long growing seasons, annual mowing is usually necessary. In many cases, a combined mowing/burning regime may be more effective than when either is used separately.

Advantages:

- Not as dependent on the correct weather conditions as burning.
- Results in fewer complaints from local residents than burning.

Disadvantages:

- Expense, especially when frequent mowing is required.
- Timing of cuts must be carefully scheduled to avoid ground nesting birds and to allow wildflowers to seed.
- Poor control of woody species, especially hardwoods.

Grazing

NPS guidelines address grazing separately from agriculture and include commercial grazing uses and non-commercial uses.[19] Grazing and browsing by wild animals, particularly deer, is also an important factor in the management of many parks. The following points should be considered:

- Animals prefer different vegetation. Goats and deer are browsers (i.e., they prefer broadleaf woody plants) sheep, horses and cattle are grazers (i.e., they prefer grasses).



Figure 7:10 Only about 120 acres of Saratoga National Military Park are farmed, seen here in the distance. The farmed fields contrast with land managed by burning and mowing in the foreground.



Figure 7:11 Farmland at Sleeping Bear Dunes National Lakeshore is too poor to be managed for farming and is mowed every five years, with more frequent cuts near woodland edges if necessary.

- Some animals, particularly horses, are extremely selective grazers and, as a result,pastures take on a very scruffy appearance.
- Combinations of different animals may give better utilization of vegetation and a more uniform appearance than single species. Cattle will graze coarse grasses, sheep fine grasses and goats invasive hardwood species, honeysuckle etc.
- Some animals are more aggressive towards dogs while others panic and are often killed as a result. Sheep are particularly susceptible and can sometimes be protected by a few goats in the flock.
- Some animals are more easily and cheaply enclosed than others on either a permanent or temporary basis. Sheep are difficult to confine, particularly mountain breeds.
- When animals can range over a large area, their grazing tends to be selective which results in a very uneven appearance.
- In hot weather, cattle and horses will spend many hours in shaded areas. The trampling and compaction that results can kill trees and pollute water. Loafing sheds may be required.
- Some animals, particularly horses, will sometimes bark trees by gnawing on them. Tree guards may be necessary.
- Some grazing animals are notoriously habitual and will follow exactly the same paths repeatedly to watering places or to mineral blocks. This can result in erosion on steep terrain.

4 (b): Tracts with farmsteads

Even in cases where farmland cannot be used for agriculture or is unproductive and not economically viable for farming, it may be possible to find a tenant if the property has a farmhouse and is a pleasant residential setting. Potential tenants may wish to pasture horses or they may simply contract to have land mowed or burned regularly. The feasibility of leasing these properties will probably depend on the amount of work and expense required to restore the house and buildings in relation to the desirability of the property as a residence.

Scenario 5: Farmsteads with no land

Historic farmsteads may no longer have any farmland associated with them. The land may have been allowed to grow up in trees or may have been attached to

another unit to increase the size of that operation. In some cases it may be feasible or appropriate to reclaim some this farmland. Potential tenants should have both the interest and financial means to preserve the farmhouse. However residential tenants may not be willing to preserve farm buildings and finding an appropriate adaptive reuse for farm buildings that no longer have an agricultural use may be a major problem. If non-historic farmsteads with no land have a useful function or if they are important visual elements in the landscape, they may be preserved but otherwise park managers should consider their removal.

Scenario 6: Living-history farms

Where agricultural resources have a high level of cultural significance and integrity and if there is a demand for a participatory educational facility (Task 3:5), a living history farm may be appropriate. However, most historic farming systems are complex, diverse and very labor-intensive. A comprehensive living history farm therefore would generally be extremely costly to run and would be economically viable only where costs could be substantially offset by user fees. Some changes will probably be needed for such an endeavor to be feasible economically and operationally. It is usually possible to show only selected parts of a historic farming system. The acreage of crops and the number of livestock are often reduced and this could mislead visitors.

Living history farms may have unacceptable impacts on natural resources. Some methods used in the past were destructive of natural values, causing erosion, water pollution, habitat destruction etc. Historically accurate farming practices may not be feasible due to their labor-intensity. Simplification of the farm enterprise or the mechanization of some operations may be required which could be difficult to interpret. Impacts on natural resources that should receive particular attention are water pollution, impacts on wetland, woodland grazing, and soil erosion.

Factors which are likely to have a major impact on the viability of living-history farms include: labor intensity, the need for resident caretakers for farm animals, the availability of historically accurate buildings, equipment, historic breeds of livestock and crop cultivars, the need for modifications to buildings and farmhouse to make them usable/livable, the configuration of fields and the feasibility of using machinery,

and the availability of residential accommodations for caretakers and volunteers. Clearly the cost of managing such an operation must be possible given the park's budget and costs must be substantially covered by user fees.

TASK 3:8 TARGET SUITABLE TENANTS AND SELECT AN APPROPRIATE TENURE MECHANISM.

This task involves targeting suitable tenants for various types of farm properties and selecting an appropriate tenure mechanism. Consider the six scenarios in Task 3:7 after reviewing the information in Task 2:8 (Inventory of Farmsteads in the Park) and Task 3:1 (Farmer Characteristics, etc.).

Scenario 1: Viable rural communities

The goal is to sustain the existing farming community by promoting the greatest autonomy and sense of ownership possible. The security of tenure of existing farmers should be fostered and vacant tenancies should be offered to the offspring of previous tenants if interested. However, wherever possible, the community itself should take the lead in targeting farmers for vacant properties. Farmers likely to meet community and park goals, are those that value security of tenure highly, those with an interest in and resources for preservation of historic structures and those tolerant of conservation provisions in farming. (See Table 6:1, Task 3:1)

Options for tenure are private ownership with deed restrictions and/or easements, and long-term leases. Other shorter term mechanisms can also be used, but for ethnographic and vernacular landscapes where the preservation of a viable farming community with minimal absenteeism is desirable, mechanisms that encourage maximum security of tenure are preferred.

Private Ownership - deed restrictions

There are very few cases in the National Park System where private ownership within the boundaries of the park is either permissible or desirable. There are cases, however, where private ownership of farms was intended by Congress. In Chapter Four, private ownership in Boxley Valley of the Buffalo National River, Point Reyes National Seashore, Ebey's Landing National Historic Reserve and Cuyahoga National Recreation Area was discussed. Essentially all these landscapes are ethnographic or

vernacular landscapes where a continuum of rural change is acceptable, and where it is desired to perpetuate the existing rural community. This category includes properties where the government acquired the full-fee and has then resold farms subject to deed restrictions, and properties for which a scenic easement was acquired within the park boundaries. In both cases, it is necessary to negotiate conditions or restrictions at the time of sale. This may be a potential problem as conditions or deed restrictions negotiated at the time of sell-back or acquisition may not anticipate unacceptable future agricultural developments. At the time of sale (in the case of easements and deed restrictions) or at the time of letting a long lease, the park manager must attempt to anticipate future unacceptable agricultural developments, but not make conditions so restrictive as to destroy the economic viability of the farm or stifle the resourcefulness of the owner or lessee.

Private Ownership - easements

The purchase of "scenic easements" on land outside the park boundary is more common than within parks. The technique was first used on the Blue Ridge Parkway to protect scenic views outside the park boundary. The term "scenic" easements is often used to include the development and mineral rights to the land. The term "conservation" easement has also become popular and may cover any right to the land.

Advantages of easements:

- Easements may enable the National Park Service to protect substantial areas at a much lower cost than purchasing the full-fee.
- As the land remains in private ownership all management expenses are the responsibility of the landowner.

Disadvantages of easements

- Checking that the conditions of easements are not broken may be beyond the resources of the park.
- It may be difficult to enforce some conditions, especially if farmers consider them to be unreasonable.
- Where development values are very high, the cost of purchasing easements may be almost as high as the full-fee.

Historic leasing

In Chapter five, the criteria for historic property leasing were discussed.[20] Historic property leases tend to be used for structures and not land, in some cases separating historic farmsteads from farmland. Although leases of up to ninety-nine years are permissible, the lengths of leases used in the parks are much shorter, often only five or ten years. In order to encourage long-term commitment to stewardship of land and structures, longer lease agreements are recommended.

Advantages:

- The program allows the lessee to bear the expense of rehabilitation and the annual rent may be adjusted to offset those costs.
- The rehabilitation costs for work by a lessee are likely to be substantially less than by a private contractor.
- Leases are not revokable at short notice and farmers may be more willing to make longer term investments as result.

Disadvantages:

- The requirement that leases are offered competitively and that the park must receive fair market value may make it difficult to find lessees.
- Generally the short length of leases offered by the National Park Service do not promote the security of tenure that encourages economic investment and long term commitment to preservation.
- The tendency to lease historic buildings separately from the land reduces the potential for qualifying for a tax credit as an income-producing historic structure.
- The requirement that a "site specific agricultural use guide" be prepared for each lease may be a disincentive for the park. However, these guides are important and necessary.
- The requirement that any land to be leased under the program must be surveyed for archaeological resources may result in delays in implementing the program.
- The lessee may not be able or willing to meet the Secretary of the Interior's "Standards for Historic Preservation Projects"
- Because leases cannot be revoked at short notice - farmers may attempt to get away with unacceptable practices.
- If leases are negotiated for long terms, it may be impossible, at the time leases are negotiated to anticipate future unacceptable changes.

Scenario 2: Farms with a high potential for profitable agriculture

Targeted farmers

Farmland without a farmstead is likely to be most in demand by local farmers wishing to increase the scale of their own operations. Often these will be full-time farmers, with a highly specialized expertise in one enterprise and generally not very tolerant of conservation provisions beyond those required by USDA. They are unlikely to be willing to invest in restoring farm buildings. However, if there are few limitations on agricultural use (Tasks 3:3, 3:4), full-time 'commercial' farmers would be appropriate tenants.

Where there is a farmstead on the land that has historic value, farmers who wish to reside on the land and who have interest in historic preservation should be targeted. These are more likely to be part-time or hobby farmers, than full-time operators. In cases of farmsteads with no historic value, interest in historic preservation is not important, but only part-time farmers or growers of specialty crops are likely to want units of less than one hundred acres. Community farms or community supported farms may be appropriate for these properties.

Where there are no buildings on site, special use permits may be used. Long term arrangements are not necessary. The farmer must obviously feel secure enough to make investments in the soil and some improvements such as fencing, but park managers do need a mechanism for letting land which can be revoked if conditions are not properly met. This particularly applies to land that is being farmed by absentee farmers or by farmers who do not live adjacent to the park. This need is met either by special use permits, or memoranda of agreement.

Special use permits

Special use permits are officially temporary and for lands "temporarily" not required by the park.[21] They are however, clearly being used on a longer-term basis. This may be because park managers do not wish to commit to longer-term leases, in which case more specific conditions required in an "agricultural use guide" would be necessary for every property. In view of their temporary nature it would be expected that special use permits would not be used for large parcels but this is not the case.

Advantages:

- Special use permits are revokable at short notice if conditions are not met.
- Most park superintendents do not feel obligated to advertise permits in order to receive fair market value and most permits are let by negotiation.
- It is made clear in most parks where permits are used that, if conditions are met, the permit will be renewed automatically.
- Permits do not have to be advertised to assure fair market value. A "fee" comparability study" is required.
- National Park Service personnel apparently have considerable freedom in assessing the reduction in fair-market value in return for the additional costs incurred in meeting the agricultural conditions required in a permit.

Disadvantages:

- Although special use permits are clearly being used for long term agricultural management, their temporary designation and revocability do not promote security of tenure among permittees.
- Lack of security of tenure does not promote long-term commitment to conservation and investment in agriculture. Some permittees are even hesitant to apply lime or fertilizer.
- Both the short term (one year) and long term (five year) permits are not long enough to encourage investment in some crops (e.g., alfalfa).
- The requirement that parks receive fair market value for permits is interpreted differently. In some parks, it has been taken to mean that all permits must be advertised and the highest bid accepted, which may be prohibitively expensive and time consuming.
- The park can only keep the revenue from special use permits if there is specific park legislation authorizing it.
- The cost of collecting fees for small permits makes them uneconomic to administer. Parks with many very small permits may choose to use letters of authorization for which fees are usually not charged. Letters of authorization are considered in Scenario 3.

Memoranda of agreement

Memoranda of agreement are used in cases where the use of the land for agriculture is clearly not temporary and where therefore the use of special use permits is therefore not appropriate, although as has been noted, special use permits

are being used by many parks where long-term agricultural use is anticipated. Memoranda of agreement tend to be used in units where the conditions for use are more complex than for special use permits. The agreements are only for five year terms. All the four parks in this study that were using memoranda of agreement were national battlefields or national military parks, but it could not be ascertained whether this was for a reason or was coincidental.

Advantages:

- Not specifically for temporary uses as are special use permits.
- Do not have to be advertised.

Disadvantages:

- The highest bid has to be accepted through this is interpreted in various ways.
- The requirement is seen as an obstacle to the best farmer winning the contract.

Scenario 3: Farms with limited potential for profitable agriculture

3(a) Tracts with no farmstead

Farmers most likely to be interested are local farmers who live near the park and need additional land. Interest may also be shown by non-farming local residents who need land for grazing horses or to make hay. Special use permits or memoranda of agreement can be used. Security of residential tenure is not at issue and long-term agricultural improvements are unlikely to be necessary. In cases where they are, the park may have to share the capital cost. Generally these tracts will be let at a reduced rent reflecting their limited economic viability. In cases where potential profits are very small, rental fees may be waived entirely and letters of authorization used instead of special use permits.

Letters of Authorization

Advantages:

- Revokable where conditions are not met.
- Waiver of fee avoids considerable time and expense for small parcels.
- Agreements are quick and easy to draw up.

Disadvantages:

- Gives the authorizee no security of tenure whatever
- Does not encourage long term commitment or investment

3(b) Tracts with historic farmsteads

Gentleman farmers or part-time farmers with the economic means and the interest to restore buildings are the most appropriate tenants for historic farmsteads. Land and buildings should be leased as a unit on long leases for 19 to 49 years(see 'Historic leasing' under Scenario 1). When farmland is leased, a "site specific agricultural use guide" is required. Park managers must bear in mind the difficulty of anticipating possible future agricultural developments when writing this guide.

3(c) Tracts with non-historic farmsteads

Retired, part-time or hobby farmers without the economic means or interest in historic building preservation would be suitable tenants. Community farming or community supported farms might also be appropriate.

Tracts with non-historic farmsteads should also be leased as a unit with the buildings. Leases may be shorter than for historic properties reflecting less financial commitment for rehabilitation on the part of the lessee. However leases should be as long as possible to promote security of the tenure and long-term investment in the property.

Scenario 4: Landscapes where only an appearance of agriculture is appropriate, practical, or desired, whether or not the farmland has potential for profitable agriculture.

4(a) Tracts without farmsteads

There are three implementation options for managing tracts in non-agricultural use as follows:

National Park Service Staff: the labor for most landscapes managed to mimic agriculture by mowing, grazing, or burning is provided by park staff. In some cases,

volunteer labor is used to assist. This involves the park in owning and maintaining machinery and the administrative load of organizing volunteers.

Contract Labor: Considerable acreage are managed under mowing contracts. If grass is to be mowed, it is preferable that it should be used for hay but in some cases practical considerations such as the timing of cuts to avoid harming wildlife or remoteness of the tracts make this unfeasible.

Special Use Permits: In rare cases (e.g., Delaware Water Gap National Recreation Area) open lands for non-agricultural uses are managed by farmers as part of their agricultural special use permits.

(b) Tracts with farmsteads

Potential tenants for these properties are those who are prepared to bear the expense of managing the land or, if appropriate, who wish to graze horses on the land, in return for living in an historic farmstead. Tenants therefore need have no farming expertise and may be the same target group as in Scenario 5. Land and structures should be let together on long-leases under the historic leasing program. (See 'Historic Leasing' under Scenario 1)

Scenario 5: Farmsteads with no land

Potential tenants who propose adaptive reuse of historic farm buildings as well as rehabilitating the farmhouse should be given preference. In some parks adaptive reuse of farm buildings as self-contained vacation dwellings may be appropriate. Park managers should encourage imaginative proposals for reusing disused buildings as long as rehabilitation can be accomplished without loss of integrity. Potential tenants that propose income-producing uses for historic farm buildings and farmhouse would be eligible for a tax credit for the cost of rehabilitation. However, it should not be a requirement that farmsteads be income-producing as long as potential residential tenants have the commitment and financial means to complete the rehabilitation. Long leases should generally be used. The park manager will have to be careful about drawing up conditions for the use or reuse of buildings. The tenancy of the farmhouse may be made conditional upon keeping farm buildings in

good repair, but this is a difficult condition to enforce where no appropriate adaptive uses for the buildings can be found.

Scenario 6: Living-history farms

The complexity, diversity, and labor intensity of living history farms puts an enormous load on park labor and financial resources. The facility also requires interpreters for demonstrations and participatory events, and park personnel have to be on-call 24 hours for livestock needs. Maintenance crews require considerable expertise in maintaining historic equipment and managers have to have a very broad expertise in farming. In addition managers have to recruit, organize and supervise volunteers to meet the high labor demands of a historic farming system. For these reasons, it is probably advisable for park managers to seek cooperating organizations who would run the farm under either a cooperative agreement or a concession contract.

Cooperative agreements are used as mechanisms for managing living-history farms in cases where the National Park Service does not wish to be directly involved with day-to-day farming operations.

Advantages:

- Products can be sold at fair-market value.
- Avoids National Park Service having to invest in machinery, equipment, livestock, etc.
- A voluntary or non-profit organization may be in a better position to attract volunteers than the National Park Service

Disadvantages:

- The cooperative responsibilities of participants need to be clearly spelled out and formally agreed.

Concession contracts, under the Concessions Policy Act of 1965, historic properties should not be leased for private use if it is "necessary and appropriate for public use and enjoyment."[22] In these cases the property would normally be let under a concession agreement unless the initiative for providing the service is entirely from a potential lessee, in which case the property may be offered under an historic

property lease. Cooperative agreements can be used for historic properties when the park is providing financial assistance to an outside non-federal organization which is using the property with substantial involvement by the park in the conduct of such activities. This would apply to most living-history farms.

STEP 4 STEWARDSHIP AND EVALUATION

The focus of this manual is on the protection and management of resources, which has involved consideration of alternatives for implementation and factors that promote stewardship.

The effectiveness an agricultural management program should be evaluated by considering the following questions:

1. Does the agricultural landscape clarify the significance of the role of agriculture in the culture of the area and the history of the park, and add substance to the interpretative programs of the park?

2. Is the management program effective in preserving the characteristics identified as contributing to the cultural significance of the agricultural landscape, and as important for the understanding and enjoyment of visitors?

3. Does agricultural management avoid any derogating impacts on other park resources, or danger to visitors?

4. Does the program achieve long-term commitment from those working the land and living in historic buildings (preferably the same), so as to minimize the administrative load on the park staff and to achieve cost-effective but sensitive and appropriate management?

5. Does the program involve and serve the local community through promoting continuity of use and occupancy where appropriate, providing opportunities for cooperative management of agricultural resources, and for involvement of local residents in day-to-day management of the park?

In evaluating the agricultural program, it is important to receive input from the advisory committee on a regular basis.

CONCLUSIONS

Agricultural landscapes reflect very clearly what is being produced, the method of production, and the natural limitations of the land. Farming is not at all as it was during the historic period of most parks, and finding appropriate

mechanisms for managing agricultural landscapes, that are practical, cost-effective, and which protect the resource, is difficult. This manual has tried to show how farming has changed so that park managers can assess the compatibility of alternative management scenarios with the preservation of culturally significant landscapes. If management is to be undertaken by farmers, park managers have to be aware not only of the economic constraints under which farmers operate, but also the values and attitudes that attach a farmer to the land. Recognition of both economic factors and personal motivation is a key to finding long-term management solutions to protect and steward culturally significant agricultural landscapes.

Although until quite recently, it was a cliche to say that farming was a way of life, it was absolutely true, but we know that this is no longer so. For centuries the sign of a good farmer was one who knew how to get the most from the soil, but today a successful farmer is one who gets the most from his capital. Managing agricultural resources in the park system is more about managing soil, than it is about managing capital. Although farmers have become pawns in a market economy, there are millions of Americans who mourn the passing of farming as a way of life where, in spite of the daily drudgery, home, work, and play were one and the same. These agrarians are not limited to retired farmers, but include millions of Americans who espouse agrarian values. To protect agricultural resources in the park system, one must find managers who sympathize with the goals of each park. For the service that the farmer performs for the park, a wage is not paid, but the farmer does expect a reward. In most cases the reward includes some profit, but it is clear that other rewards are, in many cases as, or more important. There are thousands of displaced farmers out there who yearn to reside on the land and to farm as they know best.

NOTES

1. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28.
2. Ibid.
3. Not in the case of ethnographic landscapes.
4. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.96.
5. The reader is referred to Chapter Three for an overview of changes in US agriculture.

6. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.94.

7. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28.

8. National Park Service, 1994. *Cultural Resource Management Guideline*. NPS 28, p.8.

9. Natonal Register Bulletin 30

10. National Park Service, 1987. *General Management Plan: Delaware Water Gap National Recreation Area*. p.13.

11. It is preferable that farmsteads that have a historic functional association with the land are leased with that land. It is an advantage to lease buildings and farmland together because only income-producing buildings listed on the National Register are eligible for a tax credit for rehabilitation costs. Although a farm building may not have a specific-income producing function, its use for general purposes on an income-producing farm would make it eligible.

12. National Park Service, 1994. *Cultural Resource Management Guideline.* NPS 28, Chapter10.

13. Ibid., Chapter 9.

14. Ibid.

15. Ibid., p.103.

16. Ibid., p.107.

17. Ibid., p.8.

18. National Park Service, 1991. *Natural Resource Management Guideline*. NPS 77, p.2:11.

19. Ibid.

20. National Park Service, 1982. *Historic Property Leasing Guidelines*. NPS 38.

21. National Park Service, 1986. *Special Park Uses Guidelines*. NPS 53, p.4:3.

22. National Park Service, 1982. *Historic Property Leasing Guidelines*. NPS 38, Chapter16.

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APPENDIX ONE.
RECOMMENDED READINGS IN AMERICAN AGRICULTURAL HISTORY

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APPENDIX TWO.
SELECTED AGRICULTURAL JOURNALS

Agricultural History

Agricultural Historical Society
Univ. of California Press
2120 Berkeley Way
Berkeley CA 94720

American Journal of Alternative Agriculture

Institute for Alternative Agriculture
9200 Edmonston Rd suite 117
Greenbelt MD 20770

Journal of Farm Economics

Rural Sociology

Rural Sociological Society
c/o Patrick C. Jobes, Dept of Sociology
Wilson Hall
Montana State Univ.
Bozeman MT 59717

American Farmland

Magazine of the American Farmland Trust
1920 N Street, NW Suite 400
Washington, DC 20036

APPENDIX THREE.
FARM PERIODICALS

Capper's Farmer, Topeka, Kansas

Farm Journal, Philadelphia, Pennsylvania

The New Farm: magazine of regenerative agriculture, Emmaus, Pennsylvania 18098

No Till Farmer, Birmingham, Alabama 35202

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APPENDIX FOUR. AGRICULTURAL DICTIONARIES

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APPENDIX FIVE. GLOSSARY OF AGRICULTURAL TERMS USED IN THIS MANUAL

Note: *For agricultural terms that are not included in this glossary please refer to one of the agricultural dictionaries listed in Appendix 4.*

Balds: Grass openings on the tops of ridges and mountains, particularly in Appalachia which were used for summer grazing by valley farmers.

Carousel Parlor: A milking parlor in which the cows stand on a slowly rotating carousel while being milked to eliminate unnecessary movement for the milker.

Concentrate Feed: Feed for livestock with a high nutrient bulk ratio; includes grains and pellets.

Contour Tillage: Tillage operations (plowing, discing, harrowing, etc.) that are carried out parallel to the contour to reduce erosion.

Cooperative Agreement: An agreement, in this case between the NPS and other person or persons usually to perform some service. Substantial involvement of the NPS is anticipated.

Dry cow: A cow that is not lactating.

Ensile vt.: To place green fodder in a silo.

Flume: An artificial channel to convey water across a low lying area, or tributary streams.

Fodder: Bulky feed for livestock usually with a low nutrient value.

Free Stalls: Stalls without stanchions usually for dairy cattle in which cattle are free to enter and leave at will. A free-stall barn is usually attached to a loafing yard.

Heifer: A young cow that has not borne its first calf.

Herringbone Parlor: A milking parlor where cows stand in a herringbone arrangement for the convenience of the milker.

Holsteins: The most popular breed of dairy cattle in the United States. (Black and White)

Integrated Rotation: A rotation that includes grazing livestock. All fields that are included in such a rotation are enclosed.

Letter of Agreement: This is an agreement used only (to my knowledge) on the Blue Ridge Parkway which is assumed to be identical to a Letter of Authorization which are generally used to allow the use of park resources for "minor, short-term, non-repetitive and specific activities". (NPS-77, 1991, 3:17)

Loafing Yard: A small yard in which animals (usually dairy cows) are confined when conditions prevent grazing. Usually attached to a free stall barn in which the cows are fed.

Loafing Shed Shelter: A building which grazing animals can access for shelter or during foul weather, containing no stalls.

Memorandum of Agreement: Similar to a memorandum of understanding except that the NPS receives payment from the other party.

Memorandum of Understanding: A neutral agreement between the NPS and another party that is set forth in a document in which both are participants. No funds are obligated.

Milking Parlor: An area in a building to which cows come to be milked.

No Till: A system of seeding a field without cultivating the soil by inserting the seed directly into the undisturbed ground. Because the method does not rely on soil inversion for weed control, weed growth is usually controlled with a pre-emergence herbicide.

Pit Silo: A pit or trench, usually partially below ground into which green fodder is packed and compressed to preserve as silage.

Pole Building, Shed or Barn: A building constructed of treated wooded poles in post holes to which a roof and siding are attached. This type of building is often used for loafing sheds and storage of round hay bales.

Replacement Heifer: A dairy heifer raised to replace older cows when their milk yield declines.

Rotational Farming: Farming that involves rotating crops (and in the case of a fully integrated rotational, grazing livestock) around units of the farm to make best use of resources and to prevent build up of pests and weeds.

Scenic Easements: A less-than-fee interest in the land purchased to protect the scenic quality of property. Interests usually include the right to develop the land for urban use, the right to extract minerals, the right to cut trees. Agricultural development may or may not be included.

Silage: Green fodder, usually with a higher nutrient value than hay, preserved in a silo.

Special Use Permit: A dowment issued by a park superintendent to permit a use (including agriculture) that are not specifically allowed under the legislation or which do not have an approved permitting instrument.

Stanchions: A frame usually of wood or metal that fits loosely around the head of a cow to confine the animal to its stall but allowing the animal to feed from the manger.

Tower Silo: An airtight tower in which green fodder is preserved as silage.