

Seminole County Natural Lands Program Biological Monitoring Plan 2006 Edition



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Table 1: Number of Baseline Survey Years per Property

Properties	Number of Years Surveyed
Black Bear Wilderness Area (East Side)	7
Black Hammock Wilderness Area	3
Chuluota Wilderness Area	6
Econ River Wilderness Area	7
Geneva Wilderness Area	7
Lake Jesup Wilderness Area	6
Lake Proctor Wilderness Area	6
Spring Hammock Preserve	6

2006 MONITORING PLAN

The Natural Lands Program is in the process of developing an overall management plan that encompasses all natural lands properties, and includes describing resource management activities required to preserve and/or restore habitat. The monitoring plan provides the foundation for meeting the goals and objectives of the management plan.

This plan will address the response of prescribed fire, mechanical treatment, restoration and exotic removal on plant community health based on the presence or absence, population size (increasing or decreasing), and condition of specific plant and animal species. All sampling locations will be GPS'd and data collected will be stored in a Microsoft Access database. The plant communities focused on in this plan reflect those that require the most land management attention, are imperiled statewide and tend to have the most listed species. All of these factors provide SCNLP staff with the ability to evaluate management techniques using measurable criteria. Data will be evaluated annually and any revisions made at that time.

MONITORING GOALS (REVISED)

1. *To evaluate the effectiveness of land management techniques (burning, exotic treatment, mechanical treatment).*
2. *To provide a status report for listed species on SCNLP properties and provide Florida Fish and Wildlife Conservation Commission (FWC) and Florida Natural Areas Inventory (FNAI) with annual status reports*
3. *To produce a comprehensive species list for all SCNLP properties.*

Objectives

1. To establish a protocol for determining the effectiveness of SCNLP's land management techniques based on plant community health.
2. To continue to collect baseline data on new properties.
3. To survey for listed species on all SCNLP properties.
 - a. Monitor Florida mouse (*Podymys floridanus*) populations.
 - b. Determine gopher tortoise densities in sandhill and scrubby flatwoods communities.
 - c. Monitor nesting success of listed bird species.
4. To survey and monitor exotic species on all SCNLP properties.
5. To continue to work with the public through education programs, volunteers, and interns.
6. Where possible, use data collected from qualified volunteers or academic institutions.
7. To gather information/data that provides the foundation for writing and implementing management plans for each wilderness area.

BIOLOGICAL MONITORING

The SCNLP is entering a new phase of monitoring. All of the baseline data has been collected (with a few exceptions) and the monitoring plan needs to be updated to capture the effects of land management techniques used for restoration and fuel reduction. Monitoring will occur in four separate categories:

1. Baseline Surveys.
2. Land Management Monitoring
3. Listed Species Surveying and Monitoring
 - a. Surveying for Listed Species
 - b. Monitoring Listed Species
4. Exotic Species Surveying and Monitoring

Data collected from qualified sources on Natural Lands property that have been validated by Natural Lands staff, will be incorporated.

BASELINE SURVEYS

Staff will evaluate the need to conduct baseline surveys on the west side of Black Bear Wilderness Area and the newly acquired Crockett Property. As new properties are added to the SCNLP, baseline data will be collected.

Baseline data collection will follow most of the monitoring protocol developed in the first monitoring document. Small mammals, reptiles, amphibians, fish and birds will be sampled quarterly for one year. Plant and invertebrate lists will be compiled from observational data and transects.

Small Mammals

All mammals observed, as well as identifiable sign (tracks, scat, etc.) encountered will be documented and added to the base inventory (see *Reporting Procedures*). Trapping for small

mammals using Sherman Live Traps baited with sunflower seeds will occur quarterly at established transects and trapping grids in various habitats on pre-selected properties.

Temporary small mammal sampling transects will be used in all natural communities to determine overall mammal species diversity. Trapping stations, representing single points on a transect line, will be placed ten meters apart. Only rare or listed animals will be marked and morphometric data collected.

Reptiles and Amphibians

All reptiles and amphibians observed will be recorded. The principle methods of herptile sampling will be through drift fence and cover board transects (see Appendix A for trapping schematic). Drift fences are often constructed at the margins of small water bodies (e.g. depression marsh) and at other select areas of high animal movement.

Drift fences and coverboards will be checked for three (3) consecutive days each quarter on each property. All herptiles (and other vertebrates) captured will be identified to species. Any box turtles or gopher tortoises will be marked via the notching of the marginal scutes of their carapace (see Appendix A for marking scheme).

Wetland areas on several Natural Lands parcels serve as reproductive sites for many species of amphibians. Nighttime and rain event surveys will be done as time and resources permit.

Fish

Fish populations are sensitive to changes in water quality resulting from fluctuations in water level, pesticide/herbicide use, exotic plant introduction, and other factors. They may also be affected by the introduction of non-native fishes and other fauna.

Whenever the occurrences of fish species are identified through the use of visual encounters, they will be noted and added to the base inventory. Otherwise, fish will be monitored using a variety of trapping techniques. Fish populations will be monitored quarterly corresponding with the herptile monitoring. Methods will include dip netting, seining, and the use of minnow traps.

Fish will be identified in the field and released. Voucher specimens may be collected and deposited at the University of Central Florida vertebrate collection.

Birds

In cooperation with Seminole County Audubon Society, properties will be surveyed monthly for a period of one year. Properties will be re-surveyed every five years. Protocol for surveying is attached as Appendix B.

Plants

Natural Lands staff will compile comprehensive lists, enlisting the help of qualified volunteers.

Invertebrates

Collections of invertebrates will be made in conjunction with other activities. Samples of invertebrate "bycatch" in drift fences will be collected and will be placed collectively in a jar containing 70% isopropyl alcohol. The jar will be labeled with collection date(s), natural community type, and SCNL location. The jar and contents may be submitted to the University of Central Florida (U.C.F.) where staff will identify the specimens and deposit them in the U.C.F. collection, and forward a species list to SCNLP.

Other methods of insect collection (hand, malaise, net, or pitfall trappings) made independently of vertebrate trapping events will be done as time and resources permit.

LAND MANAGEMENT MONITORING

Baseline data has been collected for most properties within the SCNLP. The next phase of monitoring involves making conclusions on how effective our land management (burning, mechanical treatment, restoration, exotic treatment) has been. Our main objective is to manage for native plant and animal diversity. The desired condition of each of the following plant communities will be defined and measurements will be taken annually using permanent transects and/or photo points.

Sandhill

According to the Florida Natural Areas Inventory (FNAI), Sandhill is described as a longleaf pine (*Pinus palustris*) – turkey oak (*Quercus laevis*) – wiregrass (*Aristida stricta* var. *beyrichiana*) association located on rolling hills with well-drained yellow sandy soils. The plant community is characterized by widely spaced longleaf pine, scattered turkey oak, and a ground cover of wiregrass. Other plants associated with this community are bluejack oak (*Quercus incana*), sparkleberry (*Vaccinium arboretum*), winged sumac (*Rhus copallina*), pineywoods dropseed (*Sporobolus junceus*), wild buckwheat (*Eriogonum tomentosum*), gopher apple (*Licania michauxii*), partridge pea (*Chamaecrista fasciculata*), and scrub or runner oak (*Quercus inopina*). Animal species found in this community include gopher tortoise, and southern flying squirrel (*Glaucomys volans*) among others. FNAI lists sandhills as imperiled in Florida because of rarity or vulnerability due to extinction.

Remnant sandhill communities are found at Chuluota, Econ River and Lake Proctor Wilderness Areas (CWA, ERWA and LPWA, respectively). All are in various stages of succession. The Econ River Wilderness Area has sandhill with the most intact groundcover of wiregrass compared with the other two sites. Most of the sandhill at ERWA have been burned once.

Of the three major sandhill components, wiregrass is the best indicator of a healthy system. Absence of wiregrass indicates soil disturbance and fire exclusion. Clewell (1986, 1989) determined that wiregrass occurs, in fire maintained communities, at a density of approximately 5 clumps (usually overlapping) per square meter on relatively undisturbed soils. The presence/absence of gopher tortoises is also a good indicator of plant community health. More recently, The Nature Conservancy and Archbold Biological Station have developed plant community objectives (Carl Weekley, pers. comm.) and qualitative criteria that will be used to rate our xeric upland communities (Table 2).

Five randomly placed 50 meter transects at Lake Proctor Wilderness Area and Econ River Wilderness Area, will be established (permanent rebar marking ends and GPS locations). Density of wiregrass (using 1 m² plots), percent cover of all species, bare ground, midstory and canopy cover will be recorded. Fire frequency and fire season will also be recorded. Permanent photo-points will be established.

The desired condition of sandhill on SCNLP properties is as follows: 10-30% bare ground, 25% or less shrub cover, greater than 80% of area burned within 5 years, 50-80% of burns during growing season, and less than 75% pine cover.

Scrub

Scrub is defined as a closed to open canopy of sand pines interspersed with scrub oaks and other shrub species, a sparse herbaceous layer, scattered lichens, and open sandy areas. This community is formed on old sand dunes and sand bars on deep well-drained sand. Major components include sand pine (*Pinus clausa*), sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), scrub oak (*Quercus inopina*), saw palmetto (*Serenoa repens*), Florida rosemary (*Ceratiola ericoides*), rusty lyonia (*Lyonia ferruginea*), scrub hickory (*Carya floridana*), silk bay (*Persea borbonia var. humilis*), scrub palmetto (*Sabal etonia*), hog plum (*Ximenia Americana*), beak rush (*Rhychospora* sp.), wiregrass, milk peas (*Galactia* sp.) and various lichens. Typical animals include red widow spider (*Latrodectus bishopi*), oak toad (*Bufo quercicis*), six-lined racerunner (*Cnemidophorus sexlineatus sexlineatus*), eastern coachwhip (*Masticophis flagellum flagellum*), and spotted skunk (*Spilogale putorius*). FNAI lists scrub as imperiled in Florida due to its rarity or vulnerability to extirpation.

Traditionally, fires occurred infrequently at intervals of 10 to 100 years (FNAI 1990, Ecosystems of Florida 1990). However there is some evidence that suggests mosaic burns of every 7 to 15 years are beneficial in some scrub communities (Weekley, pers. comm.). Scrub is found at Geneva, Lake Proctor, Black Hammock, and Chuluota Wilderness Areas. Econ River Wilderness Area has senescent sandhill that looks similar to scrub habitat.

Scrub types will be further defined on all sites and transects will be established on two representative properties. Desired condition of scrub (Table 2) is 31-50% bare ground, greater than 80% of area burned within 10 to 25 years, 50-80% of burns during growing season, mean woody height less than 0.5 meters, and pine cover less than 75%. Photo-points will be established.

Scrubby Flatwoods

This community is essentially another form of scrub and is found on elevated, deeper sandy soils than the surrounding mesic flatwoods community. However, unlike mesic flatwoods, the general sparseness of ground cover reduces the frequency of fire (8-25 years, FNAI 1990). Scrubby flatwoods are described as an open canopy with widely scattered pine trees with a sparse shrubby understory and many patches of open sand. Typical plants include longleaf or slash pine, sand live oak, Chapman's oak, myrtle oak, scrub oak, saw palmetto, staggerbush (*Lyonia fruticosa*), scattered wiregrass, shiny blueberry, gopher apple, rusty lyonia and tarflower (*Befaria*

racemosa). Scrubby flatwoods occur at Geneva, Black Hammock, and Chuluota Wilderness Areas.

Healthy scrubby flatwoods characteristics are usually based on the needs of the Florida scrub-jay (Breininger et. al. 1998, 1999). Managing for scrub-jays has shown to be beneficial to most scrubby flatwoods species (Breininger and Schmalzer 1990). This plant community has few overstory trees (pines), a shrub layer between 1.2 and 1.7 (Breininger and Oddy 2001) meters and sandy open patches.

The desired condition for scrubby flatwoods is 10% to 30% bare ground, > 80% of area burned within 5-15 years, 50%-80% of burns during growing season, mean shrub height < 0.5 meters, <75% >3 meter (height) pine cover. Plant transects will be established at one representative site. Photo-points will be established on all sites.

LISTED SPECIES SURVEYING AND MONITORING

Maintaining and increasing biodiversity is a key management goal for the SCNLP program. The presence of listed species is often an indication of good management practices. The SCNLP program hopes to identify the location (survey) and monitor populations of listed species in order to gauge the success of our management program. Listings for plants are taken from USFWS, FNAI, and Florida Department of Agriculture and Consumer Services Division of Plant Industry (FDACS). Listings for animals follow USFWS and FWC. Any previously unrecorded listed species found on SCNLP property will be added to regular monitoring.

Plants

Surveying

A table of potentially occurring listed species and their habitats will be developed using the Florida Natural Areas Inventory (FNAI) database for central Florida counties. In order to determine the most effective time during the year in which to conduct field assessments, the flowering times of all potentially-occurring listed species will be compiled using the FNAI database, Institute of Systematic Botany, Atlas of Florida Vascular Plants, on-line occurrence records, and the FDACS Notes on Florida's Endangered and Threatened Plants, 2000. Surveys will be conducted in the appropriate habitat annually when species are in bloom, mainly spring, summer and fall. The Florida Native Plant Society, Tarflower Chapter, will be asked to participate in listed plant surveys. These surveys will be conducted once in all appropriate habitats, data collected will be used to evaluate the need for any required monitoring.

Monitoring

The following are listed plants that have already been located on SCNL properties pitcher plants (*Sarracenia minor*), Okeechobee gourd (*Cucurbita okeechobeensis*), many-flowered grass-pink (*Calopogon multiflorus*), cuplet fern (*Dennistaedtia bipinnata*), Curtiss' milkweed (*Asclepias curtissii*), buckthorn bully (*Sideroxylon lycioides*), needle palm (*Rhapidophyllum hystrix*), Florida willow (*Salix floridana*), snow squarestem (*Melanthera nivea*), cardinal airplant (*Tillandsia fasciculata* var. *densispica*), giant wild-pine (*Tillandsia utriculata*), green-fly orchid (*Epidendrum canopseum*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis* var. *spectabilis*), plume polypody (*Pecluma plumula*), comb polypody (*Pecluma ptilodon* var.

Table 2: Monitoring Criteria for Natural Communities

Conservation Target	Key Attribute	Indicator	Indicator Ratings			
			Poor	Fair	Good	Very Good
Xeric uplands matrix	community structure - sandhill	% bare soil cover	>40% OR <2%	2-5% OR 30-40%	5-10%	10-30%
Xeric uplands matrix	community structure - scrubby flatwoods and yellow sand scrub	% bare soil cover NEED UPPER LIMITS 30%	0-2%	2-5%	5-10%	>10%
Xeric uplands matrix	community structure - rosemary oak scrub	% bare soil cover (at >4yrs post fire)	<5	5-10 OR >70%	11-30 OR 51-70%	31-50%
Xeric uplands matrix	community structure - sandhill	% cover of shrub midstory (1-3 m)	>75%	51-75%	26-50%	25% or less
Xeric uplands matrix	fire regime - rosemary oak scrub	fire frequency	<60% of area burned within 10-25 years	60-80% of area burned within 10-25 years	>80% of area burned within 10-25 years	NA
Xeric uplands matrix	fire regime - sandhill	fire frequency	<60% of area burned within 5 years	60-80% of area burned within 5 years	>80% of area burned within 5 years	NA
Xeric uplands matrix	fire regime - scrubby flatwoods and yellow sand scrub	fire frequency	<60% of area burned within 5-15 years	60-80% of area burned within 5-15 years	>80% of area burned within 5-15 years	NA
Xeric uplands matrix	fire regime - all community types	fire season	<25% of burns during growing season (April - Sept)	25-50% or 81-100% of burns during growing season (April - Sept)	50-80% of burns during growing season (April - Sept)	NA
Xeric uplands matrix	community structure - rosemary oak scrub, scrubby flatwoods, and yellow sand scrub	mean woody height	>2	1-2	0.5-1	<0.5
Xeric uplands matrix	community structure - sandhill	native herbaceous groundcover	0-4% cover	5-10% cover	11-30% cover	>30%
Xeric uplands matrix	community structure - sandhill, scrubby flatwoods, yellow sand scrub	pine cover >3m	>75%		<75%	
Xeric uplands matrix	community structure - rosemary oak scrub	pine cover >3m	>75%		<75%	

caespitosa), garberia (*Garberia heterophylla*), pine lily (*Lilium catesbaei*). All of these plants/populations will be recorded and added to an annual monitoring schedule.

Monitoring listed plant species will include recording GPS location coordinates, photographing the plant in bloom, and setting up any monitoring quadrats, grids or transects, depending on the size of the population. If the population of a listed plant is less than 30 individuals, they will be tagged and monitored annually.

Animals

Surveying

The gopher tortoise and Florida mouse (*Podmys floridanus*) are considered both umbrella and keystone species meaning that their presence and abundance is indicative of the health of the plant community and potentially the presence of other rare or endemic species. Long term monitoring of these species can provide qualitative proof that our land management activities are benefiting the environment.

Extensive animal surveys and monitoring has been conducted on most properties. The FNAI records database will be used to develop a potential listed species account for SCNLP properties and any necessary surveys will be conducted (on-time survey event). Surveys for the Florida mouse at Lake Proctor, Geneva and Lake Proctor Wilderness Areas will be conducted using temporary transects.

Monitoring

SCNLP staff will monitor for known populations of listed animal species quarterly. Any observational data will be included.

Gopher tortoises will continue to be surveyed through the Turtle Team volunteer program and by surveying burrows post-fire (see Appendix A for marking scheme). The Florida mouse study at Chuluota Wilderness Area will be expanded to cover adjacent habitat and more intense sampling will begin at Lake Proctor, Geneva and Black Hammock Wilderness Areas. Trapping grids (see Appendix A) will be established at all sites and permanently established using rebar and GPS if the Florida mouse is present. Short-tailed snakes have been recorded in Seminole County, but none have been found on SCNLP property. Staff will research the most effective ways to survey for this species and establish any herp arrays or cover board transects that are necessary.

The reproductive success of species including, but not limited to, sandhill crane (*Grus Canadensis*), and snowy egret (*Egretta thula*) will be monitored. The bald eagle (*Haliaeetus leucocephalus*) will be monitored yearly by checking with FWC for bald eagle nest sites on SCNLP property. Potential suitable nesting habitat will be identified on all properties and nest surveys will be conducted during the spring. The resulting success/failure (i.e., number of chicks hatched, number of chicks fledged) will be recorded each year. Audubon members will be recruited to assist with these surveys and subsequent monitoring.

When possible, graduate students will be recruited to conduct the monitoring as part of their thesis once they have been trained by SCNLP staff.

EXOTICS

Exotic plant and animal species in Florida have contributed to the degradation of habitat and loss of species in some areas. Tracking, treating and eradicating or gaining maintenance control over these species is imperative to maintaining healthy habitats. An invasive species management plan will be developed.

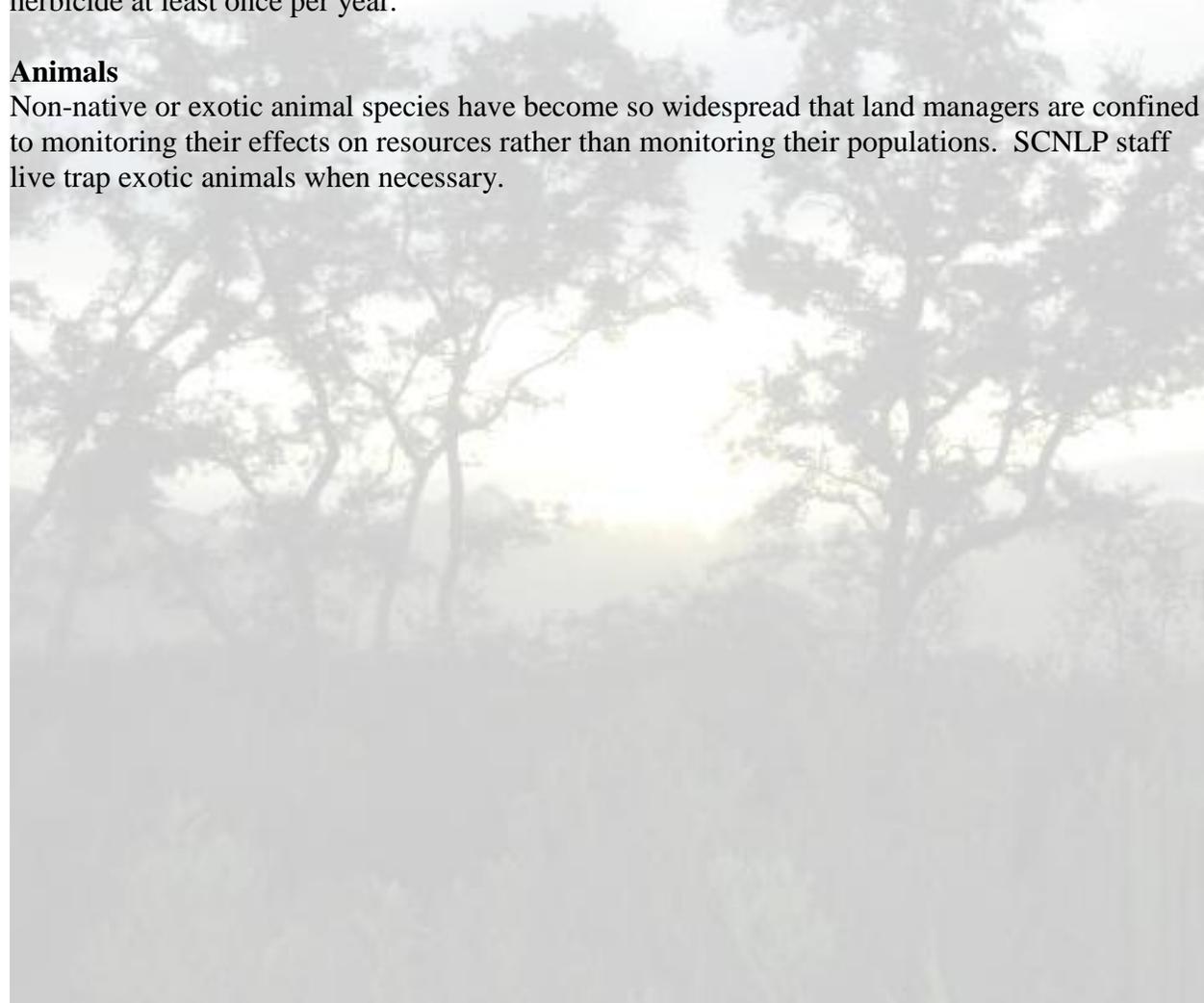
Plants

Surveying and Monitoring

A systematic survey for exotic plants on all SCNLP properties will be conducted by staff and qualified volunteers annually. Burn zones will be used as sampling units and random transects surveyed for exotics (the number and length of transects is dependent on burn zone size). Surveys will be conducted in close proximity to existing populations of exotic plants. Any new populations of exotics will be GPS'd and monitored annually. Plants will be treated with herbicide at least once per year.

Animals

Non-native or exotic animal species have become so widespread that land managers are confined to monitoring their effects on resources rather than monitoring their populations. SCNLP staff live trap exotic animals when necessary.



REFERENCES

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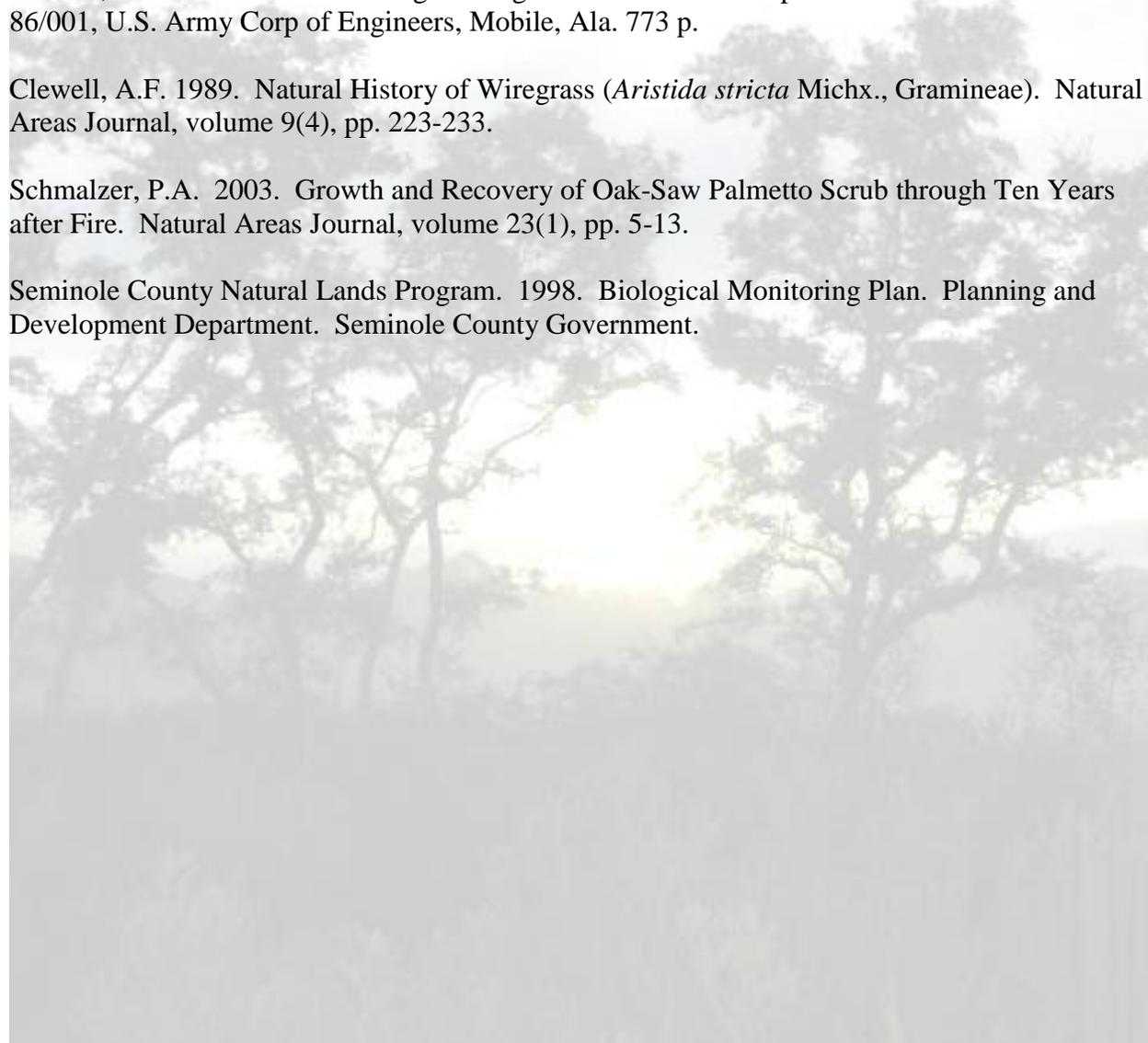
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Clewell, A.F. 1989. Natural History of Wiregrass (*Aristida stricta* Michx., Gramineae). *Natural Areas Journal*, volume 9(4), pp. 223-233.

Schmalzer, P.A. 2003. Growth and Recovery of Oak-Saw Palmetto Scrub through Ten Years after Fire. *Natural Areas Journal*, volume 23(1), pp. 5-13.

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Appendix A
Sampling Diagrams

Figure 2: Pattern created by a file on the carapace of a turtle.

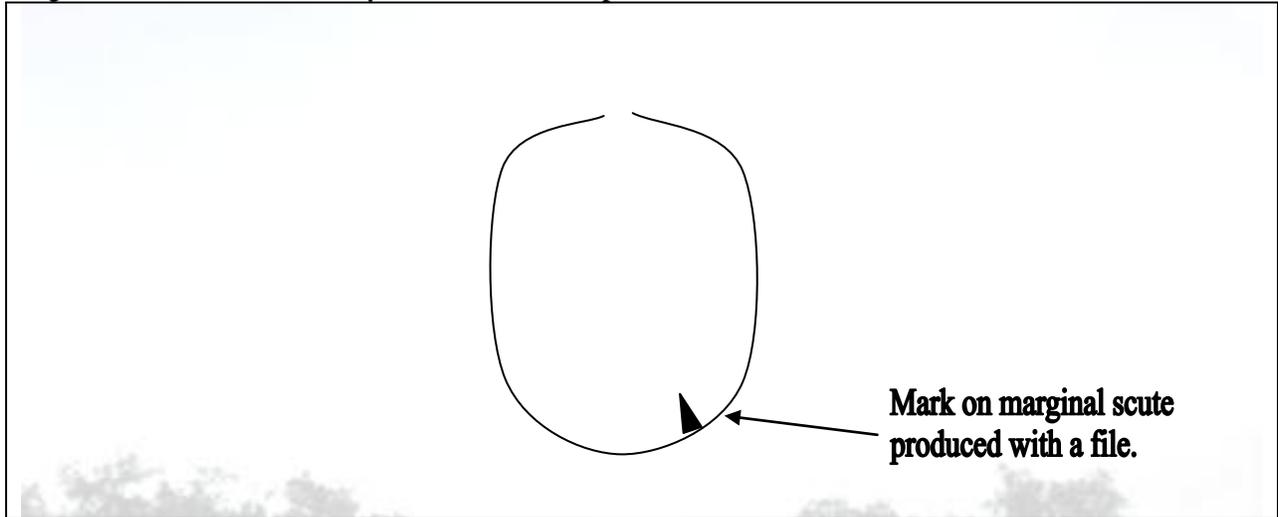


Figure 3: Gopher tortoise marking technique used to identify individuals.

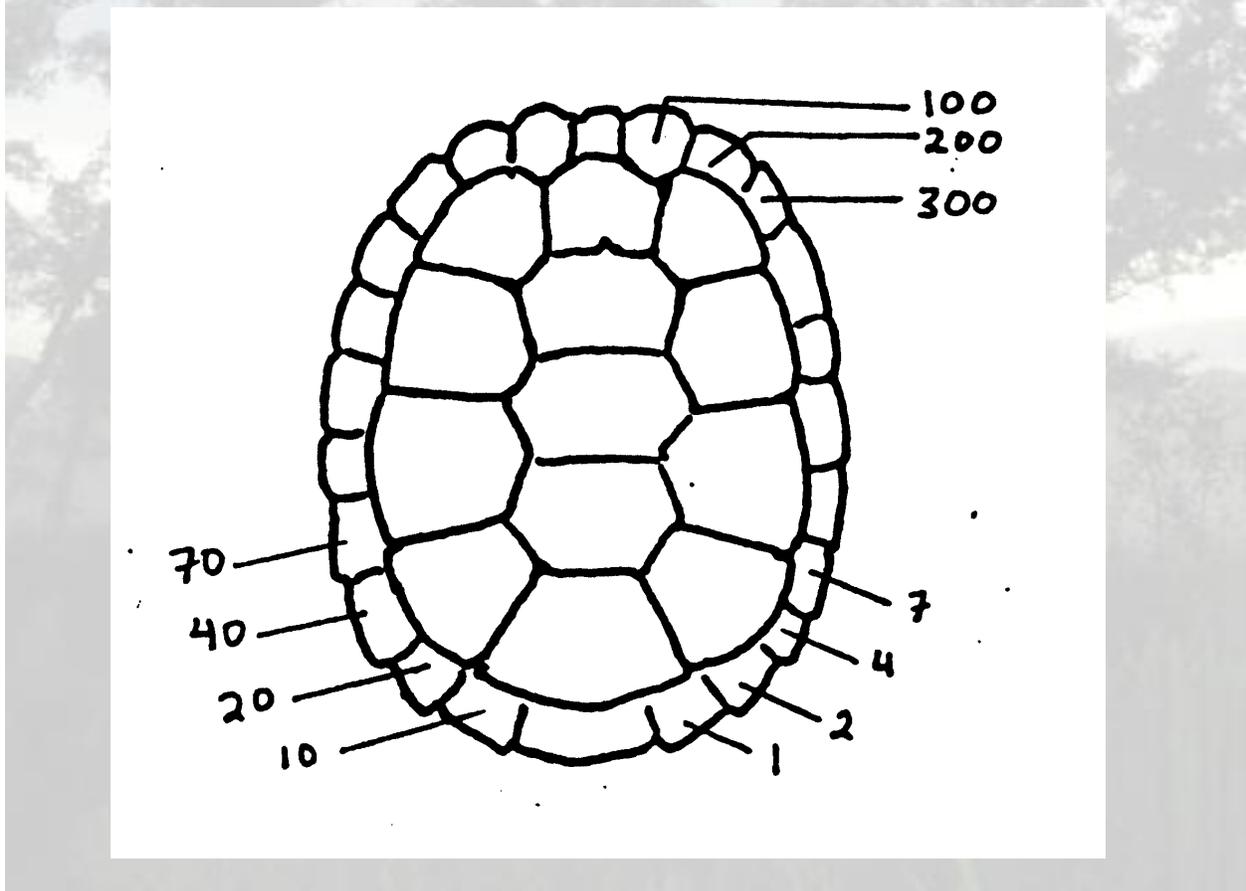


Figure 4: Straight line drift fence.

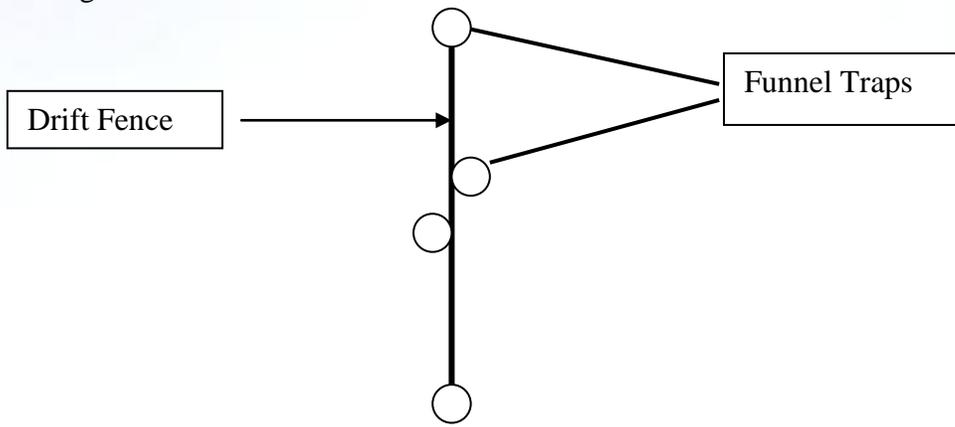


Figure 5: Diagram of a 3-armed drift fence.

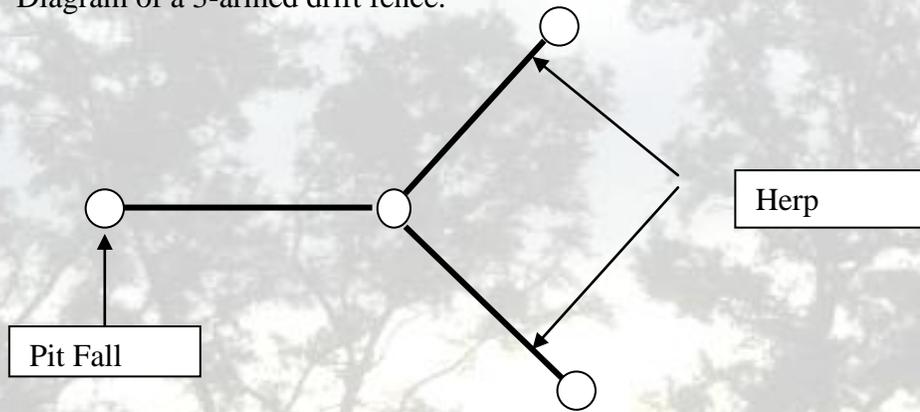
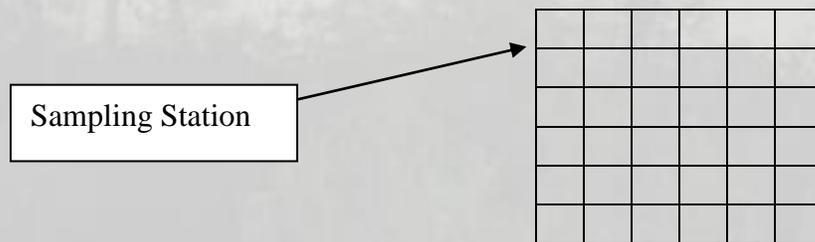


Figure 6: Diagram of a sampling grid.



Appendix B
Avian Monitoring Protocol

Point Count Bird Survey – Example from Lake Proctor Wilderness Area

Start by following the sign for trails N from the parking area. Note that directions are in italics.

POINT	POINT DESCRIPTION. <i>DIRECTIONS in italics</i>
1	Jct red/white trails 100m N of parking area. <i>Then head W on white trail yellow marker</i>
2	S end L Proctor. <i>Follow white trail to red, then L on red</i>
3	Cut stump to R, dead pine leans away to L. <i>Continue then take blue trail to W</i>
4	Small wetland to W of trail
5	Second seat by L Proctor
6	Pine deadfall on R, 60 m S of shelter. <i>Continue to red trail, keep straight on it heading E</i>
7	At powerline. <i>Follow trail S 70m, then turn L [E]</i>
8	Passing corner of property on L, 30m S on wide sandy trail. <i>Then retrace steps taking red trail E. Pass shelter, turn R then immediate L onto yellow trail for 50m</i>
9	Start of larger trees. <i>Then back to red trail which joins then leaves yellow</i>
10	On red, big snag on L, 20 m before crossing wide sandy trail
11	30 m after S bend, 35 m before crossing wide sandy trail. <i>Cross wet area after this</i>
12	Wetland to E, where trail turns R [W]
13	At powerlines. <i>Return to start from here.</i>

Distance 6.9 km or 4.3 miles. Estimated time to complete 3^o 15'

Abbreviated Instructions

- Wind key 0=none, 1=leaves move 2=branches move 3=trunks move
- Cloud record as percentage cloud cover e.g. 20%
- Sex M, F or U
- Det = first detection i.e. A or V
- S=song, C=call, D=drum
- Distance Key

• 0-10 meters	• 10
• 10-25	• 25
• 25-50	• 50
• 50-75	• 75
• 75-100	• 100
• >100	• +
• Flyover	• F

- Comments please add any important behavior e.g. mating, feeding young, or write name of species if unsure of acronym for example
- If you see any unusual birds between points, interesting mammals etc please make a note on bottom margin
- If you are unable to fill in the detailed information, that's fine, most important is the species and number.