

3 May 1988

Dave,

This is an exciting preliminary proposal. I have only a few comments.

Even though you have defined many variables for analysis, I would add a few more.

I think it would be worthwhile to estimate downed wood volume by line intersect along a few of the cruise lines. This could be done quickly and could be related to estimates from the 10x300 m transect and 400m² plots. It also would allow direct comparison with other data sets in New England and elsewhere (eg. Gore and Patterson 1986).

→ see G+P 1986
Patterson

You mention relating present vegetation pattern to composition of downed wood. With the large logs up at Pisgah, just a few misidentifications in the field (which will happen) can really throw off estimates of composition considerably. The only way to accurately identify downed wood to species is anatomically. I found that collecting, mounting and identifying rotten wood is a time consuming process, so any plan for sampling should be carefully considered. However, after a hundred or so samples it moves along a little faster.

I am excited about your plan to map tip up mounds. Peter Wayne and I were planning on doing a comparative growth study of birches (and other species?) found on tip ups. A complete map of these throughout the Tract would permit a much better analysis of species distribution and composition, as well as provide a full array of species combinations from which to sample.

As I've mentioned to you already, I would extend the grid over into an adjacent area of forest. Certainly the Tract should be done first. I am partial to the area to the west, but similar topography and some knowledge of land use history should be the major criteria for selection. Besides the obvious comparisons of vegetation composition and downed wood, it would be interesting to look at differences in the forest floor (eg. depth of different soil horizons, chemistry, soil organisms). The most compelling reason for this added effort, as I also mentioned, is to specifically demonstrate the differences between natural and "managed" forests in this region.

right, although management here = cutting in most likelihood

I would sample short-radius variable circular plots at each point. Each plot would take no more than a minute, and would provide an objective measure against which to compare stand boundaries determined by cruising.

→

The spacing of the transect lines happens to be well-suited for censusing of birds should anyone ever want to do that.

I have not made many comments on the manuscript itself. One thing that jumps out at me is that you cite no studies of vegetation dynamics at an intermediate scale except for STAP et al. So even though you say few such studies have been done, this implies that none have been done.

Pete

Literature Notes

Urban, O'Neil and Shugart 1987

development and dynamics of patterns in ecological phenomena

Landscape = mosaic of patches; agents of pattern formation = disturbance, biotic processes (birth death and dispersal), and environmental constraints. Each can be considered across range of temporal and spatial scales; these interact and are interwoven;

processes, agents, component events and patches occur at characteristic scales; figures illustrating this - adapted from Delcourt

resolve vegetation pattern on different scales: paradigm from hierarchy theory;

decompose system into discrete functional units operating at different scales; natural system are not perfectly decomposable, but many can be nearly so; components may be ordered into levels;

e.g. gap - stand - watershed - landscape; landscape are also nested spatially - each level contains those below it;

levels in this case are observed as patches; each level larger and slower;

within each level the units interact to generate higher-level behaviors;

Constraint and higher-level context:

each constraint provides a context for the behaviors of the lower levels of the hierarchy; e.g. gap size controls light and spp. comp.; the various constraints provide a context collectively;

each event has its mechanistic explanation at the next lower level and its significance in context of the higher-level constraints;

hierarchy isolates the phenomena of interest; while recognizing that there are other scales of importance;

scale dictates appropriate sampling scale and frequency;

3 strategic concerns: (1) detect pattern and define its spatial and temporal scale; define functional patches at a specific level, (2) infer which factors generate the pattern, and (3) relate this pattern to the adjacent levels;

Notes

Mosaic of small stands.

Oliver and Stephens tested for stand 0.5 ha or larger, each originating from a disturbance; versus initiation of trees throughout the forest; Chad attempted this by assigning the age of each living stem to its stump location and then working outward to find patterns of even-aged establishment that would form clumps; when even looking at areas as small as 6 m no single-age patches were found; trees of different ages relating to establishment after different disturbances were rather evenly spread through the forest; C.D. cites that Henry and Swan found the same pattern;

Discrete patches resulting from: (1) differences in pre-disturbance vegetation (overstory, advanced reproduction), (2) differential response to disturbance (damage quality and quantity), and (3) differences in post-disturbance regeneration controlled by (a) site differences, availability of propagules;

Contrast with gap dynamics; also predicts discrete patches, characterized by post-disturbance establishment, individuals within patch originating following same event, different patches originating after different events; size of area depending on size of the originating disturbance (Oliver and Stephens 1977)

Patch characteristics (size, shape, discreteness)

Discreteness: test or examine using PKS transect and then examine in the field;

Controlled less by edaphic site factors than by historical factors (prior vegetation, disturbance patterns);

Characterize:

- **species composition** (overstory and understory)
- **vegetation structure** (height, diameter distribution, density, basal area)
- **demographic structure** (mean age, mortality processes, age structure, distribution of regeneration)
- **biomass distribution** (living versus dead woody biomass)
- **edaphic factors** (soil depth, microtopography, aspect and slope, slope position);
- **shape** (border length, deviation from round, etc.)
- **size**
- **disturbance history** (extent of canopy removal, type of damage, damage to advanced reproduction, ground floor disturbance incl. extent and quality)
- **prior vegetation** (composition, size distribution)
- **stand development** (vertical development)

Methods

-walk stand to evaluate potential for study, problems and logistics

30 x30 m grid: run lines parallel to the north boundary at 30 m intervals; along lines describe vegetation and landscape features; at 30 m intervals along the line establish flags at eye level for future surveying; this would require 11 lines (including end lines) and 8 points per line;

stand identification: cruising along the transect lines, designate the edge of each stand, the two stand types and the relationship (continuity with) stands identified on the previous transect. This could be done using a map and field notes;

landscape features: note physiographic features such as ridge tops, valleys, and rock outcrops, vegetational features, and slopes;

topography: at the 30 m grid points take a topographic reading to the next point E along the transect and to the next point N on the adjacent transect; notes on abrupt changes along siting lines should allow for a fairly good map to be constructed. Total siting points will be <100.

MAP - entire area is approximately 350 x 270 m; if we created a 5 m grid that would require 70 x 52 cells, which is easily manageable; use of MAP would greatly assist the assigning of attributes to stands once data is collected and would facilitate the interpretation of spatial relationships;

Scales of vegetation response to wind disturbance

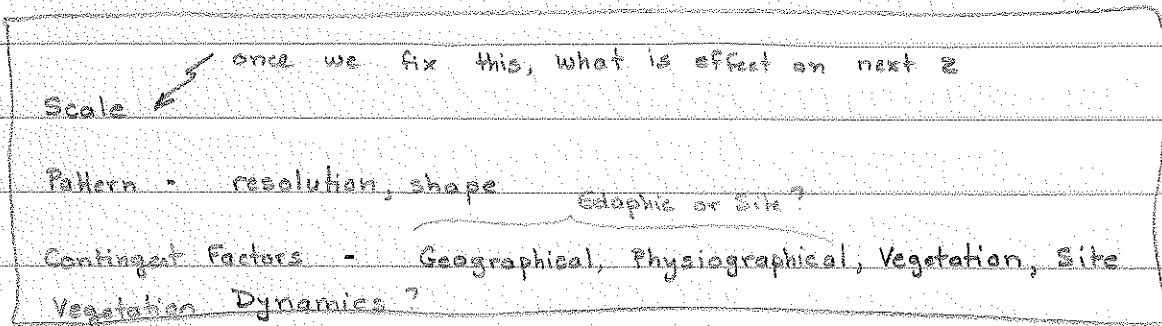
Brandscale

Regional

Pattern Landsat
 Map of New England showing outline of hurricane track + outline of disturbance pattern - Pisgah within area most severely affected

Factors operating on vegetation

Path of storm, direction and distance from storm center, latitude and distance inland; % forest vegetation & regional forest geography (formation scale)



Landscape - Map of Pisgah State Park Aerial Photograph 1: XX XXX scale

Pattern discern 3-4 classes of damage
 intricate pattern of complex damage - on scale of large stands
 within apparently homogeneous disturbance area

occasional patterns from individual downed trees
 structural - height differences

Controls Aspect, slope position, relationship to waterbodies
 Disturbance history
 Human activity → vegetation type; stand composition + structure
 Regrowth - structural changes, conifer vs hardwood

Traet Scale

low-level photography; ~~cruise~~, mapping cruise + mapping

Detailed community patterns of relative damage within previously homogeneous vegetation; small stands differentiated by species group, height, type of survival (overstory, understory, none)

Controls

Slope, slope position, small-scale physiographic shielding
species composition, height distribution, rooting characteristics

Regrowth - stands and patches

Stand Scale

Community analysis

Differences in ~~orient~~ stem damage: type, orientation, species + sizes, vigor, spatial distribution, patches of trees

Controls

^{rooting} Soil depth, ~~species~~ moisture, rockiness, soil type

Species, size, canopy position, vigor; relationship to other ~~stands~~ ^{trees}

Regrowth - sprouting, photo + geotropism, seedling establishment, advanced regrowth

Species