RELEVÉ INSTRUCTIONS

Introduction

The vegetation of each quadrat is measured using the relevé method during July and August of selected years. The purpose is to detect changes in species and abundance, and give a complete picture of the study area vegetation in each strata.

The pattern of measurement follows the one established for the timber inventory. To incorporate seasonal changes in the flora, the four quadrats of a block are measured at different times throughout the period. Quadrat 1 is measured on the first round, quadrat 2 on the second, quadrat 3 on the third, and quadrat 4 on the fourth. The crew consists of four people, one observer for each 25x25m subquadrat.

Procedures

1. Locate the quadrat center to define the subquadrats. Record location (quadrat and subquadrat, e.g., 3E1-2), date, observer, subquad physiography, and weather. Each observer should do the same subquadrat number throughout the season.
2. Each observer walks the boundary between subquadrats with the adjacent observer and decides which plants belong in which subquadrats. North-south lines are walked first, then east-west.
3. First, list the plant species using the following method. Search the lowest three strata of plants using the white lines on a height stick to delineate height classes (<25cm tall, .25–1m, and 1–5m). Make a small tick mark in the appropriate cell of the data sheet to indicate a species has been found. Count and record the number of any "rare" plants, i.e., fewer than 5 specimens. Walk back and forth across the subquadrat in parallel lines, searching systematically for at least 50 minutes. Use a timer to assure this. In wet areas and disturbed sites, many species occur that are not on the data form; supplemental forms listing species for these types of sites are available. Collect small sections of hard to identify or uncommon plants to confirm identification. A Holt plant list with identification characteristics is available under filename: PLANT-ID.LST.
4. Once the species list is complete, assess the abundance of each species in the three lowest strata using the following coverage codes.

0—None present.
1 (Rare)—Less than or equal to 5 individuals; record number.
3 (Occasional)—Numerous individuals but not common. You have to look around to find it.
4 (Common)—Occurs more or less everywhere you look, but has a coverage of less than 5%.

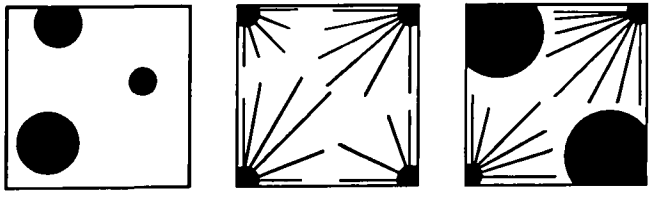
Very abundant species (>5%) are rated by their coverage:
5—5–25%
6—25–30%
7—50–75%
8—75–100%

Record by code numbers, not descriptors.

5. Search and record species for the 5–10m and >10m strata using steps 3 and 4. For tree species in the 5–10m and >10m strata, assess abundance by the total coverage of each species rather than by the number of individuals. The coverage classes and their codes for the upper two strata are
3—<1%
4—1–5%
5—5–25%
6—25–50%
7—50–75%
8—75–100%

Note that the computer code skips classes 1 and 2; this is to make this scale comparable to the species scale used for the lowest three strata. Coverage refers to that portion of the ground that a species would cover if projected into a horizontal plane. The spaces among the leaves of a plant are not considered covered (Figure 3–24).

Figure 3–24. An example of coverage estimates.



The observer makes these assessments assuming the subquadrat to be 100%. The recorder uses an approximate mean of the four subquadrats to assign the species to an abundance class for the whole quadrat. Table 3–10 is useful because it relates percentage coverage with actual area at both the quadrat and subquadrat level. It is also helpful to know whether ratings for the individual subquadrats were relatively high or low in each abundance class.

Table 3–10. Percentage coverage-area relationships.

% Coverage	Area 50x50m quadrat	25x25m subquadrat
1%	5x5m	2.5x2.5m
5%	11x11m	5.5x5.5m
25%	25x25m	12.5x12.5m
50%	35x35m	17.5x17.5m
75%	43x43m	21.5x21.5m

6. Once the species assessment is complete, the predominant vegetation type in each height strata for the subquadrat is recorded on the polycorder in a file SQTD(YR) (see below for format) using these codes:
   C=Coniferous
   S=Shrub
   D=Deciduous
   H=Herbaceous
   M=Mixed—Trees only, but not more than 75% either coniferous or deciduous
   B=Bryophytes
   L=Slash
7. Next, estimate the subquadrat density for each stratum using the following coverage codes:
   A=<5%
   B=5–25%
   C=25–50%
   D=50–75%
   E=>75%
8. Finally, record the mean and maximum height of the canopy in meters.
9. As each person finishes his/her subquadrat, she/he enters the data on the polycorder. If there are more persons

finished than there are polycorders, then one person should record while the other reads the data.

10. After all the individual subquadrat data are entered into the polycorder, the group collectively enters data for the quadrat in a file QUADTD(YR) (see below for format). These will consist of the following parameters:
    1. Quadrat location
    2. Date
    3. Mean canopy height
    4. Maximum canopy height (Maximum of whole quadrat; not mean of subquadrat maxima)
    5. Overall quadrat strata type and density
    6. Average percentage coverage for trees by species in the 5–10 and >10m strata throughout the quadrat

    Quadrat abundance figures for other species and strata will be generated by computer.
11. To facilitate group communication about uncommon and hard-to-identify species, team members should read their lists of species that do not appear on the data form and show any specimens they collected. This is an important exercise to keep everyone familiar with plants that are seldom seen.

Polycorder Formatting

The format for the SQTD file is SUBQUAD, OBSERVER, TYPESTR1, DENSSTR1, TYPESTR2, DENSSTR2, TYPESTR3, DENSSTR3, TYPESTR4, DENSSTR4, TYPESTR5, DENSSTR5, MAXCANHT, MNCANHT, where TYPE is vegetation type, DENS is density, STR# is the height strata number, MAX is maximum, MN is mean, and CANHT is canopy height.

The format for the QUADTD file is QUADRAT, DATE, TYPESTR1, DENSSTR1, TYPESTR2, DENSSTR2, TYPESTR3, DENSSTR3, TYPESTR4, DENSSTR4, TYPESTR5, DENSSTR5, MAXCANHT, MNCANHT, TREENUM, HTCL4, HTCL5, etc., up to 12 total species.

Additional Notes

1. Certain species (e.g., *Clintonia*, *Cypripedium*, *Oryzopsis*, and *Deschampsia*) have small fruiting stalks that are much higher than the rest of the plant. These are ignored when assigning a plant to a strata.
2. In certain species, individual stems are tightly aggregated into clumps (e.g., *Monotropa*, *Deschampsia*, many ferns, many shrubs), or mats (e.g., *Mitchella* and *Epigaea*). These

aggregations are considered individuals for the purposes of deciding if a species is rare or uncommon. If the aggregations are unusually large, they are given more weight accordingly.

3. If a species cannot be identified, a specimen should be collected and labeled with the quadrat number and an identification number. On the relevé form, record these species with improvised names, (e.g., *Carex "paucifolia,"* 5 seeded grass, etc.) until they can be identified that evening with the herbarium. Cut the specimen (i.e., do not pull it out with the roots) to facilitate its regeneration. The exception to this rule is *Potentilla* for which the roots are diagnostic.
4. Plants that have a distinct crown supported by a stem are counted in the strata where the crown is located, and the stem is effectively ignored (e.g., most *Quercus*, *Pteridium*, and *Aralia*).
5. Suckers arising from trees are considered separate individuals. Suckers in a clump of shrubs are not considered separately.
6. Lichens and mosses growing on boles of erect or recently fallen trees are not considered; only those that are established on the ground are included.
7. If a low tree branch has rooted (e.g., *Abies*), it is considered a separate individual.
8. "Mixed" refers only to coniferous plus deciduous, not shrub plus herbs, or shrub plus conifer.
9. Tree boles are not included in coverage estimates; photosynthetic surfaces are the key element.
10. Only living plants are recorded; e.g., last year's *Monotropa* stalks are ignored.
11. Plants tall enough to extend through more than one strata are recorded in each stratum if they have leaves present in each stratum. Their abundance score in each stratum should reflect their abundance in that stratum, not their overall abundance.

Equipment

Data sheets	Instruction sheet
Clipboard	Extra pencils
Plastic bags & labels for specimens	Height sticks (4)
Species lists	Polycorders
Timer	

Evaluation

As with most ocular estimation methods, there is a problem of observer bias and repeatability. This problem may be somewhat accentuated by the large sample plot size (625 m^2). Using this method to identify subtle changes in plant communities is not always reliable, especially since rarer species may be missed by some observers. The broad abundance categories add to the problem of seeing change because in such large plots, the percentage cover classes (>5%) are seldom used, except for trees and shrubs.

On the positive side, the resulting data provide a relative abundance and complete species list for each subquadrat and for the entire 40ha study area. The data are balanced for seasonal changes in abundance. Relevé training, learning species identification, and conducting the sampling takes a four-person crew approximately 55 field days. Depending on the species complexity, the skill of the crew, and weather, from 3–6 quadrats can be sampled in a day.

Date: 20 JUN 88 File name: RELEVÉ.INS