APPENDIX J

CRC Fire Reintroduction and Prescribed Burn Plan – On-site
(“CRC Burn Plan”)

Appendix J

CORAL REEF COMMONS

Fire Reintroduction and Prescribed Burn Plan

Submitted to U.S Fish Wildlife Service and Miami-Dade County

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1.0 INTRODUCTION

Prescribed burning is an important component of the On-site Preserves Management Plan, as discussed in Section 7.0 of the Coral Reef Commons Habitat Conservation Plan (CRC HCP), for the 45.24 acres of pine rocklands within the East and West Preserves. The following "Coral Reef Commons (CRC) Fire Reintroduction and Prescribed Burn Plan" (the "CRC Burn Plan") details the methods for fire reintroduction and implementation of the prescribed burn plan for these areas. The CRC Burn Plan was initially prepared in support of the overall Coral Reef Commons Habitat Conservation Plan (CRC HCP) submitted to the U.S. Fish and Wildlife Service (USFWS).

The 45.24 acres of pine rocklands include 44.69 acres designated as Natural Forest Community (NFC) Pine Rockland habitat by Miami-Dade County (MDC Code § 24-5). Because the CRC Burn Plan includes mechanical fuel and canopy reduction, pine thinning, and the creation of new firebreaks within the designated NFC Pine Rocklands, a NFC removal permit will be required by MDC. To address MDC NFC removal permit requirements, the CRC Burn Plan has been revised to identify prescribed burning activities within NFC Pine Rocklands. Section 6 of the CRC HCP includes the Best Management Practices (BMPs) that will be utilized for the prescribed burning activities. To educate the public on the importance of planned prescribed burns for the pine rockland portions of the On-site Preserves, the overall Conservation Program for the CRC Property includes community outreach and education and is discussed in Sections 6.0 and 7.0 of the HCP.

2.0 FIRE HISTORY IN THE RICHMOND AREA

Located in an urban setting, the pine rocklands within the CRC Property are part of a larger tract of pine rocklands known as the Richmond Pine Rockland Complex (Richmond Area). While conducting prescribed burns within an urban setting may be challenging, Miami-Dade County (MDC), in conjunction with the Florida Forest Service (FFS), has been demonstrated that the ability to conduct burns in an urban setting can be readily accomplished with adequate resources (MDC Public Comment Letter to USFWS 2/22/2016). This is evidenced by the increased burning within MDC's pine rockland preserves over the past few years through the assistance of grant funding (USFWS 2013; Information provided by MDC, 1/20/2015).

Any fire history on the CRC Property has been the result of wildfires. The northern third of the Richmond Area, including the CRC Property, experienced a crown-reducing incendiary fire in the 1950's that resulted in the mortality of most canopy trees. Another severe wildfire followed in this area in 1985. The disturbances in this area (such as hurricanes, scraping and wildfires), coupled with the proximity to urban land use, have resulted in this area being infested with Burma reed (*Neyraudia reynaudiana*). The presence of Burma reed increases the intensity and severity of wildfires (DERM 1994). In January of 2003, a wildfire occurred on-site and had to be brought under control by the State of Florida Division of Forestry (FFS) (PAMI 2004).

Table J2-1 lists the history of fire within the Richmond Area (Maschinski et al. 2013) and serves to demonstrate the feasibility of conducting prescribed burns in this area. Note that with increasing prescribed burns, the incidence of wildfires decreased.

Table J2-1. Fire history in Richmond Area

Date of Fire	Preserve Name	Estimated Acreage Burned	Type of Fire
1989	Larry & Penny Thompson Memorial Park	6	Wildfire
4/1/1993	Zoo Miami	62.5	Wildfire
9/1/1994	Larry & Penny Thompson Memorial Park	6.88	Wildfire
2/9/1995	Larry & Penny Thompson Memorial Park	2.2	Prescribed Burn
4/25/1995	Larry & Penny Thompson Memorial Park	4.3	Wildfire
6/1/1995	Larry & Penny Thompson Memorial Park	43.2	Wildfire
7/3/1995	Luis Martinez U.S. Army Reserve Station	75.07	Wildfire
7/5/1995	Luis Martinez U.S. Army Reserve Station	420.2	Wildfire
1/3/1996	Larry & Penny Thompson Memorial Park	0.6	Wildfire
2/12/1996	Larry & Penny Thompson Memorial Park	18.6	Wildfire
3/4/1996	Larry & Penny Thompson Memorial Park	1	Wildfire
3/21/1996	Larry & Penny Thompson Memorial Park	0.1	Wildfire
3/28/1996	Zoo Miami	156	Wildfire
3/28/1996	Zoo Miami	32	Wildfire
4/3/1996	Larry & Penny Thompson Memorial Park	0.42	Wildfire
4/22/1996	Larry & Penny Thompson Memorial Park	1.48	Wildfire
1/23/1997	Larry & Penny Thompson Memorial Park	13.3	Wildfire
4/2/1998	Larry & Penny Thompson Memorial Park	3.7	Wildfire
4/25/1998	Larry & Penny Thompson Memorial Park	2.7	Wildfire
12/10/1998	Luis Martinez U.S. Army Reserve Station	70	Prescribed Burn
1/14/1999	Larry & Penny Thompson Memorial Park	19.48	Prescribed Burn
2/12/1999	Larry & Penny Thompson Memorial Park	8.6	Prescribed Burn
3/18/1999	Larry & Penny Thompson Memorial Park	1	Wildfire
3/31/1999	Larry & Penny Thompson Memorial Park	34	Wildfire
4/22/2000	Larry & Penny Thompson Memorial Park	11	Wildfire
5/1/2000	Eachus Pineland	17	Wildfire
5/5/2000	Rockdale Pineland	3	Wildfire
5/27/2000	Larry & Penny Thompson Memorial Park	0.1	Wildfire
2/6/2001	Larry & Penny Thompson Memorial Park	9.5	Wildfire

Date of Fire	Preserve Name	Estimated Acreage Burned	Type of Fire
4/24/2001	Larry & Penny Thompson Memorial Park	3	Wildfire
6/5/2001	Zoo Miami	0.1	Wildfire
1/28/2002	Larry & Penny Thompson Memorial Park	2.1	Wildfire
3/5/2002	Larry & Penny Thompson Memorial Park	1.6	Wildfire
3/16/2002	Larry & Penny Thompson Memorial Park	0.3	Wildfire
4/20/2002	Larry & Penny Thompson Memorial Park	0.02	Wildfire
5/4/2002	Larry & Penny Thompson Memorial Park	0.02	Wildfire
10/18/2002	Larry & Penny Thompson Memorial Park	1.8	Wildfire
12/5/2002	Larry & Penny Thompson Memorial Park	0.1	Wildfire
12/19/2002	Larry & Penny Thompson Memorial Park	0.7	Wildfire
12/20/2002	Larry & Penny Thompson Memorial Park	1.5	Wildfire
1/24/2003	Larry & Penny Thompson Memorial Park	1.7	Wildfire
1/8/2004	Zoo Miami	93	Wildfire
4/1/2004	Larry & Penny Thompson Memorial Park	3.4	Wildfire
2/13/2005	Luis Martinez U.S. Army Reserve Station	6.5	Wildfire
1/5/2006	Larry & Penny Thompson Memorial Park	9.9	Wildfire
3/19/2006	Larry & Penny Thompson Memorial Park	50.5	Wildfire
5/21/2006	Larry & Penny Thompson Memorial Park	7.5	Wildfire
10/9/2006	Larry & Penny Thompson Memorial Park	10	Wildfire
1/9/2007	Zoo Miami	7.3	Prescribed Burn
1/12/2007	Zoo Miami	23.3	Prescribed Burn
10/23/2007	Zoo Miami	16.1	Prescribed Burn
3/31/2008	Rockdale Pineland	0.1	Wildfire
7/31/2008	Zoo Miami	9	Prescribed Burn
12/16/2008	Zoo Miami	5.1	Prescribed Burn
3/9/2009	Tamiami Pineland Complex Addition	21	Wildfire
12/6/2011	Larry & Penny Thompson Memorial Park	6.2	Prescribed Burn
12/12/2011	Larry & Penny Thompson Memorial Park	11.2	Prescribed Burn
6/17/2012	Larry & Penny Thompson Memorial Park	1	Wildfire
11/28/2012	Zoo Miami	4.7	Prescribed Burn

Date of Fire	Preserve Name	Estimated Acreage Burned	Type of Fire
12/4/2012	Zoo Miami	5	Prescribed Burn
3/21/2013	Larry & Penny Thompson Memorial Park	3.8	Wildfire
3/23/2013	Zoo Miami	2.2	Wildfire
5/6/2013	Larry & Penny Thompson Memorial Park	14.7	Wildfire
5/22/2013	Larry & Penny Thompson Memorial Park	2.7	Wildfire
6/9/2013	Larry & Penny Thompson Memorial Park	18.6	Wildfire
6/18/2013	Larry & Penny Thompson Memorial Park	6.5	Wildfire
2/16/2014	Larry & Penny Thompson Memorial Park	7.5	Wildfire
2/21/2014	Rockdale Pineland	17.7	Wildfire
3/4/2014	Larry & Penny Thompson	1.7	Wildfire
3/4/2014	Larry & Penny Thompson	3.7	Prescribed Burn
4/1/2014	Larry & Penny Thompson	2.9	Wildfire
11/6/2014	Zoo Miami	7	Prescribed Burn

2.1 Wildland-Urban Interface

The wildland-urban interface (WUI) describes the area where houses and urban development meet or intermingle with undeveloped wildland vegetation (Radeloff et al. 2005). Applying fire within a WUI area can present obvious concerns from the surrounding communities such as containment of fire and health concerns regarding smoke generated from burning. The WUI is described as the most serious issue facing managers working in pine rocklands (O'Brien et al. 2010).

It is also the most common issue encountered when implementing prescribed burns in pine rocklands within urban areas. Avoidance of these issues has resulted in the exclusion of prescribed fire from many pine rocklands. The exclusion of fire has resulted in the creation of another very serious and real danger, the buildup of hazardous fuels leading to potential uncontrolled wildfires that can have catastrophic results. It is therefore, not only a benefit to restoring pine rockland habitat, it is crucial to the safety of the surrounding community that hazardous fuels are managed through a carefully designed burn plan.

3.0 INITIAL WORK - PRESCRIBED FIRE PREPARATION

Much of the CRC Property has experienced fire suppression for decades which has resulted in a too dense canopy and high fuel loads. Intense fires from higher fuel loads can generate greater amounts of smoke and ash and increase public concern in urban areas (Menges and Gordon 2010). Fuel reduction techniques can have great utility in preparing a stand for reintroduction of prescribed fire (O'Brien et al. 2010). For the CRC Property, fuel load reduction techniques will

include canopy thinning, both mechanical and by hand, mastication and/or mowing for understory reduction and firebreaks, and invasive plant management.

3.1 Mechanical Fuel and Canopy Reduction

Mechanical fuel load reduction is planned for reintroducing fire in portions of the On-site Preserve pine rocklands. Areas where mechanical fuel load reduction may occur include 44.69 acres of Natural Forest Community (NFC) Pine Rockland and 2.40 acres of non-NFC pine rocklands. Mechanical fuel load reduction may also be used as an interim measure to reduce future fuel loads when the requirements of a burn prescription are not appropriate. Typical mechanical treatments for fuel load reduction include roller-chopping, mastication and mowing. While roller-chopping is an effective technique for reducing shrubby understory, it should not be performed in rockland habitat due to potential damage to the limestone substrate (O'Brien et al. 2010). Mastication and mowing have successfully been used in pine rocklands to alter fuel structure, establish fire lines, and allow the reintroduction of fire without the ground disturbance of roller-chopping (Personal communication Nancy Finley, National Key Deer Refuge [NKDR] manager 1/12/15; O'Brien et al. 2010).

Mechanical treatments on the CRC Property for fuel load understory reduction will only involve mastication and mowing, and not include roller chopping. When mastication and mowing result in fuel accumulation, burning will be conducted before the chips and fine fuels dry out. Raking prior to burning will also be selectively used in certain areas to reduce hazardous fuel loads. In the event a burn does not occur immediately following the initial mastication/mowing activities, the Applicant will coordinate with MDC to determine appropriate measures for management of masticated and mowed plant material. This management may include the piling and burning of plant material on-site outside of the preserves and within the preserves to provide microhabitat for Covered Species. Any piling within the preserve areas will avoid listed plant species to the maximum extent practicable.

Canopy reduction will involve pine thinning. Areas where pine thinning may occur also include 44.69 acres of Natural Forest Community (NFC) Pine Rockland and 2.40 acres of non-NFC pine rocklands. Pines will be hand thinned where feasible but some areas may need to be mechanically harvested. Removed trees will be hauled offsite or piled for burning. All equipment utilized for mechanical fuel load/canopy reduction will be rubber-tracked or rubber tired vehicles, as they are able to spread the weight over a larger surface, resulting in less compaction and minimizing the crushing and break up of limestone seen with metal tracks (O'Brien et al. 2010).

3.2 Chemical Treatments for Fuel Load Reduction

Pine rocklands on the CRC Property have become severely degraded as result of fire suppression and the invasion of non-native species, particularly Burma reed, and hardwoods. Burma reed is listed by the Florida Exotic Pest Plant Council (FLEPPC) as a Category I species and produces dense stands of tall reeds "crowding out and smothering native vegetation" (Hammer 1998). The use of herbicides in controlling invasive plants and hardwood encroachment will be an important component in the reduction of fuel loads. Chemical treatments for invasive plant management are

discussed in the Conservation Program (Sections 6.0 and 7.0 of HCP) and for Miami-Dade County, in the Miami-Dade County CRC Preserve Management Plan.

Combining thinning and invasive treatments has been shown to reduce hazardous fuels and decrease flame length and rate of spread. Following these activities and the prescribed burn, the rough will be greatly reduced, making follow-up herbicide application easier, less expensive and more effective (Brose and Wade 2002). Herbicides are known to provide greater long-term control of woody vegetation than prescribed burning alone, which results in a more open-canopy environment that is essential for the protected species that are endemic to pine rocklands. In fact, the use of mechanical and herbicide treatments, prior to prescribed burning has been found to be a useful approach not only in reducing fuel loads but in expediting restoration goals and reintroducing fire to pine rocklands (Brose and Wade 2002; Menges and Gordon 2010).

While there are considerable benefits to using chemical treatments as part of an integrated management approach, careful consideration needs to be given to how invasive plants may contribute to fire intensity of the site. In particular, Burma reed has several characteristics that pose a greater threat when employing chemical treatments and implementing prescribed burns. This plant has the ability to alter the fuel structure and load of an area, resulting in more intense burns (Rasha 2005). The seeds of Burma reed can catch fire and act to transport fire into the pine canopy as well as float into adjacent areas causing spot over fires. Mature Burma reed can reach over 8 feet tall, making the application of herbicide difficult without overspray and non-target damage (DERM 1994).

Mowing, cutting or burning of Burma reed prior to applying herbicides can reduce the cost of treatment, while increasing treatment effectiveness (Rasha 2005). In general, it is recommended that in areas with less than 30% coverage of Burma reed, prescribed burning may be employed prior to herbicide application. In areas with greater than 30% Burma reed, it is recommended that the "cut-flush" method is utilized, which involves the use of a metal bladed weed whacker or mowing, where feasible, followed by herbicide treatment. In both treatment approaches, the plants should be allowed approximately one foot of growth before chemical treatment. This equates to approximately 3-6 weeks after burn or cut, keeping in mind the plant can produce flowers 2-3 months after being cut and should not be allowed to do so (DERM 1994). If feasible, cut Burma reed should be collected, piled and burned in a safe location, as the cut reeds can add to fuel loads and fire intensity.

Previously identified locations of deltoid spurge and tiny polygala will be flagged prior to treatments and all treatment crews will be familiar with this species.

3.3 Water Availability

Adequate water will be available for prescribed burning. The CRC Property is being developed as a fire-wise community that will integrate prescribed fire management into the design. Fire hydrants will be strategically located along the On-site Preserves. Water will be readily accessible to reduce fire risks to the community and facilitate quick mop-up for efficient smoke management.

3.4 Firebreak Establishment

In general, when working in hazardous fuels, burns should be kept as small as feasible because smaller burns are easier to control and produce less smoke (O'Brien et al. 2010). Fourteen management units within the On-site Preserves were established based on existing and proposed geographic features, habitat types, and management needs. The size of the management units have been designed to minimize effects of land management activities (approximately 3-5 acres) to listed species, allow for the implementation of the prescribed burn plan and encourage a mosaic habitat. The boundaries of these units may be altered based on field conditions present at the time of establishment or maintenance but, in general, will be designed to maintain small management units. **Figure J3-1** depicts the management units for the On-site Preserves. **Figure J3-2** depicts the management units with NFCs overlaid.

Establishing firebreaks within pine rocklands can be challenging because of the limestone substrate. Permanent lines can be created using bulldozers, but this method results in structural alterations of the limestone that can be counter to restoration goals (O'Brien et al. 2010). Black lining, string trimmers, and hand raking/chopping have been shown to be viable alternatives in pine rocklands (O'Brien et al. 2010). The NKDR has successfully used mowing and mastication for establishing and maintaining firebreaks (Personal communication Nancy Finley, NKDR manager 1/12/15).

The CRC Property will have the following types of firebreaks: existing (e.g., roads, edge of pavement) and constructed (e.g., mowed, masticated, wet line or black line). Firebreaks will be a minimum width of 10 feet to allow vehicle access but may vary depending on fuel loads (Personal communication Gary Lewis, Florida Forest Service [FFS], 1/28/2015). Firebreaks will be a maximum width of 12 feet. Management units within all the On-site Preserves were designed to utilize existing features as firebreaks, which will keep construction of new firebreaks to a minimum. Based on communications with Gary Lewis (FFS) and Nancy Finley (USFWS), creating permanent firebreaks through plowing or dozing is not anticipated. Preference will be given for the use of non-permanent methods of establishing firebreaks such as mastication and mowing. As proposed now, firebreaks around all management units total 21,755 feet. Most the firebreaks are considered existing/paved (11,945 feet), which primarily consist of the existing or proposed development boundary along the outside of the On-site Preserves. Firebreaks within the On-site Preserves total approximately 9,810 feet (**Figure J3-1**); of this approximately 5,397 feet will be new (created) firebreaks, 1,128 feet enhanced along a historically existing trail that has not been maintained, 2,661 feet of existing firebreaks that will be enhanced and 624 feet of an existing asphalt trail.

Within the NFC Pine Rockland areas (44.69 acres, see **Figure J3-2**), firebreaks total approximately 8,801 linear feet and include 4,856 feet of created firebreaks, 929 feet enhanced along a historically existing trail that has not been maintained, 2,392 feet of existing firebreaks that will be enhanced and the 624 feet of existing asphalt trail.

The created firebreaks have been designed to avoid known listed plant populations. The establishment of new firebreaks within the On-site Preserves also provides habitat for many of the

listed species, including the Miami tiger beetle (MTB) (*Cicindela floridana*) and Bartram's scrub-hairstreak butterfly (*Strymon acis bartrami*). In conditions where additional precautions need to be established in order to maintain the firebreak integrity or increase the firebreak width, black lining or a wet line will be utilized, when practicable.

Pineland croton (*Croton linearis*) is an opportunistic plant that frequently colonizes disturbed open areas. It is likely pineland croton will colonize the proposed firebreaks and will be displaced during the maintenance of the firebreaks. Avoidance of pineland croton for firebreak maintenance is not practicable because this would require continued alteration of pine rockland habitat and result in less overall habitat value for covered species.

A summary of all the firebreaks for each management unit is provided in **Table J3-1**.

3.5 Covered Species Minimization

As discussed in Section 6.0 of the HCP, a Florida Bonneted Bat (FBB) roost survey will be conducted for portions of the preserve areas. If a roost is identified in the On-site Preserves during the pre-construction survey, the roost will be protected during management activities by hand removal of subcanopy or ladder fuels surrounding tree, raking and removal of fine fuels surrounding tree, limiting of chemical use around the tree, creating wetline around the tree, and other similar and appropriate methods for preservation of the roost, as identified in USFWS guidelines for Red Cockaded Woodpecker Cavity Tree Protection, Chapter 8k-5c and d (USFWS 2003).

To ensure viability and reproduction of pineland croton within the preserve areas, a wetline will be established around ½ acre portions of pineland croton patches during the initial prescribed burning in Management Units 1, 2, 8, 11 and 12. To minimize potential effects to the MTB, the majority of the burns will take place between October and December, outside of the flight period for this species.

Table J3-1. Summary of Management Units

					Firebreak			
Management Unit	**Predominant Habitat**	**Management Activities**	**Size (Acres)**	**Burn Size (Acres)**	**North**	**East**	**South**	**West**
1	Pine Rockland	B,C,M	4.11	4.11	Pavement	Create Mast./Mow	Create Mast./Mow	Pavement
2	Pine Rockland	B,C,M	5.44	5.44	Create Mast./Mow	Create Mast./Mow	Existing Firebreak-Mow	Pavement
3	Pine Rockland	B,C,M	5.21	5.21	Existing Firebreak-Mow	Create Mast./Mow	Existing Asphalt Trail	Pavement
4	Pine Rockland with Burma Reed	B,C,M	3.35	3.35	Existing Asphalt Trail	Create Mast./Mow	Create Mast./Mow	Pavement
5	Pine Rockland with Burma Reed	B,C,M	3.76	3.5	Create Mast./Mow	Create Mast./Mow	Existing Firebreak-Mow	Pavement
6	Pine Rockland Scraped w/o Canopy	G,C,M,P	0.81	NA	NA	NA	NA	NA
7	Pine Rockland - Severely Fire Suppressed	C,M	1.09	NA	NA	NA	NA	NA
8	Pine Rockland	B,C,M	4.35	4.35	Existing Firebreak-Mow	Pavement	Existing Firebreak-Mow	Existing Firebreak-Mow
9	Pine Rockland with Burma Reed	B,C,M	3.84	3.84	Pavement	Create Mast./Mow	Existing Firebreak-Mow	Existing Firebreak-Mow
10	Pine Rockland Scraped w/pine canopy	B,C,M	3.24	3.24	Create Mast./Mow	Enhance-Degraded Trail	Pavement	Create Mast./Mow
11	Pine Rockland Scraped w/pine canopy	B,C,M	3.61	3.61	Enhance-Degraded Trail	Create Mast./Mow	Pavement	Enhance-Degraded Trail
12	Pine Rockland Scraped w/pine canopy	B,C,M	4.56	4.45	Enhance-Degraded Trail	Pavement	Pavement	Create Mast./Mow
13	Pine Rockland with Burma Reed	B,C,M	4.27	4.14	Pavement	Enhance-Degraded Trail	Create Mast./Mow	Create Mast./Mow
14	Rockland Hammock/ Hist. Marl pr.	C	3.77	NA	NA	NA	NA	NA
B-Burn P-Plant	G-Grade M-Mech./Mast. C-Chemical	**Total**	**51.41**	**45.24**				

Figure J3-1. Overall Coral Reef Commons Proposed Preserve Management Units and Firebreaks

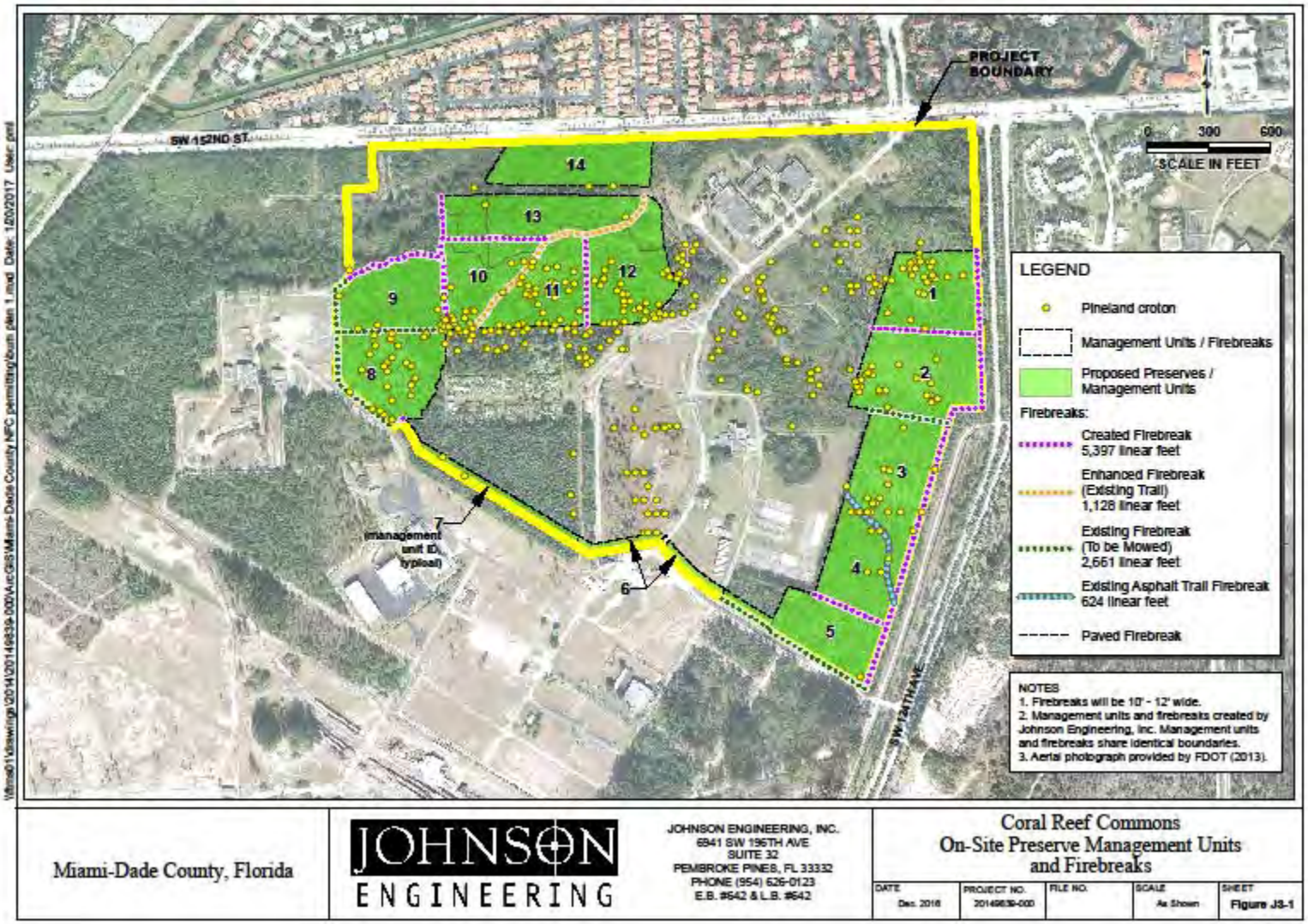
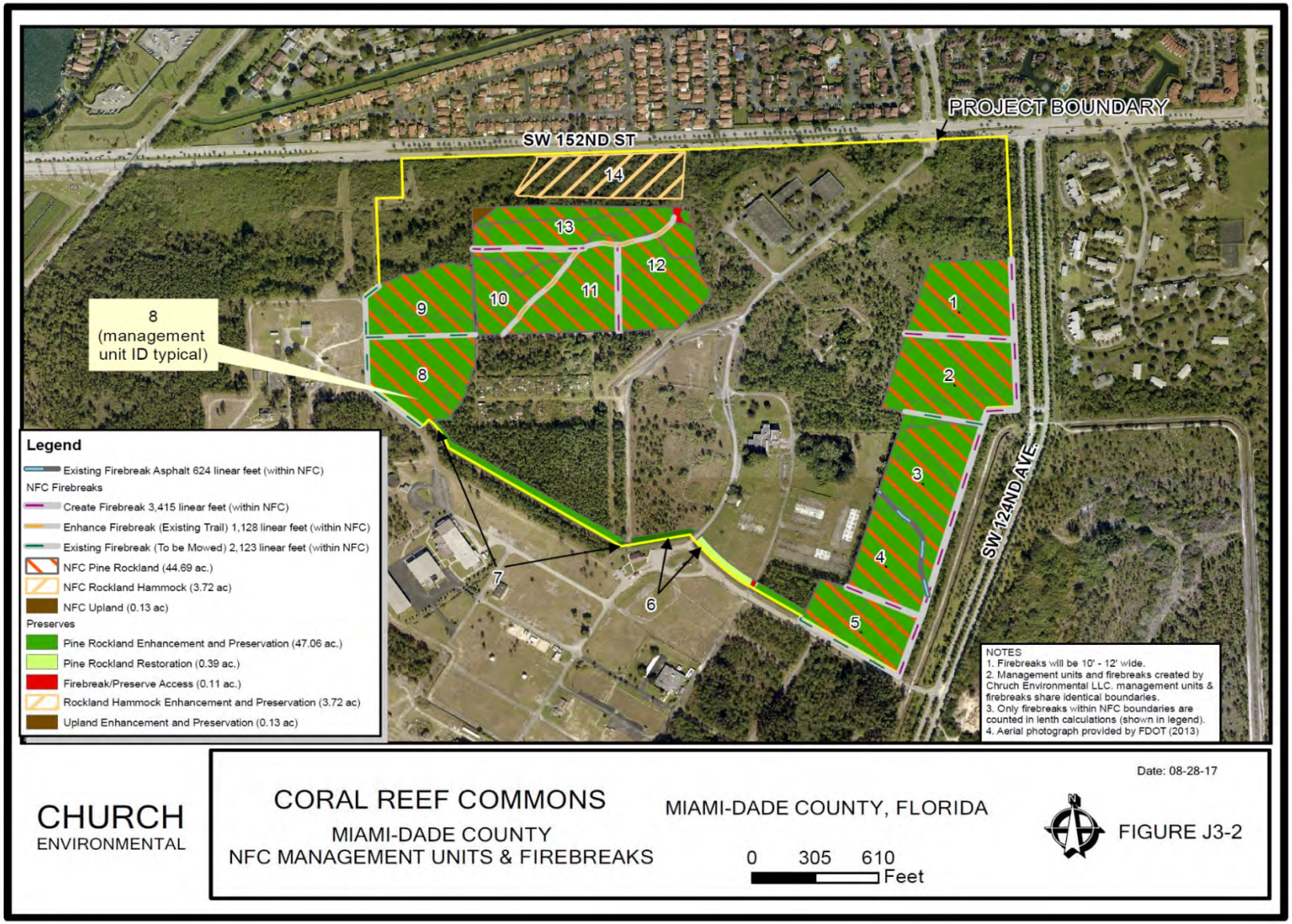


Figure J3-2. Preserve Management Units and Firebreaks with NFC Overlay



4.0 IMPLEMENTATION OF PRESCRIBED FIRE ON THE CRC PROPERTY

Given that many of Florida's ecosystems are fire dependent, legislation governs prescribed burning activities in MDC and the State of Florida. Both Florida Statute 590.125 and Chapter 5I-2 of the Florida Administrative Code (FAC) grant the FFS the authority to regulate prescribed burning in Florida. Florida law encourages prescribed burning. 590.125, F.S. states that (1) a certified prescribed burn manager must be present, (2) a written prescribed plan must be prepared, (3) prescribed burning should be considered in the public interest and not constitute a nuisance, (4) prescribed burning is a property right. Furthermore, it states that if burning is conducted according to the act, the owner or his agent cannot be held liable for damage by fire or smoke unless gross negligence is proven.

4.1 Objectives

Prescribed fire is the most important consideration in pine rockland management and should be administered every 3 to 7 years to maintain community structure and to prevent the community from succeeding to rockland hammock (FNAI 2010). These relatively shorter fire return intervals not only control hazardous fuel levels, they increase understory plant species diversity, and produce less smoke (O'Brien et al. 2010). Although hardwood species are a natural component of pine rocklands, without fire, they tend to increase in cover and reduce the amount of light penetrating the forest floor (Wade et al. 1980) and herbaceous diversity and cover (Wade et al. 1980).

The lack of fire within the CRC Property pine rocklands has resulted in the progressive degradation of pine rockland habitat as it transitions to rockland hammock or other non-pyrogenic hardwood community, which is persistently colonized by exotic species. Lack of fire increases the probability of wildfire that can be destructive to the pineland, as well as smoke impacts and spot fire concerns, to the surrounding residences and major transportation corridors. Maintaining regular prescribed burning, implemented in alternate small burn units, will help alleviate these issues and meet burn objectives.

Prescribed burning is a common practice for pine rocklands within the Richmond Area, with fifteen prescribed burns listed in **Table J2-1** and regular future burns planned. To ensure successful implementation of the CRC Burn Plan, small burn units, ranging from 3-5 acres, will be utilized and community outreach and education will be conducted. All lessees, property owners, and/or tenants within the CRC Property will be required to sign documentation acknowledging fire management activities within the CRC Property and on adjacent properties in the Richmond Area. For areas outside of the CRC Property, homeowner associations of residential communities within 0.5 miles will be notified of prescribed burns on the CRC Property prior to burning. The goal for the CRC Burn Plan is to effectively manage the 45.24 acres of pine rocklands within the East and West Preserves for listed species through the introduction and implementation of prescribed fire. The objectives for the prescribed fire focus on the restoration of natural fire regimes for the protection and maintenance of naturally evolved biotic communities and landscapes, while providing maximum protection of life and property. The following are the objectives of the CRC Burn Plan:

- Community outreach and education
- Reduce fuel load

- Reduce risk of incendiary fires
- Ensure a mosaic burn of vegetation cover to promote community diversity
- Maintain fire-dependent plant communities
- Foster biological diversity
- Maintain open canopy, sparse understory, and diverse herbaceous plant community
- Minimize exotic vegetation
- Control native hardwood encroachment
- Enhance habitat for state and federally listed species
- Increase public acceptance of prescribed burning
- Assist in achieving the success criteria identified in the Habitat Conservation Plan (HCP)

4.2 Burn Manager Duties

In accordance with Florida Statutes and MDC County Code, prescribed burning will be planned and carried out by a designated Certified Prescribed Burn Manager ("Burn Manager") (as licensed by the FFS) and experienced fire crews utilizing the FFS Prescribed Burn Plan form, referred to herein as the "prescription." Prior to a burn event, the Burn Manager will inspect the site, which may be coordinated by the Preserve Biologist or the HCP Coordinator. The Burn Manager will use the best professional judgment in writing a prescription that will safely and effectively meet the Burn Plan objectives.

Each prescription will include the following at a minimum:

- purpose for the burn;
- brief description of the habitat type(s) to be burned;
- a map depicting the location of the burn, firebreak locations, potential hazard areas, and escape routes for the fire crew;
- acceptable range of weather conditions;
- acceptable range of soil and fuel moisture;
- a pre-burn inspection of burn unit, firebreaks, and any potential hazards (including power transmission lines, and existing manmade structures) within the burn unit;
- firing techniques;
- emergency action plan with actions for unexpected weather changes or fire behavior;
- management and/or contingency plan for smoke;
- personnel, equipment, and safety requirements;
- personnel assignments and responsibilities; and
- post-burn evaluation.

The Burn Manager will obtain all necessary permits and authorizations before implementation of the burn. The planning and application of prescribed burning will comply with all applicable federal, state, and local regulations.

The Burn Manager will take into account the following considerations when preparing the prescription:

4.2.1 Fire seasonality

Seasonal timing of prescribed burns within the CRC Property will be varied, to the greatest extent practicable, to ensure a diverse community structure and composition, and to best meet individual burn objectives. Fire seasonality can affect intensity of burns. In general, winter burning is more effective for safely reducing hazardous fuel levels (Maguire 1995; Wade et al. 1980). Winter burns, however are less effective in controlling invasive woody species when woody vegetation is dormant as energy reserves are being stored in the roots (DERM 1994). Alternatively, higher intensity summer burns are more likely to result in the mortality of shrubby hardwoods (Wade et al. 1980; Snyder 1986). The NKDR conducts their burns during the lightning season or summer to mimic historical fire regimes (Personal Communication Nancy Finley, NKDR manager 1/12/15); however, this season can be characterized by unstable or variable winds, which may increase risks associated with burning. When burning in pine rocklands situated in urban areas, conducting burns during October through December may be preferable due to prevalent wind direction at this time of year and remaining fuel moisture following the rainy season (Personal communication Gary Lewis, FFS, 1/28/2015). Therefore, after the initial prescribed burning reintroduction at the CRC Property it is anticipated that burning will take place during the winter season, which is also outside the flight season for the MTB. Summer season burning may be considered for future prescribed burning, if practicable.

4.2.2 Weather and Fuel Considerations

Knowledge of weather and its effects on the behavior of fire is key to successful prescribed burning, and is mandatory for proper management of smoke produced by burning (Wade and Lunsford 1989). When developing the prescription, the Burn Manager will consider weather and fuel conditions, including, but not limited to: wind, relative humidity, temperature, rainfall and soil moisture, airmass stability, and atmospheric dispersion. The Burn Manager will be responsible for obtaining current weather forecasts from FFS, and other weather sources as necessary, prior to executing the prescribed burn. Preferred weather and fuel conditions will vary based on specific burn objectives, season, fuel load, and firing technique. Target prescription parameters will be identified for each planned burn in the recommendations included in each monitoring report. In general, wind directions between 90 - 150 degrees (ESE) and 270 - 320 degrees (WNW) will allow for conditions to avoid smoke sensitive areas. Based on a review of the Miami Executive Airport's weather data for 2016, there were 195 days (over 53%) that had the desired wind directions, relative humidity and visibility to allow prescribed burning on CRC (https://www.ncdc.noaa.gov/crn/ accessed August 23, 2017).

4.2.3 Firing Techniques

The Burn Manager will identify the firing techniques for each burn in the prescription. Choosing the appropriate firing technique is an important component in achieving burn objectives. Several other factors may influence the technique chosen for any given fire, such as fuels, weather, topography and smoke management (Wade and Lunsford 1989). The primary firing techniques that may be used alone, or together, within the CRC Property are backing, strip-heading, flanking, and pile burns, which are described below.

4.2.3.1 Backing Fire

A backing fire is a fire set along a firebreak and allowed to burn into (against) the wind. They have a relatively slow rate of spread that is not significantly influenced by wind speed. Backing fires are typically the least intense with a narrow flaming zone, and short flame lengths (Wade and Lunsford 1989). The shorter flame length reduces crown scorch of adult trees (Maguire 1995). Although backing fires are sometimes perceived as having a longer residence time than heading fires, the residence time is often about the same because the deeper flame depth of a heading fire offsets its faster movement (Wade and Lunsford 1989). Residence time should be considered in terms of flame zone residence time (duration of flaming combustion at a given location) and fuelbed residence time (amount of time to consume fuel downward into the fuelbed) (Wade 2013). The shorter flame length of a backing fire means the heat energy is closer to the ground, enhancing the downward transfer of heat (decreasing fuelbed residence time) (Wade and Lunsford 1989), which may result in the overheating of mature trees' root systems (Maguire 1995). Although conducting the burn when a higher fuel moisture is present will require more effort to keep the fire lit, it will also reduce the damage to root systems (Wade and Lunsford 1989). The higher fuel moisture can also result in a desirable mosaic burn. Because energy is focused downward, backing fires are very effective in consuming hazardous fuels. This is largely the result of the consumption of the herbaceous understory and rough, and may not result in effective control of the wood subcanopy due to the shorter flame length (Wade 2013). A backfire produces only one-third of the emissions of a headfire under the same conditions because more of the fuel is consumed during the flaming phase of combustion rather than in the smoldering phase, which translates to less production of smoke (Wade 2013). Backing fires require a steady wind direction, which often results in their application during the winter months, when wind speeds are less variable. The use of smaller burn units can reduce some of the risks associated with changes in wind directions resulting in a backing fire becoming a headfire.

4.2.3.2 Heading Fire

Natural fires that historically influenced Florida ecosystems where wind-driven head fires (Maguire 1995). Heading fires are the most intense because of its faster rate of spread, wider flaming zone, and longer flames (Wade and Lunsford 1989). While heading fires can be intense, they often result in a mosaic burn pattern because of their quick movement and dependence on wind, allowing the fire to skip over the landscape. Strip-heading fire involves a series of lines of fire set progressively upwind of a firebreak in such a manner that no individual line of fire can develop high energy before it meets the firebreak or a burned area. A backing fire can be used in conjunction with a heading fire to establish a blackline, effectively securing the baseline. The meeting of two fires, however, can resultin longer flame length and crown scorch. Heading fires are not as efficient in consuming fuels and can result in more smoldering, which equates to smoke, although they do provide good convective lift allowing for quick dispersion of smoke. Quick mop-up can further reduce smoke issues generated by this technique. Finally, due to higher intensity and risk of escape, they should not be used in heavy rough (where fire intervals exceed 3 years) (Wade and Lunsford 1989).

4.2.3.3 Flanking Fire

The flanking firing technique involves setting lines of fire directly into the wind (with multiple torch people) or at a 45-degree angle (with two or fewer torch people) so that it spreads at right

angles to the wind. The fire intensity is less intense than a heading fire but more intense than a backing fire. It may be used to secure the flanks of a strip-heading fire or to supplement a backing fire in areas of light fuel or under more humid weather conditions. It is useful in a small area when heading fires would be too intense. It can tolerate light to medium fuel loads but should not be conducted when fuel loads are at hazardous levels (Wade and Lunsford 1989).

4.2.3.4 Point Source Fire

Point source fires involve setting a line or grid of spot ignitions rather than laying down a continual ignition line. They can effectively reduce the intensity of a fire and can assist in creating a mosaic burn pattern. Spacing is key to the use of this method as igniting the spots too close to each other can result in converging fires, which rapidly increases the intensity of the fire. As in strip head firing, the downwind firebreak must be secured, most commonly by blacklining. Wind direction can be variable but stand wind or surface winds must be low (1-2mph), and fine fuel moisture should be above 15 percent (Wade and Lunsford 1989).

4.2.3.5 Pile burn

The objective of pile burning is to prolong fire residence time on a restricted area for the purpose of burning larger material. This technique is commonly used to dispose of logging or thinning debris. Care should be taken with the placement of piles because the debris is rarely consumed completely and what remains can inhibit regrowth of vegetation from under the pile, as well as restricting planting (Wade and Lunsford 1989). There are also local restrictions and setbacks on pile burning. Piles greater than 8 feet in diameter require authorization from the FFS, must have suppression equipment on hand, and need to meet additional setback requirements. The setbacks for non-residential clearing are 1,000 feet from any occupied building, 100 feet from any paved public road and 100 feet from any wildland (http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Wildland-Fire/Resources/FAQs-for-Open-Burning-in-Florida accessed 1/29/15). Pile burning can be problematic in that it produces large amounts of smoke due to prolonged smoldering from higher moisture content and lower oxygen levels. Reducing the amount of soil in a pile, keeping the piles small and allowing them to dry before burning can reduce the amount of smoke generated. Constructing the pile to allow air movement through it and igniting the center of the pile will allow the debris to be consumed quicker, producing less smoke (Wade and Lunsford 1989).

4.2.4 Smoke Management

Smoke management is an essential component of the burn prescription. The FFS authorization of a burn permit relies on a state-of-the-art weather forecasting model regarding smoke dispersion conditions. This GIS model forecasts size and direction of the smoke dispersion plume, allowing FFS to predict impacts to smoke-sensitive areas. The Burn Manager will conduct his or her own evaluation of each prescribed burn to areas located within a 20-mile radius from the location of the burn by employing a Screening System, such as recommended in Wade and Lunsford (1989) or the FFS's Forestry Smoke Screening Tool (http://flame.fl-dof.com/wildfire/tools_sst.html accessed 1/29/15). Based on definitions contained within the state regulations, smoke sensitive areas are areas within which smoke could have an adverse impact for reasons of visibility, health or human welfare (NRCS 2014). Monitoring of the prescribed burn will continue until the potential for the fire to affect smoke sensitive areas or reignite and cause an uncontrolled fire is

minimized to extent practicable. Keeping pine rocklands on a regular burn regime will reduce heavier fuels (the chief contributors to smoke events), so they do not accumulate as rapidly. As a result, smoke management is simplified because the duration of smoke events is shorter and "mop-up" is reduced (Maguire 1995).

Specific smoke management strategies that may be used on the CRC Property, to the extent practicable are as follows:

- Minimize fuel loads prior to burning through mechanical treatments;
- Reduce heavy fuels such as woody vegetation and downed trees, which cause heavy smoke output and increase fine fuels such as herbaceous grasses, which are easily combustible and produce less smoke;
- Burn when weather and fuel moisture conditions will minimize smoke production;
- Conduct burns when winds are blowing away from smoke sensitive areas;
- Burn when atmospheric dispersion index is 41 or greater (as defined by FFS);
- Utilize firing technique that will best minimize smoke while meeting burn objectives;
- Mop up immediately following flame front;
- Keep burn units approximately 3 to 5 acres;
- Mop up heavy fuels within 50 feet of control lines;
- Place smoke signals on public roads adjacent to burn areas;
- Mop up activities, when practicable, will avoid pooling water within these areas.

4.3 Burn Plan for the Management Units

The following is the general approach for reintroducing fire in the appropriate management unit. The prescription for all prescribed burns will contain more detail and will be determined by the Burn Manager at the time of the burn.

In each monitoring report, the Preserve Biologist will recommend land management activities and fuel reduction activities. Management units will be evaluated based on site conditions, previous land management activities, monitoring results, and restoration or burn objectives. The recommendations will identify and prioritize management actions for each management unit and develop an implementation schedule.

To reintroduce fire and reduce hazardous fuel buildup, this CRC Burn Plan proposes to implement fuel reduction treatment within all the management units during the first year. Construction of CRC Phase 1 is anticipated to take one year.

The burn plan will commence upon issuance of all requisite permits. The goal is to implement the burn plan in three phases in one year with one to four months intervals between each phase. The intervals will be based on observed native plant regrowth within the previous burned phase. The first phase of burning includes management units with the highest fuel loads (Management Units 4, 5, 9, 10, and 13). These units are predominantly the most degraded units with closed canopies, and extensive invasive infestations. Because of their degraded condition, these units have little to no occurrence of listed species. Therefore, implementation of management activities within these units may be conducted simultaneously and in adjacent units, minimizing impacts to Covered

Species. The second phase of burning includes Management Units 1, 3, 8, and 12, and the third phase of burning includes the remaining two units Management Units 2 and 11.

Following the initial fire reintroduction to the management units, burns will occur in a mosaic pattern, with fire applied in alternating units. Long-term management of the On-site Preserves is anticipated to involve approximately 6-10 acres being burned a year, within 2-3 non-adjacent management units. After the initial burn, the hardwood reduction and fuel reduction activities described to occur prior to the initial burning may not be necessary. See **Table J4-1** for Years 1-5 burn schedule and **Figure J3-1** for Management Units. While the goal is to burn all of the management units in Year 1, the burn schedule in Table J4-1 provides a conservative schedule.

Table J4-1. CRC Pine Rockland Burn Schedule – Years 1-5*

Year 1 Management Units	Year 2 Management Units	Year 3 Management Units	Year 4 Management Units	Year 5 Management Units
4,5,9,10,13	1,3,8,12	2,11	*4,10,13	*1,8
18.07 acres	18.12 acres	9.05 acres	*10.73 acres	*8.46 acres

*Units and acres referenced subject to change based on ecological conditions

The following is the general approach for reintroducing fire within the appropriate management units. Table J3-1 provides a summary of the activities for each management unit. The exact annual work plan and implementation schedule will be determined prior to the commencement of restoration activities, while the exact prescription for all prescribed burns will be determined by the Burn Manager at the time of the burn.

4.3.1 Management Unit 1

Management Unit 1 is approximately 4.11 acres. The vegetation in Management Unit 1 is described as pine rockland with less than 50% Burma reed (Woodmansee 2014). It has a pine canopy of 5-10% cover in the northern portion, with a variable Burma reed coverage of 25-40%. Further south into this unit, the pine canopy cover increases to 30%, while the Burma reed coverage decreases to less than 25%. The northern portion of the Unit has pineland croton, which disappears further south with the increasing pine canopy. A small population of deltoid spurge was identified in the northern and southern portions of this unit.

Firebreaks on the north and west side of Unit 1 will ultimately consist of pavement related to the development. The southern and eastern firebreaks will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g., weedeater with metal blades). Cut stems will be bundled and hauled offsite or piled for burning (Leposky 2013). Previously identified locations of deltoid spurge will be flagged prior to treatments and all treatment crews will be familiar with this species. Additionally, immediately before the burn, the southern portion of the Unit will have the pine canopy selectively thinned so that canopy cover is

approximately 15% or less. Pines will be hand thinned where feasible but some areas may need to be mechanically harvested. Dense understory will be selectively masticated to reduce fuel load where needed.

Due to the thinning occurring when residential units of the CRC Property are nearing completion, pines will not be pile burned but will most likely be transported offsite. Dense or overgrown understory (>5ft height) will be selectively masticated to reduce fuel load where needed.

Firing technique will include a backing fire under higher fuel moisture conditions, lit by spot ignitions to allow for a non-uniform or mosaic burn (Personal communication Gary Lewis, FFS, 1/28/15). For the initial burn, wetlines will be established around an approximate ½ acre area in the north with pineland croton to ensure this area is not burned.

4.3.2 Management Unit 2

Management Unit 2 is approximately 5.44 acres. The vegetation in Management Unit 2 is described as pine rockland with less than 50% Burma reed (Woodmansee 2014). The pine canopy in the northern portion has approximately 30% cover, with Burma reed coverage approximately 25% or less. The central portion of the Unit contains pine canopy of 5% or less and 5-10% Burma reed cover. It is bound on the south by a narrow strip of denser pine (50% cover) and dense Burma reed (75%). The central portion of the Unit has a moderate amount of pineland croton along with a small population of deltoid spurge.

The firebreak on the west side of the Unit will ultimately consist of pavement related to the development. The southern firebreak is an existing firebreak that was historically scraped and will be maintained by mowing. The northern firebreak between Units 1 and 2 and the eastern fire break will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g., weedeater with metal blades). Cut stems will be bundled and hauled offsite or piled for burning (Leposky 2013). Previously identified locations of deltoid spurge will be flagged prior to treatments and all treatment crews will be familiar with this species. Additionally, immediately before the burn, the southern portion of the Unit will have the pine canopy selectively thinned so that canopy cover is approximately 15% or less. Pines will be hand thinned where feasible but in some areas may need to be mechanically harvested. Dense understory will be selectively masticated to reduce fuel load where needed.

Firing technique will include a backing fire under higher fuel moisture conditions, lit by spot ignitions to allow for a non-uniform or mosaic burn. For the initial burn, wetlines will be established around an approximate ½ acre area in the central portion of this Unit with pineland croton to ensure this area is not burned.

4.3.3 Management Unit 3

Management Unit 3 is 5.21 acres. The vegetation in Management Unit 3 consists of little over 2 acres of pine rockland with less than 50% Burma reed (Woodmansee 2014). The remaining 3 acres are classified as pine rockland dominated by Burma reed. The pine canopy in the northern

portion has about a 50% cover, with Burma reed coverage approximately 50-75% with the exception of the western edge that has greater than 90% Burma reed coverage. The central portion of the Unit contains a pine canopy of 10-15% with 10% Burma reed cover, and scattered dense patches of Burma reed can be found in this area. The canopy in the southern portion of the Unit is dense with a 50-70% cover and Burma reed coverage at 50-75%. Some pineland croton and deltoid spurge occur within the central portion of this Unit.

The firebreak on the west side of the Unit will ultimately consist of pavement related to the development. The northern firebreak is an existing firebreak that was historically scraped and will be maintained by mowing. The southern firebreak is an existing asphalt trail, approximately 14 feet wide between Units 3 and 4. The eastern fire break will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation. Previously identified locations of deltoid spurge in close proximity to the asphalt trail will be flagged prior to treatments.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). Cut stems will be bundled and hauled offsite or piled for burning (Leposky 2013). Previously identified locations of remaining deltoid spurge in this Unit will be flagged prior to treatments and all treatment crews will be familiar with this species. Additionally, immediately before the burn, portions of this Unit will have the pine canopy selectively thinned so that canopy cover is approximately 15% or less. Pines will be hand thinned where feasible but in some areas may need to be mechanically harvested. Dense understory will be selectively masticated to reduce fuel load where needed.

Firing technique will include a backing fire under higher fuel moisture conditions, lit by spot ignitions to allow for a non-uniform or mosaic burn.

4.3.4 Management Unit 4

Management Unit 4 is approximately 3.35 acres. The vegetation in Management Unit 4 is described as pine rockland dominated by Burma reed (Woodmansee 2014). The pine canopy is relatively dense at 50-70% cover although there are some small open patches in the canopy in a few spots. The Burma reed cover is also relatively dense at 50-75% cover with coverage increasing to 90% in some areas, particularly along the edge of the Unit. It has a few scattered pineland croton that are isolated and surrounded by dense understory vegetation.

Firebreaks on the west side of the unit will ultimately consist of pavement related to the development. The southern firebreak between Units 4 and 5 and the eastern fire break will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation. The northern firebreak consists of an asphalt trail, approximately 14 feet wide between Units 3 and 4. Previously identified locations of deltoid spurge in close proximity to the asphalt trail will be flagged prior to treatments.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The Burma reed will be collected and stacked for burning in the cleared area to the west of the Unit that consists of concrete pads. Previously identified locations of remaining deltoid spurge in this Unit will be flagged prior to treatments and all treatment crews will be familiar with this species. The area will also require pine thinning throughout most of the Unit. Pines will be

hand thinned where feasible but due to the extent of work may need to be mechanically harvested. Debris from the thinning will be stacked in burn piles and/or transported off site. Depending on the condition of the understory following thinning activities remaining dense areas of understory may be selectively masticated to further reduce fuel load, where needed.

A backing fire will be lit along the western firebreak so that smoke is placed over the property.

4.3.5 Management Unit 5

Management Unit 5 is approximately 3.5 acres. The vegetation in Management Unit 5 is described as pine rockland habitat dominated by Burma reed (Woodmansee 2014). The pine canopy is slightly more open than Unit 4 with about 50% cover. The Burma reed cover remains dense at 50-75% cover with coverage increasing to 90% in some areas, particularly along the western edge of the Unit. One occurrence of pineland croton was documented along with a small population of deltoid spurge along the southeastern edge of the Unit.

Firebreaks on the west side of the Unit will ultimately consist of pavement related to the development. The northern firebreak, eastern and southern fire breaks will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation. The southern firebreak is an existing firebreak that was historically scraped and will be maintained by mowing.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The Burma reed will be collected and stacked for burning in the cleared area to the west that has been identified for burn piles. Pine thinning will be required throughout the Unit. Pines will be hand thinned where feasible but due to the extent of work may need to be mechanically harvested. Debris from the thinning will be stacked in burn piles and/or transported off site. Depending on the condition of the understory following thinning activities remaining dense areas of understory may be selectively masticated to further reduce fuel load, where needed. A backing fire will be lit along the western firebreak so that smoke is placed over the property.

4.3.6 Management Unit 6

Management Unit 6 is approximately 0.8 acre and will serve as wildlife corridor along the southern portion of the CRC Property. Management of Unit 6 will not involve prescribed burning due to its narrow size; therefore, the details of its management will not be discussed in the CRC Burn Plan. Details of management activities for this Unit can be found in the HCP and for MDC, in the CRC Preserve Management Plan.

4.3.7 Management Unit 7

Management Unit 7 is approximately 1.09 acres and like Unit 6 it will serve as a wildlife corridor along the southern portion of the CRC Property. Portions of this Unit will have the pine canopy selectively thinned so that canopy cover is approximately 15% or less. Raking will be selectively used as needed to remove discarded and remnant vegetation debris.

4.3.8 Management Unit 8

Management Unit 8 is 4.35 acres. The vegetation in Management Unit 8 is described as pine rockland with less than 50% Burma reed (Woodmansee 2014). The pine canopy has about a 25% cover with the exception of a few denser canopied areas (40%) on the east side of the Unit. Burma reed coverage is variable, most of the interior portion of Unit 8 has about a 25% cover or less, with the coverage creeping up to 50% around the edges of Unit 8. Unit 8 contains patches of pineland croton. It also contains several populations of tiny polygala in proximity to a few populations of deltoid spurge.

Firebreaks on the eastern side of the Unit will ultimately consist of pavement related to the development. The western, northern, and southern firebreaks are existing firebreaks that were historically scraped and will be maintained by mowing.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). Cut stems will be bundled and hauled offsite or piled for burning (Leposky 2013). Previously identified locations of deltoid spurge and tiny polygala will be flagged prior to treatments and all treatment crews will be familiar with these species. The pine canopy along the eastern side will be slightly thinned, where needed.

The burn will be conducted under higher fuel moisture conditions, and lit by spot ignitions to allow for a non-uniform or mosaic burn. For the initial burn, wetlines will be established around an approximate ½ acre area in the central portion of this Unit with pineland croton to ensure this area is not burned.

4.3.9 Management Unit 9

Management Unit 9 is approximately 3.84 acres. The vegetation in Management Unit 9 is described as pine rockland dominated by Burma reed (Woodmansee 2014). The pine canopy is denser than optimal pine rockland habitat at 50% cover in the southern area and gets progressively denser, exceeding 75% cover in the northern portion of Unit 9. The Burma reed coverage varies from 75% to 90% through the majority of the Unit. It has a few scattered pineland croton strictly found along the edges of the Unit where there is more light availability.

The eastern and northern firebreaks will be created by selectively mechanically thinning pines, masticating the understory and closely mowing the remaining vegetation. The southern and western firebreaks are existing firebreaks that were historically scraped and will be maintained by mowing.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The Burma reed will be collected and stacked for burning in the cleared area to the north of the Unit and in the cleared area to the southeast, which was previously monkey cages. Pine thinning will be required throughout the Unit, particularly in the northern portion. Pines will be hand thinned where feasible but may need to be mechanically harvested in some areas. Debris from the thinning will be stacked in burn piles and/or transported off site. Depending on the condition of the understory following thinning activities remaining dense areas of understory may be selectively masticated to further reduce fuel load, where needed.

A backing fire will be lit along the southern firebreak when a northerly wind is present, allowing smoke to be carried away from the road to the north.

4.3.10 Management Unit 10

Management Unit 10 is approximately 3.24 acres. The majority of the vegetation in Unit 10 is described as pine rockland – historically scraped but with pine canopy, with the exception of the northern portion of Unit 10, which is described as pine rockland dominated by Burma reed (Woodmansee 2014). The pine canopy is extremely dense in the northern portion of the Unit, exceeding 75% cover with the Burma reed at greater than 90% cover. The central and southern portion of the Unit has a more open canopy due to historical scraping and ranges between 25-50% cover. Burma reed coverage is less than 25% for significant portions of this area with the exception of a few patches that have about 75% cover in the central portion and along some edges. The relatively open canopy in the southern half has allowed some pineland croton to persist.

Firebreaks on the south side of the Unit will ultimately consist of pavement related to the development; currently an existing trail occurs in this location. Prior to burning, a wide firebreak (approximately 50 feet or greater) will be created. The western and northern firebreaks will be created by selectively thinning pines, masticating the understory and closely mowing the remaining vegetation. The eastern firebreak consists of a historic trail that has become overgrown; this will be enhanced by masticating and mowing the trail.

Prior to burning, the northern portion of the Unit will have extensive thinning, which may require mechanical harvesting due to the density of pines. Machinery will access the site from the northern boundary to prevent compaction of the substrate through the main portion of the site. Debris from the thinning will be stacked in burn piles and/or transported off site. Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The Burma reed will be collected and stacked for burning in the cleared areas identified for burn piles.

A backing fire will occur when a northerly or northeasterly wind is present, allowing smoke to be carried away from the road to the north. Ignition technique will use a spot fire to promote a mosaic burn.

4.3.11 Management Unit 11

Management Unit 11 is 3.61 acres. The vegetation in Management Unit 11 is described as pine rockland – historically scraped but with a pine canopy (Woodmansee 2014). The pine canopy in the northern portion is denser at about a 50-60% cover, with Burma reed coverage approximately 50-75%. The central portion is relatively open at just over 25% canopy cover and significantly less Burma reed at 10-25% cover. Burma reed coverage increases significantly in the southern portion ranging up to 75% cover. As with other units, the pineland croton distribution is largely dependent on the canopy and Burma reed coverage. Croton is primarily found in the central portion of the Unit where it is open with the exception of some occurrences along the southern boundary where the edge effect allows light penetration and growth of croton.

The northern and western firebreaks will consist of a historic trail that has become overgrown and will be enhanced by masticating and mowing the trail. The firebreak on the south side of the Unit

will consist of pavement related to the development. The eastern firebreak will have been created during the second year of burning, between Units 11 and 12.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The pine canopy will also be selectively thinned so that canopy cover is approximately 25%. Harvested pines and Burma reed will be transported off site.

Unit 11 will be burned under an easterly wind with a backing fire under higher fuel moisture conditions, lit by spot ignitions to allow for a non-uniform or mosaic burn. The easterly wind will allow the smoke to be carried away from residential units and the road. For the initial burn, wetlines will be established around an approximate ½ acre area in the central portion of this Unit with pineland croton to ensure this area is not burned.

4.3.12 Management Unit 12

Management Unit 12 is 4.45 acres in size. The vegetation in Management Unit 12 has been described as pine rockland – historically scraped but with a pine canopy. The pine canopy in the northern portion is denser at about a 50% cover, with Burma reed coverage exceeding 75% but decreases slightly to the south. In the central portion of this Unit is an area with approximately 25% canopy cover and Burma reed at 10-25% cover. Burma reed coverage returns, increasing significantly in the southern portion ranging up to 75% cover. As with other units, the pineland croton distribution is largely dependent on the canopy and Burma reed coverage.

The northern firebreak will consist of a historic trail that has become overgrown and will be enhanced by masticating and mowing the trail. Firebreaks on the south and east side of the Unit will consist of pavement related to the development. The western firebreak will be created between Units 11 and 12 by selectively thinning pines, masticating the understory and closely mowing the remaining vegetation.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The pine canopy will also be selectively thinned so that canopy cover is approximately 25% or less. Dense understory will be selectively masticated to reduce fuel load where needed.

Unit 12 will be burned under an easterly or northeasterly wind with a backing fire under higher fuel moisture conditions, lit by spot ignitions to allow for a non-uniform or mosaic burn. For the initial burn, wetlines will be established around an approximate ½ acre area in the central portion of this Unit with pineland croton to ensure this area is not burned.

4.3.13 Management Unit 13

Management Unit 13 is approximately 4.14 acres. There is a fence line that horizontally bisects Unit 13. South of the fence line, the vegetation in Management Unit 13 has been described as pine rockland dominated by Burma reed, while north of the fence line, it has been described as pine rockland – fire suppressed (Woodmansee 2014). The pine canopy north of the fence has approximately 60% cover but gets progressively denser to the west and south across the fence, where it exceeds 75% cover. The Burma reed occurrence follows a similar pattern with 30-50%

cover that quickly exceeds 90% cover to the west and south across the fence. Two isolated occurrences of pineland croton were documented within Unit 13.

Firebreaks on the north of the Unit will ultimately consist of pavement related to the development, however, at the time of the initial burning it may be undeveloped land. If needed, prior to burning, a wide firebreak (approximately 50 feet or greater) will be created outside of the preserve boundary. The eastern firebreak and part of the southern firebreak will consist of a historic trail that has become overgrown and will be enhanced by masticating and mowing. The western and southern firebreaks will be created by selectively thinning pines, masticating the understory and closely mowing the remaining vegetation.

Prior to burning, Burma reed will be cut using the appropriate hand tools (e.g. weedeater with metal blades). The Burma reed will be collected and stacked for burning in the areas designated for burn piles. Pine thinning will occur in Unit 13, and will likely require mechanical harvesting. Access to the Unit 13 will occur from the north or west, to avoid adjacent management units. Debris from the thinning will be stacked in burn piles and/or transported off site. It is likely the pine thinning will effectively reduce the understory and may not require additional mastication.

Burning will occur with a northerly wind. A backing fire will be lit along the southern firebreak so that smoke is placed over the property and away from the road to the north.

4.3.14 Management Unit 14

Management Unit 14 is 3.77 acres. The vegetation of Unit 14 is described as rockland hammock. Although rockland hammocks often occur adjacent to fire-dependent pine rocklands, fire can damage these forested habitats by consuming the organic soils and killing the hardwood canopy (FNAI 2010). In 2014, Ram Coral Reef initiated management of Unit 14 consisting of mechanical and chemical treatments only, which will continue. Management of Unit 14 will not involve prescribed burning due to the habitat type; therefore, the details of its management will not be discussed in the CRC Burn Plan. Details of management activities for this Unit can be found in the HCP and for MDC, in the CRC Preserve Management Plan.

4.4 Post-Burn Evaluation

The Burn Manager will conduct a post-burn evaluation within one week following each burn event. A post-burn evaluation is used to ensure the objectives of the burn were attained and gain information to be used in future burns (Wade and Lunsford 1989). The post-burn evaluation notes will be included in the On-site Preserves annual monitoring reports and in the next HCP Administrative Report.

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