Pinellas County
PARKS & CONSERVATION RESOURCES

# MEMORANDUM

TO: Barry A. Burton, County Administrator

FROM: Paul Cozzie, Parks & Conservation Resources Director

CC: Jill Silverboard, Chief Assistant County Administrator

DATE: May 18, 2020

SUBJECT: Recent Land Management Practices at Regional County Parks

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The Parks and Conservation Resources Department recently completed mechanical thinning, also referred to as mechanical mulching or mechanical mastication, at four regional county parks (Lake Seminole, War Veterans, Boca Ciega, and Walsingham) as part of our ongoing land management activities to reduce the dangers of wildfire and improve the health of the natural areas within these parks.

Though temporary, the visual impact of this activity is admittedly jarring to the public but is necessary to maintain the long-term health and sustainability of these natural areas. This process has been deployed at many parks and preserves over the years, including Brooker Creek Preserve, Heritage Village and the P2000 property adjacent to the Florida Botanical Gardens.

The recent thinning activity, which has now been fully completed, has resulted in seven written complaints to date from nearby residents and park patrons who believe this activity is destructive to the natural environment. However, the recent thinning activity is in fact a benefit to these areas and will result in a safer, more natural, and more sustainable ecosystem for both the vegetative communities and wildlife which reside in these parks.

With the benefit of hindsight, more robust public education may have mitigated some of those complaints, which are largely based on opinion and not sound land management principles. To that end, staff has prepared the attached report on these recent activities to further educate and inform as to the purposes and benefits of mechanical thinning.

In closing, Parks and Conservation Resources Department staff have always viewed themselves as stewards of the environment and protectors of these natural areas, and would not engage in management activities which would be destructive or detrimental to this mission.

ATTACHMENT: Vegetative Thinning in County Parks Report

**Vegetation Thinning in County Parks**
**Parks and Conservation Resources Department**
**May 18, 2020**

Pinellas County Parks and Conservation Resources hired a contractor to mechanically masticate (also known as “thinning” or “mulching”) overgrown vegetation at several parks from April-May, 2020. Work was completed at Lake Seminole Park (5 acres), War Veteran’s Memorial Park (18 acres), Boca Ciega Millennium Park (11 acres), and Walsingham Park (27 acres). Mechanical thinning, a standard land management technique, reduces fuel loads and ladder fuels found in overgrown natural areas, helping to reduce the risk of catastrophic wildfire. This habitat management technique also benefits a wide range of native plants and animals found in these natural communities.

*Equipment conducting mechanical thinning*

The upland communities in Florida, as well as most of the southeastern United States, are dependent on fire. They require fire to function properly, and historically would have burned regularly due to lightning-induced fires. Many species are fire-adapted due to their long evolution with regular fire, and a typical fire will not harm these plants and animals. When fire is excluded, palmetto and shrubs increase greatly, which in turn shades the herbaceous understory and reduces plant diversity. High fuel loads increase the risk of catastrophic wildfires. Unlike a typical seasonal fire, a catastrophic wildfire can burn at much higher temperatures and spread over much larger areas. This can damage ecosystems and kill canopy trees. Wildfires obviously present a significant risk to life and property in surrounding developed areas, and it is dangerous and expensive to contain a wildfire once started. A relevant example took place at Walsingham Park in March, 2016. This wildfire quickly crossed a paved road and nearly destroyed personal vehicles and park structures prior to being contained. The fire, which smoldered for days, left a denuded landscape and resulted in the loss of many mature canopy trees.

*Wildfire damage at Walsingham Park*

In appropriate areas of parks and preserves, we conduct prescribed burns that mimic natural fires. This not only provides the benefits associated with fire, it also reduces the risk of catastrophic wildfire. However, fires can be set only

under very precise conditions (humidity, wind, temperature, etc.) and smoke management is a primary concern due to negative impacts on neighborhoods, schools, hospitals and nearby roadways. At some properties, it is simply not possible to conduct prescribed burns safely.

*Urban development presents challenges for land management*

In areas that cannot be burned effectively, we use mechanical thinning as an alternative management technique. Heavy equipment is used to shred and grind overgrown vegetation into mulch, which is left in place. The approach opens the understory while minimizing damage to surrounding mature trees. Thinning reduces fuel loads and removes ladder fuels, reducing the risk of catastrophic wildfire. Once thinned, native plants have greater access to light and nutrients and will grow and thrive within a few weeks to months after treatment, depending on rainfall. Thinning, completed in small designated units to provide refugia for wildlife, also results in expanded food and habitat opportunities for these animals.

*Dense, overgrown vegetation at Boca Ciega Millennium Park*

*Immediately after treatment at Boca Ciega Millennium Park*

We have conducted mechanical thinning in Brooker Creek preserve for many years, with outstanding results. Since 2015, we have thinned over 1,000 acres of the preserve. We have a strong partnership with the Florida Forest Service in conducting resource management; in fact, prior to 2015 they employed a contractor as well as their Fire Mitigation Crew to complete mechanical thinning in the preserve. In 2014, the department procured a smaller 50-inch mulching mower head mounted to a skid steer; this equipment has been used in more limited applications, including at Heritage Village. Manual removal of vegetation, which includes hauling and disposal of debris, is also employed in some instances, but is simply not a feasible alternative to mechanical thinning at the scale needed at most properties.

*Two months post-treatment at Walsingham Park*

*Pre-treatment at Heritage Village*

*Post-treatment at Heritage Village*

Be assured all mechanical thinning taking place has been conducted under the supervision of our environmental land managers. This involves pre-treatment surveys to locate gopher tortoise burrows and other sensitive sites as well as potential hazards. Areas to avoid are identified and marked prior to commencement of the work. In addition, mechanical thinning is targeted to take place above the soil line to ensure impacts to wildlife are minimized. Designated sections of trails and adjacent areas are closed to the public temporarily for the safety of all park visitors.

The mission of the Parks and Conservation Resources Department is to maintain and protect the inherent value of the County's natural, cultural and recreational resources through sustainable access, education, and stewardship that enhance quality of life for our community and future generations. It is important to recognize that acquisition of land for a park or preserve is only the first step in the resource management process. These properties cannot simply be fenced and "left alone" for nature to take its course. The resources must be actively managed, otherwise their structure and function will decline over time. Active management is especially important in human-dominated

systems, since many processes that would have taken place naturally in the past, no longer occur. Our management efforts are directed at protecting the natural resources that Pinellas County had the foresight to acquire. By promoting sound stewardship of over 20,000 acres, we provide resource-based recreational opportunities to citizens while also maintaining healthy natural communities that can be enjoyed by future generations.

Please do not hesitate to contact the Department of Parks and Conservation Resources if you have any additional questions or concerns.

Additional References:

- Photographic Series of Treatment Effects at Brooker Creek Preserve
- 2020 Treatment Map for Lake Seminole Park
- 2020 Treatment Map for War Veteran's Memorial Park
- 2020 Treatment Map for Boca Ciega Millennium Park
- 2020 Treatment Map for Walsingham Park
- 2015-2018 Treatment Map for Brooker Creek Preserve
- *Mechanical Treatments and Herbicides as Fire Surrogate: State of the Science in Florida Ecosystems*. Southern Fire Exchange, Fact Sheet 2014-5
- *Mechanical Treatments in Pine Flatwoods: A Temporary Rearrangement of Fuel Structure*. Southern Fire Exchange, Fact Sheet 2015-1

*Pre-treatment at Brooker Creek Preserve*

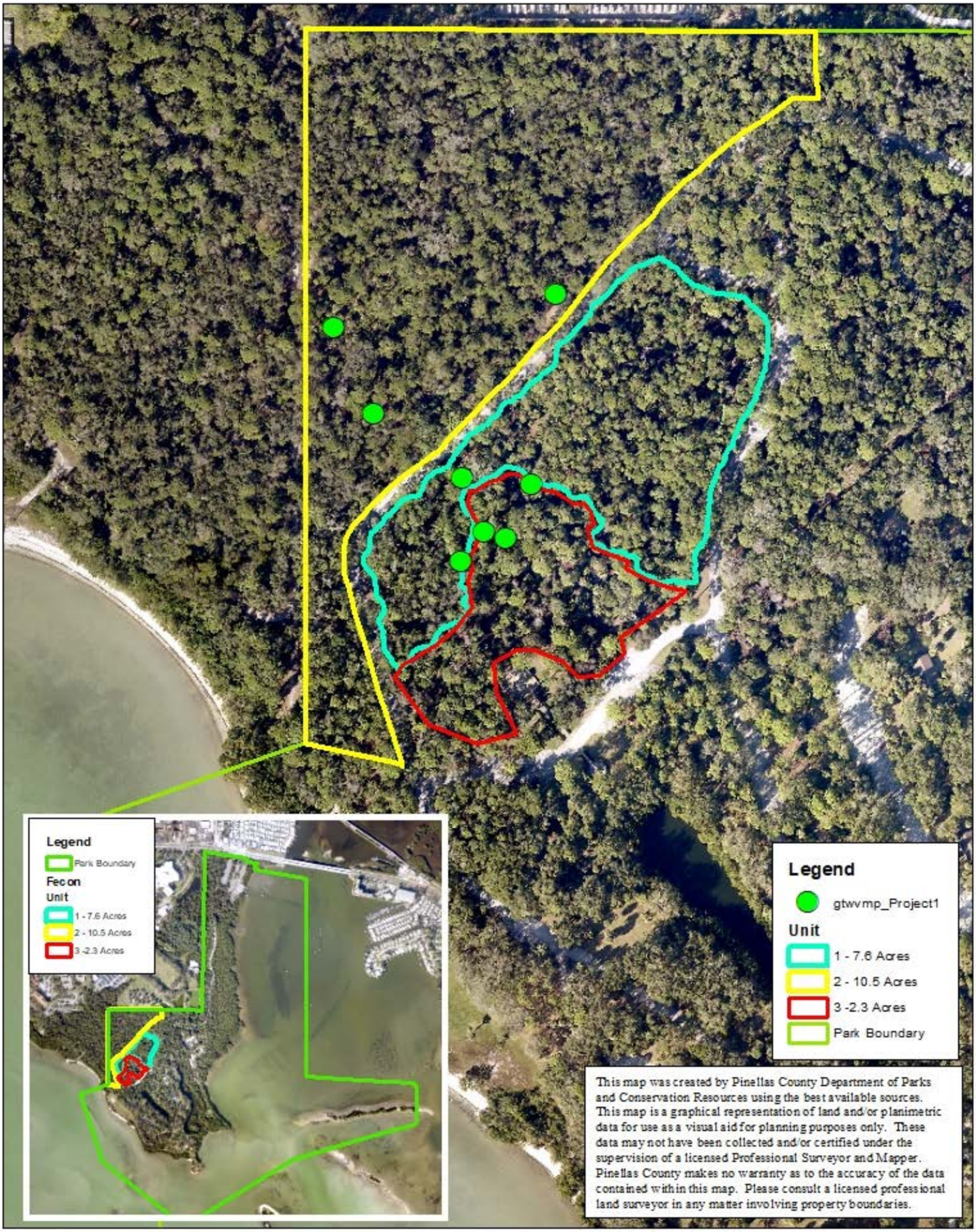
*Immediately after treatment at Brooker Creek Preserve*

*1-year post-treatment at Brooker Creek Preserve*

*2-years post-treatment at Brooker Creek Preserve*


# Lake Seminole Park Fecon

100 50 0 100 Feet

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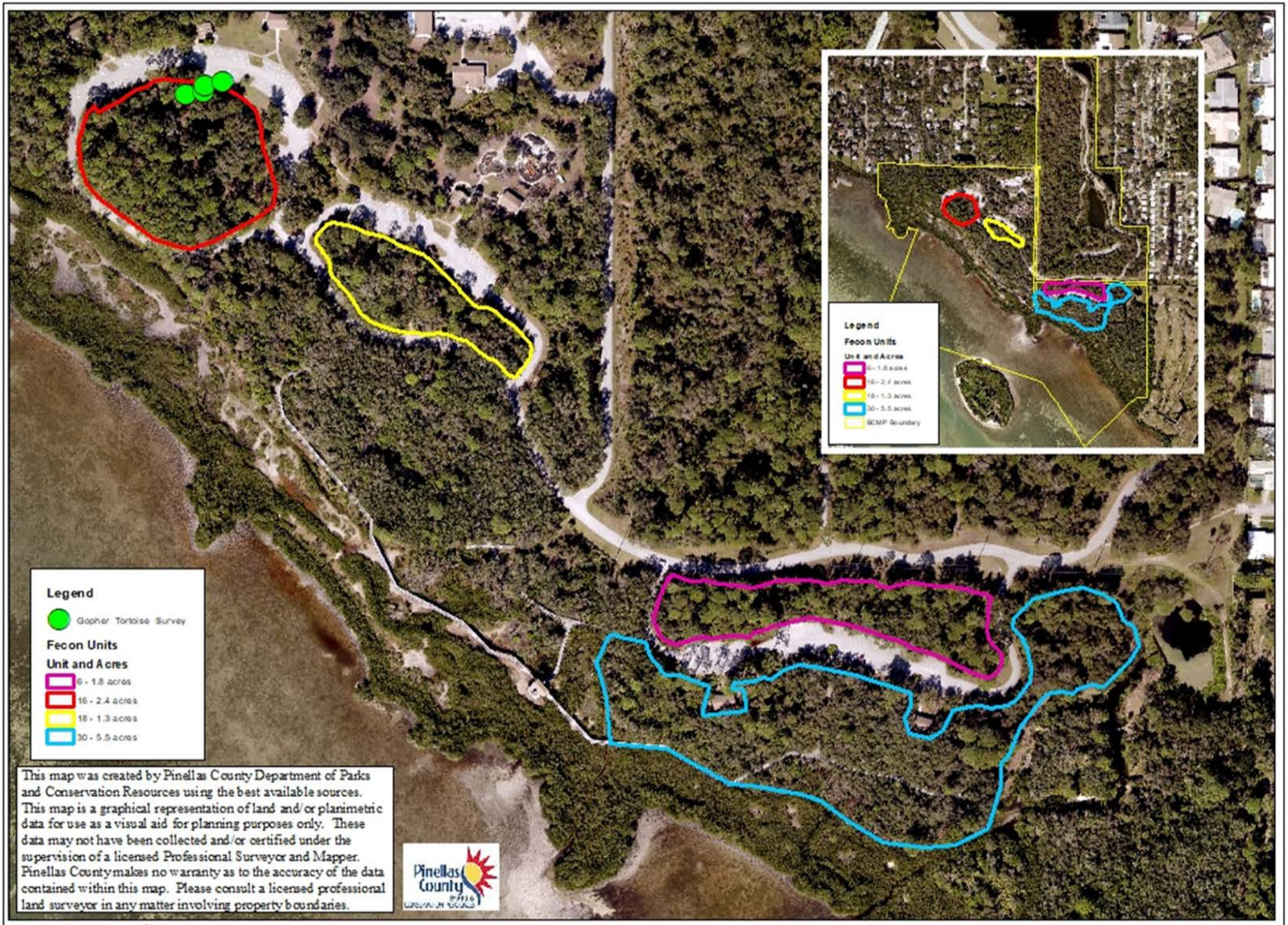
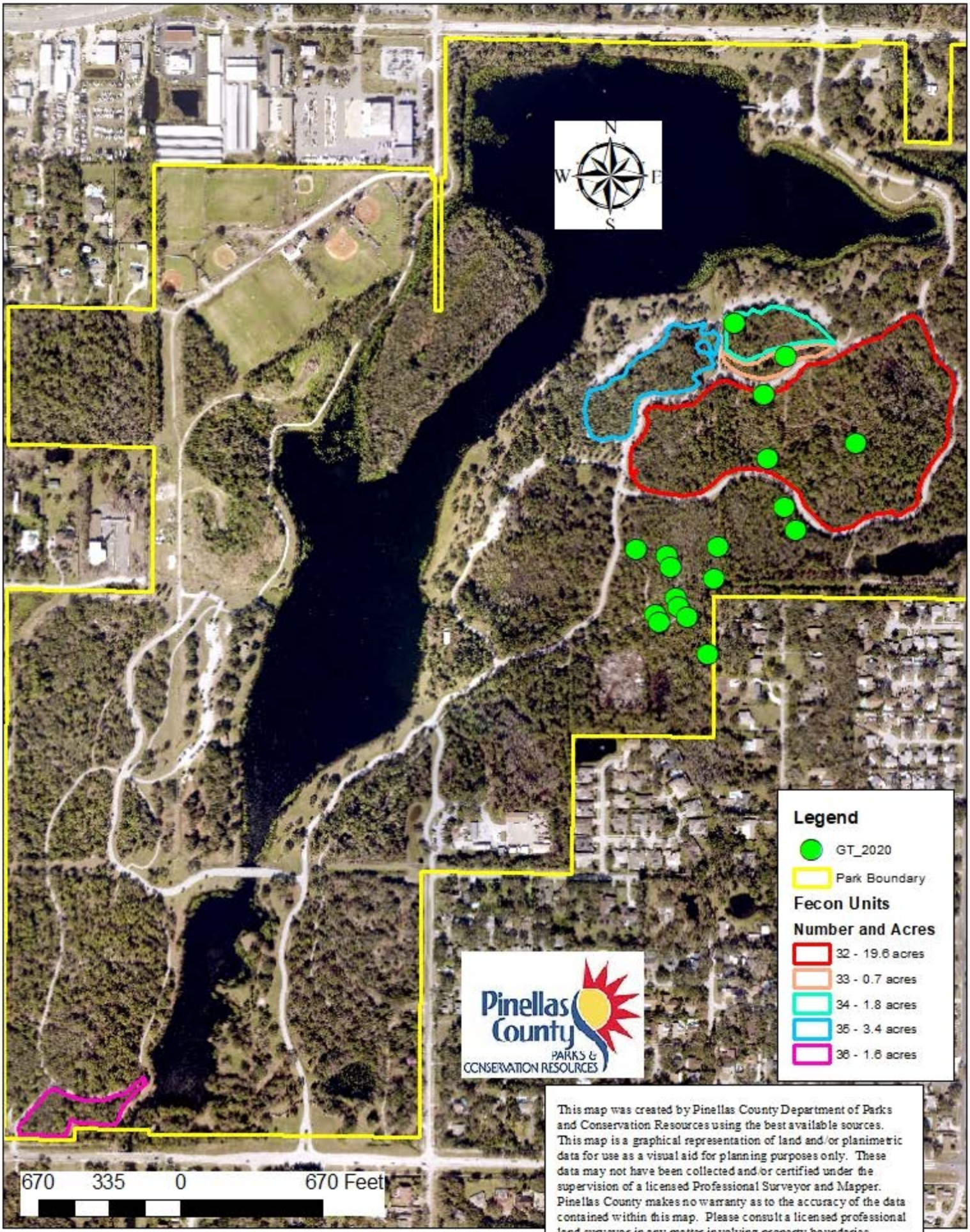
200 100 0 200 Feet

# War Veterans' Memorial Park
## Fecon 2020




# Boca Ciega Millennium Park

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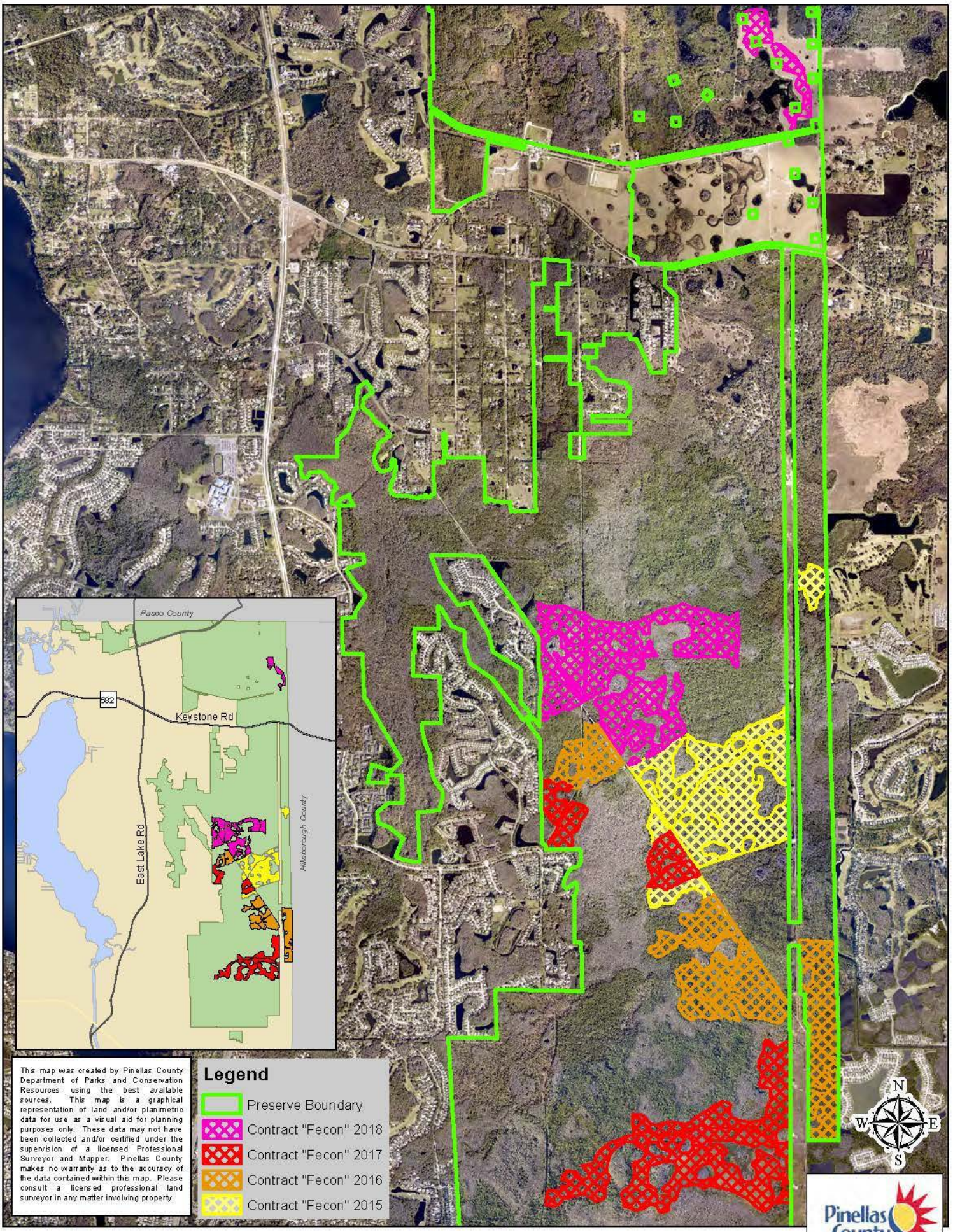
# Walsingham Park

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## Legend

- Preserve Boundary
- Contract "Fecon" 2018
- Contract "Fecon" 2017
- Contract "Fecon" 2016
- Contract "Fecon" 2015

N
W E
S

0 0.375 0.75 1.5 Miles

# Brooker Creek Preserve Flatwoods Restoration 2015 - 2018
## Understory Reduction by "Fecon" Mulcher Mowing

Pinellas County
PARKS & CONSERVATION RESOURCES

SOUTHERN
Fire Exchange
Uniting Fire Science and Natural Resource Management

SFE Fact Sheet 2014-5

# Mechanical Treatments and Herbicides as Fire Surrogates: State of the Science in Florida Ecosystems

*Alan Long, David Godwin, and Leda Kobziar*

## INTRODUCTION

How effective are non-fire vegetation treatments for achieving ecosystem restoration and management goals? This has been the main question in dozens of research studies during the last 25 years. Researchers Eric Menges and Doria Gordon published a paper in *Florida Scientist* in 2010[1] that reviewed more than 18 research studies and 112 publications that addressed that very question. While the authors focused specifically on the impacts of such treatments on Florida ecosystems, their findings have relevance to other southern Coastal Plain states with areas containing sandhill, scrub, dry prairie, and flatwoods ecosystems. Although direct comparison among the research projects was hindered by differences in experimental design, length of time treatments were evaluated, and treatment characteristics, Menges and Gordon concluded their review with a set of generalities and recommendations based on some similar conclusions drawn from the studies. This fact sheet summarizes the key points and management implications that Menges and Gordon developed in their review.

Several studies in the Southeast have explored the effectiveness of mechanical and herbicide treatments on ecosystem restoration and management goals.

### Mechanical and herbicide treatments can accelerate structural changes.

Many of the studies took place in long unburned sites with dense shrub and/or hardwood layers. Frequently, a key objective was to reduce these layers to facilitate the reintroduction of prescribed fire, promote herbaceous layer diversity and cover, and enhance wildlife habitat. Mechanical methods included logging, mowing, roller-chopping, chainsaw felling, or girdling. Herbicides were most often hexazinone in granular formulation or liquid spot applications. Although mechanical treatments were effective in reducing shrubs and hardwoods in the short-term (1-2 years post treatment), resprouting generally resulted in returns to pretreatment conditions within a few years. Herbicide applications, however, tended to lengthen control of subsequent hardwood and shrub resprouting. In most ecosystems, coupling mechanical treatments and herbicides with fire was best at reducing hardwoods and saw palmetto.

### Mechanical and herbicide treatments are best when followed by prescribed fire.

In most of the studies, other ecological benefits were also generally better when fire followed the other treatments than when mechanical or herbicide treatments were applied without fire. Such ecological benefits included improved wildlife habitat via increased herbaceous and grass diversity / cover and reductions in palmetto cover. In pine flatwoods and dry prairies, combined treatments resulted in short-term (flatwoods) and long term (dry prairies) increased grass and herbaceous species and reduced saw palmetto, regardless of season.

### Some species do not respond to mechanical and herbicide treatments.

Some arthropod, herpetofauna, and plant species only responded to prescribed fire and not mechanical treatments. This trend was seen in all ecosystems reviewed, including scrub, sandhill, dry prairie, flatwoods, and pine rocklands. For these species, mechanical and herbicide treatments may not achieve all restoration and management goals. This further supports the importance of following such treatments with prescribed fire, or using prescribed fire alone where fuel conditions allow.

### When mechanical and herbicide treatments are used they should generally be applied in the early stages of restoration and then phased out in favor of prescribed fire.

The authors concluded that once the benefits of mechanical and herbicide treatments have been achieved, managers should transition to prescribed fire-only management as soon as possible in most situations. To achieve this may require several frequent prescribed fires to solidify the initial progress in modifying species composition and structure. A transition to a fire-only management strategy also makes economic sense given that mechanical and herbicide treatments generally carry a significantly higher cost per acre than prescribed fire.

### Mechanical treatments can have unintended impacts.

Some mechanical treatments can cause soil disturbances that facilitate the invasion of non-native plants such as cogongrass. Based on the level of soil disturbance, logging would be the least preferred mechanical treatment method as compared to mowing and hand thinning methods.

### When fire alone is feasible and will accomplish restoration goals, repeated fire within the full range of the natural regime should be implemented.

If a prescribed fire regime can be used to alter ecosystem structure and composition toward more desirable conditions without mechanical or herbicide pretreatments, that will generally be the preferred management strategy. However, the fire regime should include a variety of burn timings and conditions to optimize ecological benefits.

### Management programs focused on single (umbrella) species are not recommended unless they are demonstrably beneficial for most other species.

Managing solely for a single species can be at the detriment of other species which may respond differently to treatments. Incorporating spatial and temporal heterogeneity into prescribed fire and other management practices can help to provide habitat conditions for a larger range of plant and animal species.

### More research is needed on the long-term effects of repeated mechanical and herbicide treatments.

Menges and Gordon suggest that land managers should contribute to the research process by carefully monitoring and documenting the long-term effects of mechanical and herbicide treatments. Where possible, monitoring should compare the results of mechanical and herbicide treatments to reference sites that exemplify restoration and management goals.


## SUMMARY

In conclusion, mechanical and herbicide treatments can be acceptable pretreatments to prescribed fire, especially when ecosystem structure and composition have been altered by long periods without fire. Ecological benefits from those treatments will generally be greatest when they are followed by a transition to a prescribed fire program that mimics the natural fire regime.


## ADDITIONAL RESOURCES

The Menges and Gordon research review is one of several recent review publications that provide a wealth of information on the impacts of vegetation treatments that alter fuel loads and ecosystem characteristics in the South. The Joint Fire Science Program has also sponsored field guides that focus on fuel treatments in slash/longleaf pine flatwoods[2], loblolly pine[3], and subtropical pines[4]. Information from these guides may be applicable across a large segment of the South. Readers are encouraged to access these resources for developing land management prescriptions at the Southern Fire Exchange website (http://www.southernfireexchange.org/Spotlight/Spotlight_06.html). Multiple ongoing projects continue to examine mechanical treatments in pine flatwoods and dry prairies—be on the lookout for additional Southern Fire Exchange fact sheets in the future.

## REFERENCES CITED


[1] Menges, E. and D. Gordon. 2010. Should mechanical treatments and herbicides be used as fire surrogates to manage Florida's uplands? A review. *Florida Scientist 73*(2):147-174.

[2] Budney, M., J. Kreye, L. N. Kobziar, and J. Camp. 2013. Fuel treatments in pine flatwoods: A photoseries guide. Available at http://www.southernfireexchange.org/Models_Tools/etc/Fuel_Treatments_Photo_Guide.pdf.

[3] Marshall, D. J., M. Wimberly, P. Bettinger, and J. Stanturf. 2008. Synthesis of knowledge of hazardous fuels management in loblolly pine forests. Gen. Tech. Rep. SRS–110. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 43 p. Available at http://www.treesearch.fs.fed.us/pubs/32484.

[4] O'Brien, J. J., K. A. Mordecai, L. Wolcott, and others. 2010. Fire managers field guide: Hazardous fuels management in subtropical pine flatwoods and tropical pine rocklands. Gen. Tech. Rep. SRS-123. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 55 p. Available at http://www.treesearch.fs.fed.us/pubs/35520.



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Alan Long, David Godwin, and Leda Kobziar, Southern Fire Exchange

For more information, visit www.southernfireexchange.org or email contactus@southernfireexchange.org.



The Southern Fire Exchange is funded through the Joint Fire Science Program, in agreement with the United States Forest Service, Southern Research Station. This institution is an equal opportunity provider.

SOUTHERN Fire Exchange
Uniting Fire Science and Natural Resource Management

SFE Fact Sheet 2015-1

# Mechanical Treatments in Pine Flatwoods: A Temporary Rearrangement of Fuel Structure

*Jesse Kreye, David Godwin, and Leda Kobziar*

## SUMMARY

Mechanical "mowing" treatments can alter the structure and arrangement of understory and midstory fuels in pine flatwoods thereby reducing post-treatment flame lengths and rates of fire spread. Shrubs, however, can quickly recover following treatment and reduce the longevity of this effectiveness. Surface fuels resulting from the mowing of small trees and shrubs may present challenges given that long-duration combustion can occur in these compact fuels. The timing of subsequent mechanical or prescribed fire treatments may be very important for achieving management objectives.

## MECHANICAL FUEL TREATMENTS

Prescribed burning is a dominant forest management tool used across the Southeastern U.S., yet burning is often limited due to various social, ecological, or economic factors. The use of mechanical methods as a fire surrogate or as a means to treat overgrown fuels prior to reintroducing fire has become increasingly used in the region, especially in the wildland-urban-interface (WUI) and other areas with significant smoke concerns. Mechanical treatments can include thinning of the overstory, treating understory shrubs and small trees, or a combination of both. Understory treatments commonly used in the South include "mowing", "mulching", "masticating" or "chipping" (depending on the equipment used) of shrubs and small trees. While different terms are used, each treatment is aimed at transforming aerial fuels to surface fuels to reduce fire behavior. Treatments are often employed as a stand-alone option in the WUI, or are followed-up with prescribed burning where possible. While specific treatment objectives may vary, reduction of potential fire behavior attributes including flame lengths, rate of spread, and crown fire potential, are emphasized. Reducing these fire behavior factors is important to both follow-up prescribed burning and potential wildfire.

## TREATMENT OF FUELS IN PINE FLATWOODS

Mowing is a common mechanical fuels treatment method especially in long-unburned pine flatwoods (ca. >10 yr. old rough) of the Southeastern Coastal Plain, where understories are dominated by saw palmetto (*Serenoa repens*) and gallberry (*Ilex glabra*) shrubs. Although understory shrubs in these stands can be very dense, mature longleaf pine (*Pinus palustris*) and slash pine (*P. elliottii*) in the overstory are often sufficiently spaced to facilitate mowing without damage to mature trees. While shrubs are typically the target of mowing in flatwoods, understory and midstory hardwoods may also be targeted in forests that have gone without fire for longer durations.

Importantly, mowing itself is not a "fuels reduction" treatment as it doesn't actually reduce fuel loads, but rather alters or rearranges fuel structure. During treatment, shrubs and small trees are shredded and spread across the forest floor creating a dense and shallow fuel bed (usually ≤ 4 inches deep, with the depth depending on the quantity of vegetation mowed).

Following treatment, fuel bed height is greatly reduced while fuel bed bulk density is substantially increased, both of which can influence fire behavior[1]. Fuel beds created from mowing are mixtures of small-diameter woody fuels composed of broken sticks from shrub stems, or fractured (shredded) woody debris from larger shrub or tree stems. In pine flatwoods, the bulk of the post-mowing forest floor material is often composed of shredded saw palmetto foliar material[2]. These pine flatwoods post-treatment fuel beds can be somewhat "fluffy" or aerated compared to mowed debris generated in forests where woody shrubs or trees dominate the understory[3]. Although the surface of such fuel beds may initially appear "fluffy," the lower strata of mowed fuels remain relatively dense and may become more compact over time.

Although shrubs are converted to dense surface fuels by mowing, they recover quickly following treatment in pine flatwoods[1]. It is unclear how mowing impacts shrub or tree regeneration from seeds, but palmetto, gallberry and many other flatwoods shrub species sprout vigorously after a disturbance. Where the rate of shrub regrowth exceeds that of decomposition of mowed surface fuels, total fuel loads may actually *increase* following mowing treatments. Timing post-treatment application of prescribed fire or subsequent mowing treatments may be critical to achieving management objectives.

## EFFECTS FOLLOWING TREATMENTS

Mowing of palmetto and gallberry understories in pine flatwoods may reduce flame lengths and rate of spread because shrubs are converted to dense surface fuels. However, the effectiveness of fire behavior reduction may be short-lived since shrubs recover quickly in these ecosystems. While mowed fuels may drive fire behavior immediately (within months) following treatment, shrub regrowth may lead to increases in flame length and rate of spread within a year following treatment. When post-mowing surface fuels from these treatments are ignited, research has shown that their increased bulk density can result in longer residence time, and concentrated heating of the forest floor[4]. In some cases, this prolonged heating can result in duff ignition and, if substantial fine root structures occupy the duff, overstory tree mortality.

## MANAGEMENT RECOMMENDATIONS

Using mowing treatments to alter potential fire behavior is a plausible management option, but the timing of treatments is critical to meeting management objectives. As a stand-alone treatment, mowing is likely to reduce flame length soon after treatment, but where shrub recovery is rapid, treatments would need to be frequently implemented to maintain low shrub densities and heights[1]. The accumulation of surface fuels from frequent mowing would likely pose a hazard to residual trees because of the potential for subsequent wildfires to result in long-duration heating of the forest floor and soils. These factors need to be considered when evaluating the use of mowing treatments to meet specific management objectives, especially in the WUI. When used in conjunction with prescribed burning, pine flatwoods mowing treatments are best applied where follow-up burning is expedient, in order to consume surface fuels prior to shrub recovery. Post-mowing prescribed fires should be timed to coincide with fuel moisture conditions that support the reduction of surface fuels, while minimizing the potential for duff ignition and subsequent overstory mortality.

## ADDITIONAL RESOURCES


[1]Budney, M.L., Kreye, J.K., Kobziar, L.N., Camp, J.M. 2013. Fuel Treatments in Pine Flatwoods: A Photo Series Guide. Tech. Rep. Gainesville, FL: University of Florida School of Forest Resources and Conservation. Available at http://southernfireexchange.org/Models_Tools/etc/Fuel_Treatments_Photo_Guide.pdf.

[2]Kreye, J.K., Kobziar, L.N., Camp, J.M. 2014. Immediate and short-term response of understory fuels following mechanical mastication in a pine flatwoods site of Florida, USA. *Forest Ecology and Management* 313: 340-354.



In flatwoods sites with moderate saw palmetto cover prior to mechanical treatment, understory recovery following treatment can be rapid. Figure from Budney et al. 2013.


[3]Kreye, J.K., Brewer, N.W., Morgan P., Varner, J.M., Smith, A.M.S., Hoffman, C.M., Ottmar, R.D. 2014. Fire behavior in masticated fuels: A review. *Forest Ecology and Management* 314: 193-207.

[4]Kreye, J.K., Kobziar, L.N., Zipperer, W.C. 2013. Effects of fuel load and moisture content on fire behavior and heating in masticated litter-dominated fuels. *International Journal of Wildland Fire* 22: 440-445.

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O'Brien, J., Mordecai, K.A., Wolcott, L. 2010. Fire managers field guide: hazardous fuels management in subtropical pine flatwoods and tropical pine rocklands. Gen. Tech. Rep. SRS-123. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station Available at http://www.treesearch.fs.fed.us/pubs/35520.



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