



Samworth WMA Wetlands Management Review





◀ Pictured (top to bottom):
Stephen Rockwood, Molly Kneece,
Mark Purcell, Rance Moring, Alicia Farrell

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Acknowledgments

The insights and observations in this review were made possible by the spirit of collaboration between the South Carolina Department of Natural Resources (SCDNR) Samworth WMA leadership, and the wetland review team of Rance Moring, Mark Purcell, and Stephen Rockwood. The team commends SCDNR leadership for embracing an external review process in the spirit of furthering the application of sound science in the management of the state's resources.

Wetland Review Team

Rance Moring, Vice President, York Woods LLC

Rance is currently the Vice President of York Woods and three other western entities. Residing and operating out of Charleston, Mississippi, he has oversight of personnel, budgeting and general matters of approximately 45,000 acres across three states. Rance is in his 25th year of managing habitat for waterfowl and other game species.

A native of Beaufort, South Carolina and former employee of Clarendon Farms, Rance moved to Mississippi in the Spring of 1999 in pursuit of his passion for waterfowl and the management of waterfowl habitat. In 2001, the property of York Woods was purchased from the York family. Rance has been involved in the design and development of this property from the ground up.



York Woods is a 7000-acre property located in the Lower Mississippi Alluvial Valley. This property is comprised of 2500 acres of bottomland hardwoods and 4500 acres mixed tillable land and bayous. York Woods winters thousands of waterfowl and shorebirds annually. This property is a gem in the state and large stop for waterfowl in the Mississippi flyway.

Rance is still learning, applying and pursuing his passion.

**Mark A. Purcell, Wildlife Refuge Manager,
Ernest F. Hollings ACE Basin National Wildlife Refuge**



Since 2005, Mark has been the Refuge Manager of the ACE Basin NWR, a 12,000-acre National Wildlife Refuge in the southern lowcountry of South Carolina that targets wetlands management for waterfowl and threatened and endangered species including wood stork and black rail. Over a nearly 40 year professional career in Florida and South Carolina (35 years with the federal government), Mark has held positions as a wetlands biologist, wildlife plantation manager, environmental and wildlife management consultant, and refuge manager for several USFWS-National Wildlife Refuges (including Cape Romain NWR and Santee NWR in South Carolina).

Mark is an active member of the ACE Basin Task Force, a collaborative group of representatives of state, federal, NGOs, industry and private land owners that has received international recognition for shepherding the perpetual conservation of over 300 thousand acres of lands and waters in the ACE Basin (Ashepoo-Combahee-Edisto River Basin) of South Carolina. Mark is also an active member of the USFWS Southeast Region-Waterfowl Science and Waterfowl Inventory and Monitoring Teams. Mark is the recipient of the 2020 Lifetime Achievement Award from the South Carolina Chapter of The Wildlife Society.

Stephen V. Rockwood, Biologist, Ducks Unlimited

Though formally retired, Stephen works as a wetlands biologist for Ducks Unlimited (DU) in Austin, Texas. Stephen assists the Texas Conservation staff with water policy issues, land conservation, and habitat/restoration management on a part-time basis.

Prior to working for DU, Stephen spent 32 years working for the Florida Fish and Wildlife Conservation Commission (FWC). He began his career with the agency in 1988 managing coastal, brackish, and freshwater impoundments for waterfowl and other wetland dependent species in northeast Florida. A few years later, Stephen was responsible for developing FWC's first and only public waterfowl

management area in the upper basin of the St. Johns River in southeast Florida. Wetlands that were historically diked and drained for agriculture, Stephen initiated restoration techniques that led to the establishment of 17 moist-soil impoundments, each ranging in size from 150 to 220 acres, and two flood storage reservoirs totaling about 2,300 acres. Management focused on redefining moist soil wetland management techniques for sub-tropical/tropical wetlands, developing conjunctive techniques (i.e., herbicide application, control burning, and deep flooding) to control highly invasive/exotic species, and evaluating rotational grazing as a form of disturbance in wetland management.

In 2004, Stephen then served as the agency's wetland habitat specialist and was responsible for administering and coordinating wetland management activities throughout the state, providing technical assistance to private landowners and other public and private entities and serving as the state's representative on the Atlantic Coast Joint Venture, the Atlantic Flyway Technical Section, the Southeast Aquatic Resources Partnership, and the USDA Wetlands Reserve Program, among others.



Stephen spent the last six years of his FWC career serving as Bureau Chief of the Aquatic Habitat Conservation and Restoration Program. This program, tasked with administering an annual operating budget of approximately \$12M and over 40 full-time staff, was responsible for the restoration and management of Florida's public aquatic resources, including freshwater resources, bay and estuaries, and select marine systems such as coral reefs.

Throughout his career, Stephen served as President of the Southeastern Section of the Wildlife Society (TWS), President of the Florida Chapter of the Wildlife Society, and chaired numerous technical committees including the Atlantic Coast Joint Venture, the Southeastern Association of Fish and Wildlife Agencies (SEAFWA) Wetlands Wildlife Committee, and the Atlantic Flyway Environmental Issues Committee. Stephen also was responsible for establishing TWS's Wetlands Wildlife Working Group and was instrumental in working with the SEAFWA Directors to create the Journal of the Southeastern Association of Fish and Wildlife Agencies.

Property Overview

Located between the Great Pee Dee and Waccamaw Rivers, the 1,588-acre Samworth Wildlife Management Area is a rich estuarine river delta bordered by pine uplands and agricultural fields. The property includes 1,300 acres of historical rice fields engineered to sustain the crop that made this region one of the wealthiest in the world.

Today, SCDNR staff manages Samworth WMA which consists of a series of 13 separate impoundments for resident, migrating and overwintering waterfowl in the heart of the Atlantic Flyway.

Moist Soil Management is the drawdown of water to promote germination of native plants on exposed emergent marsh and mudflats and the subsequent reflooding of same areas.

(Source: NRCS: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_016986.pdf)

Impoundment Facts

- 968 acres
- 13 moist soil impoundments
- 15.6 miles of perimeter dike
- 10.3 miles of interior dike
- 15.4 miles interior ditches
- 9 miles of quarter drains
- 24 water control structures (trunks)
- 4 employees dedicated to wetland management at Samworth
- 10 additional employees in larger Upper Coastal Waterfowl Project



Project Overview

In May 2021, SCDNR engaged a third-party facilitator and a team of three external wetland experts from public and private sectors across the South, to conduct a thorough review of their impoundment management practices. The team was tasked with evaluating the following six areas:

- Evaluate existing management plan for gaps or misplaced goals
- Evaluate infrastructure (dike, water control structures) for unknown needs
- Evaluate current water management and disturbance (burning, mechanical and chemical practices) for intended food composition
- Evaluate the potential for agricultural crops vs. natural food sources
- Evaluate efforts to control invasive species

During three meetings (two web-based teleconferences and a day-long field tour of each impoundment), the team reviewed and discussed all aspects of Samworth's wetland management program and documentation including:

- Samworth WMA Management Plan
- Waterfowl harvest data
- Maps
- Equipment and staffing
- Budgets
- Detailed management accomplishments



External Influences

Staff's ability to effectively manage wetland impoundments has been affected by three major external forces. Two of these, water and a growing coastline, have obvious impacts to waterfowl populations on Samworth WMA. The third, and perhaps lesser-known impact, conservation in the flyway, is broad and difficult to quantify.

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Water

SCDNR's ability to provide native plants as a food source for waterfowl is directly related to staff's ability to manipulate water for a successful moist soil management regime. Water flowing through or over a perimeter dike as well as water that stays within the impoundment for an excessive amount of time can have a negative impact on the desired vegetation and the ability to manage the site. Such conditions are likely to cause a proliferation of giant cutgrass- locally referred to as "white marsh" (*Zizaniopsis miliacea*) and cattail (*Typha spp.*) which outcompete valuable native plants that provide important forage.

Since 2016, Samworth WMA has experienced five hurricanes, a historic flood event, and a tropical storm in addition to higher than normal tides and record breaking rainfall events. As a result, river water has breached and overtopped dikes causing costly and time-consuming infrastructure repairs. A minimum of 8,000 linear feet of dike had catastrophic damage after the storms and virtually the entire perimeter dike system had to be repaired after this multi-year barrage of natural disasters.

Furthermore, unlike other WMAs managed for waterfowl, Samworth's impoundments are islands requiring staff and equipment to be barged on a tide-dependent schedule.

A Growing Coastline

More than one-third of the United States population lives in the Atlantic Flyway. Due east of the Samworth WMA lies the coastal town of Pawley's Island and expansive waterfront developments on the Waccamaw River, where recreational boating is enjoyed year-round. This increase in human disturbance can unintentionally displace waterfowl as they seek sanctuary and foraging habitat. This displacement results in increased energy loss further stressing the resident, migrant and wintering waterfowl on Samworth WMA.

Conservation in the Flyway

The United States Fish and Wildlife Service reports, "In the past two decades, the North American Wetlands Conservation Act (NAWCA) has funded over 3,000 projects totaling \$1.83 billion in grants. More than 6,350 partners have contributed another \$3.75 billion in matching funds to affect 30 million acres of habitat." While duck populations have increased incrementally, the dramatic increase in improved habitat conditions provides a larger footprint of available habitat which may decrease the density of waterfowl in more traditional areas such as Samworth WMA.



WATER MANAGEMENT & INFRASTRUCTURE

Observations

The single most significant barrier to creating productive wetland habitats at Samworth is the ability to manage water. Stated simply by all team members, “You have a plumbing problem.”

A tremendous amount of time and money has been spent over the last five years addressing several plumbing-related issues. The team observed dikes

that had been breached from significant weather events, compromised structural integrity from tree roots that had been allowed to grow on the dikes over the last 20 years, weakened dikes due to soil having been removed from the supportive berm that adjoins the dike, a lack of desirable native clay soil next to the dike to make repairs, and dikes that can no longer have adequate elevation to hold back historically high tides. Federal wetland legislation prohibits importing soil to the site without complex permitting requirements. Permitting could be achieved to repair “serviceable” dikes with off-site material within their existing “footprint”. New dikes, fixing old breaches, or widening the footprint of existing dikes riverward is a time-consuming permit process of unknown certainty. Barging in or dredging new material for dike repair would likely be prohibitively expensive.

WMA staff are working diligently on interior drainage- ditches and quarter drains designed to move water across the impoundments which are functioning marginally or not at all. Progress is routinely inhibited by weather events and the ability to barge equipment to each site. Unlike other WMAs with interior impoundments, Samworth is a series of islands making mobility tide dependent. Water control structures (trunks) appeared to be sound and functioning. The team recommends extending the

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bulkheading on some water control structures preferably with wing walls, and with reinforced, heavy gauge stainless steel tiebacks.

The team also observed significant progress that has taken place during this year's dry spring and work that was underway during the field tour—mowing, reestablishing quarter drains, re-topping of dikes, repair of major breaches. This work is a priority and a major undertaking that will allow staff

to sufficiently de-water impoundments, implement a variety of disturbance practices and vegetation control techniques, and allow for the planned water level/hydro-period management by quick flooding of impoundments when necessary.

Commendations

Molly Kneece and her field staff have identified (using technology and extensive ground-truthing) and prioritized a draft plan to address repairs – including budget and timeline. Additionally, they have augmented agency funding with significant external grants, positioning them to work aggressively toward their goals. The team observed not only remarkable technical expertise and creative problem solving but also a fortitude and patience to work the plan and adjust as needed.

Opportunities

The availability of staff, equipment, funding, and favorable environmental conditions drive wetland management. Climatologists predict a continued trend of rain events increasing in number and intensity, which could suggest that maintaining the infrastructure at Samworth may not get any easier in the coming years.

Staff and leadership should analyze the layout of dikes, levees, and impoundments to gauge what is the most critical infrastructure for providing quality habitat and view the management plan as a flexible, adaptable tool to document and prioritize needs. Some impoundments may need to be eliminated or consolidated. Others may need to remain semi-permanently flooded for submersed and floating aquatic plant

management. Trunks may be replaced based on the timing of available funding. Some impoundments may be able to provide enough duck habitat by managing only a portion of the unit. These recommendations will provide critical direction to the management plan.





MANAGEMENT PLAN

Observations

Samworth's Management Plan is comprehensive, thorough, and detailed; and the implementation momentum has been sustained over multiple years. Given the challenges relating to tides and rain events, the timeline for management activities is vulnerable to variables out of staff control. The plan may be impractical to implement and

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progress in some areas is difficult to measure, opening the potential to degrade staff morale over the long term. Additionally, the pressures of disturbance by recreational boaters can have a negative impact on the timing of use and abundance or density of waterfowl.

Opportunities

A measurement of hunt success alone neglects to acknowledge the benefits that this habitat work brings to a variety of wildlife species, native plants, and species that represent the base of the food chain.

Onsite land managers are acutely aware of habitat status and needs; and are encouraged to develop a documented baseline by quantifying *habitat* observations: conducting inventories, monitoring and evaluating accomplishments. The baseline also serves a valuable role in prioritizing future work and should also capture data across suites of game and non-game species. A measurement of hunt success

alone neglects to acknowledge the benefits that this habitat work brings to a variety of wildlife species, native plants, and species that represent the base of the food chain.

Examples of baseline data that can be implemented at various detail levels depending on staff and budget availability include:

- Estimated percentage of suitable waterfowl habitat in each management unit (i.e.; Unit A: 40% suitable/30% marginal/30% unsuitable)
- Complex tools such as duck use days, duck energy days, etc.
- Hydrograph of water levels of each impoundment, secured by gauges placed on trunks
- Integrated Waterbird Monitoring and Management; Annual habitat inventory and monitoring plans.

The visiting team acknowledges the impacts that boat traffic can have on waterfowl behavior within small impoundments; and the challenges associated with reducing that impact either through regulation or vegetation. Limiting access on waterways is not possible or practical. Vegetation as screening may be an option, as we note later on in the report. Reforestation of areas within or among impoundments that don't drain well or that have inadequate infrastructure should be considered to reduce noise and visual disturbance.

As management goals are reviewed, special consideration should be given to the sanctuary impoundment. Disturbance to this site is easier to control than other units and ideal habitat conditions are already established and can be incrementally improved upon. A successful sanctuary can attract wintering waterfowl throughout the WMA.

Continue to focus on practical goals for the short-term; and over the long term, strive to incrementally enhance the management outcomes over a multiple-year period for example (1-3, 4-7, 8-10 year, and 25 year). With longer-view planning, variables including staff, budgets, grant opportunities and natural disasters, can be addressed by adapting the plan.

The team recommends that management plan successes should be defined by quality of the habitats and the quality of the hunting experience. For the majority of South Carolina hunters who do not have access to private land, Samworth WMA provides

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them with an unforgettable experience along the pristine South Carolina coast. Beginning with an early morning boat ride to a blind that provides exclusive access, experiencing the wetland coming to life for the day as the sun peaks over the horizon and returning to the “hill” with stories to share with new friends. These experiences are becoming increasingly rare and are a refreshing contrast to the instant gratification that dominates of our everyday lives. They are the experiences that separate shooters from hunters and teach young people simple lessons that can guide them throughout life – patience, appreciation, respect. Success must be framed by the quality of the habitats and the richness of the experience.





CURRENT WATER AND SITE MANAGEMENT

Observation

The review team observed that the impoundments with functioning infrastructure are providing ideal moist soil conditions supporting the intended food composition. When soil conditions allow for mechanical and chemical treatment of undesirable plants, the WMA staff are well-prepared

and well-equipped to implement the plan. Desirable native vegetation is responding positively; however, it is important to note that this is a long process and may not be readily apparent to a casual observer.

Staff is commended for their use of fire as a tool and encouraged to employ that tool whenever possible.

For non-forested wetland sites with improved hydrology control and management, prescribed fire has been a readily accessible and beneficial tool for improving habitat. Staff is commended for their use of fire as a tool and encouraged to employ that tool whenever possible.

When comparing Samworth to other impoundment sites that the review team has experienced, it was noted that Samworth impoundments have ample water in the root systems year-round and the team does not see a routine need to introduce water during the growth (growing) season.

Commendation

Staff is commended for innovative site management practices and equipment. The mechanical site work is made possible by the Marsh Master, an amphibious vehicle first introduced 50 years ago. Staff have given this vehicle expanded capabilities with the addition of a hydraulic system that provides connections to farming implements.

Additionally, their ability to leverage technology is delivering positive results. Historically, land managers have had to rely on observation alone to identify quarter

drains that have silted in. WMA staff have employed LiDAR imagery to identify the historic drainage, ground-truthed their findings, and paired the imagery with GIS technology to ensure that the site work is both effective and efficient. This data is then stored for future use, saving valuable time and expensive errors.



Opportunities

Consider focusing efforts on small areas within the impoundments to allow for measurable progress while providing a mosaic of quality waterfowl wintering habitat.



POTENTIAL FOR AG CROPS

Observation

The review team recognized the popularity of planting agricultural crops and acknowledged that other sites in the Lowcountry are able to leverage this tool. Samworth's impoundments, located in a delta between two rivers, consist of soils that are not easily drained. Many of the soils cannot hold up the equipment needed to support agriculture.

The team commends WMA staff for trying rice on a small scale but note that small scale agriculture efforts don't contribute significantly to foraging habitat beyond that provided by moist-soil techniques. Without the employment of an agricultural air service or specialized equipment, it's not justifiable to take on this expensive venture to get marginal returns.

Crops, including corn and rice,
are not a practical or economically feasible
application of resources at Samworth.

While each reviewer has experienced success with growing agricultural crops in impoundments, they unanimously agreed that crops, including corn and rice, are not a practical or economically feasible application of resources at Samworth.

Opportunity

WMA staff should continue to focus efforts on improving moist soil conditions to encourage native plants for forage.



MARSH MASTER

G41879

Observation

Invasive plants can germinate in a variety of environments, produce abundant seed that is resilient over time, grow rapidly and have few natural predators. Invasives often outcompete the desired native vegetation, negatively impacting the wildlife species such as waterfowl that rely on native plants for forage.

Invasives often outcompete the desired native vegetation, negatively impacting the wildlife species that rely on native plants for forage.

The review team noted an abundance of the giant reed, a non-native exotic grass, that was once used for erosion control and served as a screen to reduce disturbance on the several impoundments. It also has an unintended consequence of outcompeting valuable native vegetation. Impoundments that are dry enough to be mowed and burned, have been, and beneficial native plant species were responding favorably to the treatment.

In nearly every unit, giant cutgrass, referred to locally as “white marsh,” is pervasive and aggressively targeted by the WMA staff. Chinese tallow tree and chinaberry tree are found in the forested impoundments.

Opportunity

WMA staff is encouraged to reach out to internal aquatic plant specialists such as SCDNR's Aquatic Nuisance Species Program Manager, local rice producers, private or government experts with extensive knowledge of aquatic herbicide applications and land grant research institutions such as Clemson University on the following opportunities:

- To identify a suitable native grass to control erosion and shield against disturbance. (Consider Alamo variety of switchgrass, eight pounds per acre, fertilizing as needed).

- To explore biological controls, such as alligator weed beetle for alligator weed (*Alternanthera philoxeroides*) control within impoundment drainage features.
- To evaluate the most effective treatment for controlling rice cutgrass including the use of herbicide(s) in conjunction with other wetland management techniques such as deep flooding and burning.

These topics may merit graduate student research projects to address undesirable plants, develop beneficial wetland management techniques, and monitor their effectiveness.

In forested management units, spot treat the existing open areas with selective herbicides or mechanical treatment to maintain hunt unit accessibility. When possible, take note of the desirable plants and avoid harmful herbicide drift. Thinning the standing forest is discouraged as it will likely promote the expansion of undesirable white marsh and willow.



Observations

The review team observed a passion and skill for conveying complex management challenges in a candid and transparent manner.

The review team observed in the Samworth WMA leadership and staff, a passion and skill for conveying complex management challenges in a candid and transparent manner. Initial steps for public awareness have been taken through the development of a plan to promote the management achievements at Samworth.

Opportunities

Currently, the visitor experience at Samworth is limited to scheduled dove hunts, draw duck hunts, water access via a boat ramp and floating dock, limited interpretive signage and a short nature trail.

The review team encourages the staff to embrace proactive public outreach that:

- Demonstrates the exceptional depth of skill and experience of leadership and staff
- Showcases and celebrates:
 - o Habitat accomplishments
 - o Stewardship of the resource
- Educates:
 - o Conveys the benefits of impoundment management across suites of species

- o Creates an awareness of human impacts on migrating waterfowl and the need to minimize disturbances
- o Establishes a common expectation for progress

Specifically, the review team recommends:

- Constructing an observation tower with information kiosks on the mainland side of the waterway to view activity within the sanctuary impoundment.
- Coordinating with non-consumptive users such as the local Audubon chapter or South Carolina Wildlife Federation for birding tours.



CONCLUSION

Land management is part art and part science, as is evidenced by what was observed and has been summarized in the preceding pages. The Samworth staff repeatedly demonstrated their ability to embrace adaptive flexibility in the management of the resources and their resilience in dealing with a complex set of environmental, societal, and economic expectations.

Land management is part art and part science.

The review team encourages leadership and staff to embrace the commendations and consider opportunities as a way to demonstrate leadership in tackling land management challenges experienced by landowners throughout the Atlantic Flyway.





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