Rice Fields and Section 106

SHPO Guidance for Federal Agencies and Applicants

This document is intended for use by federal and state agencies, plantation managers, and consultants that work with the National Historic Preservation Act, Coastal Zone Management Act, and rice fields. Although the SHPO wrote this document to cover a wide variety of projects, fields, and situations, each project is unique and may not meet all qualifications listed herein. When planning a project in a historic rice field system, early consultation with the SHPO is important and encouraged.

The guidance begins with a brief overview of the history and a description of two types of rice fields, inland and tidal. After the history, the document has definitions of key words; a discussion of Section 106, the National Register of Historic Places, and rice fields; and suggestions for further reading. All sources used in this document are cited in the further reading section.

Overview/History

The physical remains of rice cultivation systems -- the fields, trunks, dikes, and canals -- are significant, but understudied, elements of South Carolina plantations. Rice cultivation transformed the South Carolina Lowcountry landscape and the remnants of these fields are unique cultural resources. There are three general types of rice cultivation - upland, inland and tidal rice fields. The earliest rice was grown in the uplands, in fields. Soon planters learned that planting rice in inland swamps using reservoirs for irrigation was a more productive method, and the utilization of tidal rivers for irrigation surpassed inland planting. Therefore, geography, particularly river systems, played a role in the development of rice, creating distinct regions. The ACE Basin region developed along the Ashepoo, Combahee, and Edisto Rivers. The Georgetown region is located along the PeeDee, Black and Santee Rivers. There are also unique systems along the Cooper and Ashley Rivers and along the Savannah River. These different types of rice fields and their material remains that extended along the South Carolina Coast reflect a long tradition of managing land and water for agricultural, ecological and economic purposes. As such, they are also tangible records of South Carolina's agricultural, economic, and ethnic history.

Figure 1. Rice trunk at Twickenham Plantation.

To understand rice field systems as agricultural features, the fields should be considered in the context of the plantation – planter houses, slave villages, kitchens, and outbuildings. Numerous histories detail the economics of rice production and marketing, trace the sources of agricultural technology, and describe the labor systems used on plantations (see the further reading section). Archaeologists have conducted considerable research on Lowcountry rice plantations demonstrating the significance of these properties. Michael Trinkley and Sarah Fick (2003) provide a good literary review of the early development of rice in South Carolina. But until recently few researchers have investigated the fields and associated features. Andrew Agha, Charlie Philips, and Josh Fletcher (2011) surveyed eleven inland plantations in Berkeley, Charleston, and Dorchester counties to understand how specific inland rice features operated and functioned in a historic inland rice system. These studies help provide the historic context and demonstrate the significance of rice fields. Yet they also demonstrate the research potential and need for preservation. As cultural landscapes, rice fields consist of interconnected systems of land, water, vegetation, and wildlife that differentiate them from other cultural resources. Rice fields have the potential to be primary sources from which researchers can gain an understanding about the Colonial and Antebellum periods.

South Carolina's Inland and Tidal Rice Fields

Inland Rice Fields. The first rice grown in South Carolina was produced through upland cultivation for subsistence (Clowse 1971; Merrens 1977; Porcher 1987). In the upland, or the dry land method of cultivation, rice was planted in fields similar to corn or peas and was dependent upon rainfall for irrigation. Inland rice became the first economically successful form of rice cultivation. In the historical record, clear distinctions are rarely made between inland and tidal rice technologies in South Carolina (e.g., Hilliard 1973:98; Trinkley and Fick 2003:19). But by the early 18th century, most planters were growing rice in freshwater inland swamps, by damming a portion of the swamp to provide a reliable water supply for irrigation. This method, which was not dependent on rainfall and provided higher yields and profits, revolutionized rice cultivation in the coastal southeast. Defining characteristics of inland rice fields include:

- Developed from bottomland hardwood habitats;
- Wetlands can be non-tidal and freshwater;
- Wetlands tend to be linear and ephemeral (i.e., these wetlands naturally flood during winter and dry out during spring and summer months);
- Water to flood rice was dependent on rainfall and water held in "reserves" or natural springs and ponds adjacent to the linear wetland;
- Water movement was unidirectional by gravity flow;
- Typically had banks that were constructed perpendicular to flow of water down hill;
- Typically had a canal, often called a diversion canal in the 20th century, which ran parallel to water flow and between the center of the field and the adjacent uplands; and
- Where diversion canals exist, they may be found on both sides of an inland field.

Despite this knowledge, additional research is necessary to understand how fields were built, who decided where the features were to be placed/positioned within the watershed, and where the technology originated (Africa, Europe, etc.).

Tidal Rice Fields. In the 1730s, a few planters began to experiment with the tidal rice cultivation in which the power of the tidewater rivers was harnessed to irrigate the crop (Chaplin 1992; Doar 1936; Heyward 1937). Some wealthier planters began to embank tidal areas as early as the 1750s, but active expansion into these regions of the coast did not occur until after the end of the Revolutionary War in 1783. The creation of a tidal rice plantation required a substantial capital investment and a tremendous amount of labor. Slaves cleared riverside swamps of timber and undergrowth, surrounded them with earthen levees, and then constructed an intricate system of dams, dikes, floodgates, ditches, and drains. The planters relied on the rise and fall of the tide to irrigate their fields several times during the growing season to encourage rice growth and control weeds and pests.

The entire hydraulic apparatus of a rice plantation required constant maintenance by skilled slaves. African slaves were sought for their technical knowledge and skills in rice cultivation and irrigation, such as clearing swamps, building dikes, and using the tides to irrigate fields (Carney and Porcher 1993; Littlefield 1991). The process was labor intensive and the planters imported more African slaves to meet their growing needs (Carney 2001; Chaplin 1992). Defining characteristics of tidal rice fields include:

- Located in floodplains adjacent to tidal, freshwater sections of rivers in coastal North Carolina, South Carolina, and Georgia;
- Periodically inundated with tidal freshwater;
- The flooding of fields was not limited directly by rainfall (little rainfall allows salt water to migrate further upstream);
- Water is moved throughout fields in a nonlinear fashion (i.e., water may be brought into the rice field complex on one side, passed through a series of impoundments, and then released back into tidal waters at a point that is not necessarily in line with the original inflow point);
- Water may flow in both directions through a water control structure; and
- Rice field trunks are the historic and modern water control structure form.

Rice agriculture was a defining characteristic of South Carolina's Lowcountry society. Rice field systems are tangible records of the skill and labor exerted by enslaved laborers. In addition, the demands of rice agriculture not only influenced society, but it had a direct and long-lasting impact on the physical environment (Shlasko 1997). New research on South Carolina's rice systems could provide new information about Colonial and Antebellum social relationships, engineering, agricultural practices, technology, levels of technology transfer from Africa, and labor management.

After Rice. As a crop, rice was on the decline prior to the Civil War. Rice prices had fallen, and South Carolina farmers were struggling to keep up with Louisiana and Texas rice fields that were able to produce cheaper crops (Heyward 1937). The Civil War devastated most rice plantations, and the loss of slaves as a labor force was the death knoll for rice in South Carolina. Many fields lay fallow and untended until the early part of the 20th century.

At that time, northern investors and landholders became interested in South Carolina's rice plantations as hunting preserves (Cuthbert and Hoffius 2009). Northern men and women purchased large tracts of plantation land from South Carolina farmers and began managing the rice fields to attract waterfowl for hunting. Northerners either rehabilitated and expanded the existing plantation houses on their new land, or built new hunting lodges and cabins for their families and guests. Many of South Carolina's rice fields are used as hunting preserves or ecological preserves today. While many rice fields remain in private hands, other fields are managed by the U.S. Fish and Wildlife Service and the South Carolina Department of Natural Resources for habitat for migratory birds.

Definitions and Key Words

To understand rice fields, terminology is important. These definitions are developed from the historic context *Inland Swamp Rice Context, c. 1690-1783* (Agha et al. 2011) and from modern management practices (Folk 2010). Both perspectives are important for evaluating rice fields as historic properties, since the terms used to discuss rice fields can reflect the time period in which it was used. For example, Agha and co-authors (2011) suggest that researchers adopt the terms "dams," "facing ditch," and "facing embankment" for terminology related to Colonial era inland rice fields. Terms such as "drain" and "canal" imply different kinds of technology more relevant to the antebellum era. Yet it is important to understand modern usage in order to evaluate the types of actions that occur in current rice field management practices.

Avenue. A avenue is used colloquially to refer to a causeway that is the main route into a plantation. It typically begins at a public road and terminates at the "main house." Across the property, the avenue and main house are the pinnacle of landscape design and maintenance. Classically, avenues were flanked by live oak allees, but other species of trees have been used (e.g., American holly, dogwood). See also *causeway.*

Berm. A berm is an area of horizontal grade between the dike base and canal edge. This term is generally used for modern management practices (Folk 2010). The berm, or horizontal area, is of a similar grade to the rest of the rice field and provides stability for the dike. See also *water control structure.*

Bulkhead. A bulkhead is a water control structure that controls the flow of water between the canal and field segments. This term is generally used for modern management practices (Folk 2010). A bulkhead is a series of vertical boards placed behind pilings on either side and on top of a rice field trunk. The primary purpose of a bulkhead is to prevent soil from the dike above and beside a trunk from sliding into the rice field.

Canal. A canal is a waterway constructed for irrigation or water power. As planters adapted the swamps in their plantations into inland rice systems, public canals, or drains, were developed as water control devices to help the inland plantations ensure proper hydrological control as well as a means of easier transportation for their rice crops (McCord 1840:475-588). Canals are shown on late-18th and early-19th-century plats that show inland rice fields. They were pivotal to the way inland swamp agriculture worked. Therefore, there are two main types of canals: one at the perimeter of a rice field and one for transportation. Transportation canals are typically wide enough to allow passage by rice flats. See also *flat, historic property line, water control structure.*

Causeways (roads or avenues). Causeways, or dikes, were developed to help planters and slaves cross lowland areas to reach parts of the plantation property. These crossing points were frequently incorporated over dams and facing embankments. Often called causeways on 18th century plats, they should be identified as a part of the overall inland system (i.e., an upper dam may have also served as a historic roadway across the plantation). These old roadbeds, or avenues, provide a critical role in moving both labor and products around the plantation, between plantations, and getting crops to markets. See also *avenue, dike.*

Dams. Historically, the first element of an inland swamp rice field system is the dam. For inland fields, dams prevented fresh water overflow into the swamp. Generally, a primary dam sat at the bottom, or the lowest part, of the fields, and a second dam, called the upper dam, sat at the top of the swamp. The upper dam served to create a reservoir that formed as water drained down the swamp eventually pooling against the upper dam. After the two main dams were constructed, "higher up in the swamp, smaller dams were built" (Heyward 1937: 12). The sections of land between dams were known as "squares," which were often named by the planter. Therefore, a dam refers to any embankment identified as crossing through the width of a swamp, joining high ground with high ground (Agha et al. 2011). This definition is not used commonly today. See also *squares.*

Dikes. A dike is an embankment for controlling water within the fields. Historically, this was referred to as a facing embankment. The term dike is generally used for modern management practices (Folk 2010). There are a number of types of dikes. For inland rice fields, there are two general types: a diversion canal and dike and cross dikes. A diversion canal runs parallel to waterflow in inland rice fields and is located between the rice field bed and the upland. The canal is located on the upland side of the diversion dike. The exact utility of a diversion dike is unknown. Presumably, it allowed water to pass down stream without having to be passed through each inland rice field bed. In an inland field, a cross dike crosses a large area of a rice field. These are interior dikes, and may run from dike to dike or dike to hill. For tidal rice fields, there are three general types: river, interior, and line dikes. A river dike separates a tidal waterbody from a rice field. An interior dike separates rice fields from other rice fields, interior canals, or upland areas. A line dike is an interior dike that is shared by two plantations. Line dikes occur on plantations such as Cherokee and Rose Hill, Cheeha-Combahee and Paul & Dalton, and Twickenham and Bonny Hall. See also *embankments, water control structure.*

Drain. Drain is a colloquial term used to refer to a linear non-tidal wetland, or canal, that was typically converted to an inland rice field. See also *canal.*

Drop board. A drop board is a horizontal board placed across the trunk body and immediately behind the bulkhead boards. This board is attached to the trunk body but not to the bulkhead. Trunks typically settle for several years after installation. Prior to drop boards, this gap that developed between the trunk deck boards and bulkhead would permit erosion of the dike from the bottom up. This can lead to dike instability and potential failure of the trunk and dike. A drop board travels down with a settling trunk such that the gap that would be created is covered by the drop board. This is a recent innovation in trunk design. See also *bulkhead, trunks, water control structure.*

Embankments. Facing ditches and facing embankments are important elements of an inland swamp field system. After dams were set in place, ditching began. The ditches that provided water from the reservoir to the fields were called "face" ditches. These ditches ran in both the width and length of the swamp and were usually on the edges of swamps framing or "facing" the fields or squares. When the facing ditch was excavated, the soils created an embankment, or a levee. These embankments sat on the inside of the square, with the facing ditch on the outside. For inland fields, these embankments are often in very poor condition.

The facing embankments also had a ditch on the interior or field side; these were usually smaller than the ditch on the outside of the square. The internal facing ditches and embankments further subdivided the larger square into smaller fields. The primary purpose of facing ditches was to get water into or out from the fields and serve as the method of circulating water around the boundaries of a field. When compared to tidal fields, dikes and canals in inland fields can be in very poor shape. See also *facing ditches, quarter ditches, squares.*

Facing ditches. For inland fields, ditching began after dams were set in place. Heyward (1937:13) called the ditches that provided water from the reservoir to the fields "face" ditches. These ditches ran along both the width and length of the swamp. These ditches ran on the edges of swamps framing or "facing" the fields or squares. When the facing ditch was excavated, the soils created an embankment. These embankments sat on the inside of the square, with the facing ditch on the outside. See also e*mbankment.*

Flat. A flat is a barge, typically constructed locally, and used for daily transportation of slaves and rice through the plantation.

Freshet. A hydrological event, particularly the overflowing of a stream, in spring time caused by excessive rains. Freshets could destroy a recently planted crop by inundating an inland or a tidal field at an inappropriate time.

Hill. A seemingly simple term, but one that is used consistently by rice field managers. A hill referrs to the nearest upland ground to the rice field, inland or tidal field. Topography is not great in the low country but the term "hill" refers to the natural ground that is used as a part of impounding an area.

Historic property lines ("bank/ditch/dam the line"). The historic property line is often mistaken for dams or ditches. Like the old causeways, planters often marked their lands by using banks and ditches. Construction of these was similar to that of facing ditches and dams and many period plats note "bank the line," "ditch the line," or "dam the line." Some plantations used a canal between two dikes as the property boundary.

Muzzle. A muzzle is composed of the horizontal and vertical boards that comprise the end of the trunk body. The trunk door creates a seal on the muzzle to prevent waterflow. See also *trunks, water control structure.*

Quarter ditches or quarter drains. Another element of inland and tidal systems was the quarter ditch. Inside of each field were "quarter" ditches, or "the smaller of the ditches [that] ran across the swamp" (Heyward 1937:13). Besides being smaller, quarter ditches were designed to run parallel to the dams, while the facing ditches typically were constructed to run in different directions as needed. Quarter ditches also filled the expanse of the field, and facing ditches did not. The primary purpose of quarter ditches was to allow even-flow flooding of the field so as not to damage the crops. See also *facing ditches.*

Reservoirs/Reserves. A reservoir is a natural or artificial place where water is collected and stored for irrigating land. In some cases, the upper dam held back water to create a reservoir. Natural geography allowed some planters to construct an exterior reservoir out of a natural pond or small wetland lying above and adjacent to an inland rice swamp. But by and large, Colonial era field designers located their reservoirs inside one of their squares or in a portion of unbanked swamp directly adjacent to their fields. Generally, reserves were used in inland fields, but there are examples of a reserve sitting behind a tidal field.

Squares. A square, or a field, is the section of land between dams and bordered by embankments. Internal facing ditches and embankments often further subdivided the larger square into smaller fields. Squares were often named by the planter. See also *dams, embankments.*

Trunks. A trunk is a water control structure. The facing embankments join the dams to create an enclosed field. The dam holding the reservoir would have had a trunk. The trunk in the rice field system served different purposes. Trunks in the dams allowed water to flow into the facing ditches. Trunks were also installed in facing ditch embankments. The facing embankment trunk permitted water to flow from the primary facing ditch on the exterior of the field through the embankment into the smaller ditch on the other side, in the interior of the field. As the water began to flood the field, it would have moved downstream, perpendicular to the dams, circled the field, and then overflowed into the smaller quarter ditches. The quarter ditches were oriented against the flow of water and would have helped to capture the water and make sure the field flooded evenly. Trunks closed when the desired depth of water was realized in each field. After the field was flooded and the rice crop needed to have water moved off, the trunks in the fields were opened and the water moved into the exterior facing ditches, to run down through the swamp.

There are a number of types of trunks. A tidal rice field trunk is a wooden structure used to control passage of water between a tidal waterbody and tidal rice field. The general plan is composed of a wooden box (approximately 32-40' long, a maximum of 5' wide, and 18-24' tall). There are two general forms of tidal rice field trunks: Combahee (or ACE Basin style) and a Georgetown. The major difference between the two is in the angle of the door. In a Combahee trunk, the door is at an angle of 11-15 degrees. This door pivots on a rotating piece called a windlass. A Georgetown trunk door is nearly vertical and the door does not pivot as a Combahee door. Rather the entire door moves in or out depending on the use of the door for flooding or dewatering a rice field.

A diamond gate trunk is a water control structure that was typically placed in a canal. Where a trunk controls water flow between river and field, a diamond gate prevented water flow further down a canal. It was constructed of solid walls and floor where the walls are parallel to waterflow and at the edge of a dike. Four doors pivot off of two posts. Each of these posts were installed vertically and attached to the middle of the wall. Walls were made of tabby or brick. From above, the four doors formed a diamond. To allow water flow, one set of doors was opened. Water flowed through the open doors and pushed the second set of doors open. When the tide receded, water behind the closed doors would cause them to hold closed. Diamond gates had an important function in the rice field. First, they were constructed so that if both sets of doors were opened a flat could pass through. Also, diamond gates were typically installed at the river end of a canal. Many rice fields had a main canal that ran from the river to the hill. This permitted easy water traffic between the river and hill, where the rice mill typically was located. The long canal had dikes on either side and rice fields behind these dikes. For water to reach the field, it first had to pass through the diamond gate, down the canal, through a rice field trunk into the rice field. This double set of water control structures also served in an insurance capacity. Rice matured in August or September, the peak for hurricanes. When rice is harvested, the field must be kept dry. If a hurricane hits during an incoming tide, this can place substantial water force on the river dike. Were a trunk to be placed in a river dike, it could fail and the field (and mature rice) would flood. Instead, the hurricane forced tide water would have to pass through a diamond gate and then a trunk. This double valve setup provided additional insurance against flooding harvest rice.

A plug trunk is an older form of water control structure used primarily in inland fields. Examples suggest this was a hollow log buried in a dike with holes on either end. The downstream hole was at the end of the log and the upstream hole was placed on the dorsal side of the log. The upstream hole was blocked with a conically shaped piece of wood that was lowered into the dorsal hole similar to a cork mechanism. The plug was attached to the end of a vertical pole that was in turn attached to a horizontal piece. The horizontal piece was pushed down and through a lever action it lifts the vertical piece holding the plug. See also *dropboard, flat, muzzle, upright, water control structure, windlass.*

Figure 2. Installation of a new rice trunk at Long Brow Plantation.

Upright. An upright is a vertical board that is attached to the trunk body, and holds the door above the trunk. See also *trunk.*

Water control structure (WCS). A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a water surface elevation or measures water. The practice may be applied as a management component of a rice field to control the stage, discharge, distribution, delivery or direction of water flow. A trunk is a typical water control structure.

Windlass. A windlass is the topmost horizontal piece between the uprights of a trunk. The rotates and vertical boards of the door pass through it. In the past, this piece was made from wood, but today, the piece is more commonly made from galvanized metal.

Existing Historic Contexts/Additional Information

Agha, Andrew, Charles Phillips, and Joshua Fletcher (2011). *Inland Swamp Rice Context, c. 1690-1783.* Mount Pleasant: Brockington and Associates. Available online at: http://nationalregister.sc.gov/SurveyReports/HC08003.pdf

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Linder, Suzanne (1995). *Historical Atlas of the Rice Plantations of the ACE River Basin.* Columbia: South Carolina Department of Archives and History,.

Linder, Suzanne and Marta Thacker. (2001). *Historical Atlas of the Rice Plantations of Georgetown County and the Santee River.* Columbia: South Carolina Department of Archives and History,.

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Trinkley, Michael and Sarah Fick. (2003). *Rice Cultivation, Processing, and Marketing in the Eighteenth Century.* Columbia, SC: Chicora Foundation. Available online at: http://www.chicora.org/historic-contexts.html

Establishing an Undertaking

Section 106 of the National Historic Preservation Act (1966) directs federal agencies to consider historic properties when funding, licensing, or permitting any activities. The Corps of Engineers is required to comply with the provisions of Section 106 for any permitting action, including general permits, Nationwide permits, or individual permits. Any work in wetlands and rice fields that needs a permit from the Corps of Engineers will be subjected to review and consultation under the regulations of Section 106.

In South Carolina, the Office of Ocean and Coastal Resource Management of the Department of Health and Environmental Control (DHEC-OCRM) manages the state's coastal zone program. Under the Coastal Tidelands and Wetlands Act, DHEC-OCRM considers the impacts of permits or other actions in the coast on historic and cultural resources.

The South Carolina Department of Archives and History, State Historic Preservation Office (SHPO) serves as the expert state agency on history, archaeology, and culture to all federal agencies and to DHEC-OCRM.

The Area of Potential Effect (APE)

Section 106 directs federal agencies to consider both direct and indirect effects of their actions on historic properties. Direct effects to rice fields could include earthmoving activities within the fields, permanent drainage of water from the fields, or allowing water to breach dikes and embankments. Indirect effects to rice fields could include activities that change the setting, feeling or association of the fields such as the construction of docks adjacent to or across the river from the fields or development adjacent to or across the river from the fields.

Identification of Historic Properties

Section 106 defines historic properties as those buildings, structures, archaeological sites, objects, or districts that are listed in the National Register of Historic Places (NRHP) or those that are eligible for listing in the National Register. To be eligible for the NRHP, a property must be significant in American history, architecture, archaeology, engineering, or culture, possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one of four criteria. It can be associated with events that have made a significant contribution to the broad patterns of history (Criterion A). It can be associated with the lives of significant persons in the past (Criterion B). It can embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C). It can also yield, or may be likely to yield, information important in prehistory or history (Criterion D).

An intact rice field is an historic property in its own right, but rice fields may also encompass other historic properties, such as archaeological sites associated with activities prior to the rice field. Some rice fields, including plantations along the Pee Dee River, are listed in the National Register. The SHPO considers the majority of rice fields, as long as they retain historic character and integrity, to meet the criteria for listing in the NRHP.

Rice fields are eligible for the NRHP under Criterion A for association with events that have made a significant contribution to the broad pattern of history. Rice fields are associated with 18th, 19th and early 20th century rice farming technology and were a part of South Carolina's early economy. The change in land use from rice farming to hunting and other economic uses are also historically significant. Rice fields are significant under National Register thematic areas of Agriculture, Architecture, Economics, and Ethnic Heritage: Black.

Rice fields are also eligible under Criterion C for association with characteristics of a type of construction. The areas of significance under this criterion include Engineering, Landscape, and Ethnic Heritage: Black as a record of slave labor and farming techniques.

Rice field systems are also eligible under Criterion D for their ability to yield information important in history. The rice fields may be a source of archaeological data that contribute to our understanding of human history. Examples of research questions that could be addressed include, what types of rice were cultivated over time? How did construction techniques or technology change over time? What construction techniques were transferred from Africa?

Key features of rice fields include the dams; embankments and ditches delineating fields; trunks and gates for flooding and draining of fields; smaller internal embankments and ditches; and canals. Historic inland rice fields, water reservoirs, and causeways can also be present. See the Appendix for a checklist useful to determine if an intact rice field is present.

In addition to the fields, many upland buildings, structures, or archaeological sites are associated features of the plantations. These features could include the plantation house, slave cabins, overseer's house, cemeteries, food plots, outbuildings, rice mills, rice barns, hunting lodges, and guest cottages. These features could be standing buildings or structures or archaeological sites.

The documentation, treatment, and ongoing management of rice fields require a comprehensive, multi-disciplinary approach, because as cultural landscapes, rice fields consist of interconnected systems of land, water, vegetation, and wildlife. Research is essential for understanding the integrity of these historic properties. Research should help clarify site boundaries, identify the landscape's historic period(s) of ownership, occupancy, and development, and bring greater understanding of the associations and characteristics that make the landscape significant.

A variety of primary and secondary sources should be used. Primary archival sources can include historic plans, surveys, plats, tax maps, atlases, U.S. Geological Survey maps, soil profiles, aerial photographs, photographs, engravings, paintings, newspapers, journals, construction drawings, specifications, plant lists, nursery catalogs, household records, account books, and personal correspondence. Secondary sources include monographs, published histories, theses, National Register forms, survey data, local preservation plans, historic contexts, and scholarly articles.

Assessment of Effects

For a historic property to be eligible for the NRHP it must have integrity. The NRHP recognizes seven aspects of historic integrity. In determining the effect a proposed project will have on a rice field, the federal agency and the SHPO will consider if the project will affect the rice field's integrity. How the field's intergrity is assessed may vary depending upon the type of field.

Location: The location of rice field features, i.e., berms, canals, and dikes, may have changed from the historic layout. Changes to the locations of these features do not diminish the fields' integrity.

Design: The rice field must have the standard historical design for the type of rice field. For instance, a tidal field should have a boundary embankment, interior embankments, dikes, canals, and trunks.

Materials: The rice field must still use similar historic materials, although improvements in rice trunk technology may be found/ used in the fields.

Workmanship: The construction of the embankments, dikes, canals, and trunks must not change significantly from the 18th-century process of constructing rice fields.

Setting: Inland rice fields must retain the closed characteristic of lowland swamp between two highlands. In contrast, tidal rice fields must retain their open characteristic and views from the fields to the river.

Feeling: Tidal rice fields must retain their open characteristic and views from the fields to the river. Inland rice fields would retain their closed, restrictive feeling since the fields are within a lowland swamp between highlands.

Association: Tidal rice fields must retain their association with the river as well as to the upland plantation area. Associated rice mills, rice processing areas, slave cabins, and other sites must be retained for their association with the rice fields. Inland rice fields should retain their association with the upland plantation site.

In some cases, the existing conditions of the rice fields may be poor, but they continue to maintain their historic character, spatial organization, land patterns, topography, vegetation and water flow. Therefore, integrity differs from existing conditions. Integrity is the authenticity of the landscape's historic identity: it is the physical evidence of its significance. Existing conditions can be defined as the current physical state of the landscape's form, order, features, and materials. Therefore, the integrity of a rice field is based on its extant form, features and materials, including the key features of the rice fields, the embankments and ditches delineating fields, smaller internal embankments and ditches, and canals can be seen on the landscape.

Mitigation of Adverse Effects

If a project is unable to avoid altering the historic integrity of a rice field, mitigation measures will be needed to offset the adverse effect to the historic property. Mitigation measures will be designed based on each project and the extent of the effect, but could include the development of a historic context, the preparation of a history of the plantation and changes in ownership, the development of a website, or the mapping and documentation of the fields with LiDAR (Light Detection and Ranging) or other mapping techniques. LiDAR is a type of non-optical remotely sensed data that is processed through use of commonly available geographical information systems (GIS) software to create maps and images of complex cultural landscapes. LiDAR maps must be accompanied by a historic context and interpretation of the data produced in the mapping.

Another form of mitigation could be the compilation of square names. For rice plantations, many of the fields were referred to by name, or by square names. For example, some squares were identified as: leather breeches, savannah, vineyard reserve, stevens, la frasse, mill pond, or ti ti. Compiling this information with maps, could provide useful historic information about rice fields.

Archaeological research is another way in which adverse effects may be mitigated. Archaeology would be a way to test a hypothesis or hypotheses about rice cultivation, labor management and social relations on plantations, or other processes in the past that bear on important research questions in the understanding of rice field systems, Colonial life, or African influence on rice technology, and field construction.

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Further Reading

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Appendix A: Rice Field System Evaluation Criteria

The SHPO believes that in order for a tidal or inland rice field to meet the criteria for listing in the National Register of Historic Places, they should include all 9 of the following criteria. If the field does not meet one or more of the following criteria, the SHPO may request information regarding this determination.

Inland Rice Fields

1. Is there an identifiable plantation settlement, such as the plantation house, slave cabins, overseer's house, cemeteries, outbuildings, rice mills, rice barns, hunting lodges, or guest cottages near the rice field system or verifiable through research?
2. Can the rice field system contribute to a further understanding of the plantation that contains the system, as well as the plantation's historical development through time?
3. Can the rice system contribute to our understanding of rice planting technology?
4. Is the rice system in a historic swamp or lowland wetland?
5. Can the historic flow of water be identified?
6. Are earthworks, canals, water control structures present?
7. Can ALL of the following features be identified?
    a. Dams
    b. Facing ditches
    c. Facing embankments
8. Does the rice system retain the closed character of a lowland swamp between higher lands?
9. Is the rice system associated with a fresh water source?

Tidal Rice Field

1. Is there an identifiable plantation settlement, such as the plantation house, slave cabins, overseer's house, cemeteries, outbuildings, rice mills, rice barns, hunting lodges, or guest cottages near the rice system or verifiable through research?
2. Can the rice system contribute to a further understanding of the plantation that contains the system, as well as the plantation's historical development through time?
3. Can the rice system contribute to our understanding of rice planting technology?
4. Is the rice system adjacent to a tidal river?
5. Can the historic flow of water through the fields be identified?
6. Are earthworks, canals, water control structures present?
7. Can ALL of the following features be identified?
    a. River dike
    b. Interior dike
    c. Canals
8. Does the rice system retain a feeling of openness and flatness?
9. Is the rice system associated with uplands?