

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

Aucilla WMA Final Report



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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.

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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 (TNRWMA)

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



Figure 1. Map depicting the location of the 7 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 removing of bedding or windrows
 - Re-routing roads

STUDY AREA

Aucilla Wildlife Management Area is primarily located in Jefferson County, 30 km southeast of the city of Tallahassee (Figure 1). It is approximately 19,000 ha in size. Previous landowners converted the native longleaf pine ecosystem to slash and loblolly pine plantations for pulpwood production. The state acquired the lands in 1988, 2002 and in 2004 through the Conservation and Recreation Lands (CARL) program and the Florida Forever Act land acquisition program. FWC is the lead management agency and AWMA personnel are in the process of restoring the property back to more natural conditions.

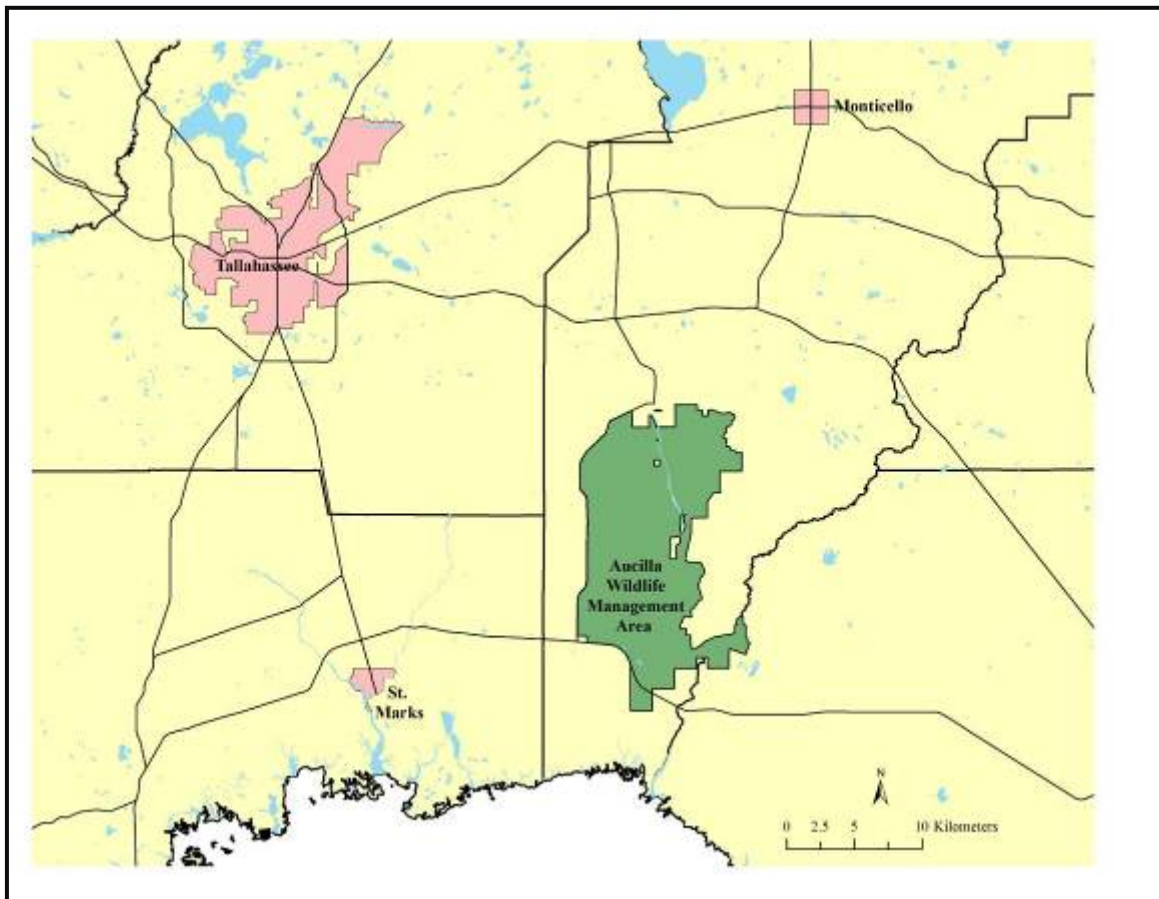


Figure 2. Location of Aucilla Wildlife Management Area.

The following information was obtained from “A Conceptual Management Plan for Aucilla Wildlife Management Area 2004-2009” published by FWC. Overall management directives for AWMA are to manage for conservation and protection of natural and historic resources and resource-based, public outdoor recreation. Select management objectives as related to this project include: restore off-site plantations, thin slash and loblolly pine plantations to facilitate natural community restoration and reduce wildfire risk, continue to implement a burn program that encourages growing season

burns where feasible but also utilizes dormant season burns, control feral hog populations, and restore hydrologic regimes by filling ditches where necessary.

Ephemeral wetland restoration, in particular, is a management priority on AWMA (M. Wilbur, FWC Lead Area Biologist, personal communication). Land managers initiated a contract to mechanically manipulate wetlands on select Management Units (MUs) to remove hummocks and tidi. They are monitoring the response of the herbaceous seed bank, and if necessary, will investigate restoring the ecotones using direct seeding with seed collected from a high quality reference site.

METHODS

We conducted an initial meeting with AWMA staff Morgan Wilbur, Area Wildlife Biologist, on 8 Dec 2009 to familiarize ourselves with land access, burning schedules, management priorities and concerns, and other pertinent issues. AWMA has many more ephemeral wetlands than we could inventory in our allotted 4-month schedule. M. Wilbur provided a list of 10 priority Management Units (MU) on which to focus our inventory. We used Digital Orthophoto Quarter Quadrangles (DOQQs) and topographic maps to remotely identify potential ephemeral wetlands on these priority MUs. We identified and generated maps for 738 potential ephemeral wetlands located on the 10 priority MUs.

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. We concentrated on ephemeral wetlands embedded in upland ecosystems. 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 has focused on inventorying wetlands that are relatively small in size to assist land managers in potentially discover 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. Definition of select data collected at each wetland follows.

Wetland ID

Wetlands were given an ID that corresponds to the MU number then the wetland number. For example, 10-02 is the second wetland inventoried in MU 10.

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 or mechanically altered wetlands

Basin Area

Length and width of wetland were measured using a range finder, where feasible. Basin area in hectares 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 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 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 and amount of standing water during site visit.

Comments

M. Wilbur provided us with 1949 aerial photographs of much of AWMA. Where applicable, we used these photographs to identify the historic conditions of wetlands and make restoration recommendations accordingly.

SITE ASSESSMENT

We began our systematic inventory of wetlands on 9 Dec 2008 and were scheduled to conduct field work 10 days in December, January, February, and March. We were not able to complete our March inventory due to weather. Several heavy rains fell during the last week of March and the beginning of April. The region received approximately 38 cm of rainfall and severe flooding made land access impossible. Our contract schedule required us to begin inventory on GRWMA before the roads at AWMA were passable and we could complete our inventory. We returned to AWMA in July 2010 to inventory 20 more ephemeral wetlands, 10 each in MU 28 and MU 29. We inventoried a total of 285 ephemeral wetlands on AWMA located in 10 of the 29 management units (Figure 3).

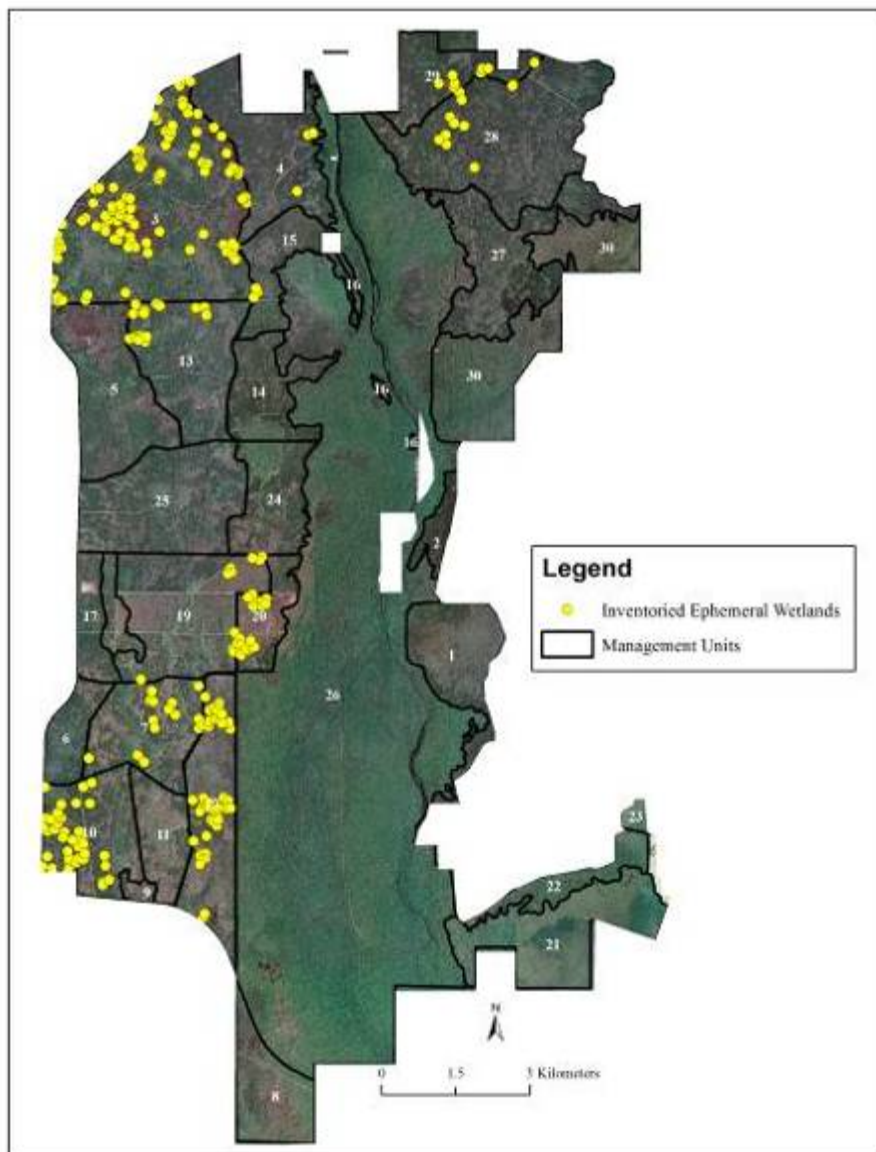


Figure 3. Map of the 285 wetlands inventoried on AWMA.

AWMA personnel are in the process of restoring the uplands through the use of mechanical treatments and prescribed fire. However, the condition of the property is still heavily impacted from the conversion to pine plantation. As evidenced by comparison to 1949 aerial photographs, the current hydrology of the landscape is altered such that large wetland systems have been reduced to smaller, isolated wetlands (Figure 4). Past ditching and bedding also altered the hydrological regime of the landscape. The extent of true ephemeral, isolated wetlands on AWMA is unknown.

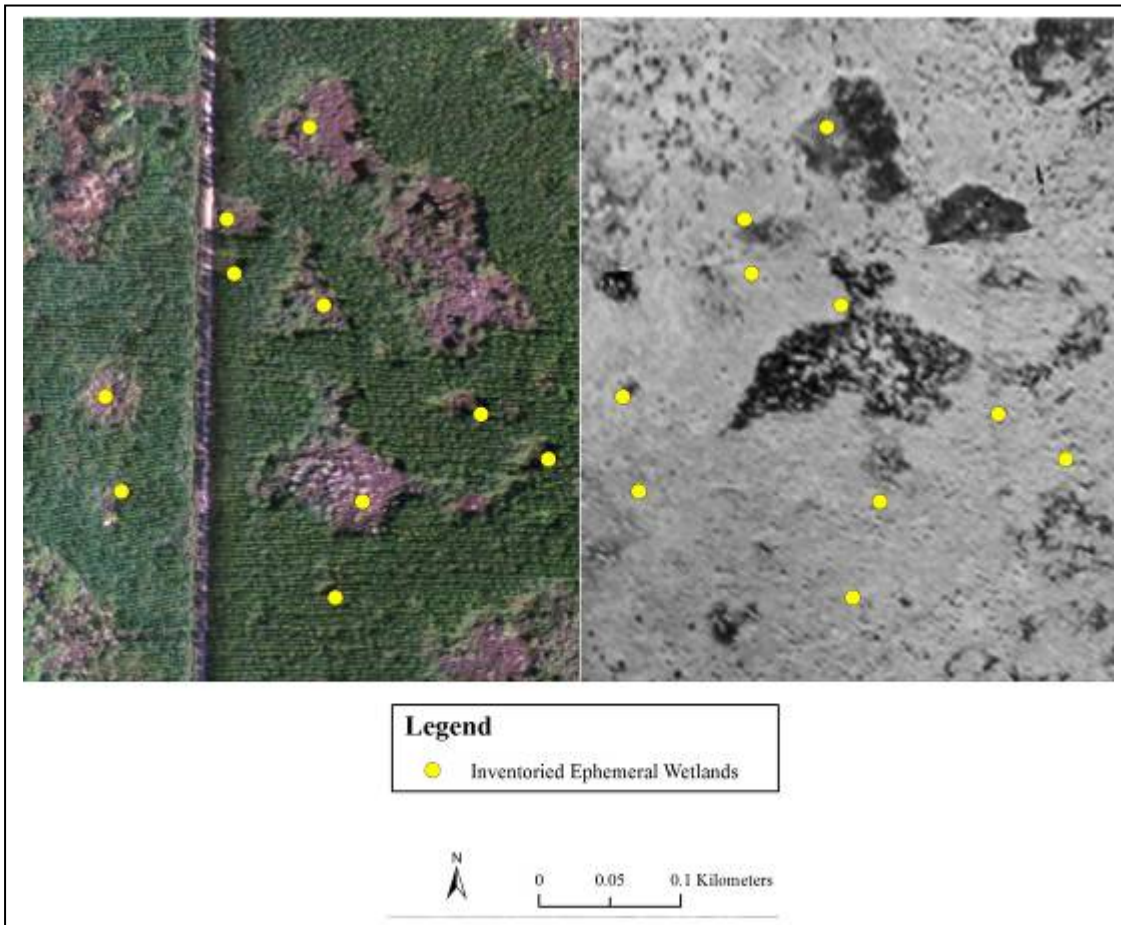


Figure 4. Comparison of present (on left) and historic 1949 (on right) conditions of a selected portion of the AWMA. Yellow dots represent the same wetland locations in both aerial photos. This figure clearly suggests that the wetland landscape is much different today than in 1949, pre-pine plantation. The conversion of the property to a pine plantation altered the hydrology of the landscape. The above comparison represents a microcosm of the property-wide situation.

We hesitate to provide recommendations for individual wetlands that are an artifact of the alteration of larger wetland systems through the practice of ditching and bedding. We predominately treated wetlands that are currently isolated and ephemeral as ephemeral wetlands, regardless of their past condition as part of a larger swamp system. However, we recommend any wetland restoration be conducted with the larger landscape in mind. In order to restore the ephemeral wetlands on this property, a complete hydrological

assessment would be helpful. Once the hydrology of the larger landscape is restored, restoration of individual wetlands could be undertaken.

The majority of restoration concerns on this property were related to problems associated with the historic logging of cypress trees, conversion of the landscape to a pine plantation, and the subsequent fire suppression of the landscape, including wetlands. For example, almost half (43%) of shrub swamps were a result of titi encroaching into logged wetlands, preventing the regeneration of cypress trees. That percentage represents only those shrub swamps in which we observed old cypress stumps. We suspect many other shrub swamps also were formerly cypress swamps. Additionally, pine trees were planted on bedding rows through 38% of wetlands 0.1 ha or smaller. The planted pines have been removed from some wetlands by AWMA personnel but evidence of bedding rows still remains.

A total of 212 wetlands (74%) were impacted by some degree of woody plant encroachment, primarily titi. The relatively high percentage of woody encroached wetlands on the AWMA is a direct result of long-term fire suppression.

- **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. These actions may need to be prioritized (see Restoration Prioritization section below).

Due to the altered state of the landscape and hydrology on AWMA, WMA personnel have a unique opportunity to experiment with different wetland restoration techniques. We do not provide experimental recommendations on a wetland by wetland basis because of the large number of candidate wetlands that potentially could be selected for experimentation. Instead we provide criteria for each Wetland Concern by which candidate wetlands could be selected for experimentation and we identify a few candidate wetlands. Experimental wetlands should be monitored and assessments of

restoration success should be made at each selected wetland after any experimental techniques have been applied. If restoration experiments are successful, the techniques could be applied property-wide. Below we detail the impacts of each Wetland Concern and how it pertains to AWMA. Not all Wetland Concerns were identified on each property but we included them as a reference for WMA personnel.

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 (e.g. 03-62, 13-02), may provide a good experimental situation for mechanically removing bedding in or around a wetland basin. 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. All mechanical activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

We encountered 58 wetlands (20%) with bedding on AWMA. Most of the bedding was old and eroding and all was a result of past pine silvicultural operations.

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 AWMA and we encountered no wetlands impacted by cattle grazing.

Drainage Ditching, 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. 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 still may be unseen effects difficult to ascertain in a short period of time without ecological monitoring.

We identified 1 wetland with a drainage ditch on AWMA, and 4 wetlands affected by roadside ditches. We did not make specific recommendations addressing the wetlands affected by roadside ditches. In all cases these wetlands were impacted by the conversion of the landscape to pine plantation and the subsequent alteration of the landscape hydrology. The wetlands were originally part of a larger wetland system. We do not recommend investing resources to address the roadside ditch concerns of these wetlands since they are part of a larger restoration issue. However, if WMA personnel wish to break the connection of ditches and wetlands, we recommend using the method described above and in Appendix B.

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 no dug-outs on AWMA.

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 Frankenger 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).

On WMA's where hog populations are dense, 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 encountered 43 wetlands (15%) impacted to some degree by feral hog damage on AWMA. Most of the feral hog damage was scattered throughout MU 3 and clustered on MUs 13 and 20 (Figure 5). Wetlands with severe and/or extensive feral hog damage were not clustered in any particular area. We do not recommend aggressive action such as trapping and/or harvesting on AWMA at this time. If feral hog damage increases in the future, it may be necessary to take aggressive action to prevent wetland degradation.

If feral hog control is needed in the future, we recommend trapping be used in combination with sport hunting and control hunting as a 3-pronged approach to reduce the impacts to ephemeral wetlands on these MUs. 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.

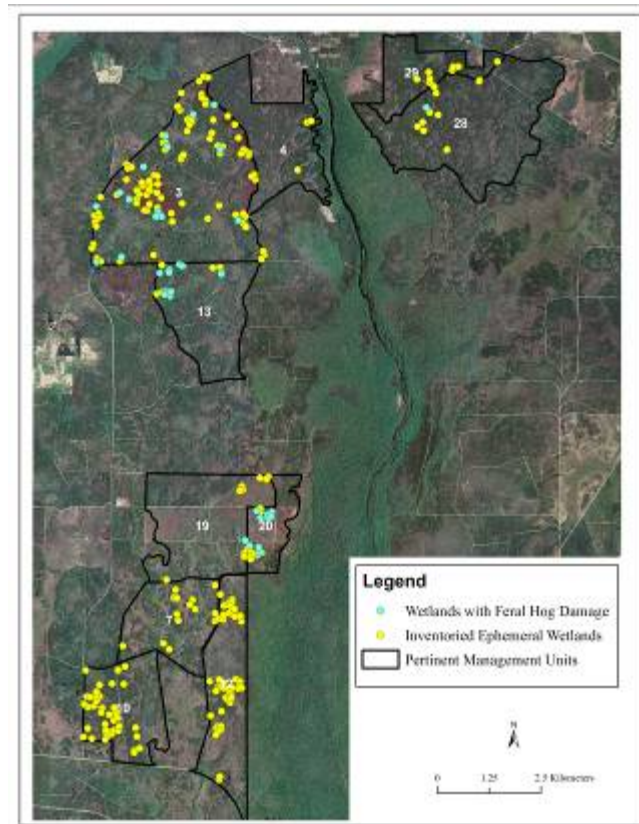


Figure 5. Map depicting wetlands with feral hog damage on AWMA. The majority of feral hog damage was located on 3 MUs.

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.). All mechanical activity

must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

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 and roads through wetlands were not a widespread concern on AWMA. We encountered no wetlands affected by a fireline and 14 wetlands affected by a road. We did not recommend re-routing roads on AWMA due to the permanency of SR 59 (which affected half of the 14 wetlands) and the already altered state of most of the wetlands. We recommend addressing the overall condition of the landscape and its hydrology before focusing on potential impacts of unpaved roads on individual wetlands.

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 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.

We encountered no wetlands on AWMA impacted by dense herbaceous vegetation.

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.

In some cases, cypress stumps were observed within swampy ephemeral wetlands that currently are forested by cypress trees. This indicates that the original plant community of the wetland re-established after logging within the wetland basin. On AWMA, 26% of the logged swamp wetlands we encountered had cypress regeneration. In some wetlands, dense brush established on the old stump hummocks or as a result of fire suppression, and the cypress canopy did not reestablish. These wetlands became shrub swamps or marshes. On AWMA, we found evidence of logging in 43% of shrub swamps and 19% of marshes.

We did not report logging as a Wetland Concern in the Wetland Characterization section because all the logging we encountered occurred long ago. We did describe the presence of stumps 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, 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 pines in an ephemeral wetland. All

mechanical activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

We encountered 30 wetlands (11%) with planted pine trees on AWMA. The pine trees were planted on bedding rows that were constructed through the middle of wetlands.

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 pines) 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, undesirable structures in wetlands. Depending on severity, push piles in ephemeral wetlands should be removed mechanically or be allowed to erode over time. Small piles having little impact on a given wetland should be allowed to naturally erode (e.g. 03-15, 03-108). Large push piles in wetlands that are significantly impacting a given wetland or in wetlands that are altered by other impacts (e.g. 03-18, 03-21) could be mechanically removed when the wetland basin is dry. The dirt and any established trees can be scooped up 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. All mechanical activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

We encountered 25 wetlands (9%) affected by push piles on AWMA. The push piles varied in severity and extent. See individual Wetland Characterizations for details.

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 28 wetlands (10%) in which there was slash or there were slash piles in and around the wetland. Slash was left in wetlands of varying sizes from 2.8 ha to <0.1 ha. In all cases we recommend the slash first be addressed using fire. However, if machinery will be used to address another restoration concern in the wetland such as mechanical vegetation or push pile removal or smoothing of vehicular ruts, slash could be removed concurrently (i.e. 10-14).

Upland Condition

Discussing upland management is beyond the scope of this project. However, we briefly characterized the uplands around each visited wetland. Because upland restoration is either planned or actively in progress on the MUs we visited on AWMA, we did not include “Upland Condition” as a Wetland Concern for this property. Currently, upland condition is an issue at most wetlands on AWMA but we believed it was unnecessary to alert WMA personnel of the need to restore uplands surrounding wetlands since they already presumably recognized this problem. However, the full ecological function of these wetlands will not be restored unless the uplands also are restored.

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.

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 (e.g. 03-96, 03-98), 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 18 ephemeral wetlands (6%) on AWMA with vehicular damage. All vehicular damage likely resulted from landscape restoration activities and not from recreational use.

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. While slash pine and wax myrtle were the 2 most predominant encroaching species into marshes we observed, titi was the main concern on AWMA. 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, wax myrtle, and titi 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 typically 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, HMWMA, 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. 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.

The degree of woody encroachment varied greatly between wetlands and between properties visited during this project. Among the 7 properties visited, AWMA exhibited the highest degree of woody encroachment (predominately titi) due to a long history of fire suppression. Because of the severity of encroachment, AWMA presents experimental opportunities for restoration. We recommend the land manager select 10 or 20 wetlands to become experimental sites for mechanical titi removal. Caution should be used if wetlands with cypress trees are chosen so that cypress trees are not damaged during the process. If the desired results are achieved, the method could be used to restore other wetlands. In the interim, we recommend all other wetlands be treated with periodic fire to reduce dense woody vegetation. Selection criteria for experimental wetlands may include: severe alteration from bedding, feral hogs, push piles, or some other disturbance (03-62, 10-03), evidence from historical aerial photos suggesting the wetland once was a marsh (03-49, 04-01), wetland unburnable due to fire-inhibiting leaf litter or other non-pyrogenic fuel (03-81), dense brush rings (03-84, 03-88), or shrub swamps with no tree canopy but evidence of past logging (03-100, 10-31).

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.). All mechanical activity must be conducted when the wetland is completely dry to minimize soil disturbance and rut formation.

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 pines established around the outer wetland margin or in slightly elevated regions that connect multiple depressions within a single large marsh. Large pines should be thinned 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. In some cases herbicide is necessary. 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. Spot herbicide treatment may be needed to remove hardwoods in the short-term because of their tendency to re-sprout after fire or chopping.

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 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 212 wetlands (74%) on AWMA in which woody encroachment was a concern. Woody encroachment, predominately by titi, was a concern in all types of wetlands (marshes and swamps). The widespread encroachment issue was due to the change in community structure and subsequent fire-suppression resulting from the large-scale conversion of the landscape to pine plantation.

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

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 (ex. Figure 5).

Wetland Characterizations and Descriptions

The following pages provide photographs and descriptions of the 285 ephemeral wetlands assessed on AWMA. The MUs are organized numerically. The wetland nomenclature uses the MU number and the wetland number. For example, 20-03 is the third wetland inventoried in MU 20. Additional photographs will be provided on a CD with the final report.

Wetland ID: 03-01

Description: This wetland is a 0.3 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 titi and wax myrtle, and covers 50- 75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. A major road (SR 59) bisects this wetland. The western half of the wetland is on private land. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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 feature, we do not recommend any action relating to the road. The wetland could be monitored to ensure it is not affected by run-off or other impacts. Periodic fire in the wetland would reduce the encroaching woody vegetation and encourage the growth of the remnant herbaceous component.

Wetland ID: 03-02

Description: This wetland is a 0.1 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 would be in great condition except for the severe hog damage. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 03-03

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland is severely overgrown with encroaching shrubs, likely due to long-term fire suppression. A major road (SR 59) runs along the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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 feature, we do not recommend any action relating to the road. The wetland could be monitored to ensure it is not affected by run-off or other impacts. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-04

Description: This wetland is a 0.5 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by dense titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-05

Description: This wetland is a 1.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by dense titi, and covers >75% of the wetland. There is no herbaceous groundcover. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. A thick wall of brush surrounds the wetland perimeter. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-06

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and holly, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. A thick wall of brush surrounds the wetland perimeter. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-07

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-08

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and wax myrtle, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 03-09

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, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. A major road (SR 59) runs along the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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 feature, we do not recommend any action relating to the road or roadside ditches. The wetland could be monitored to ensure it is not affected by run-off or other impacts. The dense fetterbush could be reduced through the use of periodic fire.

Wetland ID: 03-10

Description: This wetland is a 0.8 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 03-11

Description: This wetland is a 0.6 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. There is an almost impenetrable shrub ring around the exterior of the wetland and the interior is also extremely thick. There is at least one substantial patch of feral hog damage. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-12

Description: This wetland is a 0.8 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick layer of duff covers the wetland floor. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-13

Description: This wetland is a 0.6 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick layer of duff covers the wetland floor. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-14

Description: This wetland is a 1.1 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick layer of duff covers the wetland floor. This wetland likely was part of a much larger, more permanent wetland system that was bisected by a road. The wetland currently is connected to deep ditches along Sawdust Pile Road. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Road, Roadside ditch, Woody encroachment

Restoration Action Recommended: 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 or roadside ditches. Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-15

Description: This wetland is a 1.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland has some feral hog damage on the west side. There is a push pile in the wetland interior, grown over with titi. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Push pile, Woody encroachment

Restoration Action Recommended: The push pile is not extensive enough to merit restoration action. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-16

Description: This wetland is a 1.0 ha ephemeral shrub swamp. There is no tree canopy. Holly grows throughout the wetland, and covers 50-75% of the basin. There is no other dominant woody species. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-17

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and covers >75% of the basin. There is no herbaceous vegetation and a thick, leafy duff layer is present. A push pile is in the center of the wetland, overgrown with titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-18

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and cover 50-75% of the basin. There is no herbaceous vegetation, likely because of recent feral hog damage. There is a central push pile grown over with thick titi. It is uncertain whether this wetland was constructed as a result of push pile formation or if it was already a wetland before construction of the push pile. The uplands were burned within the past year or two but the fire did not reach into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Push pile, Woody encroachment

Restoration Action Recommended: Because feral hogs have already extensively rooted much of the depression, we recommend mechanically removing the push pile and simultaneously uprooting the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored.

Wetland ID: 03-19

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Smilax-covered titi grows densely throughout the wetland, and covers >75% of the wetland. There is no herbaceous vegetation, and a very thick duff layer covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-20

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Gum trees dominant the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland has an impenetrable wall of titi and smilax. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-21

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Wax myrtle and titi are the dominant woody vegetation, and cover 25-50% of the wetland. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. There is a push pile in the center of the wetland that has grown over with titi. Feral hog damage is severe. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Push piles

Restoration Action Recommended: Because feral hogs have already extensively rooted much of the depression, we recommend mechanically removing the push pile and simultaneously uprooting the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored.

Wetland ID: 03-22

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Gum trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. A dense shrub ring grows around the wetland perimeter. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense shrub ring.

Wetland ID: 03-23

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi and fetterbush grow throughout the wetland, and cover >75% of the basin. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-24

Description: This wetland is a 0.4 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-25

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Gum trees dominant the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, fetterbush, and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation. This wetland appears to be in excellent ecological condition. The uplands were burned within the past year or two and the dense shrubs that surrounded the wetland were killed by the fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-26

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and gum trees dominant the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and holly, and covers >75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush ring and open the midstory.

Wetland ID: 03-27

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Pine trees dominant the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This small wetland was bedded and planted with pines. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pine trees, Woody encroachment

Restoration Action Recommended: Remove the planted pine trees from the wetland interior. The bedding will erode over time. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-28

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Gum and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. At least one bedding row was constructed through the wetland. The uplands were burned within the past year or two. The fire burned into the wetland. Much of the titi burned although some remain. This is a good wetland to observe the positive effects of fire on titi reduction. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pine trees, Woody encroachment

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding row(s) should erode over time. Remove the planted pine trees from the wetland interior. Continue with fire maintenance to control the titi.

Wetland ID: 03-29

Description: This wetland is a 0.4 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and covers >75% of the basin. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-30

Description: This wetland is a 0.3 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and covers 51- 75% of the basin. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. A recent fire penetrated into the wetland, reducing the peat and titi, and opening up the wetland. This is a good wetland to observe the positive effects of fire on titi reduction. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-31

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and covers >75% of the basin. There is no herbaceous vegetation. The uplands were burned within the past year or two but the fire did not penetrate this densely grown-up titi wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-32

Description: This wetland is a 1.3 ha semi-permanent mixed swamp. Cypress and gum trees dominant the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. A recent fire penetrated the wetland and burned much of the titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-33

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. A recent fire penetrated the wetland and burned much of the titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-34

Description: This wetland is a 0.5 ha ephemeral shrub swamp. There is no tree canopy. Titi grows throughout the wetland, and covers >75% of the basin. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. Feral hogs created an open area on the north side of the wetland. Old stumps provide evidence that this wetland was once a cypress-dominated forested swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-35

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Titi grows around the wetland edge, and covers 5-25% of the wetland. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. Feral hogs have damaged the open wetland center. The uplands were burned within the past year or two and the fire burned much of the titi around the wetland edge. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 03-36

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy. Titi is the dominant woody vegetation, and covers 5-25% of the wetland. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. Feral hog damage is extensive. Old stumps provide evidence that cypress trees historically occupied the wetland. The uplands were burned within the past year or two and the fire burned the ring of titi around the wetland edge. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 03-37

Description: This wetland is a 0.5 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-38

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. A push pile or bedding row in the wetland center has thickly grown over with titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push pile, Woody encroachment,

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further shrub encroachment.

Wetland ID: 03-39

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Cypress and gum trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-40

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-41

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-42

Description: This wetland is a 0.2 ha ephemeral shrub swam. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-43

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi and holly are the dominant woody vegetation, and cover >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The uplands were burned within the past year or two. The fire reduced the brush around the perimeter but did not penetrate the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-44

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-45

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. The center of the wetland was deepened either by a peat fire or by past mechanical operations. Historic aerial photos suggest that this wetland may once have been a marsh. The uplands were burned within the past year or two but an impenetrable wall of titi and smilax still rings the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 03-46

Description: This wetland is a 0.9 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. This wetland likely was a cypress-dominated swamp that was logged and now is overgrown with titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-47

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. Historic aerial photos suggest that this wetland was once a forested swamp. Cypress trees likely were logged from the wetland and titi were able to establish due to subsequent fire suppression. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-48

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-49

Description: This wetland is a 0.1 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Historic aerial photos suggest that this wetland once was a marsh. Pine trees were planted on bedded rows through the wetland interior. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Woody encroachment,

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

Wetland ID: 03-50

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Titi is the dominant woody vegetation, and covers 25-50% of the wetland. Sedges/grasses grow throughout the wetland, and covers >75% of the basin. This marsh is not as severely encroached by woody shrubs as most of the wetlands in this MU; however, shrubs are beginning to establish. This wetland was once a part of a larger wetland system but was bisected by a major road (SR 59). Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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 feature, we do not recommend any action relating to the road. The wetland could be monitored to ensure it is not affected by run-off or other impacts. We recommend the use of fire treatments here as soon as is feasible, before shrubby encroachment eliminates the marshy character of this wetland. .

Wetland ID: 03-51

Description: This wetland is a 0.3 ha ephemeral mixed swamp, with two lobes. Gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-52

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy. Fetterbush and holly are the dominant woody vegetation, and cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover 25-50% of the basin. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Return fire to the marsh basin as soon as possible, before shrubby encroachment eliminates the marshy character of this wetland.

Wetland ID: 03-53

Description: This wetland is a <0.1 ha highly ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover 25-50% of the basin. This small wetland was bedded and planted with pine trees. There is some feral hog damage in the wetland basin. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Planted pines

Restoration Action Recommended: The old bedding in this wetland is not severe and is showing signs of significant erosion. No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior.

Wetland ID: 03-54

Description: This wetland is a 0.7 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. A thick, leafy duff layer covers the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-55

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-56

Description: This wetland is a <0.1 ha highly ephemeral altered wetland. Pine trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. There is no herbaceous vegetation. A thick pine needle duff covers the wetland floor. This small wetland was bedded and planted with pine trees. Old feral hog damage is evident in the wetland. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Planted pines

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior.

Wetland ID: 03-57

Description: This wetland is a <0.1 ha highly ephemeral altered wetland. Gum and pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by fetterbush, and covers 5-25% of the wetland. There is no herbaceous vegetation. There is a thick needle duff layer that covers the wetland floor. This wetland may have been a small marsh but feral hog damage and the shade from planted pine trees around the perimeter have eliminated potential herbaceous vegetation. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Planted pines

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior.

Wetland ID: 03-58

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. There is a thick, leafy duff layer that covers the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-59

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers 5-25% of the wetland. Sedges/grasses grow sparse in the wetland, and cover 5-25% of the basin. Recent feral hog damage is severe. Bedding rows with planted pines run up to the wetland perimeter. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 03-60

Description: This wetland is a 0.5 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This large, two-lobed wetland is extremely brushy, and has a thick duff layer and covers the floor. Interestingly, an old, cat-faced pine stump was encountered within the wetland perimeter, which indicates that the area was used for turpentine during the naval stores industry of the 19th and 20th centuries. The presence of old cypress stumps also provides evidence of historical logging. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-61

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. There is a thick, leafy duff layer covering the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-62

Description: This wetland is a <0.1 ha highly ephemeral altered wetland. The hydrology of this wetland was severely altered when it was bedded for a pine plantation. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: Due to the already altered state of this wetland, we recommend mechanically removing the bedding rows and simultaneously remove or thin titi. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-63

Description: This wetland is a <0.1 ha ephemeral forested swamp. Gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by fetterbush, and covers 5-25% of the wetland. There is no herbaceous vegetation. There is a thick, leafy duff layer covering the wetland floor. Overall, this wetland appears to be ecologically healthy, despite being embedded within a fire-suppressed landscape. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 03-64

Description: This wetland is a <0.1 ha ephemeral forested swamp. Gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers 25-50% of the wetland. There is no herbaceous vegetation. This gum pond has a thick duff layer and old bedding rows through the interior. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. Return periodic fire to the wetland basin to control encroaching titi.

Wetland ID: 03-65

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi and fetterbush are the dominant woody vegetation, and cover >75% of the wetland. There is no herbaceous vegetation. Bedding rows run through the interior of the wetland. Historic aerial photos suggest that this wetland once was a marsh or a more open wetland. The uplands were burned within the past year or two but the fire did not burn the thick wall of fetterbush ringing the wetland nor the dense titi in the interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

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

Wetland ID: 03-66

Description: This wetland is a 0.4 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. A major road (SR 59) bisects the northwest side of the wetland, creating 2 separate wetlands. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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 fixture, we do not recommend any action relating to the road. The wetland could be monitored to ensure it is not affected by run-off or other impacts. Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-67

Description: This wetland is a 0.5 ha semi-permanent shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands were burned within the past year or two but the fire did not reach into the wetland. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-68

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Gum trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This small, circular sink depression pond is surrounded by a dense ring of titi. The uplands were burned within the past few years but the fire did not reach into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the dense brush ring.

Wetland ID: 03-69

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress and gum trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps and historical aerial photos provide evidence this wetland was once a forested swamp. The uplands were burned within the past few years but the fire did not reach into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-70

Description: This wetland is a 0.6 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A very thick duff layer blankets the wetland floor. Old stumps and historical aerial photos provide evidence this wetland was once a forested swamp. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-71

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A very thick duff layer covers the wetland floor. The north side is bedded through the wetland. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-72

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Titi forms a ring around the wetland edge, and covers 5-25% of the wetland. Sedges/grasses grow sparsely in the wetland, and cover 5-25% of the basin. This small wetland has been severely damaged by feral hogs. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the titi ring and prevent further encroachment.

Wetland ID: 03-73

Description: This wetland is a 0.1 ha semi-permanent mixed swamp. The outer edge of the wetland is ringed with cypress trees and titi. The woody vegetation covers 50-75% of the wetland. There is no herbaceous vegetation and the wetland has a fairly thick duff layer. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi ring.

Wetland ID: 03-74

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. A thick layer of duff covers the wetland floor. Historical aerial photos suggest this wetland (along with 03-75 and 03-76) was part of a larger, more open wetland system before pine plantation conversion. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 03-75

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi and holly are the dominant woody vegetation, and cover >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. This relatively open sink depressional pond has a ring of brush around the edge. Historical aerial photos suggest this wetland (along with 03-74 and 03-76) was part of a larger, more open wetland system before pine plantation conversion. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 03-76

Description: This wetland is a <0.1 ha highly ephemeral shrub swamp. Pine trees were planted on bedding rows through the wetland. The tree canopy covers 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation and a thick layer of duff covers the wetland floor. Historical aerial photos suggest this wetland (along with 03-74 and 03-75) was part of a larger, more open wetland system before pine plantation conversion. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pine trees, Woody encroachment

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

Wetland ID: 03-77

Description: This wetland is a 1.1 ha semi-permanent mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, fetterbush, and wax myrtle, and covers >75% of the wetland. There is no herbaceous vegetation. Dense brush forms a ring around the wetland perimeter. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush ring and open the midstory.

Wetland ID: 03-78

Description: This wetland is a <0.1 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. There is no herbaceous vegetation. Bedding rows were constructed into the wetland edge. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Periodic fire in the wetland would reduce the brush.

Wetland ID: 03-79

Description: This wetland is a <0.1 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. There is no herbaceous vegetation and there is a thick duff layer covering the wetland floor. This small wetland has old feral hog damage and bedding around the edges. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the brush.

Wetland ID: 03-80

Description: This wetland is a 0.4 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland is nearly impenetrable around the perimeter and there is thick duff and shrub canopy in the interior. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-81

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This wetland appears to be a former gum swamp that was encroached by titi. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the titi and open the midstory.

Wetland ID: 03-82

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, galberry, and smilax, covers >75% of the wetland. There is no herbaceous vegetation. This pond has an impenetrable wall of brush and smilax around the perimeter. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush.

Wetland ID: 03-83

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. This wetland is densely ringed with brush but more open in the interior. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the thick brush ring.

Wetland ID: 03-84

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Cypress and gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation and there is a thick duff layer covering the wetland floor. This wetland has a dense brush ring around the perimeter, an open center, and signs of old bedding. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. The dense titi ring could be reduced through the use of periodic fire.

Wetland ID: 03-85

Description: This wetland is a 0.3 ha semi-permanent mixed swamp. Cypress and gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Dense brush grows throughout this wetland and there are many large, old cypress stumps. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-86

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Cypress and gum trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. Dense shrubs have grown over old and weathered push piles in the wetland. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: The push pile is already eroding and weathering. Encourage periodic fire in the wetland to reduce the dense titi and thick duff.

Wetland ID: 03-87

Description: This wetland is a 0.1 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This small shrub pond has at least one push pile in the center that has grown over with vegetation. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-88

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This pond has an open center but is surrounded by a ring of dense brush. Bedding rows were constructed in the wetland edges. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the minor bedding is recommended; the bedding rows will erode over time. Periodic fire would reduce the thick brush ring.

Wetland ID: 03-89

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Cypress and gum trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This rather big, circular wetland has extremely dense brush and a thick duff layer. The presence of old cypress stumps provides evidence of historical logging. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-90

Description: This wetland is a 0.5 ha semi-permanent mixed swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This large wetland is fairly healthy but has a dense ring of brush and a thick duff layer. The presence of old cypress stumps provides evidence of historical logging. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi ring and thick duff.

Wetland ID: 03-91

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Fetterbush is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This circular pond has thick brush and duff. Old stumps provide evidence that cypress trees historically occupied the wetland. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 03-92

Description: This wetland is a 0.4 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous ground cover. The wetland is surrounded by a dense ring of brush. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi ring.

Wetland ID: 03-93

Description: This wetland is a 0.6 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This fairly large wetland is extremely brushy throughout and has a thick layer of duff. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-94

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland has a dense ring of brush and a slightly open interior where old feral hog damage is evident. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi ring.

Wetland ID: 03-95

Description: This wetland is a 0.8 ha semi-permanent mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This large, circular wetland has a dense ring of brush and extremely thick duff. The presence of old cypress stumps provides evidence of historical logging. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-96

Description: This wetland is a 0.2 ha semi-permanent shrub swamp. It is difficult to discern whether this shrub wetland is a push pile turned wetland or a wetland covered by push piles. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland is covered by push piles. Many push piles are grown over with titi. Deep gouges in the wetland have standing water. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Vehicular damage, Woody encroachment

Restoration Action Recommended: Due to its already altered state, we recommend mechanically removing the push pile and simultaneously uprooting the titi established on the push pile. The wetland basin could be re-sculpted during the process to alleviate the deep gouges. This process should be completed when the wetland is completely dry and progress monitored.

Wetland ID: 03-97

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. There are many large hummocks and at least one push pile in the wetland. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi and hummocks. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-98

Description: This wetland is a 0.1 ha semi-permanent shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This extremely brushy wetland has large hummocks, push piles, and deep gouge holes. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Vehicular damage, Woody encroachment,

Restoration Action Recommended: Due to its already altered state, we recommend mechanically removing the push piles and hummocks and simultaneously removing the titi. The wetland basin could be re-sculpted during the process to alleviate the deep gouge holes. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-99

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. Titi is encroaching from the wetland perimeter, and covers 25-50% of the wetland. Sedges/grasses and *Sphagnum* grow in scattered patches, and cover 25-50% of the basin. There are 2 large push piles in the wetland basin with adjacent deep ruts. One push pile is over 2 m tall. This wetland may have been formed when the push piles were constructed but it is now functioning as an ephemeral wetland. We were unable to discern from historic aerial photos whether this wetland existed in 1949. Two dirt roads flank the wetland on the east and south sides. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Road, Vehicular damage, Woody encroachment

Restoration Action Recommended: Mechanically remove the push pile when the wetland is completely dry. Reintroducing periodic fire to the wetland basin will prevent further titi encroachment.

Wetland ID: 03-100

Description: This wetland is a 0.2 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. There are small push piles or large hummocks in the wetland basin. Old stumps provide evidence that cypress trees historically occupied the wetland. The uplands were burned within the past several years but the fire did not reach into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and hummocks and open the midstory.

Wetland ID: 03-101

Description: This wetland is a 0.8 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 03-102

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland burned a few years ago and the fire killed some of the titi around the perimeter. Titi remains thick in the wetland center. Historic aerial photos suggest that this wetland once was a marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Continue providing periodic fire to reduce the dense titi in the wetland interior.

Wetland ID: 03-103

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland was once part of a larger system but was bisected by Nasty Block Road. The bedding in the wetland is old and eroded. The wetland burned several years ago and killed some of the titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the old bedding is recommended; the bedding should erode over time. Encourage periodic fire in the wetland to reduce the dense titi.

Wetland ID: 03-104

Description: This wetland is a 1.8 ha semi-permanent shrub swamp. The presence of old cypress stumps as well as historical aerial photos provide evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. There is a thick duff layer covering the wetland floor. This large wetland has an open section on the northeast side with severe feral hog damage. Although this MU burned recently, the uplands surrounding this wetland were not penetrated by fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-105

Description: This wetland is a 0.1 ha highly ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. A 1 m tall push pile in the center of the wetland has grown over with titi. There is a marshy spot and minor bedding on the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Push piles, Woody encroachment

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-106

Description: This wetland is a <0.1 ha highly ephemeral shrub swamp. It is a rectangular wetland that appears to have formed in a bulldozer scrape and is now functioning as an ephemeral wetland. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. *Sphagnum* grows in scattered patches, and covers 5-25% of the basin. There is a push pile on the south side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push pile, Woody encroachment

Restoration Action Recommended: Due to its already altered state, we recommend mechanically removing the push pile and simultaneously uprooting the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 03-107

Description: This wetland is a 0.7 ha semi-permanent mixed swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, fetterbush, and titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-108

Description: This wetland is a 0.6 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland has thick brush, large hummocks, and what appear to be old push piles. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles, Woody encroachment

Restoration Action Recommended: The push pile is not extensive enough to merit restoration action. The process of erosion will eliminate this push pile over time. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 03-109

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A thick duff layer covers the wetland floor. This wetland was bedded and pine trees were planted around the edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: Allow bedding rows to erode over time, remove any planted pine trees in the wetland basin, and reintroduce periodic fire to reduce the dense titi.

Wetland ID: 04-01

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. There is no herbaceous vegetation. This small, circular depression is a very nice example of an ephemeral shrub swamp. Historical aerial photos however suggest this wetland may have been a marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: The wetland currently is functioning as a healthy, ephemeral shrub swamp. If WMA personnel desire to restore this back to marsh conditions, a hot fire is needed to kill the titi followed by periodic fire in the wetland basin to prevent regrowth of shrubs.

Wetland ID: 04-02

Description: This wetland is a 0.4 ha ephemeral mixed swamp. Gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. The wetland interior is predominantly open with widely scattered trees and shrubs. This wetland is an excellent example of a mixed swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 04-03

Description: This wetland is a 0.4 ha ephemeral mixed swamp. Gum trees dominate the wetland canopy, and cover >75% of the wetland. The midstory is dominated by titi, fetterbush, and holly, and covers >75% of the wetland. There is no herbaceous vegetation. This former cypress swamp was logged and colonized by gum trees and shrubs. The brush is not too dense however and the swamp is in fairly good condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 07-01

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress trees dominant the wetland canopy, and cover 25-50% of the wetland. The midstory is dominated by titi and holly, and covers >75% of the wetland. The wetland basin is covered in leaf litter and there is little to no herbaceous cover. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 07-02

Description: This wetland is a 1.1 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. Titi and wax myrtle form a ring around the wetland edge, and cover 5-25% of the basin. Sawgrass grows throughout the wetland, and covers >75% of the basin. The wetland appears to have burned fairly recently. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: Maintain periodic fire regime to prevent shrub encroachment.

Wetland ID: 07-03

Description: This wetland is a 0.5 ha ephemeral marsh. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi and wax myrtle, and covers 25-50% of the wetland. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. This wetland appears to be a marsh in the process of succeeding to a mixed cypress and shrub swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 07-04

Description: This wetland is a 0.3 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. Ferns grow in scattered patches, and cover 5-25% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 07-05

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is little to no canopy cover. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A recent thinning operation pushed slash debris into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the slash and the dense titi.

Wetland ID: 07-06

Description: This wetland is a 0.8 ha ephemeral marsh. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, wax myrtle, and *Hypericum*, and covers 50-75% of the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover 50-75% of the basin. Old ruts are widespread, likely from former timber operations. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: Allow the ruts to heal over time. To prevent future damage, operate machinery only when wetland is completely dry. Evidence of historical logging signifies that this wetland may once have been a cypress swamp. Historical aerial photos depict a marsh-like wetland with scattered trees in the basin. These photos may have been taken after cypress trees were logged from the wetland. Regardless of the original condition of this wetland, periodic fire will prevent the shrubs from establishing and allow this wetland to continue as a marsh if desired or succeed to a cypress swamp.

Wetland ID: 07-07

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is little to no canopy cover. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous cover. Ruts were created around the wetland, likely during recent thinning operations. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: Allow the ruts to heal over time. To prevent future damage, operate machinery only when wetland is completely dry. Smaller wetlands may need to be flagged to alert operators of the wetland's existence. Return periodic fire into the wetland to reduce the dense titi.

Wetland ID: 07-08

Description: This wetland is a 0.3 ha ephemeral shrub swamp. There is little to no canopy cover. The midstory is dominated by titi, and covers >75% of the wetland. Fern grows in scattered patches, and covers 5-25% of the basin. While this wetland has a dense titi midstory, the understory is fairly open. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 07-09

Description: This wetland is a 0.1 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% 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 basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Return periodic fire into the wetland to prevent further shrub encroachment.

Wetland ID: 07-10

Description: This wetland is a 0.2 ha ephemeral marsh. There is little to no canopy cover. The midstory is dominated by titi, wax myrtle, and *Hypericum*, and covers 25-50% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. While predominantly a marsh, shrubs are encroaching into the wetland. Old ruts are still evident in the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: The ruts should erode over time. If the ruts were a result of management operation, ensure future activity occurs only when the wetland is completely dry. Smaller wetlands may need to be flagged to alert operators of the wetland's existence. Return periodic fire into the wetland to prevent further shrub encroachment.

Wetland ID: 07-11

Description: This wetland is a 0.6 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. Wax myrtle is encroaching into the wetland, and covers 5-25% of the basin. Sawgrass grows throughout the wetland, and covers >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further encroachment of the woody vegetation and reduce the thick sawgrass.

Wetland ID: 07-12

Description: This wetland is a 0.3 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. Wax myrtle is encroaching into the wetland, and covers 5-25% of the basin. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further encroachment of the woody vegetation.

Wetland ID: 07-13

Description: This wetland is a 0.7 ha semi-permanent shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and wax myrtle, and covers >75% of the wetland. There is little to no herbaceous cover. Many old cypress stumps and old logging ruts provide evidence of historical logging in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense shrubs and open the midstory.

Wetland ID: 07-14

Description: This wetland is a 0.1 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. Titi grows in a ring around the wetland edge, and covers 5-25% of the wetland. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. There is evidence of old bedding in the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Periodic fire should prevent further encroachment of the shrub ring.

Wetland ID: 10-01

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous ground cover. The wetland appears to be an old cypress dome that was logged and colonized by titi. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-02

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Gum and cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, fetterbush, and myrtle-leaf holly, and covers >75% of the wetland. There is no herbaceous ground cover. This wetland appears to be an old cypress dome that was logged and colonized by both gum and cypress trees. Pine trees planted through the edge of the wetland recently were removed. There is a gouge on the western edge of the wetland, likely a result of recent pine tree removal activity. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: Allow the rut to heal over time. To avoid future damage, operate machinery only when wetland is completely dry. Smaller wetlands may need to be flagged to alert operators of the wetland's existence. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-03

Description: This wetland is a 0.1 ha highly ephemeral mixed swamp. Cypress and pine trees dominant the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle, myrtle-leaved holly, and fetterbush, and covers >75% of the wetland. There is no herbaceous ground cover. A former small, shallow cypress dome, this wetland was bedded and now has thick shrubs and planted pines through the center. The hydrology of this wetland has been altered as a result of the bedding rows. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pine trees, Woody encroachment

Restoration Action Recommended: Remove planted pines from wetland interior. Provide periodic fire in the wetland to reduce the dense brush.

Wetland ID: 10-04

Description: This wetland is a <0.1 ha highly ephemeral, severely altered, wetland. It is a very small depressional wetland that likely was not noticed by machine operators during recent thinning/logging. The wetland was cleared of virtually all vegetation. There is no remaining canopy or midstory cover and no herbaceous ground cover. Pines, planted on bedding rows through the wetland, were recently logged. The depression is filled with pine needles and slash piles. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash

Restoration Action Recommended: If this vegetation clearing was not intentional, we recommend flagging wetlands in the future to alert operators of a wetland's existence. This wetland will be a great experimental site to monitor how a wetland responds to complete vegetation clearing. Fire should be reintroduced into the system in order to clear out needle duff and slash piles. If fire does not eliminate the slash, mechanical treatment may be necessary.

Wetland ID: 10-05

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 titi and holly, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the wetland. The wetland is ringed in brush, beyond which was cleared to expose mineral soil and encourage the growth of herbaceous vegetation. This wetland likely once was a more open sawgrass marsh. Long-term fire suppression of the surrounding landscape allowed for the encroachment of trees and shrubs. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Monitor the wetland, fire may need to be intentionally set in the wetland basin if the bare ground creates a fire break during an upland burn. Return periodic fire into the wetland to reduce the dense brush ring and prevent further shrub encroachment.

Wetland ID: 10-06

Description: This wetland is a 0.5 ha ephemeral forested swamp. Cypress and pine trees dominant the canopy, and covers 50-75% of the wetland. The midstory is dominated by wax myrtle and water oak, and covers 50-75% of the wetland. Sawgrass grows throughout the wetland, and covers 25-50% of the basin. The east side of the swamp is a thicket of brush. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: The dense brush on the east side could be reduced through the use of periodic fire.

Wetland ID: 10-07

Description: This wetland is a 0.1 ha highly ephemeral forested swamp. Cypress and gum trees dominant the canopy, and covers >75% of the wetland. The midstory is dominated by holly and wax myrtle, and covers 5-25% of the wetland. There is no herbaceous ground cover. Slash was pushed into the wetland during recent thinning activities. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash

Restoration Action Recommended: Encourage fire in the wetland basin to eliminate the slash.

Wetland ID: 10-08

Description: This wetland is a 0.1 ha highly ephemeral shrub swamp. Water oak and cypress trees dominant the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous ground cover. This wetland appears to be a former cypress dome that was logged and colonized by titi. There are slash piles in the wetland from recent thinning activities. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: The slash and dense titi could be reduced through the use of periodic fire.

Wetland ID: 10-09

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle, and covers 50-75% of the wetland. Grass and sawgrass grow throughout the wetland, and cover 50-75% of the basin. Pine trees were planted on bedding rows up to and slightly into the wetland. The trees were recently removed. There are slash piles in the wetland from the recent logging operations. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Reintroduce fire into the wetland to reduce the slash piles and to prevent the shrubs from becoming too dense.

Wetland ID: 10-10

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by holly and fetterbush, and covers >75% of the wetland. *Sphagnum* and grasses grow in scattered patches, and cover 5-25% of the basin. There are slash piles in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Reintroduce periodic fire to eliminate the slash and reduce the dense shrubs.

Wetland ID: 10-11

Description: This wetland is a 2.8 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland is surrounded by an almost impenetrable ring of brush. There are slash piles around the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Encourage periodic fire to eliminate the slash and reduce the dense shrub ring.

Wetland ID: 10-12

Description: This wetland is a 1.8 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and buttonbush, and covers 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the basin. Old gouges from machinery are still evident. There is a small amount of slash in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Vehicular damage

Restoration Action Recommended: Periodic fire will eliminate the slash and prevent the midstory from becoming too dense. No action is recommended for the old vehicular tracks in wetland, the tracks will erode over time.

Wetland ID: 10-13

Description: This wetland is a 0.6 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is a mixture of various shrubs including titi, holly, fetterbush, and wax myrtle, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 50-75% of the basin. Gouges from machinery are still evident and there are slash piles around the wetland. What appears to be a logging track runs alongside the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Vehicular damage, Woody encroachment

Restoration Action Recommended: If the track is necessary to maintain, re-route away from the wetland. Fire may need to be intentionally set in the wetland basin if the logging track creates a fire break during an upland burn. Periodic fire will eliminate the slash and reduce the dense midstory. No action is recommended for the old vehicular tracks in wetland, the gouges will erode and re-vegetate over time.

Wetland ID: 10-14

Description: This wetland is a 0.5 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by holly, fetterbush, and titi, and covers >75% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the wetland. Deep gouges on the east side likely occurred during recent thinning operations. Fish were present in the ruts on the day of our visit. There are piles of slash around the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Vehicular damage, Woody encroachment

Restoration Action Recommended: Reintroduce periodic fire to eliminate slash and reduce the dense midstory. To prevent future damage, machinery should be operated around wetlands only when the wetland is completely dry.

Wetland ID: 10-15

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Wax myrtle, fetterbush, and titi are the dominant woody vegetation, and cover 25-50% of the wetland. Grasses grow in scattered patches, and covers 5-25% of the wetland. Remnants of old bedding rows are still apparent through the wetland interior. Brush, and possibly pine trees, recently were removed from the wetland. A slash pile remains in the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash, Vehicular damage

Restoration Action Recommended: Reintroduce periodic fire to the wetland to eliminate slash and allow this wetland to re-establish. If the next fire does not reduce the slash pile in the wetland, mechanical treatment may be necessary. With the return of fire, this wetland may become a marsh/shrub swamp. To prevent future damage, operate machinery only when wetland is completely dry. Smaller wetlands may need to be flagged to alert operators of the wetland's existence.

Wetland ID: 10-16

Description: This wetland is a 0.9 ha ephemeral marsh. Cypress and sweet bay magnolia trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by wax myrtle, and covers 25-50% of the wetland. Grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. Old bedding rows and mechanical tracks are still evident in the wetland. There is a drainage ditch associated with the wetland. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Ditching, Slash piles, Vehicular damage, Woody encroachment

Restoration Action Recommended: Plug the drainage ditch. Encourage fire in the wetland to eliminated the slash and prevent further shrub encroachment. Allow old bedding and machine gouges to erode over time.

Wetland ID: 10-17

Description: This wetland is a 1.1 ha ephemeral marsh and mixed swamp. Cypress and pine trees dominant the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 50-75% of the wetland. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. The wetland floor is very spongy from a build up of peat. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would reduce the brush and expose some of the peat to oxidation.

Wetland ID: 10-18

Description: This wetland is a 1.0 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are generating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. Sawgrass grows sparsely throughout the wetland, and covers 5-25% of the basin. Old bedding rows are still evident in the wetland as are machinery tracks, presumably from past logging operations. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Vehicular damage, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Allow the tracks to heal over time. To avoid future damage, operate machinery only when wetland is completely dry. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-19

Description: This wetland is a 1.6 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Brush has been removed around the edge of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi

Wetland ID: 10-20

Description: This wetland is a 1.1 ha ephemeral shrub swamp. Cypress and pine trees dominant the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation, and peat has built up in the wetland center. Old machinery tracks have created a small opening in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: Allow the rut to heal over time. To avoid future damage, operate machinery only when wetland is completely dry. Periodic fire in the wetland would reduce the dense titi and expose peat to oxidation.

Wetland ID: 10-21

Description: This wetland is a 0.9 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by holly, and covers 25-50% of the wetland. There is no herbaceous vegetation, and a thick layer of duff covers the wetland floor. The presence of old cypress stumps provides evidence of historical logging. A major road (SR 59) runs along the west side of the wetland. Before the road was built, this wetland was part of a larger wetland system. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road

Restoration Action Recommended: 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 part of the landscape, we do not recommend any action relating to the road. The wetland could be monitored to ensure it is not affected by run-off or other impacts.

Wetland ID: 10-22

Description: This wetland is a 0.6 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerate and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation, and a thick layer of duff covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-23

Description: This wetland is a 1.8 ha semi-permanent mixed swamp. Cypress and gum trees dominant the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, titi, and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense shrubs and open the midstory.

Wetland ID: 10-24

Description: This wetland is a 0.4 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The area surrounding the wetland was recently cleared of vegetation and some vehicular tracks remain. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-25

Description: This wetland is a 0.4 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by holly and titi, and covers >75% of the wetland. There is no herbaceous vegetation, and a thick duff layer covers the wetland floor. A major road (SR 59) runs along the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Woody encroachment

Restoration Action Recommended: 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. The wetland could be monitored to ensure it is not affected by run-off or other impacts. Periodic fire in the wetland would reduce the dense titi, open the midstory, and allow the regeneration of this cypress swamp

Wetland ID: 10-26

Description: This wetland is a 1.1 ha semi-permanent mixed swamp. It has a dense brush ring but a more open interior. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by holly and titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the dense brush ring and prevent further shrub encroachment.

Wetland ID: 10-27

Description: This wetland is a 0.7 ha semi-permanent mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by holly and titi, and covers >75% of the wetland. There is no herbaceous vegetation. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the thick brush and open the midstory.

Wetland ID: 10-28

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The titi growing in this wetland are very large and the wetland is open underneath. The presence of old cypress stumps provides evidence of historical logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-29

Description: This wetland is a 0.9 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by holly and titi, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense shrub and open the midstory.

Wetland ID: 10-30

Description: This wetland is a 0.3 ha semi-permanent shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-31

Description: This wetland is a 0.5 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-32

Description: This wetland is a 0.3 ha ephemeral shrub swamp. There is no tree canopy. Titi grows on hummocks, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 10-33

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation, and a thick duff layer covers the wetland floor. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 10-34

Description: This wetland is a 0.7 ha ephemeral shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. There are slash and push piles on the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Push piles, Woody encroachment

Restoration Action Recommended: The push piles are not extensive enough to merit restoration action. The process of erosion will eliminate these push piles over time. Periodic fire in the wetland would eliminate the slash piles and reduce the dense titi.

Wetland ID: 10-35

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Wax myrtle is the dominant woody vegetation, and covers 50- 75% of the wetland. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further shrub encroachment.

Wetland ID: 10-36

Description: This wetland is a 0.3 ha ephemeral shrub swamp. There is no tree canopy. Wax myrtle and buttonbush are the dominant woody vegetation, and cover 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further shrub encroachment.

Wetland ID: 10-37

Description: This wetland is a 0.1 ha ephemeral forested swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. There is no herbaceous vegetation, and a thick duff layer covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: Periodic fire in the wetland would prevent shrubs from encroaching.

Wetland ID: 10-38

Description: This wetland is a 0.9 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and wax myrtle, and covers >75% of the wetland. There is no herbaceous vegetation. Old cypress stumps throughout the wetland provide evidence of historic logging. The wetland was likely a cypress dome that was logged and colonized by shrubs. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense brush and open the midstory.

Wetland ID: 10-39

Description: This wetland is a 0.3 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Ruts along the wetland edge are likely a result of thinning machinery close to the wetland while there was still standing water or the wetland soils were too saturated. Old stumps provide evidence that cypress trees historically occupied the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: To avoid future damage, operate machinery only when wetland is completely dry. Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 12-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. A ring of titi around the wetland edge covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would suppress the thick titi ring around the wetland perimeter.

Wetland ID: 12-02

Description: This wetland is a 0.4 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and wax myrtle, and covers 25-50% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the shrubs and prevent further shrub encroachment.

Wetland ID: 12-03

Description: This wetland is a 0.5 ha ephemeral marsh. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by buttonbush and wax myrtle, and covers 50-75% of the wetland. Sedges/grasses grow throughout the wetland, and cover 50- 75% of the basin. This wetland likely was a cypress dome and now is a marsh with heavy shrub encroachment. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further shrub encroachment.

Wetland ID: 12-04

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 cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Bedding rows with planted pine trees were constructed through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: The planted pine trees could be removed from the wetland interior. The bedding should erode with time. Provide periodic fire for ecological maintenance.

Wetland ID: 12-05

Description: This wetland is a <0.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. The subcanopy is dominated by young gum and maple trees, and covers 5-25% of the wetland. Sawgrass grows throughout the wetland, and covers 25-50% of the basin. Bedding rows with planted pine trees were constructed through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: The planted pine trees could be removed from the wetland interior. The bedding should erode with time. Provide periodic fire for ecological maintenance.

Wetland ID: 12-06

Description: This wetland is a 0.1 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 25-50% of the wetland. Sawgrass grows dense throughout the wetland, and covers >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would reduce shrub encroachment and open up the wetland.

Wetland ID: 12-07

Description: This wetland is a 0.3 ha semi-permanent mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle and buttonbush, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-08

Description: This wetland is a 0.3 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 25-50% of the wetland. Sawgrass grows throughout the wetland, and covers 5-25% of the basin. A fire recently burned all the way through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-09

Description: This wetland is a <0.1 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. A fire recently burned all the way through the wetland. There is a push pile in the wetland on the east side. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 12-10

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and gum 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. A thick brush ring surrounds the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would reduce the ring of thick woody vegetation around the wetland edge.

Wetland ID: 12-11

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle and fetterbush, and covers 50-75% of the wetland. Fern grow throughout the wetland, and cover 5-25% of the basin. Large machinery tracks run through the center of the wetland. Grade 17, a dirt road, runs along the north side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Slash, Vehicular damage, Woody encroachment

Restoration Action Recommended: 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 fire to burn in the wetland to reduce the slash piles and dense brush. The vehicular ruts should fill in with vegetation over time. To avoid future damage, operate machinery only when wetland is completely dry.

Wetland ID: 12-12

Description: This wetland is a <0.1 ha ephemeral forested swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by gallberry and holly, and covers 25-50% of the wetland. There is no herbaceous vegetation and the wetland basin has a thick layer of needle duff. Pine trees were planted on bedded rows through the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Provide periodic fire for ecological maintenance.

Wetland ID: 12-13

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, fetterbush, and titi, and covers >75% of the wetland. There is no herbaceous vegetation but the wetland basin has a thick layer of pine needle duff. Pine trees were planted on bedded rows through the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Periodic fire in the wetland would eliminate the slash and reduce the dense midstory.

Wetland ID: 12-14

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by a mixture of wax myrtle, fetterbush, holly and titi, and covers >75% of the wetland. There is no herbaceous vegetation but the wetland basin is has a thick layer of pine needle duff. Pine trees were planted on bedded rows through the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Periodic fire would eliminate the slash and reduce the thick pine duff and dense woody vegetation.

Wetland ID: 12-15

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50- 75% of the wetland. The midstory is dominated by a mixture of wax myrtle, fetterbush, holly, and titi, and covers 50-75% of the wetland. There is no herbaceous vegetation but the wetland basin has a thick layer of pine needle duff. Pine trees were planted on bedded rows through the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Periodic fire would eliminate the slash and reduce the thick pine duff and dense woody vegetation.

Wetland ID: 12-16

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by fetterbush and titi, and covers 25-50% of the wetland. There is no herbaceous vegetation. Heavy machinery left gouges through the wetland and a slash pile was left in the wetland. Pine trees were planted on bedded rows through the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Slash, Vehicular damage, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Periodic fire would eliminate the slash and reduce the thick pine duff and dense woody vegetation. Allow the gouges to heal over time. To avoid future damage, operate machinery only when wetland is completely dry. Smaller wetlands may need to be flagged to alert operators of the wetland's existence.

Wetland ID: 12-17

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by holly, fetterbush, and titi, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. Pine trees were planted on bedded rows through the wetland. The pine trees were thinned and slight vehicular tracks remain from a recent thinning operation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Periodic fire should reduce the thick duff and woody vegetation.

Wetland ID: 12-18

Description: This wetland is a 0.1 ha ephemeral marsh. Cypress and pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by fetterbush and titi, and covers 5-25% of the wetland. Redroot grows throughout the wetland, and covers 25-50% of the basin. Pine trees were planted on bedding rows through the wetland. Recent mechanical activity removed brush and pine trees from the wetland interior. Some slash remains in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Encourage fire to burn in the wetland to reduce the slash piles and prevent shrub encroachment.

Wetland ID: 12-19

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 25-50% of the wetland. Sedges/grasses and redroot grow in scattered patches, and cover 5-25% of the wetland. Pine trees were planted on bedded rows through the wetland interior. The pine trees were recently mechanically removed when the wetland was dry but the bedding remains. Historical evidence suggests this wetland was a forested swamp prior to pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Periodic fire in the wetland would reduce the patches of dense woody vegetation.

Wetland ID: 12-20

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by holly and titi, and covers 50-75% of the wetland. There is no herbaceous vegetation but the wetland basin has a thick layer of pine needle duff. Old bedding rows run through the wetland. The pines that were planted on the beds recently were mechanically removed. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Encourage fire to burn in the wetland to eliminate the slash, reduce the needle duff, and prevent further shrub encroachment.

Wetland ID: 12-21

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, fetterbush, and titi, and covers 50-75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. Old bedding rows run through the wetland perimeter. The pines that were planted in the beds recently were mechanically removed. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Periodic fire in the wetland basin would reduce the thick duff and woody vegetation.

Wetland ID: 12-22

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by fetterbush and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation. Old bedding rows run through the wetland perimeter. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Encourage fire to burn in the wetland to eliminate the slash and prevent further shrub encroachment.

Wetland ID: 12-23

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and pine 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 vegetation but the wetland basin has a thick layer of pine needle duff. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Encourage fire to burn in the wetland to reduce the thick needle duff and eliminate the slash piles.

Wetland ID: 12-24

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation but the wetland basin has a thick layer of pine needle duff. There is a minor amount of slash in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage fire to burn in the wetland reduce the thick needle duff, eliminate the slash, and prevent further shrub encroachment.

Wetland ID: 12-25

Description: This wetland is a 0.5 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by a mixture of titi, fetterbush, holly, and wax myrtle, and covers 50-75% of the wetland. There is no herbaceous vegetation. A small amount of slash is piled around the perimeter of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage fire to burn in the wetland to eliminate the slash and reduce the woody brush.

Wetland ID: 12-26

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. There is some slash in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Encourage fire to burn in the wetland to eliminate the slash and reduce the dense titi.

Wetland ID: 12-27

Description: This wetland is a <0.1 ha ephemeral altered wetland. All vegetation was removed from this wetland during a recent thinning operation. Evidence of bedding rows remain and slash is scattered throughout the wetland interior. Historical photos suggest this wetland was part of a larger forested swamp system. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Slash

Restoration Action Recommended: Encourage fire to burn through the wetland to eliminate the slash, encourage herbaceous vegetation to return, and prevent encroachment of a dense midstory. We suggest monitoring this wetland over time to learn how it responds to complete vegetation removal.

Wetland ID: 12-28

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by holly and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation and the wetland basin has a thick layer of needle duff. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense shrubs and thick needle duff.

Wetland ID: 12-29

Description: This wetland is a 0.2 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle and fetterbush, and covers >75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. There is a thick duff layer in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense shrubs and thick needle duff.

Wetland ID: 12-30

Description: This wetland is a 0.6 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50- 75% of the wetland. The midstory is dominated by wax myrtle, titi, and fetterbush, and covers >75% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. A minor amount of slash is piled around the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would reduce the thick shrubs and eliminate the slash.

Wetland ID: 12-31

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle, titi, and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation. There is slash piled throughout the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would reduce the thick shrubs and eliminate the slash piles.

Wetland ID: 12-32

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation. There is slash throughout the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Slash, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland basin would reduce the thick titi and eliminate the slash piles.

Wetland ID: 12-33

Description: This wetland is a 0.5 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, titi, and holly, and covers 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the basin. There are minor amounts of slash around the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland will prevent shrub encroachment.

Wetland ID: 12-34

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 layer. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. Pine trees were planted on bedded rows through the wetland. The pine trees were recently removed and a minor amount of slash remains. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Use fire in the wetland basin to maintain the marsh and eliminate the slash.

Wetland ID: 12-35

Description: This wetland is a 0.8 ha semi-permanent forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. Wax myrtle, fetterbush, and holly, and grow in a ring around the wetland, and cover 25-50% of the basin. There is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire would reduce the thick ring of shrub around the wetland edge.

Wetland ID: 12-36

Description: This wetland is a 0.1 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and covers >75% of the wetland. The midstory is dominated by wax myrtle, and covers 25-50% of the wetland. There is no herbaceous vegetation. There is some slash in the wetland. A road (Grade 17) with a ditch runs along the north side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Road, Slash, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. 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 or roadside ditches. Provide periodic fire to eliminate the slash and prevent further shrub encroachment.

Wetland ID: 12-37

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is a mixture of wax myrtle, fetterbush, titi, and holly, and covers 50-75% of the wetland. There is no herbaceous vegetation and there is a thick duff layer covering the wetland floor. There is a push pile on the south side of the wetland and slash in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push pile, Slash, Woody encroachment

Restoration Action Recommended: Provide periodic fire to eliminate the slash and prevent further shrub encroachment. Allow the push pile to erode over time.

Wetland ID: 12-38

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi and fetterbush, and covers 50-75% of the wetland. There is no herbaceous vegetation, and the wetland floor has a thick layer of needle duff. This small wetland was severely disturbed by bedding (and subsequent planted pines) and push piles. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Push piles, Woody encroachment

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. While this process is occurring, the bedding rows and planted pines could be removed from the wetland interior as well. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 12-39

Description: This wetland is a 0.4 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by wax myrtle and titi, and covers 50-75% of the wetland. Fern grow throughout the wetland, and cover 5-25% of the basin. The presence of old cypress stumps provides evidence of historical logging. An old vehicular gouge runs through the center of the wetland, likely a result of past logging operations. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Vehicular damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would prevent further shrub encroachment. The vehicle damage will erode over time. To avoid future damage, operate machinery only when wetland is completely dry.

Wetland ID: 12-40

Description: This wetland is a 1.0 ha ephemeral mixed swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees have regenerated and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The area was burned a few days prior to our visit but the fire did not burn through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage fire to burn into the wetland basin to reduce the dense titi.

Wetland ID: 12-41

Description: This wetland is a 0.3 ha semi-permanent marsh. Gum trees dominate the canopy, and covers 5-25% of the wetland. The midstory is dominated by willow and buttonbush, and covers 25-50% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. This thick sawgrass wetland has a deeper, open water center. The area was burned a few days prior to our visit but the fire did not burn through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Monitor the wetland and ensure it burns the next time the wetland is dry. The wetland may need to be custom-burned in the future. Due to its longer hydroperiod, the fire periodicity of this wetland is significantly longer than that of most area ephemeral wetlands. Woody encroachment is not a problem yet but easily could become one if the wetland does not burn during the next few upland burns.

Wetland ID: 12-42

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. This wetland was bedded at one time but the bedding has since mostly eroded. The area was burned a few days prior to our visit but the fire did not burn through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-43

Description: This wetland is a 0.1 ha highly ephemeral marsh. Laurel oak and maple trees grow on a push pile in the wetland, and cover 5-25% of the basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. This wetland was altered by bedding and a push pile in the center. The area was burned a few days prior to our visit and the fire burned through half the marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Push piles

Restoration Action Recommended: Manage this wetland with periodic fire and allow bedding and push pile to erode over time.

Wetland ID: 12-44

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy. Buttonbush is the dominant woody vegetation, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Old bedding rows run through the wetland. The area was burned a few days prior to our visit and the fire burned into the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding

Restoration Action Recommended: Manage this wetland with periodic fire and allow bedding to erode over time.

Wetland ID: 12-45

Description: This wetland is a 0.2 ha semi-permanent marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Sawgrass grows throughout the wetland, and covers 50-75% of the basin. This wetland was once a cypress swamp and has many old cypress stumps. The area was burned a few days prior to our visit but the fire did not burn through the wetland, because the wetland was hydrated. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-46

Description: This wetland is a 0.7 ha semi-permanent marsh. There is no tree canopy. Buttonbush is the dominant woody vegetation, and covers 50-75% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. The presence of old cypress stumps provides evidence of historical logging. The area was burned a few days prior to our visit and the fire burned through most of the wetland. The fire burned at the surface, but did not penetrate underlying damp peat. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-47

Description: This wetland is a 0.2 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. Young cypress trees are sprouting from old, logged stumps. The area was burned a few days prior to our visit and the fire partially burned through the wetland. The fire burned at the wetland surface but did not penetrate into the damp peat. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-48

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sawgrass grows throughout the wetland, and covers >75% of the basin. Old bedding rows that were constructed through the wetland have partly eroded. The area was burned a few days prior to our visit and the fire burned completely through the wetland. The fire burned at the wetland surface but did not penetrate into the damp peat. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 12-49

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 mid-story cover. Sawgrass grows throughout the wetland, and covers >75% of the basin. Pine trees were planted on bedded rows through the wetland. The area was burned a few days prior to our visit and the fire partially burned through the wetland. The fire burned at the wetland surface but did not penetrate into the damp peat. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior.

Wetland ID: 12-50

Description: This wetland is a 0.2 ha ephemeral marsh. There is no significant tree canopy. Wax myrtle is the dominant woody vegetation, and covers 5-25% of the wetland. Sawgrass grows throughout the wetland, and covers >75% of the basin. The area was burned a few days prior to our visit and the fire burned around the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 13-01

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 titi and fetterbush, and covers >75% of the wetland. There is no herbaceous vegetation, and the wetland floor is covered with a layer of thick duff. Hummocks have formed around old, logged cypress stumps. The north side of the wetland is connected to a ditch along Sawdust Pile Road. This wetland likely was part of a larger wetland system but was bisected during road construction. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Roadside ditch, Woody encroachment

Restoration Action Recommended: 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 or roadside ditches. Periodic fire in the wetland would reduce the dense titi and thick duff.

Wetland ID: 13-02

Description: This wetland is a 0.1 ha highly ephemeral shrub swamp. Pine trees were planted on bedded rows through the wetland. The bedding is eroded and only a few pine trees remain, providing <5% cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation and a thick duff layer covers the wetland floor. Feral hog damage is minor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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

Restoration Action Recommended: The bedding rows will erode over time. The remaining planted pine trees could be removed from the wetland interior. Periodic fire would reduce the dense titi and thick duff layer. .

Wetland ID: 13-03

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi grows in a ring around the wetland, and covers 25-50% of the wetland. Sedges/grasses and red root grow in scattered patches, and covers 5-25% of the basin. The wetland has an open center as a result of recent feral hog rooting. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Provide periodic fire to the wetland to prevent encroachment of titi brush ring.

Wetland ID: 13-04

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Titi grows in a dense ring around the wetland, and covers 5-25% of the basin. Sedges/grasses and fern grow in scattered patches, and covers 5-25% of the basin. Feral hog damage is extensive. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Periodic fire in the wetland basin would prevent further titi ring encroachment.

Wetland ID: 13-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no significant tree canopy. Titi grows in a dense ring around the wetland, and covers 5-25% of the basin. Sedges/grasses and red root grow in scattered patches, and cover 5-25% of the basin. The wetland has an open center, a result of feral hog rooting. Pine trees were planted on bedded rows in the north end of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Planted pines

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Periodic fire in the wetland would prevent the brush ring from encroaching further.

Wetland ID: 13-06

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees were planted on bedded rows through the wetland. A few pine trees remain but there is no significant tree canopy. Titi grows around the wetland edges, and covers 5-25% of the wetland. Sedges/grasses and red root grow in scattered patches, and cover 25-50% of the basin. Feral hogs have rooted extensively in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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. Remove the planted pine trees from the wetland interior.

Wetland ID: 13-07

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees were planted on bedded rows through the wetland. A few pine trees remain but there is no significant tree canopy. There is no significant midstory cover. Sedges/grasses and red root grow throughout the wetland, and cover 5-25% of the basin. Feral hog damage is extensive. Titi grows dense around the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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. Remove the planted pine trees from the wetland interior.

Wetland ID: 13-08

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no significant tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. Red root grows in a ring around the edge of the wetland, and covers 5-25% of the basin. This pond almost joins wetland 13-07 but is separated by a row of pines. There is a titi-covered push pile in the wetland center. Feral hog damage is limited to the wetland edge. Pine trees were planted on bedding rows through the wetland. Most of the bedding has eroded and only a few pine trees remain. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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

Restoration Action Recommended: This wetland is a good candidate for a mechanical push pile/titi and bedding removal. Remove pine trees from wetland interior as well. Encourage periodic fire to burn through the wetland.

Wetland ID: 13-09

Description: This wetland is a 0.5 ha ephemeral shrub swamp. There is no significant tree canopy cover. Titi and fetterbush are the dominant woody vegetation, and cover >75% of the wetland. There is no herbaceous vegetation. This wetland was likely a cypress swamp that was logged and colonized by shrubs. A few cypress trees remain in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended Periodic fire in the wetland would reduce the dense titi and open the midstory.

Wetland ID: 13-10

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. There are 1 m tall push piles on the south side of the wetland. A fire burned through the wetland a few years ago, reducing the brush. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push piles

Restoration Action Recommended: The push piles could be flattened and titi thinned when the wetland is completely dry.

Wetland ID: 13-11

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and red root grow throughout the wetland, and cover 5-25% of the basin. Feral hog damage is extensive in the wetland but herbaceous vegetation is now growing back. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 13-12

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 5-25% of the wetland. Sedges/grasses grow sparsely in the wetland, and cover 5-25% of the basin. Feral hog damage is extensive. Old bedding rows that were constructed through the wetland have mostly eroded. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Periodic fire will prevent titi encroachment.

Wetland ID: 13-13

Description: This wetland is a 0.1 ha ephemeral shrub swamp. Pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Pine trees were planted on bedded rows through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pine trees, Woody encroachment,

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior. Encourage periodic fire in the wetland to reduce the thick titi.

Wetland ID: 13-14

Description: This wetland is a 0.4 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This wetland was most likely a former cypress swamp. The cypress trees were logged and hummocks have developed around the old stumps. These hummocks now support large titi shrubs. An old, eroded wind row runs through the western edge of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment, Windrow

Restoration Action Recommended: The windrow and hummocks could be flattened and the titi either removed or thinned when the wetland is completely dry. Encourage periodic fire through the wetland.

Wetland ID: 13-15

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland. Titi grows dense around the wetland edge, and covers 5-25% of the wetland. Sedges/grasses are sparsely distributed, and cover 5-25% of the basin. Pine trees and titi grow on the bedding rows through the wetland. A fire burned through the wetland a few years ago, reducing the brush. The wetland was inundated on the day of our visit. We suspect there is extensive hog rooting beneath the water. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Planted pines

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the planted pine trees from the wetland interior.

Wetland ID: 13-16

Description: This wetland is a 0.1 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses are sparsely distributed, and cover 5-25% of the basin. Feral hog damage is extensive. Bedding rows were constructed through the center of the wetland and now are eroding. A windrow along the east side of the wetland bisects what would be one, large wetland and creates a cluster of smaller ones (this wetland, 13-17, and 13-20). There is another windrow on the west side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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

Restoration Action Recommended: When the wetland is completely dry, flatten the windrow in the vicinity of the wetland. In addition to altering wetland hydrology, windrows could act as a barrier to small animal migration and dispersal. Once the windrow is eliminated, the cluster of ponds will reconnect to form one, large wetland. Remove planted pine trees from wetland interior. Encourage periodic fire to this wetland to restore the herbaceous vegetation.

Wetland ID: 13-17

Description: This wetland is a 0.2 ha ephemeral marsh. There is no canopy or midstory cover. Sedges/grasses are sparsely distributed, and cover 5-25% of the basin. Feral hog damage is extensive. A windrow along the west side of the wetland bisects what would be one, large wetland and creates a cluster of smaller ones (this wetland, 13-16, and 13-20). There is also a windrow on the east side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Windrow

Restoration Action Recommended: When the wetland is completely dry, flatten the windrow in the vicinity of the wetland. In addition to altering wetland hydrology, windrows could act as a barrier to small animal migration and dispersal. Once the windrow is eliminated, the cluster of ponds will reconnect to form one, large wetland. Encourage periodic fire to this wetland to restore the herbaceous vegetation.

Wetland ID: 13-18

Description: This wetland is a <0.1 ha ephemeral marsh. There is no canopy or midstory cover and no herbaceous vegetation. This small open wetland was inundated with water on the day of our visit. We suspect there is extensive feral hog rooting beneath the water. A windrow spans along the western edge and there are eroding bedding rows around the wetland edge. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Windrow

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. When the wetland is completely dry, flatten the windrow in the vicinity of the wetland. In addition to altering wetland hydrology, windrows could act as a barrier to small animal migration and dispersal. Encourage periodic fire to this wetland to restore the herbaceous vegetation.

Wetland ID: 13-19

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. *Sphagnum* grows sparsely, and covers 5-25% of the basin. Feral hogs have rooted an open area on the south end of the wetland. There are windrows on the west and east sides. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Windrow, Woody encroachment

Restoration Action Recommended: When the wetland is completely dry, flatten the windrow in the vicinity of the wetland and thin the dense titi. In addition to altering wetland hydrology, windrows could act as a barrier to small animal migration and dispersal. Encourage periodic fire to this wetland to reduce the dense titi.

Wetland ID: 13-20

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees grow on bedding rows through the wetland. The tree canopy covers 5-25% of the wetland. The midstory is dominated by titi, and covers 5-25% of the wetland. A windrow along the east side bisects what would be one, large wetland and creates a cluster of smaller ones (this wetland, 13-16, and 13-17). There is also an old windrow on the west side of the wetland. There is feral hog damage in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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

Restoration Action Recommended: Remove planted pine trees from wetland interior. When the wetland is completely dry, flatten the bedding rows and windrow. In addition to altering wetland hydrology, windrows could act as a barrier to small animal migration and dispersal. Once the windrow is eliminated, the cluster of ponds will reconnect to form one, large wetland. Encourage periodic fire to this wetland to restore the herbaceous vegetation.

Wetland ID: 19-01

Description: This wetland is a 0.1 ha ephemeral, altered wetland. It is either a wetland with a big, central push pile or the mechanical activity involved with forming the push pile created a semicircular arc of wetland. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. Redroot grows in scattered patches, and covers 5-25% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Push pile

Restoration Action Recommended: Mechanically remove the push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 19-02

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy cover. Large titi grow on hummocks in the wetland and cover >75% of the wetland. The hummocks may have grown around old cypress stumps. There is no herbaceous vegetation. This wetland has dense brush around the edge with a more open center. This wetland was likely part of a larger wetland system before the landscape was altered by pine plantation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: The dense titi could be reduced through the use of periodic fire..

Wetland ID: 19-03

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. This small, circular wetland has some small, natural hummocks and extremely dense brush. This wetland was likely part of a larger wetland system before the landscape was altered by pine plantation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is planned.

Wetland Concerns: Woody encroachment

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

Wetland ID: 19-04

Description: This wetland is a 0.1 ha ephemeral forested swamp. Cypress and holly trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi and holly, and covers 25-50% of the wetland. Fern grow in scattered patches, and cover 5-25% of the basin. There is a small (<1 m high) push pile in the wetland center. A recent fire burned through the entire wetland. This wetland was likely part of a larger wetland system before the landscape was altered by pine plantation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push pile

Restoration Action Recommended: The push pile is not extensive enough to merit restoration action. Encourage periodic fire in the wetland to prevent titi encroachment.

Wetland ID: 19-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Titi and buttonbush are the dominant woody vegetation, and cover 25-50% of the wetland. A diverse array of sedges/grasses grow throughout the wetland, and cover >75% of the basin. Grade 19 ½ and an accompanying ditch run along the north side of the wetland. The road likely bisected this wetland, separating it from the larger wetland system to the north. The uplands were burned recently, but the fire did not burn into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: 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 or roadside ditches.

Wetland ID: 19-06

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. Large hummocks have grown up around the titi. Sedges/grasses grow in scattered patches, and cover 5-25% of the basin. It is unclear from historical aerial photos whether this wetland previously was a marsh or did not exist at all prior to pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Reduce the titi through use of periodic fire. If fire alone does not reduce the titi and hummocks, consider mechanical treatments.

Wetland ID: 19-07

Description: This wetland is a 0.3 ha ephemeral marsh. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi and wax myrtle, and covers 25-50% of the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover 50-75% of the basin. This former cypress swamp was logged and now is a marsh with many young and regenerating cypress trees. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 19-08

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy cover. Wax myrtle and buttonbush are the dominant woody vegetation, and cover 5-25% of the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. This former cypress wetland was logged and is now a marsh with a high diversity of herbaceous vegetation. A recent fire burned through the wetland. Old, eroding bedding rows are still evident along some of the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 19-09

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Wax myrtle and buttonbush are the dominant woody vegetation, and cover 25-50% of the wetland. Sedges/grasses, and sawgrass grow throughout the wetland, and covers 50-75% of the basin. This former cypress wetland was logged and is now a marsh with a high diversity of herbaceous vegetation. A recent fire burned through half of the wetland. The wetland appears to be an archaeological chert quarry site as there is exposed, beaten chert boulders and debitage. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 19-10

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Wax myrtle and buttonbush are the dominant woody vegetation, and cover 5-25% of the wetland. Sedges/grasses and fern grow throughout the wetland, and cover 50-75% of the basin. A recent fire burned all the way through the wetland, and eliminated many shrubs. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 20-01

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation, and a thick layer of duff covers the wetland floor. A dirt road (Firebreak 14) and accompanying ditch run along the wetland's western edge. Historical aerial photos suggest this swamp was a much more open wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Road, Roadside ditch, Woody encroachment

Restoration Action Recommended: 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 or roadside ditches. Encourage periodic fire in the wetland to reduce the dense titi and thick duff.

Wetland ID: 20-02

Description: This wetland is a 1.2 ha ephemeral shrub swamp. There is no tree canopy cover. Titi and fetterbush are the dominant woody vegetation, and cover >75% of the wetland. There is no herbaceous vegetation. This wetland has dense brush except for an open section on the west side, a result of feral hog rooting. Historical aerial photos suggest this swamp was a much more open wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

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

Wetland ID: 20-03

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation and there is a thick duff layer covering the wetland floor. A recent fire burned into the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 20-04

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Titi and a few pine trees are growing on large hummocks in the wetland. There is no significant tree canopy cover. Titi covers >75% of the wetland. *Sphagnum* grows in scattered patches, and covers 5-25% of the basin. Historic aerial photos suggest this wetland, along with 20-05, once was part of a larger wetland system. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 20-05

Description: This wetland is a 0.7 ha ephemeral shrub swamp. This former cypress swamp was logged and colonized by titi. Cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Hummocks have formed around the cypress stumps. There is a thick duff layer covering the wetland floor. Historic aerial photos suggest this wetland, along with 20-04, once was part of a larger wetland system. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: The dense titi and hummocks could be reduced through the use of periodic fire.

Wetland ID: 20-06

Description: This wetland is a <0.1 ha highly ephemeral shrub swamp. Planted pines grow on bedded rows into the wetland edge. The tree canopy covers 5-25% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation; the wetland has a pine needle-covered floor. A recent fire burned into the wetland depression. Historical aerial photos suggest this wetland was either non-existent or was a small marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove planted pine trees from the interior edge of the wetland. Encourage periodic fire to reduce the dense titi.

Wetland ID: 20-07

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. There is no herbaceous vegetation, and a thick layer of duff covers the wetland floor. There are some hummocks in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense titi, the hummocks, and the thick duff layer.

Wetland ID: 20-08

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi grows densely on small hummocks within the wetland. The titi covers >75% of the wetland. There is no herbaceous vegetation, and a thick layer of duff covers the wetland floor. Feral hog damage is light and restricted to the wetland edges. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi and thick duff layer.

Wetland ID: 20-09

Description: This wetland is a <0.1 ha ephemeral shrub swamp. Gum trees dominate the canopy, and cover 5-25% of the wetland. Titi grow on large hummocks in the wetland, and cover >75% of the basin. There is no herbaceous vegetation, and a thick duff layer covers the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland would reduce the dense titi, the hummocks, and the thick duff layer.

Wetland ID: 20-10

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Titi grow on large hummocks around the wetland, and cover 5-25% of the wetland. Sedges/grasses and redroot grow throughout the wetland, and cover 25-50% of the basin. There is feral hog damage in the wetland center. The wetland appears to be a prehistoric archaeological chert quarry site. Chert boulders and abundant lithic debitage are exposed at the surface. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense titi ring and prevent further encroachment. Because this wetland appears to be an archaeological site, we recommend either not using any heavy, soil-disturbing machinery in this wetland or conferring with the Florida Division of Historical Resources.

Wetland ID: 20-11

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi grows densely in and around the wetland, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland appears to be a prehistoric archaeological chert quarry site. Chert boulders and abundant lithic debitage are exposed at the surface. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense titi. Because this wetland appears to be an archaeological site, we recommend either not using any heavy, soil-disturbing machinery in this wetland or conferring with the Florida Division of Historical Resources.

Wetland ID: 20-12

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. There is feral hog damage in the wetland center. The wetland appears to be a prehistoric archaeological chert quarry site. Chert boulders and abundant lithic debitage are exposed at the surface. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense brush. Because this wetland appears to be an archaeological site, we recommend either not using any heavy, soil-disturbing machinery in this wetland or conferring with the Florida Division of Historical Resources.

Wetland ID: 20-13

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 5-25% of the wetland. Redroot grows throughout the wetland, and covers 25-50% of the basin. A recent fire burned all the way through the wetland basin. Old bedding rows are almost completely eroded. Feral hog damage is evident in the wetland but is not severe. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: None

Wetland ID: 20-14

Description: This wetland is a <0.1 ha ephemeral marsh. Pine trees grow on bedded rows through the wetland. The tree canopy covers 5-25% of the wetland. The midstory is dominated by titi, and covers 5-25% of the wetland. Redroot grows throughout the wetland, and covers 25-50% of the basin. Feral hog damage is severe. A recent fire burned all the way through the wetland. Historical aerial photos suggest this wetland (along with 20-15, 20-20, and possibly others) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

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. Remove the planted pine trees from the wetland interior.

Wetland ID: 20-15

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy cover. Titi and buttonbush are the dominant woody vegetation, and cover 5-25% of the wetland. Grass, fern, and redroot grow throughout the wetland, and cover 25-50% of the basin. This small pond has extensive bedding and feral hog damage. It appears to be a prehistoric archaeological chert quarry site as evidenced by chert boulders and debitage. A fire recently burned through the wetland basin. Historical aerial photos suggest this wetland (along with 20-14, 20-20, and possibly others) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage

Restoration Action Recommended: Because this wetland already is extensively damaged by feral hogs, we recommend mechanically removing the bedding rows and encouraging periodic fire in the wetland. However, it appears to be an archaeological site so we recommend using caution with machinery here and also conferring with the Florida Division of Historical Resources.

Wetland ID: 20-16

Description: This wetland is a 1.0 ha semi-permanent shrub swamp. The presence of old cypress stumps provides evidence of historical logging. The cypress trees are regenerating and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. Hummocks have formed around old cypress stumps. There is feral hog damage in the wetland center. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Encourage periodic fire in the wetland to reduce the dense titi and open the midstory.

Wetland ID: 20-17

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation. Old stumps provide evidence that cypress trees historically occupied the wetland. A hot fire reduced the duff and killed many regenerating cypress trees. Dense titi remains. Historical aerial photos suggest this wetland (along with 20-18 and 20-19) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Return periodic fire into the wetland to reduce the dense titi.

Wetland ID: 20-18

Description: This wetland is a 0.2 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. Sedges/grasses and fern grow throughout the wetland, and cover 5-25% of the basin. The vegetation in the wetland is diverse. Old stumps provide evidence that cypress trees historically occupied the wetland. Hummocks in the wetland are probably a result of cypress stumps. There are some old bedding rows on the south side of the wetland. A fire burned the wetland about 5-10 years ago, reducing the duff and shrubs. Historical aerial photos suggest this wetland (along with 20-17 and 20-19) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: The wetland is currently functioning as a healthy shrub swamp with diverse vegetation. If WMA personnel wish to restore this wetland back to a cypress swamp, a hot fire is needed to kill the titi and more frequent fire periodicity would be needed to prevent titi from encroaching.

Wetland ID: 20-19

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi is the dominant woody vegetation, and covers >75% of the wetland. There is no herbaceous vegetation, and a thick duff layer covers the wetland. Old stumps provide evidence that cypress trees historically occupied the wetland. Large hummocks, probably evolved from the cypress stumps, support dense growths of titi. Feral hogs have created open areas in the wetland. Historical aerial photos suggest this wetland (along with 20-17, 20-18) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland should reduce the large hummocks and thin the dense titi.

Wetland ID: 20-20

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy cover. Titi grows densely on hummocks, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland has a few open patches created by feral hogs. Bedding rows are still evident around the wetland edges. Historical aerial photos suggest this wetland (along with 20-14, 20-15, and possibly others) was part of a larger wetland system before pine plantation conversion. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Feral hog damage, Woody encroachment

Restoration Action Recommended: Periodic fire in the wetland should reduce the hummocks and thin the dense titi.

Wetland ID: 28-01

Description: This wetland is a <0.1 ha ephemeral marsh. A large gum tree and a holly tree grow in the wetland center, and cover 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the basin. There are some old, eroding bedding rows still evident in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-02

Description: This wetland is a <0.1 ha ephemeral marsh. Pine trees were planted on bedding rows through the wetland. A few pine trees remain in the north end of the wetland, and cover 5-25% of the basin. There is a *Smilax* thicket in the center of the wetland that covers 5-25% of the basin. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. A recent fire burned through the wetland, killing much of the encroaching woody vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Remove the 3-5 large pine trees that are in the north end of the wetland. Continue managing this wetland with fire to prevent further woody encroachment.

Wetland ID: 28-03

Description: This wetland is a 1.0 ha ephemeral shrub swamp. Cypress and pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. Sedges/grasses grow in scattered patches, and cover 5-25% of the wetland. Hummocks in the wetland likely formed around old tree stumps. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 28-04

Description: This wetland is a 0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers 50-75% of the wetland. *Sphagnum* and redroot grow in scattered patches, and cover 5-25% of the wetland. Feral hog damage is old. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Feral hog damage, Woody encroachment

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

Wetland ID: 28-05

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. There is a vehicular/machine track through the north end of the wetland, likely a result of recent upland restoration activities. This wetland was impacted by woody encroachment until a recent fire burned through the wetland and killed much of the titi. The wetland is now in fire-maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-06

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Gum trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland appears to be in fire-maintenance condition and is a good example of a mixed swamp. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-07

Description: This wetland is a 0.4 ha ephemeral mixed swamp. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This wetland was impacted by woody encroachment until a recent fire burned through the wetland and left many dead titi and cypress snags. The wetland is now in fire-maintenance condition. Deep needle and leaf duff remains on the wetland floor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-08

Description: This wetland is a <0.1 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi, and covers 50-75% of the wetland. There is no herbaceous vegetation. This wetland was impacted by woody encroachment until a recent fire burned through the wetland and left many dead titi and cypress snags. A dense ring of brush surrounding the wetland was also killed. The wetland is now in fire-maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-09

Description: This wetland is a 0.1 ha ephemeral forested swamp. Gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the wetland. This wetland was impacted by woody encroachment until a recent fire burned through the wetland and left many dead titi and cypress snags. The wetland is now in fire-maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 28-10

Description: This wetland is a 2.2 ha ephemeral mixed swamp. Cypress trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. A recent fire burned to the wetland edges and killed some perimeter woody vegetation. The wetland is still extremely brushy and virtually impenetrable. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 29-01

Description: This wetland is a 0.4 ha ephemeral shrub and forested swamp. The north end of the wetland is a healthy gum and pine tree swamp with an open understory and a leaf-covered floor. The south end of the wetland is a titi thicket. Gum and pine trees cover 25-50% of the wetland basin, titi covers 25-50% of the wetland. Fire has burned through the wetland and has reduced some of the woody encroachment. Sawgrass grows in scattered patches, and covers 5-25% of the wetland. Old, eroding bedding rows are still evident in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: No action to remove the bedding is recommended; the bedding rows will erode over time. Encourage periodic fire in the wetland to reduce the dense titi.

Wetland ID: 29-02

Description: This wetland is a <0.1 ha ephemeral shrub swamp. There is no tree canopy. Titi is the dominant woody vegetation, and covers >75% of the wetland. Sedges/grasses and *Sphagnum* grow in a marshy area in the wetland center, and cover 5-25% of the basin. There is a large push pile in the southwest corner of the wetland on which a large titi grows. There are old, eroding bedding rows in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Push pile, Woody encroachment

Restoration Action Recommended: Mechanically remove the bedding and push pile and simultaneously uproot the titi established on the push pile. This process should be completed when the wetland is completely dry and progress monitored. Return periodic fire to the wetland to prevent further titi encroachment.

Wetland ID: 29-03

Description: This wetland is a 0.1 ha ephemeral mix of a marsh and a mixed swamp. There are open, marsh-like patches mixed with clumps of shrub and gum trees. Gum trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by titi and wax myrtle, and covers 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Manage with periodic fire to prevent further woody encroachment.

Wetland ID: 29-04

Description: This wetland is a 0.3 ha ephemeral mixed swamp. Gum and cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland does not appear to have burned in a long time. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 29-05

Description: This wetland is a 0.2 ha ephemeral shrub swamp. Pine and cypress trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by titi, and covers >75% of the wetland. There is no herbaceous vegetation. The wetland does not appear to have burned in a long time. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands do not appear to have burned in a long time.

Wetland Concerns: Woody encroachment

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

Wetland ID: 29-06

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Fetterbush grows in a dense ring around the wetland, and covers 25-50% of the basin. Sawgrass and *Sphagnum* grow in the wetland center, and cover 50-75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

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

Wetland ID: 29-07

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Fetterbush is encroaching into the wetland, and covers 25-50% of the basin. Sawgrass and *Sphagnum* grow in the wetland center, and cover 50-75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Manage with periodic fire to reduce the encroaching woody vegetation.

Wetland ID: 29-08

Description: This wetland is a 0.1 ha ephemeral forested swamp. Gum and pine trees dominate the canopy, and cover >75% of the wetland. There is no midstory or herbaceous vegetation. This wetland appears to be healthy and in fire-maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 29-09

Description: This wetland is a 0.8 ha ephemeral forested swamp. Cypress, gum and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, wax myrtle, and fetterbush and covers 5-25% of the wetland. There is no herbaceous vegetation. A recent fire burned through the outer half of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: 29-10

Description: This wetland is a 0.5 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer or herbaceous vegetation. This wetland appears to be healthy and in fire-maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. Upland restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

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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 C. Scientific names of common plants encountered during this project or mentioned in this report, 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>