

Natural Resource Management Plan

for the
Charleston County Park
and Recreation Commission



Charleston County, South Carolina

January 2014

Natural Resource Management Plan

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Charleston County Park
and Recreation Commission

CHARLESTON COUNTY, SOUTH CAROLINA

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The Natural Resource Management Plan addresses the diverse management needs of Charleston County Park and Recreation Commission parklands. From top, clockwise: bike trails at Wannamaker County Park, corn crop at Mullet Hall Equestrian Center, and prescribed burning of impoundments at Caw Caw Interpretive Center. (Courtesy: B. Phillips, D. Bowick, and T. Thornton)

This Natural Resource Management Plan (NRMP) was developed to help guide resource maintenance and management decisions for both developed (or “operational”) and undeveloped (or “future”) Charleston County Park and Recreation Commission (CCPRC) properties. Preparation for this document began in 2009, and over the past four years CCPRC’s Planning and Resource Management Division has collaborated with the Parks and Recreation divisions to refine, expand, and practice many of the concepts described herein. With few exceptions, CCPRC had been taking correct management actions long before the development of this NRMP; thus, in some cases this document only helps to reinforce many of the procedures and guidelines already in-place (as noted in the *Introduction*).

An explanation of CCPRC’s planning process is described at-length in *Chapter One*, including background on how CCPRC came to own/lease over 10,000 acres of parkland. This chapter also includes details on our process for collecting baseline information for each property we acquire (from cultural resource surveys to threatened and endangered species surveys), and how we use that information to develop Land Use Plans, which will ultimately help determine how and to what degree we develop future park facilities.

Chapter Two provides strategies for maintaining plant health, especially pertaining to operational park facilities. Major topics in this chapter relate to the effective treatment of invasive/exotic plant species, and the protection and enhancement of sensitive plant communities. *Chapter Three* is also about vegetation, but is most applicable to future park facilities where there tends to be more flexibility in management, as park patrons are not authorized to enter the property unless accompanied by a staffperson. On these properties (and some operational facilities) we employ active vegetation management practices, whereby site conditions are enhanced at a greater scale through habitat restoration, timber harvests, prescribed fire, and agricultural leases.

Chapter Four provides strategies for maintaining safe conditions for wildlife and patrons, especially at operational park facilities. Formalized Wildlife Conflicts Procedures have been a part of CCPRC’s wildlife response plan for years; those procedures are complemented with strategies for further protecting and enhancing wildlife resources. *Chapter Five* notes the need for an active wildlife management program throughout the park system. In such a program, species (native or non-native) found to be destructive to other ecological resources would be managed through trapping and/or hunting. Strategies for implementing wildlife corridors on CCPRC properties are also included in this chapter.

CCPRC properties provide access to an abundance of water resources, including ponds and riparian areas; brackish and freshwater impoundments; wetlands; streams, rivers, and estuaries; salt marsh, and the ocean. The strategies included in *Chapter Six* describe how our agency can take a more active role in maintaining and improving water quality on our properties and throughout our community, while also being more responsible with the water resources that we utilize. *Chapter Seven* similarly notes that the best and most effective way to improve air quality is to reduce our “carbon footprint” by using more fuel efficient vehicles and equipment and building new facilities to higher energy standards. We should continue to encourage the use of alternative transportation by employees and patrons, while also working with state and local transportation agencies to expand alternative transportation facilities throughout our region.

Soil (especially upland soil) is a finite resource in Charleston County, so we must continue to apply best management practices for stormwater management when constructing new facilities. Best management practice minimize opportunity for erosion through the use of structural or planted erosion control devices. These and other

strategies for the responsible management and use of geologic resources are included in *Chapter Eight*.

As the population of Charleston County increases, so does the visitation of our the park system. Impacts related to carrying capacity, encroaching landowners and land uses, sound levels, and light pollution are addressed in *Chapter Nine*.

Lastly, but most importantly, strategies pertaining to the education of staff and patrons are included in *Chapter Ten*. Staff and patron education is noted as a consideration under all previous factors as well, because we understand the need for a well-informed audience. CCPRC interpretive programs see over 30,000 people per year; thus, these programs are one of the most effective ways to communicate our long-term management intentions to the public.

In summary, the objective of this NRMP is not only to offer a series of strategies for effectively implementing resource maintenance and management actions. However, its ultimate objective is to be a reference document for both staff and patrons, so that they are not just aware of the management decisions that we make, but appreciate why those decisions are being made. Due to our increased landholdings we have come to appreciate the need for baseline and annual ecological assessments; active forest, wildlife, and aquatic resource management to improve on baseline conditions, and protocols for protecting and enhancing the threatened, endangered, or rare plants and wildlife already inhabiting our parkland. Other topics covered in this document are diverse, yet most are already engrained in CCPRC culture (and practiced at CCPRC facilities) thanks to a devoted Stewardship Committee and resource-conscious staff.



Great blue heron at James Island County Park (Courtesy: F. Durette)

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Yellow-bellied sliders (Courtesy: F. Durette)



Hooded merganser (Courtesy: F. Durette)

List of Acronyms

ATV	All-terrain Vehicle
BA	Biodiversity Assessment
BMPs	Best Management Practices
BR	Biodiversity Report
CAD	Computer-Aided Drafting/Design
CCPRC	Charleston County Park and Recreation Commission
CRMP	Cultural Resource Management Plan
ESA	Endangered Species Act
GIS	Geographic Information System(s)
GPS	Global Positioning System
GTR	Greentree Reservoir
IPM	Integrated Pest Management
LNT	Leave No Trace
LUP	Land Use Plan
NAAQS	National Ambient Air Quality Standards
NOAA	National Oceanographic and Atmospheric Administration
NPS	National Park Service
NRCS	National Resources Conservation Service
NRI	Natural Resource Inventory
NRMP	Natural Resource Management Plan
NRPA	National Recreation and Park Association
PPE	Personal Protective Equipment
PROST	Parks, Recreation, Open Space and Trails (PROST) Master Plan
RBP	Resource-based Planning
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SC-EPPC	South Carolina Exotic Pest Plant Council
SCFC	South Carolina Forestry Commission
SCORE	South Carolina Oyster Restoration and Enhancement Program
SMZ	Streamside Management Zone
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WCPS	Wildlife Conflicts Procedures

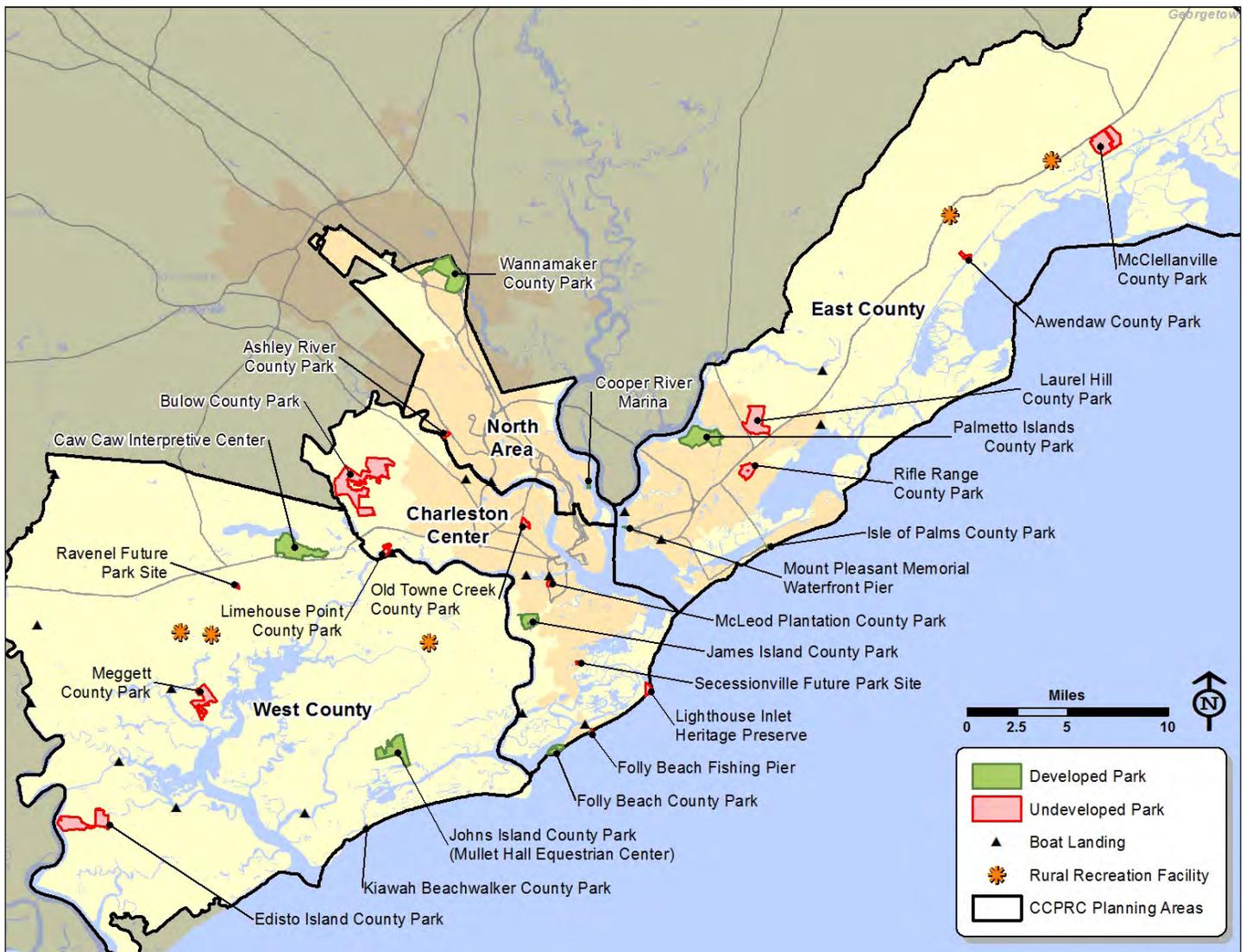


Figure 0-1. Charleston County Park and Recreation Commission facilities distribution map

In 1968, a legislative act created the Charleston County Park and Recreation Commission as a special purpose district for the purpose of providing a regional park system. Then known as the Charleston County Park, Recreation, and Tourism Commission, the agency acquired their first parcel of land in 1969: a 16.2-acre tract in the Town of Ravenel. By 1985, CCPRC owned seven properties totaling approximately 2,400 acres, including two parks that were open to the public..

As more properties were purchased and/or leased, the need for consistent management of natural resources became a higher priority. Natural Resource Interpretation programs were offered starting in 1985, to educate visitors and staff about natural resources within the county park system. In 1992, as a first step towards establishing standardized management procedures, a wildlife conflicts procedure was created to minimize disturbance to park wildlife and to protect the safety of visitors.

At the time this document was written, an additional eight County Parks have opened to the public and an additional 7,678 acres have been purchased or leased, making CCPRC's total landholdings 10,078 acres. Much of this land was acquired between 2006 and 2012 to meet the current and future recreation needs of a growing population.

The purpose of this Natural Resource Management Plan (NRMP) is to establish guidelines for managing natural resources throughout the park system, and to ensure that all parks, developed and undeveloped, are managed consistently and according to adopted strategies. While various park properties have site-specific management plans, establishing these consistent management strategies is necessary to be able to maintain a careful balance between protecting and conserving resources and providing opportunities for recreational use of the parklands.

MISSION STATEMENT

“The Charleston County Park and Recreation Commission will improve the quality of life in Charleston County by offering a diverse system of park facilities, programs, and services.” Furthermore, our mission can be broken down into an acronym:

Provision of park and recreation facilities in an efficient and economical manner.

Acquisition of park lands and open space.

Recreation services and programs to meet county-wide needs.

Knowledge through the interpretation of the county's natural, historical, and cultural resources.

Stewardship through responsible management.

BALANCING RESOURCES

All resources within our parks, from plant, wildlife, water, air, geological, cultural, human, and others affect each other and their collective environment in different ways. With proper management these resources will maintain and enhance the character of the parkland, and thereby improve the quality of life for all residents. One way to protect sensitive resources is to minimize the impact of developed areas and leave areas of undisturbed or natural habitat. Establishing limits and guidelines for development will help to protect these natural areas. Conservation easements and/or deed restrictions placed on many of our newly acquired park properties legally obligate CCPRC to minimize impacts from facility development, while also ensuring that certain resources are protected or managed in perpetuity.

The large quantity of people visiting our parks can have detrimental impacts on natural resources within the parks. Feeding wildlife is a continuing issue that negatively affects both wildlife and patrons. Bottles, cans, and other litter left behind by visitors pollute the landscape and can harm wildlife. Canoes, kayaks, motorized watercraft (with trailers), and other vessels can potentially transport aquatic invasive plant or animal species if they are not cleaned properly. Similarly, hikers and bikers can also transport invasive plants (in the form of seed) on footwear, clothing, or tire treads. Noise pollution can frighten wildlife and detract from the enjoyment of other visitors.

In developed parks CCPRC should monitor resources to ensure that they are not threatened. This could include monthly water testing, soil testing, and proper inventories to make sure that there are no negative effects occurring to the surrounding environment and the park visitors. Or, when negative effects are unavoidable, regular monitoring creates a record of impacts, providing information critical to future mitigation efforts. Our use of natural resources is one of the most direct relationships one has with the park system. It is essential that we balance public enjoyment and respect for these resources.

STEWARDSHIP GUIDELINES

Stewardship Guidelines (Appendix B) were created and adopted by CCPRC to encourage and protect natural and cultural resources, have staff and patrons involved in stewardship, and to be a model of environmental stewardship for Charleston County. The natural and cultural resources of our parks need management plans to provide for active management of those resources, as to minimize their degradation – and in some cases, to ensure that requirements of conservation easements and/or deed restrictions are being met. Properly educated staff will result in more informed decisions being made at all levels, and will thereby encourage them to be better environmental stewards in their everyday duties. Park patrons should also be made aware of CCPRC’s stewardship initiatives, to reinforce our agency’s reputation as a regional leader in environmental responsibility.

DESIGN GUIDELINES

Design Review Process and Guiding Principles (Appendix C) were created and adopted by CCPRC to encourage a sustainable approach to developing park improvements. As improvements are made (e.g., buildings, signage, trails) to park properties, the guiding principles in this document should be consulted to ensure that facilities are sensitive to land resources. This document is implemented through the Design Review process, whereby representatives of all CCPRC divisions (the “Design Review Committee”) review proposed projects for consistency with the guiding principles.

Chapter One: Natural Resource Planning

As of October 2013, land owned or leased by CCPRC (both developed and undeveloped) represents 1.5% of Charleston County's total land area of 587,136 acres. Additionally, this land provides access to public beaches and waterways in some of the most populated areas of the county.

Charleston County is the third most populous county in the State of South Carolina. According to the 2010 census the county had a total population of over 350,000 people. In anticipation of future population increase, CCPRC will be prepared to provide residents with an adequate distribution of parkland. A large push has occurred over the last five years by CCPRC to acquire land to protect streams, wetlands, forests, and other resources for the future enjoyment of Charleston County residents and visitors. Since 2005, approximately 4,857 acres has been purchased by CCPRC (Figures 1-1 and 1-2). Most of these properties will remain undeveloped and with limited access until funding for facility development becomes available.

The conservation of parkland through appropriate management practices has become an integral part of CCPRC's master planning process. Appropriate natural resource planning provides for the protection and enhancement of sensitive natural resources, while also protecting the inherent monetary and intrinsic value of diverse and healthy landscapes. Resource-based planning (RBP) begins with the preparation of a natural resources inventory so that CCPRC can fully understand and appreciate a property in the condition it was acquired. RBP then requires that the maintenance, protection, or manipulation of various resources be prioritized. Plans and regulations then direct development to areas most suited for protection, ensuring minimal impact on priority natural resources during the placement, design, and engineering of new facilities.

1.1 OPEN SPACE PLANNING

As the population of Charleston County increases, CCPRC should anticipate growth and should continue to acquire land in areas most susceptible to development. An Open Space Analysis was conducted in 2002 to determine the parkland acreage needs for Charleston County. In determining the need for additional parkland, CCPRC's goals consisted of protecting Charleston County's natural resource base, acquiring recreational lands to meet the needs of future generations, and providing reasonable access to regional park facilities for all Charleston County residents.

In developing the Open Space Analysis, CCPRC followed the National Park and Recreation Association (NRPA) guidelines for local and regional open space to determine the need for additional parkland. These guidelines define two basic facility types appropriate to CCPRC: regional parks and special use facilities. Regional parks are typically large, passive parks a minimum of 200 acres, and preferably over 500 acres. The NRPA recommends that a park system provide 20 acres of open space per every 1,000 people. These standards do not account for inaccessible wetland areas – only highland acreage. Special use facilities include parks with water access (beach parks, marinas, fishing piers, and boat landings), bikeways, and natural/cultural/historical parks.

The Open Space Analysis (2002-2015) plan determined that an additional 4,675 acres would be needed to meet the regional parkland needs of Charleston County. Areas with greatest need for parkland were East Cooper, West Ashley, and North Charleston. It was identified that additional acres should also be acquired in other underserved parts of the County. Through the Charleston County Half-Cent Sales Tax Greenbelt Program, 4,857 acres were added to the park system between 2006 and 2013. The Open Space Analysis served as a guide during this most recent period of land acquisition.

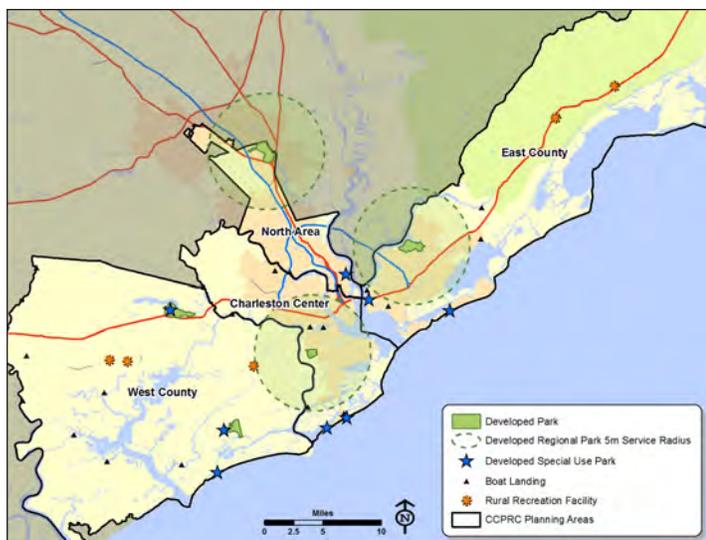


Figure 1-1. CCPRC 5-mile service radius map, pre-2005

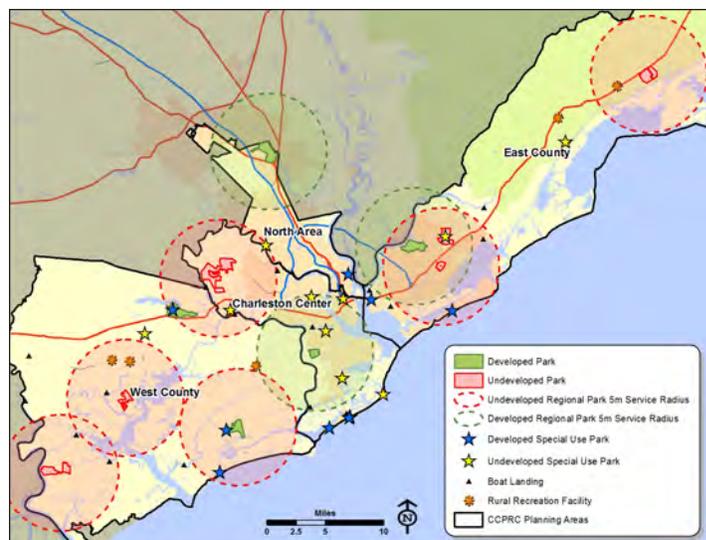


Figure 1-2. CCPRC 5-mile service radius map, post-2005

In 2013, the *Parks, Recreation, Open Space and Trails (PROST) Master Plan* (Executive Summary included in Appendix A) provided an update to the Open Space Analysis 2002-2015. The PROST Plan recommends that priorities and strategies for land acquisition should include identifying parcels adjacent to existing facilities, as well as properties providing opportunities for boat landings, beach access, trail easements, or historical sites.

The Open Space Analysis plan should be updated every ten years to adequately address the needs of the growing population, and should be reflective of emerging trends in recreational park, trail, and greenway conservation and development. This plan will be instrumental in identifying strategic land acquisition priorities as funds they become available.

Strategies:

1. Continue seeking opportunities to acquire additional land that would benefit the park system and Charleston County residents;
2. Identify location, amount, and criteria of lands to be conserved;
3. Identify a funding source for strategic parkland acquisitions;
4. Continue seeking public input on ways to improve the park system;
5. Designate park and private lands which are particularly sensitive to impacts from off-site development, encroachments, and public utility corridors under conservation easements and/or deed restrictions;
6. Identify other appropriate strategies for protecting designated public and private lands; and,
7. Develop master plans for undeveloped properties.

1.2 INVENTORY AND ASSESSMENT

Natural Resource Inventories (NRIs) are designed to contribute to a statement of the condition of park resources and involve both the compilation of existing information and the acquisition of new information. The NRI is used to develop a plan for the protection and management of these resources. An inventory should be constantly

updated as new data is collected in response to management prescriptions and park development and usage. When significant natural resources are identified at a park, a natural resource management plan should be prepared to specify procedures to monitor, maintain, and enhance the quality of those resources.

As part of the NRI, the following studies have or will be conducted on all park properties based on need:

- Boundary, Wetland, Hydrographic, Topographic, and/or Tree Surveys
- Cultural Resource Studies
- Environmental Site Assessments (Phase I)
- Ecological Baseline Assessments and Plant Community Assessments
- Threatened and Endangered Species Surveys (plants and animals)
- Natural Resource Management Plans (including Aquatic and/or Forest Management Plans)
- Land Use Plan
- Conceptual Plan and/or Master Plan

These studies have been conducted on most undeveloped park properties. A current list of completed studies is included in Appendix D. Data gathered for these various studies are often recorded spatially, using either AutoCAD or ArcGIS software. When data are available in raw, electronic format, and transferrable between these two systems, data should be uploaded to CCPRC's Geographic Information System (GIS). When spatial data are only available on print media, this information should be "georeferenced" (i.e. drawn in GIS from scanned media), and added to CCPRC's GIS. Additionally, roads and trails within parks are also to be included CCPRC's GIS. Data collected in the field by CCPRC staff or hired consultants are recorded with the aid of Global Positioning System (GPS) technology and then transferred to the GIS.

Strategies:

1. Document current conditions as part of the NRI so changes over time can be assessed;
2. Develop natural resource protection and land conservation priorities based on data gathered for the NRI;
3. Provide a basis for master planning and planning decisions based on resource protection and land conservation priorities;
4. Determine which parks require a site-specific NRMP;
5. Create and utilize a standard format for site-specific biodiversity reports on properties with significant natural resources;
6. Create a standard format for site-specific natural resource management plans on parklands with significant natural resources;
7. Inventorying vegetation and wildlife on an ongoing basis as part of the NRI;
8. Update archaeological information as new artifacts are; refer to the agency-wide CRMP for management guidance;

9. Identify rare, threatened, or endangered species and ecosystems as part of biodiversity assessments and incorporate in the NRI for purposes of directing management;
10. Continue to create plan maps utilizing AutoCAD and GIS as part of the master planning process;
11. Digitize existing master plans as part of the NRI; and,
12. Continue to educate and promote awareness about Charleston County's natural resources through appearances at local, state, and/or national advocacy group meetings and conferences.

1.3 BIODIVERSITY ASSESSMENTS AND REPORTS

Biodiversity is the variety of all life forms on earth – the different plants, animals, protists, fungi, and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part. Healthy and well-functioning freshwater, terrestrial, and marine ecosystems are important for a productive and healthy environment. Intact and well-connected ecosystems provide habitat for native plants and animals, and provide services such as clean water for drinking, and fertile soils and oceans for production.

Typically following the acquisition of a property it could take several months to several years before a master plan is created. To monitor the evolving biodiversity of our park properties, our agency conducts a baseline biodiversity assessment (BA) and prepares annual biodiversity reports (BRs). Although other park systems use a similar approach for tracking biodiversity, the BR forms used by CCPRC were developed by our agency with specific attention to the ecology of our region (Appendix E). Annual BAs and BRs build on baseline data for the various plant and wildlife communities identified on our properties, and help to track biodiversity improvements resulting from active management tasks (see *Section 3.1: Managing for Biodiversity*). Once master planning and park development begins the property should undergo continual monitoring. Photographs should be taken annually at cardinal directions at specified points (i.e. latitude/longitude) and incorporated into BRs as a means of tracking improvements/changes to the landscape over time.

Strategies:

1. Map vegetative and wildlife zones (i.e. “plant communities” [Figure 1-4]) as they presently exist throughout all the parkland with the use of GPS, GIS, and/or AutoCAD;
2. If several years pass between acquisition and master planning, update data during periodic resource inventories;
3. Use consultants to help conduct field inventories and aid in the creation of the spatial data and maps;
4. Establish and/or maintain buffers around sensitive vegetative communities;
5. Establish and/or maintain buffers around endangered species populations;
6. Educate the public and staff on the rare, threatened and/or endangered ecosystems found within the park system and how they can help preserve them through every day activities;
7. Use information gathered through the BA process to prepare annual BRs; and,
8. Consider information gathered through the BA process in the development of site-specific management plans.

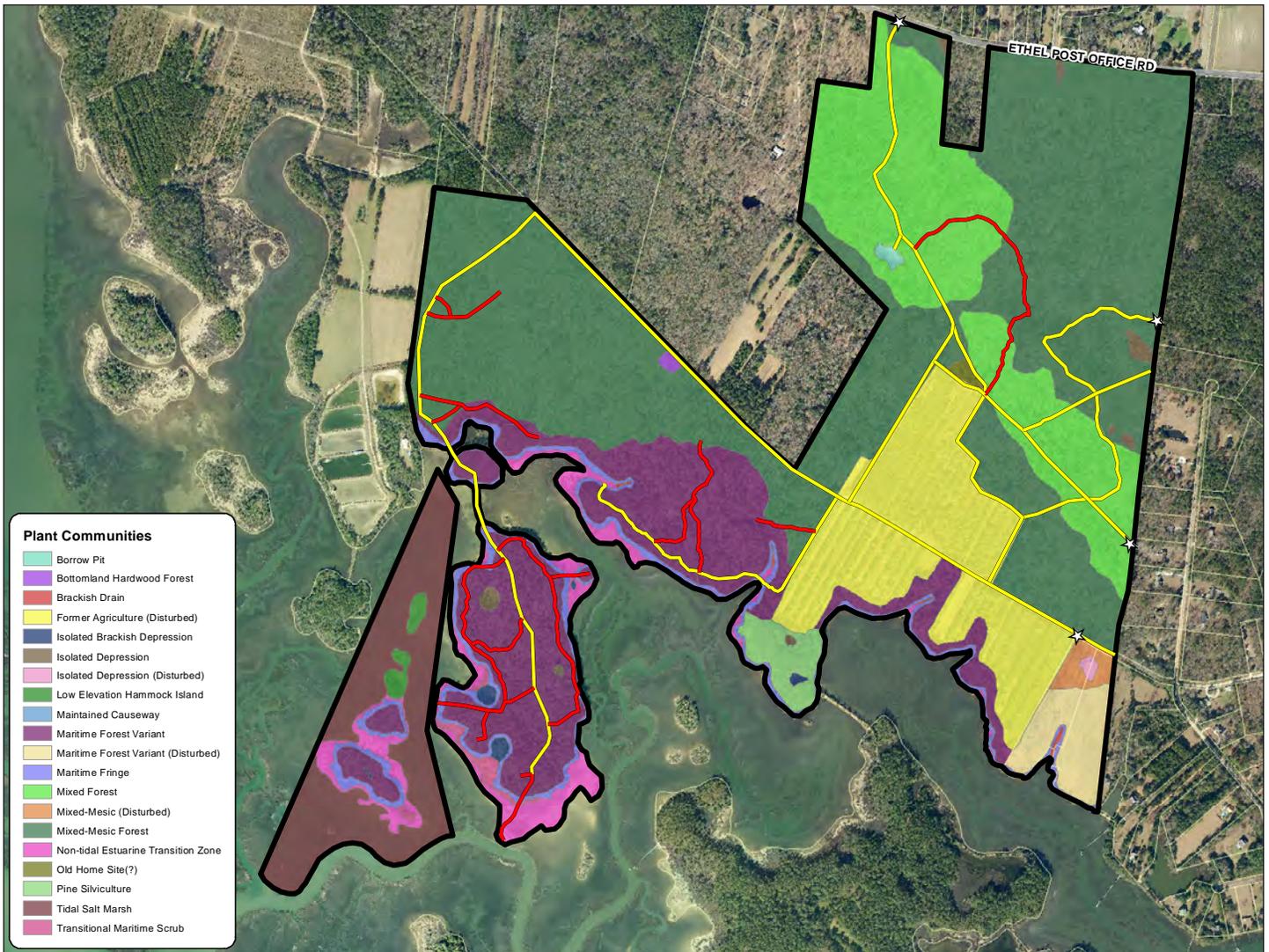


Figure 1-3. Plant communities for Meggett Future Park Site, as determined through field observations

1.4 LAND STEWARDSHIP ZONING DESIGNATIONS

When integrated in GIS, data generated during field studies and other inventories can rapidly communicate areas (or “land stewardship zones”) suitable for active recreation; or alternatively, those in need of further conservation or preservation. Applied to a specific park property these zonal designations formulate a Land Use Plan (LUP) – a preliminary step to the master planning process which helps to define appropriate levels of public access, development, and maintenance. Guidelines for each land stewardship zone will also inform interim and ongoing land management practices at each property or facility. LUPs are to be prepared by CCPRC Planning staff in coordination with other divisions.

Activity Zone

The Activity Zone allows for constructed or developed administrative, maintenance, and recreation sites, structures, and landscapes that accommodate concentrated use by visitors and staff. Examples include park offices, maintenance areas, parking lots, picnic areas, water parks, concessions areas, maintained meadows, and

other recreation areas. These areas are fully accessible to the public and have the most intensive level of use and maintenance.

- These sites are either already developed, or are deemed to be the most suitable for development based on a site assessment.
- Impacts to the site will be minimized to the greatest extent possible, utilizing a sustainable approach to structures and site improvements.
- Historic restoration, rehabilitation, or reconstruction for interpretation or adaptive reuse of historic structures will be undertaken only in conjunction with a historic restoration plan.
- Shorelines and surface waters may be used for recreation with constraints of maintaining public safety and water quality.
- Moderate to high intensity of use and maintenance.

Conservation Zone

The Conservation Zone includes areas having typical yet important natural and cultural resources. Examples include areas having a diversity of wildlife and plant habitats, agricultural resources, and resilient cultural sites and landscapes. These areas have limited accessibility by the public, and have a moderate intensity of use and maintenance. Management actions may include a wide range of potential recreation opportunities that are consistent and compatible with natural resource opportunities and goals. Additional site inventory and analysis may be needed prior to management activities to fully evaluate potential impacts to resources and landscape features.

- Utilize best management practices (BMPs) for forestry and other resource management activities to protect and maintain water quality.
- Provide safe, efficient, and sustainable trails and roads that minimize impact on natural and cultural resources while serving public needs and allowing visitors a variety of outdoor experiences. Moderate intensity of use and maintenance. Generally accommodates lower impact recreational activities.
- Low to moderate intensity of use and maintenance.

Preservation Zone

This zone includes unique and highly sensitive natural or cultural resources that have special management considerations. Examples include rare, threatened, or endangered species habitats; fragile ecosystems; or archeological and cultural sites. Public access to these areas is restricted or permissible with staff supervision. Management objectives emphasize the protection of these resources from adverse impacts.

- Forest management will be utilized only to maintain or enhance resources in/from their current condition.
- Only low-impact, non-motorized, sustainable recreation will be allowed, provided that the activities do not threaten resources.
- Existing trails and roads will be evaluated to ensure compatibility with sensitive resources. New trails or roads may be constructed only after strict evaluation and determination that there are no suitable alternatives.

- Recreational use is lower-intensity and low impact. Maintenance of historic sites or restoration of natural areas may be more substantial. Recreation activities are resource-focused and must be compatible with resource preservation.

Marine Zone

The Marine Zone designation is used for managing shoreline parks with water access, allowing for surface water activities such as swimming and boating. This designation may also help guide maintenance and management decisions within other over/underlying stewardship zones, or where the adjacent shorelines are not necessarily owned by CCPRC. The marine zone designation may also accommodate water recreation at beach areas, piers, marinas, and boat landings where land-based zoning may vary from one section of shoreline to another, but use of surface waters does not.

Significant Feature Overlay

Each of the land stewardship zones may be supplemented with significant feature overlays that identify specific resource features identified through inventory or research, and are formally designated. The overlays will provide more precise management guidance for identified resources and will serve to maintain and protect resources, regardless of the zone in which they occur. For example, an overlay would be useful when protecting a Civil War earthwork within an actively managed forest. Other examples may include temporary zoning considerations such as nesting areas, evolving resources such as partially developed park lands, or historic sites intended for adaptive re-use.

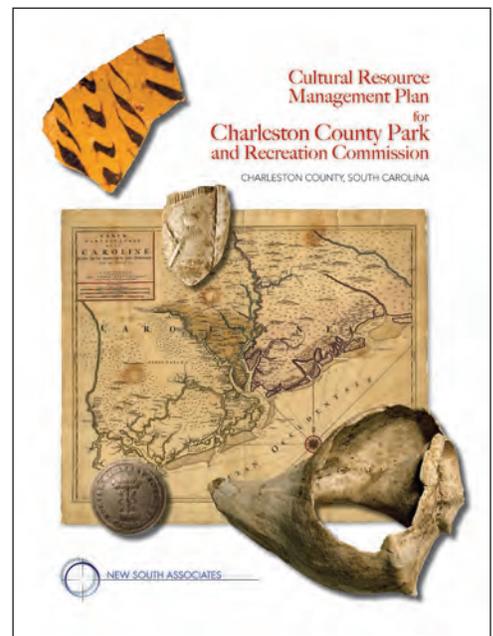
Cultural Resources Overlay

Cultural resources are defined as the collective evidence of past activities and accomplishments of people. Buildings, objects, features, locations, and structures with scientific, historic, and cultural value are all examples of cultural resources. Specifically, these resources may include prehistoric and historic archaeological sites, historic standing structures, bridges, cemeteries, and monuments, among others. Cultural resources are finite and non-renewable resources that once destroyed cannot be returned to their original state.

Impacts to resources eligible for the National Register of Historic Places must be mitigated through excavation, avoidance, or preservation. All federal and most state agencies are required to identify and protect cultural resources on lands that they manage.

Charleston County and the surrounding region have a rich cultural history that greatly influences the historical context of the U.S., and is one of the primary reasons Charleston is recognized as a tourism landmark. It is critical that cultural resources in this region be protected to make future generations aware of past cultures and their societal contributions.

As the population expands and development increases in and around Charleston County, CCPRC should protect and properly care for the unique cultural resources of its properties. Therefore, the Cultural Resource Management



CCPRC Agency-wide Cultural Resource Management Plan, November 2013

Plan (CRMP) should be consulted as the best management guide in the treatment of cultural resources within park boundaries.

Strategies:

1. Inventory natural and cultural resources of all park properties;
2. Include specific management guidelines for significant feature overlays (to be provided by consulting professionals or those groups holding conservation easements on specific properties);
3. Create LUPs reflecting appropriate land stewardship zones based on synthesized resource inventories to designate allowable future uses;
4. Consider LUPs during the development of management plans and master plans for each site;
5. Establish goals for limiting development impacts at each site, as relating to the LUP;
6. Develop planning guidelines to establish a consistent approach to park planning; and,
7. Enhance habitat quality in conservation and preservation zones, as designated by the LUP.

1.5 ASSESSING AND MANAGING ENVIRONMENTAL IMPACTS

Negative impacts can occur to the environment through both naturally occurring and human-created situations. Some natural impacts can be unpredictable (e.g., earthquake, tornado, hurricanes) while others are more readily anticipated (e.g., erosion, rain/flooding). Proper management and monitoring help to mitigate or assess the impacts which may occur. Environmental impacts resulting from human activity can be foreseen and therefore prevented. This includes preventing the unauthorized use of motorized recreational vehicles and the use of improvised trail systems. These activities lead to erosion, pollution, and degradation of the park's natural resources. Park properties and trail systems must be monitored to ensure these types of activities are not present. CCPRC's working relationships with many county, state and federal agencies as well as private non-profit organizations involved with environmental issues have been greatly enhanced over the years. Additional cooperative relationships should be sought to help improve resource protection and management of all CCPRC parkland. Partnerships with agencies like SCDNR have been very important to CCPRC's natural resource management efforts. Their ability to help fund and enter some properties into programs to help strengthen our ability (i.e. dedicating Lighthouse Inlet as a Heritage Preserve) to enforce regulations has been valuable to our conservation efforts. Future work with these groups will be necessary in order to ensure we are protecting our natural resource assets to the best of our ability and preserving them for future generations.

Strategies:

1. Develop environmental (e.g., water, air, soil) monitoring programs and have park or project managers document natural and human-influenced environmental considerations;
2. Continue to foster and expand partnerships with similar organizations to enhance resource management and monitoring capabilities; and,
3. Organize facility-specific "friends" groups to enhance public understanding and support for the agency's resource management programs. Invite active participation in management efforts.

Chapter Two: Vegetation Stewardship

Several diverse habitat types (plant communities) are present within Charleston County, from salt marsh to wetlands; to hardwood and pine forests, with numerous communities intermixed. These communities represent the plant profile of the lower coastal plain in this area. The health of the plant communities within the park system is apparent to both park patrons and wildlife. Almost all locally occurring plant communities are represented on CCPRC park properties, and where soils and hydrology allow we are working to further diversify those plant communities.

Plant surveys should be conducted after properties are purchased to establish baseline data about the site's general ecological condition. Management guidelines should be set based upon observed habitat types (through a biodiversity assessment (BA)) in order to determine the best means of preserving/enhancing rare communities and properly managing the more typical communities present on a property. To both transition and maintain quality habitat it is necessary that CCPRC actively manage park resources. This "active management" ranges in scale from large-scale forestry and agricultural practices (see *Chapter 3: Active Vegetation Management*) to ongoing maintenance at operational park facilities. At all scales the desired outcome is the same: to improve native plant health and diversity, while minimizing our impact on the environment.

2.1 INVASIVE AND EXOTIC SPECIES CONTROL

Invasive species are those species having the ability to outcompete other species in an area outside their natural range, for resources such as nutrients, light, physical space, water, or food. They are typically exotic (i.e. introduced from another country), coming from areas having a climate similar to the one they invade; thus, they usually have no native competition. Therefore, if these species evolved under great competition or predation in their native environment, the new environment may allow them to proliferate quickly. Exotic/Invasive plants may occur as trees, shrubs, vines, grasses, ferns, and forbs. They can be adaptable, aggressive, and have a high reproductive capacity. Some examples of adaptations include long taproots to access deep water sources, or an ability to live on otherwise inhabitable soil types.

In stable ecosystems, equilibrium exists in the utilization of available resources. That equilibrium is upset when an invasive species outcompetes native species. Not only does the presence of an exotic/invasive species reduce resources available to native species, it also reduces the species and abundance of wildlife that ecosystem would otherwise be able to support.

Currently, there are 211 reported exotic aquatic and terrestrial invasive plant species in Charleston County. It is unknown how many of these species are currently present on land owned or leased by CCPRC. However, some prominent examples include Chinese tallow tree (*Sapium sebiferum*), Chinese privet (*Ligustrum sinense*), wisteria (*Wisteria spp.*), common reed (*Phragmites australis*), and water hyacinth (*Eichhornia crassipes*).



Chinese privet (*Ligustrum sinense*) is present at many CCPRC facilities (Source: USDA NRCS Plant Database)

Exotic/Invasive species can ultimately impact recreational opportunities such as fishing, hunting, hiking, wildlife viewing, and water-based recreation. They negatively affect a wide array of environmental attributes that support recreation, including but not limited to water quality and quantity, water navigability, plant and animal diversity, and species abundance. Similarly, invasive plants have the potential to erode forest productivity and manageability, degrading the diversity of the ecosystem within which they reside. Controlling invasive plants is an ongoing responsibility of land ownership, especially for public landowners like CCPRC.

Strategies:

1. Identify and map invasive plant communities as part of the natural resource inventories;
2. Develop or adopt an educational tool for park patrons and volunteers interested in helping CCPRC monitor or manage invasive plant species populations;
3. List the most urgent invasive species control projects and identify the cost for each;
4. Have at least three certified pesticide applicators on staff at all times, including one certified pesticide applicator on Planning and Resource Management staff (South Carolina law requires the pesticide applicator to possess a Category 5 license for aquatic invasive plants);
5. Maintain a current list of staff certified as pesticide applicators or similar, and make available to other CCPRC staff via the Agency’s intranet site;
6. Make staff aware of Early Detection Rapid Response (EDRR) species (Appendix F)
7. Attend workshops yearly to retain and learn new information regarding invasive plant species and control techniques;
8. Develop educational programs; and/or joint programs with SCDNR Aquatic Invasive Species Task Force to make Charleston County residents and CCPRC staff more aware of invasive plant issues; and,
9. Coordinate efforts with South Carolina Exotic Pest Plant Council and other affiliated agencies and organizations.

2.2 CONSERVATION OF THREATENED AND ENDANGERED PLANTS

A species, subspecies, or isolated population is considered endangered that is, or soon may be, in immediate danger of extinction unless the species or its habitat is fully protected. A threatened species, subspecies, or isolated population is one that is likely to become endangered in the near future unless steps are taken to protect and manage the species and/or its habitat. Each species must be listed on the Federal list of threatened and endangered species before it can receive protection under the Endangered Species Act (ESA). The ESA was enacted in 1973

Table 2-1. Designated threatened or endangered plant species known to occur in Charleston County, SC

Common Name	Scientific Name	Federal (ESA) Designation	State Protection
Seabeach Amaranth	<i>Amaranthus pumilus</i>	Threatened	N/A
Canby’s Dropwort	<i>Oxypolis canbyi</i>	Endangered	N/A
Chaffseed	<i>Schwalbea americana</i>	Endangered	N/A

to conserve and establish recovery plans for endangered or threatened species and their associated habitats. Vegetation removal (e.g., for development), plant collecting, and the introduction of exotic/invasive plants and pests are some of the greatest threats to listed species. To preserve and improve plant populations land should be actively managed to provide conditions necessary for their reproduction.

There are 68 vascular plants species listed on SCDNR's 2012 list of Rare, Threatened, and Endangered Species and Communities known to occur in Charleston County – three of which are federally listed as threatened or endangered (Table 2-1) (SCDNR, 2012).

In the case of endangered chaffseed, this species needs frequent, low-intensity fire to prosper. It is extremely rare in all states, but South Carolina has more populations and individuals than any other state. Chaffseed, like many other endangered plants, was native to the longleaf-wiregrass ecosystem which experienced a fire return interval of one to five years. As a result, these plants are fire adapted like the longleaf pine, and thus need fire to thrive. Urban/Suburban development and the resulting fire suppression led their decline; therefore, to reestablish this species and others CCPRC should recreate their original environmental conditions on its properties whenever and wherever practicable.

Strategies:

1. Identify and map threatened and endangered plants and plant communities as part of the NRI;
2. Involve volunteers in the preservation and reestablishment of threatened and endangered plant communities (e.g., clearing weedy plants by hand, herbicide application, disease monitoring, planting native species);
3. Explore options to reestablish plant communities by creating and maintaining a cultivation program, and/or working with partnering agencies and organizations already operating a cultivation program;
4. Explore possibilities of working with agencies and organizations like The Nature Conservancy (TNC), SCDNR, Natural Resource Conservation Service (NRCS), South Carolina Forestry Commission (SCFC), and U.S. Fish and Wildlife Service (USFWS) for assistance and/or grants to help fund reestablishment and/or treatment efforts; and,
5. Implement an educational program to better inform Charleston County residents and CCPRC staff about environmental factors affecting threatened and endangered species.

2.3 CONSERVATION OF RARE AND SIGNIFICANT PLANTS

In Charleston County, approximately 65 plants are considered rare by the SCDNR (i.e. not including federally listed threatened and endangered species). Rare species come in a variety of different categories. There are species which are wide-ranging but are rare throughout their range; species restricted to a very small range; and species which are rare within the state, but more abundant elsewhere. Many species are rare because their natural habitat has either been converted-to or fragmented-by developed land uses. Other species are rare because the natural processes on which they depend have been removed from their habitats (e.g., through fire suppression, wetland drainage).

Strategies:

1. Identify and map all rare and significant plants within CCPRC parkland as part of the NRI;

2. Establish discrete buffer zones around discovered rare plant species; and,
3. Create a best practices management plan for managing the critical areas.

2.4 NATIVE PLANT USAGE

Native (or indigenous) plants are those plant species that existed naturally pre-European settlement. Native plants evolved to live in and among the local climate, soil types, and wildlife. They comprise the fundamental basis for both above-ground and below-ground ecosystems, such that individual species of plants form relationships with soil microorganisms, insects, and animals that are mutually interdependent. Wildlife species evolve with plants; therefore, they use native plant communities as habitat. During different times of the season, these plants will produce the food needed by foraging wildlife species.

Because native plants are adapted to local environmental conditions, incorporating native plants in planting plans and plant replacement projects can reduce long-term maintenance costs by reducing the staff time, irrigation resources, and pesticide and/or fertilizer application normally required to meet park user expectations. For example, native plants have often developed their own defenses against many pests and diseases native to this area. Native plants planted in/on dunes, slopes, and riparian buffers help to minimize erosion potential by using strong, deep rooting systems. Additionally, they will help to filter out sediment that would otherwise have entered the watershed.

Strategies:

1. Consult the Native Plants List for Landscape Use (Appendix G) and plant according to Landscape Maintenance Guidelines for Operational Park Facilities (summarized in *Section 2.9: Landscape Maintenance*; full document in Appendix H);
2. Plant native species to promote healthy native ecosystems throughout all CCPRC parkland;
3. Develop partnerships with groups such as the South Carolina Native Plant Society;
4. When developing master plans for parkland, locate and mark native plants within the construction zone so they may either be sufficiently protected or removed and transplanted elsewhere in the park;
5. Hold native plant information stands with a partnering agency or organization (e.g., on Arbor Day) to educate the public about the benefits of native plants;
6. Educate staff on how to effectively identify healthy native plants for purchase;
7. Educate staff on proper planting and maintenance techniques for ensuring high survivability; and,
8. Transition to native plants as non-native plant species are replaced in landscaped areas.

2.5 REPLACEMENT OF NON-NATIVE PLANTS

Non-native species occur outside of their native range and have been introduced by humans, either intentionally as crops or ornamentals, or by accidental transport via boat, train, or automobile. Some non-native plants are invasive and often lack the population controls from predators, competitors, and diseases that are found in their natural environment (see *Section 2.1: Invasive and Exotic Species Control*).

As non-native plants within park facilities die and/or are in need of replacement, they should be replaced with similar native species whenever practicable. Replacing non-native plants will create a more favorable environment for local wildlife dependent on native plant species, ultimately offering a more enjoyable user experience.

Strategies:

1. Define which non-natives are potentially the most harmful to CCPRC properties using the South Carolina Exotic Pest Plant Council (SC-EPPC) target species list;
2. Where feasible, equip staff and volunteers with GPS units to identify and map non-native plants on CCPRC park properties; incorporate as part of the NRI;
3. Consulting with an agency landscape architect, develop a written plan and schedule for replacing non-native plants in operational parks; and,
4. Work with Area Managers and Park Managers to allocate funding for plant replacement projects.

2.6 DEAD TREE REMOVAL

Dead trees can provide valuable habitat and foraging opportunities for wildlife. Birds benefit from the use of snags, limbs, and logs for perching, foraging, and nesting. Mammals, amphibians, reptiles, and invertebrates seek refuge in natural cavities and dens.

In North America alone, it is common for avian species nest in cavities of dead trees. In our area, eastern bluebirds, American kestrels, and wood ducks are examples of species that rely on cavities in dead wood for successful reproduction. These species need standing dead trees with cavities elevated above ground to protect their young from predators.

Many other species rely upon the microclimates created by decaying wood for their survival. For example, salamanders rely on the security and dampness of soil beneath a rotting log. Small mammals find cover and relief from the hot midday sun in dead limbs and downed wood, while spiders, beetles, worms, and microbes move and feed within the decaying matter. Additionally, fungi and mushrooms flourish on and around logs, breaking down the organic matter to release important nutrients back into the soil.

Dead trees can also have a negative effect if they become a hazard to the park and patrons. Hazardous trees may lean over a structure or have the potential to give way at any moment in an occupied area. Dead trees present a risk to impoundment structures (e.g., dikes and dams), where soil shifts as roots decay. Impoundment structures should therefore be kept free of large, woody vegetation as part of a regular maintenance program, with the exception of mature live oak trees. See *Section 6.4: Brackish and Freshwater Impoundments and Greentree Reservoirs* for more information.

Strategies:

1. If a dead tree presents no hazard to public or structure safety, let it continue to decay naturally;
2. Dead or living trees that present a hazard to public or structure safety should be removed immediately under the guidance of a licensed arborist (Note that removal of a tree containing a nest or den is potentially illegal; in such cases adhere to CCPRC's Wildlife Conflicts Procedures (WCPs) (Appendix I);

3. Acquire local permit(s) for tree removal, as required by local municipal code;
4. Removed dead trees may be reused in a forested area within the park to provide habitat for wildlife, plants, and fungi; and,
5. Inform the public of the value of dead trees so dead trees may achieve greater appreciation.

2.7 EDGE HABITAT FOR WILDLIFE

The term “edge” (or “ecotone”) is used to define the vegetated transitional zone between two different habitat types/ecosystems (Figure 2-1). As the edge is its own transitional habitat, it has the ability to hosts plant and wildlife from both bordering habitat types, as well as some species specifically adapted to the edge itself. “Edge species” are those animals that can successfully straddle this transitional zone, utilizing the resources of both dominant habitat types.

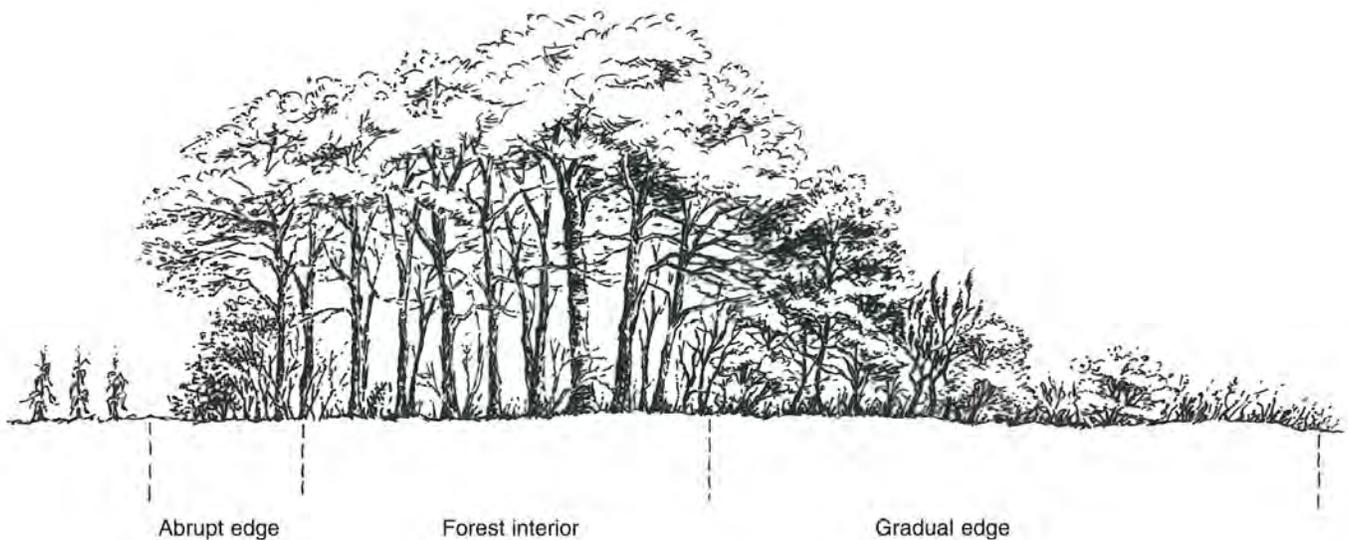


Figure 2-1. The habitat continuum (Source: Hellmund and Smith, 2006)

Due to the variations in light distribution and shading from transitional plant species, an edge typically has its own microclimate, which helps to encourage the development of certain types of fungi and parasites. Edge can provide good habitat for small reptiles, amphibians, mammals, and birds, as well as desirable insect species and highly sensitive or predated species of wildlife. Improving edge habitat throughout the park system would enhance the biodiversity of our facilities, and provide additional wildlife viewing opportunities for the public.

One of the greatest challenges to managing edge habitat is invasive-exotic plant species (e.g., Japanese wisteria, Chinese privet; see *Section 2.1: Invasive and Exotic Species Control*). Park-specific natural resource management plans should provide recommendations for stabilizing and improving quality edge habitat. Park-specific master plans should consider opportunities for maximizing quality edge habitat between developed and managed land uses.

Strategies:

1. Monitor all edge areas looking for previously unobserved species (e.g., exotic/invasive weeds), diseased or unhealthy-looking plants, evidence of pests, and litter;

2. Track significant edge inadequacies in NRI with GPS/GIS, and develop a site-specific edge improvement plan;
3. Enhance diversity of edge areas by planting wildlife food plants to encourage migration between the two dominant cover types on either side of the edge;
4. Inform the public on need to avoid sensitive edge areas, where rare or significant wildlife or plant species are known to occur;
5. Include recommendations for edge improvement in park-specific management plans and master plans; and,
6. During management and master planning configure new/proposed ponds, fields, and stand boundaries to maximize edge.

2.8 LANDSCAPE MAINTENANCE

Several factors are considered in the maintenance of operational park facilities, primarily relating to the health of turf, plants, water, and soil. It is CCPRC's objective to maintain all park facilities with minimal negative impact to the environment. However, the use of chemicals (herbicides, pesticides, and/or fertilizers) is sometimes necessary to improve the quality of certain landscape features and meet customer expectations for our facilities. CCPRC has adopted formalized *Landscape Maintenance Guidelines for Operational Park Facilities* (Appendix H; summarized in Table 2-2).

Strategies:

1. Adhere to CCPRC's Landscape Maintenance Guidelines for Operational Park Facilities;
2. Collaborate with companies to test new materials and systems at developed facilities as part of their research and development program(s); and,
3. Review and revise CCPRC's Landscape Maintenance Guidelines for Operational Park Facilities regularly, to adapt with industry standards for minimal environmental impacts in landscape maintenance practices.

Table 2-2. Summarized Landscape Maintenance Guidelines for Operational Park Facilities

Application	Summary of Treatment	Additional Notes
Chemical Use/ Integrated Pest Management	<p>Integrated Pest Management (IPM) is a method of pest management that considers the life cycles of pests and their interaction with the environment, to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment (USEPA, 2012). Personal protective equipment (PPE) will be worn during all chemical applications, as required per manufacturer’s instructions. All PPE will be inspected prior to use and on a routine basis. Any PPE found to be expired or in any other way unfit to provide the proper protection, will be disposed of properly and replaced with new PPE.</p> <p>Pesticides will be considered carefully, as they have the potential to be harmful to the health of the applicator, park patrons, and the environment. Patrons and wildlife have a high pesticide exposure potential in and around water parks and water features (e.g. splash pads), dog parks, playgrounds, and riparian areas; therefore, alternatives to synthetic fertilizers and pesticides should be identified for these areas. Park staff will not allow any chemical application which is not in accordance of the state licensing requirements.</p>	–
Mulching	<p>Mulching helps to suppress weeds, conserve soil moisture, keep soil cool, and add organics to nutrient-deficient soils. Mulching material in developed landscape areas may include pine straw, cedar mulch, or hardwood mulch.</p>	See detailed mulching instructions in Appendix H.
Plant Removal	<p>Plants may be removed for various reasons. In developed areas some trees may be hazardous due to old age, damage from storms, or death or decay. Only in these instances should a tree be removed. In natural areas these types of trees should be left in their natural state unless they pose a hazard to visitors. During construction of new park structures, if removed plants cannot be reused on-site they should be recycled within the park as wildlife brush piles in highland areas.</p>	–
Planting	<p>Staff will look to local suppliers for purchase of landscape materials. Local and regional nursery stock is adapted to local climate and soil conditions, resulting in a higher survival rate. Within parks, planting areas fall into one of two zones, either “Active” or “Conservation” zones (per <i>Section 1.4: Land Stewardship Zoning Designations</i>). Plant selection varies by land stewardship zoning designation.</p>	See detailed planting instructions in Appendix H.
Pond Care	<p>Ponds, lakes, lagoons, and similar man-made impoundments are managed to maintain safe open water areas for paddling and water-based recreation programs. These water features also hosts a variety of wildlife species either in the water itself, or in riparian areas bordering the feature. To decrease the likelihood of fish kills and increase the overall health of the water, when needed, bubblers/aerators will be used to increase beneficial bacteria, reduce the accumulation of organic matter on the bottom surface, and to maintain the oxygen level of the water. In controlling algal blooms, hydrogen peroxide-based herbicides products are preferable to copper-based products, which have the potential to contaminate the water with heavy metals.</p> <p>Water tests will be conducted annually by a third party to determine if water treatment is necessary. SCDNR will conduct scheduled fish counts to determine the health of fish populations in park water features (fish to be provided by SCDNR at no cost to CCPRC).</p>	–
Pruning	<p>Pruning is typically only necessary in developed landscape areas to stimulate fruit production, promote new growth, and increase the value of trees and shrubs. Pruning in natural areas is to be done where hazard trees those pose a threat to public safety.</p>	See detailed pruning instructions in Appendix H.
Soil Amendment	<p>Material added to soil to provide nutrients for successful plant growth. For example, lime makes soil less acidic; fertilizer (i.e. manure, compost) adds nutrients to depleted plants, and peat and bark help soil to retain more water. Only environmentally friendly amendment products should be used.</p>	–

Application	Summary of Treatment	Additional Notes
Turf Care	Turf is lawn or grasses grown in developed areas within the park. ‘Turf classes’ define the use and maintenance of turf areas. ‘Class A’ (high management) areas are the most actively managed and most used/visible areas. Programs potentially include topdressing, irrigation, aerating, and pre-treatment for insects and diseases (based on a third party soil sample). ‘Class B’ (medium management) areas are managed by weekly mowing, integrated pest management, and organic fertilizers (whenever possible). ‘Class C’ (low management) includes fields, grassed parking areas, or roadsides. Aside from weekly mowing, no additional treatment takes place in these areas. Low management areas should only be maintained if there is an intended management goal; otherwise the area(s) should be enhanced through natural succession or with planted native vegetation.	See detailed turf care instructions in Appendix H.
Watering/ Irrigation	<p>Watering is the key to plant survival. The humid sub-tropical climate in South Carolina can take a toll on many plants. This is particularly important on plants that have been recently planted. Proper watering needs to be maintained until the plant has been fully established. Controlling water management and proper irrigation, the parks can reduce runoff. An irrigation infrastructure should be managed and maintained for high usage areas, such as around park centers. Proper planning for temporary or permanent irrigation should be part of future development or planting.</p> <p>Natural areas do not need this type of water management, as they contain native species which have acclimated to the regions climate. During high drought months, the first course of action should be to water the most valuable species of trees and plants to the park. Turf grass should maintain its regular watering to remain its visual appeal to the visitors.</p>	–
Water Control/ Manipulation	<p>Planning for water usage during the master planning phase of park development can identify opportunities for streamlining irrigation systems and reducing long-term costs. Currently operational facilities should be evaluated through a similar process to identify major sources of accessible fresh water (e.g., ponds, lagoons) that can be connected to irrigation systems. Wells are often used at CCPRC facilities to draw fresh groundwater, but existing systems should be evaluated to determine the cost efficiency of freshwater alternatives.</p> <p>Other ways to conserve water usage is by use of rain barrels, cisterns, and retention ponds. These systems capture stormwater runoff from impervious surfaces which can later be used for landscape irrigation. Depending on the storage structure and the intended use of the water, some level of treatment (e.g., pH) may be necessary to make this water safe for park use.</p> <p>Another way to control water usage is by activating irrigation systems at cooler times of the day. During the hot, humid summer months, water used to irrigate plants may evaporate before it reaches the soil or roots. Therefore, conducting timed irrigation in the mornings and evenings during that time or year may reduce the amount of water evaporated, allowing the plants to access water effectively stored in the soil. Similarly, irrigation is sometimes activated during or after a heavy rain when the soil is already saturated. Timed irrigation systems should have an override setting to prevent this from happening.</p>	–
Weed/ Invasive Species Control	<p>Controlling weeds and invasive plant species is necessary for maintaining quality wildlife habitat, as well as park conditions that remain inviting to park users. Invasive plants should be managed using effective and environmentally friendly herbicides (or manual removal wherever practicable) in both developed and undeveloped areas. The selected method/ chemical should consider the physiology (e.g., germination and senescence cycles) of the undesired plant, as this can influence the effectiveness of the application.</p> <p>Typically the most effective long-term control of invasive species is achieved by using a combination of control methods, reducing site disturbance, and [re]establishing healthy native plant communities. All improvement plans should be phased over several years to account for the resilience of exotic-invasive species. Invasive control efforts should focus on those species and groupings that are: (1) the fastest-growing; (2) the least established but potentially threatening; (3) the most disruptive to functional habitat; and (4) listed noxious weeds with mandated control.</p>	See Invasive and Exotic Species Control strategies in Section 2.1; See the full list of invasive species identified in Charleston County in Appendix H.



Step 1: Identify need for harvest by referring to stand densities measured for Forest Management Plans



Step 2: Harvest trees to create "canopy gaps" approximately .5-acres in-size; skid to log deck and process for delivery to mill



Step 3: Prepare site for planting by applying herbicide to reduce competition for longleaf seedlings



Step 4: Burn (months later) to establish layer of mineral soil for planting and recruitment of herbaceous species



Step 5: Plant seedlings; burn no less than every two years (seedlings may stay in "grass stage" for several years to build root systems before shooting above flame height)



Step 6: Monitor stand progress to achieve the desired outcome (image from ACE Basin NWR)

Figure 3-1. Steps to successful longleaf pine regeneration (as recommended by the Jones Ecological Research Center in Newton, Georgia, and implemented on CCPRC's McClellanville Future Park Site)

Chapter Three: Active Vegetation Management

Active management is the process by which a landscape is altered through prescribed treatments to achieve a desired condition or effect. Many CCPRC park properties will be actively managed on an ongoing basis, at least until the park has been master planned and built. A property will have been extensively surveyed as part of the NRI, and when warranted a park/site-specific natural resource management plan will be prepared. A natural resource management plan may address specific resources like forest management, wildlife management (or threatened/endangered species), or pond/impoundment management; or a plan can address multiple resources in one combined document. Sometimes an extensive management plan is not warranted because a property is limited in size, or because site conditions are being maintained in an as-found state. In such cases a management prescription may as simple as identifying and treating exotic/invasive plant species. CCPRC is capable of managing a task of this scale with its in-house maintenance staff.

The term ‘adaptive management’ describes the practice of prescribing management treatments in response to changing site conditions. Active management and adaptive management are not mutually exclusive; active management is simply adaptive management put in practice.

Desired conditions or effects to be achieved by active/adaptive management would include the following items (addressed in more detail within this chapter):

- Increased overall biodiversity on park properties through adaptive management
- Restored rare and sensitive plant communities through adaptive management
- Maintained or improved soil vitality through active agricultural practices where appropriate
- Improved forest health by reducing stand density, where appropriate (pursuant to a written forest management plan)
- Reduced wildfire risk by prescribed (i.e. controlled) burning of woody fire fuels (pursuant to a written forest management plan)

Site conditions achieved through active/adaptive management should be regularly monitored to ensure management objectives are being met.

3.1 MANAGING FOR BIODIVERSITY

Biodiversity management is an adaptive process that relies on baseline data about site conditions and general biodiversity, towards a goal of improving biodiversity through active management prescriptions. Various management prescriptions are noted throughout this document, but some predominant examples include:

- Thinning densely forested timber stands
- Clearing/Killing exotic/invasive vegetation
- Scarifying/Disking soil surface in preparation for planting
- Planting native plants (all strata) where appropriate
- Use of regular prescribed fire where appropriate

These prescriptions are usually components of a long-range site-specific natural resource management plan (NRMP). NRMPs start with an assessment of the individual resources of a property: forest (timber stands),

fields, wildlife, and ponds, and makes recommendations to improve the health of these resource components, considering the best interests of both our agency and the resource. Managing adaptively means that approaches to managing natural systems are constantly improved and re-assessed based on the latest advice, data, and scientific evidence. The plan will propose a schedule of management tasks, like those described above. The biodiversity assessment and reporting approach described in Section 1.3: Biodiversity Assessments and Reports is the method by which CCPRC both establishes baseline data for a property, and determines the effectiveness of applied management prescriptions. This approach is designed to assess the diversity of the property; to aggregate site conditions with individual species of wildlife and plants. Photographs are taken annually as a means of tracking improvements/changes to the landscape over time. Thus, CCPRC's biodiversity approach involves the regular review of performance indicators and objectives. By continually gathering knowledge of how ecosystems and species function, and the status of current and potential threats such as climate change, management treatments can be adapted accordingly.

Strategies:

1. Continue to monitor and document ecosystems throughout all parkland, incorporating finding in the NRI;
2. Establish and/or maintain buffers around sensitive vegetative communities, while also implementing management tasks to maintain or improve those communities;
3. Establish and/or maintain buffers around endangered species populations, while also implementing management tasks to maintain or improve those communities;
4. Educate the public on how CCPRC is actively working towards reestablishing and enhancing rare, threatened and/or endangered ecosystems within the park system and how they can help preserve them through volunteer programs.

3.2 HABITAT RESTORATION

Restoration is defined as the process of returning an environment to a reference condition. This reference condition is established in one of two ways: (1) by examining the earliest records of the area and discovering what conditions were present at the time of European settlement, and (2) by identifying a "reference site" that exhibits the conditions desired for the restoration site. Examples of restoration include removing material from a filled wetland, reestablishing tidal flow to an impounded marsh, reestablishing natural sinuosity in a straightened river or creek, removing invasive species, and reintroducing fire into landscapes where it has been deliberately excluded. Restoration projects should look at all components of an ecosystem when returning an area to its reference condition.

Strategies:

1. Work with appropriate authorities and/or consultants to prepare formal restoration plans;
2. Incorporate restoration plans in park-specific management plans when possible;
3. Identify areas of most importance for restoration as part of the NRI; and,
4. Seek out grant opportunities to help fund projects (e.g., plantings, prescribed burning)

3.3 MONITORING

Monitoring of park conditions and continually updating the NRI is necessary to ensure the management prescriptions recommended in the park-specific management plans have been effectively implemented. This inventoried data is used to evaluate the vegetation, wildlife, and other natural resources of the parkland. Examples include measuring stream water quality, the distribution of various species of plants in an area, and counting the number of offspring of endangered animals. The data can be used to make assessments of a park's natural resources condition, such as what resources are present, where the resources are distributed, and how much of a resource is present. Data is also used to track changes in resources over time so that corrective management action can be implemented.

Continual monitoring offers a better understanding of what natural resources are on our park properties, and can help assess if a change in resource condition has occurred in a short period of time. For example, invasive species can appear at any time, regardless of how they were introduced. With ongoing monitoring we will better understand their dynamic nature and condition and provide reference points for comparisons with other altered environments. Regular monitoring of properties also communicates to the public that CCPRC maintains and active presence on our properties, which may help deter illegal activities (e.g., motorized vehicle use, unauthorized hunting) that may negatively impact natural resources.

Strategies:

1. Create a monthly visitation schedule for all undeveloped park properties to establish a regular presence on each, and to create an ongoing record of site conditions (to better identify unusual conditions when observed; e.g., trespassing, motorized vehicle tracks);
2. Develop and/or use a standardized agency form for monthly visits (*Strategy 1*);
3. Create a yearly visitation schedule for all park properties to conduct annual "biodiversity assessments" (including photographic documentation of site conditions), to aid in the preparation of annual Biodiversity Reports (see *Section 1.3: Biodiversity Assessments and Reports* and *Section 3.1: Managing for Biodiversity*);
4. Develop and use a standardized agency "Biodiversity Report" form for yearly biodiversity assessments;
5. Educate and enable volunteers to increase monitoring productivity through group activities (e.g., bird counts, plant assessments); and,
6. Collaborate with partnering agencies and organizations (e.g., SCDHEC, SCDNR) and consultants to monitor resource conditions when in-house knowledge is insufficient.

3.4 FORESTRY AND AGRICULTURAL PRACTICES

Forestry and agriculture are directly related to the other sections covered in this chapter, as these are the disciplines through which plant communities are restored and biodiversity is increased. Forestry and agriculture can be considered the mechanical application side of land management, using heavy wheeled or tracked equipment to implement management tasks at a broad scale. Although their principles are similar, agriculture relies on a shorter crop rotation; therefore site disturbance is more frequent. Well managed forests and fields contribute to increased biodiversity and healthier habitat for all flora and fauna, and often have the potential to generate revenue (or at least save money) for the agency.

Forest Management

The science of Forestry is built on similar principles to agriculture, where trees are harvested just prior to natural mortality. Natural mortality can occur at any age. It is simply the product of a tree not having enough of the resources it needs to survive: water, soil nutrients, sunlight/space. The site index of local soils can support relatively fast growth among both pine and hardwood tree species. However, the availability of sunlight becomes limited as a stand of trees becomes overcrowded. This is called the “stem exclusion” stage, whereby individual trees are outcompeted for resources and begin to die. Forest management prescriptions would advise that thinning be scheduled at or before the timber stand reaches a basal area (i.e. density or stocking level) too high to sustain healthy and safe conditions, and before natural mortality occurs. Thinning the stand leads to more rapid growth of the trees that are left in the stand as they expand to fill the new open space surrounding them. This process is repeated two to three times before a stand reaches maturity (Table 3-1).

Table 3-1. Approximate years to specific timber products in coastal South Carolina

Species Type	Timber Product Harvested	Years to Next Harvest
Hardwood	NA (pre-merchantable)	15
	Pulpwood	30
	Sawtimber	50
Pine (most species)	Pulpwood	15
	Chip ‘n’ Saw (yields pulpwood and sawtimber)	25
	Sawtimber	40
Longleaf Pine	Chip ‘n’ Saw	30
	Sawtimber	60

Healthy forests (i.e. those forests having an appropriate basal area for a particular tree species) help to control pest management by limiting the amount of wood available for infestation. Once heavy equipment is removed from a site following a timber harvest it will usually naturally achieve desired site conditions within one to two years, which are then maintained through non-mechanical means (e.g., prescribed fire, herbicide) until the next thinning.

In developing written park-specific forest management plans it is important that both CCPRC and hired consultants (re)familiarize themselves with the agency’s forestry objectives. These are the reasons CCPRC harvests trees:

- Restoration of forests to conditions predating European settlement.
- The restoration of rare, threatened, and endangered plant species/communities.
- The enhancement or restoration of habitat to protect rare, threatened, or endangered wildlife.
- The reintroduction of prescribed fire in all appropriate plant communities and all properties wherever feasible. Recognizing the role of prescribed fire in reducing wildfire risk, restoring native plant communities, and enhancing wildlife habitat.
- Management should focus on a functionality of the ecosystem in its entirety, and how plants, wildlife, and humans are affected by the proposed configuration and desired basal area of planned timber harvests. Wildlife corridors are one example of how a planned harvest can vary densities throughout a timber stand to encourage wildlife migration and diversify plant strata and species, while also creating an interesting setting for park patrons (see *Section 5.4: Creating Wildlife Corridors*).

It is important to note that when the intended goal for a stand is to restore quality forest conditions for plant and wildlife habitat, some intensive logging may need to take place before baseline site conditions can be established. For example, some timber stands on CCPRC properties are in second or third growth hardwood from natural regeneration after a previous harvest. These stands may require more intense thinning to improve overall stand composition – for both age structure and species diversity. Similarly, some properties are in loblolly pine (*Pinus taeda*) monoculture, in either single age (“even-age”) or multiple age (“uneven-age”) classes. Even age loblolly monoculture has the ability to maximize yield of timber products and revenue, but provides less suitable habitat for wildlife, as little else grows there in the way of browse and cover. Although most pine, hardwood, and mixed pine-hardwood timber stands on CCPRC park properties should be converted to uneven-age management, it may be preferable to leave some properties in the even-age structure. The need for even-age management should be determinable only by educational and ecological interests.

Silviculture is a sub-discipline of forestry that considers the conditions required for the regeneration of a species to determine how intensively a stand is harvested. A variety of silvicultural systems may be applied to a stand depending on the desired result of the harvest (Table 3-2).

“Understory cleaning” is not a formal silvicultural term, but is akin to the shelterwood method for uneven-age stands. In this approach overtopped and suppressed trees are removed, and quality understory trees are left to populate the newly formed canopy gaps. As in a shelterwood cut, the amount of available light is adjusted on the ground by removing fewer or more trees. Therefore, undesirable trees that can’t survive in low light conditions are shaded out and excluded from advancing to the next age class. After the new age class is established years later the overstory can be removed or spared depending on the goals of the thinning.

Table 3-2. Methods and stand conditions of typical silvicultural systems

Silvicultural System		General Approach	Intensity of Harvest	Relative Rotation
Even-age	Clearcut	The entire stand is harvested, including both understory and canopy trees. This method is sometimes necessary for reclaiming and regenerating a degraded forest.	Most Intensive	Longest
	Seed Tree	This method removes most canopy trees, leaving approximately five trees per acre to provide a quality seed crop for natural regeneration of the next cohort (age class).	Moderate Intensity	Medium to Long
	Shelterwood	The most practical even-age system for both aesthetic reasons and regeneration of a stand. This cut is designed to recruit a new stand of trees in the understory while retaining mature canopy trees. The density of this cut and the basal area of mature trees left behind are based upon the desired composition of the new stand.	Less	Medium
	Coppice	Relies on reproduction from stump sprouts (not seeds). Restricted to species that sprout vigorously (e.g., oak). Products typically include pulpwood and fuelwood when managed on short rotation.	Most Intensive	Shortest (Typical)
Uneven-age	Trees are selectively harvested to retain a diverse age structure within the stand. Less desirable hardwood species (e.g., sweetgum, maple) and low quality pine and hardwood trees are harvested, leaving high quality seed and mast producers to regenerate the next cohort.	Less to Moderate Intensity	Medium	

Strategies:

1. Develop formal programming materials to educate the public about the benefits of active forest management;
2. Continue working with consultants in creating and updating written forest management plans for specific park properties;
3. CCPRC should consider future park planning needs and forest management needs before initiating timber harvests; communicating long-term agency objectives for facilities to forestry consultants, timber buyers, and loggers through an illustrative and/or GIS-mapped “Harvest Master Plans”, as prepared by the Planning and Resource Management Division (Figure 3-2);
4. Coordinate and attend pre-harvest meetings including CCPRC, CCPRC’s hired forestry consultants, the timber buyer, and the logging crew to discuss the goals of the harvest and desired final conditions;
5. Coordinate timber sales through hired forestry consultants as needed and in accordance with written management plans;
6. Notify respective municipalities when scheduling a timber harvest, providing a general timeframe for the harvest (e.g., forthcoming winter or summer), and also providing updated dates/times as more information becomes available;

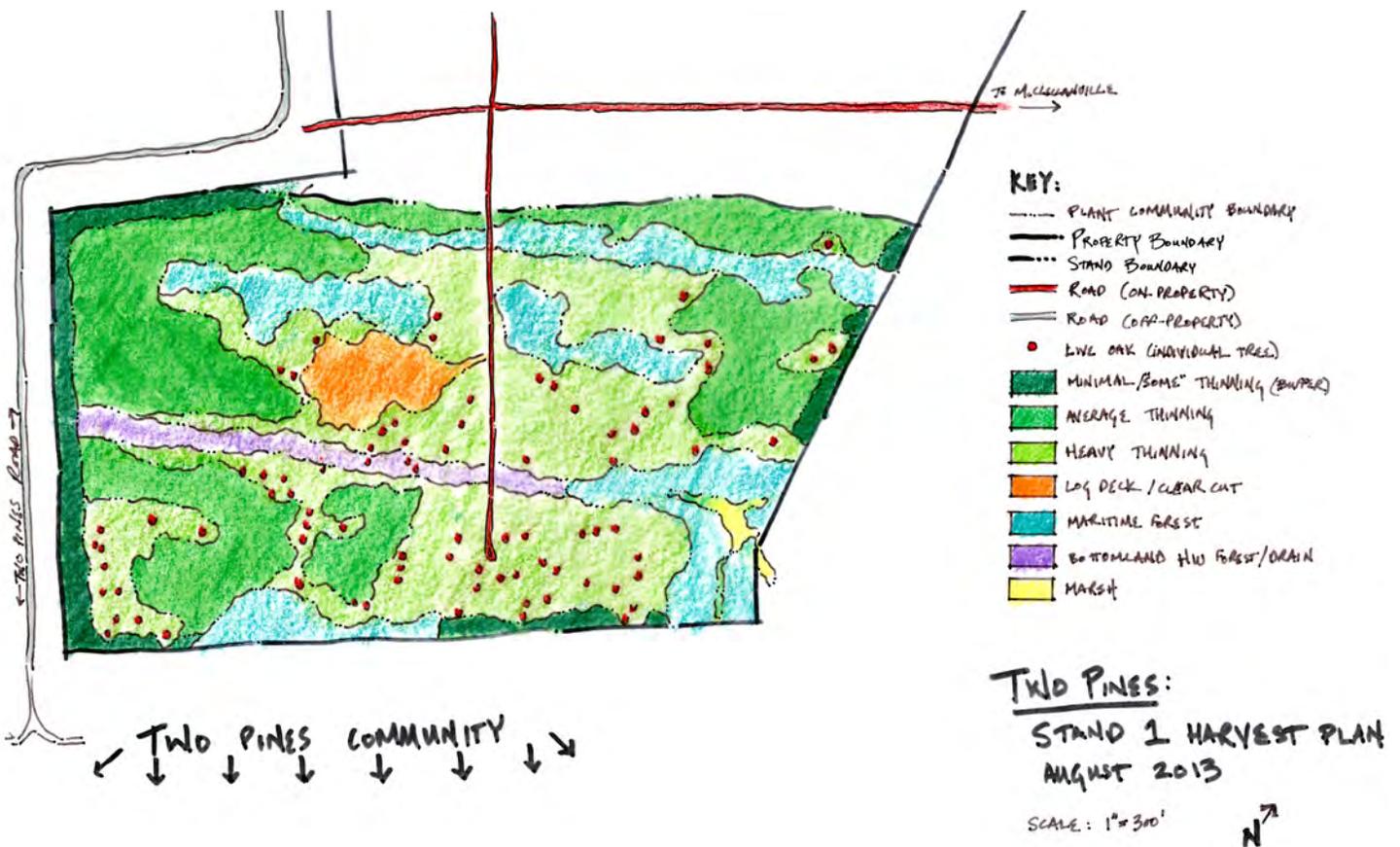


Figure 3-2. A Harvest Master Plan for CCPRC’s McClellanville (“Two Pines”) Future Park Site, Stand 1, illustrating multiple long-term agency for improved access, healthy forest structure, wildlife corridors, and increased biodiversity

7. Upon developing a list of landowners neighboring park properties, notify neighbors when a timber harvest is planned, providing a general timeframe for the harvest (e.g., forthcoming winter or summer), and also providing updated dates/times as more information becomes available;
8. Do not clearcut any areas unless needed for building purposes or for the express purpose of restoring the site to a specific desired condition compatible with the agency-wide goal of increasing biodiversity; and,
9. Adhere to limitations (e.g., buffer requirements) set forth in conservation easements, where applicable.

Fuel Management

Stands on many of the park properties are extremely crowded in the understory, resulting from the exclusion of fire. Fuel management by fire has been practiced for thousands of years to create habitat more suitable for game species, as well as conditions more suitable for human habitation. Fire is therefore an essential component of many coastal South Carolina ecosystems, including longleaf pine. The longleaf-wiregrass ecosystem is one of the United States' most diverse, and is entirely dependent on the regular inclusion of fire for controlling competition.

The standard burn interval in our region is every two to three years, or as-needed according to the density of woody understory shrubs and trees. The desired outcome for a stand's first post-thinning burn is to reduce woody fuels to ash, supplementing nutrients (e.g., nitrogen and phosphorous) in the soil, and ultimately being taken up by desirable understory plant species. In pine and mixed pine-hardwood stands routine burn treatments are conducted more frequently than hardwood stands to maintain herbaceous native understory plant species. The diversity of groundcover in a stand is related to the intensity and frequency of fire, and the new growth promoted by the fire is preferred by wildlife as a food source over older shoots on understory plants that contain less palatable tannins.



Prescribed burn of mixed hardwood-pine stand at Caw Caw Interpretive Center (Courtesy: T. Thornton)

Prescribed burning should always be accompanied by a burn plan that outlines the site-specific conditions needed for a safe and effective fire. Conditions that should be taken into account are the ignition technique, seasonality of burn (i.e. warm or cool), smoke ceiling, humidity, fuel moisture, wind speed, wind direction, and nearby areas potentially impacted by smoke. All of these factors affect the outcome of the planned prescribed burn.

Although burning is always the most preferable fuel treatment for pine and mixed pine-hardwood stands (for its effectiveness and affordability), in highly populated areas it may be necessary to resort to mechanical fuel treatment methods (e.g., mowing, gyrotracking). Instances where mechanical treatment may be necessary include park properties near densely developed residential communities, or those near high traffic roads.

Strategies:

1. Develop formal programming materials to educate the public about the benefits of prescribed fire;

2. Adhere to burn schedules recommended in park-specific management plans, except where climate or site conditions require schedule adjustments;
3. Maintain all existing fire lines;
4. Introduce new properties to prescribed burns as-needed, constructing new fire lines where necessary;
5. Continue to coordinate with consultants and/or SCFC on prescribed burns;
6. Ensure that at least one CCPRC staffperson is present when conducting prescribed burns, should anyone from the public have questions or concerns;
7. Adhere to limitations (e.g., buffer requirements) set forth in conservation easements, where applicable.
8. Notify respective municipalities when prescribed burning is planned, providing a general timeframe for the burn (e.g., forthcoming winter or summer), and also providing updated dates/times as more information becomes available;
9. Upon developing a list of landowners neighboring park properties, notify neighbors when prescribed burning is planned, providing a general timeframe for the burn (e.g., forthcoming winter or summer), and also providing updated dates/times as more information becomes available;
10. Apply for burning-related grants through SCFC, TNC, USFWS, and other agencies and partnering organizations;
11. Where prescribed fire is not a practical fuel management tool in highly populated areas, budget for mechanical fuel treatment at outer perimeter of the park property (at a minimum); and,
12. Work with Charleston County, municipalities, and partnering agencies and organizations to promote “disclosure statements”, to encourage developers to inform residents that prescribed fire is used on nearby park properties.

The Longleaf Pine Ecosystem

Between the early 1700s and early 1900s longleaf pine (*Pinus palustris*) played an important role in the development of the southeastern U.S. The species’ high quality resin was extracted and used by the naval stores industry for pitch, tar, turpentine, and gum products used to seal the hulls of ships. Its range once covered an estimated 90 million acres between Virginia and Texas; however, by the early 1900s the species only inhabited 3% of its original range as a result of overexploitation (LLA, 2013b). In recent years public agencies and private landowners and advocacy groups have worked to restore this rare ecosystem and educate people of its significance.

Though longleaf pine typically grows in sandy, well-drained soils, the recruitment and expansion of longleaf forest is more affected by incompatible adjacent uses (e.g., development pressure) more than physical site conditions. The longleaf pine ecosystem is fire-adapted, requiring low-intensity fire every two to five years. Regular fire serves a variety of purposes in this ecosystem:

- Minimizes understory competition by replacing hot-burning woody fuels with cool-burning herbaceous vegetation (e.g., grasses, legumes).
- Disturbs the soil surface and replenishes soil nutrients to improve germination of desirable and fire-dependent plant species (e.g., pitcher plant, American chaffseed, orchid species).

- Enables longleaf pine seedlings to properly establish themselves within the normal life growth cycle, including: (1) the seed stage; (2) the bottlebrush stage; (3) the sapling stage; (4) the mature stage; and, (5) the old growth stage. Longleaf pine trees can live in excess of 250 years (LLA, 2013a).



Red-cockaded and cavity on mature longleaf pine
(Source: USFWS)

The longleaf pine ecosystem is one of the most biologically diverse ecosystems in North America, and a variety of threatened and endangered plant and wildlife species depend on its unique site conditions (including the regular presence of fire). Threatened and endangered wildlife species of this ecosystem include the red-cockaded woodpecker (*Picoides borealis*) (which almost exclusively dwells in mature longleaf pine trees), gopher tortoise (*Gopherus polyphemus*), flatwoods salamander (*Ambystoma cingulatum*), and eastern indigo snake (*Drymarchon couperi*). CCPRC should continue to support the restoration of this important resource.

Strategies:

1. Where site conditions allow, include recommendations for restoring longleaf pine and corresponding plant communities in park-specific forest management plans;
2. Allow for active management of longleaf pine when master planning new facilities; include considerations for future red-cockaded woodpecker colonies when locating trails, campsites, structures, and other recreation facilities;
3. Implement thinning, planting, and prescribed burning in accordance with park-specific management plans and/or guidance recommended by longleaf pine research and advocacy groups;
4. Maintain an active presence in local and regional longleaf pine consortia;
5. Pursue grants for longleaf pine planting, burning, and groundcover restoration; and,
6. Once loblolly/longleaf stands are of appropriate age to host red-cockaded woodpecker colonies and/or gopher tortoise, consider enrolling those properties in the Safe Harbor Program (see *Section 4.2: Conservation of Threatened and Endangered Species*).

Agriculture

Most of CCPRC's park properties have been utilized for agricultural practices at some point in time. Former farm fields will quickly return to a forested condition if not maintained. Agricultural lease agreements can be issued for park properties, allowing farmers to plant their crops on parkland which in turn helps CCPRC maintain fields in an open condition. The soil can be damaged over time by excessive tillage and irrigation, so it is important that tenants utilize sustainable farming practices. Such practices will help ensure that water usage, soil erosion, and the depletion of soil nutrients are minimized.

Agricultural fields also have the potential to enhance biodiversity. Some crops (e.g., sunflowers) will attract wildlife to the fields themselves, while native flowering and fruiting trees and shrubs planted along field edges will provide both food and cover to desirable animals and insects (see *Section 2.7: Edge Habitat for Wildlife*).

Strategies:

1. Establish wind breaks to minimize soil erosion;
2. Use composted organic matter in lieu of chemical fertilizers to return nutrients to soil;
3. Practice no-till farming when possible;
4. Plant drought tolerant crops and/or utilize low-usage drip irrigation for watering crops;
5. Rotate crops and plant nitrogen-fixing crops such as alfalfa, peanuts, and legumes;
6. Require farm lessees to employ sustainable farming practices on CCPRC parkland;
7. Enhance agricultural field edges with native fruiting and flowing trees (see *Section 2.7: Edge Habitat for Wildlife*); and,
8. Plant crops that provide food for wildlife.



Actively farmed corn and wheat crops at Mullet Hall Equestrian Center (the future Johns Island County Park)
(Courtesy: D. Bowick)

Chapter Four: Wildlife Stewardship

Wildlife is a key indicator of how the natural resources in our parks are being maintained, as it pertains to the quality of habitat being provided. Charleston County is home to a rich diversity of wildlife, including many threatened and endangered species and species of special concern. CCPRC has taken great steps to responsibly manage the wildlife that inhabit both operational and future park properties. It is important that our land management prescriptions continue to consider wildlife populations currently frequenting our facilities through passive migration, as well as those that will one day rely on our facilities when dispersed by encroaching development.

Many of our undeveloped and future park properties have conservation easements which limit what activities and uses can and cannot occur on the property. Additionally, forest management activities have occurred on several properties, enhancing the overall health of the property and stimulating biodiversity. As a by-product of active management some of these properties may increasingly provide habitat for rare, threatened, and/or endangered species; each species having its own unique management requirements. Volunteers are a great monitoring network for our park system, from conducting yearly bird counts to assisting with loggerhead turtle protection along the beaches. These concerned citizens should be used as often as possible as a low cost resource for surveying wildlife populations.

4.1 WILDLIFE CONFLICTS PROCEDURES

CCPRC seeks to protect the native plants and animals of the Charleston County park system; however, our agency is equally concerned for the safety and welfare of park patrons and staff. Some species, although exciting for park users to observe, are potentially hazardous to both humans and the natural environment. Examples of these “nuisance” species include raccoon, Canada geese, alligator, and coyote.

Most nuisance wildlife species are native to our region, and have only become a nuisance because pressure by urban/suburban development left them in close proximity to humans. Thus, in some cases CCPRC facilities are some of the few remaining natural areas left where wildlife can take refuge. Usually animals are frightened by humans, and will often retreat when noticed. However, it is possible that with repeated interaction with humans or other anthropogenic factors (e.g. food, refuse) an animal can become too comfortable with humans, to the point where they present a danger to the safety of park users. Educational and regulatory signage is posted in conspicuous places where conflicts are likely to occur, but some degree of public interaction is unavoidable. For these reasons CCPRC developed *Wildlife Conflicts Procedures* (WCPs) which typically apply in operational park facilities and during programmed activities on undeveloped properties.

When conflicts arise CCPRC attempts to resolve all conflicts through non-lethal means, and will not implement lethal control measures without first consulting a wildlife control professional (typically from SCDNR or U.S. Fish and Wildlife Service [USFWS]). WCPs require that park managers – after securing the area – coordinate with natural history interpretation staff before making any final decisions about removing or killing the animal(s). The manager will attempt to give the animal adequate room to move from the area without being further harassed by the public. Alligators exhibiting unusual behavior are reported to SCDNR by Interpretation staff. Upon witnessing the animal’s behavior SCDNR may determine the alligator to be a “nuisance alligator”, and would recommend taking action to either dispatch or relocate the animal. CCPRC will then authorize SCDNR (or a specialized contractor) to implement this recommendation while notifying the Parks Division Director of the intended action.

Invasive wildlife species are species that present similar hazards as nuisance wildlife, but are not native to the U.S. These species have the potential to be very destructive to the environment and native plant and animal species,

and often require active and aggressive management. See management strategies for invasive wildlife species in *Section 5.1: Invasive and Nuisance Wildlife Control*. CCPRC's official WCPs are included in full in Appendix I.

Strategies:

1. Continually update WCPs as new conflicts with nuisance wildlife emerge;
2. Brief staff and educate the public on the benefits and hazards of wildlife, the importance of responsibly managing wildlife, and methods by which CCPRC protects wildlife and patrons;
3. Include signage at kiosks to educate park users of the potential for conflict between wildlife and humans;
4. Maintain cleared trails to reduce the potential for conflict between users and camouflaged wildlife (e.g., snakes, alligators);
5. Continue to maintain records of all wildlife conflicts and identify trends when appropriate; and,
6. Maintain a relationship(s) with SCDNR and wildlife control companies to confidently assess and act on nuisance wildlife emergencies.

4.2 CONSERVATION OF THREATENED AND ENDANGERED SPECIES

As environmental conditions change so do wildlife populations. The primary reason for population declines and subsequent listing as an endangered or threatened species is the loss of habitat that is critical for survival. Additional causes of declines in endangered species include deaths caused by people collecting or taking a species, natural disasters destroying vital habitat, introduction of non-native (exotic) species and pollution. These factors also contribute to awareness and concerns regarding preservation of open spaces. Threatened and endangered species can attract visitors to CCPRC facilities, while also demonstrating the ecological value of our parks. Preserving these species and enhancing their habitat is a high priority for our agency.



Wood stork at James Island County Park
(Courtesy: F. Durette)

According to the Endangered Species Act of 1973 (ESA) an “endangered species” is a species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is a species which is likely to become endangered in the near future if no action to improve its viability is taken. Threatened and endangered species are identified through a regulatory process and prioritized for listing according to their need for protection. Listed species are guaranteed protection under the ESA, and the list of federally protected species is maintained by the USFWS. USFWS and partnering federal, state, and local agencies help to monitor listed populations. In South Carolina SCDNR also maintains a list of state-protected wildlife (and plant) species.

According to SCDNR, there are a total of 14 state protected, and seven federally protected threatened and endangered wildlife species known to occur in Charleston County (Table 4-1). SCDNR's full list of rare, threatened, and

Table 4-1. Designated threatened or endangered wildlife species known to occur in Charleston County, SC

Common Name	Scientific Name	Federal (ESA) Designation	State Protection
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Endangered
Flatwoods Salamander	<i>Ambystoma cingulatum</i>	Endangered	Threatened
Loggerhead Turtle	<i>Caretta caretta</i>	Threatened	Threatened
Wilson’s Plover	<i>Charadrius wilsonia</i>	–	Threatened
Spotted Turtle	<i>Clemmys guttata</i>	–	Threatened
Rafinesque’s Big-eared Bat	<i>Corynorhinus rafinesquii</i>	–	Endangered
American Swallow-tailed Kite	<i>Elanoides forficatus</i>	Species of Concern	Endangered
Bald Eagle	<i>Haliaeetus leucocephalus</i>	–	Threatened
Wood Stork	<i>Mycteria americana</i>	Endangered	Endangered
Red-cockaded Woodpecker	<i>Picooides borealis</i>	Endangered	Endangered
Dwarf Siren	<i>Pseudobranches striatus</i>	–	Threatened
Gopher Frog	<i>Rana capito</i>	–	Endangered
Least Tern	<i>Sterna antillarum</i>	–	Threatened
Bachman’s Warbler	<i>Vermivora bachmanii</i>	Endangered	Endangered

endangered species known to occur in Charleston County is included in Appendix J. Several of these threatened and endangered species listed have been observed on or around CCPRC parkland. In cases such as the bald eagle, they have made great strides through strict preservation guidelines to be removed from the federal list; however, they remain protected under state law to ensure their continued success. The red-cockaded woodpecker depends almost exclusively on mature longleaf pine, and through the gradual restoration of the longleaf ecosystem in the southeastern U.S. its population will grow. See *Section 3.4: Forestry and Agriculture Practices* for CCPRC’s approach for reestablishing this ecosystem on appropriate park properties.

Strategies:

1. Conduct thorough field reconnaissance and discussions with key staff members to determine whether and where each listed wildlife species (or suitable habitat) exist on parkland;
2. Develop and maintain a current database of wildlife occurring on CCPRC property, including federal, state, or local designations of threatened, endangered, or of special concern;
3. Map best available locations of threatened, endangered, or special concern wildlife species as part of the NRI to identify relationships between species observations and delineated plant communities;
4. Use information gathered on threatened, endangered, or special concern wildlife species (mapped as part of the NRI) to ensure proper protection and management of those species, especially where required by law;
5. Consider both known nesting locations and locations potentially suitable for nesting when master planning new park facilities;
6. Continue to use “turtle-friendly” lighting in coastal areas (e.g., beach parks) to minimize negative impacts to sea turtles;

7. Coordinate with active volunteer programs/networks (e.g., sea turtle rescue programs, Master Naturalists, Native Plants Society) to keep accurate numbers of any wildlife activity on or near CCPRC park properties; and,
8. Educate the public on the agency’s role in preserving threatened and endangered species through interpretive programs and signage.

4.3 CONSERVATION OF RARE AND SIGNIFICANT WILDLIFE

Rare and significant wildlife may be thriving in another area of the country, but have few numbers according to state records. These species can be equally as important as threatened and endangered species. Although some of these species may have been documented once in an area and never seen again, they may still have a limited presence. Rare and significant species need to be monitored to determine the effectiveness of management/protection actions.

According to SCDNR, there are twenty-five rare species of wildlife known to occur within Charleston County (Appendix J). Many rare bird species on SCDNR’s list have been spotted in and over CCPRC’s Caw Caw Interpretive Center. CCPRC should broaden its efforts to conserve rare and significant wildlife by working with partnering agencies and organizations (e.g., Audubon, Carolina Birding Club, National Wildlife Federation) to catalogue species identified within all of Charleston County and the surrounding region, to help draw awareness to the ecological relevance of the South Carolina lowcountry.



Osprey on perch (Courtesy: F. Durette)

Strategies:

1. Locate and document rare and significant species identified within the park system as part of the NRI;
2. Continue to add new species to the agency wildlife database as they are observed;
3. Produce a “watch list” to inform staff and public about species of interest, and invite park users to submit observations via social media and/or web-based mapping applications;
4. Consider both known nesting locations and locations potentially suitable for nesting when master planning new park facilities;
5. Coordinate with active volunteer programs/networks (e.g., sea turtle rescue programs, Master Naturalists) to keep accurate numbers of any wildlife activity on or near CCPRC park properties;
6. Monitor and manage rare and significant wildlife in cooperation with partnering agencies and organizations; and,
7. Work with partnering agencies and organizations to boost “ecotourism” revenue by marketing the variety and quality of local natural resources to conservationists and outdoor enthusiasts.

Chapter Five: Active Wildlife Management

The procedures and recommended strategies described in Chapter 4: Wildlife Stewardship are most applicable when monitoring or reacting to wildlife observations on operational park properties. However, in recent years suburban development has put increasing pressure on wildlife populations, causing them to congregate on what limited undeveloped land remains. Land that will remain undeveloped is either protected in perpetuity by conservation easement or deed restrictions, or is owned by the public as a park. Private lands can readily implement hunting and trapping as wildlife management tool; however, CCPRC's park users may generally consider our properties to be wildlife sanctuaries.

Educational programs, like CCPRC's interpretive programs, should inform park patrons of the need for actively managing all types of wildlife, and that some need more aggressive management than others. In the case of invasive and nuisance wildlife, management may result in trapping, relocation, or death, but every effort should be made (through field interpretation and signage) to make management decisions according to the best interest of the resource. CCPRC has already hired a contractor to manage invasive wild hogs on one property. We are also becoming aware that some of our day parks may benefit from an active deer management program, as evidenced by over-browsed foliage. Sometime the best way to prevent an overpopulated deer herd (and the impact it has on the recruitment of new vegetation) is to manage it on an ongoing basis.

5.1 INVASIVE AND NUISANCE WILDLIFE CONTROL

The standard WCPs do not necessarily readily apply in situations where invasive or nuisance wildlife species are present on a park property. Invasive wildlife species are those species having been introduced to the U.S. that cause harm to the environment, the economy, or human health. Nuisance wildlife species are those species native to the U.S. that may be similarly destructive or menacing to the human environment (e.g., buildings, crops, transportation, pets, livestock, parks). Some invasive and nuisance wildlife species have the potential to spread disease directly or indirectly through their interaction with these factors.

The most prominent example of invasive wildlife currently inhabiting CCPRC property is feral (or wild) hog. This animal is a version of the Eurasian boar, domestic pig, or a cross between the two. It is commonly accepted locally that wild hogs are not supposed to be present in our area. Several of our undeveloped properties are (or soon will be) adjacent to highly developed parts of Charleston County, where hogs and other invasive species can easily encroach on neighboring landowners. Recognizing that our properties have the potential to act as hog 'incubators' or sanctuaries, we formulated a Request for Quotes pursuing eligible hog management contractors, which can be adapted for future invasive (or nuisance) wildlife control needs.

Nuisance species of concern include resident Canada geese (*Branta canadensis*), feral cats, and coyote (*Canis latrans*). Due to a variety of environmental factors (including our year-round temperate climate) resident Canada geese do not migrate like most birds. By their continuous presence they have the potential to contaminate a waterbody with fecal matter; thereby increasing bacteria levels in the waterbody. All properties are susceptible to invasion by feral cat colonies, which have been shown to significantly impact songbird populations, carry disease, and potentially affect human health. Coyotes are a scavenger species, who, if fed by park users (or if accessible to edible trash) in parks may lose their fear of humans, similar to alligators (see *Section 4.1: Wildlife Conflicts Procedures*). Nuisance wildlife may be controlled through trapping, relocation, or death, as recommended by SCDNR (or other qualified professionals) through a written management plan.

To protect both CCPRC and the public, “No Trespassing” signs are posted at all points of ingress/egress before wildlife control contractors initiate work. Signs include text explaining why people should not enter (i.e. nuisance wildlife management; firearms in use). For enforceability it is also critical that property boundaries are marked (see *Section 9.2: Property Line Encroachment*). Contractors, consultants, and CCPRC staff will tag-in and -out throughout the day using a posted map and pushpins so that all parties are aware of where firearms might be actively in use.

Mosquitos have the ability to affect visitors on a daily basis; hence they are one of our park system’s most prominent nuisance insects. Given our temperate climate and that most of our properties hold freshwater on-site (e.g., stormwater, irrigation, or recreation) or have direct access to brackish water these pests are around for most of the year. As mosquitos can be a vector of the West Nile Virus, CCPRC utilizes Charleston County Mosquito Control to routinely spray populated areas of the parks to minimize the annoyance and potential risks of mosquitos.

The parks should be continually monitored for the presence of other invasive and nuisance species. Additionally, CCPRC staff should also learn how to observe degradation of general plant and landscape health, as other smaller pests (e.g., pine beetle, emerald ash borer, Asian longhorn beetle). These species must be identified and treated immediately before they spread throughout our parks and the surrounding landscape.

Feral/Wild Hogs

Feral hogs pose a serious threat to the quality of our parks. This species follows river drainages and eats plant roots by digging them up with its snout. The high reproductive rate (three to eight piglets per litter; two litters per year) of the feral hog coupled with its destructive eating habits and potential for aggressive behavior is a cause for concern in the county park system. They spread rapidly because of their ability to thrive in a wide range of environments, and they have almost no natural predators once they reach about 30 pounds in size (Hamrick et. al, 2012).

When hogs use their snouts to tear up (or “root”) roots and soil they damage a host of other resources. When rooting, hogs are often pursuing hard-mast (e.g., acorns, hickory nuts) and insects buried in the soil. They are also known to eat the roots of longleaf pine seedlings for their carbohydrate-rich roots. The consumption of these resources can add significant delay and expense to CCPRC’s objectives of reestablishing certain plant communities. To control their spread into the park system, reduce the damage caused by their feeding habits and reduce the possibility of an aggressive encounter with a park patron immediate action must be taken against a feral hog population once their presence has been observed. All treatments must be aggressive due to their high reproductive rate.



Wild (Feral) hogs at Bulow Future Park Site

As most hogs are only threatened by humans through trapping, hunting, and getting hit by cars, their mortality rate is highly disproportional to their reproductive rate. Solutions must be both effective and humane. It is common

for some hunters to use dogs to track hogs; however, as agency we ask that hired contractors avoid this approach due to the difficulty of keeping dogs contained on CCPRC property. Other less effective methods that are being developed are fencing, harassment, and contraception. Given these circumstances it is commonly accepted (including by SCDNR) that the most effective way to control hogs is through a combination of trapping and hunting; specifically, “corral” traps and still hunting. Corral traps are large enough to trap an entire family group of hogs, including the sow. These treatments are most readily done through a licensed and insured pest control specialist that is experienced in hunting and trapping hogs.



Evidence of hog “rooting” at Bulow Future Park Site

Strategies:

1. Educate the public as to why invasive and nuisance wildlife can impact the health and safety of park users, and why actively managing these species is in everyone’s best interest;
2. Continue posting educational signage about nuisance and invasive wildlife safety, and the actions necessary for successfully managing nuisance and invasive wildlife;
3. Communicate with SCDNR and other partnering agencies and organizations for recommendations on controlling/managing invasive and nuisance wildlife and pests;
4. Work with CCPRC Interpretation Department to review and update WCPs as-needed;
5. Employ managed hunting and trapping strategies when recommended by SCDNR and other partnering agencies and organizations, with the greatest care taken to manage public safety, concerns, and perception;
6. Continue with active hog management efforts on undeveloped properties;
7. Revise procurement procedures and documents as necessary when addressing invasive or nuisance wildlife species issues; and,
8. Consider ongoing invasive and nuisance wildlife management needs when master planning new facilities.

5.2 MANAGING NATIVE WILDLIFE

A developing landscape can result in wildlife being displaced from their native contiguous habitat to fragmented pieces of habitat. CCPRC properties are predictable and appropriate recipients of displaced wildlife. However, a patch of suitable habitat (such as a park) can quickly become degraded by overuse. White-tailed deer are the best and most common example of a species whose environmental impacts are often unknown or ignored. The carrying capacity of an area for a particular species (i.e. how many individuals an area can healthfully support) is based upon the amount of available habitat. Therefore, a species can be “overpopulated” even if their overall population total is low. When available habitat cannot adequately support a species the species may become

afflicted by disease, conflict with vehicles may increase, and recruitment of desirable vegetation is suppressed by overbrowsing. In such cases, it is best that the overpopulated species be managed through an active hunting/trapping program.

CCPRC's most affected properties are those that occur within developed areas (e.g., most day parks). Therefore, we will look to similar park systems for examples of their management programs, understanding that these programs are common throughout the country, particularly for addressing deer overpopulation. A typical program is one that notifies users well in advance that a facility will be closed for deer management for a specific number of hours on specific days during deer season. Educational information can be included with press releases and/or on signage at the facility.

SCDNR regularly partners with "wounded warrior" groups, where Veterans with disabilities are invited to hunt while assisted by a trained volunteer or SCDNR staff person. Because CCPRC facilities are highly accessible (by location and infrastructure), they are optimal for this application. Similarly, SCDNR also has its "Take One, Make One" program, whereby trained volunteers or SCDNR staff people introduce novice hunters (children and adults) to the sport. CCPRC facilities would also work well for this application. Both SCDNR programs offer an opportunity to publicize CCPRC as being a responsible steward of our properties, while minimally impacting park use and scheduling. Most experts agree that the best time to manage deer (or other wildlife species) is before they become overpopulated. Several CCPRC facilities within developed areas should have deer management programs initiated immediately; other properties that will soon be fragmented by development should also have programs initiated (all pending written management plans). These are our most urgent needs for actively managing native wildlife.

In less developed (still rural) parts of Charleston County CCPRC wish to enroll in SCDNR's "Wildlife Management Area" (WMA) program. SCDNR financially compensates landowners for enrolling in the WMA program, which makes a property accessible to hunters. Landowners can apply certain restrictions to the use of the property, such as limiting hunting to bow only, or limiting hunter access to certain days of the week. If desired, public landowners enrolled in the WMA program can retain access for passive use by the public, provided that they are made aware that the property is actively enrolled in the WMA program.

Strategies:

1. Invite SCDNR (or hire private consultants) to prepare objective wildlife management plans for both developed (first priority) and undeveloped (second priority) facilities;
2. Educate staff and patrons as to the importance of maintaining healthy wildlife populations and the procedures necessary to effectively implement management recommendations;
3. Accommodate SCDNR "wounded warrior" and/or "Take One, Make One" programs at developed and/or undeveloped park facilities; and,
4. Consider enrolling undeveloped CCPRC properties in SCDNR's WMA program.

5.3 REINTRODUCTION OF NATIVE WILDLIFE

Reintroduction of native wildlife is the deliberate release of species into the wild, from captivity or relocated from other areas where the species survives. It usually involves species that are endangered or locally extinct. Reasons

for reintroduction include the restoration of ecosystem balance through the introduction of extirpated species, to bolster an existing wildlife population by increasing numbers, and/or to increase the genetic viability of a species by diversifying the available gene pool.

Suitable habitat must be available to a species before it can be reintroduced. Environmental changes (e.g., altered weather patterns, modification of forest type, reduction in water levels, human development) can impact the effectiveness of a reintroduction program. For species not having been present in their historical range for an extended period of time, reasons for their original extirpation from the range must be identified and corrected at reintroduction site(s). Reintroductions must be approved in-writing by the Executive Director on a case-by-case basis. As of May 2008 only the South Carolina Aquarium has received this authorization.

Strategies:

1. Identify wildlife species needing reintroduction by working with SCDNR, USFWS, and other partnering agencies and organizations;
2. Investigate successful reintroduction programs around the southeast;
3. Identify CCPRC properties potentially appropriate for reintroduction of selected species, and consider the positive and negative effects of reintroduction on each park property;
4. Manage identified properties in preparation of the select species' reintroduction, and ensure that ongoing management prescriptions will continue to accommodate the species;
5. Pursue grant opportunities through SCDNR, USFWS and other partnering agencies and organizations, to help fund reintroduction efforts (e.g., ongoing management prescriptions, interpretive signage); and,
6. Work with Interpretation Department to publicize and develop formal educational programs to inform the public about the reintroduction program.

5.4 CREATING WILDLIFE CORRIDORS

The fragmentation of the natural habitat of South Carolina through the clearing of land for agriculture, urban development, road construction and other human related activities have greatly reduced the amount of contiguous and traversable habitat. Between patches of functional habitat open pasture, roads, and buildings act as barriers to wildlife movement. The search for food, reproductive pursuits, and annual and seasonal migrations are essential to wildlife. Therefore, while able to support the individual, these isolated patches of habitat are not necessarily able to meet the needs of an entire population. Isolation can lead to a loss of genetic viability of a population through inbreeding (see *Section 5.3: Reintroduction of Native Wildlife*). In a shrinking range individuals may be forced to cross into populated areas in search of food or available habitat, where death or human conflict may result (see *Section 5.2: Managing Native Wildlife* and *Section 4.1: Wildlife Conflicts Procedures*).

Wildlife corridors have the ability to link isolated populations together, allowing for safe migration and gene mixing that help the species remain viable. These connections between isolated patches also allow a population(s) to relocate should fire or a drought render certain habitat temporarily unsuitable. When connecting isolated patches of habitat it may be necessary to incorporate engineered wildlife crossing structures under or over roads to minimize human-wildlife conflicts.

A system of corridors can greatly increase the value of existing isolated patches. For the corridors to be effective, however, they must be able to provide habitat appealing to the species of interest for them to work effectively. Regional-scale corridors should be modeled/planned in GIS with the coordination of partnering agencies and organizations. Land acquisition and ongoing management is an integral component of effective wildlife corridors. Smaller-scale corridors implemented by a single landowner have the ability to connect the various plant communities of a particular property. These are best designed and planned using timber stand maps and plant community maps, with consideration of other site factors. CCPRC integrates small-scale wildlife corridors in most harvest planning activities, to be implemented during forest thinning operations and maintained by active management (see Figure 3-2 in *Chapter 4: Active Vegetation Management*).

Strategies:

1. Utilize components of the NRI to identify unique ecological characteristics worthy of connecting wildlife to/from;
2. Using active forest management as a means of creating corridors within individual park properties as conduit for connecting plant communities;
3. Incorporate existing corridors in park master plans, and design and implement new corridors when feasible;
4. Ensure the corridor is planted with desirable native vegetation and actively managed to maintain quality;
5. Create “micro-corridors” by strategically planting vegetated buffers alongside trails and roads within park facilities, and potentially where parks are connected to neighborhoods and other recreation facilities via greenways; and,
6. Work with partnering agencies and organizations (e.g., SCFC, USFS, SCDNR, MeadWestvaco) to identify opportunities for connecting large patches of managed and/or protected land.



Wildlife corridors should cater to a variety of species (Courtesy: F. Durette)

Chapter Six: Water Quality

Charleston County contains approximately 440 square miles of water with 100 miles of coastline along the Atlantic Ocean. Almost all CCPRC park properties have access to a waterbody (i.e., ocean, tidal creek or river, or inland pond or impoundment). Our region of South Carolina is called the “Lowcountry” on account of its minimal topographic variation; such that even upland areas can be inundated with water for extended periods of time.

Our park system has approximately 3,507.8 acres of wetlands (43.2%), with approximately 1,978.31 acres in freshwater swamp (24.4%) and 1,529.5 acres in tidal salt marsh (18.84%). The park system also has approximately 2.1 miles of oceanfront and 32 miles of streams and river frontage. Being surrounded by water as we are, it is imperative that our agency take action toward reducing our overall impact on water resources, with regards to chemical, solid waste, and sediment runoff; sustainable and reasonable water demand; and maintaining, enhancing, or restoring significant aquatic plant and wildlife resources.



Paddlers at James Island County Park
(Courtesy: F. Durette)

6.1 WATERSHED PROTECTION

A watershed is a topographic feature that acts as a basin, collecting the precipitated runoff of all water flowing into a particular stream or body of water. Charleston County is a part of two watershed basins: the majority of the county is located in the Santee River Basin (which is divided into the Santee River Basin and the Ashley River /Cooper River Basin) and the lower southwestern portion of the county is located in the Edisto River Basin. These watersheds comprise approximately 6,141 square miles (3.9 million acres) of eastern South Carolina. Over 50% of this area consists of forests and forested wetlands. This total area includes several counties surrounding Charleston County, stretching into the midlands of South Carolina.

Charleston County’s increasing population and related development are placing unprecedented pressure on its land resources. Impervious surfaces like pavement and building roof structures that accompany development can have significant negative impacts on water resources, in the form of pollution runoff and flash flooding. Pollution can result from impervious surface drainage (i.e. parking lots), agricultural runoff from unrestricted livestock grazing, and over-application of fertilizers and pesticides used in landscape maintenance. Flash flooding is the product of highly concentrated volumes of water flowing at a rapid speeds (i.e. “storm surge”), while being simultaneously affected by reduced soil infiltration. Some of substances can cause algal blooms and depleted oxygen levels in nearby streams.

Understanding that pollution and flash flooding are the two major challenges for water quality in our watershed,

CCPRC should be cognizant of the variety of ways we can reduce our environmental impact. For example, adhering to BMPs for forestry, agriculture, and construction will inform both staff and contractors to be mindful of where we choose to refuel machinery (e.g., not in a wetland), that we refrain from using excessive chemical in riparian areas or sensitive habitat, and that we implement natural and/or structural erosion control measures when disturbing the soil surface. To reduce or minimize our contribution to flash floods, or, to promote natural groundwater recharge, we should apply guidelines for low-impact development (LID) when planning and constructing new facilities (and/or retrofitting existing facilities). Some examples of LID concepts include minimizing the amount of impervious parking surface by using pervious asphalt or concrete, and treating stormwater (e.g., from roofs and impervious parking surfaces) on-site.

Strategies:

1. Follow guidelines for use of fertilizer and chemicals in landscape maintenance;
2. Plant and/or enhance natural buffers waterbodies and developed areas in CCPRC park facilities;
3. Ensure that contractors adhere to BMPs for stormwater runoff when constructing new structures;
4. Continue to educate the public about watershed health through interpretive programs and signage, and partnerships with SCDHEC, SCDNR, and the Ashley Cooper Stormwater Education Consortium;
5. Continue to educate the public about the role CCPRC parklands play in protecting water quality in our local watersheds;
6. Investigate opportunities for installing watershed awareness signs on park properties;
7. Work closely with SCDHEC, SCDNR, and other partnering agencies and organizations to actively monitor local water quality; offer CCPRC properties as water quality testing locations; and,
8. Continue investigations for more sustainably utilizing water resources on park properties.

6.2 RIPARIAN BUFFERS AND STREAMSIDE MANAGEMENT ZONES

Riparian buffers (often called “streamside management zones” [SMZs] in forestry practices) are vegetated buffers bordering waterbodies that help to filter runoff from entering open water. Vegetation slows the speed of overland flow, allowing sediment to settle-out before entering the stream and encouraging water to percolate through the soil to naturally recharge groundwater. Riparian root systems also help to control erosion on banks bordering the body of water. Riparian buffers can absorb 50 to 100% of sediments in surface runoff depending on their width and the amount of vegetation present. They can also trap excess pollutants like phosphorus and nitrogen from fertilizer and animal waste. Phosphorus can be minimized by 80 to 85% when filtered out of the surface water. Some of the excess Nitrogen and other pollutants can be converted into a less harmful form, and even taken-up by trees within the buffer area.

According to SCFC BMPs for forestry, in most parts of the state these buffer areas should be between 60 and 120 feet wide on both sides of the stream, although the width of the buffer should be determined in the field by the amount of expected runoff and the slope of the edge of the body of water. In this area the natural cover that lines the stream is left intact and not disturbed during timber harvesting or construction operations. In effect, the steeper the slope, the wider the riparian area required to effectively filter out sediment.

Riparian buffers can also act as wildlife corridors if they are contiguous along the stream bank. Buffers have the ability to attract desirable species like the Monarch butterfly and other colorful pollinating insects, when attractive plant species are present (e.g., *Baccharis halimifolia*). Conversely, buffers can also effectively discourage nuisance species (e.g., alligators, Canada geese) from inhabit shoreline areas.

Strategies:

1. Identify, maintain, and enhance riparian buffers throughout the park system for their water quality benefits, as well as their benefits to wildlife;
2. Install new riparian buffers and/or replace overgrown or ecologically benign buffers; and,
3. Integrate wide riparian buffers in plans for new park facilities.

6.3 PONDS

Several ponds (or “lagoons”; “borrow pits”) are located in our County Park system, which were created by humans, for either recreational or agricultural purposes. Depending on the park facility, ponds may contain a limited amount of freshwater species, including fish, amphibians, reptiles, and vegetation. Because most of our ponds are separated from a natural flowing water source (i.e., similar to retention basins), they rely heavily on precipitation to keep them replenished. In developed park facilities, ponds may be replenished from both stormwater drainage systems, as well as overland flow. Therefore, facilities maintenance staff should exercise caution when applying chemicals in close proximity to ponds, and should keep drains and roadways free of trash. Pond water quality can also be affected by the presence of fecal matter, resulting from overuse by pets and wildlife (see *Section 5.1: Invasive and Nuisance Wildlife Control*).

Strategies:

1. Implement strategies for establishing and improving riparian buffers around ponds (see *Section 6.2: Riparian buffers and Streamside Management Zones*);
2. Regularly monitor the water quality of all ponds for safe bacteria levels (and heavy metals), especially before scheduled events; and,
3. Identify inflow and outflow locations of ponds (where applicable) as part of the NRI, to assist in future maintenance/management needs.

6.4 BRACKISH AND FRESHWATER IMPOUNDMENTS AND GREENTREE RESERVOIRS

Many relics of South Carolina’s plantation past are still evident in the landscape today, as former rice fields remain visible adjacent to waterways and swamps throughout the area. The technology necessary for rice culture was initially brought here by enslaved Africans, and has been modified to provide landowners with a way to manipulate water levels for agriculture or wildlife.

Impoundments, or semi-permanently flooded areas, are flooded by trapping runoff water with the use of dikes and water control structure(s). Freshwater impoundments are typically flooded year-round, but water levels fluctuate widely during periods of excessive rainfall or extended drought. Brackish impoundments rely on the introduction of saltwater for flushing or flooding the impounded area. Greentree reservoirs (GTRs) are bottomland hardwood

forests that are shallowly flooded in the fall and winter through the use of water control structures. GTRs and freshwater or brackish impoundments can provide excellent habitat areas for many species of plants and animals, including migratory birds and waterfowl if managed correctly.

Several park properties include brackish or freshwater impoundments and/or GTRs. Caw Caw Interpretive Center's former rice fields are CCPRC's best example of an intact impoundment system. These fields are currently managed for use by wading birds, shore birds, and waterfowl.

Strategies:

1. Consider the multitude of benefits of impoundments and GTRs when planning park facilities with appropriate site requirements, and assess agency need and interests;
2. Engage partnering agencies and organizations (e.g., Ducks Unlimited, USFWS) to rally support and garner grant funding for impoundment and GTR projects;
3. With the assistance of partnering agencies and organization, design and construct water control structures to appropriately manage these areas, abiding by all necessary permit requirements;
4. Identify management goals, including target species to attract and develop management plans addressing management goals for impoundment and GTR areas; and,
5. Manage water levels and vegetation according to the management plan.



Active impoundment management at Caw Caw Interpretive Center (Courtesy: T. Thornton)

6.5 BRACKISH AND FRESHWATER WETLANDS

Wetlands are present on many park properties. Freshwater wetlands may either occur within an area of upland (i.e. isolated wetland), or situated between dry upland areas and open freshwater waterbodies as a transitional habitat (e.g., bottomland hardwood forest). Brackish wetlands (i.e. “marsh”) are transitional habitat between upland areas and brackish or saltwater waterbodies. To be considered a wetland, an area must have hydric soils, hydrophytic plants, and hydrology that suggests the area collects and retains water at or below the soil surface.

Wetlands are easily affected by filling, dredging, increased runoff, sedimentation, nutrient loading, exotic-invasive plant species, and the introduction of toxic chemicals from point and non-point sources. Home construction also impacts wetlands through habitat loss, sewage disposal, and the potential introduction of exotic-invasive species. Unless inhibited by these factors, wetlands work nonstop to provide services to the public by: providing quality groundwater for drinking and irrigation, cleansing polluted stormwater, providing natural flood and storm protection to minimize loss of life and property, providing essential habitat for protected and non-protected fish and wildlife, and maintaining critical base flows to surface waters during droughts.

Strategies:

1. Conduct complete wetland delineations of all park properties and incorporate in NRI;
2. Minimize use of heavy equipment in wetland areas and use tracked equipment when accessing a wetland is absolutely necessary, as heavy equipment has the potential to disturb natural wetland hydrology;
3. Continue educating public of the importance of wetlands through workshops, interpretive programs, and signage; and,
4. Explore ways to restore wetlands to their natural, undisturbed viability (e.g., through removal of invasive species, restoring their original hydrology).

6.6 BRACKISH AND FRESHWATER STREAMS AND RIVERS

Many freshwater streams and rivers meet the Atlantic coast in Charleston County, having flowed for hundreds of miles from points further inland. These streams and rivers contain diverse fish and aquatic vegetation on their upper reaches. Further down their length they encounter agriculture and urban where they pick up sediment, and gain speed and volume. Per the USFS Watershed Condition Classification Technical Guide, the quality of a freshwater stream or river is assessed according to three factors, including water quality, watershed quality aquatic habitat condition (USFS, 2011). These factors, in turn, should be rated as either “functioning properly”, “functioning at-risk”, or “impaired functioning”. This system of watershed quality evaluation is helpful in assessing the true quality of a watershed by breaking it down into parts.

For water quality condition to receive a rating of functioning properly there cannot be any evidence of excessive sediment, nutrients, chemical pollution or other water quality issues that exceed normal background levels. A rating of “functioning at risk” might have the water containing a small amount of these contaminants. More than 10% of the stream miles or lake area must not be contaminated for the waterbody to maintain this rating. If more than 10% is contaminated and the problems listed above are severe the body of water is then listed as “impaired function”, or an impaired waterway.

With Charleston County being along the Atlantic Coast, there is a freshwater/saltwater divide line along the rivers by way of a tidal influx. Most of Charleston County's rivers and streams contain various amounts of salt water. Several CCPRC properties contain or connect to freshwater streams and rivers. With only a small portion of our parkland supporting natural freshwater ecosystem, it is important that this water element is maintained at the highest level to support aquatic life and water quality; otherwise this resource may become degraded. Protecting these areas should be done by establishing 60 to 120-foot buffers around drains and streams to prevent siltation and degradation. A high level of attention needs to be given to freshwater resources, because they are relatively rare on our park properties, as compared to saltwater resources.



Fishing Dock and marsh at James Island County Park
(Courtesy: F. Durette)

Strategies:

1. Coordinate with partnering agencies and organizations (e.g., SCDHEC, Ashley Cooper Stormwater Education Consortium) to identify methods for improving poor water quality on CCPRC facilities;
2. Consider natural hydrology when planning new facilities, and make every effort to accommodate natural flow; and,
3. Continue to educate visitors on the transportation of sediment and pollutants by rivers and streams and how it has the potential to affect the health of the stream/river, as well as the other resources it supports.

6.7 ESTUARIES

An estuary is a coastal body of water with one or more rivers or streams flowing into it and with a free connection to the open sea. These areas, where freshwater from inland sources meets saltwater from the ocean, provide high levels of nutrients in the water column, making estuaries some of the most productive natural habitats in the world. Approximately 55% of the world's population lives within 120 miles of the coast. As a result, estuaries suffer from sedimentation resulting from land clearing and improper erosion control measures, as well as poor farming practices, overfishing, drainage and filling of wetlands, loss of oxygen due to excess nutrients from sewage and animal waste, and pollutants like heavy metals.

Estuaries provide habitat for many fish nurseries, mammals, and are utilized by migratory bird populations. These species depend on the estuarine environment as a place to live, feed, and reproduce. Migratory birds use estuaries as an ideal area to rest and refuel before they continue their journey. Estuaries also constitute a large portion of all recreational fish catches, and are frequented by all types of recreational watercraft.

Estuaries are an irreplaceable natural resource that must be managed carefully for all species that depend on them. CCPRC has acquired land near or along estuaries to help maintain the quality of this ecosystem. The protection of

this ecosystem will improve the health of marine life in the surrounding areas and increase amount of life in our area, and contribute to the abundant biodiversity native to the region.

Strategies:

1. Continue to protect these areas during nesting and/or spawning seasons for various species;
2. Work with the Interpretation Department to post educational signage at CCPRC-operated boat landings about the benefits of maintaining quality estuaries; and,
3. Be involved in active estuary management where feasible, through interpretive/educational programs, volunteer programs, partnerships, or sponsorships.

6.8 TIDAL SALT MARSH

Tidal salt marsh is the transitional area between land and water influenced by the twice daily rise and fall of the tide. They are subject to rapid changes in salinity, temperature, and water depth. Tidal salt marshes can be divided into two sections: low marsh and high marsh. Low marsh floods twice daily, while high marsh floods only during storm events and unusually high tides. These patterns determine what plants and animals reside in the salt marsh. Protection of this ecosystem is vitally important –especially in South Carolina, which has more marsh acreage than any other Atlantic coast state (approximately 344,500 acres). A healthy salt marsh provided pristine habitat for wildlife, picturesque beauty, and enhances water quality by filtering sediments, nutrients, heavy metals, and other toxins from upland runoff.

Salt marsh is under great pressure from “marsh view/access” residential communities, wastes from upland sources, and dredging projects. Construction of dikes and roads has also led to the loss of marsh habitat. Restriction of tidal flow by installation of small culverts under roads leads to changes in salinity and alteration of the natural vegetation community due to a reduction in duration and frequency of tidal flooding. Runoff from roads and other paved surfaces and nutrient rich runoff from fertilized lawns can also degrade salt marsh, as can the introduction of invasive and opportunistic plant species (e.g., *Phragmites australis*). Additionally, flowing sediments can accumulate within the marsh and substantially alter the hydrology of the ecosystem. Boaters can create wakes that will erode the sides of the salt marsh banks, further releasing sediment into the system. These types of impacts to salt marsh may result in less biodiversity, as well as a decrease in flood protection capacity.

Within Charleston County, some salt marsh areas were historically impounded by dikes to capture freshwater for rice cultivation. Post-Civil War, many of these impoundments are still intact and maintained to attract waterfowl. This transformation of use is most prominently displayed at CCPRC’s Caw Caw Interpretive Center. Impoundment management plans should be closely followed to maintain water quality, vegetative health, and maintain and create tidal mud flats to invite additional migratory birds.

Strategies:

1. Document all salt marshes within CCPRC park system as part of the NRI;
2. Maintain forested buffers along the inland edge of salt marsh;
3. Continue to monitor and manage existing freshwater impoundments, and establish new impoundments where hydrology allows;

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4. Work with partnering agencies and organizations (e.g., SCDNR, SCDHEC) to identify potential source(s) of degradation in salt marsh on CCPRC properties, as well as solutions for mitigating problem areas;
 5. Coordinate with SCDNR's SCORE Program to identify suitable oyster reef restoration sites on CCPRC properties (see *Section 8.2: Soils*); and,
 6. Pursue marsh restoration projects through corporate environmental mitigation projects and available grant opportunities.

6.9 OCEAN

The ocean is one of Earth's most important natural resources. It is one continuous waterbody comprising approximately 71% of the Earth's surface. Charleston County is located along the Atlantic Ocean – the second largest ocean in the world, covering approximately 20% of the Earth's surface. The ocean contains many natural resources consisting of petroleum and gas fields, fish and marine mammals, and several types of precious minerals and metals. The ocean also hosts phytoplankton, which are microscopic plants that float freely and abundantly as a food source for marine life, while producing approximately 90% of the world's oxygen production.

CCPRC operates several beach parks, and because of limited public beach access and accommodations elsewhere in our region these facilities are well attended. However, high visitation at beach parks can generate a lot of refuse. When refuse enters the ocean it can become a nuisance to sea turtles, shorebirds, fish, and other marine animals (and humans) which have the potential to become strangled, entangled, suffocated or otherwise injured. Other types of pollution (e.g. fertilizers, sewage) also have the potential to decrease the amount of oxygen in the water, which can be a catalyst for harmful algal blooms.

Visitors should be aware of the potential for heavy currents and hazardous marine animals. Seasonally, lifeguards are stationed along the beaches at CCPRC beach parks for the safety of the public, and are ready to assist park visitors when necessary (e.g., for jelly fish stings, minor shark bites, erratic swimming).

Strategies:

1. Continue to provide separate garbage and recycling containers for visitors, and work towards pairing all garbage containers with recycling accommodations;
2. Add additional bins during holidays and other high-visitation periods;
3. Post fishing regulations near walkway entrances to inform the public of proper size and catch limits;
4. Coordinate with SCDHEC's Beach Monitoring Program and post signs to keep patrons aware of safe/unsafe bacteria levels;
5. Post signs and inform the public of any beach closings due to high bacteria counts or dangerous currents using digital media and the agency website; and,
6. Continue to educate the public on the importance of water safety.

Chapter Seven: Air Quality

Health and environmental effects of polluted air can vary depending on the concentration level, duration, and the pollutant. With the passage of more stringent air quality regulations through the U.S. Environmental Protection Agency (USEPA), come challenges to limit or reduce emissions. Air quality has the potential to negatively impact humans, wildlife, and plants, as well as other abiotic (i.e. non-living) factors, including cultural resources.

In addition to having more traffic every year, Charleston County contains one of the largest container ports in the country. The combination of millions of cars and scores of ships, trucks, trains, and industrial plants in the presents challenges to maintaining good air quality in the region. The National Ambient Air Quality Standards (NAAQS) are air quality standards set by the USEPA for six “criteria pollutants” which are among the most harmful to public health and the environment. These six pollutants are ground-level ozone, particulate matter, nitrogen dioxide, carbon monoxide, sulfur dioxide, and lead. Winds and water can carry these pollutants across the county where they may be found in the soil and water far from the source of the pollution.

Ground level ozone and particulate matter are the two primary concerns of regulatory agencies. Ground level ozone influences resources by damaging vegetation and reducing growth and survival of tree seedlings. The microscopic particles in the air are inhaled into the body and can cause many respiratory problems or trigger asthma or other lung problems in humans.

7.1 TAKING ACTION TO IMPROVE AIR QUALITY

The South Carolina Department of Health and Environmental Control (SCDHEC) Bureau of Air Quality runs a joint program with the USEPA to establish monitoring stations throughout the state of South Carolina. Monitoring stations in Charleston County include numerous sites in primarily urban areas. The urban locations of these sites make it difficult to establish an air quality baseline for rural and suburban areas; thus, there is no quality baseline for rural sites. As most of CCPRC’s properties are located in rural areas, it seems less likely that those areas would have poor air quality. However, reductions in air quality can occur at any time and it would be in CCPRC’s (and the park user’s) best interest to be aware of potential health risks.

Protection and quality management of our parkland is the first step in improving air quality. Greater amounts of vegetation and wetlands help the parklands maintain healthy environments. Vegetation filters out dust and other particulates from the air. Leaves absorb many different types of pollution, like ozone and carbon dioxide, and produce oxygen. Healthy wetlands also filter out particulates that may have been dispersed through the air.

Continued action to improve air quality is needed to promote CCPRC’s mission of improving the quality of life in Charleston County.

Strategies:

1. Design new structures and surfaces for maximum energy efficiency, as well as minimal heat reflectance;
2. Source local materials and vendors to limit the size of our “carbon footprint”, i.e. the scale of CCPRC’s impact on environment necessary for operating park facilities;
3. Continue to utilize/purchase efficient and low emission vehicles (e.g., hybrid, diesel) when feasible;
4. Track annual energy usage and embrace new energy-reducing technologies;
5. Research the carbon sequestration ability of the various trees and plant communities on CCPRC park

properties to determine an approximate baseline of carbon sequestered per year, and compare to annual approximated emissions;

6. Continue and expand opportunities to conduct electronic customer (programming) transactions through the agency website;
7. Take measures to modify lawn maintenance practices and utilization of small engine equipment to limit ozone-producing emissions (e.g., cutting grass during the morning, minimize cutting schedule);
8. Explore opportunities to purchase two-cycle equipment, replacing four-cycle equipment when practicable;
9. Explore opportunities to work with SCDHEC Bureau of Air Quality to add monitoring stations on or around various CCPRC properties, especially in areas of increasing development;
10. Educate the public by integrating air quality topics with other interpretive and education programs offered;
11. Encourage alternative transportation methods such as walking, bicycling, carpooling, and mass transit;
12. Develop a template for measuring air quality benefits of parks and parklands to the community in terms of dollars (“ecosystem services”) and communicate this value to the public;
13. Work with the South Carolina Department of Transportation (SCDOT), Charleston County, and other area entities to advocate for transportation alternatives to and between parks and neighborhoods to encourage people to walk or bike;
14. Use low-toxicity alternatives to pesticides, herbicides, cleaning chemicals, and fuels when practicable;
15. Consider providing opportunities, expectations, and/or incentives to entice employees to use alternative forms of transportation such as carpooling, bus, bike, or walk; and,
16. Continue acquiring land wherever and whenever feasible.



Cyclists observing sailboat races and dogs playing at James Island County Park (Courtesy: F. Durette)

Chapter Eight: Geologic Resource Management

Charleston County is located within the Atlantic Coastal Plain (the largest geologic landform in South Carolina) and categorized within the lower Coastal Plain. The present coastline is the result of sea level changes over the past 2 million years due to the development and break down of ice sheets to the north. The shoreline had once extended out to the continental shelf, although between 20,000 and 7,000 years ago sea level was continually rising. Around 7,000 years ago the rising sea dropped to its present elevation. Topographically, Charleston County is mostly flat with occasional rolling sand hills and elevations ranging from sea level to 70 feet.

Geology is a major determinant of the availability of fresh water, the stability of the soil, the chemistry of the water and soil, and, with climate, the type of plants and wildlife that inhabit the region. Some plant communities attributed to geologic factors include palustrine (i.e. precipitation-dependent) wetlands, bottomland swamps, floodplains, savannahs, and Carolina bays. These plant communities and their unique microclimates have the potential to sustain rare, threatened, and endangered plant and wildlife species, and are thus an asset to our park system in providing recreational programming opportunities and quality habitat.

8.1 SHORELINE AND BARRIER ISLANDS

Charleston County has approximately 100 miles of shoreline on the Atlantic Ocean. Natural (i.e. unaltered) shorelines are comprised of shifting sands which erode or accrete with changing tides and sediment flow. However, in developed areas man-made structures (e.g., jetties, bulkheads, groins) are designed to slow the flow of sediment, and dredging intentionally displaces sediment through mechanical means. Changes can also happen because of natural factors (e.g., hurricanes, heavy currents). By interpreting aerial images over a period of time, the evolution of the shoreline becomes apparent.

Barrier islands are young formations at about 4,000 years old created by the accumulation of sand and separated from mainland by a body of water (e.g., estuary). When uninhabited, barrier islands are naturally renourished, as sand and sediment moves from the north to the south via riverine deposition and coastal currents. Since most of the developed barrier islands in our region are not naturally renourished (in large part due to jetties at the Port of Charleston) sediment retention structures are utilized, and it is therefore necessary to renourish beaches mechanically. Although sediment retention structures, dredging, and renourishment are not ideal solutions ecologically, they are necessary for protecting the people, wildlife, and plants inhabiting barrier islands, as they slow the rate of erosion. In areas like Folly Beach located immediately south of the jetties) renourishment projects are periodically planned by USACE.

Barrier islands play an important role in coastal ecology. The islands themselves have several plant communities in a linear environment. Maritime forests and freshwater wetlands typically dominate the interior of the island, with marshes on the protected (mainland) side, and beach/dunes on the ocean side. Barrier islands provide shelter for the marsh and estuaries on their mainland side, which are considered to be significant breeding grounds for many marine species.

Both barrier islands and mainland coasts serve as a stopping point for many migrating birds. Migratory birds return to the same spot annually, and if suitable stopover habitat is lost for any reason, it is possible that the birds may fly past the stopover point, over-expending their energy and putting them at considerable risk. Several other birds find refuge on the shorelines where they raise their young. Barrier islands are also home to nesting sites for loggerhead turtles and other sea turtle species, which return annually to lay their eggs.

Strategies:

1. Continue posting signage and offering programming to communicate the importance of protecting shoreline bird habitat;
2. Continue protecting loggerhead sea turtle nests and working with partnering agencies and organizations (e.g., SCDNR) in volunteer efforts;
3. Review and update emergency preparedness plans in case of natural disasters (e.g., hurricanes), with regards to evacuation of park users and staff, as well as preservation of park facilities and natural resources;
4. Communicate with the National Oceanographic and Atmospheric Administration (NOAA), SCDHEC, and similar agencies to consider if and how park facilities may be affected by climate change (especially when planning new facilities);
5. During park planning efforts, understand that barrier islands and beaches are constantly evolving and changing shape, and consider their long-term effects on park operations; and,
6. Involve colleges and other academic institutions studying coastal ecology to assist in restoring and/or monitoring shoreline and barrier island resources.

8.2 SOILS

Soil is a natural body comprised of layers of mineral and organic composition. Soil makes up the outermost layer of the planet. Soil is formed from parent material (i.e. rock), climate, topography, biological factors, and time. The parent material of soils in Charleston County are marine and fluvial deposits. It can take over 500 years to form one inch of topsoil through natural processes. These soils are naturalized in their respective regions.



Structural erosion control measures (silt fencing) used during construction of the Haut Gap Middle School rural recreation facility (Courtesy: P. Newshutz)

Soil sustains biological activity, diversity, and productivity by providing habitats for plants, animals, and other organisms. Soils also regulate water flow; filters, buffers and detoxifies potential pollutants, stores and cycles nutrients, and provides structural support for plants. The maintenance of these soil functions requires careful consideration of the entire soil ecosystem, including soil flora and fauna communities, physical properties, and chemical properties. Soil composition directly influences the quality and abundance of vegetation, and wildlife indirectly.

Some of the biggest threats to soil are the loss of topsoil and organic matter, the lack of a thriving and diverse population of organisms, and compaction (i.e., reduced porosity for air and water retention). These conditions develop as a result of poor land management/maintenance practices, unsustainable trail construction (e.g., off-trail four-wheeling or equestrian use), or past

agricultural practices. Loss of topsoil due to erosion can deplete the nutrient content of the soil. As the amount of organic matter declines, the soil may become less resistant to erosion and compaction, because of its reduced ability to absorb water.

When developing park facilities it is sometimes necessary to fill low-lying areas during the construction of roads, trails, or buildings. As this practice has the potential to introduce invasive organisms, fill should be sourced locally when practicable.

Strategies:

1. Maintain intact, functioning, and natural systems by properly managing native soils;
2. Consider professionally analyzed soil samples before applying soil treatments;
3. Minimize soil loss and disturbance by building sustainable trail and retention structures;
4. Prior to construction, stabilize soils through structural sediment control measures; and,
5. Soil used as fill should be “borrowed” from highland areas of the same property or acceptable proximal properties to minimize opportunity for introduction of invasive organisms.

Erosion Control

Properly planning and implementing erosion control measures can minimize soil loss, while also minimizing the introduction of particulates into open waterbodies. These types of controls may be constructed of natural materials like rock, swales, and vegetation, which slow the flow of water, allowing sediment to settle. Similarly, construction sites may utilize manufactured products like silt fencing and other stormwater sediment protection devices. To minimize the amount of sediment leaving a construction site SCDHEC published its own Best Management Practices (BMPs) for stormwater management. To minimize the amount of sediment mobilized during a forestry operation SCFC published its own BMPs for forest management.



Volunteers installing sand fencing (to aid in dune development) at Folly Beach County Park (Courtesy: F. Durette)

Riparian buffers (see *Section 6.2: Riparian Buffers*) contain several layers of vegetation (e.g., grasses, shrubs, trees) which have stable root systems helping to slow the flow of moving water. The vegetation can also act as a wind barrier, shielding loose sediment from being blown away. A non-properly functioning riparian buffer has the potential to introduce pollutants to the water and degrade water quality.

In marsh environments, fast tides and boat wakes can substantially erode the banks of tidal rivers and creeks. Studies by SCDNR have shown that in-tact oyster beds help to minimize erosion and build stronger, healthier banks. Restoration of oyster reefs may be accomplished through SCDNR's South Carolina Oyster Restoration and Enhancement Program (SCORE). Oysters in our region can be particular about their reproductive environment, in that their spat (i.e., spawn) prefer to bond to local oysters once released from mature oysters. Therefore, SCORE projects usually involve SCDNR staff and volunteers filling bags of shucked (consumed) oysters and installing them in a structural manner along the banks of tidal rivers and creeks. If effective, these restorative structures will have successfully recruited a new generation of oysters within one year.

At the beach, sand dunes serve a similar purpose as oyster reefs, helping to dissipate and deflect wave action. However, strong natural events (e.g., hurricanes, heavy currents) can deteriorate these areas rapidly. Sand fences and native plantings (e.g., sea oats) help to stabilize and reestablish dune structures. As sand drifts in the wind, sand slows down and settles in the immediate vicinity of the fencing and vegetation. As it accumulates, plants are further established and sand dunes develop. Without dunes winds would erode an area more quickly. Similarly, if heavy storms formed, waves would travel at greater distances over land and a higher rate of erosion would occur.

Strategies:

1. Continue to follow the South Carolina BMPs for stormwater management and forestry;
2. When planning and designing new park facilities, verify the stability of all slopes proposed for development;
3. Develop formal resources and/or programming to educate the public on the importance of erosion control;
4. Coordinate with SCDNR's SCORE Program to identify suitable oyster reef restoration sites on CCPRC properties;
5. Work with staff and consultants to develop creative solutions to erosion control problems;
6. Identify potential grant opportunities to help fund erosion control or slope restoration projects; and,
7. Invite state and local colleges and agencies to assist with erosion studies.



Immature white ibis (Courtesy: F. Durette)



Little blue heron (Courtesy: F. Durette)

Chapter Nine: Managing Human Impacts

Charleston County has been a rapidly growing area in recent years and our park system has seen a steady rise in visitation as a result. Thus, there is greater potential for negative impacts to natural and cultural resources. Human impacts to our facilities occur both directly and indirectly. For example, a direct impact might erosion resulting from the overuse of a trail. Example of indirect impacts would be deer overbrowsing the vegetation in a park facility after being displaced by development; parks used for detention of off-site stormwater, and the introduction of invasive species by neighboring properties.

Many direct human impacts can be addressed by “Leave No Trace” (LNT) guidance. LNT emphasizes minimizing one’s impact on the environment by utilizing appropriate trash and recycling receptacles (or “pack it in, pack it out”), refraining from removing objects from a natural area, and only utilizing designated marked trails and parking facilities.

9.1 CARRYING CAPACITY ASSESSMENT

Natural resources have limited capacities to absorb the impacts of use and still retain their natural quality. As use increases, or as damaging patterns of use develop at specific places or times, the quality of resources may diminish either gradually or rapidly. As area conditions degrade and the standards for an indicator are approached, the area may need to employ different management actions to control the impacts. Some management actions will be more effective than others, and it may become necessary to implement direct user management, in addition to signage. At some level of use, it may become necessary to limit further visitation to protect desired conditions. The condition of the park – not necessarily the number of users – should be the focus of management attention, as a degraded facility will inevitably see less visitation over time.

Strategies:

1. Refer to National Park Service Best Management Practices to assess appropriate carrying capacity for parks; and,
2. Plan and design roads, trails, structures, and high intensity uses for minimal impact to fragile ecosystems (see *Section 1.4: Land Stewardship Zoning Designations*).

9.2 PROPERTY LINE ENCROACHMENT

All park properties have the potential to experience encroachment by neighboring properties. Encroachment is of greater concern on undeveloped properties where properties are unstaffed, and where neighbors may be accustomed to trespassing for their own recreational uses (e.g., for hunting, fishing) freely and without penalty. Some neighboring land owners may even encroach into park property to try to expand their own property limits. Many areas may also encounter illegal dumping of various objects, such as appliances, vehicles, plastics, household garbage, and landscape trimmings.

To make property lines more noticeable to both CCPRC and the encroaching party, they should be surveyed, marked, and properly maintained. The longest lasting property lines are those painted with high performance oil-based enamel paint. If the bark is shaved properly before application this paint will last between seven and ten years. This paint is available from several sources and color does not matter so long as it is highly visible in the woods – although CCPRC has chosen to use a canary yellow color for consistency among properties. Again, it is important to note that a property line that is not already marked must be surveyed properly before it is painted. An improperly painted property line has the potential to result in legal disputes.

An increase in presence and signage is usually enough to minimize illegal activity and encroachment. A fence (e.g., barbed wire, hog wire) across the area of obvious encroachment will communicate to trespassers that access to the property is restricted. However, not all activity can be stopped. Equestrians and ATV operators have easy access into many undeveloped and unattended park properties. The persons trespassing for these activities will often clear their own paths; therefore, the use of a fence along with signage should reduce or eliminate the problem. Conversely, poachers (i.e., unauthorized hunters) may enter and exit the property without obvious proof of their ever being there. Signage, along with the threat of prosecution, will help to deter this activity, but if it persists the only way to stop this use is to catch the person in the act. Poachers often flag foot trails to access hunting blinds or tree stands, so their patterns are relatively easy to recognize,



Unattended facilities should be enrolled in SCDNR's Property Watch Program



Painted trees inform park staff, patrons, and trespassers of CCPRC's property boundary

even if their point of entry is not immediately obvious. Trained SCDNR Law Enforcement officials are adept at recognizing the patterns of poachers, and will usually wait until a trespasser has committed a violation, and then issue them a citation in the field where evidence is readily available.

At many of our undeveloped properties neighbors and other concerned citizens have offered to help monitor properties for trespassers. The use of neighbors for monitoring allows for a consistent and ongoing presence near the property, leading to a higher rate of reported encroachment incidents, increased attention by both CCPRC and law enforcement officials, and better protection of the park in general. Action must be taken on encroachment issues as approximately 50% of CCPRC park property is undeveloped and located in rural areas.

Strategies:

1. Clearly mark all park property lines with signs, fencing, and/or painted trees
2. Maintain records of all neighbors, communication with neighbors, and "good neighbor" status to encourage their continual monitoring of the respective property;
3. Routinely inspect park properties for evidence of encroaching activities (e.g., hunting, fishing, and other trespassing violations);
4. Routinely inspect gates to be sure they are locked and intact;
5. Install trail/game cameras on problematic properties to document illegal or illicit activities;
6. Continue working with SCDNR and other law enforcement officials to monitor illegal activities; and,

7. Create a “Friends of ‘the Park’” program as a means of establishing a regular presence on the property, while also giving curious citizens the opportunity to visit future park properties as part of a formalized program.

9.3 SOUNDSCAPE MANAGEMENT

Noise levels throughout a park vary, from the more populated water parks or shelter areas to remotely located trails. Consideration should be given to the spacing of attractions so that louder, noise-producing attractions do not interfere with users (wildlife or humans) seeking refuge. Sounds have a very important role in wildlife behavior. Some species use sound to detect and avoid predators, define territories, navigate, or attract partners. Similarly, many visitors seek solitude at our facilities. These needs should be considered during park planning efforts as should the needs of neighboring properties and property owners..

Any significant degradation of the natural sound environment deprives park visitors of the chance to connect with and appreciate nature. Opportunities for escape from the noise and from the hectic pace of modern life are becoming increasingly rare. Built barriers (e.g., berms, walls) are the most effective forms of sounds attenuation in a landscape setting; however, natural barriers, such as high shrubs or tree lines, can also help shield sound from high volume areas. Sound is not only transmitted through the air, but water and solid materials as well. Therefore, the type and amount of development around the periphery of an area will largely dictate the future condition of the soundscape.

Strategies:

1. In existing facilities, consider monitoring high volume areas and take steps in planting or constructing buffers, if needed; and,
2. Consider high volume uses and high volume areas when master planning and retrofitting park facilities.

9.4 LIGHT MANAGEMENT

Light intensity has been a critically overlooked resource until recent years. Like air pollution, light pollution is a transboundary issue, crossing property lines and borders regardless of land use. There is the potential for nocturnal animals to become disoriented with changes in light, by not being able to properly physiologically adjust to the varying intensity. This can harm the wildlife by disrupting their predation patterns and/or their orientation abilities.

This is an imperative consideration for sea turtles especially, as they need complete darkness to lay their eggs. Sea turtle hatchlings can be attracted to an artificial light source and not make it to the ocean. Similarly, nocturnal birds use the moon and stars for navigation during migration. They can also become disoriented by high intensity lights. Some amphibian species’ ability to properly orient themselves is also scrambled by artificial light. Considering light pollution as a potentially negative factor during the planning



Low-energy LED (“light emitting diode”) lights installed at James Island County Park overflow parking lot

phase of park development will allow CCPRC to incorporate ecologically (and environmentally) sensitive lighting alternatives (e.g., downlighting, low energy alternatives).

Strategies:

1. Continue to use “turtle-friendly” lighting in coastal areas to minimize negative impacts to sea turtles;
2. Plan for use of shielded fixtures (that direct light downward) in new park facilities, and when retrofitting existing park facilities;
3. Use low energy lighting fixtures when feasible to minimize ongoing energy usage; and,
4. Avoid using landscape lighting unless necessary for safety, to limit potential disturbance of nocturnal animals.



Refuse is a prominent human impact where water and land meet – even at CCPRC facilities
(Courtesy: S. Giles)

Chapter Ten: Educating Staff and Patrons

Before a patron or staff member can effectively care for the resources of a park (or future park), he or she must understand what it is that makes a particular resource valuable. Education, then, relates to the gathering and dissemination of knowledge about natural resources among CCPRC staff and park users. This knowledge is necessary to appropriately build and manage the parks. The Planning Division works closely with other staff, consultants, contractors, natural resource agencies, and others to continually research the tremendous variety and scope of natural resources contained within our park system. In preparation of the master planning process, natural resource inventorying and mapping is extensive (see *Section 1.2: Inventory and Assessment*). This initial assessment, as well as on-going education of staff through constant research, is vital for the agency to fully understand the unique characteristics of its properties, and to plan, develop, and manage these facilities.



“Beach Sweeps” are one of CCPRC newest programs, where volunteers and staff work together to remove refuse deposited on local beaches (Courtesy: S. Giles)

Information gained from the inventory, anecdotal personal accounts, and staff field interpretations are communicated to the public through several forms of media, including press releases or magazine/newspaper articles, interpretive programming, or interpretive webpages, kiosks, and other signage. It is well accepted among park and recreation professionals that interpretation is the most effective to educate the public on how to best care for resources.

Over 30,000 people attend interpretive programs each year in the Charleston County park system. Of these, about 18,000 are school children who attend standards-based programs. Programs focus on the importance

and inter-relation of the staggering array of habitats present in South Carolina’s lowcountry region, particularly those present on CCPRC properties. The Interpretation Department also works closely with colleagues and consultants to develop and produce issue-specific interpretive signs to educate patrons about preventing alligator-pet interactions, protection of shorebird nesting areas, and other important issues. Similarly, CCPRC’s Stewardship Committee also prepares programs and materials to inform and encourage park users to limit their environmental impact (e.g., by recycling, harvesting rainwater, limiting energy use).



Children enjoying one of CCPRC’s many boat landings (Courtesy: F. Durette)

Strategies:

1. Continue to educate the public about the natural history of our region through innovative interpretive programs;
2. Interpretation Department should work with the Planning and Resource Management Division to develop a joint volunteer program for addressing resource management issues (e.g., invasive species control), while simultaneously educating the public;
3. Increase the amount of signs/kiosks and web-based materials to inform the public of both natural history interpretation and natural resource management issues (which often overlap);
4. Make the community aware of CCPRC's role in active resource management by publishing articles on subjects related to natural resource interpretation and management;
5. Maintain and expand relationships with partnering agencies and organizations, as related to natural resource interpretation and management; and,
6. Expand interpretive programming for staff, to inform them of the importance of managing resources, and so they are better prepared if asked resource-related questions by park users.

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Osprey on perch (Courtesy: F. Durette)

**APPENDIX A: PARKS, RECREATION, OPEN SPACE AND TRAILS (PROST) MASTER PLAN
EXECUTIVE SUMMARY (CCPRC)**

APPENDIX B: STEWARDSHIP GUIDELINES (CCPRC)

APPENDIX C: DESIGN REVIEW PROCESS AND GUIDELINES (CCPRC)

APPENDIX D: LIST OF COMPLETED STUDIES (CCPRC)

APPENDIX E: BIODIVERSITY REPORTING FORM – DRAFT (CCPRC)

**APPENDIX F: SOUTH CAROLINA EARLY DETECTION AND RAPID RESPONSE TARGET
SPECIES (SC-EPPC)**

APPENDIX G: NATIVE PLANTS LIST (CCPRC)

**APPENDIX H: LANDSCAPE MAINTENANCE GUIDELINES FOR OPERATIONAL PARK FACILITIES
(CCPRC)**

APPENDIX I: WILDLIFE CONFLICTS PROCEDURES (CCPRC)

**APPENDIX J: RARE, THREATENED, AND ENDANGERED SPECIES AND COMMUNITIES KNOWN
TO OCCUR IN CHARLESTON COUNTY (SCDNR)**

APPENDIX A:

PARKS, RECREATION, OPEN SPACE AND TRAILS (PROST) MASTER
PLAN EXECUTIVE SUMMARY (CCPRC)

*Parks, Recreation,
Open Space and Trails
Master Plan
Executive Summary*

September 2013



A. Purpose and Goals

The Parks, Recreation, Open Space, and Trails Master Plan will help to further the mission of Charleston County Park and Recreation Commission (CCPRC) while determining additional service needs that can be provided in harmony with other recreation providers. This 10-year growth plan focuses on immediate, short-term, and longer-term capital development and improvement strategies that correspond to the community's unmet needs and priority investments for critical parks and recreation services. This plan articulates a clear vision (a "road map") for CCPRC's future that:

- Identifies and serves current and future parks and recreational needs through an integrated park system that provides adequate open space, recreational services and facilities, trails, and stewardship of natural and cultural resources.
- Provides an accessible and diverse offering of parks and recreation facilities and programs to all residents of Charleston County.
- Establishes the updated greenways and trails master plan, including trails for recreational use within park facilities, as well as County-wide greenway corridors and linkages.
- Develops an action plan – a strategy for prioritizing, phasing, funding, and accomplishing the identified needs.

B. History and Planning Context

"The Charleston County Park, Recreation and Tourist Commission was created in 1968 as a county special purpose district by an act of the South Carolina legislature. The original act was amended in 1972, authorizing the Commission to promote Charleston's historical and tourist attractions, to create and operate countywide parks and recreation facilities, and to provide technical assistance to existing park and recreation agencies and community groups.

"In July 1985, the Commission's tourism function was transferred to the Charleston Trident Chamber of Commerce and the commission was renamed Charleston County Park & Recreation Commission. CCPRC represents one of the most unique park and recreation agencies in the State of South Carolina.

"The agency has specific areas of responsibility that are defined through our legislative act. The Commission is charged with the responsibility to provide park and recreation services, but not to duplicate services provided by the other municipalities and special recreation districts existing in the area.

"One of the prime responsibilities of the Charleston County Park & Recreation Commission is the development of a countywide park system. These parks are generally of a size and scope that would not be developed by other municipalities and public service districts. The park system emphasizes passive activities, outdoor recreation, environmental education, and public beach access. Each park facility offers a variety of programming generally directed toward the natural features and characteristics of the site. The staff and commission[ers] of the Charleston County Park and Recreation [Commission] are committed to maintaining high standards in the delivery of leisure services and facilities to the citizens of Charleston County.¹"

¹ <http://www.ccprc.com/index.aspx?NID=3>

C. Planning Process

In February 2012, CCPRC engaged the services of a team of consultants with national and local recreation planning experience to assist in developing this master plan guided by a staff Project Team. The consultant team, led by Colorado-based GreenPlay LLC, assessed existing parks, trails, recently acquired undeveloped lands, recreation facilities and services, and new opportunities through research, site visits, and a comprehensive public engagement process. The consultant team reviewed administrative, land, facility, programmatic, and industry trends, as well as demographic trends, and considered best practices. A comprehensive needs assessment, gap analysis, and level of service analysis were also performed as part of their process.



D. Guiding Principles

Based on the public and stakeholder input received throughout the planning process, the following guiding principles were identified to provide a framework for parks and recreation within CCPRC.

- Parks and recreation opportunities are provided to promote healthy active lifestyles and connect people to nature.
- Core services include management and protection of historically or culturally significant resources, land acquisition, and environmental stewardship.
- The community is engaged in planning decisions.
- Environmental, social, and financial sustainability guides planning and operations.
- Provide park facilities within a 15-minute drive time or less to every resident.
- Priorities include providing recreation programs and services for all age groups, connectivity and development of hiking/biking trails and greenways, more water and beach access, improve or expand existing park facilities, and develop new parks on recently acquired lands.

E. Mission, Vision, and Core Values

CCPRC Mission

“The Charleston County Park and Recreation Commission will improve the quality of life in Charleston County by offering a diverse system of park facilities, programs, and services.”

CCPRC Vision

“CCPRC continues their legacy of preservation for the public good through responsible stewardship, management, and improvement of the current public entrusted infrastructure; and through the balance of passive, active, and entrepreneurial planning and development for the undeveloped properties acquired through the 1992 bond program.”

Core Values

“Charleston County Park & Recreation Commission is making a commitment to a new set of Core Values. This effort will ensure that we leave some blue up above and some green on the ground. Adopting these important values ensures a thriving park system for our children and grandchildren.”

Community Enrichment – *Enriching lives through education and programs*

Leadership – *Providing professional staff development*

Fun – *Delivering fun to customers*

Exceptional Customer Service – *Always focusing on you*

Health and Wellness – *Providing and promoting healthy lifestyle opportunities*

Quality – *Striving for quality throughout the park system*

Diversity – *Fostering diverse populations of vendors, employees, and customers*

Safety – *Ensuring safe and secure environments*

Accessibility – *Providing accessibility through affordable options and a variety of offerings*

Stewardship – *Preserving and conserving cultural, natural, and historical resources*

Building a Legacy – *Maintaining a vision for the future while sustaining a healthy park system*

F. Funding the Legacy

“Over the past 5 years, CCPRC has doubled the acreage in its park system, now totaling nearly 10,000 acres. As we dream about future improvements (keeping in mind that quality recreation facilities and programs cost money to provide and maintain), how much additional property tax would you be willing to pay annually to increase recreational opportunities in Charleston County?”

You offer great facilities, and I think you are doing a good job. I think that by raising property taxes and making park admission free, you could reach more citizens.

Survey write-in comment

Based on this information, most survey respondents (36%) stated that they would be willing to increase property taxes by \$1 to \$10 annually, 28 percent were willing to pay an annual increase of \$11 to \$20, and 17 percent indicated that they were willing to pay more than \$20 in increased property taxes. Less than 20 percent of respondents indicated that they would not be willing to increase property taxes.

If a bond referendum was identified as a viable funding source for parkland expansion, 73 percent of respondents said that they would support passing a vote for this option (31 percent “definitely support”; 42 percent “probably support”). Whereas nine percent said that they would not support passing a vote. Eighteen percent were neutral.

G. Key Findings

Public Engagement

A series of six public meetings and several small focus group meetings with staff, potential partners, and key stakeholders were conducted in June and July 2012, resulting in these key findings.

- Provide a variety of affordable services
- Maintain quality infrastructure
- Pursue partnerships for sustainable services
- Get the word out and expand marketing efforts
- Grow what we have – trails, water access, camping, environmental opportunities, etc.
- Increase rural recreation areas that are underserved
- Develop parks on newly acquired lands

*Thanks for allowing us to give feedback regarding our special view of the world!!
Keep up the great job!*

Survey write-in comment

Survey

A random, statistically-valid survey, as well as an open on-line survey, yielded input from over 3,000 residents. The following survey conclusions provide understanding of usage patterns and recreation preferences, and help to establish priorities.

- CCPRC parks, programs, and services are well loved and used.
- Water access, maintaining what the community already has, development of recently acquired properties, and trails are priorities for the Charleston community.
- There appears to be support for a future taxation measure to develop the newly acquired properties, improve the system, and address prioritized unmet needs.



PARKS FOR TOMORROW

Sharing the Dream

Analysis of Inventory & Services

Key Issues for Existing Developed Lands

Through public and stakeholder input, consultant team observation and expertise, GRASP® level of service analysis, and the needs assessment, the following key issues were identified for consideration.

For Regional Parks and Special Use Facilities

- Wayfinding signage is needed for waterparks on adjacent highways.
- Complete the Folly Beach County Park re-nourishment project.
- Additional parking is needed at all three CCPRC beach properties.
- Wannamaker County Park may be at capacity, and phase 2 is warranted.
- Maintain and sustain amenities at James Island County Park with a focus on upgrades and repurposing of existing amenities to enhance visitor experience.
- Enhance amenities at Palmetto Islands Park to increase annual visitors.

For Rural Recreation Areas

- Rural areas have gaps in level of service.
- There are opportunities to partner with the School District to utilize school sites for recreation facilities.
- Level of quality in amenities is not consistent across rural recreation sites.
- Rural recreation sites at school facilities should feel welcoming to users.
- Opportunities exist to strengthen educational experience and public involvement at school sites.

For Water Access

As the population continues to grow, access to the water both for boating opportunities and other water-based recreational activities becomes more limited. Parking at popular boat launches is already a major issue, along with conflicts between boaters, fishing and crabbing, and non-motorized users. More boat landings are needed.

Key Issues For Planning of Undeveloped Lands

There are a number of significant criteria that will drive the planning and development of undeveloped lands in the coming years. Each of the following items should be considered not only within the context of the individual property, but also within the framework of the overall park system. The criteria are shown in no particular order of importance, as they should all be evaluated equally in the determination of parkland development, prioritization, and planning.

- GRASP® level of service (LOS)/accessibility to user population
- Programming based on community identified needs/survey results/public input meetings
- Connectivity/trails
- Management and protection of natural and cultural resources
- Access to water
- Impacts/development considerations:
 - Environmental sensitivity
 - Physical conditions of site
 - Deed restrictions/conservation easements
 - Adjacent existing development/surrounding context
 - Population context
 - Political considerations

- Revenue potential/funding – Significant financial resources will be required to implement the planning and construction necessary to realize the recommendations of this plan. CCPRC will need to consider a number of possible revenue streams as well as establishing priorities for respective projects that are based on balancing expenses with known revenue streams. Possible funding mechanisms could include:
 - Revenue bonds
 - Increasing user fees
 - Create sponsorship opportunities for capital improvements
 - Grants
 - Expand existing or create new revenue generating features/activities
 - Improve attendance by marketing to new and different user groups
 - Financial partnerships/joint ventures

Key Issues For Trails

As a whole, Charleston County has qualities naturally suited for bicycling, walking, and trail activity and for trail and greenway development. The County benefits from:

- Scenic, protected natural areas and undevelopable wetlands
- Flat terrain
- Climate for year-round bicycling and walking
- Relatively dense, mixed-use areas (such as North Charleston)
- Master-planned bike and walk friendly developments (such as I'on Village)
- Bike and walk friendly beach communities (such as Isle of Palms)
- Popular recreation amenities and outdoor attractions
- Segments of two long-distance trails, (the Palmetto Trail and the East Coast Greenway)

The following key needs were identified with regard to trails.

- Improved access to trails in urban areas
- Provide trails in undeveloped parks for multiple users: hiking, mountain biking, equestrian, and ATV
- Improve and increase ADA accessible trails within parks
- Connect trails to municipal and county parks
- Improve and repair existing trails
- Expand trail network
 - Trails in new properties
 - Connector trails between parks and mountain bike trails

The trail recommendations of this Plan address the community-identified goals of expanding Charleston County's existing trail system and creating bicycle and pedestrian access to park and recreation facilities. Recommendations build on the strengths of the existing CCPRC parks and recreation system and previous bicycle, pedestrian, and trail planning efforts. Proposed improvements are organized as follows:

- Recommended Trail Facility Types
- Regional Trails
- Interior Park Trails
- Water-based Trails
- Trail Network Recommendations by Sub-Area
- Implementation Strategies

Key Issues for Programs

Through public and stakeholder input, survey results, consultant team observation and expertise, and the needs assessment, the following key issues were identified for consideration:

- Because of weather and environmental issues related to Lowcountry living and the proximity to many bodies of open water, all Charleston County youth should know how to swim and feel comfortable in the water.
- Wedding venues and event destinations are an opportunity for service expansion in Charleston County.
- Ecotourism is a program area ripe for expansion.
- Nature programs and environmental education are highly valued.
- Festivals are well attended and desired services.
- Providing recreation opportunities to rural recreation sites will require partnerships and creative, leveraged uses of existing resources. Both CCPRC owned and managed sites and school sites should be invested in as growth and demand necessitate.

Key Issues for Operations and Management

CCPRC is one of the premiere park and recreation agencies in the in the nation and provides a sustainable operation with their many entrepreneurial endeavors. Identifying and anticipating industry trends have helped them refine their service portfolio and be responsive to opportunistic endeavors as they present themselves. Continual self-analysis and feedback identified these areas for attention:

- CCPRC should continue to seek the sustainable balance between available resources and needs, revenues and expenses, passive and active recreation opportunities, development and preservation, etc. as they provide services into the future.
- There was a consistent message throughout the internal and external input process that CCPRC needed to upgrade their registration and rental software, along with the possibility of linking it to an upgraded point-of-sale software. Both could be linked to the financial tracking software system.
- There was a consistent message throughout the public input process that improved marketing efforts to inform the public of facilities, activities, services, and update was desirable.
- Internal staff focus groups pointed out the need to streamline the process to get marketing materials approved and created.
- CCPRC should continue to let the public know how they leveraged the half-cent sales tax bond money to get approximately twice the amount of public land for parks.
- CCPRC should package the costs of the priority items identified in the Parks, Recreation, Open Space, and Trails Master Plan and develop a strategy to educate the public to vote for another bond referendum that will finance the development of the recommended improvements.

H. Summary of Plan Recommendations

The recommendations are provided for 1-3, 4-7, and 8-10 years out and are not in priority order. In addition, flexibility with this plan is warranted, because unique, opportunistic enterprises for entrepreneurial ventures or other partnerships may arise as CCPRC moves forward. It is realistic to assume that unique circumstances will arise, providing opportunities for CCPRC to participate in recreation options that are not currently quantifiable. Whether through property acquisition or by partnering with other entities in the design, construction, and/or management of recreation facilities or programs, CCPRC should remain open to opportunities that would further its mission.

Recommendations are provided for:

- Existing Developed Lands
- Undeveloped Lands
- Trails
- Opportunity Enterprises including acquisition

Additional operational and programmatic suggestions and recommendations can be found in other chapters in this document and are not included here, because most of them do not have financial implications.

Capital recommendations for existing developed lands, undeveloped lands, and trails by Sub-Area:

- West Sub-Area \$29,635,000
- Charleston Central Sub-Area \$28,442,000
- North Sub-Area \$45,596,000
- East Sub-Area \$20,256,500
- All \$16,213,600
- Location TBD \$19,935,000

I. Future Opportunities and Funding Needs

The entire capital campaign totals \$160,078,100 not including acquisition and other costs to be determined.

- Years 1-3 \$61,795,700
- Years 4-7 \$49,167,200
- Years 8-10 \$49,115,200

Funding from General Obligation Bonds will help provide short and mid-term priority projects, feasibility studies, and conceptual planning efforts identified in this Master Plan. Additional longer-term facilities are proposed, and funds will need to be identified to support additional improvements. There is a potential to use revenue bonds for revenue producing facilities. Leveraging resources through partnerships and grants will be important to successful implementation of many of the plan's recommendations. CCPRC may also need to consider operational funding increases as well.

J. Summary

Charleston County is home to over 350,000 diverse residents, some of whom are avid users of CCPRC's parks, facilities, and services, and others who are not aware of what the CCPRC system has to offer. This Parks, Recreation, Open Space and Trails Master Plan provides a vision and strategies to enhance popular indoor and outdoor recreational activities and add new ones to engage diverse communities. An "all hands on deck" approach is needed (among staff, stakeholders, and partners) to embrace the Plan's vision and guiding principles. This master plan helps position the Charleston County Park and Recreation Commission to proactively plan for the future and ensure its legacy as a valued treasure for the next century and beyond.

APPENDIX B:
STEWARDSHIP GUIDELINES (CCPRC)



Charleston County Park and Recreation Commission Stewardship Guidelines

The Primary Goals of the Stewardship Guidelines

The CCPRC will encourage and protect the stability, integrity, value, and beauty of natural and historical resources, cultivate an ethic of stewardship in its staff and patrons, and become a model of environmental stewardship for the region.

Definition of Stewardship

Stewardship is the careful and responsible management of the resources entrusted to the CCPRC by the citizens of Charleston County for present and future generations.

As a steward of public land and natural and cultural resources for the taxpayers of Charleston County, CCPRC will identify, preserve, maintain, and create a diversity of ecosystems throughout the park system. The park system includes aquatic habitats, wetlands, estuaries, open meadows, shrub lands, succession areas, mature forest, beach communities, and other natural areas. Similarly, the park system also includes a diversity of historical and cultural sites. Therefore, a key focus of the stewardship guidelines is to encourage and protect the integrity, stability, value, and beauty of natural and historical resources for present and future generations. Further, the CCRPC will cultivate an ethic of stewardship in its management of agency resources of all kinds.

Background

Just as CCPRC has policies, procedures, and staff to steward fiscal, labor, and other resources, CCPRC has recognized the need to steward its natural and cultural resources in a systematic and proactive way.

Properly managed natural and cultural resources ensure quality of life for current and future residents, protect biodiversity and cultural diversity, and preserve environmental services valuable to the larger community, such as the capacity of intact wetlands to retain and filter storm water. As Charleston County becomes urbanized at an increasing rate, it becomes more difficult to protect these rapidly degrading resources. Because we have promised the county taxpayers that we will protect their investment in their

parklands through wise management and because it is in our mission, we are obligated to protect, manage, and interpret these resources.

Natural and cultural resources must be actively managed according to resource management plans. To not actively manage them is to allow them to degrade. These guidelines will enable active management of parklands that will mitigate or eliminate such ecological concerns as native wildlife populations being out of balance, competing uses leading to wildlife conflicts, non-native invasive species, fragmentation of valuable habitat, encroachment by park neighbors, and other threats. Additionally, cultural resources are non-renewable and will be gone forever if not protected. These natural and cultural resources must be stewarded carefully by managing them systemically, not on a park-by-park basis. Because of the scope of resources the CCPRC administers and its status in the community, there is no doubt that the agency will become a regional leader in stewardship by applying the stewardship guidelines effectively and consistently.

The rewards of becoming a regional leader in stewardship go well beyond the health and welfare of the county park system's resources. There are other broader and more compelling reasons to instill and support a stewardship ethic in our staff, our patrons, and our colleagues. The scientific, environmental, anthropological, archeological, and historic preservation communities worldwide report an accelerating loss in both quantity and quality of resources for many reasons. Fragmentation of habitats and cultures, climate change, energy production and supply concerns, tremendous waste, poor development practices, people's inability to "connect with nature", and other reasons are often cited in addition to many other reasons too numerous to mention in this document. As the stewards of many thousands of acres of park lands in a rabidly urbanizing region, we can play a significant role in halting or mitigating these patterns in this region and our example will have immeasurable effects far beyond our region and our lifetimes.

Finally, the agency can only truly be a regional leader in stewardship by instilling a pervasive stewardship ethic in its staff members and its patrons. Proper education, tools, and expectations from the agency will allow all staff members to be stewards in their everyday duties. As a result, well informed decisions will protect and enhance stewardship throughout the agency, including facility development, procurement, fleet management, and other services that are linked to the general health of the environment in the region and the world. Also, recognizing that a fast growing population means increased potentially negative impacts on park lands, the agency must use additional outreach and interpretation to encourage patrons and the general public to support the stewardship practices of the CCPRC.

Agency and Divisional Statements of Purpose

Agency Statement of Purpose:

To foster an agency-wide stewardship awareness which results in each employee promoting and actively supporting the stewardship guidelines in their daily work, in order

to effectively and efficiently preserve and protect the natural and cultural resources and to attain the primary goals of the stewardship guidelines.

Four key divisions were identified and each was asked to develop a statement of purpose

Maintenance Statement of Purpose: Planning for and taking necessary actions to protect the natural, cultural, or historical value of the resource asset. This involves performing regular maintenance and upkeep, necessary monitoring, educating and informing those who might negatively impact the resource asset.

Operations Statement of Purpose: Provide opportunities to inform and educate staff and patrons about natural and cultural resources in the parks. Work with appropriate staff to manage waste, energy, invasive species, wildlife species of interest, and other environmental issues. Encourage park staff and patrons to explore environmentally friendly products and services.

Planning and Resource Management Statement of Purpose: Through careful planning and analysis, provide quality park facilities for the citizens of Charleston County, while protecting the natural and cultural resources. Thoughtful park planning ensures that we continue to improve our quality of life for future generations, in keeping with the agency mission.

Recreation Statement of Purpose: Through careful planning & implementation, the Rec. Division will provide quality programming and services for the visitors of CCPRC's parks and facilities, while emphasizing the protection of its natural and cultural resources.

Guiding Stewardship Principles

Share our stewardship message to be a catalyst for positive change in the world and to encourage awareness and action among park patrons and staff

Provide employees and patrons expectations, training, opportunities, and incentives to practice environmentally sound behaviors

Protect and restore the intrinsic values of parklands for future Charleston County residents, human and otherwise

Comply with environmental legislation, follow best management practices, and continuously innovate and improve our stewardship efforts by monitoring, analyzing, and reacting to trends in the environment, the community, and the world

Minimize our waste and conserve natural resources, particularly through energy and water conservation

Value the natural and cultural heritage of our parklands and interpret them for visitors

Conduct inventories of existing natural and cultural resources in order to understand and protect the assets of each site

Design, develop, manage, and operate parks to maintain or improve environmental and cultural integrity, including non-native species management, protection of lands from encroachment or degradation, and protection from misuse or overuse of resources

Consider long term and overall health of natural and cultural resources in our decision making at every level

Purchase goods and services that tend to protect natural and cultural resources, including using materials from renewable resources, products that have low emissions, locally manufactured materials, or other goods and services that provide environmental benefits

Implement changes to encourage environmentally-effective growth as well as economic growth since long-term economic progress and care of the park system's resources are interdependent

Utilize environmentally-sound products in order to promote, protect, and enhance the well-being of our employees, our patrons, and the natural environment

Implications

Failing to effectively implement the stewardship guidelines and the plans, processes, and products they necessitate will mean:

- Continued degradation of vital natural and cultural resources
- Loss of inherent monetary value of well managed resources
- Loss of credibility with patrons and colleagues
- Loss of general support for the agency
- Increased maintenance and operational costs
- Increased negative press

By effectively implementing the stewardship guidelines and the plans, processes, and products they create, the agency will:

- Protect vital natural and cultural resources entrusted to it by the taxpayers
- Preserve or enhance the monetary value of the park system's holdings
- Educate its patrons so they will tend to take better care of the parks
- Lower labor costs for maintenance and operations staff members and lower material costs
- Build an informed public that is generally more supportive of the agency
- Protect the biological and cultural integrity of the parks as a way of serving functions, such as water and air quality protection, important to the welfare of surrounding communities.

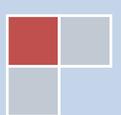
APPENDIX C:
DESIGN REVIEW PROCESS AND GUIDELINES (CCPRC)



DESIGN REVIEW PROCESS

With Guiding Principles

A process outline, designed to help guide the advancement of Agency stewardship efforts and to facilitate well designed and quality built parks, facilities and features throughout the Charleston County Park and Recreation Commission system. Its use also provides guidance in producing innovative, creative, efficient and effective solutions for use in the planning and development process.



Design Review Procedures

The Mission:

Committee's purpose is to ensure that the Agency's overall goals and objectives are achieved as each physical improvement is added to the CCPRC park system. Committee responsibilities will be to ensure that each project meets established policies and procedures; that there is consistency between projects and facilities and, that design, safety, and stewardship guidelines are followed while balancing costs considerations.

The Committee

One member (Standing Member) is from each of the following divisions; if unavailable, an alternate member from that division is to sit in:

Exec	Finance *
Ops	Planning **
Capital Projects	Recreation ***
Maintenance	<i>Safety/Stewardship</i> ****

* For meetings with applications relating to change orders
** Facilitates
*** As Applicable
**** Copied to provide comments, (not Committee Members)

The Applicant:

One or more staff members associated with the project, and, as needed, their consultants.

Submittal Instructions:

Deadline: each Wednesday, 12pm; Review will be the following Tuesday, 11am HQ Board Room
Submit Application to Design Review Coordinator: Cynthia Montague, HQ 762-8032

- Five (5) copies of the application and accompanying documents (drawings/photos/supporting documents) are required (unless all documents can be submitted electronically)
- Preferred submittal is electronically, if applicable
- Plans/drawings are to be drawn to scale
- The applications are available in public folders (Planning/Office Forms);
- The applicant will be the contact person for that Project
- Incomplete applications will not be reviewed until all requirements have been provided

The Meeting:

The meetings will be held each **Tuesday 11am HQ Board Room**. If the deadline for submittal is missed, the application will automatically go on the following week's agenda.

Prior to the meeting, the Committee will review the applications and be familiar with the project. The Committee will meet with the Applicant (and any others that wish to appear on behalf of the project). The Applicant (or designee), will present the project to the Committee. The Applicant(s) may also choose to not be present at the review. The Committee will render one of the following:

- Project Recommended for Approval – Proceed Forward (Design Review)
- Project Recommended for Approval W/ Stipulations –Proceed Forward (Design Review)
- Final Approval (Signs Only)
- Recommend for Funding (Change Orders)
- Recommend to Continue on with Design Process (Any Category)
- Return to Applicant - For Further Work (Any Category)
- Project Unable to be Approved (Any Category)

Design Review Process

Guiding Principles

Overview:

Through careful planning and analysis, Charleston County Park and Recreation Commission provides quality park facilities for the citizens of Charleston County while concurrently protecting its natural and cultural resources. Thoughtful planning ensures that we continue to improve the quality of life, both now, and for future generations, and is in keeping with the Agency mission.

To help implement the above Agency goal, a *design review process*, complete with a committee to oversee individual projects, has been established to ensure strategic planning occurs prior to all new or renovated park development. The goals of the Process are:

- Help to advance stewardship efforts agencywide,
- Provide well designed and quality built parks, facilities and features
- Establish and maintain a leadership role in the Community, and within the park and recreation professional field, through the use of innovative, creative, efficient and effective solutions in the planning and development process

The *Design Review Committee's* role will be to review projects planned for development. The Committee's objective is to provide recommendations for each project with the overall goal, that each may be completed successfully while following the process and efficiently spending public funds. The Committee will review for:

- Adherence to stewardship objectives
- Compliance with the Agency's design standards
- The balance of costs consideration with other goals and objectives.

Pre Planning:

For any project that will be reviewed by the Design Review Committee, the Applicant is encouraged to contact Planning Division staff for guidance or assistance prior to the start of the project. The Planning staff can help with the process which, in turn, may result in moving the project forward more quickly.

Guiding Principles (continued)

General Design & Planning Standards Goals:

- All applicable Stewardship Principles have been applied (See Stewardship In Planning)
- Good Design Principles (both existing and implied) have been followed i.e. safety issues have been addressed; the new building design ties into surrounding features, etc.
- A Planning Sequence has been represented i.e. additional construction will not happen over newly developed project
- As appropriate, Public Participation has occurred For large, or all controversial projects, the information has been assimilated and addressed prior to submittal
- Preliminary Permitting research is to be done early in planning process to assure that the project can be accomplished, as planned
- Site Planning
The project is part of a Master Plan or is part of an independent of a plan or if not, why not.

Eligible Projects: All CRR, MCP, CEP projects included but not limited to:

- All Building projects including Picnic Shelters; Comfort Stations; Open Shelters; Enclosed Shelters; Multipurpose Structures (Park Centers); Utility Buildings & Out Buildings; Special Use Buildings (i.e. within water parks); Structural Changes; Redecoration; Roof Remodels/Changes
- Vehicular/Pedestrian /Circulation; Gateways (into parks/facilities); Intersections (site clearance); Access/Roads; Parking Areas; Pedestrian Circulation; Paved and Unpaved Walkways; Boardwalks; Pedestrian Entrances; Unpaved Trails & Roads
- Sports Facilities (Active Recreation)
- Specialty and Aquatic Facilities & Features; Playgrounds and Equipment;
- Water Access (boat landings); Docks; Boat Ramps; Piers
- Site Furnishings; Trash Receptacles/Recycling Areas
- All Permanent Signs, including Movable signs
- Landscaping & Planting Renovation; Fencing; Exterior Lighting; Large Trash Enclosures

Consultant Specific Guidelines

All Consultant prepared plans must follow same above guidelines for Design Review. In addition, the following shall be addressed:

- A preliminary budget, at a minimum, is to be provided
- All applicable construction documents (sets), must be submitted to the Committee at each phase of review including cost estimates

Guiding Principles (continued)

Consultant Specific Guidelines (continued)

- For change order applications, at a minimum preliminary costs must be provided at a preliminary review. If no need for a preliminary review, costs must be provided at the final (only) review.
- The applicant must be able to address all previous staff/public comments if they have not been included in the submittal.
- All other requirements as noted on the Application Form must be met.

Stewardship in Planning

To accomplish the goal of becoming more environmentally responsible toward the land and its resources, environmentally sustainable objectives and materials should be incorporated wherever possible in the planning, construction and operation of new, and renovated park facilities. At existing parks and facilities, revised operational and maintenance practices that can reduce environmental impacts over the life span of that park or facility will also significantly help in the effort. The following are achievable goals for improving stewardship practices within the Agency.

Sites:

- Develop a master plan utilizing low impact development strategies
- Maximize natural spaces
- Provide facility access through alternative transportation opportunities (walking, bicycle, public transport, etc)
- Provide safe pedestrian and bicycle connections within the parks and facilities
- Protect or restore habitat areas
- Enhance, improve or expand wildlife habitats
- Protect and investigate areas of archeological or historical interest or significance
- Reduce heat emissions produced by development
- Reduce construction pollution (promote construction waste management)
- Reduce light pollution
- Improve water quality and reduce storm water run-off
- Balance cut and fill of grading during development
- Optimize building orientation to maximize solar impact, views, land and environmental disturbance,
- Retain and utilize native plant materials in the landscape
- Locate recycling facilities in appropriate locations
- Provide shared parking facilities
- Prevent safety, graffiti & vandalism

Guiding Principles

(continued)

Stewardship in Planning *(continued)*

Water:

- Use low water consumption irrigation technologies and techniques
- Utilize water use reduction strategies
- Provide low or no consumption plumbing fixtures
- Incorporate innovative wastewater technologies
- Develop and integrate rainwater collection systems

Energy:

- Maximize natural lighting
- Minimize night light pollution
- Optimize energy performance in buildings (equipment, appliances, HVAC & lighting)
- Utilize on-site renewable energy (solar, wind, rain, tides, geothermal, etc).
- Incorporate new technologies in roof design (highly reflective, insulating, heat reduction capabilities)

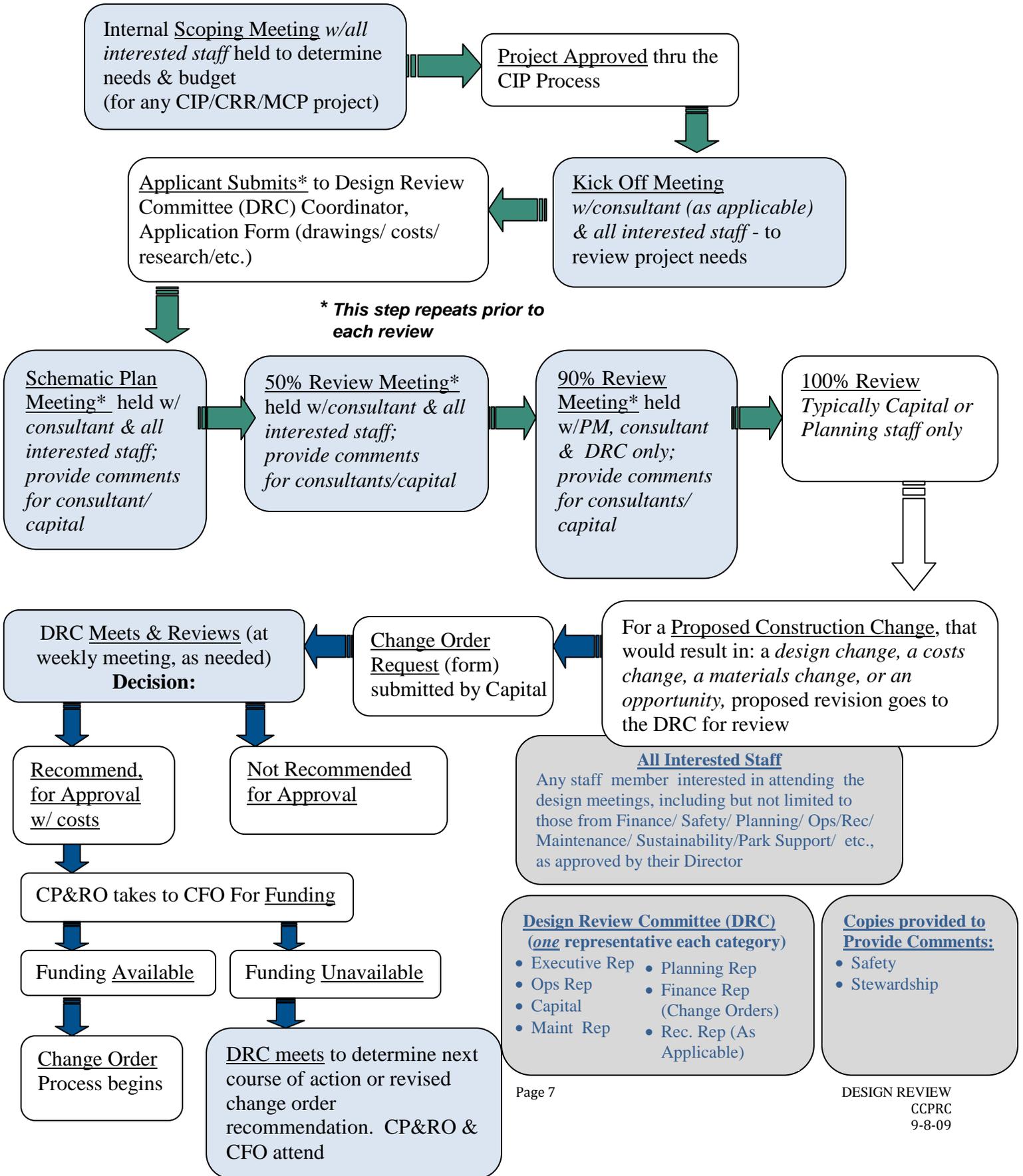
Materials:

- Provide low maintenance, long-life materials
- Obtain materials locally/regionally
- Use Forest Stewardship Council certified wood, where possible
- Distribute organic debris on site versus taking off site, where possible
- Utilize rapidly renewable materials
- Reuse/repurpose products and materials
- Use products containing recycled content

Indoor Environmental Quality

- Specify no or low-emitting materials (paints, coatings, carpet, adhesives and sealants, etc.)
- Maximize daylight and views ; Minimize artificial light
- Minimize indoor chemical & pollutant sources; Increase natural ventilation
- Provide local controllability of systems such as lighting, and HVAC and utilize high efficiency air exchange

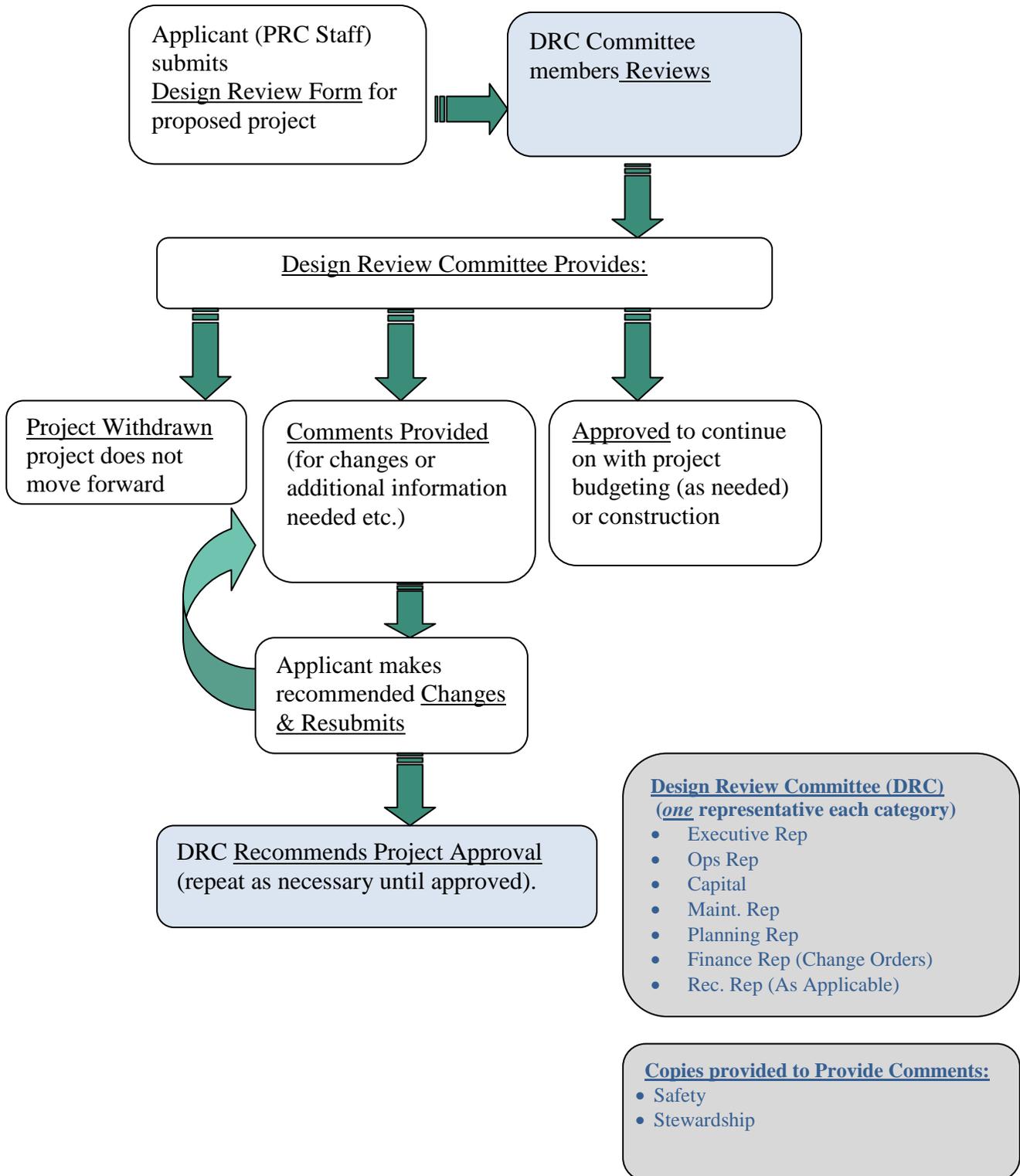
DESIGN REVIEW LARGE PROJECTS Budgets Over \$25,000



DESIGN REVIEW

SMALL PROJECTS

Budgets Under \$25,000



DESIGN REVIEW SIGNS

Including Installation Process

Determine Project Type

- Sign Only
- Part of Multifaceted Project

Sign Only

- w/ Approved Budget
- No Consultant is Utilized
- Includes: Renovation/Revision of Existing Sign (some CRR and/or within Division Budgets); New Sign(s) in Existing Area(s)

Multifaceted Project

- w/ Approved Budget
- When Consultant is Utilized
- Includes: CIP/CRR/MCP

- **Tasks Include:** design*, purchase order, permitting (as needed), site locating* & installation supervision at existing facilities
- **Responsibility:** *Initiating Staff*
- **Requirements:** To follow existing design guidelines*/park facility existing standards
- **Installation:** *Contractor/Staff*

- **Tasks Include:** all necessary signs for major projects including design, contracting, permitting (as needed), site locating* & installation supervision
- **Responsibility:** *Consultant & CCPRC Project Manager*
- **Requirements:** To follow existing design guidelines*/park facility existing standards & incorporate into plans/specs.
- **Installation:** *Sub-Consultant* (to general contractor) OR, separate *Sign Contractor* (managed by CCPRC Project Manager)

Sign Design Review:
Planning Preliminary Approval
Design Review Committee
Final Approval

Sign Design Review:
Design Review Process Approval w/
all other project design

Design Review Committee (DRC)
(one representative each category)

- Executive Rep
- Ops Rep
- Capital
- Maint. Rep
- Planning Rep
- Finance Rep (Change Orders)
- Rec. Rep (As Applicable)

Copies provided to Provide Comments:

- Safety
- Stewardship

*As Requested, the Planning Division Staff will assist *Initiating Staff/Consultant* with Design/Guidelines/Site Layout

APPENDIX D:
LIST OF COMPLETED STUDIES (CCPRC)

MATRIX OF COMPLETED STUDIES - January 2014

PROPERTY	SURVEY DATA						STUDIES/ INVENTORIES					MANAGEMENT PLANS			MASTER PLANS		
	Boundary	Wetland	Hydrographic	Topographic	LiDAR	Tree	Cultural Resource	Environmental Site Assessment	Ecological Baseline Assessment	Threatened & Endangered Species	Plant Community	Aquatic (Impoundment/Pond)	Forest	General Natural Resource	Land Use	Conceptual	Final Master Plan
ASHLEY RIVER FUTURE PARK SITE	X	X					X*	X									
AWENDAW FUTURE PARK SITE	X	X					X	X		X		X					
BULOW FUTURE PARK SITE	X	X*			X*		X	X		X*	X	X			X*		
CAW CAW INTERPRETIVE CENTER	X	X					X		X		X	X					X
COOPER RIVER MARINA	X	X	X														
EDISTO FUTURE PARK SITE	X	X*					X	X	X	X	X*	X			X*		
FOLLY BEACH - EAST ARCTIC FUTURE PARK SITE	X														X*		
FOLLY BEACH COUNTY PARK	X																X
FOLLY BEACH FISHING PIER	X																X
ISLE OF PALMS COUNTY PARK	X																X
JAMES ISLAND COUNTY PARK	X	X					X*	X									X
JOHNS ISLAND COUNTY PARK (MULLET HALL)	X	X										X					X
KIAWAH BEACHWALKER COUNTY PARK (leased)																	
LAUREL HILL FUTURE PARK SITE (leased)	X						X	X			X*	X*					X
LIGHTHOUSE INLET HERITAGE PRESERVE	X	X					X	X	X		X		X				X
LIMEHOUSE POINT FUTURE PARK SITE							X	X			X						
McCLELLANVILLE FUTURE PARK SITE	X	X*						X	X			X					
McLEOD PLANTATION FUTURE PARK SITE	X			X		X	X	X			X		X				X
MEGGETT FUTURE PARK SITE	X	X					X	X			X*	X					
MOUNT PLEASANT MEM. WATERFRONT PIER (leased)																	X
OLD TOWNE CREEK FUTURE PARK SITE							X	X			X						
PALMETTO ISLANDS COUNTY PARK	X	X*					X*										X
RAVENEL FUTURE PARK SITE																	
RIFLE RANGE FUTURE PARK SITE	X	X		X		X	X				X*	X	X				
SECESSIONVILLE FUTURE PARK SITE							X*										
SKATE PARK	X	X				X		X									
WANNAMAHER N. CHAS. COUNTY PARK	X	X			X*		X*										X

*indicates partial site information

APPENDIX E:
BIODIVERSITY REPORTING FORM – DRAFT (CCPRC)

Species Type	Family	Common Name	Genus	Species
<i>Herbaceous</i>				
<insert rows as-needed>				
<i>Woody Shrub</i>				
<insert rows as-needed>				
<i>Woody Vine</i>				
<insert rows as-needed>				
<i>Woody Tree</i>				
<insert rows as-needed>				
<i>Amphibians</i>				
<insert rows as-needed>				
<i>Birds</i>				
<insert rows as-needed>				
<i>Mammals</i>				
<insert rows as-needed>				
<i>Reptiles</i>				
<insert rows as-needed>				
*Indicates non-native introduced species				

APPENDIX F:
SOUTH CAROLINA EARLY DETECTION AND RAPID RESPONSE
TARGET SPECIES (SC-EPPC)

South Carolina Early Detection and Rapid Response Target Species*

<p>State Early Detection (ED) Species</p> <p>(Non-native invasive plants which threaten but are not known to occur in South Carolina)</p>	Regulated Species:	EDRR Zones of Concern
	1. Benghal Dayflower (<i>Commelina benghalensis</i>) L. jio	All
	2. Giant Hogweed (<i>Heracleum mantegazzianum</i>) Sommier & Levier	M, P
	3. Karib-weed, Giant Salvinia (<i>Salvinia molesta</i>) Mitchell (Eradicated from Colleton County in 1995)	All
	4. Professor-weed, Goatsrue (<i>Galega officinalis</i>) L.	All
	5. Japanese Dodder (<i>Cuscuta japonica</i>) Choisy (Eradicated from the Clemson Arboretum in 1994)	All
	6. Hellroot, Small Broomrape (<i>Orobanche minor</i>) Sm. (Eradicated from Erskine College Campus in 1993)	All
	7. Burningbush, Winged Euonymus (<i>Euonymus alatus</i>) (Thunb.)Siebold	M, P
	Other ED Species:	
	8. Canada Thistle (<i>Cirsium arvense</i>) (L.) Scop.	M, P
	9. Chocolate Vine (<i>Akebia quinata</i>) (Houtt.) Decne.	M, P
	10. Woodrush flatsedge, Deeprooted Sedge (<i>Cyperus entrerianus</i>) Boeckeler	All
	11. Garlic Mustard (<i>Alliaria petiolata</i>) (M.Bieb.) Cavara & Grande	M, P
	12. Bushkiller (<i>Cayratia japonica</i>) (Thunb.) Gagnep.	P
	13. Oriental Bittersweet (<i>Celastrus orbiculatus</i>) Thunb.	M, P
14. Small-leaf or Old World Climbing Fern (<i>Lygodium microphyllum</i>) (Cav.)R.Br.	P, CP	
15. Purple Loosestrife (<i>Lythrum salicaria</i>) L.	M, P	
<p>State Rapid Response Species</p> <p>(Non-native invasive plants which are limited in distribution yet potentially pose a threat to SC resources)</p>	Regulated Species:	EDRR Zones of Concern
	16. Cogongrass (<i>Imperata cylindrica</i>) (L.)P.Beauv.	All
	17. Common Reed (<i>Phragmites australis</i>) (Cav.)Trin.ex Steud.	CP
	18. Waterhyme or Hydrilla (<i>Hydrilla verticillata</i>) (L.f.)Royle	All
	19. Tropical Soda Apple (<i>Solanum viarum</i>) Dunal	All
	20. Asiatic Witchweed (<i>Striga asiatica</i>) (L.)Kuntze	All
	Other EDRR Species:	
	21. Roundleaf chastetree or Beach Vitex (<i>Vitex rotundifolia</i>) L.f.	CP
	22. Japanese Knotweed (<i>Polygonum cuspidatum</i>) Siebold & Zucc.	All
	23. Tamarisk or Saltcedar (<i>Tamarix</i> sp.)	CP
24. Japanese Climbing Fern (<i>Lygodium japonicum</i>) (Thunb.)Sw.	All	

*Authorities, latin and common names based on the PLANTS database @ <http://plants.usda.gov/index.html>. EDRR Zones of Concern include Blue Ridge Mountains (M), Piedmont (P), Coastal Plain (CP), based on maps from the SC Plant Atlas, the SE-EPPC EDDMAPS database, and observations of local experts.

APPENDIX G:
NATIVE PLANTS LIST (CCPRC)

NATIVE PLANT LIST - FOR GENERAL PARK PLANTING
3/10/95

The following plants are for general park planting projects. These plants are native to the South Carolina Lowcountry and are most suitable for planting in reforestation and other desired natural areas. This list also reflects plants that are available from current nursery sources. The list should be used as a guide since often, certain plants are not available within the nursery industry for a period of time.

For a plant list suitable for highly landscape areas (such as around buildings and at entrances see the "Landscape Plants List").

<u>COMMON NAME</u>	<u>BOTANICAL NAME</u>	<u>MINIMUM SIZE PLANTING RECOMMENDATION</u>
LOW SHRUBS (6" - 4')		
Bush Honeysuckle	Dievilla sessilifolia	
Dwarf Fothergilla	Fothergilla gardenii	
Smooth Hydrangea	Hydrangea arborescens	
Inkberry	Ilex glabra	
MEDIUM SHRUBS (4-8')		
Serviceberry	Amelanchier spicata	
Wild Indigo	Amorpha fruticosa	
Sweetshrub	Calycanthus floridus	
Beauty Berry	Callicarpa americana	
Alt.-leaved dogwood	Cornus alternifolia	
Hazel Nut	Corylus americana	
Strawberry Bush	Euonymus americanus	
Fothergilla	Fothergilla major	
Oakleaf Hydrangea	Hydrangea quercifolia	
Fetterbush	Lyonia lucida	
LARGE SHRUBS (6-15')		
Bottlebrush Buckeye	Aesculus parviflora	
Buttonbush	Cephalanthus occidentalis	
Fringetree	Cliftonia monophylla	
Swamp Dogwood	Cornus amonum	
Hawthorn	Crategus marshallii	
Lost Gordonia	Franklinia altamaha	
Loblolly Bay	Gordonia lasianthus	
Witchhazel	Hamamelis virginiana	
Dahoon	Ilex cassine	
Possumhaw	Ilex decidua	
Myrtal Holly	Ilex myrtifolia	
Winterberry	Ilex verticillata	
Yaupon Holly	Ilex vomitoria	
Wax Myrtle	Myrica cerifera	

COMMON NAMEBOTANICAL NAMEMINIMUM SIZE PLANTING
RECOMMENDATION**LARGE SHRUBS (6-15')**
continued

Devilwood	<i>Osmanthus americanus</i>	
Winged Sumac	<i>Rhus copallina</i>	
Smooth Sumac	<i>Rhus glabra</i>	
Sparkleberry	<i>Vaccinium aboreum</i>	
Arrowwood	<i>Virburnum dentatum</i>	
Black Haw	<i>Virburnum prunifolium</i>	
Spanish Bayonet	<i>Yucca aloifolia</i>	

SMALL TREES (10'-30')

Hornbeam	<i>Carpinus caroliniana</i>	
Calolina Silverbell	<i>Halesia carolina</i>	
American Holly	<i>Ilex opaca</i>	
Sweetbay	<i>Magnolia virginiana</i>	
Palmetto	<i>Sabal palmetto</i>	
River Birch	<i>Betula nigra</i>	multi-stem 6'0" height
Flowering Dogwood	<i>Cornus florida</i>	2" Cal
<i>Prunus serotina</i>	Black Cherry	

LARGE TREES (over 35')

Bigleaf Magnolia	<i>Magnolia macrophylla</i>	
Sugar Maple	<i>Acer saccharum</i>	
Hackberry	<i>Celtis occidentalis</i>	
Sweetgum	<i>Liquidambar styraciflua</i>	
Tuliptree	<i>Liriodendron tulipifera</i>	
Cucumbertree	<i>Magnolia acuminata</i>	
Common Persimmon	<i>Diospyros virginiana</i>	
Southern Magnolia	<i>Magnolia grandiflora</i>	
Water Tupelo	<i>Nyssa aquatica</i>	
Black Gum	<i>Nyssa sylvatica</i>	
Longleaf Pine	<i>Pinus palustris</i>	
Eastern White Pine	<i>Pinus strobus</i>	
Loblolly Pine	<i>Pinus taeda</i>	
Virginia Pine	<i>Pinus virginiana</i>	
American Sycamore	<i>Platanus occidentalis</i>	
White Oak	<i>Quercus alba</i>	
Southern Red Oak	<i>Quercus falcata</i>	
Laurel Oak	<i>Quercus laurifolia</i>	
Water Oak	<i>Quercus nigra</i>	
Pin Oak	<i>Quercus palustris</i>	
Willow Oak	<i>Quercus phellos</i>	
Red Oak	<i>Quercus rubra</i>	
Live Oak	<i>Quercus virginiana</i>	

WOODY VINES

Trumpetcreeper	<i>Campsis radicans</i>
Bittersweet	<i>Celastrus scandens</i>
Carolina Jessamine	<i>Gelsemium sempervirens</i>
Trumpet Honeysuckle	<i>Lonicera sempervirens</i>
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
American Wisteria	<i>Wisteria frutescens</i>

COMMON NAMEBOTANICAL NAMEMINIMUM SIZE PLANTING
RECOMMENDATION**FERNS**

Maidenhair Fern	<i>Adiantum pedatum</i>
Southern Lady Fern	<i>Athyrium asplenioides</i>
Marginal Wood Fern	<i>Dryopteris marginalis</i>
Sensitive Fern	<i>Onoclea sensibilis</i>
Cinnamon Fern	<i>Osmunda cinnamomea</i>
Royal Fern	<i>Osmunda regalis</i>
Christmas Fern	<i>Polystichum acrostichoides</i>
Bracken Fern	<i>Pteridium aquilinum</i>
Wood Fern	<i>Thelypteris kunthii</i>

HERBACEOUS PERENNIALS

(In many instances, additional species within the species may be suitable)

Columbine	<i>Aquilegia canadensis</i>
Jack-in-th-Pulpit	<i>Arisaema triphyllum</i>
Wild Ginger	<i>Asarum canadense</i>
Butterfly-weed	<i>Asclepias tuberosa</i>
Aster	<i>Aster species</i>
Blue Wild Indigo	<i>Baptisia australis</i>
Wild Indigo	<i>Baptisia pendula</i>
Green & Gold	<i>Chrysogonum virginianum</i>
Coreopsis	<i>Coreopsis auriculata</i>
Toothwort	<i>Dentaria diphylla</i>
Shooting-star	<i>Dodecatheon meadia</i>
Wild Geranium	<i>Geranium maculatum</i>
Sunflower	<i>Helianthus angustifolius</i>
Liverleaf	<i>Hepatica nobilis</i>
Wild Cotton	<i>Hibiscus moscheutos</i>
Dwarf Iris	<i>Iris cristata</i>
Blazing Star	<i>Liatris spicata</i>
Cardinal Flower	<i>Lobelia cardinalis</i>
Great Lobelia	<i>Lobelia siphilitica</i>
Virginia Blue Bells	<i>Mertensia virginica</i>
Bee-balm	<i>Monarda didyma</i>
Horsemint	<i>Monarda fistulosa</i>

GRASSES

APPENDIX H:
LANDSCAPE MAINTENANCE GUIDELINES FOR OPERATIONAL PARK
FACILITIES – DRAFT (CCPRC)

Landscape Maintenance Guidelines for Operational CCPRC Park Facilities

Soil Amendment

Soil amendment is material which is added to the soil to improve the plants growth and overall health. An areas region helps classify the type of soil amendment used, depending on soil composition, climate, and the type of plant. Various soils lack the proper nutrients needed to have successful plant growth. Several different materials are used for these cases. Lime makes soil less acidic, fertilizer (i.e. manure, compost) adds nutrients to depleted plants, and peat and bark will help soil retain more water. Careful consideration should be made when choosing the appropriate amendment to make sure it is environmentally friendly and will benefit the park and its stewardship practices.

Planting

Buying locally reduces our impact on the environment, and promotes the local economy. When possible the maintenance division will look to local suppliers to purchase landscape materials.

Planting areas are broke into two zones – either “Active” or “Conservation”. These categories are meant to achieve the management objectives for each particular area with the least impact on the environment and the patrons within our park system.

1. Active
 - a. Water Park and water feature areas- These landscaped areas are managed for a manicured tropical look to coincide with the water features. To accomplish this management goal native plants and the use of approved non-native plants are acceptable.
 - b. Specialty areas (Hanging baskets, Entrances, Gate houses) - These landscaped areas are designed for the attraction of people or wildlife. Approved non- natives are able to be used in these areas
 - c. Building envelope- These landscaped areas around buildings are designed to soften the appearance and provide an attractive look.
2. Conservation
 - a. Day park and general public areas-These landscaped areas are to use native plants to accomplish any management objectives.

Plant selection

Site preparation, species selection, and planting layout are site-specific. All plants will be selected based on the management objective for a particular area. All needs will be considered including water, location within the park in accordance with the landscape categories, blooming time, and derived from the plant lists. (Refer to the appendix of this document for plant lists)

The goal of any natural area planting is to restore a functional native plant community.

The two basic steps in planting are preparing the site, and setting the tree or shrub. Proper preparation will encourage root growth rather than adding to the difficulties already challenging the newly planted trees or shrubs.

- Ideal planting hole is twice the diameter of the root ball (depending on existing soil conditions)
- Minimum planting hole is 12” wider than root spread or root ball
- Hole shall be no deeper than the ball and the ball shall sit firmly on the undisturbed subsoil
- Balled-and-burlapped trees shall be placed in the hole and plumbed vertically. All Rope shall be removed from around the trunk of the tree and the top 1/3 of the
- Burlap shall be folded back down into the hole. Whenever possible complete removal of the top third of burlap by cutting it away with a sharp knife is preferred.
- Trees in wire baskets shall have all of the basket removed, using bolt cutters
- Backfill soil in lifts of 4-6” at a time with compaction of each layer. Do not compact muddy backfill. Water thoroughly after backfilling to settle the soil, eliminate air pockets and re-wet the root system.
- Trees planted in sandy or loamy soils should have a 3” high berm erected just past the perimeter of the planting hole to funnel water to the root ball and wet the hole/sidewall interface.
- Berms should not be constructed in clay soils or on heavily compacted sites.

Mulching

Mulching is one of the easiest ways to protect all vegetation types. Mulching is an essential component of any natural area planting project for suppressing weeds/invasives and thereby reducing root competition. Mulch conserves soil moisture, keeps soil cool, and to adds organics to nutrient-deficient soils. Mulching material in developed landscape areas may include Pine straw, Cedar mulch or Hardwood mulch.

Mulching around Trees

- Clear weeds and grass from under the tree, in a circle out to the drip line at the tips of the branches.
- Spread layer of organic mulch, 2-4” deep in developed landscape areas in a circle out to the tree’s drip line or in a 3’ diameter circle (whichever is greater).
- Keep mulch away from the tree trunk to prevent crown rot or insect damage.
- Maintain 3”-4” of mulch annually in developed landscape areas (during 3 year establishment period or beyond as needed).

Mulching around Shrubs

- Follow similar procedures as for trees, above.
- Spread layer of organic mulch 2-3” deep in developed landscape areas
- Cover entire planting bed with mulch where applicable.
- Keep mulch away from contact with crown of plant.

Pruning

Pruning Trees

Pruning for safety

- Remove branches that grow to low and could cause injury or property damage.
- Trim branches that interfere with site lines on streets or driveways.
- Remove or trim branches in natural areas that are a hazard to public safety.

Pruning for Health

- Create a strong structure when tree is young.
- Remove dead, diseased or damaged branches to increase strength and longevity of trees.
- Thin crown to increase airflow and reduce pest problems.
- Remove crossing and rubbing branches.
- Do not apply dressing to pruning wounds, as this may invite disease problems.

Pruning for Aesthetics

- Enhance the natural form and character of the tree.
- Never 'top' trees

Pruning Shrubs

Pruning for Health

- Follow principles of natural target pruning.
- Make cuts as close to the bud as possible.
- Do not leave stubs.

Pruning for Aesthetics

- Enhance balanced, natural shape of shrub species.
- Remove crowded and crossing branches.
- Remove terminal bud to stimulate lower branching.
- Remove reverted shoots.
- Enhance flowering and fruiting.

Plant Removal

Plants may be removed from time to time for many different reasons. In developed parks, some trees may be hazardous due to old age, damage from storms, or death of a tree. Only in these instances should a tree be removed. In natural areas, these types of trees should be left in their natural state unless they pose a hazard to visitors. In construction of a new building, shrubs and trees will be removed for this project. The first goal is to see if these plants can be removed and replanted around the new building or throughout the parkland. If the removed plants cannot be saved, they should be recycled within the park as wildlife brush piles within the upland habitat.

Strategies:

1. Remove hazardous trees if in direct path of visitor areas

2. Determine if a tree or shrub is worth transplanting or removing completely
3. Create wildlife habitats with brush piles when allowed
4. Remove any plant that is diseased and dispose of off site

Turf Care

Turf is the term applied to any lawn or grasses grown in the developed landscapes within the park. The wide variety and type of use indicates varied maintenance and management practices

Turf classes are established for each park:

Class A: High management area- This grass is the most highly visible grass park wide. Programs including topdressing, Irrigation, aerating, and pre-treatment for insects and diseases will be established based on a third party soil sample and followed to ensure the turf is maintained. Six parks contain class A turf.

1. PICP (6 Acres)
 - Four acre meadow
 - Big toy area
 - Splash Island
2. JICP(18 Acres)
 - Ten acre meadow
 - Park Center
 - Entrance and Islands
 - Gate House
 - Splash Zone
3. FBCP
 - Dunes house
 - Front entrance
4. Pier
 - Parking lot Islands
5. IOP and Boat Landings
 - Park center to overflow parking area
6. WCP (10 Acres)
 - 6 Acre Meadow
 - Day Park Concessions area
 - Play hill
 - Water Park
 - Sun mounds

Class B: Medium management area- These turf areas will be maintained through integrated pest management. Organic based products will be highly considered in these areas when fertilizer is needed. They are mowed on a weekly basis during the growing season from April through October and watered if there is an extreme drought.

Class C: Low management area- These Turf areas are usually fields, grassed parking areas, or roadsides. No additional treatment takes place in these areas. They are maintained by mowing weekly during the growing season from April through October.

Mowing

- During the growing season (April Through October) the turf should be mowed weekly.
- Mow to a height of 2 to 2.5 inches (avoid removing more than 1/3 leaf blade height at any one time).
- Care should be taken in areas where tree roots protrude above the ground surface, and mower height should be raised whenever possible to avoid excessive root damage.
- Alternate mowing patterns to avoid ruts and compaction from the wheels.
- Avoid driving on frozen turf.
- Avoid driving on wet ground where ruts will remain.

Trimming

- Use walk- behind mowers and line trimmers where site cannot be accessed by riding mowers, and around trees to avoid trunk damage from riding mowers.

Irrigation

- Apply approximately one inch of water per week.
- Monitor auto irrigation effectiveness on a weekly basis.

Aeration

- 2 to 3 times per year using .75 inch hollow tines.
- Best periods: March/April, late June, late August.
- Make two passes at 90 degree angles.

Top Dressing

- Use 80% coarse sand and 20% composted organic material.
- Most effective when done lightly and frequently.
- Apply ¼ inch, each application.
- Monthly applications in heavy wear areas during peak seasons is ideal

Proper training and licensing will be maintained to ensure the chemicals used are used safely and in accordance with the chemicals label.

Postings will be made to inform patrons for the time required by the manufacturer. Areas will use organic alternatives where applicable

All fertilizer applications are based off of the recommendations of the soil sample

The use of organic products will be highly considered with in water parks, playgrounds and dog parks to accomplish the turf management goals.

Pond Care

Water will be managed to accomplish our goals in the safest way possible for the environment and the patrons of our parks. When needed, Bubblers/aerators will be used as an alternative management tool to

increase the beneficial bacteria, reduce the accumulation of organic matter on the bottom of the body of water, and to maintain the oxygen level of the water. This will decrease the likelihood of fish kills and increase the overall health of the water.

Hydrogen peroxide based products will be used, as an alternative to copper based products, when needed to maintain the health of the water. Copper based products can contaminate the water with heavy metal that will remain in the water for long periods of time.

Water test will be taken to determine if the water needs treatment annually

Scheduled fish counts will be conducted by the DNR to determine the health of the fish population (free fish to be provided by DNR)

Chemical Use/IPM

During all chemical applications personal protective equipment will be worn as required by the label. All PPE will be inspected on a routine basis. Any PPE found to be expired or in any other way unfit to provide the proper protection, will be disposed of properly and new PPE will be issued.

No application will take place without the proper PPE equipment.

Pesticides will be considered carefully. They can be harmful to the health of the applicators, park patrons, and the environment. Recognizing this, the maintenance division will not allow any chemical application which is not in accordance of the state licensing requirements.

Pesticide free areas

These are areas which have been determined to have high exposure potential to patrons, bodies of water and/or wildlife. Within these areas alternatives to synthetic fertilizers and pesticides will be a high priority.

- Water parks/water features
- Dog parks
- Playgrounds
- Buffer zones

All applications will consider use by the patrons, turf type, and effects on the environment. All applications will be made based on the labels recommendation for a particular pest/ disease. All applications will consider the timing of the application, the recommended method, and amount of product recommended for use on a specific pest to achieve the best result.

Watering

Watering is the key to plant survival. The humid sub-tropical climate in South Carolina can take a toll on many plants. This is particularly important on plants that have been recently planted. Proper watering needs to be maintained until the plant has been fully established. Controlling water management and proper irrigation, the parks can reduce runoff. An irrigation infrastructure should be managed and maintained for high usage areas, such as around park centers. Proper planning for temporary or permanent irrigation should be part of future development or planting.

Natural areas do not need this type of water management, as they contain native species which have acclimated to the regions climate. During high drought months, the first course of action should be to water the most valuable species of trees and plants to the park. Turf grass should maintain its regular watering to remain its visual appeal to the visitors.

Weeding and Invasive Control

Weeding and controlling invasive are necessary as an ongoing maintenance action throughout the Park in developed landscaped areas as well as natural areas. In addition, most natural area planting projects will include initial removal and ongoing control of invasive as a major component of the project, as will reclamation and renovation projects in the historic landscape areas. (Refer to the Invasive species list in the appendix of the document for recommended action on certain species. Generally, the most effective long-term control of invasive species is achieved by using a combination of control methods, reducing site disturbance, and establishing healthy native plant communities.) All control efforts should be directed over time towards establishing and maintaining more sustainable plant communities.

Invasive control should focus on those species and specific infestations that are:

- The fastest-growing,
- The least established but potentially threatening,
- The most disruptive to functional habitat
- Listed noxious weeds with mandated control.

APPENDIX I:
WILDLIFE CONFLICTS PROCEDURES (CCPRC)

**Charleston County Park and Recreation Commission
2013 Wildlife Conflicts Procedures**

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BACKGROUND

The Charleston County Park and Recreation Commission seeks to protect and perpetuate, as part of the natural environment, the native plants and animals of the Charleston County Park system. Equally, the commission is concerned with the health of the ecosystem as a whole as well as the safety of park visitors and staff. Fortunately, in many cases, the safety of both the animals and park visitors can be protected through the use of common sense and application of the following procedures.

When a wildlife-patron conflict arises, the CCPRC will always begin by applying non-lethal means first if a non-lethal means exists. This is rarely followed by lethal means if recommended by a wildlife agency or human health agency and approved by the Executive level staff.

Conflict Prevention Through Visitor Education

These procedures are strengthened by CCPRC's proactive educational and interpretive approach to inform the public and staff so that we can prevent many potential wildlife conflicts. Each staff member is expected to educate patrons to the best of his/her ability about CCPRC's role as a steward of wildlife and to serve as a good role model for behavior we expect from patrons. Educated patrons are far more likely to follow regulations because they understand why the regulations are necessary to protect the natural resources they enjoy on their park visits. If you can guide a patron to understand that parks are a place for wildlife as well as people or simply serve as a good role model for behavior that protects instead of imperils wildlife, you will prevent wildlife-patron conflicts from happening.

Inherent Risks of Sharing Parks with Wildlife

It is important to realize that entering a natural area, such as a park, has some inherent risks. Just as we can not protect patrons from every hazard represented by the park's non-living features, such as uneven terrain or sudden changes in weather, the agency can not protect patrons from all risks represented by wild animals and plants.

Working with Other Agencies

In nearly all situations, we rely heavily on wildlife agencies and commercial animal control businesses that employ professionals to handle wild animals. Everyone working on a wildlife-patron conflict call is attempting to resolve the situation as quickly as possible, but other agencies may be very busy responding to other calls or may not place the same priority on a conflict that the CCPRC does. Occasionally, patience is needed.

CONTACT INFORMATION & IMPORTANT CONSIDERATIONS

Why Follow These Procedures?

While it may sometimes seem easier or faster to handle a call yourself, doing so puts you and the agency at risk of litigation because of state and federal regulations. Additionally, it may put you or a patron at risk of bodily harm or death if a wildlife call is handled improperly. The guidelines in these procedures have been refined continually since 1992 and are the agency's official coordinated response. The procedures give patrons and wildlife the protection and consideration they require. For these reasons, CCPRC employees must strictly adhere to these procedures.

Tracking Wildlife Calls

Incident Reports (IR) can be highly important for establishing patterns over many years, getting a clearer picture of the complete situation, and for adhering to laws. When the purpose of the IR is to provide thorough, accurate, and timely information so the agency can make a fully informed decision about how to handle a wildlife call, it is important for the MOD to talk directly to the Natural History Interpretation Coordinator or Natural History Interpretation Specialist. In these cases, the IR will be completed by the Natural History Interpretation Coordinator or Natural

History Interpretation Specialist **while on the phone with the MOD**. When the purpose of the IR is simply to serve as a matter of record, it will be completed by the MOD and routed in the normal way. In still other cases, the agency may not require an IR. Please read the procedure very closely to determine when or if an IR is utilized during a specific wildlife conflict.

Phone Numbers

Please follow this order when making calls unless indicated otherwise in specific procedures.

1. Always call the Manager on Duty (MOD) at your park first.
2. Natural History Interpretation Coord. 408-1470
3. Natural History Interpretation Specialist 224-8435
4. Interpretation Manager 408-6381
5. Interpretation Department 889-8898

FEEDING OF ANIMALS

Overall, the best action staff can take to prevent wildlife conflicts is to never allow people to feed animals either on purpose or as a result of carelessness. All animals are attracted to garbage and food. Feeding of wild animals or providing easy access to garbage affects the well being of the animals and creates a nuisance and safety issue. Sometimes, a change in the animals' diet can cause them to become unhealthy or can even lead to death. In other cases, animals that have been fed approach people and pose a serious threat to the safety of park visitors. These animals, such as alligators and Canada geese, that do approach people due to feeding must be removed or killed. Due to this, **Charleston County Park and Recreation Commission strictly forbids the feeding of ANY wild or feral animals within the parks.**

If it is specifically addressed in a CCPRC master plan or a resource management plan, a feeding area may be exempted from these procedures.

NUISANCE ALLIGATOR CONTROL

Most, if not all, alligator "problems" can be prevented by managing visitor behavior that causes alligators to become more aggressive. It is important to understand and communicate to visitors that alligators are docile creatures unless one feeds them or harasses them or their babies. Enforceable state laws govern alligator removal.

CCPRC Definition of a Nuisance Alligator

Nuisance Alligator – Any alligator that poses a real, potential or perceived threat to the safety of park visitors or park staff.

An alligator is not a nuisance animal simply by being in its natural habitat within the park system. If an alligator's natural habitat is used in a way that is incompatible with the health or

welfare of the alligator or results in a concern for the safety of staff or visitors, the Natural History Interpretation Coordinator or Natural History Interpretation Specialist, after discussing options with the SC Dept. of Natural Resources, may deem the alligator likely to become a nuisance alligator. In this case, the alligator may be killed by a SC Dept. of Natural Resources alligator agent before it becomes a nuisance alligator.

Procedure for Nuisance Alligator Control

1. If a MOD suspects an alligator is a nuisance alligator, the MOD will contact the Natural History Interpretation Coordinator or Natural History Interpretation Specialist and provide details so the Natural History Interpretation Coordinator or Natural History Interpretation Specialist can complete a thorough IR. The procedures can not be activated by leaving details on a voice mail or an email message.
2. One of the following recommendations will be made by the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.
 - A) Leave the animal alone. Location, proximity to park visitors, proximity to program participants, and behavior of the animal are considered.
 - B) The animal is considered a nuisance alligator and CCPRC requires assistance from a SC Dept. of Natural Resources licensed alligator agent to kill it. A recommendation for the killing of an alligator requires approval of the Parks Division Director (PDD) before the action can be taken. If the Parks Division Director is not available, approval will be gained by following the chain of supervision beginning with the PDD's supervisor.
3. Implementation of the recommendation will be facilitated by the Natural History Interpretation Coordinator or Natural History Interpretation Specialist or his or her designee. There are important steps that must be taken, including issuing an alligator "tag" or permit assigned to CCPRC, to take the alligator legally.

In order to comply with state wildlife laws and restrictions enforced by the SC Department of Natural Resources for Alligator Removal, the following MUST BE DONE as the agency puts the recommendation into action.

- Do not attempt to harass, capture or ensnare any alligator.
- Do not attempt to restrict the alligator's movements by cornering, surrounding or other methods designed to keep the animal in a "convenient" location for capture.
- The Natural History Interpretation Coordinator or Natural History Interpretation Specialist will issue the alligator tag for CCPRC.

RABIES OR DISTEMPER

Populations of small mammals, especially raccoons and foxes, are periodically affected by diseases such as rabies or distemper. This is a natural process that can last for weeks or months. Although rabies and distemper produce similar symptoms in a given animal, they are two different diseases. Examples of these symptoms include disorientation, lack of muscle control, dull red eyes, seizures, diarrhea, vomiting, hair loss, and an overall rough appearance. It is **impossible** for a CCPRC staff member to tell if a mammal displaying the above symptoms has distemper or rabies. Only testing of the animal in a lab can determine whether the animal has distemper or rabies.

Distemper is not a threat to humans, but it can affect puppies and other unvaccinated dogs.

Unlike distemper, rabies can be lethal to humans if left untreated.

In the case of a **SICK ANIMAL** displaying the above symptoms:

1. Call the MOD.
2. Without harassing or approaching the animal, keep patrons away and monitor the situation.
3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist and provide details so the Natural History Interpretation Coordinator or Natural History Interpretation Specialist can complete a thorough IR.

If you see an **ANIMAL DYING OR DEAD** shortly after displaying the above symptoms:

1. Call the MOD.
2. Keep patrons away from the dead animal.
3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist and provide details so the Natural History Interpretation Coordinator or Natural History Interpretation Specialist can complete a thorough IR. A thorough record can not be created as a result of leaving details on a voice mail or an email message. The animal may need to be disposed of properly or a human health agency may need to test it. If it must be disposed of properly, go to step 4. If not, the Natural History Interpretation Coordinator or Natural History Interpretation Specialist will instruct you what to do with the animal so it can be tested.
4. Using Bloodborne Pathogen protocol and a shovel to protect yourself, take one of the following steps:
 - a. Bury the animal deep enough so that it cannot be dug up by other animals.
 - b. Place the animal in multiple layers of plastic bags and dispose of it in a dumpster.

If a **SICK ANIMAL IN A VERY BUSY AREA** may be dangerous to staff or visitors, or normal park operations are inhibited:

1. Call the MOD.
2. Without harassing or approaching the animal, keep patrons away and monitor the situation.
3. Call an animal control specialist (look in phone book yellow pages) to remove the animal.

4. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist and provide details so the Natural History Interpretation Coordinator or Natural History Interpretation Specialist can complete a thorough IR. A thorough record can not be created as a result of leaving details on a voice mail or an email message.

VENOMOUS AND NON-VENOMOUS SNAKES

Of the many different species of snakes in Charleston County, only six are venomous. They are:

Eastern Diamondback Rattlesnake
Eastern Cottonmouth (Water Moccasin)
Pygmy Rattlesnake
Eastern Canebrake Rattlesnake or Timber Rattlesnake (same)
Southern Copperhead
Eastern Coral Snake

All of these snakes may exist in our park system.

It is important to remember that venomous or not, most snakes will bite when threatened. A majority of persons bitten by snakes are bitten because they are either trying to catch the snake or kill it. No member of the public or CCPRC will be allowed to kill any snake within the park system, venomous or not. A venomous snake in an area that is frequented by the public is considered a direct threat. **Being a direct threat does not mean it is acceptable to kill the snake!**

1. Notify the MOD immediately.
2. The MOD should give the snake every chance to move away from the area without interference from staff or public. If necessary, temporarily block off the area to the public. The MOD should not hesitate to call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist with any questions about the snake.
3. If perceived by the MOD to be a direct and unavoidable threat to the safety of patrons or staff, the MOD will call an animal control specialist. (Look in phone book yellow pages)

INJURED WILDLIFE

Wildlife injuries can range from life threatening to very minor. No procedure can cover all situations. In some cases, wildlife may appear to be injured when they are not. Some ground nesting birds, for instance, fake an injury to draw perceived threats away from nesting areas. As

a general rule, if the animal looks like it could continue to survive, leave it alone. Under no circumstances should you approach any wild animal!

If the animal appears to be so injured that it cannot be rehabilitated

1. The MOD will be notified. Let the MOD know if an injury could be life threatening for either the animal or park visitors.
2. The MOD will call the Natural History Interpretation Coordinator (NHIC) to discuss the situation and get a recommendation. If the NHIC is not available, the MOD will call the Natural History Interpretation Specialist. If the NHIS is not reachable, the MOD will call the Interpretation Manager.
3. If the NHIC or his designee recommends it, the MOD should call the SC Dept. of Natural Resources Wildlife Hotline at 1-800-922-5431. The dispatcher will send a law enforcement officer to respond to the situation.
4. Before the officer arrives, staff should clear the area of any park visitors and staff. This is a safety precaution as the officer may elect to use a firearm if the animal must be killed for humane reasons.
5. Once the officer has surveyed the scene, he or she will determine whether the animal should be killed.
6. After the animal is killed, the MOD should brief park staff about the incident and advise them to direct all questions about the incident to the MOD.
7. If possible, use protective equipment and move the dead animal to a location away from the public's view but open enough so vultures can find it.
8. After the situation is under control, the MOD will complete a thorough IR and route through normal channels.

If the animal is injured but it seems possible to rehabilitate the animal

1. The MOD will be notified. Let the MOD know if an injury could become life threatening for either the animal or park visitors.
2. The MOD calls a registered wildlife rehabilitator. The list can be found at <http://www.dnr.sc.gov/wildlife/rehab.html> . The MOD should not hesitate to call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist, with any questions prior to contacting the rehabilitator.
3. After the situation is under control, the MOD may call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist if needed.

PETS IN PARKS

Pets in parks can interact with wildlife in many ways, some of them with dramatic negative effects for the dog and for the wildlife. Luckily, these negative interactions are usually preventable.

Importance of Leashing

A leashed pet is not likely to stress songbirds or other wildlife. A pet on a leash is less likely to be harmed or killed by poisonous plants, venomous snakes, ticks, or vehicles. Also, a leashed dog is less likely to ruin the outing of another visitor. For these reasons, the staff must insist that dogs are leashed unless in a dog park.

Dogs and Alligators

Dogs are far more likely than most people to wander into the water at the edge of a pond. In the Charleston area, there is always a chance an alligator may be present in any body of water and they may interpret the dog as a food item. **Ultimately, the dog owner must decide whether or not to allow his or her pet in the water. It is highly impractical and undesirable for CCPRC to either post warning signs at every possible location where an encounter may occur or rid the park system of alligators.**

The Effect of Pet Waste on Water Quality and the Spread of Disease

Dog owners bagging pet waste and placing it in collection containers will prevent run-off contamination of nearby water from which dogs and wildlife drink and reduce diseases and parasites that can transmit to other pets, wildlife, and people. Staff is expected to prevent disease outbreaks and keep the dog parks inviting by encouraging patrons to dispose of their pets' waste properly.

NESTS AND DENS

Trees likely to have active nests or dens that have been marked for removal or limbing pose a special problem because when babies are present the animals are much less likely to leave the nest or den. Also, nests and dens may contain species protected by federal or state laws. Therefore, the tree or limb which has been determined to have a nest or den in it should not be removed or limbed until the babies have left the nest or den or nesting season is over. **If the tree or limbs pose an immediate threat to public safety in a frequently used area of the park, CCPRC may elect to remove it regardless of the presence of a nest or den UNLESS there is a protected species involved and the taking of the limb or tree would be unlawful.** If it is not in an area frequented by the public or if there is a protected species and the tree can not be cut, the area may be flagged off, so as to exclude the public from that area. This action may be accompanied with an agency sign that informs the public of the agency's action.

Procedure for nests and dens:

1. The MOD calls the Natural History Interpretation Coordinator or Natural History Interpretation Specialist and provides details so the Natural History Interpretation Coordinator or Natural History Interpretation Specialist can complete a thorough IR. A thorough record can not be created as a result of leaving details on a voice mail or an email message. They may elect to involve other staff if needed.

2. Upon reaching a decision, either flagging of the area or removing/limbing will be recommended. If the nest contains a federally or state protected species, **under no circumstances will any action be taken until the proper authorities are contacted.**

BABY ANIMALS

Very young animals and birds, particularly baby animals, sometimes seem to be separated from their parents. In most cases, the parents are hiding nearby to retrieve their young.

If a baby animal is reported and has not been removed from area where it was first seen:

1. Call the MOD.
2. Do not approach or pick up the baby. Leave the animal where it is.
3. If necessary, temporarily block off the area to the public.

If a baby animal is brought to a staff member:

1. Call the MOD
2. Find out exactly from where the animal was taken.
3. Return the animal to exactly the place where it was found unless placing it there would be dangerous to staff or the animal. If so, return the animal to a safe place as close to where it was found as possible.
4. If necessary, temporarily block off the area to the public.
5. Call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist if you feel you need additional assistance.

WILDLIFE MIGRATION

Wildlife and people can come into conflict in ways that are sometimes difficult to predict. This is particularly true during the spring and fall when millions of animals migrate through our area using the parks' and undeveloped park lands' resources to find badly needed resting spots and food. Areas that appear to be unkempt to many of us often offer the very best cover and food for wildlife. If migrating birds and butterflies lose these resources at the wrong time, it can mean the difference between life and death for them. While maintenance is sometimes necessary in shrubby and weedy areas, special care should be taken to not cut them during times of spring or fall migration if at all possible.

Another danger during migration is when shorebirds are resting or nesting on the beach or dunes. After flying, in some cases thousands of miles, the birds are exhausted and have little stored fat left. If a dog or patron chases them even once or twice, it may mean the difference between the bird surviving or not.

Staff should consider the effects of their own actions as well as the actions of patrons when the actions have the potential of greatly disturbing or destroying wildlife nesting, roosting, or feeding areas. Further, staff should not tolerate harassment of animals, particularly when the animals are in a weakened state due to migration or nesting. In some cases, resource management plans or maintenance plans can be of help. If a Manager has concerns about this subject, please do not hesitate to call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

BANDED AND TAGGED WILDLIFE

Many organizations use banded or tagged wildlife for research and information. Animals most often banded or tagged are birds and fish (saltwater). If an animal is found dead with a tag or band, take the following steps:

1. Call the MOD.
2. Using tools and protective gear such as gloves, remove the tag or band from the dead animal. Take several digital photos of the animal for identification purposes if possible.
3. Place the tag or band in an envelope with information about when and where the animal was found, how it died, etc.
4. Send the tag and information to the Natural History Interpretation Coordinator or Natural History Interpretation Specialist via interoffice mail. Send digital photos via email to kmccullough@ccprc.com and kwheeler@ccprc.com.
5. If removing the tag is not feasible, record the information on the tag or band and send that information to the Natural History Interpretation Coordinator.

ENDANGERED, THREATENED, OR PROTECTED WILDLIFE

There are endangered and threatened species found throughout the CCPRC park system. State and federal laws protect these animals and plants. Any molesting or harassing of an endangered or threatened species can result in state and federal prosecution. The feeding of wildlife can be considered molestation or harassment.

Body parts, including bones, shells, claws, and feathers of endangered or threatened animals are also protected by law. The possession of any part of a protected animal can result in state and federal prosecution. ([Keeping Animals and Animal Parts](#))

Migratory birds are protected by the Migratory Bird Act of 1918. Following a 2006 update, 972 species of bird are protected by this act. The possession of nests, eggs, feathers, and other body parts of birds can result in state and federal prosecution. All birds, including their nests and body parts (including feathers), are off-limits to staff and patrons. ([Keeping Animals and Animal Parts](#))

ANIMAL AND PLANT REMOVAL AND INTRODUCTION

Removal of Plants and Animals

Charleston County Park and Recreation Commission will not allow any plants or animals to be taken from developed parks or undeveloped parklands. *This includes, but is not limited to, live sand dollars, live whelks, hermit crabs, fiddler crabs, and any plant species.* The only exceptions are legally caught fishes, shrimps, crabs, and animals or plants taken through activities that are approved in writing by the Executive Director.

The intent of this procedure is to prevent the harming of natural resources of the park system, not to impose undue restrictions on the staff and patrons. By approving exceptions on a case by case basis, the agency is able to address the needs of the resource, ethical concerns, and the potential for the exception to serve a greater purpose for, if not the park system, the community. The agency is aware that managers may need to make an exception to the absolute nature of this procedure from time to time but also expects that these will be rare cases and the manager will keep the intent of this procedure in mind when making these exceptions. For instance, a manager faced with a school group collecting pine cones or sweetgum balls would not be expected to invoke these procedures to prevent the activity. Limited collection of these kinds of plant parts do no harm to the plants and also do not harm the animals which depend on them for food or cover. Likewise, in some cases, people may take bark rubbings (bark patterns transferred to paper by rubbing a crayon over the paper against the bark), dead leaves from the ground, sticks, etc. with no real harm to the environment. However, just as we do not allow live plants to be collected for firewood at the campground, the agency does not allow live plant parts to be taken except through activities approved in writing.

Introduction of Plants and Animals

Because of the risk of dissemination of diseases and/or parasites or the danger of competition from a non-native introduced species, CCPRC does not allow introduced plants or animals of any kind. **ANY** exceptions must first be approved in writing on a case by case basis by the Executive Director. This is an exceedingly rare situation.

If an animal is released in a park without expressed approval by the Executive Director, the MOD should contact the Natural History Interpretation Coordinator or Natural History Interpretation Specialist immediately. The Natural History Interpretation Coordinator or Natural History Interpretation Specialist will contact SC DNR and advise the MOD on how to proceed.

SEA TURTLES

Sea turtles are protected by federal law. This includes sea turtles themselves (adults or hatchlings), eggs, nests, and sea turtle parts (bones, shells, etc.). **Possession of sea turtle parts, no matter how small, can result in federal prosecution. *Picking up hatchlings and taking them to the water is considered harassing and is illegal!* (See *Endangered, Threatened, and Other Protected Wildlife*, pg. 9)**

Charleston County Park and Recreation staff or patrons are not allowed to move sea turtle nests or eggs under any circumstances. In the case of a sea turtle nest, a sea turtle hatching event, or a sea turtle stranding, take the following steps:

Turtle Nest or Turtle Hatching

In nearly all cases, trained turtle volunteers have already seen the nest and marked it, usually with a surveyors tape or by screening the nest from predators. These teams of people walk the beach about 6 a.m. every day during nesting season. However, it is possible they may miss a few. If you find an **Unmarked Nest or Hatching Event**, please do the following.

1. Call the MOD.
2. Call 1-800-922-5431
3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

Dead Turtle Stranding

1. Call the MOD.
2. Call 1-800-922-5431
3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

Live Turtle Stranding

1. Call the MOD.
4. Call 1-800-922-5431
2. Call a SC Dept. of Natural Resources staff member.
3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

Live Turtle Sighting

Sightings of healthy sea turtles that are not stranded may be reported at www.seaturtle.org/istor/

SEA TURTLE CONTACTS

Always call 1-800-922-5431 first. If this fails, use the numbers below.

SC DNR Staff Members for live strandings

Kelly Sloan – 843-870-6480

Charlotte Hope – 843-303-2097

DuBose Griffin – 843-870-3667

Main Office –953-9015

KEEPING ANIMALS AND ANIMAL PARTS

Feathers, skulls, eggs, bones, or other parts of animals are most often protected by law. For this reason, the CCPRC Interpretation Department has federal permits to lawfully salvage these parts for educational and scientific use. If you find an animal part or an animal that may be useful for educating people about the natural resources of the park system, please give the Interpretation Dept. a call at 889-8898.

USE OF ANIMALS IN APPROVED COMMISSION ACTIVITIES

Some activities of the Charleston County Park and Recreation Commission utilize animals as a necessary component of the patron's experience.

These activities include, but may not be limited to:

- Programs which are wholly or partly educational in nature.
- Exhibits in parks displaying appropriate native animals in aquaria on a short term basis.
- Horseback riding, dog shows, or other similar recreation that includes the handling of animals as a necessary part.
- Selling of live bait in appropriate parks.

The general well being of these animals, as evidenced by attention to safety, care, and cleanliness, should be paramount in importance at all times.

Tame or Domestic Animals

If tame animals are brought into an official CCPRC event by a vendor, the staff member will obtain a contract to reflect the vendor's adherence to federal and state guidelines for safety. Staff should also check a vendor's references before contracting them.

Captured Animals

If animals are captured from the wild for brief educational study, such as during a curriculum based ocean seining program, staff will take every appropriate step to ensure the animals are not overly stressed or mishandled.

Animals sold for live bait will be kept in a clean and healthy environment that satisfies any federal or state regulations that may apply.

BEAVERS

Beavers can cause special concerns because of their ability to dramatically alter the landscape. In many cases, this is not a problem and no conflict exists. In fact, many patrons may find the activity and the resulting beaver community a highlight of their visits. However, in some cases, there is a conflict that calls for action. In these cases, the agency will first recommend non-lethal means. If the conflict can not be resolved in this way, lethal means can only be used by a wildlife control agent with a fur bearers license after approval from the Parks Division Director. No action will be taken until the Natural History Interpretation Coordinator or Natural History Interpretation Specialist discusses the specific situation with appropriate wildlife authorities.

Dams and lodges can sometimes be impressive and retain many acres of water. Never break apart a structure built by beavers without following proper protocol or you and the agency could be breaking federal law by inadvertently draining a wetland.

If there is beaver activity in the park that the MOD considers a conflict, please call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist to discuss it.

MARINE MAMMALS

DOLPHINS AND WHALES

Dolphins and whales sometimes strand on beaches in South Carolina. There are many potential causes for this, and the animal(s) can be dead or alive when stranded on a beach. In the case of a marine mammal stranding that is not a Manatee:

1. Call the MOD.
2. Call the NOAA pager at 843-820-0612 and leave your contact information.

OR

If you are unable to get a response from NOAA, call the SCDNR hotline at 800-922-5431 and report the stranding.

3. The MOD will call the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

MANATEES

Manatees are large marine mammals that can be found in the Charleston County area during the summer and early fall. The biggest problem that Manatees face is boat traffic. They spend much of their time near the water's surface and since they aren't able to dive and move quickly they can be damaged or killed by boat propellers. In the case of an **injured or dead** manatee:

1. Call the MOD.
2. Call SC Dept of Natural Resources hotline, **1-800-922-5431**.
3. After the situation is under control, the MOD will email kmccullough@ccprc.com and kwheeler@ccprc.com.

Healthy manatees may be reported online at:

<http://www.dnr.sc.gov/manatee/sight.htm>

OTHER CONCERNS

Any wildlife related issues or situations not specifically covered by these procedures will be handled on a case by case basis by the Natural History Interpretation Coordinator or Natural History Interpretation Specialist.

APPENDIX J:

RARE, THREATENED, AND ENDANGERED SPECIES AND
COMMUNITIES KNOWN TO OCCUR IN CHARLESTON COUNTY
(SCDNR)

Rare, Threatened, and Endangered Species and Communities Known to Occur in Charleston County
 March 13, 2012

Scientific Name	Common Name	USESA Designation	State Protection	Global Rank	State Rank
<u>Vertebrate Animals</u>					
<i>Accipiter cooperii</i>	Cooper's Hawk			G5	S3?
<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	LE: Endangered	SE: Endangered	G3	S3
<i>Acris crepitans</i>	Northern Cricket Frog			G5	S5
<i>Aimophila aestivalis</i>	Bachman's Sparrow			G3	S3
<i>Ambystoma cingulatum</i>	Flatwoods Salamander	LT: Threatened	SE: Endangered	G2	S1
<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander			G5T5	S2S3
<i>Caretta caretta</i>	Loggerhead	LT: Threatened	ST: Threatened	G3	S3
<i>Charadrius wilsonia</i>	Wilson's Plover		ST: Threatened	G5	S3?
<i>Clemmys guttata</i>	Spotted Turtle		ST: Threatened	G5	S5
<i>Condylura cristata</i>	Star-nosed Mole			G5	S3?
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat		SE: Endangered	G3G4	S2?
<i>Crotalus horridus</i>	Timber Rattlesnake			G4	SNR
<i>Dendroica virens</i>	Black-throated Green Warbler			G5	S4
<i>Elanoides forficatus</i>	American Swallow-tailed Kite	SC: Sp. of Concern	SE: Endangered	G5	S2
<i>Haliaeetus leucocephalus</i>	Bald Eagle		ST: Threatened	G5	S2
<i>Heterodon simus</i>	Southern Hognose Snake			G2	SNR
<i>Ictinia mississippiensis</i>	Mississippi Kite			G5	S4
<i>Lasiurus cinereus</i>	Hoary Bat			G5	SNR
<i>Limnothlypis swainsonii</i>	Swainson's Warbler			G4	S4
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker			G5	SNR
<i>Microtus pennsylvanicus</i>	Meadow Vole			G5	SNR
<i>Micrurus fulvius</i>	Eastern Coral Snake			G5	S2
<i>Mycteria americana</i>	Wood Stork	LE: Endangered	SE: Endangered	G4	S1S2
<i>Myotis austroriparius</i>	Southeastern Bat			G3G4	S1
<i>Neotoma floridana</i>	Eastern Woodrat			G5	S3S4
<i>Neotoma floridana floridana</i>	Eastern Woodrat			G5T5	S3S4
<i>Ophisaurus compressus</i>	Island Glass Lizard			G3G4	S1S2
<i>Pelecanus occidentalis</i>	Brown Pelican			G4	S1S2
<i>Phoca vitulina</i>	Harbor Seal			G5	SNA
<i>Picoides borealis</i>	Red-cockaded Woodpecker	LE: Endangered	SE: Endangered	G3	S2
<i>Plegadis falcinellus</i>	Glossy Ibis			G5	SHB,SNRN
<i>Pseudobranchius striatus</i>	Dwarf Siren		ST: Threatened	G5	S2

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<i>Rana capito</i>	Gopher Frog		SE: Endangered	G3	S1
<i>Sciurus niger</i>	Eastern Fox Squirrel			G5	S4
<i>Seminatrix pygaea</i>	Black Swamp Snake			G5	SNR
<i>Sterna antillarum</i>	Least Tern		ST: Threatened	G4	S3
<i>Tyto alba</i>	Barn-owl			G5	S4
<i>Ursus americanus</i>	Black Bear			G5	S3?
<i>Vermivora bachmanii</i>	Bachman's Warbler	LE: Endangered	SE: Endangered	GH	SX
<u>Animal Assemblage</u>					
Waterbird Colony				GNR	SNR
<u>Vascular Plants</u>					
<i>Agalinis linifolia</i>	Flax Leaf False-foxglove			G4?	SNR
<i>Agrimonia incisa</i>	Incised Groovebur			G3	S2
<i>Amaranthus pumilus</i>	Seabeach Amaranth	LT: Threatened		G2	S1
<i>Amphicarpum muehlenbergianum</i>	Blue Maiden-cane			G4	S2S3
<i>Anthaenantia rufa</i>	Purple Silkyscale			G5	S2
<i>Asclepias pedicellata</i>	Savannah Milkweed			G4	S2
<i>Botrychium lunarioides</i>	Winter Grape-fern			G4?	S1
<i>Calopogon barbatus</i>	Bearded Grass-pink			G4?	S2
<i>Canna flaccida</i>	Bandana-of-the-everglades			G4?	S2
<i>Carex decomposita</i>	Cypress-knee Sedge			G3	S2
<i>Carex elliotii</i>	Elliott's Sedge			G4?	S1
<i>Chasmanthium nitidum</i>	Shiny Spikegrass			G3	S1
<i>Coreopsis gladiata</i>	Southeastern Tickseed			G4G5	SNR
<i>Coreopsis integrifolia</i>	Ciliate-leaf Tickseed			G1G2	S1
<i>Cornus racemosa</i>	Stiff Dogwood			G5?	S1?
<i>Cyperus tetragonus</i>	Piedmont Flatsedge			G4?	S2
<i>Dionaea muscipula</i>	Venus' Fly-trap			G3	S3
<i>Eleocharis tricostata</i>	Three-angle Spikerush			G4	S2?
<i>Eleocharis vivipara</i>	Viviparous Spike-rush			G5	S1
<i>Eryngium aquaticum</i> var. <i>ravenelii</i>	Ravenel's Eryngo			G4T2T4Q	S1
<i>Eupatorium anomalum</i>	Florida Thorough-wort			G2G3	S1?
<i>Eupatorium fistulosum</i>	Hollow Joe-pye Weed			G5?	SNR
<i>Forestiera godfreyi</i>	Godfrey's Privet			G2	S1
<i>Galactia elliotii</i>	Elliott's Milkpea			G5	S1
<i>Helenium pinnatifidum</i>	Southeastern Sneezeweed			G4	S2
<i>Hypericum nitidum</i>	Carolina St. John's-wort			G4	S1

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<i>Ipomoea macrorhiza</i>	Large-stem Morning-glory			G3G5	S1
<i>Ipomoea stolonifera</i>	Beach Morning-glory			G5?	SNR
<i>Iris hexagona</i>	Walter's Iris			G4G5	S1
<i>Lepuropetalon spathulatum</i>	Southern Lepuropetalon			G4G5	S2
<i>Lilaeopsis carolinensis</i>	Carolina Lilaeopsis			G3G5	S2
<i>Listera australis</i>	Southern Twayblade			G4	S2
<i>Litsea aestivalis</i>	Pondspice			G3	S3
<i>Lobelia boykinii</i>	Boykin's Lobelia			G2G3	S3
<i>Ludwigia lanceolata</i>	Lance-leaf Seedbox			G3	S1
<i>Lysimachia hybrida</i>	Lance-leaf Loosestrife			G5	S1
<i>Monotropsis odorata</i>	Sweet Pinesap			G3	S2
<i>Muhlenbergia filipes</i>	Bentgrass			G5?Q	S3S4
<i>Orobanche uniflora</i>	One-flowered Broomrape			G5	S2
<i>Oxypolis canbyi</i>	Canby's Dropwort	LE: Endangered		G2	S2
<i>Paspalum bifidum</i>	Bead-grass			G5	S2
<i>Peltandra sagittifolia</i>	Spoon-flower			G3G4	S2
<i>Physostegia leptophylla</i>	Slender-leaved Dragon-head			G4?	SNR
<i>Pieris phillyreifolia</i>	Climbing Fetter-bush			G3	S1
<i>Plantago sparsiflora</i>	Pineland Plantain			G3	S2
<i>Platanthera integra</i>	Yellow Fringeless Orchid			G3G4	S1
<i>Psilotum nudum</i>	Whisk Fern			G5	S1
<i>Pteroglossaspis ecristata</i>	Crestless Plume Orchid			G2G3	S2
<i>Quercus austrina</i>	Bluff Oak			G4?	S1
<i>Rhexia aristosa</i>	Awned Meadowbeauty			G3	S3
<i>Rhynchospora breviseta</i>	Short-bristle Baldrush			G3G4	S1
<i>Rhynchospora careyana</i>	Horned Beakrush			G4?Q	S3
<i>Rhynchospora globularis</i> var. <i>pinetorum</i>	Beakrush			G5?T3?	S1
<i>Rhynchospora harperi</i>	Harper Beakrush			G4?	S1
<i>Rhynchospora inundata</i>	Drowned Hornedrush			G4?	S2?
<i>Rhynchospora tracyi</i>	Tracy Beakrush			G4	S3
<i>Sageretia minutiflora</i>	Tiny-leaved Buckthorn			G4	S3
<i>Sarracenia rubra</i>	Sweet Pitcher-plant			G4	S3S4
<i>Schwalbea americana</i>	Chaffseed	LE: Endangered		G2G3	S3
<i>Scleria baldwinii</i>	Baldwin Nutrush			G4	S2
<i>Spiranthes laciniata</i>	Lace-lip Ladies'-tresses			G4G5	S1S2

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<i>Tridens carolinianus</i>	Carolina Fluff Grass			G3G4	S1
<i>Tridens chapmanii</i>	Chapman's Redtop			G3	S1
<i>Triphora trianthophora</i>	Nodding Pogonia			G3G4	S2
<i>Xyris brevifolia</i>	Short-leaved Yellow-eyed Grass			G4G5	S1
<i>Xyris difformis</i> var. <i>floridana</i>	Florida Yellow-eyed Grass			G5T4T5	S2
<i>Xyris elliottii</i>	Elliott Yellow-eyed Grass			G4	S2
<i>Xyris stricta</i>	Pineland Yellow-eyed Grass			G4	S1
<u>Communities</u>					
Atlantic coastal plain depression meadow	Depression Meadow			G5	SNR
Bald cypress - tupelo gum swamp				G5	S4
Bald cypress - water tupelo swamp	Bald Cypress - Tupelo Gum Swamp			G5	SNR
Bottomland hardwoods				G5	S4
Carolina bay				GNR	SNR
Depression meadow				G3	S2
Estuarine intertidal mud flat	Intertidal Mud/sand Flat			G5	SNR
High pocosin	Pocosin			G3G4	SNR
Interior freshwater marsh				G3	SNR
Juniperus virginiana var. silicicola - zanthoxylum clava-herculis - quercus virginiana - (sabal palmetto) / sageretia minutiflora - (sideroxylon tenax) woodland	South Atlantic Coastal Shell Midden Woodland			G2?	SNR
Longleaf pine flatwoods				GNR	SNR
Maritime forest				G2	S2
Maritime shrub thicket				G4	S2S3
Mesic mixed hardwood forest				G5	S4
Middens				GNR	S3
Non-alluvial swamp forest				G5	S4S5
Pine - scrub oak sandhill				G4	S4
Pine flatwoods				G5	S3S4
Pocosin				G3G4	S3S4
Pond cypress pond				G4	S4
Pond cypress savanna				G3	S2
Pond pine woodland				G4G5	S3

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Salt flat (allard)	Salt Flat			G5	SNR
Salt marsh				G5	S5
Salt shrub thicket (allard)	Salt Shrub Thicket			G5	SNR
South atlantic inland maritime forest	Maritime Forest			G2	SNR
Spruce pine - mixed hardwood forest				G3	S2
Spruce pine / mixed hardwood				GNR	SNR
Swamp tupelo pond				G3	S3
Tidal freshwater marsh				G3	S3
<u>Geological</u>					
Carolina bay				GNR	SNR

