



MIAMI-DADE COUNTY NATURAL AREAS MANAGEMENT PLAN

Miami-Dade County Natural Areas Management Working Group

Department of Environmental Resources Management (DERM)
Technical Report Number 2004-1



The Institute for
Regional Conservation

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Contents

Acknowledgements	1
Introduction	2
1. All Natural Areas	
Habitat Management	4
Public Awareness and Human Impacts	6
Adaptive Management	7
Best Management Practices	9
2. Pine Rocklands	
Habitat Management	12
Best Management Practices	12
3. Rockland Hammocks	
Habitat Management	14
Best Management Practices	14
4. Historic Transverse Glades	
Habitat Management	16
Best Management Practices	16
5. Scrubby Flatwoods	
Habitat Management	18
Best Management Practices	18
6. Coastal Uplands (Dune, Berm, Strand)	
Habitat Management	20
Best Management Practices	20
7. Wetlands	
Habitat Management	22
Best Management Practices	23
8. Ecotones	
Habitat Management	24
Best Management Practices	24
Appendices	
TABLE 1: Cooperating Agencies by topic	26
TABLE 2: Cooperating Agency Contact Information	27
TABLE 3: List of Habitats in Each Natural Area	29
Mission Statements	32
Definitions	32
Literature Cited	33

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Agency abbreviations:

DERM = Department of Environmental Resources Management, Miami-Dade County

EEL = Environmentally Endangered Lands program, Miami-Dade County (part of the Department of Environmental Resources Management)

FTBG = Fairchild Tropical Botanic Garden

IRC = The Institute for Regional Conservation

NAM = Natural Areas Management, Miami-Dade County (part of the Park and Recreation Department)

Introduction

The Miami-Dade County Natural Areas Management Working Group created the Miami-Dade County Natural Areas Management Plan in 2003 and 2004 to guide management and restoration practices in Miami-Dade County over the next decades.

We have created this document with the intention that it will be used in Miami-Dade County, but it has some applicability throughout southern Florida. Land management agencies, such as other county and local governments can use this document in planning management activities in natural areas. It is also a useful tool for private landowners who manage natural areas.

These guidelines are intended to be general enough for application to a wide range of habitats. In the section entitled “All Natural Areas,” general goals, objectives and actions that apply to all of the subsequent habitat types are described. Specific goals, objectives and actions unique to a particular habitat follow in the separate habitat sections (described below). Actions listed in this plan will not always apply in the same way to all sites. Therefore, site managers should develop and implement actions recommended in this plan on a per-site basis.

In most cases, we used nomenclature for habitat (community) types described by the Florida Natural Areas Inventory (FNAI and FDNR 1990), with short descriptions taken from the 1999 tracking list (Marois 1999). Those habitats marked with asterisks are not recognized by FNAI. Habitats addressed here include:

- **Pine Rockland** - Flatland with exposed limestone substrate; mesic-xeric; subtropical; frequent fire; south Florida slash pine, palms and/or hardwoods, and mixed grasses and herbs.
- **Rockland Hammock** - Flatland with limestone substrate; mesic; subtropical; rare or no fire; mixed tropical hardwoods, often with live oak.
- **Scrubby Flatwoods** - Flatland with sand substrate; xeric-mesic; subtropical or temperate; occasional fire; longleaf pine or slash pine with scrub oaks and wiregrass understory.
- **Coastal Uplands** - Substrate and vegetation influenced primarily by such coastal (maritime) processes as erosion, deposition, salt spray, and storms.
 - **Beach Dune** - Active coastal dune with sand substrate; xeric; temperate or subtropical; occasional or rare fire; sea oats and/or mixed salt-spray tolerant grasses and herbs.
 - **Coastal Berm** - Old bar or storm debris with sand/shell substrate; xeric-mesic; subtropical or temperate; rare or no fire; buttonwood, mangroves, and/or mixed halophytic herbs and/or shrubs and trees.
 - **Coastal Strand** - Stabilized coastal dune with sand substrate; xeric; subtropical or temperate; occasional or rare fire; dense saw palmetto and/or seagrape and/or mixed stunted shrubs, yucca, and cacti.
 - **Maritime Hammock** - Stabilized coastal dune with sand substrate; xeric-mesic; subtropical or temperate; rare or no fire; mixed tropical hardwoods and/or live oak.

- **Wetlands** - Includes communities from palustrine, lacustrine, and marine/estuarine subgroupings described by FNAI (FNAI and FDNR 1990).
 - **Bayhead*** - Wetland with peat substrate; usually saturated and occasionally inundated; subtropical; rare or no fire; bays and/or dahoon holly, cocoplum, wax myrtle, and other hardwoods (description from IRC 2001).
 - **Dome Swamp** - Rounded depression in sand/limestone substrate with peat accumulating toward center; seasonally inundated, still water; subtropical or temperate; occasional or rare fire; pond cypress, and/or blackgum, and bays, often tallest in center.
 - **Marl Prairie** - Flatland with marl over limestone substrate; seasonally inundated; tropical; frequent to no fire; sawgrass, spikerush, and/or mixed grasses, sometimes with dwarf cypress (but see Historic Transverse Glades, below).
 - **Swale** - Broad, shallow channel with sand/peat substrate; seasonally inundated, flowing water; subtropical or temperate; frequent or occasional fire; sawgrass, maidencane, pickerelweed, and/or mixed emergents.
 - **Tidal Marsh** - Expansive intertidal or supratidal area occupied primarily by rooted, emergent vascular macrophytes (e.g., cord grass, needlerush, saw grass, saltwort, saltgrass and glasswort); may include various epiphytes and epifauna.
 - **Tidal Swamp** - Expansive intertidal and supratidal area occupied primarily by woody vascular macrophytes (e.g., black mangrove, buttonwood, red mangrove, and white mangrove); may include various epiphytes and epifauna.
 - **Freshwater Tidal Swamp** - Rivermouth wetland, organic soil with extensive root mat; inundated with freshwater in response to tidal cycles; rare or no fire; cypress, bays, cabbage palm, gums and/or cedars.

- **Historic Transverse Glades*** - We deviated from the FNAI classification of “Marl Prairie;” opting instead for the term “Historic Transverse Glades” as a subset of south Florida Marl Prairies that intersect uplands in Miami-Dade County. In doing so, we underscore that this community is extremely rare, and that hydrologic alterations have eliminated any undisturbed transverse glades outside of Everglades National Park -- a fact that restoration efforts must acknowledge.

- **Ecotones*** - We have added a separate section for ecotones, because their management creates unique problems, which we have tried to address.

As progress is made toward restoring and managing the seven habitat types, these plans will undoubtedly need to be modified. Therefore, this working document will be periodically revised.

All Natural Areas

GOAL 1: Restore and maintain habitat structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

ALL.1.1. Control and/or extirpate populations of invasive plants and exotic and nuisance animals.

- Eliminate, to the extent possible, invasive pest plants and exotic animals from natural areas, including outlying populations.
- Ensure that control measures are not deleterious to native species.
- Continue to review and update invasive species management techniques.
- Conduct routine surveys to detect new infestations and new species.
- Evaluate effectiveness of different treatment techniques and treatment intervals on invasive plants.
- Identify disproportionately large populations of native wildlife and eliminate human activities such as feeding that increase populations.
- Manage refuse in parks and neighboring areas so that it is not available for consumption by wildlife.

ALL.1.2. Maintain or restore the viability of rare and endemic species consistent with the preservation and restoration of the habitat.

- Prioritize and monitor existing rare plant and animal species.
- Maintain GIS records of all known rare plant locations and distribute to land managers to make crews aware of plants to protect.
- Conduct management activities such as invasive plant removal, fence construction, etc., away from rare plants when possible. When such actions cannot be prevented, consider alternatives to minimize the impacts to rare species.
- Reintroduce populations of extirpated species, and augment existing populations where appropriate.
- For federally listed species, use USFWS Recovery Plans as guides.

ALL 1.3. Assess the role of fire in natural areas and the use of prescribed fire for maintenance and restoration.

- Execute a Memorandum of Understanding with Everglades National Park for assistance with prescribed burning.

ALL.1.4. Protect habitats from point and non-point source pollution.

- Coordinate with Miami-Dade County Public Works, Mosquito Control District to reduce or eliminate spraying for mosquitoes on and adjacent to natural areas.

- Reduce or eliminate drifting pesticide spray and dust from agricultural and commercial operations.
- Buffer natural areas from adjacent pollution sources by retaining existing vegetation or planting native vegetation that is appropriate to the habitat.
- Prevent dumping of pollutants such as automotive oil, paint and pesticide containers, home chemicals, roofing and construction materials, landscape debris, automobile parts, trash, and contaminated stormwater.
- Encourage the use of non-toxic bullets in areas that allow hunting.

ALL.1.5. Increase size, connectivity, and diversity of natural areas.

- Complete acquisitions in Miami-Dade County under the Environmentally Endangered Lands Program.
- Remove roads that fragment natural areas, except as they are needed for firebreaks or maintenance access.
- Recreate natural areas where they have been destroyed by human activities.
- Restore to the most practical natural habitat those areas that have suffered such extreme degradation that re-creation of the original plant community is either impossible or impractical.
- Use disturbed areas to create additional habitats adjacent to or within intact natural areas.
- Promote site-appropriate native landscaping in developed areas around a site to increase habitat area.

ALL.1.6. Restore historic hydrological conditions by rehydrating areas with quality water, thereby increasing availability of water for species requiring more mesic or hydric conditions.

- Identify preserves that will be appropriate for hydrologic restoration.
- Pursue collaborations with researchers to address hydrological questions.
- Pump water in, dike, install wells, etc., to approximate historic, pre-drainage hydrology.
- Work with water agencies to maintain the water table as high as possible, and water quality as high as possible.
- Monitor soil moisture before and after hydrologic restoration.
- Reconnect natural areas with water sources where possible as an alternative to full-scale hydrologic restoration.

ALL.1.7. Develop plans to respond to disasters such as hurricanes, tornadoes, catastrophic fires, major pest outbreaks, etc.

- For natural disasters, coordinate with the Emergency Operations Center's command team through the assigned County staff members.
- For catastrophic fires, coordinate with the pre-determined incident command team (F-DOF, M-D Fire Rescue, ENP, Parks, DERM, etc.)
- For major pest outbreaks, coordinate with other concerned agencies and research facilities such as UF-IFAS.
- Develop disaster-response site plans and keep them in multiple, easily accessible locations. Plans should include maps (vegetation types, rare species, property surveys),

- site inventories, emergency signage, and contact information for project managers.
- Prioritize recovery tasks on a per-site basis, including clearing of fire breaks, identifying and treating populations of invasive plants that are likely to spread quickly, and identifying areas where wildfire risk is heightened.
- Continue to monitor updates of the Miami-Dade County Emergency Operations Center disaster response plans to ensure that staging areas for recovery efforts are not located in environmentally sensitive sites.

ALL.1.8. Review and update knowledge about restoration and management.

- Review pertinent literature on historic information, recent scientific studies, and natural history.
- Use current techniques to gather new information on canopy cover, seed bank, pollen, appropriate times to treat invasive plants, plant/animal interactions (dispersal, pollination), etc.
- Coordinate restoration and management with site-specific management objectives.

GOAL 2: Increase public awareness and provide appropriate and compatible public access while protecting natural areas from adverse human impacts.

OBJECTIVES AND RECOMMENDED ACTIONS:

ALL.2.1. Increase public awareness and engender public support for protecting and preserving natural areas.

- Continue and expand efforts to educate the public through means such as Adopt-a-Natural Area Program, the Environmentally Endangered Lands Program, and the Natural Areas Management website.
- Create, display, and distribute promotional and educational materials about Miami-Dade County's natural areas, their plant and animal residents, and their invaluable community benefits.
- Update educational materials and websites periodically.
- Provide information to the communications department that will increase support for natural areas management and inspire public action.
- Promote incorporation of natural areas information into the curriculum of Miami-Dade Public Schools by providing links to science standards.
- Recommend new, compatible public education programs to focus on the natural history of natural areas.
- Coordinate natural areas management with public education and Eco-Tourism programs to encourage interaction, cross-training, and joint meetings.
- Publish promotional information about natural areas in the media.

ALL.2.2. Develop and implement public use plans for all natural areas.

- Identify site-specific opportunities for compatible public use and access.

- Determine public use capacity for individual parks or sites within parks.
- Develop a specific master site plan for each natural area.
- Develop a public use compatibility permit system.
- Develop standards for the type of facilities and materials to be used when developing public use facilities in preserves. Examples include composting toilets, use of recycled lumber for boardwalks, energy saving materials, water conserving fixtures, use of firewise construction and materials, and permeable asphalt.

ALL.2.3. Protect natural areas from inappropriate public use such as dumping, release of invasive plant and animal species (including feral and domesticated pets), poaching of native plant and animal species, off-road vehicles (ORVs), campfires, paintball games, and other unauthorized uses.

- Establish signs to identify environmentally protected areas, designate areas for public access, and to discourage inappropriate public use.
- Provide public access through a clearly identified trail system, where appropriate.
- Institute appropriate access control measures such as fences and gates, where appropriate; monitor and repair as needed.
- Ensure that existing rules and regulations concerning the protection of natural resources are enforced. Project managers are responsible for identifying situations where illegal public use is occurring.
- Continue coordinating with Miami-Dade Police Department's Environmental Crimes Unit to monitor natural areas.

GOAL 3: Increase effectiveness of natural areas management by periodically reviewing and revising/updating management plans, monitoring results, evaluating techniques, and training staff.

OBJECTIVES AND RECOMMENDED ACTIONS:

ALL.3.1. Develop and periodically revise site and habitat management plans.

- Develop management plans, fire management plans and monitoring plans for all natural areas.
- Establish a protocol and schedule for reviewing and updating site, habitat, and fire management plans.
- Review and update management plans every 5 years, at minimum.

ALL.3.2. Maintain a long-term biological monitoring program.

- Make regular site visits according to the monitoring plans.
- Develop a standard form for use in conducting site visits and recording observations.
- Biologists should regularly visit sites where crews are working to discuss management techniques, priorities, plant identification, rare species protection, etc.
- Conduct rare species surveys prior to implementation of management activities.
- Collect appropriate baseline data useful in detecting habitat changes over time, including

- species inventories, vegetation mapping, etc.
- Develop appropriate monitoring protocols for individual projects.
- Monitor results of general management practices to detect positive response or off-target damage.
- Prioritize rare/indicator species and monitor at least annually by mapping, counting, sampling, conducting demographic studies, or a combination of these methods.
- Analyze monitoring data and summarize results in an annual report.
- Use results to evaluate and refine management methods.
- Encourage relationships with outside researchers for monitoring pests, insects, reptiles, amphibians, fishes, birds, and mammals, as an indicator of pollution and general ecosystem health.

ALL.3.3. Maximize efficiency and cost effectiveness of management activities on County natural areas.

- Establish quantifiable target objectives for management activities (e.g., set thresholds for invasive plant cover, target species priorities, and optimal timing of treatment).
- Develop scope-of-work and budgets for projects.
- Organize management actions to coordinate personnel, maximize biological effectiveness, account for seasonal/ecological factors, and meet budget and schedule requirements.
- Keep accurate records of management actions, labor, materials, equipment use, and costs.
- Monitor biological conditions and compare with target objectives, budgets, and schedules.
- Analyze and summarize the cost and ecological effectiveness of management activities.
- Utilize past records when planning new projects.

ALL.3.4. Improve effectiveness of natural areas management through staff training.

- Provide training and appropriate identification materials to staff for rare native plant and animal species, invasive plants, and exotic animals.
- Provide a mechanism for documenting and reporting on new populations of species of interest.
- Encourage staff participation in technical training, workshops, and conferences.
- Encourage certification or licensure of staff involved with prescribed burning (FDOF), arboriculture (ISA), and natural areas weed control (FDACS, Pesticide certification section).
- Require exotic plant control contractors to be licensed in the natural areas weed category by FDACS.
- Ensure that institutional knowledge is maintained through documentation and dissemination of key information.

ALL.3.5. Ensure that long-term interagency coordination is maintained, and encourage the sharing of maps, data, and literature (see Appendix for relevant agencies).

- Execute appropriate interagency agreements to solidify essential natural areas restoration components such as fire management, reforestation, invasive plant and animal control, and research.
- Maintain communication network with land managing agencies in adjacent counties.
- Publish technical information about natural areas management in journals.
- Give presentations at relevant conferences.
- Encourage staff participation in professional societies and interagency committees.

GOAL 4: Develop best management practices for habitats consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

ALL.4.1. Minimize habitat loss and damage from development and/or maintenance of trails, buildings, sewer lines, etc.

- Ensure that the construction of sewer lines, buildings, and roads minimizes impacts to natural areas, and that impacts are mitigated.
- Establish procedures for maintaining trails and firebreaks in natural areas that minimize impact.

ALL.4.2. Protect the integrity of natural areas in the layout, design, and management of development projects adjacent to natural areas.

- Minimize potential impacts at the interface between natural areas and developed landscapes, such as creeping sod grasses, polluted runoff, alterations in drainage and elevation, creation of fire hazards, dispersal of invasive plant propagules, litter and trash dumping.
- Revise zoning codes to protect natural areas from adverse impacts from development.
- Ensure that management practices on public property account for the protection of natural areas.
- Designate management zones around existing natural areas to identify potential management concerns, such as smoke dispersion, wild and domestic animals, invasive plants, dumping, and inappropriate use.
- Notify developers during the planning process when planned developments are in a management zone to ensure that management activities can continue once the area is developed.
- Develop procedures to address concerns within management zones in existing developed areas.

ALL.4.3. Ensure that restoration and monitoring practices in natural areas minimize deleterious off-target effects to native plant and animal species.

- Use herbicide application methods such as spot-treatment whenever possible to reduce non-target impacts.
- Limit herbicide application to known, identifiable targets.

- Select herbicides that are safe, effective, have minimal impacts to non-target species, have minimal soil persistence, and degrade rapidly.
- Provide maps of rare species locations to project managers and crew supervisors.
- Combine rare species monitoring with invasive species control to minimize impact on rare species.
- Conserve rare species microhabitats when conducting restoration activities in natural areas.
- Plan timing of restoration activities to avoid impact on rare species during critical life history phases.
- Develop procedures for staff use of ORVs to minimize impact to sensitive areas.

ALL.4.4. Avoid or remove invasive species propagules to prevent new infestations and the spread of existing invasive species.

- Inform outside agencies of protocols to prevent the spread of invasive species and require that outside agencies working in natural areas adhere to them.
- Coordinate with the Florida Department of Transportation, FPL, Public Works, SFWMD, etc., to eliminate dumping and maintain easements free of invasive plants.
- Minimize soil disturbance in natural areas when conducting restoration activities.
- Before ground-disturbing activities begin, inventory and prioritize treatment of invasive species.
- Expand invasive plant control activities to include areas outside of natural areas, including nature centers, administrative grounds, and parking lots.
- Plan staging areas and access routes to avoid heavy infestation areas, and begin invasive species control in lightly infested areas prior to heavily infested areas.
- Remove mud, dirt, and plant parts from equipment before moving it into a project area.
- Avoid driving and walking through sites infested with invasive species, most notably *Lygodium microphyllum* (Old World climbing fern, small-leaf climbing fern). If these activities must occur, then staff should wear appropriate work clothing.
- Keep equipment used on sites contaminated with *L. microphyllum* and other species with highly mobile propagules separate from “clean” equipment.
- Consider developing a wash station area at sites infested with *L. microphyllum*.
- Crews need to inspect, remove, and properly dispose of invasive plant seed and plant parts found on their clothing and equipment, after being trained to recognize the priority species in the area.
- Proper disposal of invasive species propagules should be assessed to prevent contamination.

ALL.4.5. Prevent the introduction and spread of invasive plants caused by moving infested mulch, sand, gravel, borrow, and fill material.

- Inspect and document in the first year after project completion the areas where materials are used to ensure that any invasive plants transported to the site are promptly detected and controlled.
- Maintain stockpiled material in an invasive plant-free condition, in a configuration conducive to mowing and maintenance.

ALL.4.6. Where project disturbance creates bare ground, develop restoration protocols for the appropriate plant community.

- Monitor and document all ground-disturbing operations for invasive plants. Incorporate disturbed areas into ongoing restoration.
- Develop guidelines and protocols for the establishment of native plants and influx of native plant propagules in areas to be restored.
- Treat disturbed soil in a manner that facilitates the establishment of the appropriate plant community.
- Use local native material where appropriate and feasible.

ALL.4.7. Protect geologic, pre-historic, archaeological, and historic sites within all management areas.

- Obtain a certificate of appropriateness when performing substrate disturbance, including digging.
- Maintain GIS records of all known geologic, pre-historic, archaeological, and historic sites, and distribute to land managers and crew leaders to ensure protection of these sites.
- Direct work crews to not disturb archaeological material.
- Evaluate public impact to geologic, pre-historic, archaeological, and historic sites, and modify public use, if appropriate.

Pine Rockland

GOAL 1: Restore and maintain pine rockland structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

PR.1.1. Establish the appropriate fire regime for pine rocklands, using prescribed fire in conjunction with other appropriate techniques.

- Conduct prescribed burning to approximate natural fire regimes, as closely as possible.
- Utilize site preparation and firing techniques that are safe and will reduce negative impacts to the public, staff, and property.
- Conduct pre- and post-burn monitoring to assess fire effects.
- Establish and utilize a procedure to evaluate the prescribed burn (e.g. fire behavior, smoke dispersion, safety, public response) and assess whether objectives set in the prescription were met.

PR.1.2. Establish or restore the appropriate canopy and understory structure in pine rocklands.

- Maintain a supply of genetically appropriate pine seed for use in restoration following a catastrophic event (e.g. hurricane, pest outbreak).
- Collect seed using methods that minimize damage to trees and pine rockland habitat.
- Use restoration strategies that will achieve uneven-aged forest structure with varying densities and age distributions of pine trees.
- When necessary, modify the understory (e.g., saw palmetto, native hardwoods, vines, etc.) to restore historic structure, to expand potential habitat for herbs and forbs, and/or to improve smoke management.

GOAL 2: Develop best management practices for pine rocklands consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

PR.2.1. Ensure that restoration and monitoring practices in pine rocklands minimize deleterious off-target effects to native plant and animal species.

- Schedule and conduct prescribed burns to avoid negative long-term impact on rare species during critical life history phases.
- Divide sites into multiple burn units to minimize impacts to native animals.
- Consider relocating rare species such as epiphytes and *Liguus* tree snails when critical

populations may be harmed by fire.

- Prior to burns, reduce fuel through hardwood thinning and spot-treatment with herbicides, followed by removal of such material from the site, to reduce fire intensity and smoke, and minimize mortality of rare species.

PR.2.2. Minimize habitat loss and damage from development of trails, buildings, sewer lines, etc.

- Ensure that construction of trails minimizes impacts to pine rocklands and that trails double as fire breaks.
- Manage trails and fire breaks as habitat for low, herbaceous species.

PR.2.3. Protect the integrity of natural areas in the layout, design, and implementation of development projects adjacent to pine rocklands.

- Ensure that projects account for fire management needs of pine rockland sites.
- Encourage the use of local native plant material in sites adjacent to natural areas. Use species beneficial to pine rocklands such as *Pinus elliottii* var. *densa* (seed source), appropriate wildlife attractors, ecotonal species, etc.

Rockland Hammock

GOAL 1: Restore and maintain rockland hammock structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

RH.1.1. Maintain hammocks free of critical invasive plant species to facilitate recovery from natural catastrophic events.

- Identify, categorize, and prioritize the critical invasive species that impact rockland hammocks.
- Cooperate with neighboring landowners to reduce critical invasive plants adjacent to rockland hammocks.
- Reduce critical invasive plants from hammock edges.
- Reduce disturbance at hammock edges.
- Reduce influx of propagules from invasive plants.

RH.1.2. Establish and restore the appropriate canopy, edge, and understory structure in rockland hammocks.

- Investigate vegetation management techniques that will mimic natural hammock ecotones and act to increase humidity, reduce wind, and provide habitat for edge and gap species.
- Facilitate the regeneration of appropriate native species in hammock gaps where natural revegetation is short-circuited by exotic vine invasion.
- Conduct staged removals of invasive plants in order to maintain shade and protect rare plant species that would be negatively affected by high intensity light (e.g., ferns).
- In areas dominated by invasive species with few or no native plants, conduct staged removals of invasive plants to reduce a flush of invasive species recruitment.

GOAL 2: Develop best management practices for rockland hammocks consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS

RH.2.1. Ensure that restoration and monitoring practices in rockland hammocks minimize deleterious off-target effects to native plant and animal species.

- Minimize use of herbicides containing triclopyr (e.g. Garlon) in the proximity of native *Ficus* species, as they may be severely impacted or killed.
- Avoid piling vegetative debris on top of native rockland hammock vegetation or in sinkholes when conducting invasive species control.

- Consider relocating rare species such as epiphytes, ferns, and *Liguus* tree snails when critical populations may be harmed by restoration activities.
- In areas where many species of plants grow together and overlap (e.g., vines), crews should take extra precautions to only treat known, identifiable targets.
- Restrict herbicide use within vicinity of sinkholes.
- Minimize trampling rare plants, surface roots, and rock formations when conducting restoration activities in rockland hammocks.

Historic Transverse Glade

GOAL 1: Restore and maintain to the extent practicable transverse glade structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

HTG.1.1. Establish the appropriate fire regime for historic transverse glades, using prescribed fire in conjunction with other appropriate techniques.

- Conduct prescribed burning to approximate natural fire regimes.
- Utilize site preparation and firing techniques that are safe and will reduce negative impacts to public, staff, and property.
- Conduct pre- and post-burn monitoring to assess fire effects.
- Establish and utilize a procedure to evaluate the prescribed burn (e.g. fire behavior, smoke dispersion, safety, public response) and assess whether objectives set in the prescription were met.
- Due to the extreme rarity of historic transverse glades, do not establish new firebreaks within them.

HTG.1.2. Rehydrate historic transverse glades to restore historic hydrology, increasing availability of water for species requiring more mesic or hydric conditions.

- Increase quality water availability.
- Implement physical improvements to increase water availability such as weir installation, canal plugging, and pumping.

HTG.1.3. Establish or restore the appropriate vegetative structure and composition in historic transverse glades.

- Use restoration strategies that limit the development of canopy.
- When necessary, modify the understory (native pines, hardwoods, vines, etc.) to restore historical structure, to expand potential habitat for herbs and forbs, and/or to improve smoke management.
- Identify relict plant species that are specific to the transverse glade habitat.
- Consider conducting experimental outplantings of transverse glade plant species into restored marl prairies.
- Survey for rare transverse glade plant species in areas of appropriate habitat.
- Consider reintroducing extirpated transverse glade plant species.

GOAL 2: Develop best management practices for historic transverse glades consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

HTG.2.1. Ensure that restoration and monitoring practices in historic transverse glades minimize deleterious off-target effects on native plant and animal species.

- Schedule and conduct prescribed burns to avoid negative long-term impact on rare species during critical life history phases.
- Manage transverse glade sites as multiple burn units through the use of wetlines and other non-invasive methods.
- Avoid establishing crew trails that can change local water flow and hydrology.
- Avoid transfer of exotic organisms in water inputs.

HTG.2.2. Prevent habitat loss and damage to historic transverse glades from development.

- Utilize existing roads and footpaths to develop low-impact interpretive opportunities.
- Due to their rarity, development within historic transverse glade areas should be minimized.

HTG.2.3. Protect the integrity of historic transverse glades in the layout, design, and implementation of adjacent development projects.

- Ensure that projects account for hydrological and fire management needs of historic transverse glades.

Scrubby Flatwoods

GOAL 1: Restore and maintain scrubby flatwoods structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

SF.1.1. Establish the appropriate fire regime for scrubby flatwoods, using prescribed fire in conjunction with other appropriate techniques.

- Conduct prescribed burning to approximate natural fire regimes.
- Utilize site preparation and firing techniques that are safe and will reduce negative impacts to the public, staff, and property.
- Conduct pre- and post-burn monitoring to assess fire effects.
- Establish and utilize a procedure to evaluate the prescribed burn (e.g. fire behavior, smoke dispersion, safety, public response) and assess whether the objectives set in the prescription were met.

SF.1.2. Establish or restore the appropriate canopy and understory structure in scrubby flatwoods.

- Use restoration strategies that will achieve uneven-aged canopy structure with varying densities and age distributions of trees.
- When necessary, modify understory (native hardwoods, vines, etc.) to restore historical structure, to expand potential habitat for herbs and forbs, and/or to improve smoke management.

GOAL 2: Develop best management practices for scrubby flatwoods consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

SF.2.1. Ensure that restoration and monitoring practices in scrubby flatwoods minimize deleterious off-target effects to native plant and animal species.

- Schedule and conduct prescribed burns to avoid negative long-term impact on rare species during critical life history phases.
- Divide sites into multiple burn units and conduct experimental prescribed fires to determine the plant community response.
- Consider relocating rare species such as bromeliads when critical populations may be harmed by fire or pest outbreak.
- Reduce and remove fuel through hardwood thinning and spot-treatment with herbicides

prior to burns to reduce fire intensity and smoke, and minimize mortality of rare species.

SF.2.2. Minimize habitat loss and damage from development of trails, buildings, sewer lines, etc.

- Ensure that construction of trails minimizes impacts to scrubby flatwoods and that trails double as fire control lines.
- Manage trails and fire breaks as habitat for low, herbaceous species.

SF.2.3. Protect the integrity of natural areas in the layout, design, and implementation of development projects adjacent to scrubby flatwoods.

- Due to the fact that scrubby flatwoods burn with high intensity, ensure that development projects account for fire management needs of scrubby flatwood sites.
- Encourage the use of local native plant material in sites adjacent to natural areas, using species beneficial to scrubby flatwoods.
- Discourage the use of flammable plant material in landscaping adjacent to scrubby flatwoods.

Coastal Uplands

(Includes: Beach Dune, Coastal Berm, Coastal Strand and Maritime Hammock)

GOAL 1: Restore and maintain coastal uplands structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

CU.1.1. Establish the appropriate fire regime for fire-dependent coastal upland communities such as coastal strand and dune, using prescribed fire in conjunction with other appropriate techniques.

- Conduct prescribed burning to approximate natural fire regimes.
- Utilize site preparation and firing techniques that are safe and will reduce negative impacts to the public, staff, and property.
- Conduct pre- and post-burn monitoring to assess fire effects.
- Establish and utilize a procedure to evaluate the prescribed burn (e.g. fire behavior, smoke dispersion, safety, public response) and assess whether objectives set in the prescription were met.

CU.1.2. Establish or restore the appropriate canopy, understory structure, and topography in coastal uplands, or re-establish after disturbance from storms, etc.

- For coastal strand sites, use restoration strategies that will achieve a diverse landscape with patches of open sand, *Serenoa repens* (saw palmetto), and scattered hardwood shrubs.
- Manage coastal strand sites to restore historical topography and ecosystem structure, and to expand potential habitat for herbs and forbs. When necessary, remove native species that are not consistent with the historic vegetation structure.
- Restore the appropriate canopy, understory structure, and topography in coastal uplands after storms, when determined necessary.
- Evaluate the impacts of wrack-line deposition on plant species and remove portions, if necessary.

GOAL 2: Develop best management practices for coastal uplands consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

CU.2.1. Ensure that restoration and monitoring practices in coastal uplands minimize deleterious off-target effects to native plant and animal species.

- When removing invasive plants, minimize piling of plant debris to reduce concentrations of nutrients in low-nutrient system, coastal strand and dune.
- Conduct experimental prescribed burns to determine the role of fire in the life history of rare plants in coastal uplands.
- Consider relocating rare species when critical populations may be harmed by fire.
- Conduct experimental removal of trees and shrubs to promote the growth of fire-adapted plants.

CU.2.2. Minimize habitat loss and damage from development of trails, buildings, sewer lines, etc.

- Ensure that construction of trails minimizes impacts to coastal uplands and that trails double as fire breaks.
- Manage trails and fire breaks as habitat for low, herbaceous species.

CU.2.3. Protect the integrity of natural areas in the layout, design, and implementation of development projects adjacent to coastal uplands.

- Ensure that projects account for fire management needs of coastal uplands.
- Encourage the use of local native plant material in sites adjacent to natural areas. Use species beneficial to coastal systems, avoiding species such as *Lantana camara* (shrubverbena, lantana), *Calophyllum inophyllum* (beautyleaf), *Washingtonia robusta* (Washington fan palm), and *Scaevola sericea* (beach naupaka).

Wetlands

(Includes: Bayhead, Dome Swamp, Marl Prairie, Swale, Tidal Marsh, Tidal Swamp, and Freshwater Tidal Swamp)

GOAL 1: Restore and maintain freshwater wetlands structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

W.1.1. Encourage restoration of historic hydrology to freshwater wetlands and adjacent estuaries.

- Integrate freshwater wetlands into regional wetland restoration plans.
- Participate in the Comprehensive Everglades Restoration Plan (CERP) process and other regional water management restoration projects to maximize the restoration of historic hydrology in freshwater and coastal wetlands.
- Remove hydrologic barriers such as roads, fill pads, and mosquito ditch spoil.
- Consider filling or plugging canals that drain water from the system.

W.1.2. Restore or improve water quality in wetlands.

- Implement local authority and work with federal and state agencies to: (1) reduce nutrient inputs from agricultural fields into regional canals that serve as water sources for freshwater wetlands, and (2) provide appropriate salinity regime for coastal wetlands.
- Establish buffer zones around wetlands to minimize nutrient and pollutant inputs from adjacent land uses.

W.1.4. Establish the appropriate fire regime for freshwater wetlands, using prescribed fire in conjunction with other appropriate techniques.

- Conduct prescribed burning to approximate natural fire regimes.
- Utilize site preparation and firing techniques that are safe and will reduce negative impacts to public, staff, and property.
- Conduct pre- and post-burn monitoring to assess fire effects.
- Establish and utilize a procedure to evaluate the prescribed burn (e.g. fire behavior, smoke dispersion, safety, public response) and assess whether objectives set in the prescription were met.
- Prevent soil fires in tree islands during drought periods.

W.1.5. Work with owners of private inholdings to reduce impacts on freshwater wetlands

- Encourage and assist with control of populations of invasive plants on private inholdings.
- Discourage and control the release of domestic animals from private inholdings.
- Develop legal mechanisms to include inholdings in the larger prescribed burn unit.

- Discourage inappropriate use of freshwater wetlands such as ORV use, target shooting, and unregulated hunting.

W.1.6. Reduce populations of exotic fish.

- Reduce depth of canals in order to eliminate thermal refugia for tropical exotic fishes.

GOAL 2: Develop best management practices for freshwater wetlands consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

W.2.1. Ensure that restoration and monitoring practices in freshwater wetlands minimize deleterious off-target effects to native plant and animal species.

- Schedule and conduct prescribed burns in appropriate habitats (i.e., not tree islands) to avoid negative long-term impacts on rare species during critical life history phases.
- Divide sites into multiple burn units to minimize impacts to native animals.
- Consider relocating or protecting rare species when critical populations may be harmed by fire.
- Evaluate possible off-target effects of herbicides when developing management strategies.
- Determine acceptable off-target damage from aerial herbicide applications.

W.2.2. Minimize habitat loss and damage from development of trails, buildings, sewer lines, etc.

- Ensure that construction of trails minimizes impacts to freshwater wetlands and that trails double as fire breaks.

W.2.3. Protect the integrity of natural areas in the layout, design, and implementation of development projects adjacent to freshwater wetlands.

- Ensure that projects account for fire management and hydrological needs of freshwater wetlands.
- Encourage the use of local native plant material in sites adjacent to natural areas. Use species beneficial to freshwater wetlands, avoiding species such as *Melaleuca viminalis* (weeping bottlebrush).
- Monitor adjacent tree farms and nursery operations for prohibited species.

Ecotones

GOAL 1: Restore and maintain ecotone structure and function to maximize native biotic diversity and preserve natural resource values.

OBJECTIVES AND RECOMMENDED ACTIONS:

E.1.1. Maintain or restore historic ecotones in preserves containing multiple ecosystems.

- Eliminate firebreaks between habitats, or where this is not possible, continue burns across firebreaks to recreate historic ecotones.
- Use prescribed fire where possible to restore and maintain ecotones.
- When necessary, reduce hardwoods and remove invasive plants from fire-suppressed pine rocklands to recreate ecotones.
- Reintroduce rare ecotonal plant species to restored ecotones.

GOAL 2: Develop best management practices for ecotones consistent with other stated goals.

OBJECTIVES AND RECOMMENDED ACTIONS:

E.2.1. Ensure that restoration and monitoring practices in ecotones minimize deleterious off-target effects to native plant and animal species.

- Consider relocating rare species such as epiphytes and *Liguus* tree snails when critical populations may be harmed by ecotone restoration.
- Avoid piling storm and other debris along ecotones to protect organisms such as bromeliads and terrestrial orchids.

APPENDIX

Table 1. MIAMI-DADE NATURAL AREAS MANAGEMENT COOPERATING AGENCIES*BY TOPIC

Fire management	M-D DERM, M-D Parks, M-D Fire Rescue, M-D Risk Management, ENP, FDOF, TNC (training)
Exotic Plants	M-D DERM, M-D Parks, BNP, FPL, FDACS (Pest. Cert.), USFWS, DEP (BIPM), FLEPPC (list committees, etc.), TNC (community outreach), FNGLA, IRC
Exotic Animals	UF-IFAS, FFWCC
Monitoring/Research/ Rare Species Mgmt	IRC, USFWS, FTBG, FFWCC, FDACS (DPI), FNAI, UM, FIU, M-D Public Works Mosquito Control (to reduce spraying in natural areas), DEP
Reforestation/Planting	FDOF (grows seedling pines), M-D DERM (collects pine seed), M-D Parks (landscaping), relevant nurseries
Hydrology	SFWMD, ACOE
Public Use	M-D Parks, FNPS, TAS, DEP (G&T), MPO (bicycles), community support orgs., homeowners assns., civic assns., environmental education community
Protection	M-D Police Dept (including Environmental Crimes Unit, Agriculture Patrol Unit and Police Services (homeless)), M-D Solid Waste Management, FFWCC, SFWMD (hammocks only), DEP, M-D DERM, USFWS
Emergency Response	M-D Emer. Mgt., incident command team (F-DOF, M-D Fire Rescue, ENP, Parks, DERM, etc.), UF-IFAS (pest outbreaks)

*Other agencies may be added to this preliminary list

Table 2. COOPERATING AGENCY CONTACT INFORMATION

Abbreviation	Agency	Telephone	Website
ACOE	US Army Corps of Engineers, Jacksonville	904-232-2241	www.usace.army.mil
BNP	Biscayne National Park, Headquarters	305-230-1144	www.nps.gov/bisc
DEP	Florida Department of Environmental Protection		
➤ BIPM	➤ Bureau of Invasive Plant Management	850-487-2600	www.dep.state.fl.us/lands/invaspec
➤ G&T	➤ Office of Greenways and Trails	850-245-2052	www.dep.state.fl.us/gwt
ENP	Everglades National Park, Beard Research Center	305-242-7700	www.nps.gov/ever
FDACS	Florida Dept. Agriculture and Consumer Services		
➤ DPI	➤ DPI = Division of Plant Industry	352-372-3505	doacs.state.fl.us/pi
➤ Pest. Cert.	➤ Pest. Cert. = Pesticide Certification	850-488-3314	doacs.state.fl.us/onestop/aes/pestapp.html
FDOF	Florida Division of Forestry	305-257-0875	www.fl-dof.com
FFWCC	Florida Fish and Wildlife Conservation Commission (South Regional Office)	305-956-2500	myfwc.com
FIU	Florida International University, Dept. of Biology	305-348-2201	www.fiu.edu/%7Ebiology
FLEPPC	Florida Exotic Pest Plant Council		www.fleppc.org
FNAI	Florida Natural Areas Inventory	850-224-8207	www.fnai.org
FNGLA	Florida Nursery Growers and Landscape Association	800-375-3642	www.fn gla.org
FNPS	Florida Native Plant Society		www.fnps.org
FPL	Florida Power and Light	305-442-0388	www.fpl.com
FTBG	Fairchild Tropical Botanic Garden, Research	305-667-1651 ex. 3410	www.fairchildgarden.org

Table 2. COOPERATING AGENCY CONTACT INFORMATION (CONTINUED)

Abbreviation	Agency	Telephone	Website
IRC	The Institute for Regional Conservation	305-247-6547	www.regionalconservation.org
ISA	International Society for Arboriculture	888-ISA-TREE	www.isa-arbor.com/home.asp
MPO	Miami-Dade Metropolitan Planning Org.	305-375-4507	www.co.miami-dade.fl.us/mpo/home.htm
M-D	Miami-Dade County		
➤ DERM	➤ DERM	305-372-6641	www.miamidade.gov/derm
➤ Emer Mgt	➤ Office of Emergency Management	305-468-5900	www.miamidade.gov/oem/
➤ FireRescue	➤ Fire Rescue	786-331-5000	www.miamidade.gov/mdfr
➤ Parks	➤ Park and Recreation Department	305-755-7800	www.miamidade.gov/parks
➤ Police Dept	➤ Police Department	305-4POLICE	www.mdpd.com
	◆ Agriculture Patrol Unit	305-383-6800	www.mdpd.com/sta08apuinfo.htm
	◆ Environmental Crimes Unit	305-477-1616	www.co.miami-dade.fl.us/derm/code_report_viron_comp.asp
	◆ Police Services	305-471-2625	www.mdpd.com/adp.htm
➤ Pub Works	➤ Public Works (Mosquito Control)	305-592-1186	www.miamidade.gov/pubworks/mosquitoes/mhome.asp
➤ Risk Mgmt	➤ Risk Management Division	305-375-4400	www.miamidade.gov/gsa/depart_risk.asp
➤ SolidWaste	➤ Solid Waste Management	305-514-6666	www.miamidade.gov/dswm
SFWMD	South Florida Water Management District	561-686-8800	www.sfwmd.gov
TAS	Tropical Audubon Society	305-667-7337	www.tropicalaudubon.org
TNC	The Nature Conservancy (S. FL outreach)	954-564-6144	nature.org
UF-IFAS	University of Florida, Inst. Food & Agric. Sci., Dept. Wildlife Ecology & Conservation	352-846-0643	www.wec.ufl.edu/index2.html
UM	University of Miami, Dept. of Biology	305-284-3973	fig.cox.miami.edu
USFWS	United States Fish and Wildlife Service, Vero Beach office	561-562-3909	www.fws.gov

Table 3. LIST OF HABITATS IN EACH NATURAL AREA (N=96)

Site Name	Habitat(s)
A.D. Barnes	Pine Rockland, Rockland Hammock
Arch Creek	Wetlands, Rockland Hammock
Arch Creek Addition*	Rockland Hammock
Big & Little George*	Rockland Hammock
Bill Sadowski	Rockland Hammock, Pine Rockland
Black Creek Forest*	Pine Rockland, Rockland Hammock
Black Point	Wetlands, Coastal Uplands
Biscayne Wetlands	Wetlands, Coastal Uplands
Boystown*	Pine Rockland
C - 111*	Wetlands
Camp Greynolds	Coastal Uplands, Rockland Hammock, Wetlands
Camp Owaissa Bauer	Pine Rockland, Rockland Hammock
Castellow Hammock	Rockland Hammock, Pine Rockland
Castellow Hammock #28*	Rockland Hammock
Chapman Field	Wetlands
Charles Deering Estate	Rockland Hammock, Pine Rockland, Wetlands
Colonial Drive	Pine Rockland
Coral Pine	Pine Rockland
Coral Reef	Pine Rockland
County Line Scrub*	Scrubby Flatwoods
Crandon	Coastal Uplands, Wetlands
Deering North Addition*	Coastal Uplands, Wetlands
Deering South Addition*	Rockland Hammock, Pine Rockland, Coastal Uplands
Dolphin Center	Scrubby Flatwoods
Dolphin Center Addition*	Scrubby Flatwoods
Eachus Pineland*	Pine Rockland
East East Greynolds	Wetlands, Rockland Hammock, Coastal Uplands
East Greynolds Addition	Wetlands, Rockland Hammock
East Greynolds	Wetlands, Rockland Hammock, Coastal Uplands
Fairchild Trop. Bot. Garden	Wetlands
Florida City Pineland*	Pine Rockland
Fuchs Hammock	Rockland Hammock, Pine Rockland
Fuchs Hammock Addition*	Pine Rockland, Rockland Hammock
Gold Coast Railroad	Pine Rockland
Goulds Pineland*	Pine Rockland
Greynolds	Wetlands, Pine Rockland, Rockland Hamm., Coastal Uplands
Harden Hammock*	Rockland Hammock
Hattie Bauer Hammock*	Rockland Hammock
Haulover	Wetlands, Coastal Uplands
Highland Oaks	Wetlands
Holiday Hammock*	Rockland Hammock
Homestead Bayfront	Wetlands
Ingram Pineland *	Pine Rockland

Site Name	Habitat(s)
Kendall Indian Hammocks	Rockland Hammock
Kendallwood	Rockland Hammock
Larry & Penny Thompson	Pine Rockland, Historic Transverse Glade
Lincoln City #2	Pine Rockland
Loveland Hammock*	Rockland Hammock
Lucille Hammock*	Rockland Hammock
Ludlam Pineland Tract*	Pine Rockland
M.E. Thompson Campground	Historic Transverse Glade
Mangrove Preserve	Wetlands
Martinez	Historic Transverse Glade
Matheson Hammock	Rockland Hammock, Wetlands, Historic Transverse Glade
Medsouth Park	Pine Rockland
Meissner Hammock*	Rockland Hammock
Metro Zoo	Pine Rockland
Model Lands*	Wetlands
Navy Wells #39*	Pine Rockland
Navy Wells #42*	Pine Rockland
Navy Wells Preserve	Pine Rockland
Ned Glenn Pineland*	Pine Rockland
Nixon Smiley Preserve	Pine Rockland
Oak Grove	Rockland Hammock
Oleta River Corridor Tract C*	Wetlands
Oleta River Corridor Terama*	Wetlands
Owaissa Bauer Addition*	Rockland Hammock, Pine Rockland
Palm Drive (CARL)*	Pine Rockland
Pelican Harbor	Wetlands
Pine Island	Pine Rockland
Pine Shore	Pine Rockland
Quail Roost*	Pine Rockland
R. Hardy Matheson	Wetlands, Pine Rockland, Rockland Hamm., Coastal Uplands
Rock Pit	Pine Rockland
Rock Pit #34	Pine Rockland
Rock Pit #39	Pine Rockland
Rockdale*	Pine Rockland
Rolling Oaks	Pine Rockland, Rockland Hammock
Ron Ehman	Pine Rockland
Ross Hammock*	Rockland Hammock
Royal Oaks	Rockland Hammock
Seminole Wayside	Pine Rockland
Silver Palm Groves*	Pine Rockland
Silver Palm Hammock	Rockland Hammock, Pine Rockland
South Dade Wetlands*†	Wetlands
Sunkist	Pine Rockland
Sunny Palms*	Pine Rockland
Tamiami #8*	Pine Rockland
Tamiami Complex Addition*	Pine Rockland

Site Name	Habitat(s)
Trail Glades Range	Wetlands
Tree Island Park*	Wetlands
Trinity Pineland*	Pine Rockland
Tropical Park	Pine Rockland
Vizcaya Museum	Wetlands, Rockland Hammock
West Biscayne Pineland	Pine Rockland
Whispering Pines	Rockland Hammock, Pine Rockland

* Includes acquired EEL Property

† Includes property owned by South Florida Water Management District

MISSION STATEMENTS

NAM Mission Statement: To restore, protect, and manage Miami-Dade County's naturally occurring plant communities through resource management, inter-governmental environmental liaison, and community outreach including environmental education and volunteer programming to preserve these areas for present and future generations of South Floridians.

EEL Purpose: To manage environmentally endangered lands with the primary objective of maintaining and preserving their natural resource values by employing management techniques that are most appropriate for each native community so that our natural heritage may be preserved for future generations.

DEFINITIONS

Goal - A desired future condition, at least 50-100 years from now.

Objective - A shorter-term, smaller-scale benchmark needed to reach the goal.

Action - The means to reach a specific objective.

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