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

Big Bend WMA Final Report

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December 2009 – May 2010

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

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

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

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

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

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

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

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

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

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

ACKNOWLEDGEMENTS

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

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

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

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INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

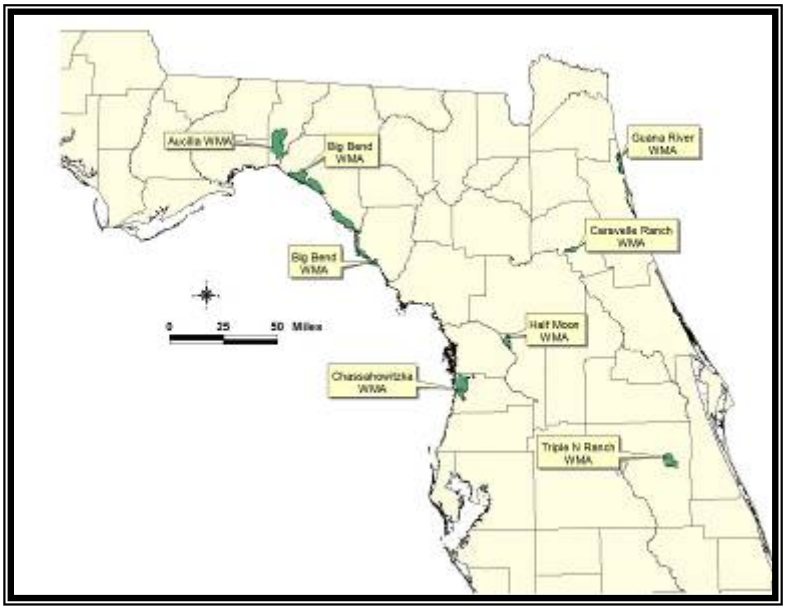

Figure 1. Seven FWC-lead WMAs targeted for this study.

EPHEMERAL WETLAND ECOLOGY AND RESTORATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STUDY AREA

Big Bend Wildlife Management Area is approximately 29,098 ha in size and is located along the Gulf Coast in Taylor and Dixie counties (Figure 2). The WMA spans a distance of approximately 110 km and is composed of 5 separate units: Snipe Island, Hickory Mound, Spring Creek, Tide Swamp, and Jena. Each of the five units is partitioned into several land management units. The major vegetation communities within BBWMA are hardwood swamp, hydric hammock, salt and brackish marsh, mixed wetland forest, and wet flatwoods and mesic flatwoods.

Before state ownership, virtually all of the forested land on BBWMA was logged. The longleaf pine communities were converted to pine plantations and cypress trees were logged from the wetlands. The property was purchased by the state in 1987 through the Conservation and Recreation Lands (CARL) program. Restoration of the uplands has been on-going through thinning and prescribed fire.

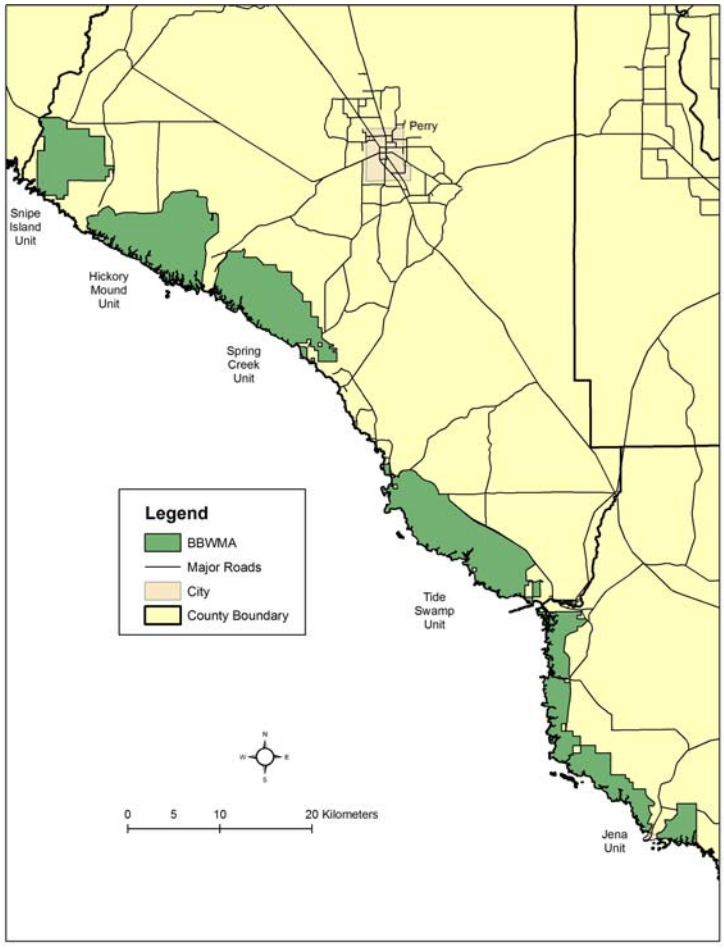

Figure 2. Map of the Big Bend Wildlife Management Area (BBWMA). The WMA spans 110 km along the Gulf Coast in Taylor and Dixie Counties.

METHODS

We conducted an initial meeting with District Biologist Daniel McDonald, along with BBWMA Biological Supervisor Nuria Sancho and BBWMA biologists Randy Havens, Sharon Hester, and Brent Howze on 1 December 2009. Kevin Kemp, AHRES representative, also attended the meeting. The purpose of the meeting was to familiarize ourselves with land access, burning schedules, management priorities and concerns, and other pertinent issues, and to discuss wetland inventory strategy.

We used Digital Orthophoto Quarter Quadrangles (DOQQs) and topographic maps to remotely identify potential ephemeral wetlands on the property. The number of wetlands on BBWMA was too large to conduct a complete inventory of the ephemeral wetlands in our allotted time frame. As per BBWMA staff request, we began sampling 3-4 wetlands per land management unit. After sampling all the management units on the 5 units, we concentrated our remaining sampling efforts on the higher sandhill and mesic flatwoods communities.

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

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

Wetland ID

Wetlands were given an ID that corresponds to the WMA Unit letters, the Management Unit number, and the wetland number. For example, SI 07-02 is the second wetland inventoried in Management Unit 7 within the Snipe Island Unit.

Wetland Type

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

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

Shrub swamp – dominated by shrub or midstory woody vegetation

Forested swamp – forested or wooded wetland - examples include heads, bogs, domes, strands, and hammocks
Mixed swamp – forested wetland with a heavy shrub midstory
Altered – damaged wetland whose original ecological classification is unrecognizable - examples include drained, logged, or mechanically altered wetlands

Basin Area

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

Hydroperiod

Highly Ephemeral – wetlands with a very short hydroperiod, estimated to have standing water only a few months out of a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.
Ephemeral – wetlands with an intermediate hydroperiod, estimated to have standing water for up to 8-10 months out of a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.
Semi-permanent – wetlands with a long hydroperiod, estimated to have standing water for more than a year. Estimations are based on wetland vegetation, soil conditions, and amount of standing water during site visit.

Comments

As requested by BBWMA personnel, we indicated which wetlands were potential striped newt breeding habitat. We designated a wetland "striped newt potential" based on current wetland conditions and on our experience with striped newt habitat, not on any quantitative variables. We provided this information to help concentrate future amphibian sampling efforts in wetlands with the greatest potential of supporting striped newts. Striped newts have not been recorded on BBWMA, but this may change in the future after repeated sampling efforts. We also made note of ephemeral wetlands with significant amounts of maidencane, which will help concentrate future round-tailed muskrat (*Neofiber alleni*) sampling efforts.

SITE ASSESSMENT

We began our systematic inventory of wetlands on 6 January 2010 and completed the assessment on 10 May 2010. Heavy rains this winter slowed our progress and prevented access to lower lying areas on BBWMA. We inventoried a total of 286 wetlands on the property: 29 wetlands on Snipe Island Unit (Figure 3), 31 wetlands on Hickory Mound Unit (Figure 4), 87 wetlands on Spring Creek Unit (Figure 5), wetlands on 69 Tide Swamp Unit (Figure 6), and 70 wetlands on Jena Unit (Figure 7).

Of the 286 wetlands we inventoried, 143wetlands (50%) were in excellent condition with no associated disturbances or concerns. The majority of restoration concerns on this property were related to encroaching woody vegetation, roads, and feral hogs. Woody encroachment affected 64 wetlands (22%), most of which was in the form of pine trees encroaching from the wetland edge. Roads affected 37 wetlands (13%) throughout the WMA except in the Half Moon unit. Feral hog damage was evident in 28 wetlands (10%); the majority of damage was in the Tide Swamp and Spring Creek units.

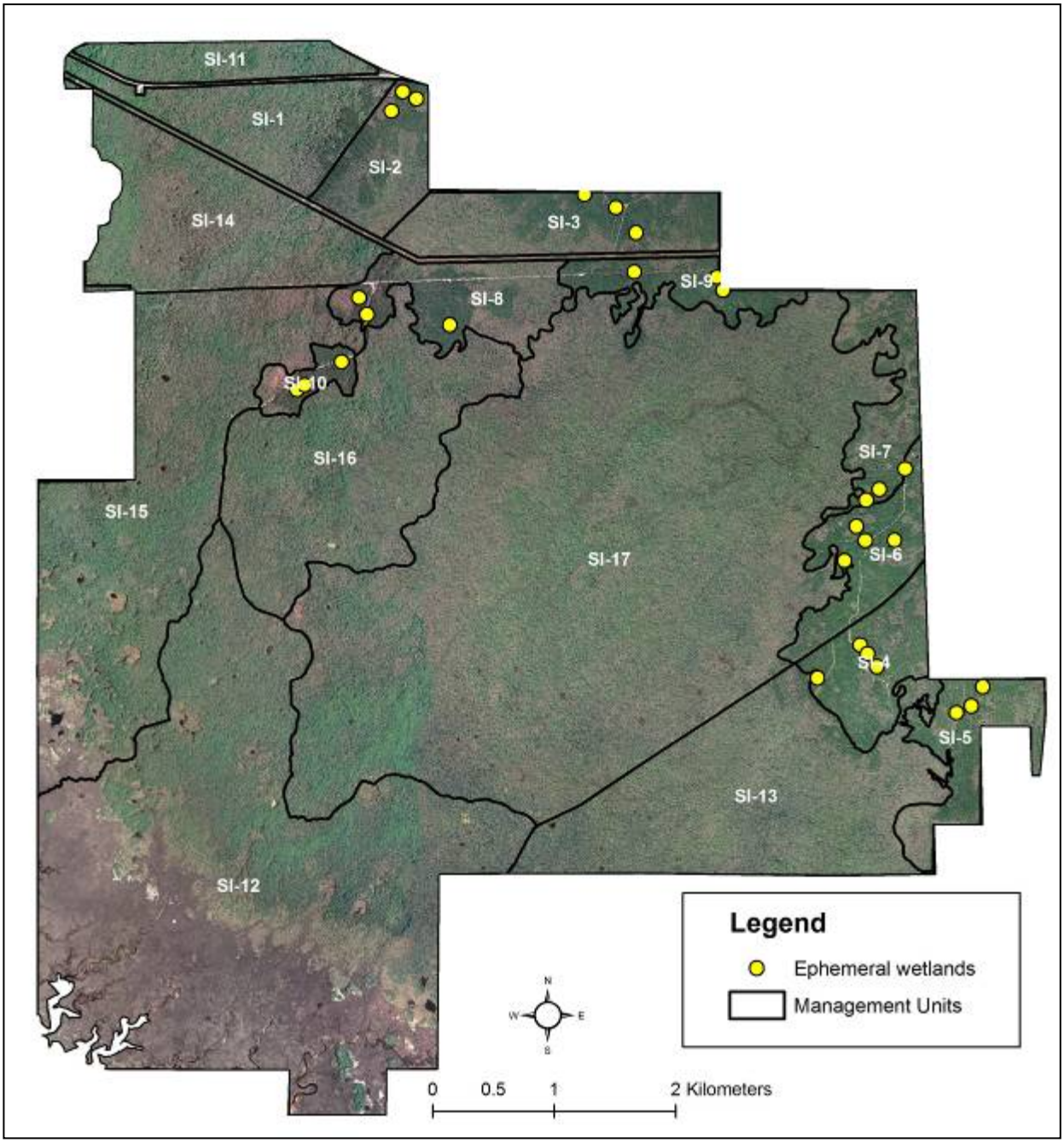

Figure 3. Map of the 29 ephemeral wetlands inventoried on the Snipe Island Unit of BBWMA.

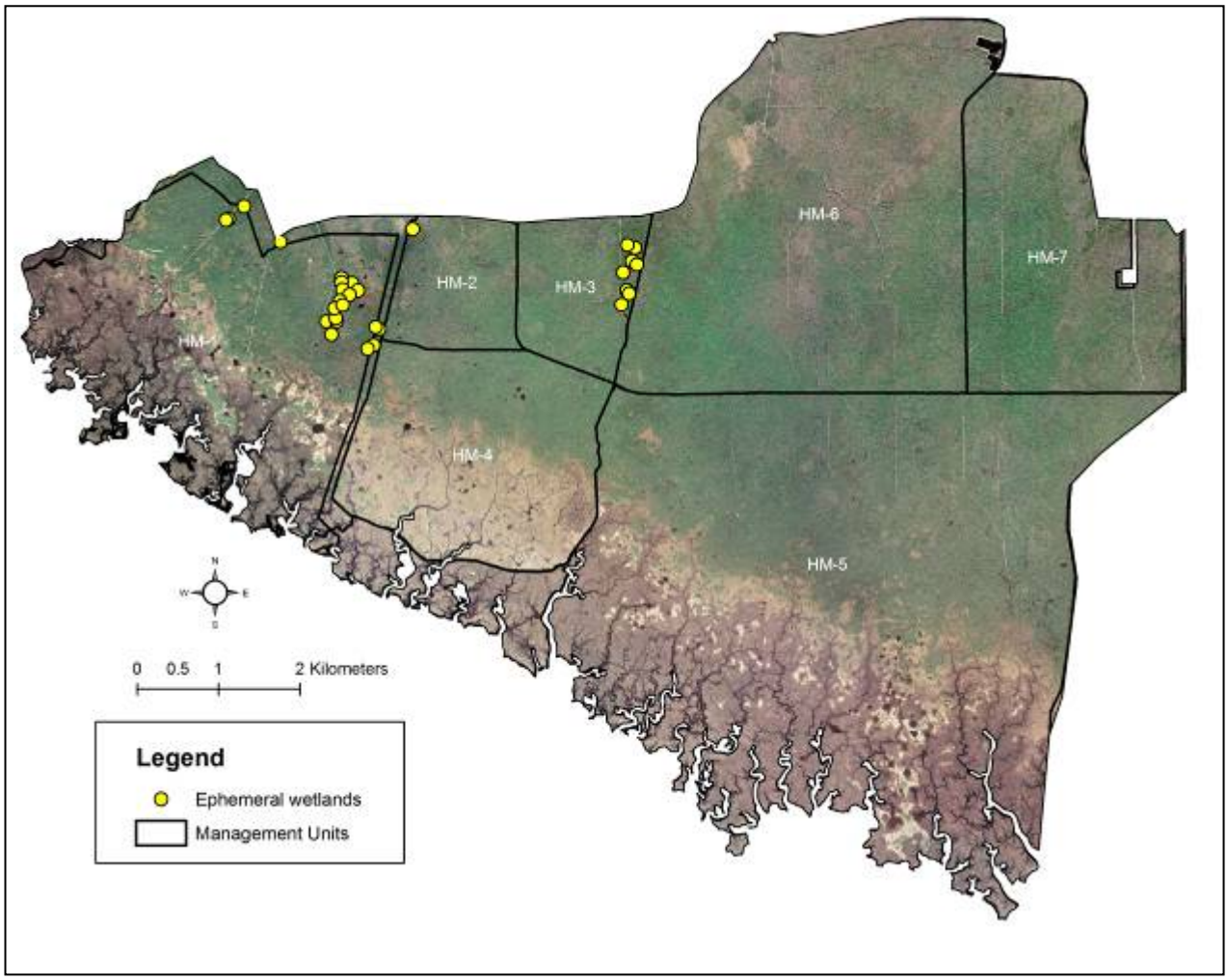

Figure 4. Map of the 31 ephemeral wetlands inventoried on the Hickory Mound Unit of BBWMA.

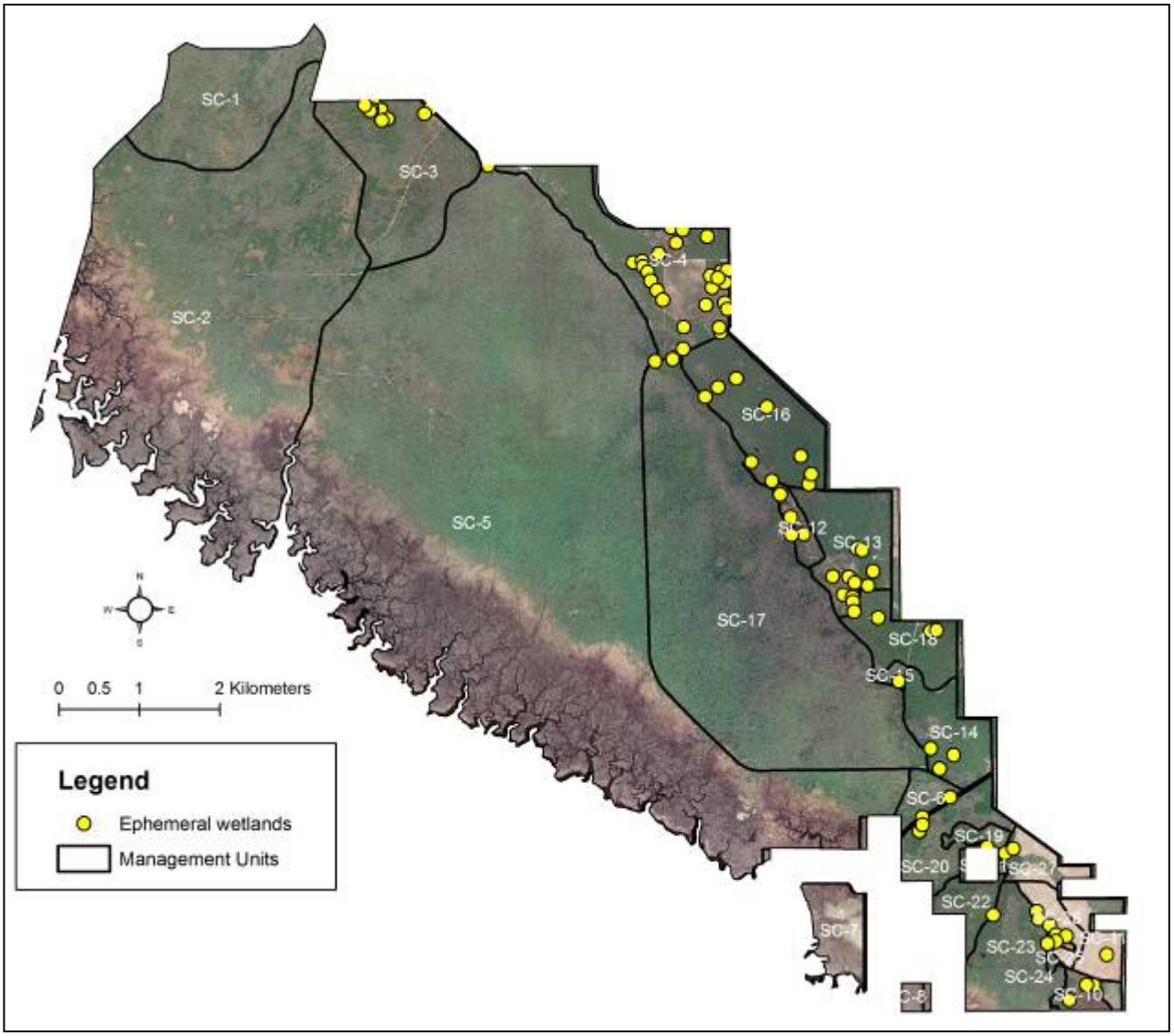

Figure 5. Map of the 87 ephemeral wetlands inventoried on the Spring Creek Unit of BBWMA.

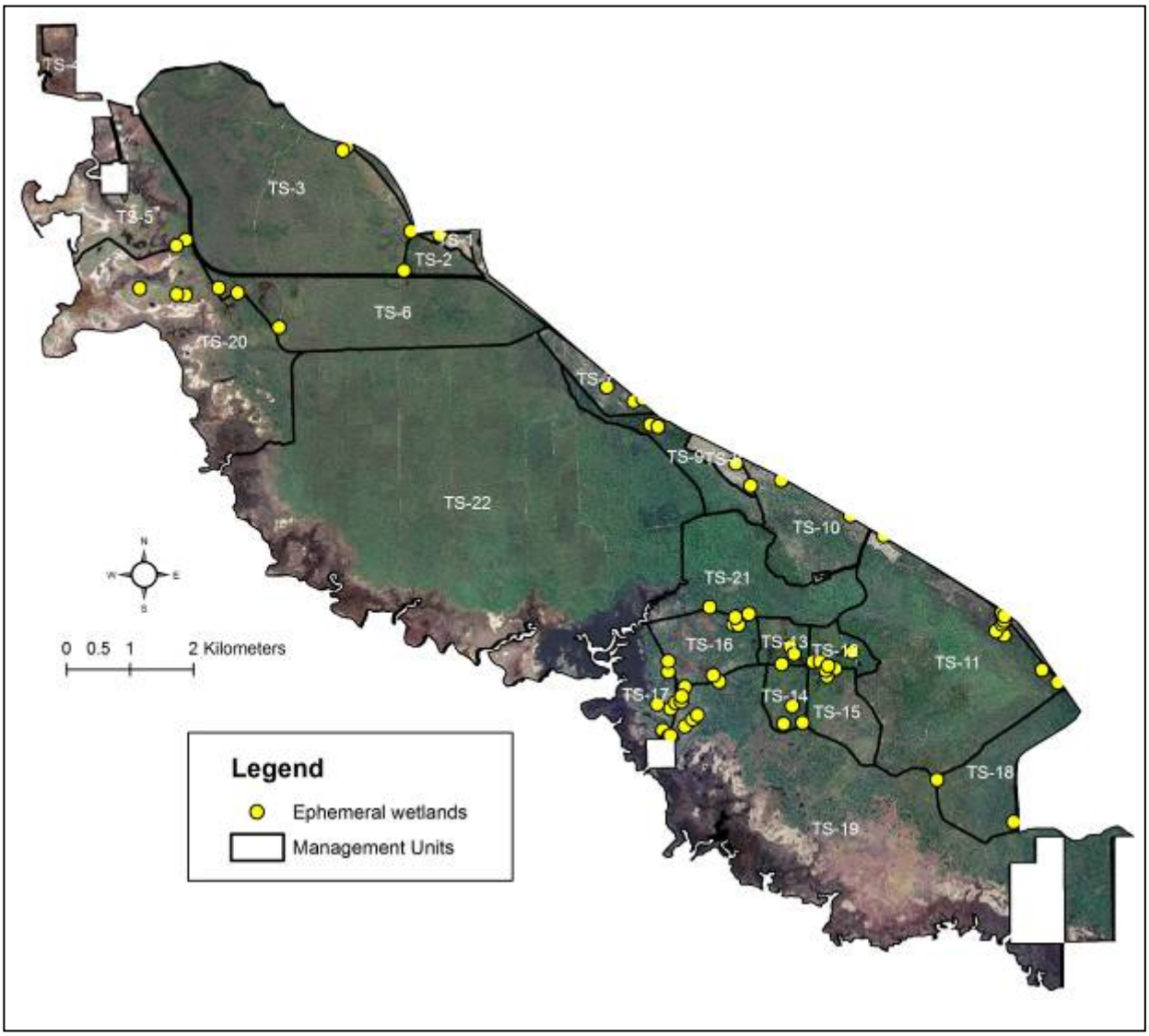

Figure 6. Map of the 69 ephemeral wetlands inventoried on the Tide Swamp Unit of the BBWMA.

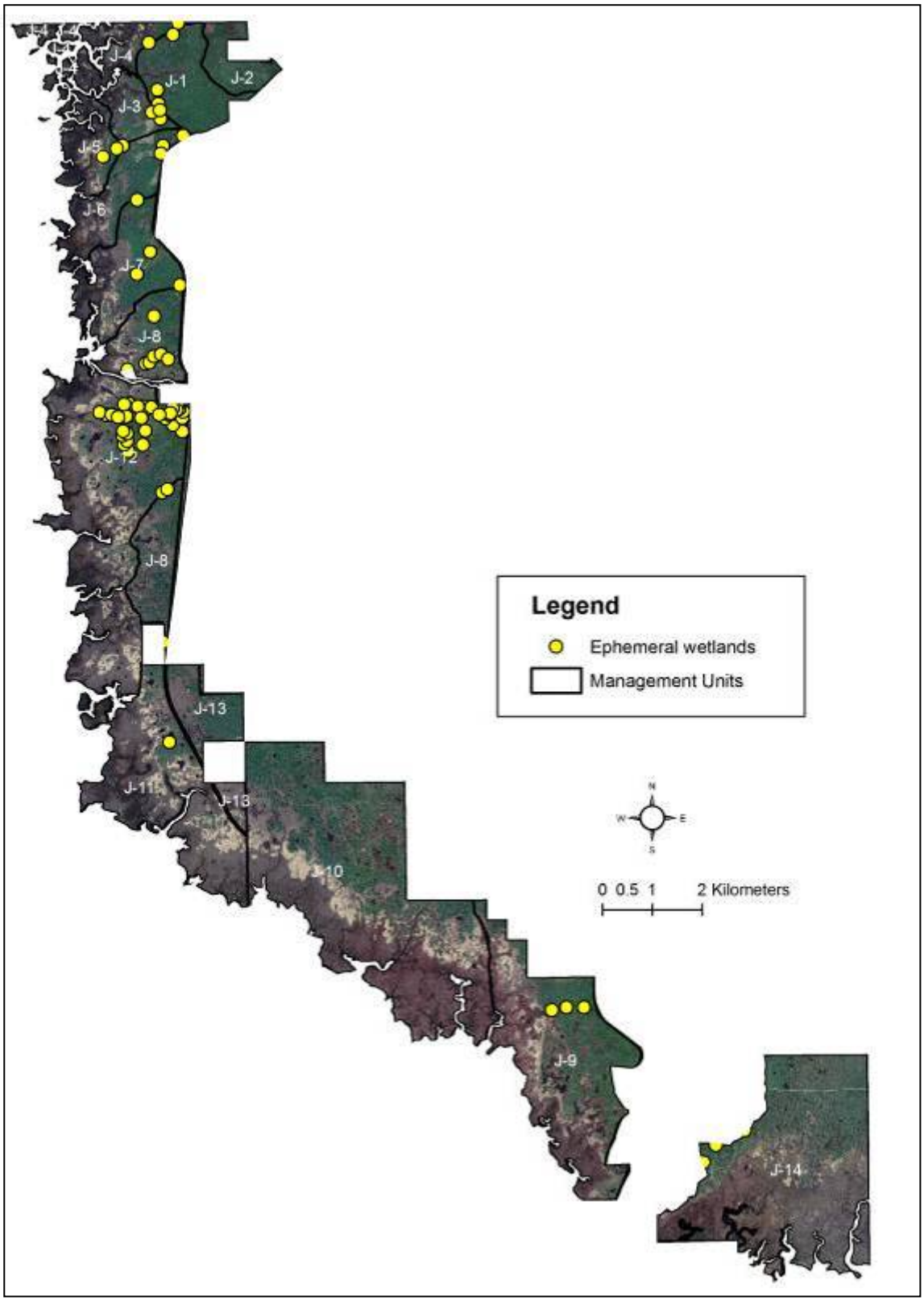

Figure 7. Map of the 70 ephemeral wetlands inventoried on the Jena Unit of the BBWMA.

Wetland Concerns

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

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

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

Bedding

Historically, much of Florida's flatwoods were bedded in order to provide higher, less water-logged sites on which to plant pine trees. Sometimes bedding was constructed through the edge or center of wetlands. Typically this practice occurred with smaller wetlands. We generally recommend allowing bedding to erode over time. However, more severely damaged wetlands, such as those with severe feral hog damage or altered hydrology, may provide a good experimental situation for mechanically flattening bedding in or around a wetland basin when the wetland is dry. If bedding removal proves successful (i.e. retention of native wetland plants, maintenance of hydroperiod), the method could be used on other, less severely damaged wetlands to restore bedding impacts. In some cases we may recommend specific wetlands where experimental bedding removal could be undertaken. All mechanical activity must be conducted when the wetland is completely dry to minimize soil damage and rut formation.

Bedding affected 27 wetlands on BBWMA. In many cases, the bedding rows were eroding and no action was recommended. Some wetlands provided an excellent opportunity to experiment with mechanical treatments (e.g. SI 04-01, SI 04-02, SC 04-01, SC 20-03, TS 09-01, and TS 14-03.).

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 BBWMA and we identified no wetlands affected by cattle.

Drainage Ditching, Culverts, Berms, and Roadside Ditching

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

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

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

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

We identified 1 wetland with a drainage ditch and 21 wetlands affected by roadside ditching. In almost all cases, the roadside ditches were created as a result of road-building through the wetland and provided a semi-permanent water source though the wetland itself was historically ephemeral. If the road is not re-routed, we recommended plugging the ditch where it is adjacent to the wetland and filling it with sand up to the level of the wetland bottom. All but 3 wetlands affected by roadside ditching (86%) were on the Jena Unit.

Dug-outs

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

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

We encountered 1 dug-out on BBWMA. The dug-out was created as a result of road building and was serving as a refugium for fish.

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 Frankenberger 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.

Feral hog damage was evident in 28 of the 286 wetlands (10%) on BBWMA. The majority of affected wetlands were in Spring Creek and Tide Swamp units, with the highest concentration on Tide Swamp (Figure 4). Because the percentage of affected wetlands is high and the extent of damage is extensive in MUs TS 12, 13, and 15, we recommend WMA personnel consider aggressive action such as trapping and/or harvesting be taken in this area to prevent further wetland degradation. The other areas on Tide Swamp and Spring Creek could be monitored. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

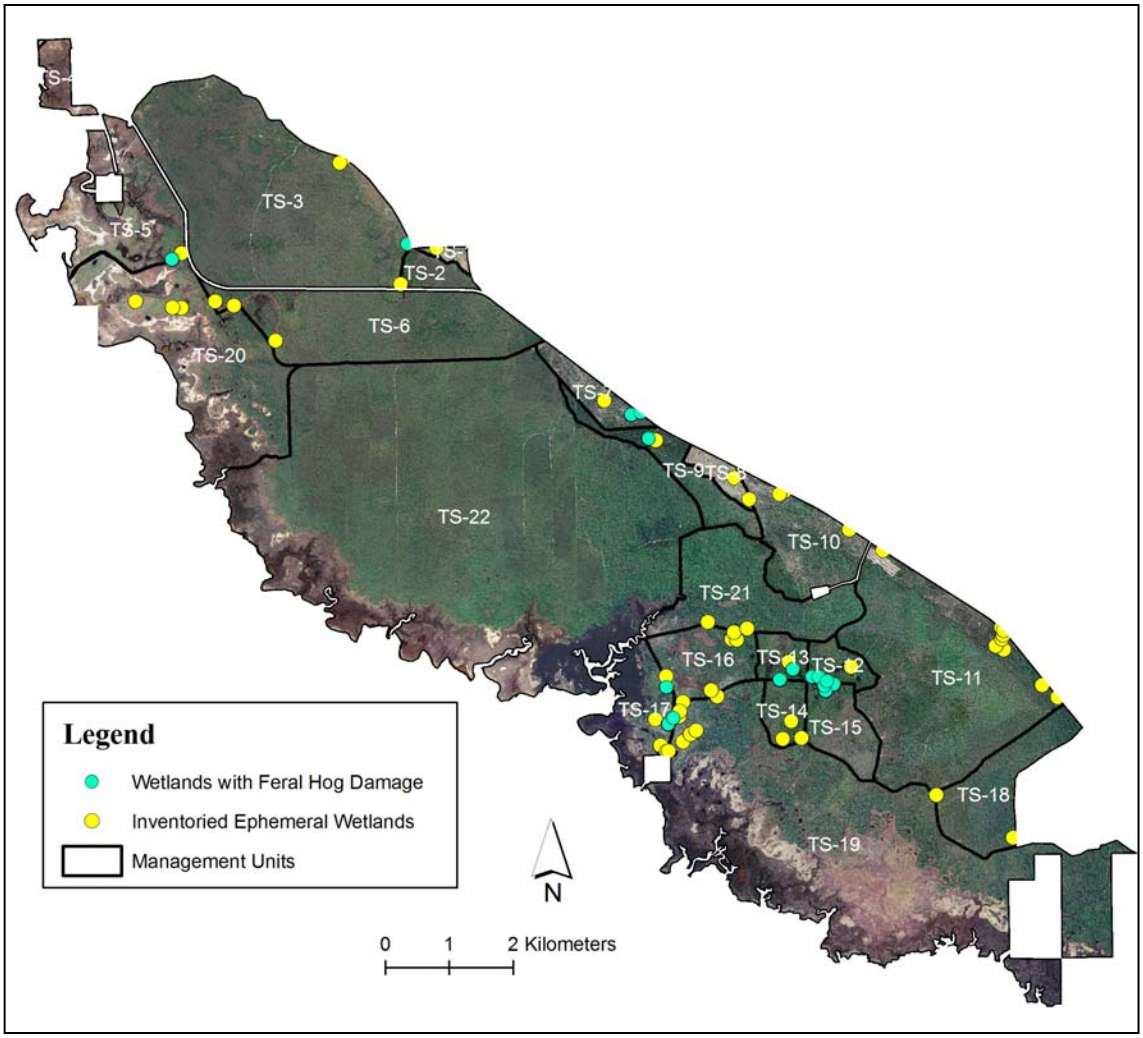

Figure 8. Map depicting the spatial extent of feral hog damage on the Tide Swamp unit.

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

Firelines/Management Unit Boundaries/Roads

The placement of firelines and roads through wetlands is detrimental to wetland habitat because the swath of exposed soil and denuded vegetation is a direct alteration of wetland habitat and can impact wetland hydroperiod. We recommend firelines and roads be rerouted at least 15m from a wetland edge to prevent damage to the wetland littoral zone. For wetlands that are located

adjacent to MU boundaries, we recommend delineating the wetland edges with flagging or some other method so the machine operators will be alerted to diverge from their straight line paths.

We typically recommend allowing abandoned firelines to fill in with vegetation over time. However, WMA personnel have employed mechanical treatments to rework and restore fire plow lines in and around wetlands. Using a low-ground pressure bulldozer and disc for minimal ground disturbance, old wildfire suppression plow lines have been rehabilitated on CRWMA. WMA personnel have observed a more natural hydroperiod and the ability to reintroduce fire into the wetland basin (J. Slater, CRWMA, pers. com.). Firelines bisecting wetlands also have been reworked on GRWMA to address hydrological impacts (J. Ellenberger, GRWMA, pers. com.).

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

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

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

Roads affected 38 wetlands on BBWMA (13%). In some cases roads were constructed directly through the center of a wetland, which created 2 separate wetlands. See individual wetland characterizations for details.

Herbaceous Plant Density

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

one species, usually maidencane or sawgrass. Additionally, these wetlands provide poor habitat for amphibian reproduction and for other species.

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

We encountered 4 wetlands with dense herbaceous vegetation on BBWMA. We highlight these wetlands so that WMA personnel can monitor their condition. If the condition becomes more severe over time, the wetland may need to be custom burned by waiting until the wetland is dry or intentionally lighting the wetland if a firebreak is present. Prescribed burning of a choked herbaceous marsh reduces vegetation density, increasing sunlight into the wetland ecosystem, and increases overall ecological productivity of the wetland.

Logging

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

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

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

Planted Pine Trees

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

We encountered 16 wetlands impacted by planted pine trees. In all cases we recommended removing the planted pine trees from the wetland interior.

Push Piles

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

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

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

We encountered 3 wetlands affected by a push pile on BBWMA. In all cases we recommended allowing the push piles to erode over time.

Slash

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

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

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

Upland Condition

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

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

Vehicular damage

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

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

We encountered 7 wetlands on BBWMA with vehicular damage. Almost all cases were old and a result of recreational or some other activity, not a result of large machinery. It does not appear that recreational use is an issue in wetlands at BBWMA.

Woody Vegetation Encroachment

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

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

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

There are some woody species that naturally grow in parts of marshes. Buttonbush, for example, is a wetland shrub that often becomes established in deeper sink depressions within marshes where a natural fire shadow exists in the wetland because of increased hydroperiod. Deep areas are less likely to burn over time because they are usually water-filled. These deep areas will and should burn during dry periods. Any native shrubs or trees that become established in the deepest part of a marsh should not be removed—prescribed fire alone is the proper management tool.

Our primary recommendation to reduce encroaching woody vegetation is the use of prescribed fire. If upland burning occurs during a period of wetland inundation, fire crews can return later in the year when the wetlands are dry and provide fire to any unburned wetlands. Because the

surrounding uplands will have little to no fuel load, a hot, ring fire can be ignited around the wetland basin, thereby improving chances the entire basin burns. This technique has been successful in restoring an herbaceous community to hardwood-encroached wetlands (C. Hess, USFS/FSU, pers. com.) and has been used successfully as a management technique (N. Dwyer, 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. Some of these wetlands provide a good experimental situation for mechanically removing the vegetation. If the desired results are achieved, the method could be used to restore other wetlands.

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

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

Dense brush rings occur when fire is not allowed to burn to the wetland edge, usually due to the presence of a fireline or because burning occurs when the wetland contains water (e.g. SC 20-01, TS 19-07). 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 bushog (mower). Single pass, single drum roller-chopping, followed by burning, also has successfully been used around wetland edges to reduce the midstory component while allowing grasses and herbs to germinate (J. Slater, CRWMA, pers. com.).

Woody vegetation encroaching from the wetland edge occurs during a dry period when the wetland is dry for an extended period of time. Woody vegetation (primarily pine and wax myrtle) from the surrounding uplands then has an opportunity to encroach and establish if fire is not allowed to burn into the wetland (e.g. J 08-01, J 12-31). Sometimes, there are large, mature slash and loblolly pine trees established around the outer wetland margin or in slightly elevated regions that connect multiple depressions within a single large marsh. Large pine trees should be

thinned and harvested using the least disruptive techniques to the wetland. Similarly, wax myrtle shrubs encroaching from the wetland edge can be thinned by chopping or bush hogging, depending on severity of encroachment. We recommend a single thinning of encroaching woody species per marsh in the short-term. After the thinning event, a marsh could be managed solely by periodic prescribed fires over the long-term.

Establishment of woody vegetation in a wetland basin also occurs during a dry period when the wetland is dry for an extended period of time accompanied by a lack of fire. In this scenario, woody vegetation (primarily slash pine trees and wax myrtle) sprouts and colonizes across the entire wetland basin, not just along the wetland edge (e.g. TS 19-08, J 12-18). 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 95 wetlands (35%) on CWMA impacted by some degree of woody encroachment. Many of these wetlands are in the beginning stages of encroachment and just need to be monitored to ensure the next fire or inundation eliminates the encroaching vegetation. Almost 70% of wetlands affected by woody encroachment were marshes.

Restoration Prioritization

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

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

Database

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

- Wetland ID
- Wetland type
- Basin area
- Hydroperiod
- Canopy coverage (%)
- Dominant canopy species
- Midstory coverage (%)
- Dominant midstory species
- Herbaceous coverage (%)
- Dominant herbaceous species
- Herbaceous distribution
- Wetland concerns
- Upland community type
- 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 (e.g. Figure 8).

As requested by BBWMA personnel, we made note of ephemeral wetlands with significant amounts of maidencane, which will help concentrate future round-tailed muskrat (*Neofiber alleni*) sampling efforts. For wetlands that had maidencane as one of several herbaceous vegetation species, maidencane was listed as the first species in the database. This will allow WMA personnel to sort by the Dominant Herbaceous Species field to quickly identify all wetlands with maidencane.

Wetland Characterizations and Descriptions

The following pages provide photographs and descriptions of the 286 ephemeral wetlands inventoried on BBWMA. The MUs are organized numerically within each of the 5 units. The units are organized from north to south: Snipe Island, Hickory Mound, Spring Creek, Tide

Swamp, and Jena. The wetland nomenclature uses the WMA Unit letters, the MU number, and the wetland number. For example SI 2-01 is the first wetland within MU 2 in the Snipe Island Unit. Additional photographs were provided on the accompanying CD.

Wetland ID: SI 02-01

Description: This wetland is a 0.2 ha ephemeral forested swamp. Most large trees in the swamp are snags. Maple and laurel oak trees dominate the canopy, and cover 50-75% of the wetland. The midstory is mixture of corkwood and various other woody plants, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are wet flatwoods that were recently clear-cut.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 02-02

Description: This wetland is a 0.2 ha ephemeral forested swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer. Sedges/grasses grow in scattered patches, and cover 5-25% of the wetland basin. The wetland floor has an oak leaf bottom. There is a lot of dead fall in the wetland. The adjacent uplands are wet flatwoods that were recently clear-cut.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 02-03

Description: This wetland is a 2.2 ha ephemeral forested swamp. Maple and laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by young cabbage palms, wax myrtle, and other hardwoods, and covers 5-25% of the wetland basin. There is no herbaceous vegetation. This swamp has a leaf bottom and is mostly open under the canopy. A major access road (Mandalay Rd.) and accompanying drainage ditch bisect the west side of the wetland. This wetland was once connected to a much larger, more permanent wetland system. The adjacent uplands are wet flatwoods that were recently clear-cut.

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 and the hydrology of the landscape restored. If this road is now a permanent attribute to the property and recognizing that the hydroperiod of this wetland has been altered by the road more so than the ditch, we do not recommend any action relating to the roadside ditches.

Wetland ID: SI 03-01

Description: This wetland is a 0.3 ha ephemeral forested swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by young cabbage palms, and covers 5-25% of the wetland basin. The wetland has an oak leaf bottom with sparse sawgrass. The herbaceous vegetation covers 5-25% of the wetland basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 03-02

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush covers 5-25% of the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. Bedding rows were constructed through the wetland but now are eroding. An access track was constructed to the north of the wetland. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None, the bedding rows will erode over time.

Wetland ID: SI 03-03

Description: This wetland is a 0.4 ha ephemeral forested swamp. Gum and laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and small palm, oak, and gum trees, and covers 25-50% of the wetland. The wetland basin is leaf-covered with sparse sawgrass. The herbaceous vegetation covers 5-25% of the wetland. There are areas of what appears to be old, eroded push mounds of dirt that are about 1m high. The adjacent uplands are wet flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Push piles

Restoration Action Recommended: None, the push piles will erode with time.

Wetland ID: SI 04-01

Description: This wetland is a 0.2 ha ephemeral forested swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer. The wetland basin is leaf-covered with sparse sedges/grasses. The herbaceous vegetation covers 5-25% of the wetland. Severe bedding rows are still evident through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: The severity of bedding rows in this wetland provides a good template to experiment with mechanically flattening the old bedding rows when the wetland is completely dry. If successful at this wetland, the method could be used on other, less severely damaged wetlands to restore bedding impacts.

Wetland ID: SI 04-02

Description: This wetland is a 0.2 ha ephemeral forest swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by small palm trees, and covers 5-25% of the wetland. The wetland basin is leaf-covered with no herbaceous vegetation. Severe bedding rows run through the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: The severity of bedding rows in this wetland provides a good template to experimentally mechanically flatten the old bedding rows when the wetland is completely dry. If successful at this wetland, the method could be used on other, less severely damaged wetlands to restore bedding impacts.

Wetland ID: SI 04-03

Description: This wetland is a 0.6 ha ephemeral forested swamp. Cypress, gum, and laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is comprised of a diversity of shrubs, and covers 5-25% of the wetland. The wetland basin is leaf-covered with no herbaceous vegetation. Pronounced bedding rows run through the southwest quarter of the wetland where the area is a little higher and drier. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None; the bedding rows will erode over time.

Wetland ID: SI 05-01

Description: This wetland is a 0.4 ha ephemeral forested swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by buttonbush, young palms, and covers 5-25% of the wetland. The wetland basin is leaf-covered with sparse sawgrass. The herbaceous vegetation covers 5-25% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 05-02

Description: This wetland is a 0.5 ha ephemeral forested swamp. Oak and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is a mixture of buttonbush, sparkleberry, small oak trees, and covers 5-25% of the wetland. The wetland basin is leaf-covered with no herbaceous vegetation. This swamp is functioning but the ground is uneven and full of hillocks, likely due to past logging practices. There is a raised, <1m tall island in the wetland center and bedding into the periphery. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Push piles

Restoration Action Recommended: None. While it would be advantageous to restore the topography of this wetland, the process would destroy the existing forest. Any mechanical activity should await the results of experiments at smaller, more impacted wetlands.

Wetland ID: SI 05-03

Description: This wetland is a 1.5 ha ephemeral mixed swamp. Gum, palm, and oak trees dominate the canopy, and cover 50-75% of the wetland. The midstory is comprised of wax myrtle, buttonbush, young palms and oaks, and covers 50-75% of the wetland. Sedges/grasses and sawgrass grow in scattered patches, and cover 25-50% of the wetland. The wetland interior is highly variable with deeper and shallower areas, and areas of marsh, hammock, and water holes. There is a high diversity of trees and shrubs. Old stumps indicate previous logging. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 06-01

Description: This wetland is a 0.4 ha ephemeral forested swamp. Laurel oak and gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by an unidentified thorny shrub, which covers 5-25% of the wetland basin. There is no herbaceous vegetation. This swamp has a leaf bottom and is mostly open under the canopy. There is evidence of fire around the wetland perimeter. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 06-02

Description: This wetland is a 1.5 ha ephemeral forested swamp. Cypress and gum dominate the canopy, and cover >75% of the wetland. There is no midstory layer. There is no herbaceous vegetation. This swamp has a diversity of tree species, thin leaf litter, and an open understory. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 06-03

Description: This wetland is a 0.7 ha ephemeral forested swamp. Laurel oak and pine trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by smaller laurel oak and cabbage palm trees, and covers 25-50% of the wetland basin. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. This swamp was bedded and planted with slash pine trees. The beds are eroding and a few slash pine trees remain in the interior. An old vehicular track bisects the south end of the wetland. There is a deeper hole on the north side of the wetland. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Planted pines, Vehicular damage

Restoration Action Recommended: Remove pines from the wetland interior and allow bedding to erode. If the track is necessary, re-route it away from the wetland.

Wetland ID: SI 07-01

Description: This wetland is a 0.1 ha ephemeral mixed swamp. Cypress and laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by young laurel oak trees, and covers 50-75% of the wetland basin. There is no herbaceous vegetation. This swamp has a fairly dense brush perimeter with an open interior. The adjacent uplands are mesic flatwoods and currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 07-02

Description: This wetland is a 0.3 ha ephemeral forested swamp. Cypress and laurel oak trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by palm, oaks, and wax myrtle, and covers 25-50% of the wetland basin. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland. The 2 lobes of this swamp each have deep holes and an elevated connecting region that is highly ephemeral and brushy. The adjacent uplands are mesic flatwoods with planted pine on the north side. The uplands currently are managed with prescribed fire and mechanical vegetation removal.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 07-03

Description: This wetland is a <0.1 ha semi-permanent man-made isolated pond. There is no canopy or midstory layer. Emergent vegetation grows throughout, and covers 50-75% of the wetland. This pond is uniformly deep, and has clear water and fish present. The ground around the periphery is raised. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: If the ground around the wetland were flattened, this man-made pond would function as an ephemeral wetland.

Wetland ID: SI 08-01

Description: This wetland is a 0.2 ha ephemeral forested swamp. Willow and maple trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by young willow and maple trees, which covers 50-75% of the wetland. There is no herbaceous vegetation. An access road forms a berm along the east margin of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. There is a large, plowed food plot on the west side of the wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 08-02

Description: This wetland is a 0.1 ha ephemeral marsh. Oak and palm trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by buttonbush and young willow and maple trees, and covers 25-50% of the wetland. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. A fire burned through the marsh and killed some woody vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. There is a large, plowed food plot on the south side of the wetland.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Continue providing periodic fire to reduce woody vegetation.

Wetland ID: SI 08-03

Description: This 0.3 ha wetland has been severely altered. Formerly an ephemeral marsh, the area was chopped, scraped, plowed, and planted into what appears to be a food plot. Recent flooding has outlined the size of the former wetland. There is exposed earth and limerock. A thin strip of marsh vegetation remains in the center, and covers 5-25% of the wetland. The adjacent uplands are a mix of wet and mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Mechanical activity

Restoration Action Recommended: We strongly discourage the practice of altering wetlands to create food plots. We recommend abandoning the food plot and allowing the natural long-term process of vegetation recovery to occur.

Wetland ID: SI 09-01

Description: This wetland is a 0.4 ha ephemeral forested swamp. Laurel oak trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and young palm trees, and covers 5-25% of the wetland. The wetland basin is leaf-covered, and there is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 09-02

Description: This wetland is a 0.5 ha ephemeral mixed swamp. Laurel oak and cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and young palm trees, and covers 50-75% of the wetland. The wetland basin is leaf-covered, and there is no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. There is a large food plot on the west side of the wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 09-03

Description: This wetland is a 0.4 ha ephemeral forested swamp. Cypress, gum, and oak trees dominate the canopy, and cover >75% of the wetland. Wax myrtle and young pine trees grow around the wetland edge, and cover 5-25% of the wetland. Sawgrass grows in a ring around the edge of the wetland basin, and covers 5-25% of the wetland. The interior of the wetland is open and leaf-covered. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 10-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy. Unidentified deciduous sapling trees are the only woody vegetation in the wetland, and cover 5-25% of the wetland basin. Sedges/grasses and sawgrass grow throughout, and cover 50-75% of the wetland. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 10-02

Description: This wetland is a 0.4 ha ephemeral forested swamp. This healthy wetland has a diversity of tree species and an open understory. Gum, maple, and palm trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer. Sawgrass grows in scattered patches, and covers 25-50% of the wetland. The adjacent uplands are a mixture of mesic and wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 10-03

Description: This wetland is a 0.7 ha ephemeral forested swamp. This healthy wetland has a diversity of tree species and a mostly open understory. Gum, maple, and palm trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle, buttonbush, and young maple trees, and covers 5-25% of the wetland. Sawgrass grows in scattered patches, and covers 50-75% of the wetland. This wetland connects to ditches that run along a nearby access road. The adjacent uplands are a mixture of mesic and wet flatwoods that were bedded and converted to a pine plantation. This conversion of the landscape likely isolated this wetland from a larger, more permanent wetland forest system. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: It appears this wetland became isolated when the area surrounding was bedded and converted to a pine plantation. The landscape conversion and road building altered the wetland more so than does the ditching. In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed and the hydrology of the landscape restored. If 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: SI 13-01

Description: This wetland is a 0.5 ha ephemeral forested swamp. This healthy wetland has a diversity of tree species and an open understory. Cypress trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer. The wetland basin is leaf-covered with no herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SI 17-01

Description: This wetland is a 0.3 ha ephemeral forested swamp. Cypress, gum, and laurel oak trees dominate the canopy, and cover >75% of the wetland. There is no midstory layer or herbaceous vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-01

Description: This wetland is a 0.1 ha ephemeral marsh. Cedar and pine 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, and covers >75% of the wetland basin. This wetland will connect to a ditch associated with a nearby access road, but the impact does not appear to be great. The adjacent uplands are a mix of wet and mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy. A shrub canopy, dominated by wax myrtle and holly, covers 5-25% of the wetland. Sawgrass and sedges/grasses grow throughout the wetland, and cover >75% of the basin. This large, open marsh has a thin brush ring around the perimeter. A few small pines and shrubs are encroaching into the wetland interior. The marsh will connect with a large hydric hammock to the east during times of high water. The adjacent uplands are a mix of wet and mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage fire in the wetland basin within the next few years to control the encroaching woody vegetation. The vegetation could be hand-chopped from the wetland if it is not killed by the next fire.

Wetland ID: HM 01-03

Description: This wetland is a 0.2 ha ephemeral marsh. Maple trees are encroaching into the wetland basin. Gum and maple 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. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Ensure that the marsh basin burns periodically to control the encroaching woody vegetation. The maple trees could be hand-chopped from the wetland if they are not killed by the next fire.

Wetland ID: HM 01-04

Description: This wetland is a 0.1 ha ephemeral marsh. The wetland is open except for a gum-dominated canopy on the south side. The tree canopy covers 5-25% of the wetland. There is no midstory layer. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland may connect to HM 01-05 to the southwest. A ditch associated with a nearby access road is separated from the wetland by an earth berm. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-05

Description: This wetland is a 0.1 ha ephemeral marsh. The marsh has 2 lobes with a slightly higher peninsula of land separating the lobes. A mixture of maple, palm, and pine trees grow around the edge of the wetland. This tree canopy covers 5-25% of the wetland basin. The midstory is dominated by wax myrtle, palm, and various other woody plants, and covers 5-25% of the wetland. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland may connect to HM 01-04 to the northeast. A ditch associated with a nearby access road is separated from the wetland by an earth berm. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Ensure that the marsh basin burns periodically to control the encroaching woody vegetation.

Wetland ID: HM 01-06

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. This circular wetland is an exemplary sawgrass marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-07

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. There is a shrub layer dominated by corkwood that covers 5-25% of the wetland. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland is an exemplary sawgrass marsh. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-08

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. A large diversity of herbaceous vegetation grows throughout, and covers >75% of the wetland basin. This circular wetland is an exemplary marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-09

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes dominate the wetland interior and sedges/grasses grow in a ring around the wetland edge. The herbaceous vegetation covers >75% of the wetland basin. This wetland is an exemplary marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-10

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland is an exemplary sawgrass marsh. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. It is somewhat difficult to discern the boundary between the surrounding flatwoods and the wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-11

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. There is a little slash in the wetland from a recent thinning that likely will burn with the next fire. This wetland is an exemplary open, grassy marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-12

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. The flatwoods in this area have wetland-indicating herbaceous vegetation. It is difficult to distinguish the wetland from the flatwoods except for the presence of water in the wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-13

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows densely throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: This wetland would benefit from a fire to reduce the density of the sawgrass.

Wetland ID: HM 01-14

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland is an exemplary sawgrass marsh. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-15

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. Bedding rows were constructed through the wetland but are eroding now. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. It is difficult to distinguish the wetland from the flatwoods except for the presence of water in the wetland.

Wetland Concerns: Bedding (minor)

Restoration Action Recommended: None

Wetland ID: HM 01-16

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. There is a shrub layer, dominated by corkwood, which covers 5-25% of the wetland. A few small pine trees are scattered around the outer edge of the wetland but will easily be killed by the next fire. Sedges/grasses grow in the wetland interior and sawgrass grows around the outer edges. The herbaceous vegetation covers >75% of the wetland basin. Old bedding rows on the wetland edge are eroding. Vehicular ruts from recent restoration activity also are evident along the wetland edge. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding (minor), Vehicular damage (minor)

Restoration Action Recommended: Allow the bedding and ruts to erode 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: HM 01-17

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. It is difficult to distinguish the wetland from the flatwoods except for the lack of planted pine trees.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-18

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community. It is difficult to distinguish the wetland from the flatwoods except for the presence of water in the wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-19

Description: This wetland is a 0.1 ha ephemeral marsh. A thin ring of gum trees grows around the wetland edge. The tree canopy covers 5-25% of the wetland basin. There is no midstory layer. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are a mix of mesic and wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-20

Description: This wetland is a 0.3 ha ephemeral marsh. Gum and palm trees grow in a ring around the wetland. This tree canopy covers 5-25% of the wetland basin. There is no midstory layer. Sawgrass and rushes grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 01-21

Description: This wetland is a 0.4 ha ephemeral marsh. There is a distinct swamp ring around the wetland edge composed of gum and palm trees. This tree canopy covers 25-50% of the wetland. The midstory is dominated by wax myrtle and *Baccharis*, and covers 5-25% of the wetland. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

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

Wetland ID: HM 01-22

Description: This wetland is a 0.9 ha ephemeral marsh. There is a palm and hardwood hammock ring around the wetland edge. This tree canopy covers 5-25% of the wetland. There is no midstory layer. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 02-01

Description: This wetland is a 0.2 ha forested swamp. Gum and maple trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by corkwood, wax myrtle, and maple trees, and covers 5-25% of the wetland. Sawgrass grows in the wetland center, and covers 5-25% of the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned, burned, and chopped in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 03-01

Description: This wetland is a 0.5 ha ephemeral shrub swamp. There is no tree canopy. A shrub canopy, dominated by wax myrtle, willow, buttonbush, and small maple trees, covers 50-75% of the wetland. Sawgrass grows throughout, and covers 50-75% of the wetland basin. This wetland was likely once a marsh that was impacted by the encroachment of wood vegetation over a long period of fire suppression and dryness. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands currently are managed with prescribed fire.

Wetland Concerns: Woody encroachment

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

Wetland ID: HM 03-02

Description: This wetland is a 2.1 ha ephemeral forested swamp. Cypress and maple trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle and willow, and covers 5-25% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the wetland basin. This wetland is highly variable with diverse vegetation and appears to be healthy. There is fire evidence around the wetland perimeter. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 03-03

Description: This wetland is a 0.2 ha semi-permanent shrub swamp. There is no tree canopy. The shrub layer is dominated by willow, and covers >75% of the wetland. Sawgrass grows in scattered patches, and covers 25-50% of the wetland basin. Fish were present on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 03-04

Description: This wetland is a 1.0 ha semi-permanent forested swamp. Cypress and maple trees dominate the canopy, and cover >75% of the wetland basin. There is no midstory cover. Sawgrass grows throughout, and covers 50-75% of the wetland basin. This wetland likely was once a marsh but has succeeded to a healthy, forested swamp. Most trees are greater than 30 years old. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None. There are many marshes on this property already and this is a healthy, functioning forested swamp. We do not recommend investing resources to restore this wetland back to a marsh.

Wetland ID: HM 03-05

Description: This wetland is a 0.2 ha ephemeral marsh. Hardwood trees are encroaching into the wetland basin. Young maple trees dominate the canopy, and cover 25-50% of the wetland. The midstory is dominated by buttonbush, and covers 25-50% of the wetland. Sawgrass and *Sphagnum* grow throughout, and cover 50-75% of the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Hand remove maple trees in wetland interior and encourage periodic fire to prevent further woody encroachment.

Wetland ID: HM 03-06

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees are planted on bedded rows through the wetland. The tree canopy covers 5-25% of the wetland. The midstory is dominated by wax myrtle, and covers 25-50% of the wetland. Sawgrass and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: Allow bedding rows to erode over time, remove planted pines from the wetland basin, and provide fire to manage encroaching woody vegetation.

Wetland ID: HM 03-07

Description: This wetland is a 0.6 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The shrub layer is dominated by buttonbush, and covers 5-25% of the wetland. Sawgrass grows in scattered patches, and covers 5-25% of the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: HM 03-08

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. This wetland is a beautiful, open, circular sawgrass marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 03-01

Description: This wetland is a 0.1 ha ephemeral marsh. Gum trees grow in a ring around the wetland, and cover 25-50% of the wetland basin. There is no midstory cover. Sawgrass grows throughout, and covers 50-75% of the wetland basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 03-02

Description: This wetland is a 0.2 ha ephemeral marsh. Gum trees grow in a ring around the wetland, and cover 5-25% of the wetland basin. There is no midstory cover. Sawgrass and emergent vegetation grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 03-03

Description: This wetland is a 0.2 ha ephemeral marsh. Young maple, gum, and pine trees are beginning to encroach into the wetland. The tree canopy covers 5-25% of the wetland basin. Sedges/grasses, rush, and emergent vegetation grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching vegetation and prevent further woody encroachment. The woody vegetation could be hand-chopped if it is not killed by the next fire or inundation.

Wetland ID: SC 03-04

Description: This wetland is a 0.2 ha ephemeral marsh. Gum trees grow in a thin ring around the wetland, and cover 5-25% of the wetland basin. There is no midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. A recent fire killed some young trees around the wetland edge. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 03-05

Description: This wetland is a 0.1 ha ephemeral marsh. Gum and maple trees have encroached into the wetland, and cover 50-75% of the wetland basin. Willow grows throughout the wetland, and covers 5-25% of the wetland basin. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to eliminate woody vegetation and prevent further encroachment.

Wetland ID: SC 03-06

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 03-07

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees grow in a cluster in the center of the wetland, and cover 5-25% of the wetland basin. There is no midstory cover. Sawgrass and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: The large pine trees could be removed from the wetland center or fire could continue to be used, and the wetland monitored, to ensure no additional pines become established.

Wetland ID: SC 03-08

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Emergent vegetation grows in the deeper wetland center and sedges/grasses grow throughout. The herbaceous vegetation covers >75% of the wetland basin. Feral hogs have rooted around the wetland edge on the south side. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 03-09

Description: This wetland is a 0.2 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by buttonbush, and covers 5-25% of the wetland. Diverse, low-lying herbaceous vegetation grows throughout and there is a dense *Sphagnum* mat. The herbaceous vegetation covers >75% of the wetland basin. Feral hogs have rooted in a ring around the wetland edge. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 04-01

Description: This wetland is a 0.9 ha ephemeral borrow pit. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by gallberry, and covers 5-25% of the wetland. Sedges/grasses grow throughout, and cover 50-75% of the wetland. This man-made borrow pit has high sandy banks and pines growing in bedded rows through the center. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. Planted sand pine was recently removed to restore the sandhill community. K. Enge identifies this wetland as PORN 16.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: We recommend managing this borrow pit as an ephemeral wetland, since it currently functions as one. Remove pines and provide regular fire. This wetland is a candidate for experimentally flattening bedding rows and monitoring vegetation response.

Wetland ID: SC 04-02

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Old ORV ruts are evident throughout the marsh but are healing. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community. K. Enge identifies this wetland as PORN 17.

Wetland Concerns: Vehicular damage (old)

Restoration Action Recommended: Allow ruts to heal.

Wetland ID: SC 04-03

Description: This wetland is a 0.5 ha ephemeral marsh. Pine trees are encroaching along the southern 2/3 of the marsh, and cover 25-50% of the wetland basin. There is no midstory cover. Sedges/grasses grow throughout on the north side, and cover 25-50% of the wetland basin. Pine needle duff covers the southern 2/3 of the wetland, inhibiting the growth of herbaceous vegetation. A recent fire reduced the needle duff. This wetland provides a great example of the effects of pine encroachment and subsequent shading of herbaceous vegetation. This wetland is a potential striped newt breeding pond. Both ornate and southern chorus frogs were calling on the day of our visit. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove interior pines and thin pine trees around the wetland edge.

Wetland ID: SC 04-04

Description: This wetland is a 6.9 ha ephemeral forested swamp. This wetland is forested in the interior with a ring of herbaceous vegetation around the edge. Cypress trees dominate the canopy, and cover 50-75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 25-50% of the wetland. Maidencane, sawgrass, and sedges/grasses grow in a ring around the wetland edge, and cover 25-50% of the wetland basin. There is minor feral hog damage in the wetland. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 04-05

Description: This wetland is a 0.1 ha highly ephemeral marsh. Planted slash pines grow into the wetland edge, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow in scattered patches and cover 25-50% of the wetland basin. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: Planted pines

Restoration Action Recommended: Remove planted pine trees from the wetland interior.

Wetland ID: SC 04-06

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover 50-75% of the basin. This wetland provides a great example of a pristine marsh. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-07

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. This wetland provides a great example of a pristine, open pineland, marsh and is a potential striped newt breeding pond. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-08

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. This wetland provides a great example of a pristine marsh and is a potential striped newt breeding pond. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-09

Description: This wetland is a 0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. This wetland provides a great example of a pristine marsh. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-10

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 50-75% of the wetland basin. This wetland is a striped newt breeding pond. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community. This wetland is either the wetland or near the wetland K. Enge identifies as PORN 19 wetland.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-11

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. This wetland is a potential striped newt breeding pond. There is evidence of fire in the wetland basin. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-12

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is a potential striped newt breeding pond. There is evidence of fire in the wetland basin and a natural oil slick/seep on the water surface (no unusual odor). The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-13

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout and cover >75% of the wetland basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-14

Description: This wetland is a <0.1 ha ephemeral marsh. Several large pine trees grow on old bedded rows in the wetland basin. The tree canopy covers 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. This wetland is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were bedded and converted to a pine plantation, but now are being restored to more open communities.

Wetland Concerns: Bedding, Planted pine trees

Restoration Action Recommended: Allow bedding to erode and remove planted pine trees from the wetland basin.

Wetland ID: SC 04-15

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. A recent fire killed shrubs that were growing in clumps in the wetland. This wetland is an exemplary sandhill marsh and is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-16

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and covers>75% of the wetland basin. A recent fire killed the fetterbush that was growing in clumps around the wetland edge. This exemplary sandhill marsh is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-17

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and *Sphagnum* grow throughout the wetland, and cover >75% of the basin. A recent fire killed the shrubs that were growing around the wetland perimeter. This exemplary sandhill marsh is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-18

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. A recent fire burned completely through the wetland. This exemplary sandhill marsh is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-19

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and covers >75% of the wetland basin. A recent fire burned completely through the wetland. This wetland an exemplary sandhill marsh and is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-20

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. A recent fire killed the shrubs and small pines growing in the wetland. This exemplary sandhill marsh is a potential striped newt breeding pond. A mesic flatwoods community grows in the low areas adjacent to the wetland. Rolling sandhills are upslope. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-21

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and covers >75% of the wetland basin. A sand property boundary road bisects the northern tip of the wetland. Tadpoles were present in the drying pond on the day of our visit. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: Road/Property boundary

Restoration Action Recommended: In order to restore the hydrology of this wetland, 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.

Wetland ID: SC 04-22

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. Buttonbush grows scattered in the wetland basin and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-23

Description: This wetland is a 0.1 ha ephemeral marsh. Large pine trees grow in the wetland interior and cover 5-25% of the wetland basin. Small pine trees also are encroaching into the wetland and cover 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove large pine trees from the wetland interior. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: SC 04-24

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland has 2-lobes. The smaller lobe on the west side is higher, more ephemeral, and has a few shrubs and pine trees. The larger eastern lobe is a circular depression that is open with herbaceous vegetation. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-25

Description: This wetland is a 6.6 ha semi-permanent forested swamp. Cypress and gum trees dominated the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle and covers 5-25% of the wetland. There is no herbaceous vegetation. Old cypress stumps are abundant in the wetland but grown cypress trees are now as large as the old stumps. This healthy swamp has an open understory and a leaf litter bottom. The adjacent uplands are sandhills. The uplands were converted to a pine plantation but now have been cleared as part of the restoration process.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 04-26

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. This healthy marsh is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 05-01

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. Dry-up holes in the wetland were filled with tadpoles on the day of our visit. There is minor in the wetland. This wetland is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods. The uplands were bedded and converted to a pine plantation but now are being restored to a more open flatwoods community. Sandhills lie 100m to the north of the wetland.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 06-01

Description: This wetland is a 0.4 ha ephemeral marsh. Gum and pine trees grow in a ring around the wetland edge, and cover 5-25% of the wetland basin. The midstory is dominated by buttonbush, and covers 5-25% of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are mixed mesic and scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 06-02

Description: This wetland is a 0.5 ha ephemeral, shallow borrow pit. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. Even though it is man-made, this borrow pit is functioning as a very healthy ephemeral wetland and is a potential striped newt breeding pond. A county road is located along the southeast side of the wetland. The adjacent uplands are mixed mesic and scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road

Restoration Action Recommended: The wetland may receive run-off from the road but appears to be a healthy, functioning wetland.

Wetland ID: SC 10-01

Description: This wetland is a 1.5 ha ephemeral marsh. Pine trees dominated the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by wax myrtle and loblolly bay, and covers 5-25% of the wetland. Sedges/grasses and sawgrass grow throughout, and cover 50-75% of the wetland basin. This wetland provides a good example of the restorative effects of fire to a shrub-encroached marsh. There are numerous dead shrub snags. The adjacent uplands are mixed mesic and scrubby flatwoods that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 10-02

Description: This wetland is a 0.4 ha ephemeral marsh. Pine trees dominated the canopy, and cover 5-25% of the wetland basin. There is no midstory cover. Sawgrass grows throughout, and covers 50-75% of the wetland basin. A recent fire burned through the wetland and reduced a shrub ring and killed perimeter pine trees. This wetland provides a good example of the positive effects of fire in maintaining a marsh. The adjacent uplands are mixed mesic and scrubby flatwoods that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 10-03

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rushes grow throughout the wetland, and cover >75% of the basin. This wetland is a healthy rush marsh. It was fresh water on the day of our visit but likely is influenced by salt water periodically. The adjacent uplands are mixed mesic and scrubby flatwoods that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 11-01

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. This wetland lies atop a scrubby sand ridge and is a potential striped newt breeding pond. The adjacent uplands are treeless scrub.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 12-01

Description: This wetland is a 2.7 ha ephemeral marsh and shrub swamp. A few pine trees grow throughout the wetland, and cover 5-25% of the wetland basin. Fetterbush and holly trees dominate the midstory, and cover 25-50% of the wetland. The fetterbush grows in clumps on raised hummocks. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. This wetland may be an old, logged swamp. There is evidence of fire in the wetland basin. Feral hog damage is moderate and patchy. This wetland may connect to 12-02 during times of high water. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 12-02

Description: This wetland is a 0.6 ha ephemeral marsh and shrub swamp. There is no tree canopy. A shrub canopy, dominated by fetterbush and loblolly bay saplings, covers 25-50% of the wetland. The fetterbush grows in clumps on raised hummocks. A recent fire killed some of the fetterbush. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. This wetland may be an old, logged swamp. Feral hog damage is minor and patchy. This wetland may connect to 12-01 during times of high water. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 12-03

Description: This wetland is a 5.0 ha ephemeral forested swamp. This strand swamp has a distinctive circular, open, marsh area on the north side. Cypress and pine trees dominate the canopy, and cover 50-75% of the wetland. Wax myrtle dominates the midstory, and covers 5-25% of the wetland. Sedges/grasses and sawgrass grow in scattered patches, and cover 5-25% of the wetland basin. Fire has penetrated all the way through the wetland. Southern chorus frogs were calling on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 13-01

Description: This wetland is a 0.4 ha highly ephemeral marsh. There is no tree canopy. However, a few live oak shrubs are growing along the wetland edge and the interior, covering 5-25% of the wetland. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. There are a few old vehicle ruts through the wetland that are healing. The adjacent uplands are sandhills that were converted to a dense sand pine plantation.

Wetland Concerns: Vehicular damage, Upland condition, Woody encroachment

Restoration Action Recommended: Allow the ruts to erode over time. Encourage periodic fire to burn through the wetland basin to kill the encroaching vegetation and prevent further woody encroachment. The woody vegetation could be hand-chopped if it is not killed by the next fire or inundation. In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 13-02

Description: This wetland is a 0.3 ha highly ephemeral marsh. Live oak trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by small oak, palm, and sand pine trees, and covers 5-25% of the wetland. Maidencane and sedges/grasses grow in scattered patches, and cover 50-75% of the wetland basin. The adjacent uplands are sandhills that were converted to a dense sand pine plantation.

Wetland Concerns: Upland condition, Woody encroachment

Restoration Action Recommended: Remove interior trees. In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 13-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. There are two large wax myrtle clumps in the center of the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. An access road bisects the west side of the wetland. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: Road

Restoration Action Recommended: Re-route the road into the uplands to the west of the wetland if feasible.

Wetland ID: SC 13-04

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. Hog damage is moderate. There are a few old vehicle ruts through the wetland that are healing. An access road bisects the wetland. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: Feral hog damage, Road, Vehicular damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Re-route the road away from the wetland if feasible. Allow the ruts to erode over time.

Wetland ID: SC 13-05

Description: This wetland is a 0.3 ha ephemeral marsh. Gum trees grow in a deeper hole in the south end of the wetland. The tree canopy covers 5-25% of the wetland basin. There is no midstory layer. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. Fire has burned all the way through the wetland, including through the deeper hole. This wetland provides a great example of fire through a marsh. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 13-06

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Maidencane and sedges/grasses grow throughout the wetland, and cover >75% of the basin. A recent fire burned all the way through the wetland. This wetland appears to be in great ecological condition and is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 13-07

Description: This wetland is a 0.2 ha ephemeral marsh. Three slash pine trees grow in the wetland edge. The tree canopy covers 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This open marsh has a deeper depression on the north side. There is evidence of fire throughout the wetland. The wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 13-08

Description: This wetland is a 0.5 ha ephemeral marsh. Rows of planted pines grow on the east side of the wetland. Gum and pine trees dominate the canopy, and cover 5-25% of the wetland basin. There is no midstory layer. Sedges/grasses and maidencane grow throughout the wetland, and cover >75% of the basin. A recent fire has improved what was the beginning of pine encroachment. Feral hog damage is minor. This healthy pineland marsh has diverse herbaceous vegetation and is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: Feral hog damage, Planted pines

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Remove the planted pines from the east side of the wetland.

Wetland ID: SC 13-09

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 13-10

Description: This wetland is a 0.2 ha ephemeral marsh. Small slash pine trees grow in a dense cluster in the wetland center, and cover 50-75% of the wetland basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland provides a good example of severe pine encroachment and is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to a dense sand pine plantation. Dense, planted sand pine remain around half of the uplands, the other half has been cleared for restoration.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees should be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: SC 13-11

Description: This wetland is a 0.2 ha highly ephemeral marsh. Pine trees were planted through the wetland. Only 3 trees remain in the wetland and the tree canopy covers 5-25% of the basin. There is no midstory layer. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. The adjacent uplands are sandhills that were converted to a dense sand pine plantation.

Wetland Concerns: Planted pines, Upland condition

Restoration Action Recommended: Remove the 3 planted pines. In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 14-01

Description: This wetland is a 0.2 ha ephemeral forested swamp. Gum trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by buttonbush, and covers 5-25% of the wetland. Maidencane grows in scattered patches, and covers 25-50% of the wetland basin. This circular gum swamp has a marsh area on the west side. There are planted pines through the marsh, some of which have been removed. Ornate chorus frogs were calling on the day of our visit. The adjacent uplands are mesic flatwoods to the west and sand pine plantation to the east. The flatwoods have been thinned in order to restore them to a more open community.

Wetland Concerns: Planted pines

Restoration Action Recommended: Remove planted pines from the wetland interior.

Wetland ID: SC 14-02

Description: This wetland is a 0.5 ha ephemeral marsh. Gum and pine trees dominate the canopy, and cover 25-50% of the wetland basin. The midstory is dominated by buttonbush and small pines, and covers 5-25% of the wetland. Maidencane grows throughout, and covers >75% of the wetland basin. Ornate and southern chorus frogs were calling on the day of our visit. The adjacent uplands are mesic flatwoods to the west and dense sand pine to the east. The uplands have been thinned in order to restore them to a more open pine community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove large pines from the wetland interior and thin pines along the wetland edge. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: SC 14-03

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by buttonbush and an unidentified thorny shrub, and covers 25-50% of the wetland. Sawgrass grows in scattered patches, and covers 50-75% of the wetland basin. This wetland has been encroached by shrubs and small pines and there is a pine tree ring around the edge. This wetland is a striped newt breeding pond. The adjacent uplands are planted sand pine scrub.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove interior pine trees and girdle the large interior oak trees. Thin pine trees around the wetland edge. Encourage fire to prevent further woody encroachment.

Wetland ID: SC 15-01

Description: This wetland is a 0.8 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland. Fern grow in scattered patches, and cover 5-25% of the wetland. There is evidence of fire in the wetland basin. Southern chorus frogs were calling on the day of our visit. The adjacent scrub uplands once were converted to a sand pine plantation and have recently been clearcut.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 16-01

Description: This wetland is a 0.4 ha ephemeral shrub swamp. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by fetterbush and gallberry, and covers 50-75% of the wetland. Sedges/grasses grow in scattered patches, and cover 5-25% of the wetland basin. A recent fire has improved what was the beginning of pine encroachment. The wetland is surrounded by a concentric ring of planted slash pine flatwoods and planted dense sand pine further upslope. K. Enge identifies this wetland as PORN 15.

Wetland Concerns: Upland condition

Restoration Action Recommended: In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 16-02

Description: This wetland is a 0.3 ha ephemeral marsh. It is impacted by fire suppression and subsequent shrub and tree encroachment. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by fetterbush, wax myrtle, and small pine and maple trees, and covers 25-50% of the wetland. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill that were converted to a sand pine plantation. K. Enge identifies this wetland as PORN 16.

Wetland Concerns: Upland condition, Woody encroachment

Restoration Action Recommended: Remove small and large pines from wetland interior and provide periodic fire to the wetland basin. Encourage periodic fire to prevent further woody encroachment. In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 16-03

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover 50-75% of the wetland basin. The wetland is moderately impacted by feral hog rooting. A few small pines are beginning to establish but should be managed by the next fire or inundation. The adjacent uplands are sandhill that were converted to a sand pine plantation.

Wetland Concerns: Feral hog damage, Upland condition

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. In order to restore the full ecological function of the wetland, the uplands need to be restored.

Wetland ID: SC 16-04

Description: This wetland is a <0.1 ha ephemeral marsh. Maple trees dominate the tree canopy, and cover 5-25% of the wetland basin. The midstory is dominated by buttonbush, and covers 5-25% of the wetland. Sedges/grasses grow throughout, and cover >5% of the wetland basin. This small depressional marsh is adjacent to a MU boundary road and receives heavy amounts of sediment. All the ground vegetation is coated with a layer of silt. A recent fire burned some woody vegetation in the wetland basin. The adjacent uplands are mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road

Restoration Action Recommended: Alter the composition of the road for the stretch along the wetland (<10 m) using a substance that does not create a siltation run-off issue, such as a gravel.

Wetland ID: SC 16-05

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. This wetland is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods with sandhills beyond that were converted to a pine plantation. The flatwoods have been thinned and burned in order to restore them to a more open community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 16-06

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. The wetland has a conical depression with a deep center. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open sandhills community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 16-07

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 adjacent uplands are sandhills that were converted to a dense pine plantation.

Wetland Concerns: Upland condition

Restoration Action Recommended: In order to restore the full ecological function of the wetland, the uplands will need to be restored.

Wetland ID: SC 16-08

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 adjacent uplands are sandhills that were converted to a dense pine plantation.

Wetland Concerns: Upland condition

Restoration Action Recommended: In order to restore the full ecological function of the wetland, the uplands will need to be restored.

Wetland ID: SC 16-09

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy. Fetterbush and small sand pine trees are encroaching from the wetland edges, this woody vegetation covers 5-25% of the wetland. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. The adjacent uplands are sandhills that were converted to a dense pine plantation.

Wetland Concerns: Woody encroachment, Upland condition

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching vegetation and prevent further woody encroachment. The woody vegetation could be hand-chopped if it is not killed by the next fire or inundation. In order to restore the full ecological function of the wetland, the uplands will need to be restored.

Wetland ID: SC 17-01

Description: This wetland is a 0.1 ha ephemeral marsh and shrub swamp. There is no tree canopy. A shrub layer is dominated by fetterbush, and covers 25-50% of the wetland. Sedges/grasses and fern grow in scattered patches, and cover 5-25% of the wetland basin. A recent fire has burned the majority of the abundant fetterbush clumps in this wetland. The wetland may be man-enhanced. Old tree stumps provide evidence of past logging practices in the wetland. Feral hogs have extensively rooted around the wetland edge. The adjacent uplands are a mix of mesic flatwoods and sandhill that were converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open pine community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: SC 17-02

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and some maidencane grow throughout the wetland, and cover >75% of the basin. Old bedding rows are eroding in the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding (minor)

Restoration Action Recommended: Allow bedding rows to continue to erode.

Wetland ID: SC 18-01

Description: This wetland is a 0.1 ha highly ephemeral marsh. Live oak trees have encroached into the wetland, and cover 25-50% of the wetland basin. The midstory is dominated by buttonbush and young oak trees, and covers 5-25% of the wetland. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. The wetland topography is varied with areas of deeper holes in the interior. The adjacent scrub uplands once were converted to a sand pine plantation and have recently been clearcut.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Thin the oaks from the wetland interior and encourage fire in the wetland to prevent further woody encroachment.

Wetland ID: SC 18-02

Description: This wetland is a <0.1 ha highly ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. Recent logging left a thin layer of tree debris in the wetland that likely will decompose or burn over time. The adjacent scrub uplands once were converted to a sand pine plantation and have recently been clearcut.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 18-03

Description: This wetland is a 1.3 ha ephemeral forested swamp. Live oak, laurel oak, and gum trees dominate the wetland, and cover 25-50% of the wetland basin. The midstory is dominated by buttonbush and young oak trees, and covers 5-25% of the wetland. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland basin. The wetland likely was a large, open marsh and has succeeded to a swamp. The adjacent scrub uplands once were converted to a sand pine plantation and have recently been clearcut.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: None. There are many marshes on this property and this is a healthy, functioning forested swamp. We do not recommend investing resources to restore this wetland back to a marsh.

Wetland ID: SC 20-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. A shrub layer is dominated by wax myrtle and gallberry, and covers 5-25% of the wetland. Sedges/ grasses grow throughout, and cover 50-75% of the wetland basin. There is a very dense gallberry and smilax brush ring surrounding the wetland and many pine trees encroaching into the wetland interior. The southern part of this wetland is on private property. The adjacent uplands are a mix of scrubby and mesic flatwoods that were converted to a pine plantation. The uplands have been thinned and chopped in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Ensure the wetland basin burns within the next year. If no fire is possible, hand chop the pines from the interior and consider chopping the gallberry ring when the wetland is completely dry.

Wetland ID: SC 20-02

Description: This wetland is a 0.1 ha ephemeral forested swamp. Gum, maple, and oak trees dominate the canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle and buttonbush, and covers 25-50% 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 have been thinned and chopped in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 20-03

Description: This wetland is a 0.1 ha ephemeral marsh. Planted pines grow on bedding rows through the wetland, and cover 5-25% of the wetland basin. There is no midstory cover and no herbaceous vegetation. The lack of herbaceous vegetation may be a result of a recent growing-season fire. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and chopped in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: Remove large planted pines, allow bedding to erode over time. Alternatively, this wetland would be a candidate for experimentally flattening the bedding rows.

Wetland ID: SC 23-01

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow throughout, and cover 50-75% of the wetland basin. A fire burned through the wetland within the past 2 years. The wetland has diverse herbaceous vegetation and is a potential striped newt breeding pond. A drift fence array is present. The adjacent uplands are mesic flatwoods and sandhills that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 23-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. A shrub layer is dominated by fetterbush and gallberry, and covers 25-50% of the wetland. Sedges/ grasses are sparse, and cover 5-25% of the wetland basin. It appears that much of the gallberry and fetterbush were machine-chopped out of the wetland when the wetland was dry. The wetland is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods and sandhills that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 23-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow throughout, and cover 50-75% of the wetland basin. Old bedding rows run through the wetland basin. The adjacent uplands are mesic flatwoods were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None, the bedding rows will erode over time.

Wetland ID: SC 24-01

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow in scattered patches, and cover 5-25% of the wetland basin. Numerous logs and tree limbs are scattered across the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Slash

Restoration Action Recommended: None – the slash piles should burn during the next fire.

Wetland ID: SC 25-01

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow throughout, and cover 50-75% of the wetland basin. A fire recently burned through the entire wetland. This exemplary marsh is a potential striped newt breeding pond. The adjacent uplands are fire-maintained scrubby flatwoods and scrub.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 25-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow throughout, and cover 50-75% of the wetland basin. A fire recently burned through the entire wetland and reduced a gallberry ring that was growing around the wetland edge. This exemplary marsh is a potential striped newt breeding pond. The adjacent uplands are fire-maintained scrubby flatwoods.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 25-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/ grasses grow throughout the wetland, and cover >75% of the basin. A fire recently burned through the entire wetland and suppressed gallberry encroachment. This exemplary marsh is a potential striped newt breeding pond. The adjacent uplands are fire-maintained scrubby flatwoods and scrub.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 25-04

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. This circular, shallow marsh is a potential striped newt breeding pond. The adjacent uplands are fire-maintained scrubby flatwoods.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 27-01

Description: This wetland is a 0.9 ha ephemeral forested swamp. Cypress and gum trees dominate the canopy, and cover >75% of the wetland basin. The midstory is dominated by small trees, and covers 5-25% of the wetland. There is no herbaceous groundcover. Fire has burned through to at least the wetland edges. The adjacent uplands are scrubby flatwoods and sandhills that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open pine community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: SC 27-02

Description: This wetland is a <0.1 ha ephemeral marsh. Gum trees dominate the canopy, and cover 5-25% of the wetland basin. The midstory is dominated by buttonbush, and covers 5-25% of the wetland. Sedges/grasses are sparse, and cover 5-25% of the wetland. This healthy sink depression is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods and sandhills that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open pine community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 01-01

Description: This wetland is a 0.2 ha highly ephemeral marsh. A county road bisects the wetland and created 2 separate wetlands with different characteristics. The wetland on the north side of the road is on private property and is an herbaceous marsh. The wetland south of the road is on WMA property and lies in a swale that was bedded and planted with pine trees. The pine canopy covers 25-50% of the wetland basin. The pine canopy and subsequent needle duff excluded the growth of most wetland vegetation. Sedges and grasses are sparse, and cover 5-25% of the wetland basin. There are 3 interior, deeper pothole sink depressions within the swale, which held water on the day of our visit. The pothole on the south end is the deepest and most likely to be a productive amphibian breeding wetland. The adjacent uplands are sandhills. The uplands have been thinned in order to restore them to a more open sandhills community.

Wetland Concerns: Bedding, Planted pines, Road

Restoration Action Recommended: Remove additional pines from wetland interior and allow bedding to 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 feature of the landscape, we do not recommend any action relating to the road.

Wetland ID: TS 02-01

Description: This wetland is a 1.3 ha semi-permanent marsh. It is a man-made, square, borrow pit but is functioning as a marsh. There is no tree canopy or midstory cover. Cattails and maidencane grow in scattered patches, and cover 25-50% of the wetland. There is a moderate brush ring forming on a berm that surrounds the wetland. There are deeper and shallower regions in the wetland and fish are present. A dirt road runs along the west side of the wetland and there is a paved, country road on the south side. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation.

Wetland Concerns: Road

Restoration Action Recommended: None

Wetland ID: TS 03-01

Description: This wetland is a 0.1 ha highly ephemeral marsh. Densely packed, small to medium-sized pine trees grow throughout the marsh. The tree canopy covers >75% of the wetland basin. Due to the shading and needle duff deposition from the pine canopy, there is no midstory or herbaceous vegetation. Feral hog damage is widespread and severe. This wetland provides an example of the maximum damage potential of pine encroachment to marshes. The adjacent uplands are mesic flatwoods and sandhill that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Consider conducting a restoration experiment by mechanically removing every pine tree from the wetland interior when the wetland is completely dry. Additionally, machinery can re-sculpt the wetland floor to ameliorate the extensive hog rooting. Encourage fire in the wetland basin once fuel is reestablished. Monitor the wetland as herbaceous vegetation returns.

Wetland ID: TS 03-02

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy cover. A patch of buttonbush grows in the deep center of the wetland, and covers 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover 50-75% of the wetland. There is fire evidence throughout the wetland. The wetland is a striped newt breeding pond. The adjacent uplands are sandhill that were converted to a longleaf pine plantation.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 03-03

Description: This wetland is a <0.1 ha ephemeral marsh. Pine trees grow around the wetland edge, the tree canopy covers 5-25% of the wetland. Mixed hardwoods and small pine trees are beginning to encroach into the wetland, and cover 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover 50-75% of the wetland. There is fire evidence throughout the wetland. The adjacent uplands are mesic flatwoods and sandhill that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open community.

Wetland Concerns: Woody encroachment (minor)

Restoration Action Recommended: Provide fire to the wetland basin within the next few years to control the woody vegetation and prevent further encroachment. The vegetation could be hand-chopped from the wetland if it is not killed by the next fire.

Wetland ID: TS 05-01

Description: This wetland is a 1.5 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rushes grow throughout, and cover >75% of the wetland. This healthy, open marsh is in fire maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 05-02

Description: This wetland is a 0.1 ha ephemeral marsh. A few planted pines remain in the wetland but provide <5% canopy cover. Small palms and wax myrtle cover 5-25% of the wetland basin. Sedges/grasses and rushes grow throughout, and cover >75% of the wetland. A recent fire burned through the wetland basin, killing some encroaching shrubs. Feral hog damage is minor. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage (minor), Woody encroachment (minor)

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Woody encroachment at this wetland is minor and, as long as the current fire regime is maintained, likely will not become a problem.

Wetland ID: TS 06-01

Description: This wetland is a 1.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This pristine wetland is in fire maintenance condition. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 06-02


Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. An access road/MU boundary bisects the south end of the wetland, separating this wetland from a very large mixed swamp and marsh wetland system. Essentially, this access road created an ephemeral wetland out of the larger, permanent wetland system. This new ephemeral wetland appears to burn regularly and is in good condition. The adjacent uplands are mesic flatwoods and that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road/MU boundary

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.

Wetland ID: TS 06-03

Description: This wetland is a 4.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rushes grow throughout, and cover >75% of the wetland. An access road/MU boundary bisects the west side of the wetland. A deep dug-out associated with the road construction provides a refugium for fish. The adjacent uplands are mesic flatwoods and that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Dug-out, Road/MU boundary

Restoration Action Recommended: Fill the deep dug-out with sand until the dug-out depth matches that of the surrounding wetland to restore the original hydroperiod. 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.

Wetland ID: TS 07-01

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. Small pine and maple trees are encroaching into the wetland, providing 5-25% midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. There is minor feral hog damage. A paved county road borders the northeast side of the wetland. This wetland is a potential striped newt breeding pond. The adjacent uplands include a thin ring of bedded mesic flatwoods followed by sandhill that is undergoing restoration.

Wetland Concerns: Feral hog damage, Road, Woody encroachment

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Recognizing that this road is now a permanent feature, we do not recommend any action relating to the road. Remove interior pine trees and encourage periodic fire to burn through the wetland basin to kill the encroaching vegetation and prevent further woody encroachment. The woody vegetation could be hand-chopped if it is not killed by the next fire or inundation.

Wetland ID: TS 07-02

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. Feral hog damage is extensive and severe. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills undergoing restoration.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: TS 07-03

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This is a fine, healthy depressional marsh. A few small tree saplings are growing scattered around the wetland but will be managed with the next fire. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills undergoing restoration.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 08-01

Description: This wetland is a <0.1 ha ephemeral marsh. Oak and palm trees form a ring around this steep-sided sink wetland. The tree canopy covers 25-50% of the wetland. The midstory is a mixture of buttonbush and other woody vegetation, and covers 50-75% of the wetland. Sedges/grasses and sawgrass grow in scattered patches. This herbaceous vegetation covers 25-50% of the wetland. A road with a culvert bisects the wetland, creating 2 separate wetlands. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill with planted longleaf pine trees.

Wetland Concerns: Woody encroachment, Road

Restoration Action Recommended: Thin oak ring around the wetland and restore periodic fire to the wetland basin to reduce woody encroachment.

Wetland ID: TS 08-02

Description: This wetland is a 0.4 ha ephemeral marsh. Pine and palm trees form a ring around the wetland. This tree canopy covers 5-25% of the wetland basin. The midstory is dominated by willow, buttonbush, and small pine trees, and covers 25-50% of the wetland basin. Sedges/grasses and sawgrass grow throughout, and cover >75% of the wetland. There is a dense thicket of shrub in the wetland interior. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill.

Wetland Concerns: Woody encroachment (minor)

Restoration Action Recommended: Encouraging fire to burn through the wetland basin would kill the thicket in the interior of the wetland and prevent further woody encroachment.

Wetland ID: TS 09-01

Description: This wetland is a 0.2 ha ephemeral marsh. Pine trees were planted on bedded rows through the wetland. The trees were removed during a thinning operation, eliminating the tree canopy cover. Fetterbush and gallberry grow on the old bedding rows, and cover 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover 50-75% of the wetland. Feral hog damage is widespread. The adjacent uplands are mesic flatwoods with sandhills beyond the flatwoods. The uplands were bedded and converted to a pine plantation and are now being restored.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Encourage fire in the wetland basin to restore the herbaceous vegetation and prevent further encroachment of woody vegetation. Alternatively, the bedded rows could be flattened and the shrubs removed.

Wetland ID: TS 09-02

Description: This wetland is a 3.0 ha ephemeral mixed swamp. This is a densely brushy swamp that has not burned in many years. Cypress and pine trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by titi, fetterbush, and holly, and covers >75% of the wetland basin. There is no herbaceous vegetation. A thin ring of mesic flatwoods surrounds the wetland with sandhill community starting further upslope. The sandhills were densely planted in a sand pine plantation and have since been cleared.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Conduct a ring fire in the wetland. The fire would be intense but the cleared uplands would provide a great fire break.

Wetland ID: TS 10-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. Buttonbush and an unidentified thorny shrub cover 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. A major road (CR 361) with a culvert bisects the wetland. The northeastern portion of the wetland is on private property, the southwestern portion is WMA land. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill that were converted to a pine plantation. 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 feature, we do not recommend any action relating to the road.

Wetland ID: TS 10-02

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy. Buttonbush and wax myrtle cover 5-25% of the wetland basin. Sedges/grasses and sawgrass grow throughout, and cover >75% of the wetland. While this marsh is near a road, it remains isolated from the roadside ditches. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhill that were converted to a pine plantation. Restoration is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 10-03

Description: This wetland is a <0.1 ha ephemeral marsh bisected by a flowing stream. Normally we would not inventory a stream system but this wetland is very interesting hydrologically and ecologically. The stream likely flows only during times of high water and there is no incised stream channel, a rare occurrence in a sandhill community. This diffuse marsh has numerous small lobes and deeper potholes that normally function as isolated wetlands but connect via this stream during times of high water (as was the case on the day of our visit). The stream meanders shallowly through the sandhills and flows into a siphon/sink situated on the east side of Indian Island Rd. There is no tree canopy or midstory cover in the wetland. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. This wetland is a potential striped newt breeding pond and was filled with tadpoles (no fish) on the day of our visit. Restoration of the surrounding sandhills is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy. A shrub layer is dominated by willow, and covers 5-25% of the wetland basin. Sawgrass grows throughout, and covers >75% of the wetland. This is a healthy, circular sawgrass marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-02

Description: This wetland is a 0.3 ha ephemeral marsh. Pines were planted in bedded rows on the north side of the wetland. The tree canopy covers 5-25% of the wetland basin. The midstory is dominated by willow and buttonbush, and covers 25-50% of the wetland. The buttonbush grows in a dense thicket in the wetland interior. Sedges/grasses and sawgrass grow throughout, and cover >75% of the wetland. There is a sand ridge on the west side of the wetland and a vehicular track on the north side. The adjacent uplands are mesic flatwoods and sandhills that were bedded and converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: Bedding, Planted pines, Vehicular damage

Restoration Action Recommended: Allow bedding rows to erode over time. Abandon vehicular track, use fire to reduce interior buttonbush thicket, remove all planted pines in wetland interior.

Wetland ID: TS 11-03

Description: This wetland is a 0.2 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland basin. Sawgrass is sparse and covers 5-25% of the wetland. Old stumps provide evidence of past logging. There also is evidence of fire in the wetland. This is a healthy, small swamp with an open understory. The adjacent uplands are sandhill and mesic flatwoods that were bedded and converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-04

Description: This wetland is a 0.8 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by holly, and covers 5-25% of the wetland basin. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland. Old stumps provide evidence of past logging. There also is evidence of fire in the wetland. This is an exemplary healthy swamp with an open understory. The adjacent uplands are sandhill that were converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-05

Description: This wetland is a 0.4 ha ephemeral forested swamp. Cypress trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland basin. Sedges/grasses and maidencane grow in scattered patches, and cover 25-50% of the wetland. Old stumps provide evidence of past logging. The adjacent uplands are sandhill that were converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-06

Description: This wetland is a <0.1 ha ephemeral marsh. Trees and shrubs grow around the wetland edge, some leaning over into the wetland. Maple and oak trees dominate the tree canopy, and cover 50-75% of the wetland. The midstory is dominated by wax myrtle, and covers 5-25% of the wetland basin. Sedges/grasses and emergent vegetation grow throughout, and cover 50-75% of the wetland. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Thin trees around wetland edge

Wetland ID: TS 11-07

Description: This wetland is a <0.1 ha ephemeral marsh. Pine, maple, and palm trees dominate the canopy, and cover 5-25% of the wetland. There is no midstory cover. Sedges/grasses grow in scattered patches, and cover 25-50% of the wetland. This is a healthy, small, circular, sinkhole pond and, together with 11-06, is an exemplary small pond doublet. This wetland is a potential striped newt breeding pond. The adjacent uplands are sandhills that were converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 11-08

Description: This wetland is a <0.1 ha ephemeral marsh. Oak and sweet gum trees dominate the canopy, and cover 25-50% of the wetland. There is no midstory cover. Sedges/grasses and sawgrass grow throughout, and cover 50-75% of the wetland. This small, steep depressional marsh is adjacent to CR 361. This wetland is a potential striped newt breeding pond. The wetland is surrounded by a thick oak ring and sandhills that were converted to pine plantation. Restoration of the uplands 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. Thin the oak trees.

Wetland ID: TS 11-09

Description: This wetland is a <0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This small marsh appears to have sustained some filling during construction of the adjacent road and associated road shoulder. There are vehicular tracks through the wetland. This wetland is a potential striped newt breeding pond. The wetland is surrounded by sandhills that were converted to pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: Road, Vehicular damage

Restoration Action Recommended: Allow tracks to 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 feature, we do not recommend any action relating to the road.

Wetland ID: TS 11-10

Description: This wetland is a 0.2 ha ephemeral marsh. Maple trees dominate the canopy, and cover 5-25% of the wetland. Buttonbush grows in a dense thicket in the wetland center, and covers 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. This wetland is a potential striped newt breeding pond. The wetland is surrounded by a thick oak ring and sandhills that were converted to a pine plantation. Restoration of the uplands is in progress.

Wetland Concerns: Woody encroachment (minor)

Restoration Action Recommended: None

Wetland ID: TS 12-01

Description: This wetland is a 0.7 ha ephemeral marsh. There is no tree canopy. However, small pines are becoming established on the south end of the wetland, and cover 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. The wetland was flooded on the day of our visit and fish were present. There is extensive feral hog rooting on the south end of the wetland. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: TS 12-02

Description: This wetland is a 0.2 ha ephemeral marsh. The north end of the wetland has a deeper hole with gum trees, the middle of the wetland is open and herbaceous, and the south end has patchy clusters of small pine trees. The tree canopy covers 5-25% of the wetland. The midstory covers 5-25% of the wetland. Sedges/grasses grow throughout, and cover >75% of the wetland. Some of the feral hog damage was submerged on the day of our visit. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: TS 12-03

Description: This wetland is a 2.5 ha ephemeral marsh. There is no tree canopy or midstory cover. A few small pines are growing on the west end of the wetland but cover <5% of the wetland basin. Sedges/grasses grow throughout and a prominent patch of sawgrass grows in the east end of the wetland. This herbaceous vegetation covers >75% of the wetland. A drift fence array was constructed in the east end of the wetland. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 12-04

Description: This wetland is a 0.5 ha ephemeral marsh. Pine trees are encroaching fairly extensively. The tree canopy covers 25-50% of the wetland basin. There is no midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The south end of the wetland has been mechanically thinned. Some feral hog damage is evident around the wetland edge. The marsh was flooded on the day of our visit and the extent of soil and herbaceous vegetation damage due to logging and feral hogs is unclear. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. Remove pine trees from the wetland interior.

Wetland ID: TS 13-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This oblong marsh has widespread feral hog damage that is mostly submerged and grown over with vegetation. The pond is situated along a road and connects to a roadside ditch. Planted pines were thinned out of the wetland. The wetland is surrounded by a mix of mesic and wet flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Road, Roadside ditch

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. It appears this wetland became isolated when the area surrounding was bedded and converted to a pine plantation. The landscape conversion and road building altered the wetland more so than does the ditching. In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed and the hydrology of the landscape restored. If 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: TS 13-02

Description: This wetland is a 0.3 ha ephemeral marsh. Gum and pine trees grow in a thin ring around the wetland, and cover 5-25% of the wetland basin. There is no midstory cover. Sedges/grasses, emergent vegetation, and sawgrass grow throughout, and cover >75% of the wetland. There is evidence of fire in the wetland basin. This is a spectacular marsh with a diverse plant assemblage and a lot of open water. The wetland is surrounded by a mix of mesic and wet flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 13-03

Description: This wetland is a 1.7 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover > 50% of the wetland. The herbaceous vegetation likely covers the entire wetland basin but due to recent flooding, its extent is hard to discern. This is an exemplary marsh with evidence of fire in the wetland basin. A few young pine trees grow around the wetland edge but will be managed with the next fire. Feral hog damage is minor. The wetland is surrounded by a mix of mesic and wet flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage (minor)

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area.

Wetland ID: TS 14-01

Description: This wetland is a 0.6 ha ephemeral marsh. Large, planted pines grow in the south end of the wetland, covering 5-25% of the wetland basin. There also is a dense patch of young pines in the wetland interior, this midstory layer covers 5-25% of the wetland basin. Sawgrass grows throughout, and covers >75% of the wetland. This wetland provides a good example of sawgrass at a good, intermediate density. A ditch connects the wetland to roadside ditches along the east side. Old bedding in the south end is eroding well. There is evidence of fire in the wetland. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Ditching, Woody encroachment

Restoration Action Recommended: Allow bedding to erode over time. Fill the ditch to break the wetland's connection to nearby roadside ditches. Remove large, planted pines in the south end of the wetland, hand-remove the dense patch of small pines in the wetland interior.

Wetland ID: TS 14-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >50% of the wetland. The herbaceous vegetation likely covers the entire wetland basin but due to recent flooding, its extent is hard to discern. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 14-03

Description: This wetland is a 0.4 ha ephemeral marsh. Planted pine trees grow in the eastern side of the wetland, and cover 5-25% of the wetland basin. Young pine trees have established on the bedded rows, this midstory layer also covers 5-25% of the wetland. The western half of the wetland looks and functions like a marsh, and sedges/grasses grow throughout. Sphagnum grows throughout the eastern half of the wetland where the pine canopy has affected herbaceous growth. This wetland provides a great location to observe the effects of bedding and pine establishment. The wetland is surrounded by mesic and wet flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: Remove all interior pine trees. This wetland is a good location to experiment with flattening the bedded rows when the wetland is completely dry. If the bedded rows are not flattened, pine encroachment will likely continue on these higher and drier areas.

Wetland ID: TS 15-01

Description: This wetland is a 1.8 ha ephemeral marsh. Hydric hammock surrounds 2/3 of the wetland on the east side. This tree canopy covers 25-50% of the wetland. Willow trees grow in a dense clump in the wetland center, and cover 25-50% of the wetland. There is a sawgrass island in the center of the wetland and sawgrass grows in scattered patches as well. This herbaceous vegetation covers 25-50% of the wetland basin. Feral hog damage is patchy around the wetland edge. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area.

Wetland ID: TS 15-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy. However, a patch of small pine trees grows in the south end, covering <5% of the wetland basin. Sedges/grasses grow throughout, and covers >75% of the wetland. The wetland has excellent herbaceous structure and density. There were many frog egg masses attached to vegetation on the day of our visit. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. Burn the wetland promptly or hand-chop small, interior pine trees.

Wetland ID: TS 15-03

Description: This wetland is a 0.2 ha ephemeral marsh. Some small and medium sized pine trees grow in the wetland interior, and cover 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover 50-75% of the wetland. Extensive hog damage is submerged under recent flooding on the south end of the wetland. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment (minor)

Restoration Action Recommended: Consider trapping and/or harvesting of feral hogs in this area. Hand-chop interior pine trees

Wetland ID: TS 16-01

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This marsh is a very healthy wetland with diverse herbaceous vegetation. The wetland is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 16-02

Description: This wetland is a 1.3 ha ephemeral marsh. Cypress trees grow in a ring around the marsh. This tree canopy covers 25-50% of the wetland basin. There is no midstory cover. Sawgrass grows in the wetland center, and covers 50-75% of the wetland. The wetland may be a marsh succeeding to a cypress swamp. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 16-03

Description: This wetland is a 0.8 ha ephemeral marsh. There is no substantial tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This wetland appears to be a pristine marsh with an open water center and evidence of past burns. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 16-04

Description: This wetland is a 10.8 ha semi-permanent marsh. There is no tree canopy or midstory cover. Sawgrass grows throughout, and covers >75% of the wetland. There is evidence of fire around the wetland. The wetland is surrounded by mesic and scrubby flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 17-01

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This circular marsh has an open water center, diverse herbaceous vegetation, and is a good example of a healthy marsh. The wetland is a potential striped newt breeding pond. Feral hog damage is minor and patchy. There is evidence of past fire in the wetland. The wetland is surrounded by scrubby flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: TS 17-02

Description: This wetland is a 0.8 ha ephemeral marsh. There is no tree canopy. However, small pine trees are encroaching and are scattered throughout the wetland interior. The pine trees cover 5-25% of the wetland basin. Sedges/grasses and rush grow throughout, and cover >75% of the wetland. This marsh has diverse herbaceous vegetation and is a potential striped newt breeding pond. Southern chorus frogs were calling on the day of our visit. The wetland provides a good example of a healthy marsh with pine encroachment. Feral hog damage is minor and patchy. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: TS 17-03

Description: This wetland is a 0.5 ha ephemeral marsh. Planted pines grow on bedding rows in the wetland interior. The pine tree canopy covers 5-25% of the wetland basin. The midstory is dominated by wax myrtle, *Yaupon*, and *Baccharis*. These shrubs mainly grow on the bedding rows, and cover 50-75% of the wetland. Sedges/grasses and rush grow throughout, and cover >75% of the wetland. There is evidence of fire in the wetland although the bedded rows likely prevent fire from reaching the wetland interior. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding, Planted pines, Woody encroachment

Restoration Action Recommended: Allow bedding to erode over time and remove interior planted pine trees. Encourage periodic fire to reduce shrub encroachment.

Wetland ID: TS 17-04

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout, and cover >75% of the wetland. The wetland was completely freshwater on the day of our visit though it occasionally may have some saltwater influence. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 17-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout, and cover >75% of the wetland. The wetland center may have been mechanically deepened. A road/MU boundary bisects the east side of the wetland.. This road bisected a larger wetland and created 2, smaller ephemeral wetlands, this one and TS 19-04. This wetland is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road/MU boundary

Restoration Action Recommended: In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed. Re-route the road away from the wetlands if feasible.

Wetland ID: TS 18-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree or midstory canopy. Sawgrass grows throughout, and covers >75% of the wetland. This wetland provides a good example of a sawgrass marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 18-02

Description: This wetland is a 0.7 ha ephemeral marsh. There is no tree canopy. A small willow and buttonbush patch grows in the wetland center, and covers 5-25% of the wetland basin. A diverse assemblage of sedges and grasses grows throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 19-01

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. Feral hog damage is minor and patchy. This marsh appears to be very healthy and is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Feral hog damage

Restoration Action Recommended: Monitor the wetlands in this area. If feral hog damage increases, it may be necessary to take aggressive action in target areas.

Wetland ID: TS 19-02

Description: This wetland is a 1.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass densely grows throughout, and covers >75% of the wetland. There is a dense fetterbush/gallberry/smilax ring forming around the wetland ecotone. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Herbaceous density

Restoration Action Recommended: This wetland has reached a relatively high sawgrass density. Encourage periodic fire in the wetland.

Wetland ID: TS 19-03

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow densely throughout, and cover >75% of the wetland. The wetland is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Herbaceous density

Restoration Action Recommended: This wetland has reached a relatively high herbaceous density. Manage with fire. Fire will also control the few small pines and wax myrtle beginning to encroach.

Wetland ID: TS 19-04

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow densely throughout, and cover >75% of the wetland. This wetland was connected to TS 17-05 before an access road/MU boundary was constructed. Now the wetland is bisected into two, separate wetlands. This wetland is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Road/MU boundary

Restoration Action Recommended: In order to restore the hydrology of this wetland and the larger wetland system, the road would have to be removed. Re-route the road away from the wetlands if feasible.

Wetland ID: TS 19-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. Several small pines are growing in the wetland interior, covering 5-25% of the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. There is fire evidence on the larger tree bases and some trees were killed by the last fire. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Provide fire to the wetland basin within the next few years to kill the interior pines and prevent further woody encroachment. The young pine trees could be hand-chopped from the wetland if they are not killed by the next fire or inundation.

Wetland ID: TS 19-06

Description: This wetland is a 1.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass grows dense and tall throughout, and cover >75% of the wetland. The wetland is surrounded by dense brush and by mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Herbaceous density

Restoration Action Recommended: This wetland has reached a relatively high sawgrass density. Encourage periodic fire.

Wetland ID: TS 19-07

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Several small pines are growing in the wetland interior, covering 5-25% of the wetland basin. Sawgrass grows densely throughout, and cover >75% of the wetland. The wetland is surrounded by a dense brush ring and by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Herbaceous density

Restoration Action Recommended: This wetland has reached a relatively high sawgrass density. Encourage periodic fire.

Wetland ID: TS 19-08

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy cover. Several small pine trees are growing in the wetland interior, covering <5% of the wetland basin. These pines are not currently a problem but may become so if a fire does not burn through the wetland in the next few years. There is evidence of fire on the palm trees around the wetland perimeter. Sedges/grasses grow throughout, and cover >75% of the wetland. The wetland is a potential striped newt breeding pond. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Provide fire to the wetland basin within the next few years to prevent pine tree encroachment. The young pine trees could be hand-chopped from the wetland if they are not killed by the next fire.

Wetland ID: TS 19-09

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy cover. Several small pine trees are encroaching into the wetland interior, covering 5-25% of the wetland basin. Many of these pine trees may be just large enough to resist the next fire. Sedges/grasses grow throughout, and cover >75% of the wetland. The wetland is surrounded by scrubby and mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: TS 20-01

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The wetland appears to be fire-maintained. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 20-02

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. The wetland has a deep center with open water; sedges/grasses grow in a ring around the wetland edge. The herbaceous vegetation covers >50% of the wetland basin. The wetland appears to be fire-maintained and is a great example of an herbaceous marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 20-03

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rushes grow throughout, and cover >75% of the wetland. The water in the wetland has a slight hint of salt and is likely brackish at times. The wetland appears to be fire-maintained. The adjacent uplands are mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 21-01

Description: This wetland is a 1.4 ha ephemeral marsh. Pine trees grow around the wetland edge. This tree canopy covers 5-25% of the wetland basin but is not shading out the herbaceous vegetation. There is no midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The wetland appears to be fire-maintained. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: TS 21-02

Description: This wetland is a 0.2 ha ephemeral marsh. Gum and pine trees dominate the canopy, and cover 5-25% of the wetland basin. The pine trees in the southeast quadrant of the wetland are large and are shading-out herbaceous vegetation. There is no midstory cover. Sedges/grasses grow throughout, and cover 50-75% of the wetland. Feral hog damage is minor and patchy. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove 4-6 large pine trees from the wetland interior.

Wetland ID: TS 21-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and sawgrass grow throughout, and cover >75% of the wetland. A few old bedding rows penetrate into the wetland perimeter on the south end. A nearby road separates this wetland from a larger marsh to the south. The two wetlands likely were one system before the road was built. The wetland is surrounded by mesic flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None, the bedding will further erode over time.

Wetland ID: J 01-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is an old push pile in the wetland center creating an island on which shrubs and trees have established. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. Small palms and pine trees cover 5-25% of the wetland. The woody vegetation on the push pile does not appear to be negatively impacting the wetland in terms of shading or needle duff. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic and wet flatwoods that were bedded and converted to pine plantation. The uplands have been thinned in order to restore them to a more open flatwoods community.

Wetland Concerns: Push pile

Restoration Action Recommended: None. The push pile will erode over time.

Wetland ID: J 01-02

Description: This wetland is a 0.9 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow in a ring around the wetland, and cover 50-75% of the wetland. The adjacent uplands are sandhills with a patch of mesic flatwoods to the southeast. This wetland is a potential striped newt breeding pond. The flatwoods were bedded and all the uplands were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 01-03

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sawgrass and rush grow throughout, and cover >75% of the wetland. This healthy sink depression was teeming with tadpoles on the day of our visit. The wetland is situated along a sandhill/flatwoods interface. The flatwoods were bedded and all the uplands were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 03-01

Description: This wetland is a 1.8 ha semi-permanent marsh. Maple and palm trees grow in the north end of the wetland, this tree canopy covers 5-25% of the wetland basin. There is no midstory cover. A diverse assemblage of herbaceous vegetation grows throughout, and covers >75% of the wetland. A past fire burned completely through the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned but the understory remains dense.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 03-02

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rush grow in a ring around the wetland, and cover >25% of the wetland. On the day of our visit, the wetland had a large amount of open water in the center. This wetland appears to be fire-maintained and is a potential striped newt breeding pond. The adjacent uplands are half mesic flatwoods that were bedded and converted to a pine plantation and half sandhill. The sandhill has been cleared and the flatwoods have been thinned but the understory remains dense.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 03-03

Description: This wetland is a 0.2 ha marsh. An access road/MU boundary with a ditch bisects the wetland creating an ephemeral wetland on the south side of the road and a semi-permanent wetland on the north side of the road. It appears the ditch was created as a result of road-building through the wetland. The wetland to the south is very healthy with diverse herbaceous vegetation and open water. The wetland to the north is in MU J 01 and has a dug-out ditch. There is no tree canopy or midstory cover. Herbaceous vegetation covers >75% of each wetland. The wetland functions as two separate wetlands but they connect via a low spot in the road during times of high water. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned but the understory remains dense.

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. The ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 04-01

Description: This wetland is a 0.1 ha ephemeral marsh. Maple and pine trees grow around the wetland edge, this tree canopy covers 5-25% of the wetland basin. Small palms and wax myrtle dominate the midstory, and cover 5-25% of the wetland. Sedges/grasses and sawgrass grow throughout, and cover >75% of the wetland. There is evidence of past fire around the wetland perimeter. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned but the understory remains dense.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encouraging fire to burn through the wetland basin would kill the shrubs and prevent further woody encroachment.

Wetland ID: J 04-02

Description: This wetland is a 0.2 ha ephemeral marsh. Planted pine trees grow on the north side of the wetland, this tree canopy covers 5-25% of the wetland basin. Wax myrtle dominates the midstory, and covers 5-25% of the wetland. Sedges/grasses and rushes grow throughout, and cover >75% of the wetland. The wetland appears to be fire-maintained. The wetland is situated along a road/MU boundary and is connected to a ditch along the road. There were fish in this deeper spot of the wetland on the day of our visit. The adjacent uplands are wet flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road/MU boundary, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed away from the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 05-01

Description: This wetland is a 0.1 ha marsh. A road, raised on an earthen berm, bisects this wetland creating an ephemeral wetland to the north of the road and a semi-permanent wetland to the south of the road. The ditches along the road are deeper than the original wetland and the road itself has eliminated nearly half of the original wetland area. Pine trees dominate the canopy, and cover 5-25% of the wetland basin. Small palm and pine trees grow on hillocks in the wetland basin and cover 5-25% of the wetland. Sedges/grasses grow throughout, and cover >75% of the wetland. There is evidence of fire in the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road/MU boundary, 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. Consider re-routing the road to the southeast, away from the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom. Hand-chop interior pine trees.

Wetland ID: J 05-02

Description: This wetland is a 1.2 ha ephemeral marsh. Pine trees grow in a ring around the wetland, and cover 5-25% of the wetland basin. Wax myrtle and small pine trees also grow around the wetland edge, this midstory layer covers 5-25% of the wetland. Sedges/grasses and rush grow throughout, and cover >75% of the wetland. The last fire burned through the entire wetland basin. Due to the close proximity with the coast and salt marsh, this wetland may have a salt water influence. The water was fresh on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 05-03

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rush grow throughout, and cover >75% of the wetland. The center of the wetland has an open water pool. There is fire evidence around the wetland edge. While this wetland is located adjacent to the salt marsh and coast, the water had no brackish taste on the day of our visit. The adjacent uplands are a mix of bedded, mesic flatwoods and sandhills. The uplands were converted to a pine plantation but now are being restored to more open communities.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 06-01

Description: This wetland is a 0.2 ha ephemeral forested swamp. Gum, maple, and palm trees dominate the canopy, and cover > 75% of the wetland basin. The midstory is dominated by wax myrtle and holly, and covers 5-25% of the wetland. There is no herbaceous vegetation. This healthy, isolated swamp has a leaf litter bottom and an open understory and is a good example of a small swamp. There is fire evidence in the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 06-02

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy cover. However, small pines are beginning to encroach from the wetland edge and cover 5-25% of the wetland basin. Sawgrass grows throughout, and covers >75% of the wetland. This wetland is a good location to observe the beginning stages of pine encroachment. The last fire thinned some of the pine saplings but several remain. The adjacent uplands are scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 06-03

Description: This wetland is a 0.4 ha ephemeral marsh. This wetland has moderate pine encroachment. Although a fire has burned through the wetland, pine trees were not killed. The pine tree canopy covers 5-25% of the wetland basin. Small pine trees dominate the midstory, and cover 5-25% of the wetland. Sedges/grasses and sawgrass grows throughout, and cover >75% of the wetland. Feral hog damage is moderate. The wetland is connected to a roadside ditch on the north side. The ditch along the road is deeper than the original wetland. The adjacent uplands are a mix of mesic and scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Feral hog damage, Roadside ditch, Woody encroachment

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed north of the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom. Remove interior pine trees either by hand-chopping or with a chain saw.

Wetland ID: J 07-01

Description: This wetland is a 0.1 ha marsh. A road with accompanying ditches bisects the wetland. The ditches provide a semi-permanent water source though the wetland itself is historically ephemeral. There is no tree canopy cover. However, there is a shrub layer dominated by holly and willow trees that covers 5-25% of the wetland basin. Sawgrass grows throughout, and covers >75% of the wetland. There are lily pads in the roadside ditches. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed north of the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 07-02

Description: This wetland is a 0.4 ha marsh. A road with accompanying ditches bisects the west side of the wetland. The ditches were created as a result of road-building and provide a semi-permanent water source though the wetland itself is historically ephemeral. Hardwoods are encroaching into the wetland interior. Maple trees dominate the tree canopy, and cover 5-25% of the wetland. The midstory is dominated by willow, buttonbush, and small maple trees, covers 5-25% of the wetland basin. Sawgrass and sedges/grasses grow throughout, and cover >75% of the wetland. Emergent vegetation grows in the roadside ditches. The adjacent uplands are a mix of bedded, mesic flatwoods and sandhills. The uplands were converted to a pine plantation but now are being restored to more open communities.

Wetland Concerns: Road, Roadside ditches, Woody encroachment

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed north of the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom. Encourage fire to burn into the wetland basin when the wetland is dry would reduce the encroaching woody vegetation.

Wetland ID: J 07-03

Description: This wetland is a 0.6 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. A recent fire killed many young pine trees in the wetland interior. This wetland is an excellent example of a healthy marsh. The adjacent uplands are a mix of bedded, mesic flatwoods and sandhills. The uplands were converted to a pine plantation but now are being restored to more open communities.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-01

Description: This wetland is a 0.1 ha ephemeral marsh. Half of this wetland has been heavily encroached by pine trees and is void of herbaceous vegetation. The other half of the wetland is a beautiful herbaceous marsh with sedges and grasses growing throughout. There is no midstory cover. Some of the pine trees were killed in a recent fire but many remain. This wetland provides an excellent example of pine encroachment. There is evidence of old feral hog damage. The adjacent uplands are sandhills that were converted to a pine plantation. The uplands have been thinned in order to restore them to a more open community.

Wetland Concerns: Feral hog damage, Woody encroachment

Restoration Action Recommended: Remove pine trees from the wetland basin.

Wetland ID: J 08-02

Description: This wetland is a 1.4 ha marsh. A sand road with an accompanying ditch bisects the north side of the wetland. The ditch was created as a result of road-building through the wetland and provide a semi-permanent water source though the wetland itself is historically ephemeral. Over 90% of the wetland is south of the road and the ditch is located on the north side of the road. There is no tree canopy or midstory cover in the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. The separated wetlands will connect over the road during times of high water. The adjacent uplands are a mix of bedded, mesic flatwoods and sandhills. The uplands were converted to a pine plantation but now are being restored to more open communities.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed north away from the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 08-03

Description: This wetland is a 1.4 ha marsh. A road, with accompanying ditch, runs along the south side of the wetland. It appears the ditch was created as a result of road-building through the wetland and it provides a semi-permanent water source though the wetland itself is historically ephemeral. There were fish in the ditch on the day of our visit. There is no tree canopy or midstory cover in the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. This wetland is in excellent ecological condition with diverse, fire-maintained vegetation. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed south way from the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 08-04

Description: This wetland is a 0.7 ha ephemeral marsh. There is no tree canopy cover and there are only a small number of small pine trees scattered through the wetland interior. A shrub layer, dominated by wax myrtle, covers 5-25% of the wetland. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-05

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy cover. A shrub layer, dominated by an unidentified woody plant, covers 25-50% of the wetland. This woody vegetation does not appear to be shading out the herbaceous vegetation. Sedges/grasses grow throughout, and cover >75% of the wetland. This wetland is a good example of a flatwoods marsh. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-06

Description: This wetland is a 0.3 ha ephemeral forested swamp. Gum trees dominate the canopy, and cover >75% of the wetland. The midstory is dominated by wax myrtle and small palms, and covers 50-75% of the wetland. Sawgrass is sparse and covers 5-25% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-07

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes and sedges/grasses grow in a ring around the wetland, and cover 50-75% of the wetland. This wetland may have a brackish influence. There were frogs around the wetland edge and fish present on the day of our visit. A recent fire did not burn into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-08

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout, and cover >75% of the wetland. A recent fire did not burn into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-09

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Pickerelweed grows in the wetland center and sawgrass grows around the wetland edges. The herbaceous vegetation covers >75% of the wetland. The wetland was drying on the day of our visit. Fish were present and likely will be killed if the wetland dries completely before the summer rains. A recent fire did not burn into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-10

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes, sawgrass, and sedges/grasses grow throughout, and covers >75% of the wetland. A recent fire did not burned in patches around the wetland edge. The wetland dried just before our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 08-11

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Highly diverse herbaceous vegetation grows throughout, and covers >75% of the wetland. Bedding rows were constructed through the wetland but now are eroding. A recent fire did not burn into the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None, allow the bedding rows to erode over time.

Wetland ID: J 09-01

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and sawgrass grow throughout the wetland, and cover >75% of the basin. There is a road along the south side of the wetland but there is no associated ditch and the road does not seem to impact the wetland. A recent fire burned through the wetland interior and a large pine was removed from the wetland interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands currently are managed with prescribed fire.

Wetland Concerns: Road

Restoration Action Recommended: None

Wetland ID: J 09-02

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy. A shrub layer is dominated by an unidentified woody shrub, and covers 5-25% of the wetland basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A recent fire burned through the wetland edge but did not burn into the interior. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands currently are managed with prescribed fire.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 09-03

Description: This wetland is a 0.3 ha ephemeral marsh. An access road bisects the south end of the wetland, creating 2 separate wetlands. The southern wetland is small and has a ditch in the wetland. The northern wetland is large and is an open sawgrass marsh. Willows and other shrubs grow on the road berm, and cover 5-25% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands currently are managed with prescribed fire.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed away from the wetland. Alternatively, chop the brush and burn periodically. Both wetlands appear healthy despite the road. The hydroperiod of the ditch and the wetland appear to be similar, the ditch is not high priority concern.

Wetland ID: J 11-01

Description: This wetland is a 1.3 ha ephemeral marsh. There is no tree canopy or midstory cover. A dense bunch grass grows throughout, and covers >75% of the wetland basin. The wetland likely has a salt water influence at times but was fresh water on the day of our visit. A ditch, associated with Bowlegs Rd, connects to the wetland on the north side. The ditch appears to be ephemeral and therefore not a negative impact. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-01


Description: This wetland is a 0.5 ha marsh. Sand Pit Road runs along the north edge of the wetland and the wetland has some deeper holes along the road that may be dug-outs from road-building. A lengthy ditch along Sand Pit Road connects to the wetland. The majority of the wetland is ephemeral but the deeper holes and ditch provide a semi-permanent water source. The wetland was quite flooded on the day of our visit so it was difficult to tell the structure of the wetland along the road. There is no tree canopy or midstory cover in the wetland basin. Sedges/grasses grow throughout and emergent vegetation grows in the deeper holes. The herbaceous vegetation covers >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: Determine if the deeper holes in the northern side of the wetland are dug-outs when the wetland is dry. If they are man-made, fill the holes with sand up to the level of the wetland bottom.

Wetland ID: J 12-02

Description: This wetland is a 1.5 ha marsh. There is a road along the west side of the wetland with a ditch in the wetland edge. It appears the ditch was created as a result of road-building through the wetland and it provides a semi-permanent water source though the wetland itself is historically ephemeral. Currently, the wetland appears to be in fire-maintenance condition. However, sometime in the past, fire suppression allowed large pine trees to get established. Some pine trees are planted on old bedding rows. Large pine trees dominate the canopy, and cover 5-25% of the wetland basin. Small pine trees are encroaching into the wetland interior from the edges. This midstory layer covers 5-25% of the wetland. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Bedding, Road, Roadside ditch, Woody encroachment

Restoration Action Recommended: The ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom. Remove interior pine trees. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 12-03

Description: This wetland is a 1.0 ha ephemeral marsh. This is a heavily pine-encroached wetland. Pine trees grow in a dense ring around the wetland edge, and cover 25-50% of the wetland basin. There is no midstory cover. Shading from the pine trees is impacting the growth of herbaceous vegetation. Sedges/grasses cover 50-75% of the wetland. A shallow, ephemeral ditch is associated with a nearby road on the northern side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove all pine trees up to the wetland edge.

Wetland ID: J 12-04

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy cover. Small pine trees are beginning to encroach into the wetland, and cover 25-50% of the wetland basin. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 12-05

Description: This wetland is a 0.6 ha semi-permanent marsh. There is no tree canopy cover. However, small pine trees form a dense ring around the wetland, and cover 5-25% of the wetland basin. Longer hydroperiods have prevented the pine trees from encroaching into the wetland basin. Sedges/grasses grow in a ring around the wetland edge and emergent vegetation grows in the wetland center. This herbaceous vegetation covers 25-50% of the wetland. A roadside ditch connects with the north end of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment, Road, Roadside ditch

Restoration Action Recommended: The roadside ditch does not appear to be impacting the wetland hydroperiod. Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 12-06

Description: This wetland is a 0.1 ha ephemeral marsh. Planted pines and a small patch of palm trees grow on bedded rows in the west side of the wetland. The tree canopy covers <5% of the wetland. There is no midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: Allow bedding to erode over time. Remove pine and palm trees on bedded rows in the wetland.

Wetland ID: J 12-07

Description: This wetland is a 0.1 ha ephemeral marsh. Pine trees are planted on bedded rows up to the wetland edge but do not appear to be impacting the wetland. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-08

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. There is an old, abandoned fireline along the south side of the wetland that is now grown over with vegetation. Two old tires were discarded in the wetland basin. Other than the trash, this is an exemplary marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Trash

Restoration Action Recommended: Remove the abandoned tires.

Wetland ID: J 12-09

Description: This wetland is a 0.3 ha semi-permanent marsh. There is no tree canopy or midstory cover. Cattails, rush, and emergent vegetation grow throughout, and cover >75% of the wetland. This square-shaped, deep wetland likely was a man-made borrow pit but now is functioning as a healthy, isolated wetland. There were fish present in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-10

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. This is an exemplary marsh and was teeming with tadpoles on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-11

Description: This wetland is a 0.1 ha ephemeral marsh. Planted pine trees grow on bedded rows through the wetland basin. The tree canopy covers 5-25% of the wetland. There is no midstory cover. Sedges/grasses grow throughout, and cover >75% of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Bedding, Planted pines

Restoration Action Recommended: Allow bedding to erode over time. Remove pine trees on bedded rows in the wetland.

Wetland ID: J 12-12

Description: This wetland is a 0.2 ha semi-permanent marsh. There is no tree canopy or midstory cover. Rush and emergent vegetation grow throughout, and cover >75% of the wetland. This marsh is situated along an access road and is connected to the roadside ditch. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed away from the wetland. However, the hydroperiod of the ditch and the wetland appear to be similar, so the ditch is not a high priority concern. The brush along the roadway should periodically be chopped or burned.

Wetland ID: J 12-13

Description: This wetland is a 0.4 ha marsh. This otherwise health marsh is connected to a ditch and road along the east side of the wetland. It appears the ditch was created as a result of road-building through the wetland and it provides a semi-permanent water source though the wetland itself is historically ephemeral. The ditch also provides a refugium for fish, and fish were present on the day of our visit. There is no tree canopy or midstory cover in the wetland. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: In order to completely restore the wetland, the road should be re-routed away from the wetland. Alternatively, the ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 12-14

Description: This wetland is a 1.2 ha ephemeral marsh. There is no tree canopy or midstory cover in the wetland. Sedges/grasses and rush grow throughout the wetland, and cover >75% of the basin. An access road with a ditch is connected to the wetland on the south side. It appears the ditch was created as a result of road-building through the wetland, is ephemeral, and therefore not impacting the hydroperiod of the wetland. The adjacent uplands are scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Road, Roadside ditch

Restoration Action Recommended: Return to the wetland during drier times to ensure the roadside ditch is ephemeral. If the hydroperiod of the ditch and the wetland appear to be similar, the ditch should not be considered a high priority concern.

Wetland ID: J 12-15

Description: This wetland is a 0.4 ha ephemeral marsh. Pine trees are extensively encroaching into the wetland basin. A recent fire killed many of the smaller pine trees but larger ones remain. The pine trees cover 25-50% of the wetland basin. There is no midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Remove pine trees from the wetland interior before shading of herbaceous vegetation occurs.

Wetland ID: J 12-16

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Fern grows throughout and sedges/grasses and sawgrass are also abundant. The herbaceous vegetation covers >75% of the wetland basin. There is fire evidence in the wetland basin. The wetland is rectangular and could have been constructed as a borrow pit. Old bedding rows are in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Bedding

Restoration Action Recommended: None, the bedding will erode over time.

Wetland ID: J 12-17

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Young pine trees form a ring around the wetland edge but provide <5% canopy cover. Sedges/grasses grow throughout the wetland and emergent vegetation grows in the wetland center. The herbaceous vegetation covers >75% of the wetland basin. The wetland was teeming with tadpoles on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: Provide fire to the wetland basin within the next 2 years to prevent pine tree encroachment. The young pine trees could be hand-chopped from the wetland if they are not killed by the next fire.

Wetland ID: J 12-18

Description: This wetland is a 0.9 ha ephemeral marsh. Pine trees are extensively encroaching throughout the wetland basin and are beginning to exclude herbaceous vegetation. A recent fire burned through the wetland but did not kill any of the pine trees. The pine tree canopy covers 25-50% of the wetland basin. The midstory is dominated by small pine trees, and covers 5-25% of the wetland. Sedges/grasses and fern grow throughout the wetland, and cover >75% of the basin. There are old bedding rows in the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Bedding, Woody encroachment

Restoration Action Recommended: Allow the bedding to erode over time. Hand-chop small, encroaching pine trees.

Wetland ID: J 12-19

Description: This wetland is a 1.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This is a beautiful and diverse marsh with fire evidence around the wetland edge. There are a few small pine trees scattered around the wetland depression that should be killed in the next fire. The wetland was teeming with tadpoles and frogs on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: Provide fire to the wetland basin within the next 2 years to prevent pine tree encroachment. The young pine trees could be hand-chopped from the wetland if they are not killed by the next fire.

Wetland ID: J 12-20

Description: This wetland is a <0.1 ha ephemeral borrow pit that is a functioning, isolated marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. This wetland has no connection with ditches and was teeming with tadpoles and invertebrates on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-21

Description: This wetland is a 0.4 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and emergent vegetation grow throughout, and pickerelweed grows in the wetland center. The herbaceous vegetation covers >75% of the wetland basin. A few small pine trees grow around the wetland edge but will be managed with the next fire. This beautiful, health marsh is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods to the west and hammock to the east.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-22

Description: This wetland is a 0.3 ha ephemeral marsh. Pine trees grow in a dense ring around the outside of the wetland edge, and are beginning to shade-out the herbaceous vegetation. The pine tree canopy covers 5-25% of the wetland. There is no midstory layer. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching small pine trees and prevent further woody encroachment. The small pine trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 12-23

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout the wetland, and cover >75% of the basin. This marsh is the northern half of a once larger wetland now bisected by an access road. The road completely isolates the 2 halves and the wetlands have different herbaceous plant communities. There is no ditch associated with the road on this wetland's side. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Access 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. If this road is now a permanent attribute to the property, we do not recommend any action relating to the road.

Wetland ID: J 12-24

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and covers >75% of the wetland basin. This marsh is the southern half of a once larger wetland now bisected by an access road. The road completely isolates the 2 halves and the wetlands have different herbaceous plant communities. A deep ditch was created as a result of road-building through the wetland. This wetland may connect to a large marsh to the southeast during times of high water. There were fish present in the wetland on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

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. The ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 12-25

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses and rushes grow throughout the wetland, and cover >75% of the basin. This marsh used to connect to a much larger wetland to the south but is now isolated by an access road. The large wetland to the south is brackish but this wetland was completely fresh water on the day of our visit. The wetland connects to a ditch that is associated with the road. Fish and metamorphosing tadpoles (southern leopard frog) were present on the day of our visit. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

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. The ditch could be plugged where it is adjacent to the wetland and filled with sand up to the level of the wetland bottom.

Wetland ID: J 12-26

Description: This wetland is a 1.0 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout, and sawgrass grows in a ring around the wetland edge. The herbaceous vegetation covers >75% of the wetland basin. The wetland is surrounded by a dense ring of brush and hardwood hammock. The adjacent uplands are a mix of scrubby and mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been thinned and burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-27

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow in the wetland center, and sedges/grasses grow in a ring around the wetland edge. The herbaceous vegetation covers >75% of the wetland basin. This wetland is an exemplary marsh and is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-28

Description: This wetland is a 0.3 ha ephemeral marsh. Small pine trees have encroached into the wetland basin, particularly on the west side. A recent fire burned through the wetland and killed many pine trees under 3m, but the taller pine trees survived. The pine tree canopy covers 5-25% of the wetland. There is no midstory layer. The wetland has a diverse mix of sedges/grasses, rushes, and *Sphagnum*. The herbaceous vegetation covers >75% of the wetland basin. The wetland is a potential striped newt breeding pond. The adjacent uplands are scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Hand-chop pine trees from the wetland interior.

Wetland ID: J 12-29

Description: This wetland is a 2.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes and pickerelweed grow in the deeper wetland center and sawgrass grows in a ring around the wetland edge. The herbaceous vegetation covers >75% of the wetland basin. The adjacent uplands are scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-30

Description: This wetland is a 0.1 ha ephemeral marsh. There is no tree canopy or midstory cover. Rushes grow throughout the wetland, and cover >75% of the basin. There is an open water pool near the center of the wetland. The adjacent uplands are scrubby flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-31

Description: This wetland is a 0.5 ha ephemeral marsh. There is no tree canopy cover. However, small pine trees are encroaching into the wetland from the edges, and cover 5-25% of the wetland. A recent fire burned through the wetland, but did not kill the small pine trees. Rushes and sedges/grasses grow throughout the wetland, and cover >75% of the basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Hand-chop encroaching pines from the wetland interior.

Wetland ID: J 12-32

Description: This wetland is a 0.3 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout, and pickerelweed grows in the deep wetland center. The herbaceous vegetation covers >75% of the wetland basin. This wetland is an exemplary marsh and is a potential striped newt breeding pond. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-33

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory cover. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. There is a brush ring forming around the wetland ecotone, but there is fire evidence within the brush ring. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-34

Description: This wetland is a 2.2 ha semi-permanent marsh. There is no tree canopy or midstory cover. Sedges/grasses and emergent vegetation grow throughout the wetland, and cover >75% of the basin. Fish were present in the wetland on the day of our visit. The wetland is surrounded by a hardwood hammock ring but there is fire evidence within the ring. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 12-35

Description: This wetland is a 0.4 ha semi-permanent marsh. There is no tree canopy or midstory cover. Emergent vegetation grows in the wetland center, and sawgrass and sedges/grasses grow around the wetland edge. The herbaceous vegetation covers >75% of the wetland basin. There is a brush ring on the east side of the wetland with patchy fire evidence. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The uplands have been burned in order to restore them to a more open, flatwoods community.

Wetland Concerns: None

Restoration Action Recommended: None

Wetland ID: J 14-01

Description: This wetland is a 0.1 ha ephemeral marsh. This circular marsh is showing signs of fire suppression. Several small maples have established in the wetland basin, and the leaf duff is thick. The maple trees cover 5-25% of the wetland. There is no midstory layer. Rush grows throughout, and cover >75% of the wetland basin. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The underbrush is very dense. Sandhill is to the west of the wetland.

Wetland Concerns: Woody encroachment

Restoration Action Recommended: Encourage periodic fire to burn through the wetland basin to kill the encroaching maple trees and prevent further woody encroachment. The maple trees could be hand-chopped if they are not killed by the next fire or inundation.

Wetland ID: J 14-02

Description: This wetland is a 0.6 ha ephemeral marsh. Pine and palm trees have encroached into the wetland basin. Pine trees dominate the canopy, and cover 5-25% of the wetland. The midstory is dominated by small palm and small pine trees, and covers 5-25% of the wetland basin. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. A recent fire burned through the wetland basin. Water was present in the wetland and the fire burned incompletely, leaving a mosaic-like pattern. A WMA property boundary road bisects the north side of the wetland. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. A recent fire burned through the uplands reducing what was thick underbrush.

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. If this road is now a permanent attribute to the property, we do not recommend any action relating to the road. Hand-chop interior pine trees.

Wetland ID: J 14-03

Description: This wetland is a 0.2 ha ephemeral marsh. There is no tree canopy or midstory later. Sedges/grasses grow throughout the wetland, and cover >75% of the basin. During times of high water, the northwest side of the wetland may connect to an adjacent hydric hammock community. The adjacent uplands are mesic flatwoods that were bedded and converted to a pine plantation. The underbrush is very dense.

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:

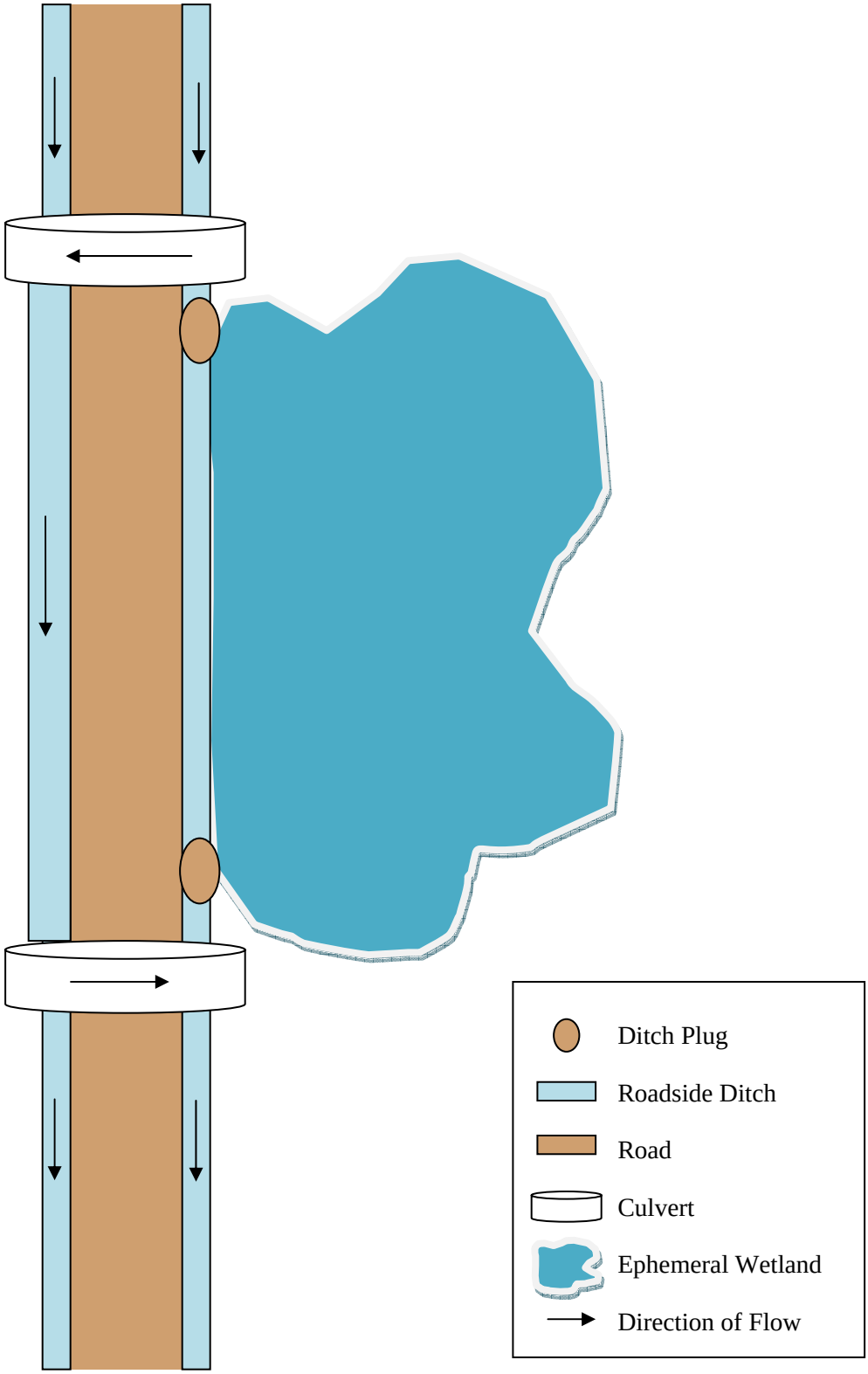
Upland Assessment

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



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

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