

Inventory, Assessment, and Restoration Potential of Ephemeral Wetlands on FFWCC Wildlife Management Areas

Chassahowitzka WMA Final Report



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June 2009 – September 2009

EXECUTIVE SUMMARY

Ephemeral wetlands are biologically unique systems that serve as focal points of animal and plant diversity in the southeastern United States. Despite their typically small size, these wetlands are extremely valuable in terms of biological diversity and ecological function. Historically, ephemeral wetlands were largely ignored by scientists, regulatory agencies, and land managers. Because of their small size, they were believed to have lower biological diversity and less significant ecological function than larger, more permanent water bodies. Consequently, many smaller, isolated wetlands have been destroyed or their ecological integrity degraded through human activities that include logging, ditching, draining, fire suppression, and mechanical site preparation. After over 20 years of research on hundreds of sites across the country, we now know that ephemeral wetlands are not just subsets of larger wetlands, but rather they hold their own unique and intrinsic biological value.

This pilot project was created to provide the Florida Fish and Wildlife Conservation Commission (FWC) with the site-specific tools and knowledge it needs in order to carry out the long-term ecological management of Florida's ephemeral wetlands by identifying them using remote sensing tools such as GIS, DOQQs, and topographic maps, conducting on-the-ground assessments of ephemeral wetland conditions using quantitative and qualitative metrics, and recommending restoration strategies for each identified wetland or management unit. Seven FWC-lead Wildlife Management Areas (WMAs) were selected for study: Aucilla WMA, Big Bend WMA, Caravelle Ranch WMA, Chassahowitzka WMA, Guana River WMA, Half Moon WMA, and Triple N Ranch WMA.

We used Digital Orthophoto Quarter Quadrangles (DOQQs) and topographic maps to remotely identify potential ephemeral wetlands on each property. We then ground-truthed potential ephemeral wetlands, obtained a GPS location, and conducted a standardized quick assessment of wetland and surrounding upland conditions. The data were entered into a GPS unit on site in order to generate a spatially referenced database for each property. Additional data were collected on a per property basis as requested by WMA personnel. Multiple photographs were taken of each wetland to provide a current "snapshot" of their physical appearance. We made restoration recommendations for each wetland based on wetland concerns identified in the field and the custom needs and challenges of each WMA.

We inventoried a total of 1513 isolated, ephemeral wetlands across the 7 WMA properties. The majority of wetlands (72%) were marshes. Forested swamps accounted for 9% of wetlands visited, shrub swamps 9%, and mixed swamps 8%. Another 2% of wetlands were of another classification such as borrow pits and sinkhole ponds. A total of 424 wetlands (28%) were in excellent condition with no associated wetland concerns. The three most prevalent wetland concerns were woody encroachment, feral hog damage, and roads/firelines.

Woody encroachment was the most ubiquitous wetland concern across all WMAs. A total of 494 wetlands (33%) were affected by woody plant encroachment. The percentage of wetlands impacted by woody plant encroachment varied per property from 3% of inventoried wetlands up to 74%. Half of all wetlands with woody encroachment were marshes. Within marshes, the

majority of woody encroachment was in the form of slash pine and wax myrtle encroaching from the wetland edge. Woody plant establishment in marshes represented a major threat to ephemeral wetlands in many of the visited WMAs and is largely a result of the lack of fire in the wetland basin. Canopies formed by woody plants in a marsh over time will shade out herbaceous marsh vegetation, eventually transforming the marsh into a swamp. To combat woody plant encroachment in marshes, we recommended that land managers remove encroaching woody plants in a single treatment using a variety of techniques depending on the situation, and subsequently implement long-term fire management in the wetland, if it wasn't already in effect.

There were 352 wetlands (23%) that were impacted by some degree of observable past or present feral hog activity. Some properties were more impacted by hogs than others, the percentage of wetlands impacted varied per property from 4% of inventoried wetlands up to 67%. Feral hogs can alter the plant and animal composition of wetlands and damage wetland soils. We made recommendations on feral hog management based on the severity of the damage and, using the generated database, the spatial extent of the damage. We recommended that trapping be used in combination with sport hunting and control hunting as a 3-pronged approach to reduce the impacts to ephemeral wetlands in heavily damaged areas of some properties.

Roads and firelines affected 2-19% of wetlands inventoried per property, a total of 125 wetlands (8%) were impacted project-wide. The placement of firelines and roads through or tangential to wetlands is detrimental to wetland habitat because the swath of exposed soil and denuded vegetation is a direct alteration of wetland habitat, can impact wetland hydroperiod, and can facilitate the spread of invasive species. Most, if not all, observed road-related impacts were created in the past. Now, current land managers must decide how to implement ephemeral wetland restoration of road impacts while balancing the need to access and partition the property for both public and managerial use. We made recommendations on a case-by-case basis.

Cattle grazing was permitted on 3 of the WMAs we visited. Cattle grazing pressure over time can degrade both wetland and upland habitats by altering plant communities and subsequently reducing landscape biodiversity. Furthermore, cattle frequently congregate in ephemeral wetland basins. Impacts to wetlands include nutrient overloading from concentrated urine and feces, trampling, altering plant community structure, facilitating the spread of invasive/exotic species, and soil compaction. We observed varying degrees of cattle impacts to wetlands during this project. Immediate recommended actions varied per property but in general we recommended cattle be phased out of WMAs altogether as part of a longer-term management strategy to maintain long-term ecological health of ephemeral wetlands and their surrounding uplands.

This pilot study has illuminated the need for future scientific research in several areas of ephemeral wetland restoration. There is a paucity of experimental data and peer-reviewed literature relating to the management of ephemeral wetlands. While some experimental data do exist, and we relied on it heavily for this report, most of the information we have compiled was acquired from our field expertise or through personal communications with land managers and other scientists. One major area that needs to be studied is the ecological response of wetlands to woody plant encroachment and the most effective methods for restoring wetlands impacted by woody encroachment. The long term effects of feral hogs on ephemeral wetland biodiversity

and community composition is another area for which there is little research. A final information gap we have identified is the fire ecology of ephemeral wetlands including targeted fire return interval, impacts of dormant versus growing season fires, and community composition response to varying fire regimes.

Although we've identified information gaps, this report is the most comprehensive compilation of knowledge about ephemeral wetland management and restoration to date. Results from this project provide an enormous database of the ecological status of ephemeral wetlands on state managed properties in Florida. This project also supplies baseline data that can be used in future studies of wetland response to management techniques and a template for future studies to identify, inventory, assess, and implement restoration actions for ephemeral wetlands on other properties.

The deliverables for this project include a final report for each of the 7 WMAs (of which this is one report), a spatially-referenced database of wetlands inventoried (in the form of a shapefile per property), and a catalog of wetland photographs. A DVD of reports, shapefiles, and photographs was sent to each of the 7 WMAs and to the AHRES project manager, Beacham Furse. The reports also were posted on, and the shapefiles made available upon request from, Coastal Plains Institute's website: www.coastalplains.org.

ACKNOWLEDGEMENTS

We would like to thank the WMA personnel who assisted us with land access, property history and management information, land management expertise, and general project development: Jason Slater and Jimmy Conner (CRWMA), Morgan Wilbur (AWMA), Justin Ellenberger (GRWMA), Chad Allison and Jennifer Roberts (CWMA), Nancy Dwyer (HMWMA), Dan McDonald, Sharon Hester, Randy Havens, Nuria Sancho, and Brent Howze (BBWMA), and Jeremy Olson (TNRWMA). Kevin Kemp was our AHRES representative and provided invaluable comments and insights to the project. Our project manager, Beacham Furse, helped to conceive this project and assisted us in its execution.

We would also like to thank our colleagues Lora Smith (Joseph W. Jones Ecological Research Center), David Printiss (The Nature Conservancy), and Bruce Means (Coastal Plains Institute) whose comments, input, and experiences contributed greatly to this project. Katherine Finn (University of Florida) and Kathy Steinheimer (Coastal Plains Institute) provided indispensable administrative assistance. And a special thanks to Memaw for taking care of Skyla from Aucilla to Triple N.

This project was funded by the Florida Fish and Wildlife Conservation Commission Aquatic Habitat Restoration and Enhancement Sub-Section of the Division of Habitat and Species Conservation, Grant No. FWC08112.

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INTRODUCTION

Ephemeral wetlands are biologically unique systems that serve as focal points of animal and plant diversity in the southeastern United States. Despite their typically small size, these wetlands are extremely valuable in terms of biological diversity and ecological function. For example, at least 12 Florida amphibians, including the federally listed flatwoods salamander (*Ambystoma bishopi*, *A. cingulatum*) and other candidate species (e.g., striped newt (*Notophthalmus perstriatus*) and gopher frog (*Rana capito*)), breed exclusively in this wetland type (Dodd and Charest 1988, Means and Means 1998, Printiss and Hipes 1999, Enge and Wood 2000, Greenberg et al. 2003). Even small wetlands (<1 ha) can support a high diversity and density of species (Dodd 1992, Semlitsch 2000, Means 2007).

Ephemeral wetlands are usually small and isolated with a cyclic nature of drying and refilling. Termed “hydroperiod,” the duration an ephemeral wetland holds water can vary from 1 or 2 weeks to 1 or 2 years, and hydroperiod can vary from year to year and wetland to wetland. The water-holding capacity of a wetland is a function of multiple factors including underlying geology, soil characteristics, rainfall, wetland depth and size, evaporation, evapotranspiration, and tree canopy cover (Williams 1987, Hart and Newman 1995, Blood et al. 1997, Tiner et al. 2002). Bands of herbaceous vegetation around the wetland periphery, known as the littoral zone, move upslope and downslope depending on the water level of the wetland and reflect soil moisture conditions (LaClaire and Franz 1990).

The ephemeral nature and isolation of these wetlands make them unsuitable for fauna requiring longer hydroperiods, such as predatory fish. While some amphibians can breed in the presence of fish, the lack of predatory fish in ephemeral wetlands is essential to the successful reproduction of a large portion of Florida’s amphibian species.

Our region’s biological diversity is greatly enhanced by the presence of ephemeral wetlands. Ephemeral wetlands provide habitat to a large diversity of plants, invertebrates, reptiles, mammals, and birds (LaClaire 1992, Tiner et al. 2002, Comer et al. 2005, Scheffers et al. 2006, Means 2007). At least 10 federally and state-listed species facultatively or obligately utilize isolated wetlands for some portion of their life cycle (Hart and Newman 1995). These wetlands also serve as water sources for game species such as white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and waterfowl. Additionally, the aesthetic value of small wetlands is of great importance to a society that places a major emphasis on the value of water bodies.

The longleaf pine ecosystem, once widespread across the southeastern Coastal Plain, has been reduced to <2.2% of its original extent (Frost 2006). In just the past 50 years, a quarter of Florida’s forest and wetland habitats have been cleared (Cox et al. 1994). The cumulative effect of ephemeral wetland destruction in Florida has not been measured, but studies by Semlitsch and Bodie (1998) and Gibbs (1993) illuminate the problems associated with the loss of small wetlands. Small wetlands are crucial for maintaining

regional biological diversity and are important because they support plants, microcrustaceans, and aquatic insects that would be negatively impacted by their loss. From an amphibian metapopulation standpoint, reducing the number of wetlands reduces the amount of young individuals dispersing into surrounding uplands. Ephemeral wetland reduction also increases the dispersal distance among wetlands. While some amphibians can travel up to 2 km (Franz et al. 1988), these dispersal distances appear to be rare. The majority of individuals appear to stay within 1 km of their breeding wetland (Johnson 2003, Rosnik 2007), so increasing dispersal distance could negatively impact amphibian populations. An increase in dispersal distance also may increase the extinction rate of populations of small mammals, turtles, and other less vagile species (Gibbs 1993).

Historically, ephemeral wetlands were largely ignored by scientists, regulatory agencies, and land managers. These wetlands were generally thought to be subsets of larger wetlands. Because of their small size, they were believed to have lower biological diversity and less significant ecological function than larger, more permanent water bodies (Moler and Franz 1987). Studies over the past 20 years have dispelled that notion. We now know that ephemeral wetlands are not just subsets of larger wetlands, but rather they hold their own unique and intrinsic biological value. However, wetland regulations and management plans maintain their focus on larger wetlands. Consequently, many smaller, isolated wetlands have been destroyed or their ecological integrity degraded through human activities that include logging, ditching, draining, and mechanical site preparation. Additionally, fire suppression or improper use of prescribed fire has altered the natural conditions of many ephemeral wetlands.

Coastal Plains Institute (CPI) biologists recently completed a Florida Fish and Wildlife Conservation Commission (FWC) State Wildlife Grant project entitled “Management Strategies for Florida’s Ephemeral Ponds and Ephemeral Pond-Breeding Amphibians” (Means 2008). Through that project, CPI identified and prioritized the necessary steps to improve the management of ephemeral wetlands in Florida. Upon completion of that project, the next logical step in the goal of proper ecological management of Florida’s ephemeral wetlands was the development of the current project. Proper ephemeral wetland management was given the highest priority at “Ephemeral Pond-Breeding Amphibians: Threats and Research Gaps,” a 2007 meeting of amphibian biologists at which research needs of ephemeral wetlands and associated biota were identified and prioritized. The current project will provide FWC with the site-specific tools and knowledge it needs in order to carry out the long-term ecological management of Florida’s ephemeral wetlands by:

- 1) Identifying ephemeral wetlands using remote sensing tools such as GIS, DOQQs, and topographic maps
- 2) Conducting on-the-ground assessments of ephemeral wetland conditions using quantitative and qualitative metrics
- 3) Recommending restoration strategies for each identified wetland or management unit

Seven FWC-lead Wildlife Management Areas (WMAs) were selected for study based on FWC-identified restoration potential priorities and the distribution and occurrence of amphibian Species of Greatest Conservation Need, as identified from CPI's geo-referenced database developed as part of the recent CPI project funded by a State Wildlife Grant (Figure 1). This current project serves to assist FWC land managers by identifying, inventorying, and assessing the restoration need of ephemeral wetlands on the following WMAs:

- Aucilla (AWMA)
- Big Bend (BBWMA)
- Caravelle Ranch (CRWMA)
- Chassahowitzka (CWMA)
- Guana River (GRWMA)
- Half Moon (HMWMA)
- Triple N (TNWMA)

This draft report provides an inventory, characterization, and restoration assessment for ephemeral wetlands on CWMA, the fourth of the 7 WMA's visited as part of this project.

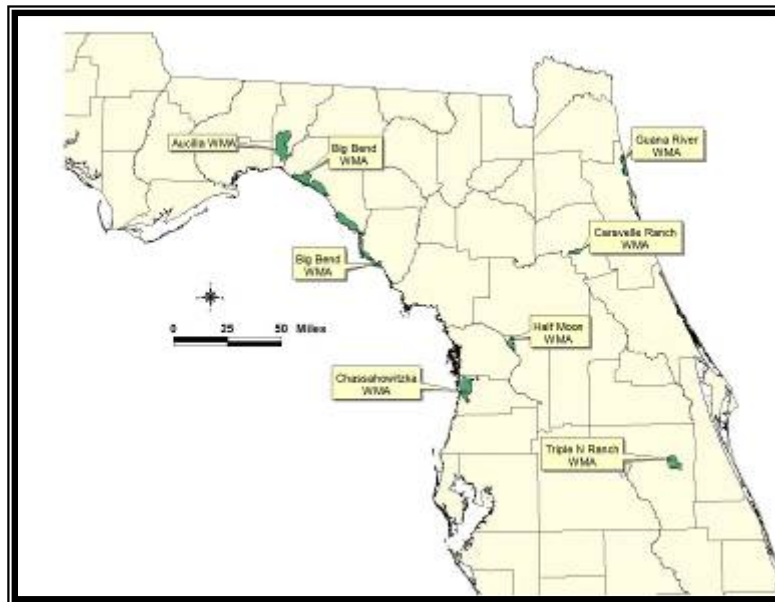


Figure 1. Seven FWC-lead WMAs targeted for this study.

EPHEMERAL WETLAND ECOLOGY AND RESTORATION

Ephemeral wetlands also are known as temporary ponds, isolated wetlands, Carolina bays, seasonal ponds, cypress domes, sinkhole wetlands, seasonal marshes, intermittent ponds, pineland depressions, depressional wetlands, and vernal pools. They can be classified as either marshes, shrub swamps, or forested swamps (Whitney et al. 2004). Marshes are dominated by herbaceous vegetation; grasses and forbs that can be emergent, submergent or floating. Swamps are wetlands dominated by woody vegetation. Shrub swamps are dominated by shrubs and forested swamps are dominated by trees.

Both fire and water residency time (hydroperiod) play major roles in shaping the ecological function and the physical appearance of isolated wetlands in Florida landscapes. In the case of marshes, fire and hydroperiod work in unison to produce open, ephemeral, herbaceous marshes. A marsh is likely to succeed into a shrubby or forested swamp over time if two things occur in the wetland: 1) dry conditions ensue long enough for woody plants to become established in the newly exposed wetland floor; 2) fire is absent in the wetland during the dry period.

Historically, wildfires occurred during dry periods and burned across the Florida landscape. The absence of fire from an ephemeral wetland during a prolonged dry period enables the establishment of woody plants in a marsh. Woody invaders into marshes will create a shading effect over time and eliminate low-lying herbaceous vegetation through competitive exclusion. Succession of a marsh into a swamp can be a natural process but much more often, on lands that have been impacted by humans over the long-term, marshes are succeeding into shrub and forested swamps. Over the last century of human growth and development in Florida, a great many marshes in Florida may have succeeded into shrubby and forested swamps as a result of fire suppression induced by humans. This conversion of wetland type may be a factor in the decline of some ephemeral wetland-breeding species such as the striped newt and the gopher frog.

Just as it is possible for marshes to succeed to swamps, it is also possible for marshes to become too choked with herbaceous vegetation (i.e. sawgrass or maidencane) if they do not burn frequently enough. High densities of a single species in wetlands can eliminate open water pools, create a shading effect, and reduce species diversity. Grass-choked marshes are usually best managed with fire.

Dry periods coupled with lack of fire in an ephemeral marsh will lead to woody encroachment, competitive exclusion of herbaceous vegetation, and subsequent loss of marsh habitat. We have observed significant woody shrub and tree encroachment in many ephemeral marshes and swamps in most of the WMA's visited as part of this project. All wetlands exhibiting signs of fire suppression should be encouraged to burn during landscape level prescribed fires. Various other restoration techniques are available to catalyze restoration of fire-suppressed marshes. These additional techniques are discussed in the Wetland Concerns portion of the Site Assessment section. In the short term, marshes should be given higher restoration priority over swamps. Marshes

will rapidly succeed to swamps if not properly managed, whereas swamps are more enduring, already canopied, wetland habitats.

The most important management strategy for ephemeral wetlands and the surrounding landscape is to actively maintain or restore historic fire regimes. Fire suppression was identified as one of the top 8 threats to amphibian conservation (Means 2008) and frequently is cited as a cause for decline in wetland-breeding amphibian populations (Palis 1997, Franz and Smith 1999, Hipes 2003, Jensen and Richter 2005, Means 2007) as well as other taxa (Stoddard 1931, Mushinsky 1985, Brennan et al. 1998, USFWS 2003). The Florida Comprehensive Wildlife Conservation Strategy ranked “incompatible fire” as one of the highest overall threats across all Florida’s terrestrial habitat (FWC 2005). Most land managers recognize the necessity of fire to maintain the longleaf pine ecosystem, but there is debate regarding the importance of fire season versus fire frequency (Bishop and Haas 2005) and as to the appropriate fire frequency (Schurbon and Fauth 2003, Means et al. 2004, Robertson and Ostertag 2004). Additionally, many managers have to contend with managing units or entire properties that have heavy fuel loads resulting from long-term fire suppression. These heavy fuel loads present specific fire safety and ecological concerns.

Regardless of upland burn season and frequency, managers should ensure ephemeral wetland basins burn at least every 1-4 years (Wade et al. 1980, Printiss and Hipes 2000, Ripley and Printiss 2005, Means 2007). Because some wetlands may be severely fire suppressed, several treatments of annual or biennial burns may be necessary to initially suppress the hardwoods (Printiss and Hipes 2000). Historically, fires were ignited by lightning during the spring and early summer and had the potential to burn across large portions of the landscape (Robbins and Myers 1992). Wetlands were often dry during this time and fires were more likely to burn through the wetland basin. Fire reduces hardwood encroachment and buildup of organic matter (Wade et al. 1980). Fire also encourages growth of the herbaceous vegetation around the wetland edge, an area referred to as the littoral zone. This shallow zone is extremely important to adult amphibians for use as breeding and ovipositioning sites and to amphibian larval for food and cover habitat.

We primarily recommend the use of growing season prescribed fires in Florida landscapes in order to mimic the historical fire regimes that occurred here prior to European induced fire suppression. Embedded ephemeral wetlands within upland landscapes should be allowed and encouraged to burn. However, we recognize that dormant season burning may have to be conducted by land managers in many cases, especially in the initial phases of landscape restoration.

From an amphibian conservation perspective, burning of the wetland basin may be as important as the attention given to upland burn frequency and season. The U.S. Forest Service (USFS), in cooperation with Florida State University (FSU), are experimenting with whether dormant season upland burns combined with intentional burning of wetlands will improve conditions for flatwoods salamander populations in the Apalachicola National Forest (C. Hess, USFS/FSU, pers. com.). The uplands

surrounding the wetlands were burned during the USFS's normal winter burning season, but the researchers returned later when the wetland basin was dry and conducted a burn through the wetland basin. Because the fuel load of the surrounding area had been eliminated during recent burns, the researchers were able to conduct a hot, ring fire in the wetland basin. The resulting elimination of woody vegetation and the creation of an herbaceous community in the wetland basin were dramatic and extremely successful (C. Hess, USFS/FSU, pers. comm.). This method can be implemented to improve the ecological condition of ephemeral wetland basins suffering from fire-suppression due to dormant season burning when wetlands are typically filled with water.

The ecological health of an ephemeral wetland is unequivocally connected to that of the surrounding upland habitat (Semlitsch and Jensen 2001, Gibbons 2003, Semlitsch 2003). Wetlands are part of a larger landscape unit comprising a network of energy transfers and chemical interactions among organisms that are directly or indirectly dependent on surface water when it is present (Gibbons 2003). Studies of amphibians in ephemeral wetlands illuminate the enormous wetland-upland biomass exchange. In Florida, 14 amphibian species exclusively or principally breed in ephemeral wetlands and at least a dozen more species utilize the habitat opportunistically (Means 2008). These species spend the majority of their life cycle in the uplands, migrating to wetlands to breed. Travel distances of greater than 400 m have been recorded for many species (Lannoo 2005). The number of individual amphibians entering and exiting a wetland in a given year is often in the thousands (Dodd 1992, Johnson 2001, Means 2007) and even tens of thousands (Semlitsch et al. 1996, Means 2007).

When considering how to properly restore and manage ephemeral wetlands, it is important to note that landscapes typically contain a multitude of ephemeral wetlands that may vary in hydroperiod, floral and faunal species composition, and other ecological characteristics. Whereas some ephemeral wetlands appear quite similar to one another, each is a unique ecological entity possessing unique ecological qualities and processes. Ephemeral wetlands are dynamic ecosystems that constantly undergo ecological succession, responding to abiotic (e.g. climate change, hydroperiod, fire) and biotic (e.g. plant succession, faunal reproductive activity, alteration by humans) factors that are continually ongoing. Whereas in some cases we will recommend how to manage wetlands that need specific attention, the goal of ephemeral wetland management should be to manage at a landscape level for long-term ecological health and biodiversity of the entire ecosystem, including all embedded ephemeral wetlands.

In cases where wetlands can be restored to mimic the natural condition that existed before alteration occurred, we make recommendations on how to accomplish this. We make every effort to tailor our recommendations to the specific needs of each WMA visited. Because little work has been conducted in the field of ephemeral wetland restoration, we may recommend experimenting with different restoration techniques. Any or all of the following techniques may be recommended for the proper, long-term, ecological management of specific ephemeral wetlands or management units that contain multiple similarly impacted wetlands visited within this project:

-
- Landscape (or ecosystem) management
 - Prescribed growing season fire
 - Prescribed dormant season fire
 - Fireline placement
 - Spot use of herbicide on exotic or invasive flora
 - Filling or plugging of drainage ditches
 - Physical elimination/reduction of damaging exotic wildlife (e.g. hogs)
 - Grazing reduction/elimination
 - Hand removal of encroaching vegetation
 - Mechanical removal of encroaching vegetation
 - Mechanical flattening of bedding or windrows
 - Re-routing roads

STUDY AREA

Chassahowitzka Wildlife Management Area is approximately 13,000 ha in size and is located along the Gulf Coast in Hernando County, just north of the town of Weeki Wachee, and approximately 75 km north of the city of Tampa (Figure 2). The major vegetation community within CWMA is hydric hammock. Other prevalent habitat types include basin marsh, basin swamp, coastal salt marsh, flatwoods, and sandhill. Historically, land use in the area was concentrated around timber, agriculture, citrus, hunting, and trapping. The majority of the property was purchased by the state in 1985 through the Conservation and Recreation Lands (CARL) program.

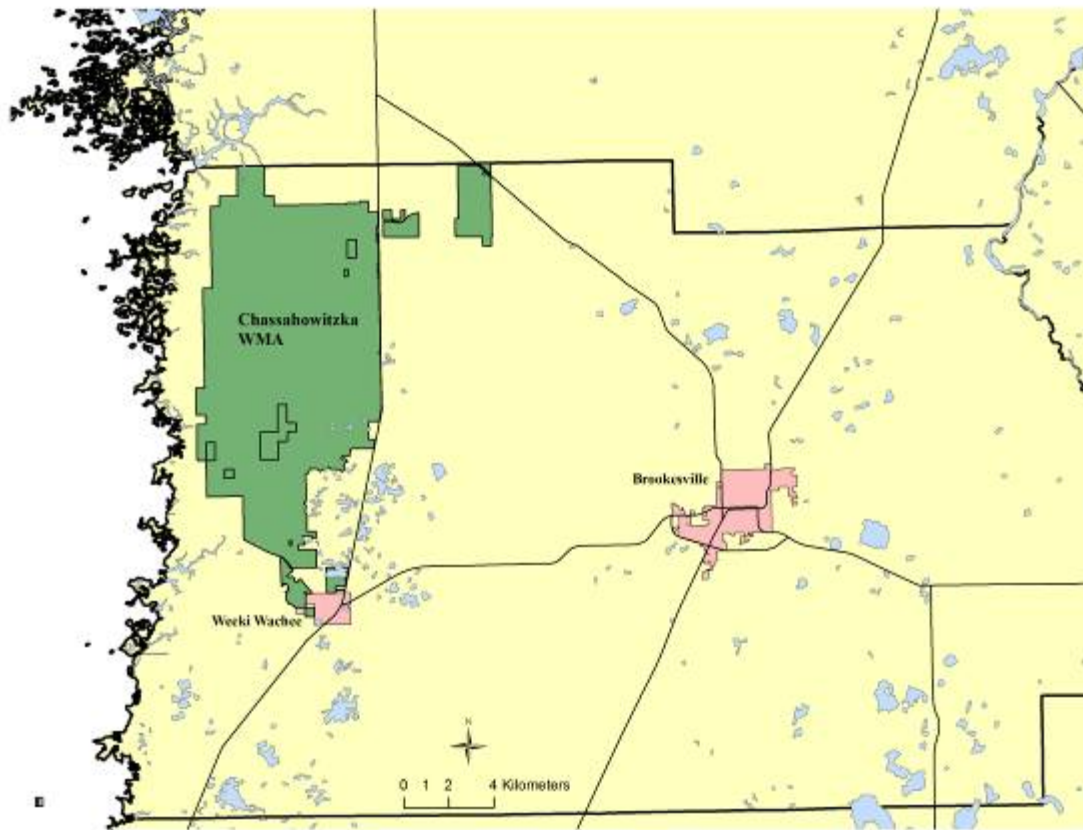


Figure 2. Location of Chassahowitzka Wildlife Management Area.

The following management information was obtained from “A Conceptual Management Plan for Chassahowitzka Wildlife Management Area 2001-2006” published by FWC (2001). Overall management directives for CWMA are to manage for the conservation of unique or significant ecosystems and the establishment of public uses consistent with resource protection. Select management objectives as related to this project include: conducting an inventory of natural resources, restoring native plant communities, developing a comprehensive prescribed burn plan addressing habitat recovery and maintenance, managing habitats to benefit nongame species, and managing habitats for the perpetuation and expansion of threatened and endangered species.

Management activities on CWMA involve monitoring of select species, managing for recreational use (primarily hunting and fishing), prescribed fire, chemical treatment, timber harvesting, and chopping and shredding. Both growing season and dormant season prescribed fire is used. Chemical treatments are used primarily to control exotic species. Timber harvests are used for thinning and restoration purposes. Chopping and shredding is used for restoration, primarily in sandhills and at the upland/lowland ecotone.

METHODS

We conducted an initial meeting with CWMA staff Chad Allison, Area Manager, and Jennifer Roberts, Wildlife Biologist, to familiarize ourselves with land access, burning schedules, management priorities and concerns, and other pertinent issues. We used Digital Orthophoto Quarter Quadrangles (DOQQs) and topographic maps to remotely identify potential ephemeral wetlands on the property. We identified and generated maps for 345 potential ephemeral wetlands on the property.

For this study, ephemeral wetlands were defined as depressional features containing wetland-indicating vegetation, isolated from much larger and deeper wetland strands, swamps, basins, lakes, or other more permanent wetlands. Unless specifically requested by a land manager, we did not visit wetlands surrounded by swampy lowlands such as hydric hammock and tidal marsh. No minimum or maximum size was required to designate a wetland as an ephemeral wetland, but this study focused on inventorying wetlands that were relatively small in size to assist land managers in potentially discovering wetlands that they formerly did not know existed.

We obtained a GIS location at each wetland using a TDS Recon 400x with a Garmin 10 Bluetooth. A quick assessment of wetland and surrounding upland conditions was conducted and recorded on an ephemeral wetland inventory datasheet (Appendix A) and entered into the Recon datalogger. Multiple photographs were taken of each wetland to provide a current “snapshot” of their physical appearance. Clarification of select data collected follows.

Wetland ID

Wetlands were given an ID that corresponds to the Management Unit (MU) number then the wetland number. For example, 01C-01 is the first wetland inventoried in management unit 1C.

Wetland Type

We placed each wetland into one of 5 generalized categories based on descriptions from Ewel (1990), Kushlan (1990), and Whitney et al. (2004):

Marsh – dominated by herbaceous vegetation rooted in or emergent from shallow water - examples include basin, depressional, swales, and wet prairie

Shrub swamp – dominated by shrub or midstory woody vegetation

Forested swamp – forested or wooded wetland - examples include heads, bogs, domes, strands, and hammocks

Mixed swamp – forested wetland with a heavy shrub midstory

Altered – damaged wetland whose original ecological classification is unrecognizable - examples include drained, logged, or mechanically altered wetlands

Basin Area

Length and width of wetland were measured using a range finder, where feasible. Basin area was estimated using the measure tool and DOQQs in ArcMap.

Hydroperiod

Highly Ephemeral – wetlands with a very short hydroperiod, estimated to have standing water only a few months out of a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.

Ephemeral – wetlands with an intermediate hydroperiod, estimated to have standing water for up to 8-10 months out of a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.

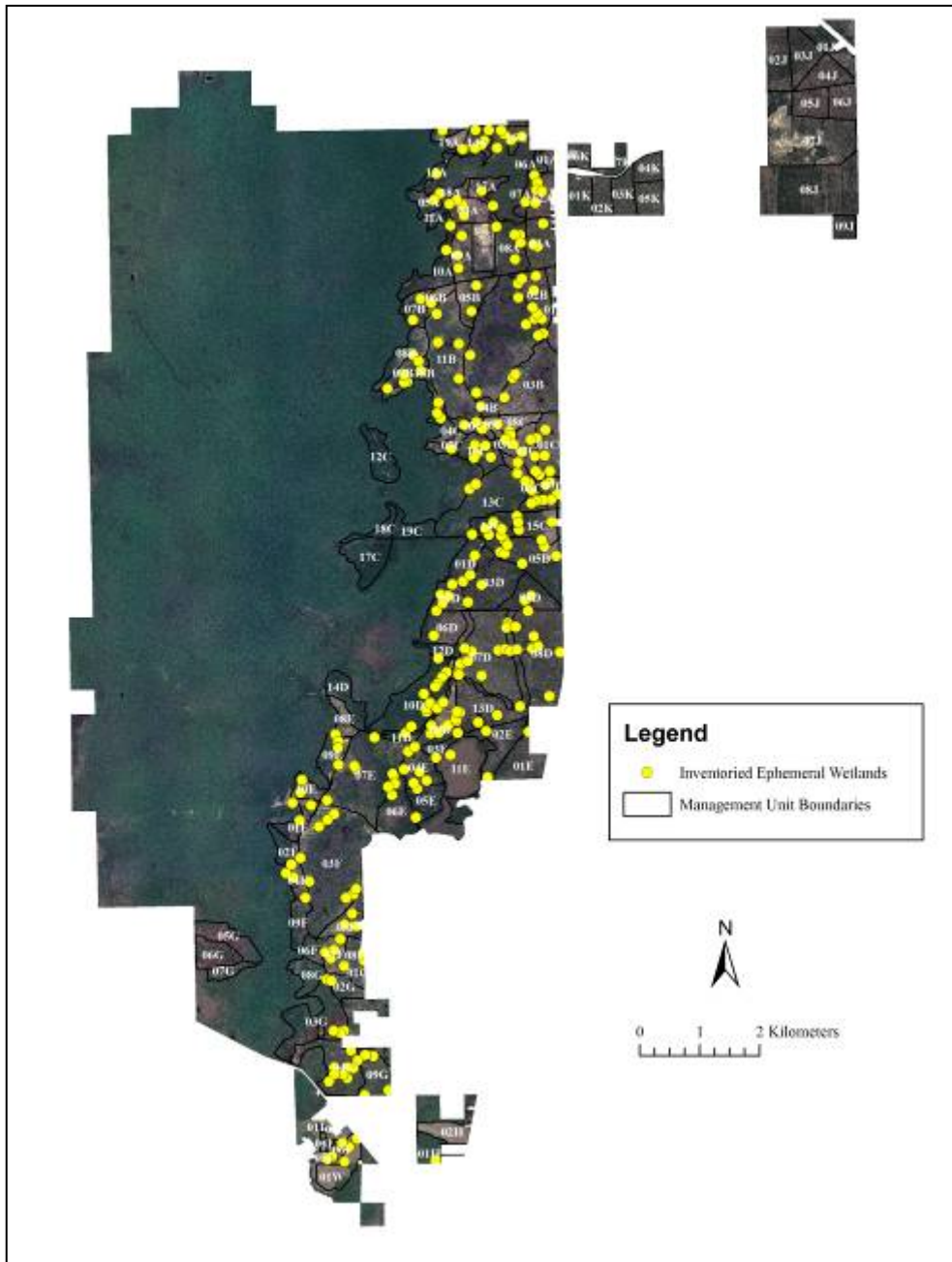
Semi-permanent – wetlands with a long hydroperiod, estimated to have standing water for more than a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.

Comments

As requested by C. Allison and J. Roberts, we indicated which wetlands were potential striped newt breeding habitat. We designated a wetland “striped newt potential” based on current wetland conditions and on our experience with striped newt habitat, not on any quantitative variables. We provided this information to help concentrate future amphibian sampling efforts in wetlands with the greatest potential of supporting striped newts. As of now, no striped newts have been recorded on CWMA, but this may change in the future after repeated sampling efforts.

SITE ASSESSMENT

We began our inventory of wetlands on 10 June 2009 and completed the assessment on 29 September 2009. We inventoried all 345 potential wetlands on the property and assessed 271 as ephemeral wetlands (Figure 3). The wetlands were located in 70 management units as well as in areas that have no management unit designation.



The major wetland concern on this property was feral hog damage. We observed feral hog damage in 67% of the wetlands on the property. Some of the damage was old and grown over primarily with redroot and fern. Affected wetlands were located throughout the property and not concentrated in any one location. Based on our inventory, feral hogs appear to be a widespread problem on CWMA.

Additional wetland concerns were woody vegetation encroachment (35% of wetlands) and the placement of firelines through or around ephemeral wetlands (8% of wetlands). Some of the ephemeral wetlands on CWMA were in good ecological condition (20% of wetlands) with no associated wetland concerns.

Wetland Concerns

Wetland Concerns were identified for each wetland to highlight areas that may need to be addressed. When deciding what concerns to address, we first recommend using a landscape perspective. The condition of an individual wetland is not as important as the condition of the wetlands as a whole over the landscape. In addition, there is no universally-accepted target condition for every wetland. A mosaic of different wetland conditions is desirable and increases the diversity of the property. For example, if only 1 or 2 wetlands in an area are impacted by woody encroachment, WMA personnel may decide to address this concern by using general landscape management techniques such as periodic, prescribed fire. However, if multiple wetlands are impacted, it may signify a larger issue that may need to be addressed and/or the affected wetlands may need to be custom managed through vegetation removal, burning when the wetland is dry, removing fire breaks, etc. We provided a database for each property to facilitate the use of GIS to spatially identify problem areas (see Database section below).

Depending on resource constraints, landscape conditions, the presence of focal species, or other factors it may be more advantageous to manage at an individual wetland level. Therefore, we also provided restoration actions for each individual wetland. These actions may need to be prioritized (see Restoration Prioritization section below).

Below we detail the impacts of each Wetland Concern and how it pertains to CWMA. Not all Wetland Concerns were identified on each property but we included them as a reference for WMA personnel. Occasionally we note a Wetland Concern because it has the potential to become a problem in the future, not because it is a current issue (e.g. woody encroachment in wetlands)

Bedding

Historically, much of Florida's flatwoods were bedded in order to provide higher, less water-logged sites on which to plant pine trees. Sometimes bedding was constructed through the edge or center of wetlands. Typically this practice occurred with smaller wetlands. We generally recommend allowing bedding to erode over time. However, more severely damaged wetlands, such as those with severe feral hog damage or altered hydrology, may provide a good experimental situation for mechanically flattening

bedding in or around a wetland basin when the wetland is dry. If bedding removal proves successful (i.e. retention of native wetland plants, maintenance of hydroperiod), the method could be used on other, less severely damaged wetlands to restore bedding impacts. In some cases we may recommend specific wetlands where experimental bedding removal could be undertaken. All mechanical activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

Only 1 wetland was impacted by bedding on CWMA. The wetland had been bedded and planted with pine trees. The bedding rows were eroding and no action was recommended.

Cattle

Impacts of cattle grazing to a natural landscape in both wetlands and uplands include nutrient overloading from concentrated urine and feces, trampling, altering plant community structure, facilitation of invasive/exotic species colonization, and soil compaction. We recommend that cattle-grazing be phased out of WMAs altogether as part of a longer-term management strategy to maintain long-term ecological health of ephemeral wetlands and their surrounding uplands. Due to their affiliation with water sources, cattle are a danger to the ephemeral wetland community. If cattle cannot be removed from the property, we recommend continuing the current management practice of keeping them on habitat already degraded by past land use practices. Grazing densities should be kept as low as possible, particularly in MUs with ephemeral wetlands. The use of excluder fencing may be needed for severely damaged wetlands or wetlands with SGCN or other target species.

Cattle grazing is not permitted on CWMA and we identified no wetlands affected by cattle.

Drainage Ditching, Culverts, Berms, and Roadside Ditching

Ditches have been used in Florida to drain wetlands for decades. Drainage ditches alter the hydrological regime, and therefore the ecological character, of a wetland over time. Culverts associated with wetlands generally are constructed for flood control and/or to drain the wetland or maintain the connectivity of a bisected wetland system. Culverts can allow for unnatural wetland floods or fish inoculations to occur within isolated wetlands. Berms are linear, earthen raised rows usually running parallel to a ditch. These features sometimes run near, through, or around wetlands. Berms can alter wetland hydrology and provide a platform for the establishment of upland plant species through a wetland. Many times berms are created during road-building. The result is an elevated road with ditches on one or both sides of the road. In many cases, access roads run tangent to wetland edges, and have associated roadside ditches of varying depth and hydroperiod. Roadside ditches along wetland edges can provide an unnatural avenue for connectivity to other wetlands located along the road. Roadside ditches may also become refuges for fish if they are deeper with longer hydroperiods than the affected wetland.

It is important to break the connection between ditches and wetlands. We typically recommend filling in all drainage ditches, because it is likely that ditches affect the long-term hydrological regime of a wetland. If filling in the ditch is not an option, the ditch should be plugged as close to the wetland edge as possible.

In the case of roadside ditches tangent to isolated wetlands, we suggest experimental restoration of 1 or 2 wetlands. In order to preserve the drainage functionality of the ditches as well as sever the connectivity between ditches and wetland, 2 culverts could be employed to divert all water to the ditch on the opposite side of the road. The recipient ditch may need to be expanded to accommodate the increase in flow. The modified ditch and culvert system would need to be monitored during heavy rains and, if successful, the method could be used property-wide. An explanatory diagram is provided as Appendix B.

Sometimes ditches themselves are ephemeral and the wetland does not appear to be hydrologically impacted by the ditch. Although priority should be given to filling/plugging deep ditches, we still recommend filling ephemeral ditches because there may be unseen effects difficult to ascertain in a short period of time without ecological monitoring.

We encountered 2 wetlands with berms. In both cases we recommended removing the berm from the wetland. We encountered no wetlands affected by roadside ditching and 8 wetlands with drainage ditches. We recommended filling most of the drainage ditches; however, several ditches were shallow enough that they could be restored by allowing vegetation to naturally re-establish.

Dug-outs

Dug-outs are features that were created primarily to serve as watering holes for cattle. These structures commonly were excavated within already existing wetland basins. Dug-outs alter the original hydrology of the surrounding wetland by providing a deep, permanent water body that may harbor predatory fish in wetlands that otherwise would not support fish. The unnatural presence of fish in ephemeral wetlands makes them unsuitable for certain rare amphibian species to breed such as the striped newt, gopher frog, and ornate chorus frog (*Pseudacris ornata*).

We recommend that deep dug-outs within ephemeral wetland basins be filled and leveled with the surrounding wetland bottom in order to restore the natural topography and hydrology of the original wetland basin. Existing earthen mounds can be the fill material source. Established permanent wetland animals (e.g. fish, turtles, alligators) could be trapped and moved to other suitable natural wetlands prior to filling the dug-out. Wetland vegetation should quickly reestablish over the filled area.

We encountered 1 dug-out on CWMA. The dug-out was on the private property side of the wetland and no action was recommended.

Feral Hog Damage

Feral hogs (*Sus scrofa*) have occupied Florida for almost 500 years (Belden and Frankenberg 1977) and have been recorded in all 67 counties of the state (Layne 1997). Among exotic mammals in Florida, feral hogs have the most destructive impact on natural habitats (Layne 1997). The list of these impacts is long and includes preventing the natural regeneration of native plants such as the longleaf pine (Lipscomb 1989), facilitating the spread of exotic species (Jensen and Vosick 1994), adversely affecting soil microarthropods (Vtorov 1993), transmitting disease (Forrester 1991, Maffei 1997), destroying the nests of birds, turtles, and snakes (Maffei 1997), and affecting species composition (Randall et al. 1997). Habitat damage by feral hogs is most pronounced in wet environments (Choquenot et al. 1996). From an amphibian conservation perspective, rooting and subsequent habitat alteration can destroy amphibian breeding habitat as well as upland refugia (Printiss and Hipes 2001, Means and Travis 2007). Foraging by feral pigs during amphibian breeding events has been observed and could result in the consumption of significant numbers of breeding adults (Jolley 2007).

Most land managers, biologists, and conservationists agree that feral hog reduction and removal should take place to reduce the many impacts hogs have on the natural environment. However, the removal of feral hogs from a property is problematic from both a political and ecological standpoint. The main political obstacle to hog removal often is a strong sport hunter's lobby. Even if managers decide to reduce or remove hog populations, it is extremely difficult to fully eradicate them due, in part, to their high fecundity and the substantial resources required for total eradication. However, it is possible to significantly reduce hog populations and their impacts on a landscape with the use of certain removal techniques.

Sport hunting and direct culling have been used with varied success (Belden and Frankenberg 1977, Ferriter et al. 1997, Engeman et al. 2007). Other possible techniques include fencing of wetlands or wetland clusters (Hone and Atkinson 1983, Lipscomb 1989) and immunocontraception (Killian et al. 2006). Trapping hogs in baited pen traps is one of the most successful techniques to reduce feral swine in a landscape (Engeman et al. 2007; D. Printiss, The Nature Conservancy, pers. com.). In a study on Eglin Air Force Base, hogs were trapped and control hunted on a portion of the property closed to sport hunting where hog populations were relatively high (Engeman et al. 2007). In this study, hog populations and impacts to seepage slopes were dramatically reduced within the closed-to-hunting zone in the first year of hog removal and reduced further in subsequent years. Furthermore, reductions of hogs and impacts also occurred property-wide where hunting has taken place for decades. The researchers calculated economic valuations of seepage slopes and demonstrated substantial benefit-cost ratios to application of swine removal over a three-year period.

Funding to manage feral swine and restore habitat is finite and must be carefully managed to optimize the positive impact on the protected resources (Engeman et al. 2007). In spite of the difficulties encountered with feral hog removal, trapping and

hunting can be used to successfully reduce hog populations and their impacts on a given property (e.g., Engeman et al. 2007).

Feral hog damage affected 182 of the 271 wetlands (67%) on CWMA. Feral hog damage was old within many of these affected wetlands and vegetation was growing over the uprooted soil. Affected wetlands were located throughout the property and not concentrated in any one location (Figure 4). Based on our inventory, feral hogs appear to be a widespread problem on this property.

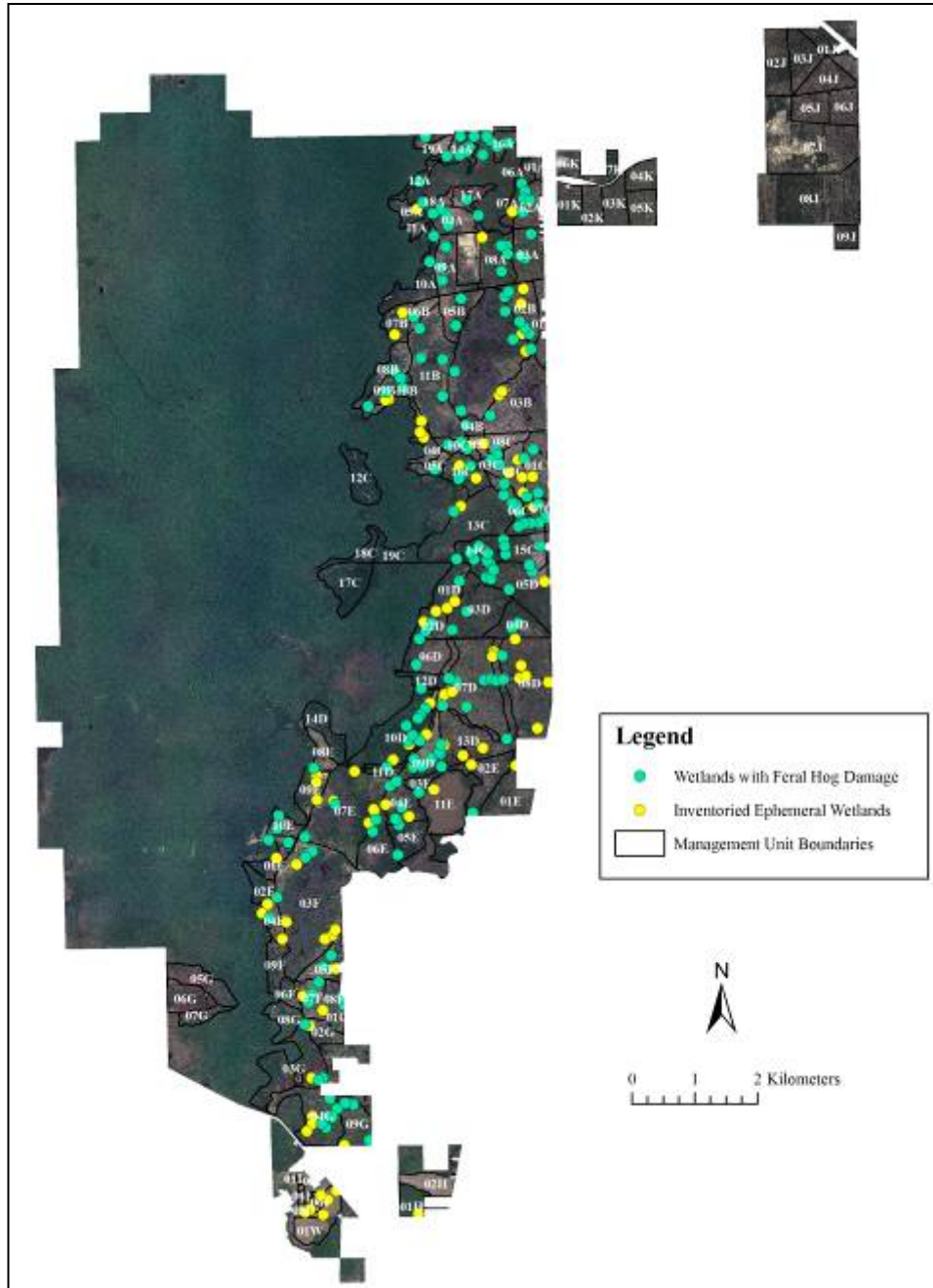


Figure 4. Map depicting the spatial extent of feral hog damage in wetlands on CWMA.

Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Sensitive areas that are sustaining heavy hog damage and areas with SGCN could be identified through ecological monitoring. Once identified, these areas could be targeted for hog removal as in the Engeman et al. (2007) study. Benefits mostly would occur in the targeted area, adjoining areas likely would also profit.

We recommend that trapping be used in combination with sport hunting and control hunting as a 3-pronged approach to reduce the impacts to ephemeral wetlands. Hog-trapping can be conducted using WMA personnel or by soliciting the services of the US Department of Agriculture Wildlife Services, the federal agency responsible for managing conflicts with wildlife (Engeman et al. 2007, US Department of Agriculture 1997). To simultaneously provide hunting opportunities and reduce hog impacts to sensitive areas, hunting could take place year-round and in management units (MU's) that have fewer sensitive areas and SGCN while the most sensitive areas are targeted for hog removal via trapping.

The widespread presence of feral hogs and their impacts to ephemeral wetlands on the CWMA presents an opportunity for initiating some much needed research on feral hog impacts to ephemeral wetland ecology. There are a multitude of both impacted and unimpacted wetlands from which to select to be part of any potential feral hog impact study. Powerful before-after-control-impact (BACI) studies could be initiated where data would be taken both before and after hogs impact given experimental wetlands. Baseline and post-impact data could be compared.

Important unanswered research questions about feral hog impacts to ephemeral wetlands include: length of time for a hog-damaged wetland to naturally regenerate its original plant community, differences in biodiversity between hog-rooted and undisturbed wetlands (e.g. plant communities, amphibian communities), and soil impacts. Researchers conducting any future studies on hog impacts to ephemeral wetlands should consider the CWMA as a prime potential study location.

Firelines/Management Unit Boundaries/Roads

The placement of firelines and roads through wetlands is detrimental to wetland habitat because the swath of exposed soil and denuded vegetation is a direct alteration of wetland habitat and can impact wetland hydroperiod. We recommend firelines and roads be rerouted at least 15m from a wetland edge to prevent damage to the wetland littoral zone. For wetlands that are located adjacent to MU boundaries, we recommend delineating the wetland edges with flagging or some other method so the machine operators will be alerted to diverge from their straight line paths.

We typically recommend allowing abandoned firelines to fill in with vegetation over time. However, WMA personnel have employed mechanical treatments to rework and restore fire plow lines in and around wetlands. Using a low-ground pressure bulldozer and disc for minimal ground disturbance, old wildfire suppression plow lines have been

rehabilitated on CRWMA. WMA personnel have observed a more natural hydroperiod and the ability to reintroduce fire into the wetland basin (J. Slater, CRWMA, pers. com.). Firelines bisecting wetlands also have been reworked on GRWMA to address hydrological impacts (J. Ellenberger, GRWMA, pers. com.).

In some instances, a road does not appear to be negatively impacting a wetland and we do not recommend moving the road. In these cases, the action of re-routing a road might be more destructive than leaving it in place. Additionally, we recognize that there are cases where firelines and roads in or near wetlands cannot be rerouted. If firelines/roads cannot be moved, the affected wetlands can be monitored to ensure they burn periodically and do not become impacted by encroaching woody vegetation, sand run-off, or other disturbances. Firelines can be plowed and maintained when wetland is completely dry to prevent large ruts from developing. Vehicular traffic should be discouraged along these firelines.

Where MU boundaries mark a property line with a private landowner, we recommend contacting the private landowner to see if the MU boundary can be moved to encompass the entire wetland. If the wetland is of particular interest (surrounded by intact uplands, potential breeding location for striped newt, etc.), a land swap may be an option to acquire ownership of the entire wetland.

If the road cannot be re-routed, it may be appropriate to experiment with filling in a roadside ditch where it connects to the wetland (see Ditching section). More severely damaged wetlands provide a good opportunity for such an experiment. If successful at these wetlands, the method could be used on other, less severely damaged wetlands to restore ditch impacts. All activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

Firelines affected 21 wetlands (8%) on CWMA. Several firelines were associated with property boundaries but the majority were not. Roads affected 5 wetlands on CWMA. Two wetlands were located adjacent to roads that were off the property.

Herbaceous Plant Density

The herbaceous community within a wetland is in constant ecological flux. Between fire and inundation, the density of herbaceous vegetation changes over time. For example, immediately following a fire, standing crop biomass of herbaceous vegetation is almost or completely eliminated; however, roots, rhizomes, and seeds of these plants remain resident in the soil and regenerate quickly following fire. Over time, herbaceous vegetation grows back and, if too much time passes between fires or inundation, becomes extremely dense. Wetlands with dense herbaceous vegetation have low plant species diversity and often are completely dominated by one species, usually maidencane or sawgrass. Additionally, these wetlands provide poor habitat for amphibian reproduction and for other species.

For any given WMA property that has a multitude of isolated ephemeral wetlands, the optimum ecological condition is a mosaic of wetlands in different stages of flux. Unless multiple wetlands in an area exhibit dense herbaceous vegetation, long-term ecological fire management of the landscape is sufficient to favor ecological health of a single wetland.

We encountered only 1 wetland affected by dense herbaceous vegetation on CWMA. We highlight these wetlands so that WMA personnel can monitor their condition. If the condition becomes more severe over time, the wetland may need to be custom burned by waiting until the wetland is dry or intentionally lighting the wetland if a firebreak is present. Prescribed burning of a choked herbaceous marsh reduces vegetation density, increasing sunlight into the wetland ecosystem, and increases overall ecological productivity of the wetland.

Logging

Old tree stumps or stump hummocks were observed in many ephemeral wetlands on multiple properties during this project, direct evidence of past logging practices. Most of the stumps appeared to be cypress. Sometimes, old logging stumps became hillocks or hummocks onto which woody shrubs established. This process was particularly prevalent on AWMA.

In most cases, stumps and hummocks were observed within swampy ephemeral wetlands that currently are forested by cypress trees. This indicates that the original plant community of the wetland reestablished after logging within the wetland basin. In some wetlands, dense brush established on the old stump hummocks and the cypress canopy did not reestablish. These wetlands became mixed shrub swamps or marshes.

We did not report logging as a Wetland Concern in the Wetland Characterization section because all the logging we encountered occurred long ago and most logged wetlands we observed had reforested. We did describe the presence of stumps or hummocks in the wetland description paragraph in an effort to be as descriptive as possible. In general, we do not recommend that any action be taken to remove old stumps or hummocks, unless they exist within a densely brushy wetland that is a candidate for experimental brush removal, or otherwise needs some other restoration attention. If a wetland becomes densely brushy, and this process is facilitated by the presence of stump hummocks, periodic fire should keep brush in check and stump hummocks should oxidize.

Planted Pine Trees

Public lands previously owned by timber companies often have evidence of past silviculture practices. Pine trees were planted through small wetland basins, often associated with bedding. Both the shade from the tree canopy and the needle duff can eliminate the herbaceous vegetation vital to the ecological health of a marsh. In most cases, we recommend removing the planted pine trees in an ephemeral wetland.

We encountered 3 wetlands impacted by planted pine trees on CWMA. In all cases we recommended removing the planted pine trees from the wetland interior.

Push Piles

Push piles are earthen mounds commonly formed during the process of land clearing. Heavy machinery is used to scrape clean the harvested landscape. After tree removal, remaining limbs, branches, small trees and shrubs often are pushed into piles and prepared for elimination by burning. Sometimes push piles are not burned, but left behind. In either case, an earthen hillock usually is created in the process, and logged landscapes can have these so-called “push piles” present for decades. Push piles can be several feet high and dozens of feet in diameter. During logging operations of the 20th century, it was not uncommon for land clearing personnel to create push piles within dried ephemeral wetland basins.

Push piles in wetlands can alter the original wetland ecology in at least 2 ways. First, there is the issue of direct reduction of wetland habitat. Second, a raised pile of dirt in a wetland favors establishment of small upland habitats where upland plants and trees can grow. If allowed to grow to maximum height, upland trees (most frequently pine trees) can create a canopy over a potentially large portion of a wetland. If the wetland in question originally was a marsh, the problem mirrors that of woody encroachment into a marsh, namely the shading and subsequent exclusion of native herbaceous wetland vegetation.

Push piles are unnatural and undesirable structures in wetlands. Depending on severity, push piles in ephemeral wetlands should be removed mechanically or be allowed to erode over time, depending on the size and impact of a given pile. Small piles having little impact on a given wetland should be allowed to erode over time. Large push piles in wetlands that are significantly impacting a given wetland should be mechanically removed when the wetland basin is dry. The dirt and any established trees can be removed and distributed in nearby uplands in such a way as to not damage uplands. Alternatively, dirt from push piles could be used for other purposes such as road and ditch fill, etc. A pile should be removed down to the level of the rest of the wetland basin.

We encountered no wetlands affected by a push pile on CWMA.

Slash

Slash is a term used to describe the treefall and brush byproducts of logging operations. After tree removal, slash is scraped into piles for burning or left to decompose, or the slash is scattered across the ground to decompose. Sometimes slash is left in a wetland. Unless it is a minor amount, we do not recommend slash be left in a wetland. The slash we encountered within wetlands was usually a byproduct of recent mechanical tree thinning or brush removal as part of the restoration process. Depending upon the amount

of brush left in a wetland, we recommend two different approaches to eliminate slash within wetlands.

If a significant portion of the wetland is covered with slash, the slash pile is dense, and/or mechanical treatment is needed for some other restoration concern, we recommend removal by root rake or mechanical means when the wetland is completely dry. Slash can be distributed in the uplands and should decompose and/or burn during the next prescribed fire. If the slash amount is minor and is not covering significant proportion of a wetland basin, we recommend encouraging fire in the wetland basin to eliminate the slash.

We encountered only 1 wetland affected by slash on CWMA. The slash was not dense and will burn with the next fire.

Upland Condition

Discussing upland management is beyond the scope of this project. However, we briefly characterized the uplands around each visited wetland. We used the phrase “Upland Condition” to identify wetlands surrounded by altered uplands or uplands needing restoration attention. When managing for the long-term ecological health of ephemeral wetlands, the ecological condition of surrounding uplands and upland corridors connecting multiple wetlands is equally important. For more information about wetland buffer zones, upland corridors and managing the uplands surrounding wetlands see Semlitsch and Jensen 2001, Semlitsch 2003, and Means 2008.

We encountered 4 wetlands affected by upland condition. All of these wetlands were located along an urban/wildland interface.

Vehicular Damage

Vehicles as a wetland concern usually are related to either recreational use or a result of mechanical activity related to vegetation clearing. Vehicles can impact ephemeral wetlands by compacting soil, destroying the wetland littoral zone, creating ruts that can alter hydrology, and/or facilitating the spread of invasive species. Additionally, the open soil left from vehicular damage can encourage further damage from feral hogs. In the case of recreational vehicles, gates, fencing, and road closures may be needed to reduce access and have been used successfully in some areas (C. Petrick, U.S. Forest Service, pers. com.).

In general, ruts and tracks can be left to erode and revegetate over time. If a wetland is highly damaged and mechanical activity is recommended for another reason, the vehicular damage could be treated mechanically. We acknowledge that some minor vehicular ruts may be created along the edge of wetlands while personnel are working to mechanically remove dense vegetation for the purpose of habitat restoration. To keep rut formation and soil damage to a minimum, all mechanical activity should be conducted when the wetland is completely dry.

We encountered 1 wetland on CWMA with vehicular damage associated with management activities. We also encountered a wetland with an old, abandoned vehicle. We recommended removing the vehicle as it may be a point source of chemical contamination that could leach into wetland.

Woody Vegetation Encroachment

Throughout the evolutionary history of the longleaf pine-wiregrass ecosystem, wildfires frequently occurred during the growing season and were common across the Florida landscape, particularly during dry periods (Means, 1996, Platt 1999). Since European colonization, humans have altered the natural fire regime in Florida by suppressing fire during the hot, dry growing season or, more recently, by prescribe burning during the dormant season. Suppressing fire during the growing season allows for dried, exposed wetland soils to be colonized by encroaching woody shrubs and trees. The practice of prescribed dormant season burning, while frequent, corresponds to the time when wetlands typically hold water, a condition which prevents thorough burning of wetlands. During this project, we have observed many ephemeral wetlands with dense, encroaching woody vegetation. This change in community structure has altered the fire feedback mechanism necessary to maintain a fire-adapted wetland community (Martin and Kirkman 2009).

The encroachment of woody vegetation usually manifests as a dense brush ring around the wetland edge, gradual encroachment from the wetland edge, and/or the colonization of plants throughout the wetland basin. Slash pine and wax myrtle are the two most predominant encroaching species into marshes we observed. These native Florida plant species normally occur in the upland/wetland ecotone and along the edge of wetlands and are maintained at low densities under a natural fire regime. However, during drought and fire suppression, these species can vigorously colonize open wetlands in unnaturally high densities along the edge and across the wetland basin. Once established, these species can shade out and exclude herbaceous vegetation, particularly in marshes.

Woody encroachment in marshes is considered on a case by case basis but generally we define it as having greater than 5% of the wetland basin covered by off-site, encroaching species that clearly have become established across the wetland basin during a dry period and fire suppression. Woody-encroached marshes should be managed in the short-term both by fire and other techniques that focus on the direct thinning of invading species. Encroaching woody vegetation in marshes, particularly slash pine and wax myrtle, should be addressed as soon as possible because succession and subsequent exclusion of marsh habitat can happen relatively quickly. Woody encroachment in a forested swamp is defined by having greater than 50% of the wetland midstory covered by shrubs.

There are some woody species that naturally grow in parts of marshes. Buttonbush, for example, is a wetland shrub that often becomes established in deeper sink depressions within marshes where a natural fire shadow exists in the wetland because of increased hydroperiod. Deep areas are less likely to burn over time because they are usually water-filled. These deep areas will and should burn during dry periods. Any native shrubs or

trees that become established in the deepest part of a marsh should not be removed—prescribed fire alone is the proper management tool.

Our primary recommendation to reduce encroaching woody vegetation is the use of prescribed fire. If upland burning occurs during a period of wetland inundation, fire crews can return later in the year when the wetlands are dry and provide fire to any unburned wetlands. Because the surrounding uplands will have little to no fuel load, a hot, ring fire can be ignited around the wetland basin, thereby improving chances the entire basin burns. This technique has been successful in restoring an herbaceous community to hardwood-encroached wetlands (C. Hess, USFS/FSU, pers. com.) and has been used successfully as a management technique (N. Dwyer, HWMMA, pers. com.). Sometimes specific attention to lighting fire at the edges or center of a wetland during regular upland burns may be all that is needed. If a fire shadow exists around the wetland, a combination of mowing and chopping of shrubs can be very effective to get fire into the wetland and change the vegetation composition, particularly with saw palmetto (J. Ellenberger, GRWMA, pers. com.).

We recognize that some wetlands are dominated by deciduous hardwoods that will not readily burn and there are cases with larger wetlands where hardwood encroachment is too extensive and/or budget or logistical constraints prevent the use of prescribed fire alone. Some of these wetlands provide a good experimental situation for mechanically removing the vegetation. If the desired results are achieved, the method could be used to restore other wetlands.

Below we provide alternative restoration recommendations for each of the 3 woody encroachment scenarios. These alternative recommendations should be used as a tool to return the wetland to a restored state, after which the wetland can be managed by fire alone. Martin and Kirkman (2009) were able to re-establish the herbaceous community-fire feedback mechanism in hardwood dominated wetlands by removing hardwoods and taking advantage of a persistent seed bank. Their paper is an important reference and represents one of the only published experiments on hardwood removal in southern ephemeral wetlands.

In cases where there is uncertainty about how to manage an impacted ephemeral wetland, we recommend acting on the side of caution and simply manage the surrounding landscape and associated wetlands with frequent prescribed fire. Assuming that everything else in the landscape is functioning close to naturally, frequent fire and periodic inundation will ultimately restore wetland function.

Dense brush rings occur when fire is not allowed to burn to the wetland edge, usually due to the presence of a fireline or because burning occurs when the wetland contains water. Mechanical removal can be used to reduce a thick and potential hazardous fuel load, after which the use of regular, growing-season fire can be used to maintain the natural ecology and prevent re-sprouting. Where mechanical treatment prior to burning is necessary, we recommend using a gyrotrack or bushhog (mower). Single pass, single drum roller-chopping, followed by burning, also has successfully been used around wetland edges to

reduce the midstory component while allowing grasses and herbs to germinate (J. Slater, CRWMA, pers. com.).

Woody vegetation encroaching from the wetland edge occurs during a dry period when the wetland is dry for an extended period of time. Woody vegetation (primarily pine and wax myrtle) from the surrounding uplands then has an opportunity to encroach and establish if fire is not allowed to burn into the wetland. Sometimes, there are large, mature slash and loblolly pine trees established around the outer wetland margin or in slightly elevated regions that connect multiple depressions within a single large marsh. Large pine trees should be thinned and harvested using the least disruptive techniques to the wetland. Similarly, wax myrtle shrubs encroaching from the wetland edge can be thinned by chopping or bush hogging, depending on severity of encroachment. We recommend a single thinning of encroaching woody species per marsh in the short-term. After the thinning event, a marsh could be managed solely by periodic prescribed fires over the long-term.

Establishment of woody vegetation in a wetland basin also occurs during a dry period when the wetland is dry for an extended period of time accompanied by a lack of fire. In this scenario, woody vegetation (primarily slash pine trees and wax myrtle) sprouts and colonizes across the entire wetland basin, not just along the wetland edge. There are cases where simply hand chopping young slash pine trees will suffice in small wetlands. Very small pine trees and wax myrtle likely would be killed by the next inundation or fire. If the marsh is large, there are hundreds of invading slash pine trees or wax myrtle, and/or the dbh of the woody vegetation is too large then a bush hog or shredder may be more suitable.

As part of the restoration of a hydrologically modified wetland on GRWMA, approximately 12 ha of willow and wax myrtle were successfully treated using a shredder followed by the reintroduction of fire into the wetland basin (J. Ellenberger, GRMWA, pers. com.). On AWMA, where heavily encroached titi swamps were also impacted by hummocks and old push piles, a low ground pressure track hoe and dozer combination was used to remove the titi and thick organic material down to the mineral soil. The herbaceous vegetation response was variable but generally positive (M. Wilbur, AWMA, pers. com.). In severely disturbed wetlands with dense shrub encroachment Martin and Kirkman (2009) successfully used an industrial mower to remove all small saplings (up to 10 cm dbh) from wetland basins. Large trees can be removed by hand or girdled. Spot herbicide may be necessary on some tree species to prevent re-sprouting (Martin and Kirkman 2009).

All mechanical and herbicide treatments must be conducted when the wetland is completely dry to minimize soil damage and rut formation and to reduce the risk of herbicide entering the aquatic system. We were unable to locate any sufficient references that unequivocally show herbicides are safe in wetlands. We did find references related to the toxicity of herbicides to amphibians (Berrill et al. 1994, Cheek et al. 1999, Relyea 2005a, Relyea 2005b) as well as the long-term persistence of herbicides in soil (Bell 1997). Herbicide treatments should be selected as a last resort and used with extreme

caution. Some general guidelines to follow include: minimizing non-target vegetation spread, using chemicals only on one patch of the site at a time and evaluating the impact, conducting treatments when the wetland is dry during the dry season when the wetland is completely dry and not expected to hydrate, and using the chemical with the least impact. We found 3 publications that may be useful if herbicide is selected as a management tool: Langeland 2006, Ferrell et al. 2006, Langeland et al. 2009.

We encountered 95 wetlands (35%) on CWMA impacted by some degree of woody encroachment. Many of these wetlands are in the beginning stages of encroachment and just need to be monitored to ensure the next fire or inundation eliminates the encroaching vegetation. Almost 70% of wetlands affected by woody encroachment were marshes.

Restoration Prioritization

Because resources are finite, not all recommended restoration actions can be employed immediately. Ultimately, the prioritization of wetland restoration is up to the land manager and their objectives, resource availability, and logistical constraints. However, we provide here some general ideas to assist managers in prioritizing restoration of wetlands:

- Conduct biological surveys for rare species, particularly amphibians and other species dependent on ephemeral wetlands. Prioritize restoration actions based on the results of these surveys (i.e. feral hog control or other aggressive actions).
- Prioritize the filling of ditches that are either permanent or connect to permanent water sources over the filling of ephemeral ditches that connect to ephemeral water sources.
- Address woody encroachment in marshes before swamps because succession and subsequent exclusion of marsh habitat can happen relatively quickly.
- Consider resources required and condition of the uplands

Database

In addition to this report, a shapefile was provided that includes all the wetlands inventoried on the property. The shapefile includes an attribute table with fields associated with the following information:

- | | |
|-------------------------------|---------------------------|
| • Wetland ID | • Herbaceous distribution |
| • Wetland type | • Wetland concerns |
| • Basin area | • Upland community type |
| • Hydroperiod | • Upland conditions |
| • Canopy coverage (%) | |
| • Dominant canopy species | |
| • Midstory coverage (%) | |
| • Dominant midstory species | |
| • Herbaceous coverage (%) | |
| • Dominant herbaceous species | |

This database provides a quick reference for land managers to not only locate ephemeral wetlands on each property, but to know wetland attributes associated with each location and spatially identify major wetland concerns (e.g. Figure 4).

Wetland Characterizations and Descriptions

The following pages provide photographs and descriptions of the 271 ephemeral wetlands assessed on CWMA. The MUs, or burn units, are organized alphabetically beginning from the north end of the property. Each letter designation is further divided numerically. The order of the wetlands described below follows this nomenclature and is ordered alphabetically then numerically within each alphabetical section. Wetlands located outside an identified MU were given the prefix “U” and are located at the end of the segment. Additional photographs were provided on the accompanying CD.

Wetland ID: 02A-01

Description: This wetland is a 0.2 ha ephemeral marsh. Slash pine trees are beginning to encroach into the wetland basin on the west side but cover <5% of the wetland. There is no canopy or midstory cover. Sedges/grasses, maidencane, and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has severe feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 02A-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Dog fennel, buttonbush, and holly are the dominant woody vegetation, and cover 25-50% of the wetland. Sedges/grasses, maidencane, and redroot are distributed throughout the wetland, and cover 50-75% of the basin. This depression marsh has a deeper, sinkhole depression on the west side. Shrubs have established due to the naturally long hydroperiod of this deep depression. The wetland has extensive feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03A-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has minor, old feral hog damage. This wetland will connect with wetland 03A-02 during periods of high water. There is a ditch on the eastern side of the wetland that drains to/from the adjacent highway (US 19). This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire. This wetland provides a nice example of how fire-management maintains low to moderate maidencane density.

Wetland Disturbance: Feral hog damage, Ditching

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Fill the ditch to break connectivity with the wetland. Alternatively, the ditch could be plugged and vegetation allowed to regenerate.

Wetland ID: 03A-02

Description: This wetland is a 0.4 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has old feral hog damage. This wetland will connect with wetland 03A-01 during periods of high water. Due to the connectedness of these two wetlands, the ditch that drains to or from wetland 03A-01 will also affect this wetland. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage, Ditching

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Fill the ditch to break connectivity with the wetland. Alternatively, the ditch could be plugged and vegetation allowed to regenerate.

Wetland ID: 03A-03

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. Small pine trees are encroaching into the wetland, and cover 5-25% of the basin. Redroot grows throughout the wetland, and covers 50-75% of the basin. Feral hogs have caused extensive damage throughout the wetland. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 04A-01

Description: This wetland is a 1.9 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland basin. Redroot grows throughout the wetland, and covers 50-75% of the basin. The wetland has severe feral hog damage. The wetland provides an excellent example of a marsh encroached by trees from the adjacent swamp. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor the woody vegetation in the wetland. If the gum trees begin to shade out the herbaceous vegetation or if the wax myrtle becomes more prevalent, they should be removed from the wetland interior.

Wetland ID: 04A-02

Description: This wetland is a 0.5 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, fetterbush, and holly, and covers 50-75% of the wetland basin. Sedges/grasses and fern grow in scattered patches, and cover 25-50% of the wetland. The wetland has both old and new feral hog damage. The adjacent uplands are sandhill and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland basin to reduce the encroaching woody vegetation.

Wetland ID: 04A-03

Description: This wetland is a 0.7 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and covers 50-75% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers >75% of the wetland basin. Fern grow in scattered patches, and cover 5-25% of the wetland. A thick duff layer covers the wetland floor. Old stumps provide evidence of historic logging within the wetland. The wetland has both old and new feral hog damage. The adjacent uplands are sandhill and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the shrubs.

Wetland ID: 04A-04

Description: This wetland is a 2.0 ha semi-permanent mixed swamp. Cypress trees dominate the canopy, and covers 50-75% of the wetland basin. The midstory is dominated by wax myrtle, fetterbush, and holly, and covers 50-75% of the wetland basin. Sedges/grasses and maidencane grow in a ring around the wetland, and cover 25-50% of the basin. The edge of the swamp is marsh with small and widely scattered cypress trees; the center is deeper and has a denser canopy. Large stumps provide evidence of historic logging within the wetland. The wetland has both old and new feral hog damage. The adjacent uplands are sandhill and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further encroachment of woody vegetation

Wetland ID: 05A-01

Description: This 1.5 ha semi-permanent wetland is ringed with cypress trees and shrubs, with a deeper, marsh interior. Cypress trees cover 25-50% of the wetland basin. The midstory is dominated by wax myrtle, fetterbush, and holly, and covers 25-50% of the wetland basin. Maidencane grows throughout the wetland, and covers 50-75% of the basin. Old stumps around the perimeter cypress ring provide evidence of historic logging within the wetland. Young cypress trees are colonizing the wetland center. A recent fire burned into the wetland edge. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: None

Restoration Action Recommended: Continue with periodic fire treatments to prevent the shrub ring from encroaching into the wetland interior.

Wetland ID: 07A-01

Description: This wetland is a 0.5 ha ephemeral shrub swamp. Maple trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle, willow, and buttonbush, and covers 50-75% of the wetland basin. Sedges/grasses, sawgrass, and emergent vegetation grow throughout the wetland, and cover >75% of the basin. This wetland was likely once a marsh but has succeeded to a shrub swamp. There is a thick duff layer. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland basin to reduce the encroaching shrubs. The maple trees in the wetland interior could be removed.

Wetland ID: 07A-02

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by small pine trees, and covers 5-25% of the wetland basin. Fern and redroot grow throughout the wetland, and cover >75% of the basin. Some pine trees and hardwoods are encroaching into the wetland basin. The wetland has both old and new feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. If the next fire or inundation does not kill the encroaching small pine trees, they should be removed from the wetland. Thin the large pine trees in the wetland basin.

Wetland ID: 07A-03

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. Small pine trees are encroaching into the wetland, and cover 5-25% of the basin. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has new feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. If the next fire or inundation does not kill the encroaching small pine trees, they should be removed from the wetland.

Wetland ID: 07A-04

Description: This wetland is a 1.1 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has old feral hog damage. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 08A-01

Description: This wetland is a 0.8 ha ephemeral marsh with a deep center. There is no tree canopy. Wax myrtle are encroaching into the wetland, and cover 5-25% of the basin. Maidencane grows throughout the wetland, and covers >75% of the basin. A fireline/property boundary bisects the western wetland edge. Approximately 10% of this wetland is privately owned. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill and are managed with mechanical treatments.

Wetland Disturbance: Fireline, Woody encroachment

Restoration Action Recommended: Because the fireline represents a private property boundary, it is unlikely that fireline can be moved. Maintain the fireline when the wetland is dry to prevent establishment of ruts. Encourage periodic fire in the wetland to prevent further encroachment of woody vegetation

Wetland ID: 08A-02

Description: This wetland is a 0.2 ha ephemeral marsh. Holly trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers 5-25% of the wetland. Maidencane grows throughout the wetland, and covers >75% of the basin. A few trees and some shrubs are encroaching into the wetland basin. The wetland has relatively light feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent sandhills appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further encroachment of woody vegetation.

Wetland ID: 08A-03

Description: This wetland is a 0.7 ha ephemeral marsh. Maple trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle, holly, dog fennel, and small bay and maple trees, and covers 50-75% of the wetland. Maidencane, sedges/grasses, and emergent vegetation grow throughout the wetland, and cover >75% of the basin. A dense brush ring surrounds the wetland and a stand of maples grow in the wetland center. The wetland has severe feral hog damage. This wetland is a potential striped newt breeding pond but is in danger of succeeding to a shrub swamp. The adjacent sandhills appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove large maple trees from the wetland interior. Encourage periodic fire in the wetland. Monitor this wetland to ensure encroaching woody vegetation is eliminated with the next fire or inundation. If they become established, the encroaching vegetation will need to be removed from the wetland.

Wetland ID: 08A-04

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy. Wax myrtle, holly, small pine trees, and dog fennel are encroaching into the wetland, and 25-50% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is severe and deep feral hog damage in the wetland. This marsh likely connects with wetland 03A-02 during periods of high water. This wetland is a potential striped newt breeding pond. The adjacent sandhills appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland. Monitor this wetland to ensure encroaching woody vegetation is eliminated with the next fire or inundation. If they become established, the encroaching vegetation will need to be removed from the wetland.

Wetland ID: 08A-05

Description: This wetland is a 1.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, holly, and fetterbush, and covers 50-75% of the wetland. Maidencane, sedges/grasses, and sawgrass grow in scattered patches, covering 25-50% of the wetland. The wetland has a forested center with a more open, marsh-like perimeter. The interior of the wetland has a thick layer of duff. Old stumps provide evidence of historic logging. The wetland has minor feral hog damage. This wetland will connect to a larger swamp strand system on the south side in times of high water. The adjacent sandhills appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further encroachment of woody vegetation.

Wetland ID: 09A-01

Description: This wetland is a 0.9 ha ephemeral marsh. Pine trees grow in a dense ring around the wetland, and cover 5-25% of the basin. The midstory is dominated by wax myrtle and holly, and covers 5-25% of the wetland. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent sandhills appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Thin slash pine trees from the dense ring around the wetland.

Wetland ID: 09A-02

Description: This wetland is a 2.4 ha semi-permanent forested swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, buttonbush, fetterbush, and holly, and covers 25-50% of the wetland. Maidencane, sedges/grasses, and emergent vegetation grow in scattered patches, and cover 25-50% of the wetland. The wetland has a deeper and more marsh-like interior. Old stumps provide evidence of historic logging within the wetland. The wetland has both new and old feral hog damage. This wetland is in fire maintenance condition. The adjacent uplands are mesic flatwoods and sandhills, a portion of which is a pine plantation. The uplands appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09A-03

Description: This wetland is a 1.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers 50-75% of the wetland. Maidencane and sedges/grasses grow throughout, covering 50-75% of the wetland. This wetland is primarily a mixed swamp with young cypress trees and a marsh-like section on the western side. Old stumps in the wetland's center provide evidence of historic logging within the wetland. The wetland has both new and old feral hog damage. The adjacent uplands are sandhills that were planted into a pine plantation. The uplands appear to be fire-suppressed and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further encroachment of woody vegetation.

Wetland ID: 10A-01

Description: This wetland is a 0.1 ha ephemeral marsh. Slash pine trees were planted through the wetland and also are encroaching from the edges. The tree canopy covers 25-50% of the wetland basin. The midstory is dominated by wax myrtle, holly, and young maples, and covers 5-25% of the wetland. Redroot grows throughout, covering >75% of the wetland. The wetland has extensive, but recovering, feral hog damage. A recent fire burned into the edge of the wetland. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned to restore them to a more open flatwoods community.

Wetland Disturbance: Feral hog damage, Planted pine trees, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove the planted and encroaching pine trees from the wetland interior.

Wetland ID: 10A-02

Description: This wetland is a 0.2 ha semi-permanent marsh. There is no tree canopy. Wax myrtle, fetterbush, and loblolly bay grow in a ring around the wetland, and cover 5-25% of the wetland basin. Sedges/grasses, fern, and redroot grow throughout the wetland, and cover >75% of the basin. An almost 1m tall berm nearly surrounds the wetland. A recent fire killed some of the shrubs around the wetland. The wetland has old feral hog damage that is recovering well. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned to restore them to a more open flatwoods community.

Wetland Disturbance: Berm, Feral hog damage, Woody encroachment

Restoration Action Recommended: Remove the berm and simultaneously thin the dense brush ring. Continue to encourage fire in the wetland basin to prevent encroachment of woody vegetation. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 12A-01

Description: This wetland is a 0.2 ha ephemeral marsh. Slash pine trees cover 5-25% of the wetland basin. There is no midstory cover. Redroot grows throughout the wetland, and covers >75% of the basin. A recent fire killed the smaller pine trees that had encroached into the wetland basin; larger pine trees still remain. The wetland has severe feral hog damage. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove the large pine trees from the wetland interior, thin larger pine trees from the wetland edge.

Wetland ID: 14A-01

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy. Wax myrtle, buttonbush, and *Hypericum* grow in a ring around the wetland, and cover 5-25% of the basin. A diverse array of maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A ditch enters the wetland on the north side and exits on the south side. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Ditching, Feral hog damage

Restoration Action Recommended: Fill both ditches. Periodic fire should prevent the shrub ring from encroaching into the wetland.

Wetland ID: 14A-02

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no tree canopy. Dog fennel covers 25-50% of the wetland. Saw palmetto grows on the higher islands within the wetland basin. Redroot grows throughout the wetland, and covers >75% of the basin. The wetland has severe hog damage; the hog rootings now are growing with herbaceous vegetation. The adjacent uplands are mesic flatwoods. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 14A-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland has severe feral hog damage. The adjacent uplands are mesic flatwoods. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 14A-04

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. Gallberry covers 25-50% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has severe feral hog damage. The hogs have altered the wetland topography, creating small hills and valleys in an otherwise relatively flat basin. Gallberry clumps have established on the tops of these hillocks. This marsh provides a good example of how feral hogs can alter plant communities in a wetland. The adjacent uplands are mesic flatwoods and sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Mechanically re-sculpt this wetland basin, and simultaneously remove the gallberry, when the wetland is completely dry. The goal is to restore the original topography of the wetland and reduce the potential for upland plants to become established in the wetland basin.

Wetland ID: 14A-05

Description: This wetland is a 0.2 ha ephemeral marsh. Maple trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers 5-25% of the wetland. Redroot grows throughout, covering >75% of the wetland. The wetland has severe hog damage. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. A few maple trees and wax myrtles are encroaching into the wetland and could be removed. However, encroachment is relatively minor here, and a fire provided quickly probably will suppress shrubs sufficiently.

Wetland ID: 14A-06

Description: This wetland is a 0.1 ha ephemeral marsh. Gum trees are encroaching into the marsh, covering 5-25% of the wetland basin. There is no midstory layer. Redroot and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old and new hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. This wetland is in the early stages of succeeding from a marsh to a gum swamp. To maintain this wetland as a marsh, remove the gum trees from the wetland interior and encourage periodic fire to prevent further encroachment.

Wetland ID: 16A-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. Small pine trees are beginning to encroaching, and cover 5-25% of the wetland. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has severe feral hog damage. A fireline bisects the west edge of the wetland. The adjacent uplands are sandhill. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Fireline, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 16A-02

Description: This wetland is a 0.2 ha highly ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory also is dominated by small pine trees, and covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has new and old feral hog damage. The adjacent uplands are sandhill. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure the small pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now. Monitor the larger pine trees in the wetland. If they begin to shade out the herbaceous vegetation, the pine trees should be thinned from the wetland interior.

Wetland ID: 17A-01

Description: This wetland is a 2.0 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses, maidencane, and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has widespread feral hog damage. This wetland has diverse herbaceous vegetation and is in fire maintenance condition. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 17A-02

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has both old and new feral hog damage. This wetland is in fire maintenance condition. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 18A-01

Description: This wetland is a 0.1 ha ephemeral marsh. Multiple cohorts of slash pine trees are encroaching into the wetland basin. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. Small pine trees are beginning to encroach, and covers 5-25% of the wetland. Redroot grows throughout the wetland, and covers >75% of the basin. The wetland has extensive old and new feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure small pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now. Monitor the larger pine trees in the wetland. If they begin to shade out the herbaceous vegetation, the pine trees should be thinned from the wetland interior.

Wetland ID: 19A-01

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees are encroaching into the wetland, and cover 25-50% of the basin. The midstory is dominated by gallberry, and covers 5-25% of the wetland. Redroot and fern grow throughout the wetland, and cover >75% of the basin. The wetland has new and old feral hog damage. The adjacent uplands are mesic flatwoods. The uplands appear to have been fire suppressed but now are receiving prescribed fire. Planted longleaf pine trees are growing nearby.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove slash pine trees from the wetland interior

Wetland ID: 02B-01

Description: This wetland is a 0.4 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. Old feral hog damage has grown over with vegetation but the hillocks in the wetland basin are still evident. This wetland will connect to wetland 02B-02 during periods of high water. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02B-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. Old feral hog rootings have grown over with vegetation but the hillocks in the wetland basin are still evident. This wetland will connect to wetland 02B-01 during periods of high water. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02B-03

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hog damage is extensive. The adjacent uplands are mesic flatwoods and xeric hammock. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02B-04

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has extensive old feral hog damage. This wetland is doughnut-shaped with a saw palmetto/galberry island in the center, indicative of either an extended dry period or higher elevation. The adjacent uplands are mesic flatwoods. The flatwoods appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove shrub island to prevent encroachment of the shrubs into the surrounding wetland. The shrub island could be burned repeatedly, removed by hand, or removed by mechanical means when the wetland is completely dry.

Wetland ID: 02B-05

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy. Wax myrtle is beginning to encroach into the wetland, and covers 5-25% of the basin. Maidencane, sedges/grasses, and redroot grow throughout the wetland, and cover >75% of the basin. There is evidence of past feral hog damage. The adjacent uplands are mesic flatwoods. The flatwoods appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage fire in the wetland basin to prevent further shrub encroachment.

Wetland ID: 02B-06

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 02B-07

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no tree canopy. Small longleaf pine trees are beginning to establish in the wetland basin, and cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The longleaf pines establishing is a sign of a prolonged dry period. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 03B-01

Description: This wetland is a 1.7 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. Old feral hog damage has grown over with vegetation. There is a peizometer and a depth gauge in the wetland. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03B-02

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no tree canopy. A prolonged dry period and the lack of fire have allowed gallberry to establish in the marsh. The gallberry covers 50-75% of the wetland. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Encourage fire in the wetland to reduce the encroaching gallberry.

Wetland ID: 03B-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland. This wetland is in fire maintenance condition and is a potential striped newt breeding pond. There is evidence of past fire in the wetland. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 04B-01

Description: This wetland is an 8.1 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A fireline/MU boundary bisects the wetland. The larger portion of the wetland lies to the west of the MU boundary in MU 11B. The interior of the wetland has burned in the past and is in good ecological condition. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are receiving prescribed fire.

Wetland Disturbance: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 05B-01

Description: This wetland is a 3.8 ha ephemeral marsh. There is no tree canopy. Wax myrtle, holly, *Hypericum*, and small slash pine trees are beginning to encroach into the wetland, and cover 5-25% of the basin. Sedges/grasses and maidencane grow throughout the wetland, covering >75% of the basin. This wetland likely connects to the big swamp to the east during periods of high water. The wetland has both old and new feral hog damage. A fireline/MU boundary bisects the east side of the wetland. The adjacent uplands are fire-suppressed sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Fireline, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing. Encourage fire to burn through the wetland to prevent further woody encroachment.

Wetland ID: 05B-02

Description: This wetland is a 6.8 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, fetterbush, and holly, and covers 50-75% of the wetland. Maidencane grows throughout the wetland, and covers 50-75% of the basin. The wetland has both old and new feral hog damage. Old stumps provide evidence of historic logging within the wetland. An unpaved road bisects the northern edge of the wetland. The adjacent uplands are fire-suppressed sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Road

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06B-01

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has both old and new feral hog damage. This depressional wetland is fire maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are fire maintained sandhills.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07B-01

Description: This wetland is a 1.9 ha ephemeral mixed swamp. Pine, cypress, gum, and maple trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland basin. Sawgrass and fern grow throughout the wetland, and cover 25-50% of the basin. Lack of fire, coupled with a long dry period, has encouraged the encroachment of shrubs into this swamp. A recent fire burned deep into the wetland around all sides, killing sweet gum, wax myrtle, and fetterbush. A layer of thick duff still remains. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce encroaching woody shrubs.

Wetland ID: 07B-02

Description: This wetland is a 0.7 ha ephemeral baygall community. Cypress and bay trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by fetterbush and gallberry, and covers >75% of the wetland basin. There is no herbaceous vegetation. This wetland likely connects to the big swamp to the west. A fire recently burned into the wetland. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 08B-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy cover. The wetland is ringed with holly and small slash pine trees, which cover 5-25% of the wetland. Redroot grows throughout, covering >75% of the wetland. The wetland has severe feral hog damage. A recent fire did not burn into the wetland basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09B-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. A diverse array of redroot and sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has severe feral hog damage. This wetland has is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09B-02

Description: This wetland is a 2.0 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by fetterbush and dog fennel, and covers 25-50% of the wetland. Fern and sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The wetland has minor, old feral hog damage. A fire burned through the wetland and thinned much of the brushy vegetation. Some fetterbush is resprouting. This wetland provides a good example of the beneficial effects of fire in swamps. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09B-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Redroot and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has both old and new feral hog damage. A fire recently burned through the wetland basin. This wetland is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09B-04

Description: This wetland is a 0.1 ha semi-permanent, steep-sided, sink depression pond. The tree canopy is dominated by oaks, and covers 25-50% of the wetland basin. Buttonbush grows in a ring around the wetland edge, and covers 5-25% of the wetland. Emergent vegetation grows throughout the wetland, and covers 50-75% of the basin. The wetland currently has fish. When the wetland dries and refills (thereby eliminating the fish), it will be a great potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 10B-01

Description: This wetland is a 1.5 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by fetterbush and wax myrtle, and covers 50-75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence of historic logging in the wetland. A recent fire burned deeply into the wetland, reducing the woody vegetation and duff. The deep interior did not burn and is still thick with brush and duff. This wetland provides a good example of the positive effects of a summer fire in a previously fire suppressed wetland. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Encourage fire in the wetland interior to reduce the dense brush.

Wetland ID: 10B-02

Description: This wetland is a 0.5 ha ephemeral mixed swamp. Gum and holly trees mostly grow in a ring around the wetland edge, and cover 5-25% of the wetland basin. The midstory is dominated by loblolly bay and holly, and covers 5-25% of the wetland. Redroot and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old feral hog damage that is now recovering. A recent fire burned around the wetland edges. This wetland is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10B-03

Description: This wetland is a <0.1 ha semi-permanent sinkhole pond. Oak trees grow in a ring around the wetland, and cover 25-50% of the wetland basin. Buttonbush also grows in a ring around the wetland, and covers 5-25% of the basin. Emergent vegetation grows throughout the wetland, and covers >75% of the wetland basin. A recent fire burned around the wetland edges. Fish were present on the day of our visit but the wetland. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 11B-01

Description: This wetland is a 3.1 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by fetterbush, holly, and wax myrtle, and covers 25-50% of the wetland. Maidencane and sawgrass grow in scattered patches, covering 25-50% of the basin. The wetland has minor feral hog damage. Old stumps provide evidence of historic logging in this wetland. This large, isolated cypress dome is a borderline semi-permanent wetland. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 11B-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Dog fennel grows throughout the wetland, and covers 5-25% of the basin. Maidencane, sedges/grasses, and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has severe feral hog damage. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 11B-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old feral hog damage that is recovering well. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 11B-04

Description: This wetland is a 9.6 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by fetterbush and wax myrtle, and covers 50-75% of the wetland. Maidencane and redroot grow throughout the wetland, and cover 50-75% of the basin. This large cypress swamp has two big lobes connected by a skinny strand. The wetland has new feral hog damage. This wetland has a longer hydroperiod and appears not to have burned in a long time. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage fire when the wetland is completely dry to reduce the brush.

Wetland ID: 12B-01

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old feral hog damage. This small, open marsh appears to have been dry for quite a while; a few pine trees have established in the wetland, mainly around edge. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 12B-02

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no tree canopy. Clumps of saw palmetto cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 12B-03

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy. Gallberry and saw palmetto cover 5-25% of the wetland basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A prolonged dry period in what was already a highly ephemeral marsh allowed the shrubs to establish. The adjacent uplands are mesic flatwoods and currently are managed with mechanical treatments.

Wetland Disturbance: None

Restoration Action Recommended: Encourage periodic fire in the wetland to prevent further gallberry encroachment. The wetland may need to be custom burned.

Wetland ID: 12B-04

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Maidencane grows densely throughout the wetland, and covers >75% of the basin. The wetland has old feral hog damage that has grown over with vegetation. The adjacent uplands are scrubby flatwoods, sandhills, and xeric hammock. The uplands currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage fire in the wetland to reduce the thick maidencane.

Wetland ID: 12B-05

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. This wetland will connect to the big swamp to the north during periods of high water. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 12B-06

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy. Dog fennel covers 50-75% of the wetland basin. Redroot grows throughout the wetland, and cover 50-75% of the basin. The wetland has severe feral hog damage. The adjacent uplands are mesic flatwoods and sandhill and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 12B-07

Description: This wetland is a 0.9 ha ephemeral forested swamp. Cypress and holly trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers 25-50% of the wetland basin. Fern grow throughout the wetland, and cover 5-25% of the basin. The wetland has minor, old feral hog damage and thick duff. Cypress stumps provide evidence of historical logging in the wetland. The wetland is surrounded by a dense ring of gallberry and saw palmetto. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the brush and prevent further encroachment of woody vegetation.

Wetland ID: 01C-01

Description: This wetland is a 0.4 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has a heavy ring of feral hog rooting around the perimeter. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 01C-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 01C-03

Description: This wetland is a 0.5 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage that is recovering well. A fireline/MU boundary runs along the west side of the wetland. The wetland has a monitoring well. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 01C-04

Description: This wetland is a 4.5 ha semi-permanent marsh. There is no tree canopy. Buttonbush covers 25-50% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This large, treeless marsh has a deep, water-filled center hole. The wetland has light feral hog damage. A very shallow ditch bisects the wetland, and appears to manage storm water run-off for the nearby highway (US 19). This wetland has diverse herbaceous vegetation and would be a great striped newt breeding pond if it does not harbor carnivorous fish. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Ditching, Feral hog damage, Woody encroachment

Restoration Action Recommended: Fill the ditch to break the connection of this wetland to potential road run-off. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further shrub encroachment.

Wetland ID: 02C-01

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses and maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has old feral hog damage that is recovering nicely. A fireline/MU boundary runs along the west side of the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 02C-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. A recent fire eliminated many large slash pine trees around the edge of the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 02C-03

Description: This wetland is a <0.1 ha ephemeral marsh in a steep-sided sink depression. This small, yet potentially very productive wetland, is a classical depressional ephemeral marsh in sandhills created by local karst geology. There is no tree canopy. Buttonbush covers 25-50% of the wetland. The interior shrubbery occupies a natural fire shadow caused by steep sidewalls and long hydroperiod. Maidencane grows throughout the wetland, and covers >75% of the basin. This marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 02C-04

Description: This wetland is a 0.2 ha highly ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Recent inundation and fire killed almost all the encroaching slash pine trees. This wetland provides a good example for observing the opposing forces of encroachment, and inundation and fire. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Woody Encroachment

Restoration Action Recommended: Monitor this wetland to ensure remaining pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 02C-05

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. A recent fire burned through the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03C-01

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has minor, old feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03C-02

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy or midstory cover. Redroot and maidencane grow throughout the wetland, and cover >75% of the basin. The wetland has widespread feral hog damage that has grown over with redroot. There are some small, dead pine trees in the wetland basin that were killed by recent inundation. This marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03C-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Buttonbush grows in the deeper wetland center, and covers 5-25% of the wetland. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has minor, old feral hog damage. There are some small, dead pine trees in the wetland basin that were killed by recent inundation. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04C-01

Description: This wetland is a 1.9 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle and fetterbush, and covers >75% of the wetland. Fern grows sparsely, and covers 5-25% of the wetland basin. This cypress dome has a very dense brush midstory. A recent fire burned deep into the wetland edges, eliminating the perimeter brush; interior brush remains dense. The adjacent uplands are sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland basin to reduce the dense brush.

Wetland ID: 05C-01

Description: This wetland is a 1.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory also is dominated by small pine trees, and covers 5-25% of the wetland. Maidencane grows throughout, covering >75% of the wetland basin. Pine trees are encroaching as a result of an extended dry period and a lack of fire in the wetland. A recent fire burned through the wetland and killed many encroaching pine trees. The wetland has old and new feral hog damage. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 06C-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old feral hog damage that is recovering well. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06C-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. The wetland has old and new feral hog rooting. The damage was once severe but is now recovering. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06C-03

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees grow around the wetland, and cover 5-25% of the wetland. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has old feral hog rooting that is recovering well. The adjacent uplands are mesic flatwoods with dense palmetto and gallberry. The uplands currently are managed with mechanical treatments.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06C-04

Description: This wetland is a 1.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 25-50% of the wetland. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has patchy feral hog rooting and is heavily encroached by pine trees. This large, shallow wetland will connect to the hydric swamp to the west during periods of high water. The adjacent uplands are mesic flatwoods that have not been burned in a long time. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees from the wetland interior.

Wetland ID: 06C-05

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy. A few small pine trees and wax myrtles are scattered around this large, shallow marsh but the encroachment is minimal. The midstory covers 5-25% of the wetland. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has minor feral hog rooting. A very shallow ditch bisects the wetland on the south side. This ditch connects to wetlands 07C-02 and 07C-03. The adjacent uplands are mesic flatwoods and low sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Ditching, Feral hog damage

Restoration Action Recommended: Allow the ditch to erode and to fill in with vegetation. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire to prevent further woody encroachment.

Wetland ID: 06C-06

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This shallow wetland has old feral hog rootings that are recovering well. The adjacent uplands are mesic flatwoods and low sandhills with dense palmetto. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06C-07

Description: This wetland is a 0.9 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has patchy feral hog rooting. Many encroaching pine trees were killed by recent inundation. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills with dense palmetto and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07C-01

Description: This wetland is a 1.3 ha ephemeral marsh. There is no tree canopy. Wax myrtle grows throughout the wetland, and willow and buttonbush grow in a patch in the wetland center. The woody vegetation covers 5-25% of the wetland. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has very minor feral hog damage. A major highway (US 19) runs along the east side of the wetland and a fireline bisects the west side. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Fireline, Road, Woody encroachment,

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing. Monitor this wetland to ensure wax myrtle are reduced with the next fire or inundation. If they become established, the encroaching shrubs will need to be thinned or removed.

Wetland ID: 07C-02

Description: This wetland is a 0.9 ha ephemeral marsh. There is no tree canopy. Wax myrtle and small pine trees grow in a patch in the wetland center, and cover 5-25% of the wetland. Maidencane grows throughout the wetland, and covers >75% of the basin. This open marsh has old feral hog rooting that is recovering well. A shallow ditch was dug through the center of the wetland but does not seem to be adversely affecting the wetland hydrology. The ditch connects this wetland with 07C-02 and 06C-05. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhill and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Ditching

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Allow the ditch to erode and to fill in with vegetation.

Wetland ID: 07C-03

Description: This wetland is a 1.1 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. A shallow ditch was dug through the center of the wetland but does not seem to be adversely affecting the wetland hydrology. The ditch connects this wetland with 07C-02 and 06C-05. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Ditching

Restoration Action Recommended: Allow the ditch to erode and to fill in with vegetation

Wetland ID: 08C-01

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy. Dog fennel covers >75% of the wetland. Feral hogs have rooted in a few small areas. A recent fire burned through the wetland, charring broomsedge clumps. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09C-01

Description: This wetland is a <0.1 ha ephemeral marsh in a circular sink depression. This is a classical small ephemeral wetland formed by karst processes. There is no tree canopy. Buttonbush grows in the deeper wetland center, and covers 5-25% of the wetland. Maidencane grows throughout the wetland, and covers 50-75% of the basin. A recent fire burned through the wetland. This wetland is in great ecological condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire. An upland ring of palmetto encircles the wetland. The uplands in this vicinity are in some of the best ecological condition on the CWMA.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10C-01

Description: This wetland is a <0.1 ha ephemeral marsh in a circular sink depression. This is a classical small ephemeral wetland formed by karst processes. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is in good ecological condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills with a dense ring of palmetto surrounding the wetland. The uplands appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10C-02

Description: This wetland is a 0.4 ha ephemeral marsh. Pine trees grow around the wetland edge, and cover 5-25% of the basin. There is no midstory layer. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive, old feral hog damage that has grown over with redroot. Pine trees were planted through the wetland but the majority have died due to water inundation. The adjacent uplands are sandhills grading to mesic flatwoods. The uplands appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Planted pine trees

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove planted pine trees from the wetland interior.

Wetland ID: 10C-03

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has old feral hog damage that has grown over with redroot. The wetland was bedded and planted with pine trees. Bedding rows have eroded somewhat. This marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire.

Wetland Concerns: Bedding, Feral hog damage, Planted pine trees

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove the planted pine trees from the wetland interior.

Wetland ID: 10C-04

Description: This wetland is a 2.9 ha ephemeral forested swamp. Cypress and holly trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. This large wetland has a forested interior and a very wide littoral zone. The adjacent uplands are mix of scrubby flatwoods and sandhills and are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 13C-01

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is light and patchy feral hog damage in the wetland. Several young pine trees are established in the wetland basin. There is a fireline through the eastern edge of the wetland. The adjacent uplands are mesic flatwoods and low sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Fireline, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing. Hand chop the small pine trees from the wetland interior.

Wetland ID: 13C-02

Description: This wetland is a 0.5 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is old feral hog damage in the wetland. The adjacent uplands are mesic flatwoods and low sandhills and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor the wetland to ensure the interior pine trees create a shading effect and eliminate the herbaceous vegetation in the wetland. If the herbaceous vegetation is affected, remove pine trees from the wetland interior.

Wetland ID: 13C-03

Description: This wetland is a 0.4 ha ephemeral marsh. Gum and holly trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is old feral hog damage in the wetland. This marsh is near the edge of the large hydric hammock. A recent fire burned through the wetland. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 13C-04

Description: This wetland is a 0.6 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland. Sedges/grasses are distributed throughout, and cover 50-75% of the wetland basin. This small cypress dome has a brushy midstory. A recent fire burned to the wetland edge. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage fire in the wetland when the basin is dry to reduce the dense brush.

Wetland ID: 14C-01

Description: This wetland is a 1.9 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin around the edge. The midstory is dominated by *Hypericum*, and covers 25-50% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is patchy feral hog damage in the wetland. Some pine trees are beginning to encroach from around the wetland edges. This large marsh has rich, diverse herbaceous vegetation and is a potential striped newt breeding pond. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire to reduce the encroaching pine trees. Monitor the wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be thinned back to the wetland edge.

Wetland ID: 14C-02

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees are beginning to encroach from the wetland edge, and cover 5-25% of the basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is minor feral hog damage in the wetland. This wetland was connected to wetland 05D-06 before it was bisected by an unpaved road (Rattlesnake Branch Rd). The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Road, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed. Recognizing that this road is now a permanent attribute to the property, we do not recommend any action relating to the road. Encourage periodic fire to reduce the encroaching pine trees. Monitor the wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be thinned back to the wetland edge.

Wetland ID: 14C-03

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees recently were thinned from around the wetland edge. A few pine trees remain and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is severe feral hog damage in the wetland. There are rotting pine logs in the wetland depression. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 14C-04

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees dominate the canopy, and cover 25-50% of the wetland basin. There is no midstory layer. Redroot is distributed throughout the wetland, and cover 50-75% of the basin. There is severe feral hog damage in the wetland. Some thinning occurred in the wetland though there are still young pine trees remaining. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 14C-05

Description: This wetland is a 0.4 ha ephemeral marsh. Pine trees dominate the canopy, and cover 25-50% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is severe feral hog damage in the wetland. Some thinning occurred in the wetland though there are still young pine trees remaining. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 14C-06

Description: This wetland is a 0.3 ha ephemeral marsh. Young pine trees grow in a ring around the wetland, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is minor feral hog damage in the wetland. Pickerelweed grows in the deeper center of this marsh and there is a ring of young pine trees encroaching from the wetland edge. This large marsh has rich, diverse herbaceous vegetation and is a potential striped newt breeding pond. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to eliminate encroaching pine trees. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 14C-07

Description: This wetland is a 0.1 ha ephemeral marsh. A ring of young pine trees surround this circular sink depression, shading out the herbaceous vegetation. The pine trees cover 25-50% of the wetland basin. Maidencane grows in the wetland center where there is no canopy cover and plenty of sunlight. The herbaceous vegetation covers 50-75% of the basin. There is minor feral hog damage in the wetland. This marsh is a potential striped newt breeding pond. This wetland provides a perfect example of how the shade and needle duff from encroaching pine trees can exclude herbaceous vegetation in a marsh. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove all slash pine trees from the wetland interior. Encourage periodic fire to prevent further pine encroachment.

Wetland ID: 15C-01

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin around the edge. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is a little feral hog damage in the wetland. Some pine trees are encroaching from the wetland edge. This marsh is a potential striped newt breeding pond. The adjacent uplands are fire suppressed scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to eliminate encroaching pine trees. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 15C-02

Description: This wetland is a 1.1 ha ephemeral marsh. The wetland is ringed with encroaching pine trees. Some trees recently were killed, most likely by water inundation, but many remain. The pine trees cover 5-25% of the wetland. The midstory is dominated by *Hypericum*, and covers 5-25% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is moderate, patchy feral hog damage in the wetland. This is a good place to observe the opposing forces of upland plant encroachment and water inundation. The wetland will connect to 15C-03 during periods of high water. This marsh has rich, diverse vegetation and is a potential striped newt breeding pond. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to eliminate remaining encroaching pine trees. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 15C-03

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. This oblong wetland has a deeper sink hole at the east end. There is extensive feral hog damage in the wetland. Encroaching pine trees are patchy and some thinning of larger pine trees has occurred. The wetland will connect to 15C-02 during periods of high water. This marsh is a potential striped newt breeding wetland, especially in the sink depression. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees from the wetland interior.

Wetland ID: 15C-04

Description: This wetland is a 1.2 ha ephemeral marsh. The wetland is ringed with encroaching pine trees. Some trees recently were killed, most likely by inundation, but many remain. The pine trees cover 5-25% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. There is extensive feral hog damage in the wetland. This marsh is a potential striped newt breeding pond. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees in the wetland out to the upland/wetland ecotone

Wetland ID: 16C-01

Description: This wetland is a 1.3 ha ephemeral marsh. There is no tree canopy or midstory cover. A recent fire burned into the wetland, eliminating the encroaching wax myrtle. A small patch of buttonbush remains in the wetland center. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor old and new feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical vegetation removal and prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 16C-02

Description: This wetland is a 1.5 ha ephemeral marsh. There is no tree canopy. This large marsh is in excellent ecological condition. A recent fire burned deep into the wetland, eliminating encroaching wax myrtles and pine trees. The deepest center of the wetland did not burn. Wax myrtle covers 5-25% of the wetland basin. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland provides a good example of the direct effect of fire in a wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical vegetation removal and prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 16C-03

Description: This wetland is a 0.1 ha ephemeral marsh in a circular depression. Holly trees grow in the deeper wetland center, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has a ring of feral hog rooting. A recent fire burned into the wetland, but the wetter center of the wetland did not burn. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical vegetation removal and prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 16C-04

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. Wax myrtle and buttonbush cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage that has grown over with vegetation. A recent fire burned into the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical vegetation removal and prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 16C-05

Description: This wetland is a 2.9 ha ephemeral forested swamp. Cypress trees are dense and cover >75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Sedges/grasses grow sparsely and cover 5-25% of the wetland basin. A recent fire burned to the wetland edges. The adjacent uplands are sandhills and currently are managed with mechanical vegetation removal and prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 01D-01

Description: This wetland is a <0.1 ha ephemeral marsh in a sink depression. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. There are 2, 6' long pine log sections left in the wetland from when the area was logged. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 01D-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 50-75% of the wetland basin. There are some roll-chopper tracks through the center of the wetland that eliminated some vegetation, but the vehicles did not create deep ruts. This wetland is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Vehicular damage

Restoration Action Recommended: None. The vehicular tracks will erode over time. Vehicles should not be operated in wetlands unless restoration action is warranted. Smaller wetlands may need to be flagged to alert operators of the wetland's existence.

Wetland ID: 01D-03

Description: This wetland is a 0.5 ha ephemeral marsh. Pine trees have encroached in the wetland, and cover 25-50% of the basin. There is no midstory layer. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The trees have charred bases, indicating the wetland basin has received fire in the recent past. However, the pine trees now are too large to be killed by a typical prescribed fire. The wetland has extensive feral hog damage. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees from the wetland interior

Wetland ID: 02D-01

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees grow around the wetland edge, and cover 5-25% of the basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland is recovering well from past feral hog damage but also has some new, minor damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02D-02

Description: This wetland is a <0.1 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. This pristine little flatwoods pond is situated on the edge of the big hydric hammock. The adjacent uplands are mesic flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 02D-03

Description: This wetland is a 0.1 ha ephemeral marsh. Some young pine trees are encroaching from the edge of the wetland; many were killed during a recent fire. Pine trees cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has old and new feral hog damage. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02D-04

Description: This wetland is a 0.3 ha ephemeral human-made or enhanced marsh. It is a square-shaped grassy plot, human-made, and functions as an ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Firelines bisect the north and east sides. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Fireline

Restoration Action Recommended: Although this is a man-made marsh, and could be considered a disturbance itself, this grassy plot is functioning as an ephemeral wetland and could be managed as such. We have found striped newts breeding in other human-made wetlands, such as borrow pits. We recommend moving the firelines outward at least 15m from the wetland edge. If the firelines cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 03D-01

Description: This wetland is a 13.7 ha ephemeral marsh. Hundreds of small slash pine trees have established in the wetland, presumably due to lack of fire. The pine trees cover 25-50% of the basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has widespread feral hog damage. The adjacent uplands are fire suppressed mesic flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove dense pine trees from the wetland interior and thin the pine trees around the wetland edge.

Wetland ID: 03D-02

Description: This wetland is a 0.1 ha ephemeral marsh. Young pine trees are encroaching into the wetland basin; some larger pine trees were removed during a recent thinning operation. The pine trees cover 25-50% of the wetland basin. There is no midstory layer. Redroot grows in scattered patches, covering 25-50% of the wetland basin. The wetland has severe feral hog damage. The adjacent uplands are fire suppressed mesic flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove dense pine stand from the wetland.

Wetland ID: 04D-01

Description: This wetland is a 1.8 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and dog fennel grow throughout the wetland, and cover >75% of the basin. The wetland has some feral hog damage. There are multiple 1m tall linear earthen berms constructed into the wetland basin from the south side and one on the east side. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed sandhills with a dense oak and palmetto ring. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Berm, Feral hog damage, Woody encroachment

Restoration Action Recommended: Remove the berms and the pine trees from the wetland interior. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04D-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The wetland has minor feral hog damage. This circular marsh has old dirt mounds and rows in and around the wetland perimeter. They do not seem to be adversely affecting the wetland ecology. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed sandhills with a dense oak and palmetto ring. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Dirt piles and rows

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The dirt piles are not large enough to merit attention and should erode over time.

Wetland ID: 05D-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Many small pine trees are encroaching into the wetland, and cover 5-25% of the basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This circular sink depression is a potential striped newt breeding pond. The adjacent uplands are fire suppressed upland pine forest and currently are managed with mechanical treatments.

Wetland Disturbance: Woody encroachment

Restoration Action Recommended: Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 05D-02

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Redroot grows throughout, covering >75% of the wetland basin. This wetland has extensive feral hog rooting; much of the disturbed soil is grown over with redroot. Some small pine trees are beginning to encroach from the wetland perimeter. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: 05D-03

Description: This wetland is a 0.8 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Maidencane grows throughout, covering >75% of the wetland basin. Some small pine trees are encroaching into the wetland basin. The wetland has minor hog damage. This marsh is a potential striped newt breeding pond. The adjacent uplands are fire suppressed upland pine forest and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now. Thin a few pine trees from the denser stands along wetland edge.

Wetland ID: 05D-04

Description: This wetland is a 0.6 ha ephemeral marsh. Large pine trees were thinned within the wetland and pine logs are scattered across the marsh. Some smaller pine trees remain and are encroaching into the wetland basin. The trees cover 5-25% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers >75% of the basin. The wetland has extensive hog damage but appears to be healthy overall. This wetland will connect to wetland 05D-5 during periods of high water. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed upland pine forest and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Hand chop the remaining pine trees from the wetland interior.

Wetland ID: 05D-05

Description: This wetland is a 0.3 ha ephemeral marsh. Some small pine trees are encroaching into the wetland, and cover 5-25% of the basin. There is no midstory layer. Maidencane grows throughout the wetland, and cover 50-75% of the basin. The wetland has severe hog damage. This wetland will connect to wetland 05D-04 during periods of high water. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Hand remove pine trees from the wetland interior.

Wetland ID: 05D-06

Description: This wetland is a 0.7 ha ephemeral marsh. Young slash pine trees are extensively encroaching into the wetland, and cover 50-75% of the wetland basin. There is no midstory layer. Maidencane and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has severe hog damage. An unpaved road (Rattlesnake Ranch Rd.) bisects this wetland on the north side, creating 2 wetlands, this one and 14C-02. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Road, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed. Recognizing that this road is now a permanent attribute to the property, we do not recommend any action relating to the road. Hand remove pine trees from wetland basin

Wetland ID: 05D-07

Description: This wetland is a 0.3 ha ephemeral marsh. Slash pine trees are encroaching into the wetland, and cover 50-75% of the wetland basin. There is no midstory layer. Maidencane grows throughout the wetland, and covers 50-75% of the basin. The wetland has extensive hog damage. The adjacent uplands are fire suppressed mesic and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Hand remove pine trees from the wetland interior.

Wetland ID: 06D-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor hog damage. A recent fire burned through the wetland killing many shrubs; diverse herbaceous vegetation is growing back. This wetland provides a great example of the positive effects of prescribed fire, particularly growing season fire, to marsh restoration and management. The wetland is situated on the eastern edge of the big hydric hammock and is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods and hydric hammock.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 06D-02

Description: This wetland is a <0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor, old hog damage. A recent fire burned through the wetland basin. This wetland provides a great example of the positive effects of prescribed fire, particularly growing season fire, to marsh restoration and management. The adjacent uplands are mesic flatwoods and hydric hammock.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-01

Description: This wetland is a 2.9 ha ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. The wetland has patches of old feral hog rooting, although most of the damage has grown over with vegetation. The entire wetland is ringed with a wide, sandy fireline. This wetland is an excellent potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 07D-02

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. Charred pine bases in the depression show evidence of fire in the wetland. The wetland has new feral hog damage. A fireline bisects the western end of the wetland. This wetland is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage, Fireline, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees from the wetland interior. Thin the dense pine trees around the wetland edge. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 07D-03

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. Extensive feral hog damage rings the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-04

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The wetland is ringed with extremely dense palmetto in the adjacent uplands. The adjacent uplands are historically fire suppressed sandhills with dense palmetto, although a wildfire burned through this MU in 2006.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 07D-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The wetland is ringed with extremely dense palmetto. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 07D-06

Description: This wetland is a 0.6 ha ephemeral marsh. There is no canopy or midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has severe feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. Dense saw palmetto surround the wetland. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-07

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Holly covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has old and new feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. Dense saw palmetto surround the wetland. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-08

Description: This wetland is a 0.2 ha semi-permanent to permanent sinkhole pond. There is no canopy or midstory layer. Sedges/grasses and emergent vegetation grow in a ring around the wetland edge, and cover 5-25% of the wetland basin. This pond has steep edges with 3m tall sandy walls, and a deep center. Various fish species are present, including bass and other Centrarchids. The wetland serves as a stable water hole, with game trails leading to and from the wetland. This pond is the first in a series of sinks that likely collapsed along a linear subterranean cave system. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 07D-09

Description: This wetland is a <0.1 ha ephemeral sinkhole pond. Live oak trees grow around the wetland edge, and cover 5-25% of the wetland. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The pond has steep, 3m tall sandy walls. The wetland serves as a stable water hole, with game trails leading to and from the wetland. This pond is the second in a series of sinks that likely collapsed along a linear subterranean cave system. This is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 07D-10

Description: This wetland is a <0.1 ha ephemeral sinkhole pond. There is no canopy or midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This pond has steep 2m tall sandy walls and is a potential striped newt breeding pond. The wetland serves as a stable water hole, with game trails leading to and from the wetland. This pond is the 3rd in a series of sinks that likely collapsed along a linear subterranean cave system. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 07D-11

Description: This wetland is a 1.9 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has widespread feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-12

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. A dense ring of palmetto and oak surrounds the wetland. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07D-13

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. A dense ring of palmetto and oak surrounds the wetland. The adjacent uplands are historically fire suppressed sandhills, although a wildfire burned through this MU in 2006.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 08D-01

Description: This wetland is a 1.6 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills and a dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 08D-02

Description: This wetland is a 0.7 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills and a dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 08D-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A canal that drains US 19 runoff during heavy rains enters the wetland on the east side. A fireline runs along the south end of the wetland. This wetland may have originated as a borrow pit for ditch construction, but now functions as a small, ephemeral marsh. The adjacent uplands are historically fire suppressed sandhills and currently are managed with herbicide.

Wetland Disturbance: Ditching, Fireline

Restoration Action Recommended: Fill in the ditch and allow vegetation to regenerate. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 08D-04

Description: This wetland is a 0.2 ha highly ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. This marsh is in fire-maintenance condition. The adjacent uplands are historically fire suppressed sandhills and currently are managed with herbicide.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 08D-05

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills. A dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 08D-06

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are historically fire suppressed sandhills. A dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 08D-07

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy. Patches of saw palmetto grow within the wetland, and cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. This marsh is in fire-maintenance condition. The adjacent uplands are historically fire suppressed sandhills. A dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 08D-08

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A couple of longleaf pine trees grow within the wetland. This marsh is in fire-maintenance condition. The adjacent uplands are historically fire suppressed sandhills. A dense ring of palmetto and oak surround the wetland. The uplands currently are managed with herbicide.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 09D-01

Description: This wetland is a 1.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A fireline runs along the north side of the wetland, bisecting a small connector arm that would link this wetland with wetland 09D-02. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland, south of the 09D-01, 02, 03 pond complex. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 09D-02

Description: This wetland is a 2.4 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has minor and patchy feral hog damage. A fireline near the south side of the wetland bisects a small connector arm that would link this wetland with wetland 09D-01. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland, south of the 09D-01, 02, 03 pond complex. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 09D-03

Description: This wetland is a 0.8 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A fireline bisects the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland, south of the 09D-01, 02, 03 pond complex. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 09D-04

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive hog damage. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09D-05

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Redroot is distributed throughout the wetland, and cover 50-75% of the basin. The wetland has extensive and severe hog damage. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09D-06

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory cover. Redroot grows in scattered patches, covering 5-25% of the wetland basin. The wetland has severe hog damage. A fireline runs along the east side of the pond, barely touching the wetland edge. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 09D-07

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush grows throughout 5-25% of the wetland. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. The wetland has minor hog damage in a ring around the pond edge. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-01

Description: This wetland is a 0.9 ha ephemeral marsh. Holly and pine trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has new and old feral hog damage. A fireline bisects the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 10D-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10D-03

Description: This wetland is a 1.4 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10D-04

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hog rootings are patchy in the wetland. A fireline runs bisects the north side of the wetland. This oblong marsh is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage, Fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline in the interior of the MU is not a MU boundary. We recommend it be abandoned and allowed to recover over time. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 10D-05

Description: This wetland is a 0.5 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor, patchy feral hog damage. A recent fire killed the holly and bay that used to form a midstory layer, now the marsh is open with dead shrub snags. This marsh provides a good example of the benefits of prescribed fires to marsh management and restoration. The adjacent uplands are mesic flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-06

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Minor damage from feral hogs has grown over with vegetation. This marsh is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-07

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10D-08

Description: This wetland is a 0.7 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A recent fire burned through the wetland. This low-lying marsh likely connects with the adjacent hydric hammock during periods of high water. The adjacent uplands are mesic flatwoods and hydric hammock managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-09

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. This marsh is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 10D-10

Description: This wetland is a <0.1 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has old and new feral hog damage. A recent fire burned through the wetland. The adjacent uplands are scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-11

Description: This wetland is a 0.1 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A recent fire burned through the wetland. This circular depression marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods and hydric hammock managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-12

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Redroot grows throughout the wetland, and covers >75% of the basin. The wetland has old feral hog damage that is grown over with vegetation. This marsh is in fire-maintenance condition. The adjacent uplands are mesic flatwoods and hydric hammock managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10D-13

Description: This wetland is a 0.7 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has minor feral hog damage. A recent fire burned through the wetland. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are mesic and scrubby flatwoods managed with growing season prescribed fires.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 13D-01

Description: This wetland is a 1.1 ha ephemeral marsh. There is no midstory or canopy cover. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has minor feral hog damage. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are xeric hammock and currently are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 13D-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no midstory or canopy cover. Sedges/grasses are distributed throughout the wetland, and cover 50-75% of the basin. This marsh is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods with a thick ring of low palmetto encircling the wetland. The uplands currently are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 13D-03

Description: This wetland is a <0.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory. Sedge/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. A fireline runs through the uplands on the west side of the wetland. This marsh is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 13D-04

Description: This wetland is a 6.8 ha ephemeral marsh. There is no midstory or canopy cover. Maidencane grows throughout the wetland, and covers >75% of the basin. This large basin marsh has a few deep pot holes and is a potential striped newt breeding pond. This wetland is in fire-maintenance condition. The adjacent uplands are scrubby flatwoods and currently are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 13D-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no midstory or canopy cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A fireline bisects the center of the depression marsh. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with prescribed fire.

Wetland Concerns: Fireline

Restoration Action Recommended: The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 01E-01

Description: This wetland is a 1.7 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is bisected by a property line. The east side is private property and has been dug out. The wetland is located on an urban/wildland interface. A housing development is located to the east; the remaining uplands are xeric hammock.

Wetland Concerns: Dug out, Upland condition

Restoration Action Recommended: None, the WMA portion of this wetland is in good ecological condition.

Wetland ID: 02E-01

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Maple trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and young maple and loblolly bay trees, and covers 50-75% of the wetland. Sawgrass grows throughout the wetland, and cover 50-75% of the basin. This wetland appears to be a fire-excluded marsh succeeded to a shrub swamp. The adjacent uplands are xeric hammock.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce encroachment of woody vegetation.

Wetland ID: 02E-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush grows in a deeper sinkhole within the wetland, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog rooting around the edges that has now filled in with vegetation. The adjacent uplands are sandhill.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04E-01

Description: This wetland is a 0.2 ha ephemeral marsh. Gum trees grow in the deepest part of the wetland interior, and cover 25-50% of the basin. *Hypericum* covers 5-25% of the wetland. Redroot and sedges/grasses grow throughout the wetland, and cover >75% of the basin. Both old and new feral hog damage is evident in the wetland. The new hog damage is minor. The adjacent uplands are fire-suppressed mesic flatwoods. Palmetto grows in a thick ring around the wetland. The uplands currently are managed with herbicide.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04E-02

Description: This wetland is a 0.2 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by *Hypericum* and buttonbush, and covers 5-25% of the wetland. Redroot and sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is beginning to show signs of fire suppression with patches of thick woody shrubs. The adjacent uplands are fire-suppressed sandhills. Palmetto grows in a thick ring around the wetland. The uplands currently are managed with herbicide.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the patches of dense brush.

Wetland ID: 04E-03

Description: This wetland is a 1.5 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and buttonbush, and covers 25-50% of the wetland. Sawgrass and other herbaceous vegetation grow in scattered patches, and cover 5-25% of the wetland basin. This wetland was logged years ago and shrubs now grow on stump hummocks in the wetland. Thick needle duff covers the wetland floor. The adjacent uplands are fire-suppressed mesic flatwoods and xeric hammock and currently are managed with herbicide.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 04E-04

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Old and new feral hog damage is evident in the wetland. The new damage is moderate to bad in spots and is recovering in other spots. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are fire-suppressed sandhill and xeric hammock with a dense palmetto ring surrounding the wetland. The uplands currently are managed with herbicide.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04E-05

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 25-50% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hogs have created deep rootings in places. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and were managed with herbicide. A growing season wildfire burned in 2008 killing most of the oaks.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04E-06

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Buttonbush covers 25-50% of the wetland. Most of the buttonbush is established in a deeper section of the wetland in a natural fire shadow. However, many buttonbushes have established throughout the basin as a result of a prolonged dry period and fire absence in the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. There is extensive feral hog damage in the south half of the wetland and around the wetland edge. The adjacent uplands are sandhills and were managed with herbicide. A growing season wildfire burned in 2008 killing most of the oaks. Selective logging occurred around the wetland.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage fire to prevent further encroachment of buttonbush.

Wetland ID: 04E-07

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush grows in the deepest portion of the wetland, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has old feral hog damage that has grown over with vegetation. The edges of this circular, depressional marsh were mowed to reduce the palmetto ring. The adjacent uplands are xeric hammock and were managed with herbicide. A growing season wildfire burned in 2008.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 05E-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Herbaceous vegetation is growing over old feral hog damage. The wetland basin has diverse herbaceous vegetation and is in good ecological condition. There is thick brush in the upland margin. The adjacent uplands are fire-suppressed mesic flatwoods and currently are managed with herbicide and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. This MU is just north of a suburban landscape and therefore the wetland may develop issues associated with fire suppression and exotic species. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 05E-02

Description: This wetland is a 0.8 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. Old feral hog damage is recovering; new hog damage is minor. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are fire-suppressed xeric hammock and currently are managed with herbicide and mechanical vegetation removal.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. This MU is just north of a suburban landscape and therefore the wetland may develop issues associated with fire suppression and exotic species. The wetland could be monitored to ensure exotic species, and encroachment of woody vegetation, do not become an issue.

Wetland ID: 06E-01

Description: This wetland is a 0.2 ha highly ephemeral marsh. A stand of slash pine trees grows in the wetland, and covers 50-75% of the wetland. There is no midstory cover. Fern and redroot are distributed throughout the wetland, and cover 50-75% of the basin. Feral hogs severely rooted the wetland basin but the vegetation has recovered. The adjacent uplands are mesic flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove pine trees from the wetland interior. This MU is just north of a suburban landscape and therefore the wetland may develop issues associated with fire suppression and exotic species. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 06E-02

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. Feral hog damage is minor. The adjacent uplands are fire-suppressed mesic flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. This MU is just north of a suburban landscape and therefore may the wetland may develop issues associated with fire suppression and exotic species. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 07E-01

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses, fern, and redroot grow throughout the wetland, and cover >75% of the basin. Old and new feral hog damage is evident in the wetland. The new hog damage is minor. The adjacent uplands are sandhills. A wildfire burned through this MU in 2008. The uplands directly surrounding this wetland are thick with palmetto and don't appear to have burned.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07E-02

Description: This wetland is a <0.1 ha ephemeral marsh. There is no canopy or midstory cover. Grasses grow throughout the wetland, and cover >75% of the basin. This wide, open grassy marsh burned recently. The adjacent uplands are mesic flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 07E-03

Description: This wetland is a 0.1 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. There is no midstory cover. Sawgrass grows in scattered patches, covering 5-25% of the wetland basin. A recent fire burned entirely through the wetland basin, killing the dense shrubs and opening up the midstory. The wetland floor was probably damp during the fire as the peat did not appear to burn. The adjacent uplands are mesic flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 07E-04

Description: This wetland is a 0.4 ha highly ephemeral marsh. Large slash pine trees were logged from the wetland. Medium-sized pine trees remain and cover 5-25% of the wetland. There is no midstory cover. Sedges/grasses are distributed throughout the wetland, and cover 50-75% of the basin. A recent fire burned entirely through the wetland basin. There are no vehicular ruts from the recent logging activity but slash was left in the wetland. A MU boundary/fireline bisects the eastern edge of the wetland. The adjacent uplands are mesic flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: Fireline, Slash, Woody encroachment

Restoration Action Recommended: Remove remaining pine trees from the wetland interior. The slash will likely burn during the next fire. The fireline/MU boundary should be re-routed away from the wetland. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 07E-05

Description: This wetland is a <0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. A recent fire burned entirely through the wetland basin. The wetland has minor feral hog damage. This small marsh is close to the west side of a large swamp/marsh. The adjacent uplands are scrubby flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07E-06

Description: This wetland is a 0.2 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A recent fire burned entirely through the wetland basin. This small marsh is surrounded by thinned palmetto and is adjacent to a large swamp. The adjacent uplands are scrubby flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 07E-07

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is a dirt WMA access road along the north side of the wetland. The adjacent uplands are scrubby and mesic flatwoods that burned during a 2008 wildfire. The uplands also are managed with mechanical treatments.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 09E-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and fern grow throughout the wetland, and cover >75% of the basin. The wetland burned fairly recently. The adjacent uplands are sandhill and are managed with mechanical treatments.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 09E-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Fern grow throughout the wetland, and cover >75% of the basin. The wetland has very old, almost unnoticeable feral hog damage across the wetland. There is a mechanically dug hole on the east side of the wetland. The marsh has a very defined ecotonal boundary. The adjacent uplands are mesic flatwoods managed with mechanical vegetation removal.

Wetland Disturbance: Dug-out, Feral hog damage

Restoration Action Recommended: Fill the dug-out. Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 09E-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is a small four-wheeler track around the wetland but the damage is minimal and most likely done while the wetland was dry. The adjacent uplands are scrubby flatwoods and are managed with mechanical treatments.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 09E-04

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland burned fairly recently. This circular wetland has diverse herbaceous vegetation and is in great ecological condition. The adjacent uplands are mesic flatwoods and are managed with mechanical treatments.

Wetland Disturbance: None

Restoration Action Recommended: None

Wetland ID: 10E-01

Description: This wetland is a 0.1 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory layer. Sedges/grasses and fern grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and recovering well. This wetland is a potential striped newt breeding pond. The adjacent uplands are fire-suppressed sandhills with a thick palmetto ring around wetland. The uplands were managed with an herbicide treatment.

Wetland Disturbance: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 10E-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and recovering well. The adjacent uplands are fire-suppressed sandhills to the south and hydric hammock to the north. A thick palmetto ring surrounds the wetland. The uplands were managed with an herbicide treatment.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 11E-01

Description: This wetland is a 79.0 ha semi-permanent marsh. Cypress trees grow in 3 deeper holes in the bottom lobe of the wetland. The cypress tree canopy covers 5-25% of the wetland. Cypress and maple grow in a deeper hole in the northeast corner as well. The midstory is dominated by wax myrtle, willow, and small maples, and covers 5-25% of the wetland. Sawgrass grows densely throughout, covering >75% of the wetland basin. The effects of fire suppression are evident. A brush and cypress ring is forming around the wetland edge and the marsh is choked with sawgrass. The adjacent uplands are fire-suppressed sandhills and are managed with mechanical treatments. A palmetto ring was recently chopped around the wetland perimeter.

Wetland Concerns: Herbaceous density, Woody encroachment

Restoration Action Recommended: Prescribe burn promptly when wetland has normal water levels to reduce initial fuel load. Burn again approximately a year later when water levels are lower (late spring/early summer if dry year) to remove upper duff and peat levels and more thoroughly reduce sawgrass density. Alternatively, if not worried about initial fire intensity, provide first burn when water is low so that encroaching woody shrub zones and dense sawgrass are reduced.

Wetland ID: 01F-01

Description: This wetland is a 1.8 ha semi-permanent shrub swamp, baygall community. There is no tree canopy. Fetterbush and loblolly bay saplings cover >75% of the wetland. Fern grow throughout the wetland, and cover >75% of the basin. The wetland has patchy feral hog damage. There is a thick layer of peat and duff in the wetland basin. The adjacent uplands are sandhills and currently are managed with prescribed fire and herbicide treatment.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland basin to reduce the dense shrubs and duff layer.

Wetland ID: 01F-02

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by fetterbush, loblolly bay, and wax myrtle, and covers 50-75% of the wetland. Fern are distributed throughout the wetland, and cover 50-75% of the basin. There is a thick layer duff in the wetland basin. This small swamp is very close to a much larger swamp to the west. The adjacent uplands are sandhills and currently are managed with prescribed fire and herbicide treatment.

Wetland Concerns: None

Restoration Action Recommended: Encourage periodic fire in the wetland to prevent the woody vegetation from becoming too dense.

Wetland ID: 03F-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Loblolly bay saplings cover 5-25% of the wetland. Redroot and fern grow throughout the wetland, and cover >75% of the basin. Uneven ground in the wetland and the presence of disturbance-colonizing vegetation suggest this wetland was disturbed by feral hogs in the past, but old rooting is now eroding. Woody vegetation is beginning to encroach in the wetland basin along the edge. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further shrub encroachment.

Wetland ID: 03F-02

Description: This wetland is a 1.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by fetterbush and wax myrtle, and covers >75% of the wetland. Sedges/grasses grow throughout the wetland, and cover 5-25% of the basin. This large, circular swamp is surrounded by a thick ring of brush and has a thick duff and peat layer in the basin. There is minor feral hog damage in the wetland. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the dense shrubs.

Wetland ID: 03F-03

Description: This wetland is a 0.4 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by fetterbush and wax myrtle, and covers 50-75% of the wetland. Fern grow throughout the wetland, and cover 50-75% of the basin. This circular swamp has a thick duff layer, very tall ferns, and patches of thick brush in the basin. The wetland is surrounded by a thick ring of brush. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick patches of brush and prevent further shrub encroachment.

Wetland ID: 03F-04

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has minor, old feral hog damage. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03F-05

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and fern grow throughout the wetland, and cover >75% of the basin. The herbaceous vegetation is diverse and very dense. Gallberry is beginning to encroach into the wetland basin. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: None

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce dense herbaceous vegetation and prevent the encroachment of gallberry.

Wetland ID: 03F-06

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and holly trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by fetterbush and wax myrtle, and covers 50-75% of the wetland. Fern, redroot, and sphagnum grow throughout the wetland, and cover 50-75% of the basin. This wetland has a thick brush ring and an open interior. There is a thick duff layer in and around the wetland. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to reduce the dense brush ring and prevent further shrub encroachment.

Wetland ID: 03F-07

Description: This wetland is a 1.3 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland. Sedges/grasses grow in scattered patches, covering 5-25% of the wetland basin. This wetland has a dense brush ring and a thick duff layer. The adjacent uplands are fire-suppressed sandhills.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to reduce the dense brush ring and prevent further shrub encroachment.

Wetland ID: 03F-08

Description: This wetland is a 0.6 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress have regenerated and cover >75% of the wetland. The midstory is dominated by fetterbush and holly, and covers >75% of the wetland. There is no herbaceous vegetation. Hummocks have developed around old stumps and are now supporting the shrubs. There is a thick layer of duff in the wetland. The adjacent uplands are fire-suppressed sandhills that are thick with brush and oaks.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush and duff layer.

Wetland ID: 04F-01

Description: This wetland is a 1.3 ha semi-permanent shrub swamp. Cypress and loblolly bay trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by fetterbush, and covers >75% of the wetland. Fern grow in scattered patches, covering 5-25% of the wetland basin. This baygall swamp has very thick duff and peat and is likely an old cypress dome. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush and duff layer.

Wetland ID: 04F-02

Description: This wetland is a 1.0 ha ephemeral shrub swamp. Cypress and loblolly bay trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by buttonbush and loblolly bay, and covers >75% of the wetland. Sedges/grasses and redroot grow in scattered patches, covering 5-25% of the wetland basin. The north end of this baygall wetland has a cypress-dominated lobe and the rest is an impenetrable fetterbush/bay thicket. Feral hog damage is spotty and is both old and new. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the thick brush.

Wetland ID: 04F-03

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Fetterbush and gallberry cover >75% of the wetland. There is no herbaceous vegetation. This baygall swamp has burned in the past but is extremely thick with shrubs. The adjacent uplands are sandhills. The sandhills appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush.

Wetland ID: 05F-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. Holly and *Hypericum* cover 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and has recolonized with redroot. There is a 5 m diameter sinkhole on the west side of the depression in the ecotone. Palmetto grows in a dense ring around the wetland. The adjacent uplands are fire-suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 05F-02

Description: This wetland is a 3.7 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by buttonbush and wax myrtle, and covers 25-50% of the wetland. Sedges/grasses and maidencane grow in scattered patches, and cover 25-50% of the wetland basin. This swamp is located on a private land boundary, two-thirds of the wetland is owned by CWMA and the other third is private. The edge of the wetland was mechanically treated but there are no vehicular tracks. There is evidence of fire on some cypress bases in the wetland interior. The adjacent uplands are fire-suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 05F-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. Feral hog damage is minimal. Saw palmetto grows in a thick ring around the wetland. The adjacent uplands are fire-suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07F-01

Description: This wetland is a 0.6 ha semi-permanent mixed swamp. Cypress and holly trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle, fetterbush, and holly, and covers 50-75% of the wetland. Sedges/grasses and maidencane grow in scattered patches, and cover 25-50% of the wetland basin. The wetland is surrounded by a thick ring of brush and saw palmetto. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to prevent further shrub encroachment.

Wetland ID: 07F-02

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by fetterbush, wax myrtle, and holly, and covers 50-75% of the wetland. Redroot and fern grow in scattered patches, and cover 25-50% of the wetland basin. There is evidence of previous fire around the wetland edge and a thick layer of duff in the wetland. Feral hog damage is old and recovering. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further shrub encroachment.

Wetland ID: 07F-03

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 25-50% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Past feral hog damage has re-vegetated with redroot and new feral hog damage is minor. The wetland is surrounded by a thick ring of *Hypericum*. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07F-04

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. This wetland has extensive, old feral hog damage that has grown over with redroot. This wetland is in fire maintenance condition. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 07F-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and fern grow throughout the wetland, and cover >75% of the basin. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills and currently are managed with mechanical treatments.

Wetland Concerns: None

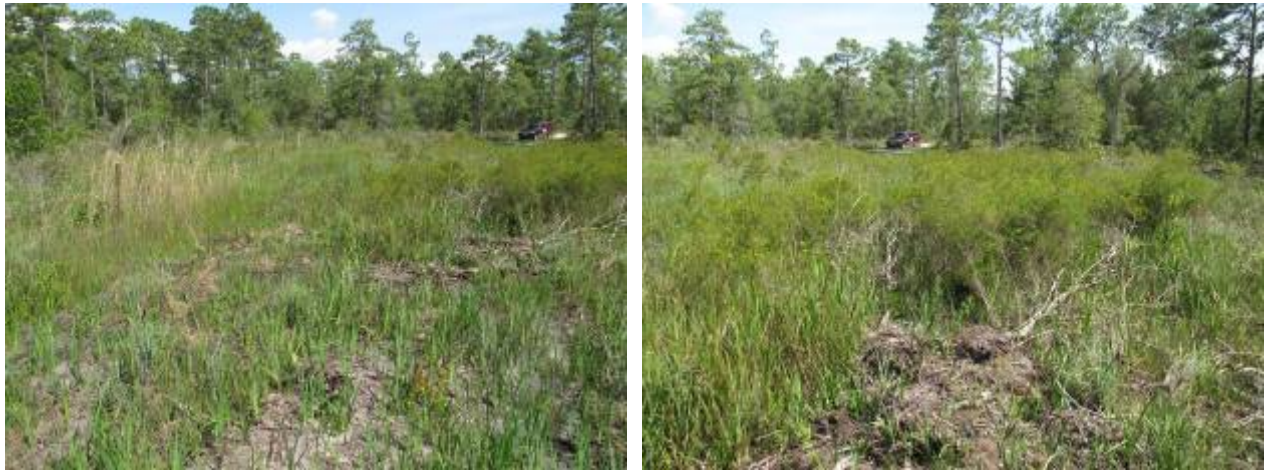
Restoration Action Recommended: None

Wetland ID: 08F-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Redroot grows throughout the wetland, and covers >75% of the basin. A property boundary/fireline and fence bisect the center of the wetland. The wetland has some feral hog damage. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Property boundary/fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/boundary should be re-routed away from the wetland if feasible. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 08F-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. A property boundary/fireline and fence bisect the marsh. The private half of the wetland has markedly more shrub encroachment. The CWMA half of the wetland, which likely receives more fire, is open marsh. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Property boundary/fireline

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. The fireline/boundary should be re-routed away from the wetland if feasible. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing.

Wetland ID: 02G-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and grown over with redroot. The rooting pock marks have eroded. The adjacent uplands are a mix of flatwoods, xeric hammock, and scrubby flatwoods and currently are managed with mechanical treatments. The mechanically treated area directly adjacent to the wetland looks very good.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 02G-02

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are a mix of sandhill, xeric hammock, and mesic flatwoods and currently are managed with mechanical treatments. The mechanically treated area directly adjacent to the wetland looks very good.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03G-01

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy. *Hypericum* grows in a ring around the wetland, and covers 5-25% of the basin. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and minor. The rare corkwood plant (*Leitneria* sp.) is present in the *Hypericum* ring. This wetland is a potential striped newt breeding pond and has diverse herbaceous vegetation and a nice littoral zone. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03G-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Feral hog damage is old and minor and is grown over with vegetation. This wetland is a potential striped newt breeding pond and has diverse herbaceous vegetation. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 03G-03

Description: This wetland is a 0.2 ha semi-permanent marsh. There is no tree canopy. Fetterbush, holly, and bay grow in a dense ring around the wetland, and cover 5-25% of the basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are fire suppressed sandhills and scrubby flatwoods and currently are managed with mechanical treatments.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to prevent further shrub encroachment.

Wetland ID: 04G-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Redroot grows throughout the wetland, and covers >75% of the basin. Feral hog damage is extensive. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 50-75% of the wetland. Maidencane, sedges/grasses, and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive old and new feral hog damage. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-03

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy. Fetterbush covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is minor feral hog damage in the wetland. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-04

Description: This wetland is a 0.1 ha ephemeral marsh. Several holly trees grow throughout the wetland and cover 5-25% of the basin. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive old and new feral hog damage that is mostly grown over with redroot. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-05

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 5-25% of the wetland. A diverse array of sedges/grasses grows throughout the wetland, and covers >75% of the basin. The wetland has minor feral hog damage around some of the edge. This marsh is in fire-maintenance condition and is a potential striped newt breeding pond. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-06

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 50-75% of the wetland. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has moderate feral hog damage. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: 04G-07

Description: This wetland is a 2.1 ha ephemeral mixed swamp. Cypress and holly trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the wetland basin. The wetland has very thick duff and moderately thick brush. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush and duff layer.

Wetland ID: 04G-08

Description: This wetland is a 0.8 ha ephemeral mixed swamp. Cypress and holly trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland. There is no herbaceous cover. The wetland has very thick duff and moderately thick brush. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush and duff layer.

Wetland ID: 04G-09

Description: This wetland is a 0.7 ha ephemeral mixed swamp. Cypress and loblolly bay trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, fetterbush, and young loblolly bay trees, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland has very thick duff and dense shrubs, especially around the wetland edge. The adjacent uplands are fire suppressed sandhills and currently are managed with mechanical treatments.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the thick brush and duff layer.

Wetland ID: 09G-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. A property boundary/fireline bisects through the south side of the wetland. The wetland is located on an urban/wildland interface. A housing development is located to the south and the uplands adjacent north are a fire suppressed oak/pine forest. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Property boundary/fireline, Upland condition

Restoration Action Recommended: The fireline/MU boundary should be re-routed away from the wetland if feasible. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing. Due to the proximity of houses, this wetland is at risk of becoming fire suppressed. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 09G-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. *Baccharis* covers 5-25% of the wetland. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. There is old and new feral hog damage in the wetland. The wetland is located on an urban/wildland interface. A housing development is located to the east; the remaining uplands are fire suppressed sandhills/oak. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Woody encroachment, Upland condition

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to prevent further shrub encroachment. Due to the proximity of houses, this wetland is at risk of becoming fire suppressed. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 09G-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Holly covers 5-25% of the wetland. Maidencane and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. The wetland is located near an urban/wildland interface. A housing development is located approximately 300m to the east; the immediate adjacent uplands are fire suppressed sandhills. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Upland condition

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Due to the proximity of houses, this wetland is at risk of becoming fire suppressed. The wetland could be monitored to ensure exotic species, and the encroachment of woody vegetation, do not become an issue.

Wetland ID: 09G-04

Description: This wetland is a 0.9 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The wetland has minor feral hog damage. This wetland is a potential striped newt breeding pond with diverse herbaceous vegetation and a shallow herbaceous littoral zone. This wetland will connect to a larger depressional marsh on private land to the north during high water. An old car is located on the south side of the wetland. A housing development is located approximately 500m to the east; the immediate adjacent uplands are fire suppressed sandhills. The uplands currently are managed with mechanical treatments.

Wetland Concerns: Feral hog damage, Vehicle

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Remove vehicle as it may be a point source of chemical contamination that could leach into wetland.

Wetland ID: 01H-01

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 01W-01

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Pine trees grow in a ring around the wetland, and cover 5-25% of the basin. The midstory is dominated by willow and an unidentified shrub, and covers 50- 75% of the wetland. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. This wetland was a marsh is succeeding to a shrub swamp. A thick brush ring surrounds the wetland ecotone. A fireline and a major highway (US 19) run along the northeast side of the wetland. The wetland receives road and sand runoff. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: Fireline, Road, Woody encroachment

Restoration Action Recommended: The fireline/MU boundary should be re-routed away from the wetland if feasible. If the fireline cannot be re-routed, monitor the wetland to ensure fire is not excluded. Maintain the fireline when the wetland is completely dry to prevent ruts from developing. Provide prescribed fire whenever possible to eliminate the shrub encroachment. Alternatively, the shrubs could be mechanically removed when the wetland is completely dry.

Wetland ID: 01W-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland appears to be in excellent ecological condition. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 01W-03

Description: This wetland is a 0.3 ha ephemeral marsh. Small pine trees and shrubs are beginning to encroach into the wetland but cover <5% of the basin. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. This circular wetland has diverse herbaceous vegetation and is in good ecological condition. The center of the wetland has a thick layer of peat. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: The longer fire interval of scrub habitat facilitates woody plant colonization during drought periods more than marshes within sandhill or flatwoods. If WMA personnel want to retain this wetland as a marsh in the long term, then removal of small shrubs and pine trees in the basin will be necessary. Promptly provide fire before small shrubs and trees become well-established. If fire cannot be provided within a year or two, then hand-remove pine trees and shrubs in wetland basin.

Wetland ID: U1-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland appears to have been disturbed by hogs in the past but the vegetation has completely regenerated. The peat layer is thick in the wetland basin. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: U1-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Holly covers 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover >75% of the basin. The wetland appears to have been disturbed by hogs in the past but the vegetation (mostly redroot) has completely regenerated. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: U1-03

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. This depressional wetland has been dry for a long time. The adjacent uplands are scrub that was converted to sand pine plantation. The sand pine was clearcut 10 years ago and now the scrub is regenerating.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: U1-04

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. Holly covers 5-25% of the wetland. Sedges/grasses, fern, and redroot grow throughout the wetland, and cover 50-75% of the basin. The wetland has old and new feral hog damage. The old hog damage has grown over with redroot and fern. A very thick shrub and palmetto ring encircles the wetland in the wetland/upland ecotone. The adjacent uplands are sandhills and flatwoods

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: U2-01

Description: This wetland is a 0.3 ha ephemeral shrub swamp/baygall community. Loblolly bay trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by fetterbush and young loblolly bay trees, and covers >75% of the wetland. There is no herbaceous vegetation. This baygall community has extremely dense shrubs. Charred stems provide evidence of a recent fire. The adjacent uplands are fire suppressed sandhills.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense brush.

Wetland ID: U3-01

Description: This wetland is a 30.7 ha ephemeral marsh. There is no tree canopy. Wax myrtle, willow, and baccharis cover 25-50% of the wetland. Maidencane and sedge/grass are the dominant herbaceous vegetation, and cover >75% of the wetland. The center of this very large marsh is deeper than the surrounding area and has taller vegetation and shrubs. The area surrounding the shrubby center has a thick peat layer and a variety of herbaceous vegetation. A major highway (US 19) runs along the east side of the wetland and a suburban development lies to the north. The adjacent uplands to the south are scrub.

Wetland Concerns: Road, Upland condition

Restoration Action Recommended: The major management concern with this wetland is related to the wildland/suburban interface, major highway, and predominant wind direction, which present a difficult combination for prescribed fire. We recommend waiting for a good burn window sometime in the next 5-10 years. If after that period no fire was possible, the managers could consider mechanically thinning some shrubs when the wetland is dry. Currently, the wetland is in good condition.

Wetland ID: U4-01

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory was dominated by fetterbush and wax myrtle, and covered >75% of the wetland. There is no herbaceous vegetation. This wetland was a mixed swamp with thick brush. Within the past month or two, a fire burned completely through the wetland, charring every single shrub in the wetland, as well as reducing the thick duff. This wetland provides an excellent example of how powerful a summer fire can be as a brush management tool. The wetland 80m to the south (04C-01) may provide a good example of a “before fire” wetland. The adjacent uplands are sandhills.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: U5-01

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy. *Hypericum* covers 50-75% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. A dense ring of brush grows around the wetland. The wetland has old feral hog damage that is recovering well. This marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property.

Wetland ID: U5-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush grows in the deeper wetland center and a few small pine trees are encroaching into the basin. The woody vegetation covers 25-50% of the wetland. Fern and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has old and new feral hog damage. This depression marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the encroaching pine trees and prevent the buttonbush from encroaching into the wetland basin. Monitor this wetland to ensure pine trees are killed with the next fire or inundation. If they become established, the encroaching pine trees will need to be removed from the wetland. Alternatively, the small pine trees can be hand-chopped now.

Wetland ID: U5-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Wax myrtle and holly grow in the deeper wetland center and a few small pine trees and shrubs are encroaching inward from the edges. The woody vegetation covers 25-50% of the wetland. Fern, sedges/grasses, and redroot grow throughout the wetland, and cover >75% of the basin. The wetland has extensive feral hog damage. This depression marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands appear to have been fire suppressed but now are managed with prescribed fire.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Because of the widespread damage to ephemeral wetlands on CWMA, we recommend aggressive action to reduce the overall numbers of feral hogs on the property. Encourage periodic fire in the wetland to reduce the encroaching pine trees and shrubs. Monitor this wetland to ensure the encroaching vegetation is killed with the next fire or inundation. If they become established, the shrubs and pine trees will need to be removed from the wetland. Alternatively, they can be hand-chopped now.

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Appendix A. Wetland Survey Form.

Management Area: _____ Date: _____ Wetland ID: _____ Photos: _____

Wetland Basin Assessment

Wetland Type:

☐ Marsh ☐ Shrub swamp ☐ Forested swamp ☐ Mixed swamp
☐ Altered ☐ Other:

Basin area: _____

Hydroperiod: ☐ Highly Ephemeral ☐ Ephemeral ☐ Semi-Perm

% Canopy Cover:

☐ <5% ☐ 5-25% ☐ 25-50% ☐ 50-75% ☐ >75%

Dominant Canopy:

☐ N/A ☐ Cypress ☐ Gum ☐ Pine ☐ Cypress/gum
☐ Holly ☐ Cypress/pine ☐ Cypress/holly ☐ Gum/pine ☐ Gum/holly
☐ Holly/pine ☐ Other:

Sub-canopy Cover:

☐ <5% ☐ 5-25% ☐ 25-50% ☐ 50-75% ☐ >75%

Dominant Sub-canopy:

☐ N/A ☐ Wax Myrtle ☐ Willow ☐ Titi ☐ Buttonbush ☐ Fetterbush
☐ Gallberry ☐ Holly ☐ Other:

% Herbaceous Cover:

☐ <5% ☐ 5-25% ☐ 25-50% ☐ 50-75% ☐ >75%

Dominant Herbaceous Groundcover:

☐ N/A ☐ Maidencane ☐ Sphagnum ☐ Rush ☐ Sedge/Grass
☐ Sawgrass ☐ Emergents ☐ Fern ☐ Redroot ☐ Other:

Herbaceous Distribution:

☐ Sparse ☐ Ring around edge ☐ Scattered patches ☐ Throughout ☐ Other:

Wetland Restoration Concerns:

☐ Hog damage ☐ Logging ☐ Slash ☐ Ditching ☐ Woody Encroachment
☐ Choked w/herb. ☐ Fireline ☐ Cattle ☐ Invasive Species ☐ Push Piles
☐ Bedding ☐ Desiccation ☐ Vehicular ☐ Other:

Comments:

Upland Assessment

Surrounding Community Type:

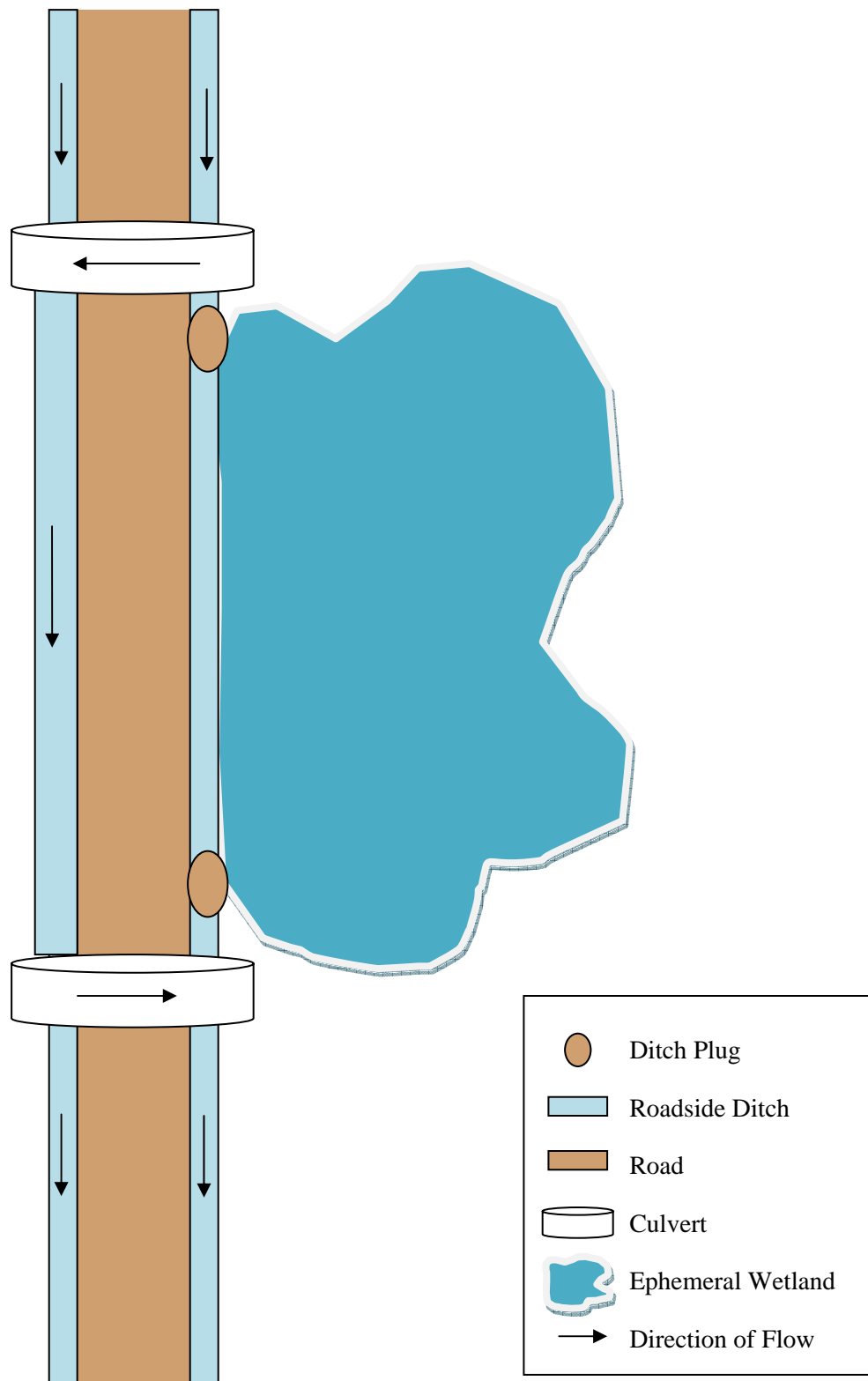
☐ Mesic flatwoods ☐ Wet flatwoods ☐ Scrubby flatwoods ☐ Upland pine forest
☐ Wet prairie ☐ Pasture ☐ Old field ☐ Sandhill ☐ Other:

Upland Condition:

☐ Fire suppressed ☐ Has burned ☐ Old bedding ☐ Pine plantation
☐ Hog damage ☐ Invasive species ☐ Grazing ☐ Other:

Comments:

Appendix B. Suggested method to break connectivity between an ephemeral wetland and tangent roadside ditch. This method is recommended as an experimental approach to restore the hydrology of wetlands connected to permanent ditches.



Appendix C. Scientific names of common plants encountered during this project, listed alphabetically by common name.

Bahia grass	<i>Paspalum notatum</i>
Black gum	<i>Nyssa sylvatica</i>
Broomsedge	<i>Andropogon sp.</i>
Buttonbush	<i>Cephalanthus occidentalis</i>
Cogongrass	<i>Imperata cylindrica</i>
Cordgrass	<i>Spartina sp.</i>
Corkwood	<i>Leitneria floridana</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Fetterbush	<i>Lyonia lucida</i>
Gallberry	<i>Ilex glabra</i> (short gallberry), <i>Ilex tomentosa</i> (tall gallberry)
Hackberry	<i>Celtis sp.</i>
Japanese climbing fern	<i>Lygodium japonicum.</i>
Laurel oak	<i>Quercus laurifolia</i>
Lizard's tail	<i>Saururus cernuus</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Maidencane	<i>Panicum hemitomon</i>
Muscadine grape	<i>Vitis rotundifolia</i>
Myrtle-leaved holly	<i>Ilex myrtifolia</i>
Persimmon	<i>Diospyros virginiana</i>
Pickernelweed	<i>Pontederia cordata</i>
Pond cypress	<i>Taxodium ascendens</i>
Redroot	<i>Lachnanthes caroliniana</i>
Sawgrass	<i>Cladium jamaicense</i>
Sand pine	<i>Pinus clausa</i>
Slash pine	<i>Pinus elliotii</i>
Smartweed	<i>Polygonum hydropiperoides</i>
St. Johns wort	<i>Hypericum spp.</i>
Sweet gum	<i>Liquidambar styraciflua</i>
Sweet bay magnolia	<i>Magnolia virginiana</i>
Titi	<i>Cliftonia monophylla</i> (black titi), <i>Cyrilla racemiflora</i> (swamp titi),
Torpedograss	<i>Panicum repens</i>
Wax myrtle	<i>Myrica cerifera</i>

Appendix D. Table of wetlands for which restoration actions are recommended for immediate consideration.

Fill/Plug Ditch	Encourage fire		Thin/remove trees	Re-route Fireline	Other
03A-01	04A-02	04E-06	07A-02	04B-01	Fill dug-out: 09E-02
03A-02	04A-03	11E-01	08A-03	05B-01	Remove vehicle: 09G-04
14A-01	04A-04	01F-01	09A-01	01C-03	Reduce brush ring: 10A-02
01C-04	07A-01	01F-02	10A-01	02C-01	Remove berm: 10A-02, 04D-01
08D-03	08A-01	03F-01	12A-01	07C-01	Mechanical resculpt: 14A-04
	08A-02	03F-02	19A-01	13C-01	Vegetation removal: 02B-04
	08A-05	03F-03	06C-04	02D-04	
	09A-03	03F-05	10C-02	07D-01	
	02B-05	03F-06	10C-03	07D-02	
	03B-02	03F-07	13C-01	08D-03	
	05B-01	03F-08	14C-07	09D-01	
	07B-01	04F-01	15C-03	09D-02	
	10B-01	04F-02	15C-04	09D-03	
	11B-04	04F-03	01D-03	09D-06	
	12B-03	07F-01	03D-01	10D-01	
	12B-04	07F-02	03D-02	10D-04	
	12B-07	03G-03	04D-01	13D-05	
	01C-04	04G-07	05D-03	07E-04	
	04C-01	04G-08	05D-04	01W-01	
	13C-04	04G-09	05D-05		
	02E-01	09G-02	05D-06		
	04E-02	U2-01	05D-07		
			07D-02		
			06E-01		
			07E-04		