David

Techwrite\PS1099Y.DOC

Ann - this is great. Please check my comments & return
let's discuss this all. 2 Thanks.

Ann Lezberg

Pisgah 1990 Review
Understory Vegetation Survey:

Grid point information: We recorded slope and aspect in degrees using a Silva compass and described site position. I wanted to have some sort of check on the resolution we were picking up for slope and aspect from our derived maps of elevation. Site position information will also be generally helpful in annotating our maps. These were described initially for the 10 m. circular plot but instead of giving a range (which would be useful) they were given as slope and aspect at the steepest slope only. Luckily the site position will clarify when a 2nd slope existed but wasn't measured. It might be valuable to code aspect into 16 -32 values, etc. This data has not been input yet.

Saplings: (Recorded for the 5 m. circular plot). We tallied saplings unofficially to keep track of cover so we probably could get densities as well. (There may be cases where they were not tallied on paper). Height ranges was given to the nearest 0.5 meters. Dead saplings were not tallied. The cut off was less than 5 cm. dbh or greater than 30 cm. tall. Saplings did not need to be rooted in the plot to be counted for cover. Densities would propably have been more accurate and less subjective because the densities are low. Our overall sampling at Pisgah may not give an accurate description of trees in the ~ 5cm-10cm range because the variable radius plots probably undercounted these small trees and they were not counted in the 5 m. circular plots.

good if possible we could always fill in gaps

Shrubs, Herbs, and Ground Cover: (Recorded for the 5 m. circular plot). We described cover values for all herbaceous species and woody shrubs. These cover estimates seem fairly consistent and the scale worked well in describing the abundance of vegetation. Percentages were converted to areas in m.sq. to assist in the interpretation of cover values. It should be noted though, that the scale actually goes: 1-4 %, 4<x<=10%, etc. because we used the upper limit as our demarcation point. Plants did not need to be rooted in the plot to be counted. A number of minor points on vegetation follow:

a. Dryopteris spinulosa included ferns identified as Dryopteris intermedia as these were sometimes mixed within a fern clump and may hybridize or be varieties depending on the authority.

not a problem

b. We did not count dead species for herbs, shrubs, or saplings. In the future there may be a value to doing this.

do you think there were may cases where species were missed due to this? - no - dead would primarily be species already noted

c. Season of sampling turned out to be particularly important.especially for short-lived species like Monotropa uniflora and Epifagus virginiana, which suddenly appeared out of no-where following late summer rains. These species were not found in the plots sampled earlier or in the 1984 14 plots. (in the 1990 sample)

interesting - they should be excluded from DECORANA analysis, etc.

c. There were a number of unknown species (mostly tiny things). Most were collected and/or consistently named with a consecutive number. It may be worth while to make a small Pisgah collection as voucher specimens for these (particularly for grasses, sedges) to insure consistent naming.

d. For a number of species we are having difficulty separating to species:

-Vaccinium vacillans vs. angustifolium
-Viburnum cassinoides vs. nudum vs. lentago } right
-Thelypteris palustris vs. Thelypteris simulata

e. If a single plant had more than a 1% cover, it was given the larger cover value of 4 (1-4 % cover) rather than a cover of 1=1 individual.

f. We will be able to complete a new species list soon. A number of species found in 1944 were not found in our survey. It will be interesting to run an ordination on these plots to compare with the Cline and Spurr 1942 data. I also noticed that P. Schoonmaker noted Athyrium felix-femina in his plots and we have not recorded it. It is very possible this was misidentified as Dryopteris spinulosa. Additional species found in the tract but not in our plots included:

a single Panax quinquefolius - American ginseng (I believe) ← !
a single Arisaema dracontium - Green Dragon (I think but it is a rather odd specimen) ↳ wouldn't this be odd?
Goodyera tessalata - Checkered rattlesnake plantain — I've seen that then
Botrichium multifidium - Leathery grape fern
Theylypteris Hexagonoptera - Broad Beech Fern } !
Circaea alpina - Small enchanters nightshade
Iris versicolor

B. multifidium and A. dracontium occured near BC54, near a dry stream drainage. Both have been noted as species that grow in basic soils. It would be interesting to do some more checking in that area (actually this is beyond our property) for other species and a source of buffering.

Panax quinquefolia, Botrichium multifidum, B. dissectum, and Theylypteris phegopteris (broad beech fern) were also found in the stream running north from the parking lot to the Harvard Tract.

g. Sometimes notes were taken on species with apparent environmental or co-occuring relations. It would have been valuable to do this more often.

h. Moss was counted only on the first day on various substrates. It would be valuable to have some estimate of total moss cover keyed to different substrates. Moss was not included in total ground cover.

i. There are spots where there seems to be damage to vegetation as a result of our sampling.

Leaf litter was assessed in the 5 m. radius plot for coniferous and deciduous litter as well as bare ground (exposed soil). It might have been valuable to have assessed rock cover at this scale as well so that vegetation could be related to rock cover and so that leaf litter + bare ground+ rock would = 100 %.

Microsite survey:

I had a number of concerns about the microsite survey primarily in the: 1) repeatability of sample; 2) accuracy of our estimates. To test this I :
1. Compared our cover estimates at points with the cover % derived from the

1984 plot data for nearby plots. These were for boles only and assumed cover to be the area of a rectangle based on length and average diameter of downed stems.

2. Took average mound sizes from my class project data to calculate average area of a mound (an ellipse) and multiplied by density at a number of points.

3. Compared to data in the literature on area in mounds+pits, boles, and especially that from Lutz and Spurr transect.

4. Returned to a few sites and redid the plots (and will plan to test a few more) by flagging off paced 10 m. radia, counting microsites by their dimensions, and calculating area later in the lab.

5. It might also be valuable to compare our estimates with Peter's values from the transect. This way we could check if our trends parallel those actually found in the transect.

Data from the 14 plots and our new measurements gave bole covers of between 3 and 19 %. Based on this and on unusually high mound estimates where densities of mounds were low, I'm concerned that estimates, at least in part, are very high.

The sources of error we've discussed as a group include:

For cover values: Misestimating plot distance, misplacing flags: this affects densities more than cover values; Difficulty of estimating cover on the 10 m. scale over rough topography, particularly for skinny long objects; Inappropriateness of the scale. If a cover scale was used it would be more appropriate to break it up finely at the low end. There is no need for high values. It seems to me that when we switched people for a week, Eowyn to Martha, and then back to Eowyn the cover choices changed.

For densities: definitions of microsites may have been a little loose, developing over time as things came up. More testing ahead of time in the field would have been helpful. The definitions we used for microsites and problems for each follow:

Tipups: counted if they had exposed wood, attached bole, root, or mineral soil (evidence of tipup) rather than just a mound. Partial tipups attached to bowed live trees were not counted.

Pits: counted if they were associated with mounds and were concave, enough so to stand "in" or which seemed like they would hold water if the water table rose. Most pits were not distinguishable as pits and rarely had exposed soils of rock. They disappear much quicker than the mounds, and are filling in with organic material. These were measured as you would measure pits of new treefalls, from root to edges so cover probably overestimated what we tend to think of as pits. Number of pits counted probable were high compared to what I would count but could reflect the environment just after the hurricane.

Boles: It was difficult to tell sometimes if you had a bole, a top of a

tree, a branch, or a piece of a bole already counted. At the beginning we tried noting in comments how many fresh ,etc. but this was not followed through. We used a 10 cm. minimum for stumps, boles to be counted. Half way through the survey we tried to tally separately 3 relative age (decay) categories of downed stems so that we would have a better assessment of the 1938 damage as well as an assessment of the present day variation in microsites across the grid. Age classes are difficult to do consistently and somewhat misleading (the swamp stems are so different than those on the ridge). It is difficult to decide if we want a very subjective scale (in which we would use judgment about the size of tree, how it fell, decay condition to decide when it fell) or if we wanted an objective scale (just giving us how decayed it was).

Joel and Eowyn tried to use a three prong system to parallel that used in the 1984 14 plots (f=fresh (solid) m=mid (partially decayed) d=decomposed (decomposing into soil). The used the d category to represent logs that had broken and where at least part of the log was decaying, crumbling into the ground. Our judgements did not always coincide for the categories. From the beginning we decided not to count those boles you had to "look for". Exposed wood was required but we did include boles very sunk into the ground and with some wood and moss delineating the shape. I myself am not sure which of these older logs would be 1815 hurricane logs, or pre 1938 ones. Unfortunately, they did not continue to tally totals as well.

Stumps: included snags broken below dbh. with original diamters greater than 10 cm.

let's discuss this

Originally we opted to avoid direct measurements because it would take more time. Actually I think it would have been easier, more acurate, and timely to not give cover estimates at all but to tally microsites by relative age and estimated dimensions and determine a % cover in the lab. This has the advantage of being easier to recreate if something looks fishy, and its much less subjective. In addition, we might see the finer nuances in cover of different types of wind-related microsites.

Below is another possible scale for relative microsite age. We used this scale to test a few plots when testing our cover values. This would allow us to separate to some degree the post hurricane woody debris from 1938 wind created microsites and pre-1938 microsites. However variability of habitat and size of tree (especially in the swamp) hides the ability to age these woody pieces. Indexes have been developed by Sernander (1936) ( a 6-pt. necrotization scale) and Franklin et al, 1981. The following has been modified from Franklin's scale.

1. Recent: (Boles and stumps)-Bark intact; Small twigs < 3 cm; Texture intact; Bole shape defined; Bole elevated off ground; (Tipup mounds and pits)-Bark intact; Small roots < 3 cm; Original vegetation still evident on root plate; Mineral soil exposed on rootside; Roots still apparent and exposed; Bottom roots not yet covered with fill; Bole still attached

2. Moderately old: (Boles and stumps)-Bark only partially intact; No twigs < 3 cm; Bole shape defined (firm enough not to crumble, if large can stand on it; Large boles still elevated off ground; Bole still attached firmly to tipup mound; Species identifyable; (Tipup mounds and pits)-Some bark

evident; No small roots; Roots still exposed; Mineral soil, rock, still exposed (in pit as well); Root wall still forms angle with ground > 60 degrees

3. Old: (Boles and stumps)-Old bark separated or sloughed off (may find evidence nearby); Bark remains in pieces only (except paper birch); Large branches still apparent as knobs on bole; Boles soft but keep form (can press in depression but doesn't crumble; Boles not sunken into ground but may be partially lying on ground (Tipup mounds and pits)-Large roots exposed only; Only small amounts of mineral soil still exposed; Bottom roots of tipups sunk or buried partially into ground; Pit filling in; no exposed soil but concavity

4. Very old: (Boles and stumps)- Bole shape still evident; No bark present (except for paper birch which is only bark)- Bole often partially sunk into ground; Stumps with little or no bark and wood breaks easily; Wood breaks into clumps and crumbles or very soft - boles not firm; Boles maybe covered with moss but wood still evident; (Tipup mounds and pits)- No exposed roots; without obvious associated bole (however may be evident as green moss line) but not attached or obvious; Mineral soil not exposed; Root wood found in clumps;

5. Extremely old: (Boles and stumps)- Very small fraction of wood exposed; Often bole marked by moss line or ridge on ground; (Tipup mounds and pits)- Mound shape evident but no evidence of origin (could be stump or tipup); Wood pieces; Shallow organic layer on mound and mineral soil found near surace (< 2 cm.); Scattered rocks near surface; No bole apparent;

6. Bump in the ground: (Mounds and pits)- Not quite enough evidence to prove this was a windthrow mound rather than a rock, etc. without excavating

These values probable correspond to those used in the 14 plot study as follows 1=solid = 1, 2; 2=partially decayed; broken = 3; 3= decomposed into soil; 4,5.

Other work:

1. Check a number of unknown species, to see if consistently named, to identify or to collect;

2. Get missing cover values at number of plots where pit counts and cover are missing or where mound and stump cover was not taken

3. Either complete total bole cover in 2nd half or by age class in first part or redo entirely.

4. Check cover values for pits/mounds/boles that seemed unusually high

5. Test cover values with tally/dimension methods in later plots to see if consistent.

6. Record site position for a few plots

7. Edit all vegetation data (it has all been entered) and analyze for

frequency and using ordination techniques

8. Map some of the more common or interesting species distribution and perhaps use analysis to look for associations.

9. Input the microsite data, edit, and map.

# PISGAH 1990 - UNDERSTORY VEGETATION AND MICROSITE SURVEY METHODS

The Pisgah Understory survey will be conducted on 115 of the 30m. grid points falling within the boundaries of the Harvard tract. At each point rope will be attached to the grid point PVC and stretched out, marked at 5 m. and 10 m. intervals. Flags may be temporary placed to facilitate locating the circular plot. Species are listed in the appropriate category as they are encountered, starting at a line projecting east (69 degrees) and moving clockwise around a 5- meter circle (for herbs, shrubs, ground cover, and litter) or a 10- meter circle (for microsites).

Describe aspect, slope, and site position for the point and the 10 m. circular plot around it. Saplings should be listed by species, and cover estimated for the projection of leaf area. Ht. ranges should be given in meters with comments used to describe distribution of ht. ranges. Shrubs, herbs, and ground cover (moss, lichen, ferns, grass, lycopodium) should be listed by species where possible. If distinctive mosses are found and can be consistently distinguished in the plots, they can be listed as moss # 1, etc. as long as a record is filled out (Unknown species list) and a collection is made. Unknown herbs and shrubs should be described thoroughly, drawn, identified to genus if possible, and listed on the Unknown species list. If a healthy characteristic specimen can be collected without changing the abundance, (or better yet, outside the plot) a collection would be helpful.

Estimates of cover within the 5-meter radius circle should be given for each of the categories: shrubs, ground cover (herbs, ferns, moss, grass, etc.) and saplings. In addition we will estimate cover of bare ground (soil), deciduous litter, and coniferous litter for the 5-meter circle if possible.

Within the 10 m. radius area we will estimate abundance (number of occurences) and cover (modified domin. scale) of these microsites: pits, boles (fallen main stems), tipup mounds, and stumps (broken or rarely cut). We will do cover estimates only for surface in bare rock and moss covered rock. Remember that % are now determined for a 10 m.-radius plot.

In the notes, please describe completely the unknown species, and indicate and site-species associations such as : Aster primarily on East facing rock-cliff; blueberry at edge of swamp. Be neat!

UNKNOWN SPECIES LIST:

On a separate form you will again list unknown species so that we can match species names to collections, and to species collected later in the tract. Give the date and collector. Give the location as the grid point and more specific information if possible. List the species in the appropriate group and describe the following: habitat, associated species, abundance, general morphology (shrub-like, prostrate, size, etc. ) and more detailed morphology for species which cannot be successfully collected (hairyness, opposite vs. alternate, unusual features). Try to collect only characteristic species, (not those chewed up, deformed, etc.). Finally, attempt an identification with our field guides. The species should be collected with roots (for herbaceous species) and placed with wet towels or in folded newspaper in a press. The following information must accompany the collection: collector's name, date, location, species code and possible name.

R in R

# PISGAH 1990 - UNDERSTORY VEGETATION AND MICROSITE SURVEY

## 5-METER/10 METER RADIUS CIRCULAR PLOT RELEVES

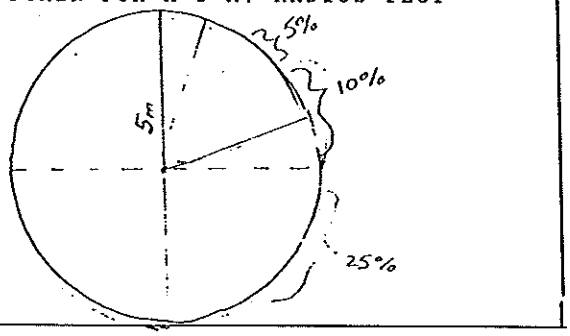
DATE:_____ POINT:_____ CREW:_____
ASPECT:_____ SLOPE:_____
SITE POSITION:_____

MODIFIED DOMIN SCALE:
0 = NO INDIVIDUALS
1 = A SINGLE INDIVIDUAL
2 = 2 INDIVIDUALS
3 = LESS THAN 1 %
4 = 1 - 4 %
5 = 5 - 10 %
6 = 11 - 25 %
7 = 26 - 50 %
8 = 51 - 75 %
9 = 76 - 90 %
10= 91 - 100%

For 5 m. Radius
3=( <30cm x 30cm)
4=( < 1.8m x 1.8m)
5=( < 2.8m x 2.8m)

For 10 m. Radius
3= (<1.3m x 1.3m)
4= (< 3.5 x 3.5m)
5= (< 5.6m x 5.6m)

ESTIMATING DOMIN FOR A 5 M. RADIUS PLOT




SAPLINGS (less than 5 cm. dbh, greater than 30 cm. tall):

| Species | Cover | Ht. Range | Comments |
|---|---|---|---|
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SHRUBS, HERBS, AND GROUND COVER (Modified Domin 10-point scale)

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| | | |
| | | |

Total shrub cover..... Total ground cover..... Total sapl cover.....

MICROSITE COVER AND DENSITY (Surface type/Domin cover/Abundance)

Tipup Mound...../.....Pit ...../.....Bare Rock.....
Bole...../.....Stump...../.....Moss-covered rock.....
Deciduous litter.....Bare ground.....Coniferous litter.....

NOTES: * if collected