



ATTACHMENT II

Endangered Species Survey Methodology

The Meandering Strip Census*

In Compliance with the Lee County Endangered Species Ordinance No. 89-34

The survey methods of the meandering strip census uses transect lines at 50-100' intervals, with the observer sampling the transect area using varied meanders determined by the density of the vegetation. This methodology permits the observer to pattern the survey to each specific area throughout the transect. The survey has an advantage to an observer which is knowledgeable in recognizing site indicators of the species being surveyed.

The meandering strip census method is applied when the subject property has possible listed species occurring in the specific Florida Land Use, Forms and Cover Classification (FLUCCS) register being surveyed.

Step One

On an aerial photograph, delineate the appropriate FLUCCS registers found on the subject property. (Figure 1)

Areas of multiple occurrence of the same FLUCCS register, having the potential for Lee listed species, should be identified as compass quadrants or cross labeled on a reference map with alphabetical subscripts following the FLUCCS codes (Figure 2). A copy of the aerial is used during the survey to identify the sighting location of the species (A symbol or letter code may be used to identify each species).

Step 2

Tabulate on a data sheet each of the FLUCCS registers with the list of potential Lee listed species which could occur in that register. This list will be used as a tabulation list in the field during the survey of each register.

(Example not to scale)

Pine Flatwoods (411):

Common Name	Observed	Comments
A. Eastern Indigo snake		
B. gopher tortoise		
C. gopher frog		
D. Southeastern American kestrel		
E. red-cockaded woodpecker		
F. Big Cypress fox squirrel		
G. Fakahatchee burmannia		
H. satinleaf		
I. beautiful pawpaw		
J. twisted air plant		
K. Florida coonle		



Re: Meandering Strip Census Survey Methodology (cont.)

Step 3

The meandering stripe census uses transect lines at 50-100' intervals. At each FLUCCS area the first transect usually begins on the ecotonal boundary, 50-100' from the access to the register. Transects usually follow compass headings, however natural references may be used if the site is small or visibility extends across the register. Flagging tape is attached to a plant or stake to visibly identify the transect location.

Step 4

The observer proceeds on a meandering pattern within the limits of the transect area, recording any sights of listed species on an aerial. The Meanders extend into adjoining transect survey areas to provide for a near 100% coverage. The frequency of the meanders is determined by the ground cover and visibility. The more densely vegetated areas receives a greater frequency of meanders, thus decreasing the area between meanders in some registers to as nears as 12' apart. Unusual changes in the meander size are noted on the aerial map. If the terminus flagging markers of the transect lines are not visible, then survey flagging tape is attached to vegetation at the outer extent of the transect meanders to mark the coverage area for that transect. (Figure 3)

The visibility of the flagging tape assists in maintaining the transect direction, and is used as a gauge for determining the frequency of meanders within a transect area. Each tape must be visible from the previous meander.

Step 5

Faunal species which do not lend themselves to the typical transect line survey methodology, require an additional method of observation. These species require game stalking techniques of periodic "stop-look-listen" observations at frequent intervals along transect lines. The frequency and duration of observations are determined by habitat density, species observed, and the stalking skills of the observer. Field glasses and the ability to blend into the surroundings is also a key to success.

Step 6

On the subsequent transects, the flagging tape is removed and relocated at the outer limits of its transect area (Figure 3). Steps 1 through 5 are continued until all the area has been sufficiently covered.



Re: Meandering Strip Census Survey Methodology (cont.)

Step 7

Determining species abundance and density:

It would be inaccurate to assume that species density and species abundance for all listed species could be determined by a single survey. This survey methodology can only be valid for stationary species such as plants. Other techniques would have to be incorporated to determine the density and abundance of faunal species, which are not within the scope of the Lee County endangered species ordinance.

If a Lee listed plant species is present and the density of the species is to be determined, the following calculation should be followed:

$$\text{Density}(D) = \text{number observed}(n) / \Sigma (\text{transect length}(L) \times \text{transect width}(W))$$

or

$$D = n / \Sigma(L \times W)$$

(These calculations assume that 100% of each transect area was surveyed.)

If a Lee listed plant species is present and the abundance of the species is to be determined, the following calculations should be followed:

$$\text{Abundance} = \Sigma [\text{species observed}(n_i) / \text{Percent of habitat surveyed}(A)]$$

If the Lee listed species are gopher tortoises and the density of the species is to be determined, the following calculation should be followed:

$$\text{Density}(D) = \text{number active and inactive burrows}(n) \times .6 / \Sigma (\text{transect length}(L) \times \text{transect width}(W))$$

or

$$D = .6n / \Sigma(L \times W)_i$$

(These calculations assume that 100% of each transect area was surveyed.)

If the Lee listed species are tortoises, and the abundance of the species is to be determined, the following calculations should be followed:

$$\text{Abundance}(P) = \text{the sum of all active \& inactive burrows in each transect}(n_i) \times .6 / \text{percent area surveyed}(A)$$

or

$$P = \Sigma n_i (.6) / A$$



Re: Meandering Strip Census Survey Methodology (cont.)

Step 8

The completed survey would include the following:

1. A completed vegetation map with FLUCCS codes, and sightings of listed species locations located.
2. A Site description, with dominant vegetation, condition, and acreage for each FLUCCS register surveyed.
3. A description of the survey methodology used, noting any unusual circumstances
4. An endangered species list for each FLUCCS register surveyed, noting if species were observed, number observed, and general comments.
5. A discussion, summarizing the survey, suggesting development and management guidelines to benefit the species observed, and listing additional species which may be observed during the year, but were not observed.

(EXAMPLE)

Habitats Surveyed:

<u>Code</u>	<u>Description</u>	<u>Observed Species</u>
411	Pine Flatwoods	2
424W	Melaleuca Wetlands	0
612	Mangrove Forest	5
642	Salt Marsh	2

Endangered Species Observations

Salt Marsh (642): 5.8 acres of wetlands are made up of a salt marsh community. The dominant plants are cord grass, buttonwood, black rush, cabbage palms, myrsine, buckthorn, snowberry, joewood, black mangroves, saltgrass, sea blite, and sea purslane. Several melaleuca and Brazilian pepper have also invaded.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Obs.</u>	<u>Comments*</u>
American alligator	Alligator mississippiensis	no	possibly transient
American crocodile	Crocodylus acutus	no	possibly transient
Roseate spoonbill	Ajaja ajaja	no	possibly seasonal
Little blue heron	Egretta caerulea	yes	1 flying over marsh
Reddish egret	Egretta rufescens	no	possibly seasonal
Snowy egret	Egretta thula	no	possibly seasonal
Tricolored heron	Egretta tricolor	yes	1 flying over marsh
Wood stork	Mycteria americana	no	possibly seasonal
Brown pelican	Pelecanus occidentalis	no	possibly transient
West coast prickly apple	Cereus gracilis	no	not observed
Twisted air plant	Tillandsia flexuosa	no	not observed

* Because the area was dry during the survey, many of the typical species, which should be found during the rainy season, were not observed.



Re: Meandering Strip Census Survey Methodology (cont.)

Step 8 (cont.)

(EXAMPLE)

Endangered Species Observations

To follow is a list of endangered species expected to be observed sometime during the year, but may not have been sighted during the survey.

Endangered Species Expected to be Observed

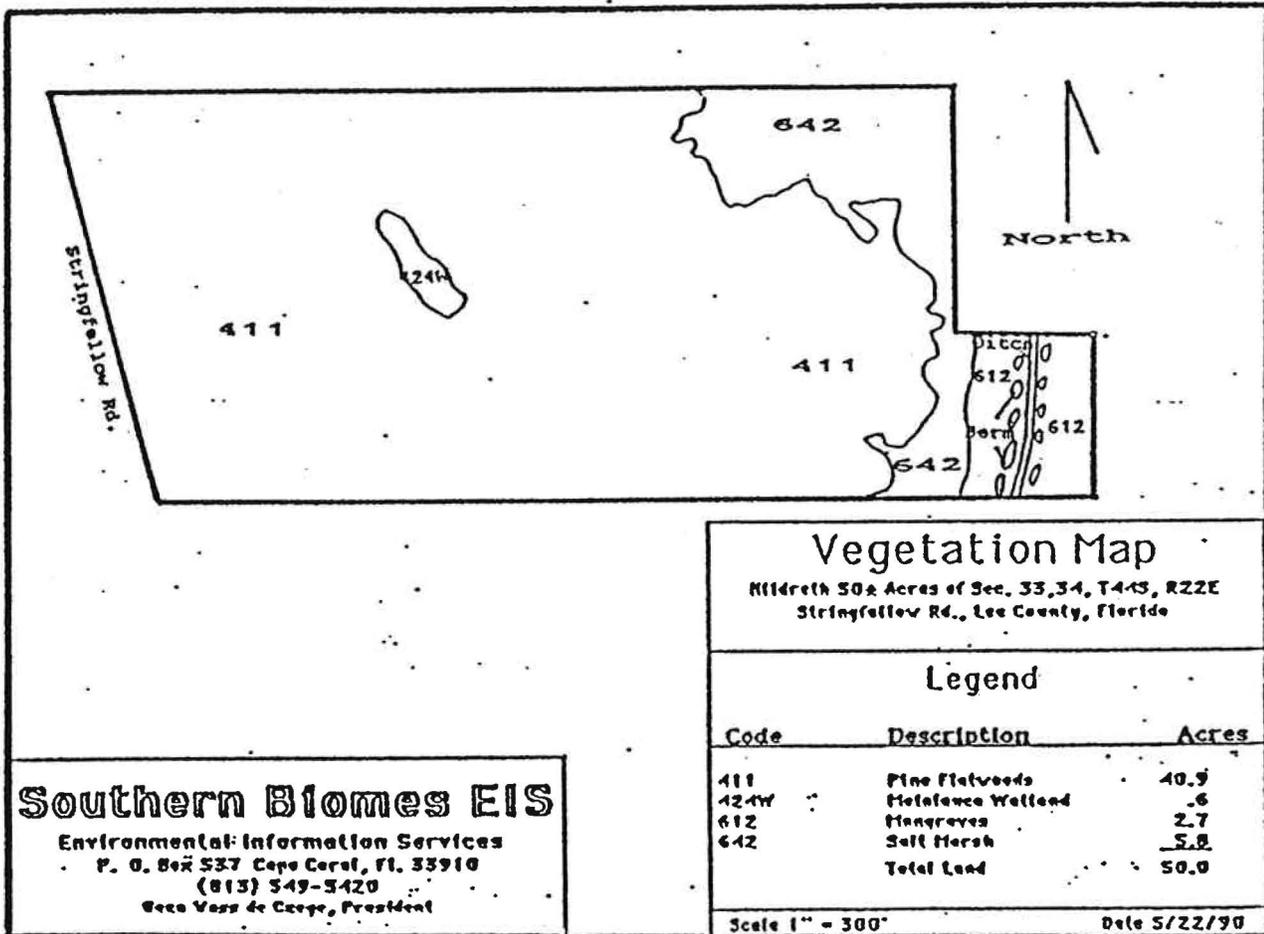
Common Name	Scientific Name	Comments
Eastern Indigo snake	<i>Drymarchon corals couperi</i>	associated with tortoises
Roseate spoonbill	<i>Ajaia ajaja</i>	possibly seasonal
Little blue heron	<i>Egretta caerulea</i>	common during wet season
Reddish egret	<i>Egretta rufescens</i>	possibly during wet season
Snowy egret	<i>Egretta thula</i>	common during wet season
Tricolored heron	<i>Egretta tricolor</i>	common during wet season
Wood stork	<i>Mycteria americana</i>	transient only
Brown pelican	<i>Pelecanus occidentalis</i>	transient only



Re: Meandering Strip Census Survey Methodology (cont.)

Figure 1

(FLUCCS codes are used to delineate Habitats on aerial photographs)



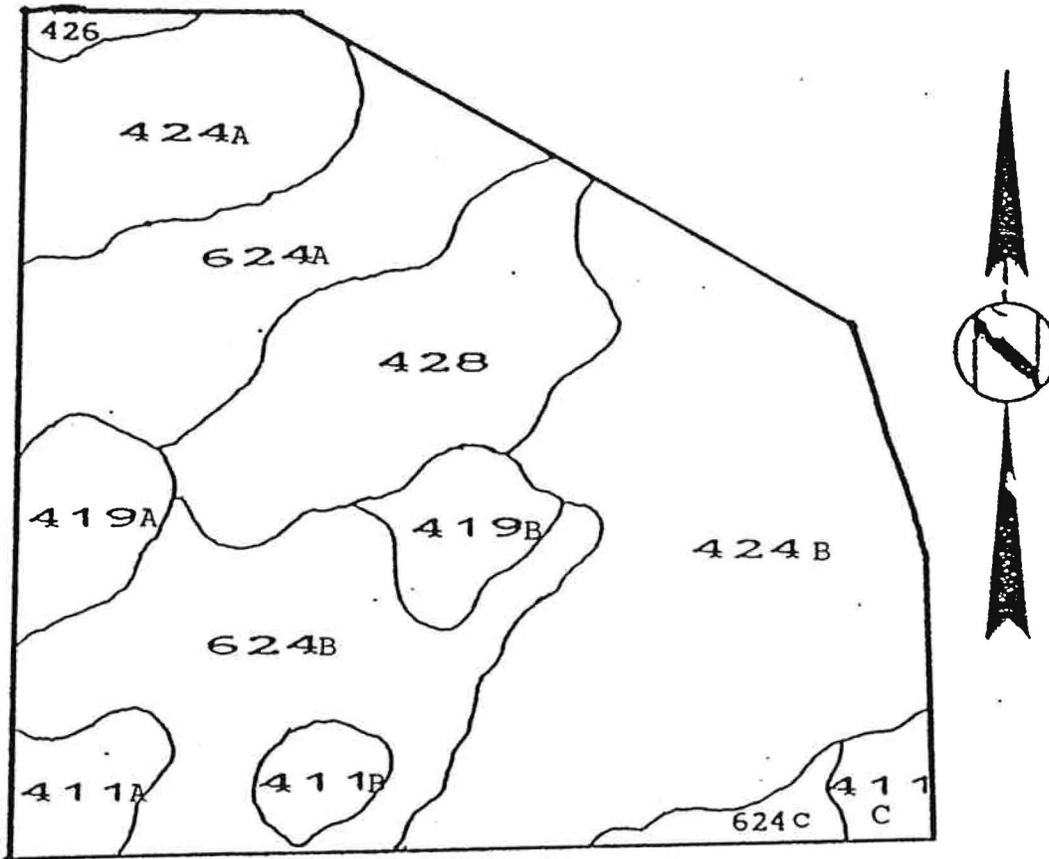
Southern Biomes EIS
 Environmental Information Services
 P. O. Box 537 Cape Coral, Fl. 33910
 (813) 549-5420
 Gene Voss de Cecco, President



Re: Meandering Strip Census Survey Methodology (cont.)

Figure 2

(Habitats with multiple occurrences of the same FLUCCS code may need alphabetical subscripts to geographically differentiate them.)

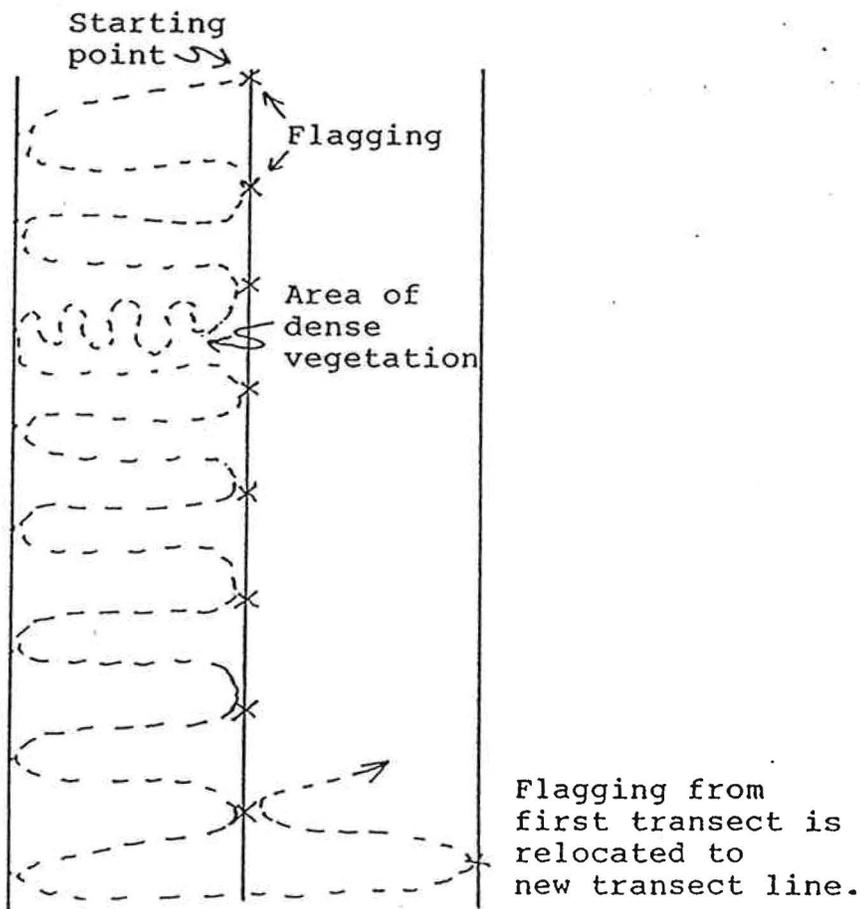




Re: Meandering Strip Census Survey Methodology (cont.)

Figure 3

(Flagging tape is used to aide in surveying 'dense cover' registers and to determine the frequency of meanders within a transect area. Flagging tape must be visible from the previous meander.)



Typical meander during a survey varies with habitat