

APPENDIX II

VERMONT HARDWOOD DIEBACK  
AND  
MORTALITY SURVEY

1991

FIELD SURVEY WORK PLAN

Prepared by

Ronald S. Kelley  
Forest Protection Specialist  
Vermont Department of Forests, Parks & Recreation  
Morrisville VT 05661

## VERMONT HARDWOOD DIEBACK AND MORTALITY SURVEY 1991 FIELD SURVEY WORK PLAN

### CELL LOCATION

#### Relocating previously established cells.

Follow the maps and directions that accompanied the original data sheets, plus the original transparency showing the cell location.

#### Establishing new cells.

If good landmarks identifiable on the photograph occur in or near the cell and between the cell and your starting point, the easiest way to locate the cell will be to walk from one landmark to another by use of the photo pair as viewed in stereo.

If the cell is more remote, without good landmarks, using a compass and chain from known points may be the best method. One way to do this is to locate the cell as closely as possible on a topographic map and draw a reference line on the map from your planned starting point, such as a road, to the cell center. Draw the lines out so that they intersect the meridian lines at the edge of the map (use inner lines, if two are present). Then obtain the bearing using a protractor or a compass (after lining the meridian line up with true north, if using a compass). If your planned starting point is not an easily identified point, such as an intersection or structure, then tie it in with such a landmark and record the distance.

Use true north for all bearings. It may be helpful, especially when it comes to locating the cell center, to place a north arrow on the photo liner with your blue pilot pen. Put it in a field or elsewhere where it will not obliterate any needed image.

Since the bearings you have determined are unlikely to go exactly to the cell center, once you have completed the ground plots, set your compass on a fixed bearing and chain back out from the cell center (center point of Plot 5) to your approximate starting point. Then determine the distance from your intersection with the road, stream, or whatever, to your starting point landmark (ex.-structure) and record distance and bearings on your sketch map.

If, after considerable searching, you cannot locate the cell due to lack of visible landmarks, you should substitute an alternate cell and notify the project leader of this change.

### CELL IDENTIFICATION INFORMATION

If you are confident that you have correctly located the cell on the ground and it is a wet feet cell (for all five prism plots), re-classify it as such and abandon it, substituting an alternate cell. Also, if softwood (if more than 50 percent of the dominant/codominant basal area is softwood) species outnumber

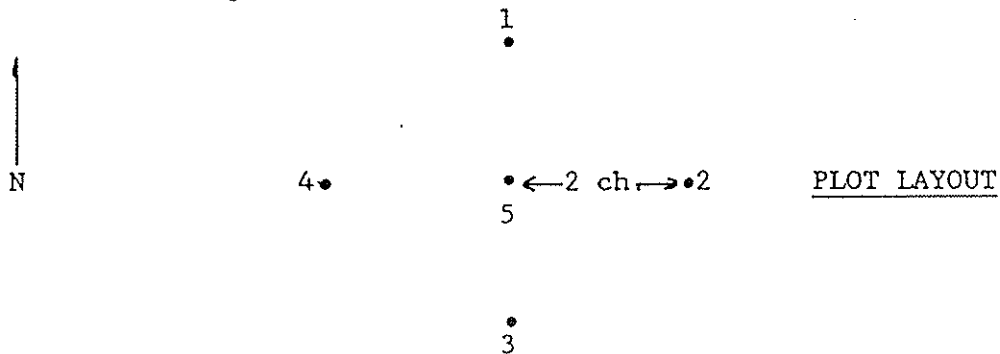
hardwood species in the cell, then the photograph was stratified incorrectly and you should abandon this cell and do some type re-stratification in the office before proceeding with the ground survey. If the cell is hardwood and is not a wet feet cell, proceed with the ground survey even if a logged area or urban setting. If an unusual situation exists not covered in this plan, ask for advice.

First record all the location, crew, and date information as listed under the survey title heading on the data sheet (Fields 1-8). If the forest type is not obvious, wait until all five prism plots are completed before filling in the proper code number. If the type is something other than one of the following, then list the predominant species in descending order of abundance, listing up to three species.

<u>Code No.</u>	<u>Forest Types</u>
11	aspen-birch
20	white pine-red oak-white ash
25	sugar maple-beech-yellow birch
27	sugar maple
108	red maple
39	ash-elm-red maple
54	red oak-basswood-white ash

PRISM PLOT ESTABLISHMENT

Five prism plots, BAF 10, will be taken within the 2.5 acre cells. Plot 5 will be at the center point. The other plots will be established clockwise in the cardinal compass directions two chains from the center of Plot 5, beginning with Plot 1 in the North position.



If one of the plots falls in an opening, take it where it falls - do not move it.

## MARKING THE PLOTS

Nail plot number tag to side on pressure treated stake near the top and drive stake into center of the plot.

ALUMINUM TAG F2-B6 - 5

Next, mark or remark the first healthy dominant/codominant/hardwood tree (plot identification tree) to the right of north at a height of seven-eight feet. Use orange spray paint and place a band of paint around the tree. If the owner objects to the use of paint, use flagging instead and write tree numbers on the flagging with a magic marker.

Paint the plot number just below the band on the plot identification tree or on the flagging, if this is used. Call this tree number one and proceed clockwise to record tree data. Mark the stump of each tree in the plot with the tree number, if possible, or a spot of paint for very small trees.

## PLOT DATA COLLECTION

### Field No.

9. Plot Number - prism point number (1, 2, 3, 4, or 5).
10. Elevation - record in 100's of feet.
11. Slope - record in percent using a clinometer or other instrument, taken from plot center downslope.
12. Aspect - record in degrees, azimuth for the predominant direction the slope is facing.
- 13-14. Locator Tree - record the distance in feet (to the nearest tenth of a foot) and bearing in degrees azimuth from tree 1 to the center point.
15. Stand Geography
  - 1) Hillside
  - 2) Rolling
  - 3) Swamp
  - 4) Mountain top
  - 5) Plateau-high elevation flat
  - 6) Cove-a mountainside stream valley
  - 7) Flat-lowland
  - 8) Bench-small flat area of deeper soils on a hillside
16. Outcroppings
  - 1) Present
  - 2) Absent

17-22. Soil Depth Data - not to be collected in 1991 except for new cells.

Using a soil auger, bore into the ground at an average terrain position within the plot and record inches to bedrock or hardpan (dense till) and depth to mottling, if mottles are found. Further procedure details will be explained by a soil scientist.

If depth to bedrock, hardpan, or mottles exceeds length of the auger, record length of auger in block 17, 19, or 21. Record a 2 (=not present or depth greater than auger length) in block 18 or 19. If depth is an actual measurement, record a 1 (=actual measurement) in block 18, 19, or 21.

23. Drainage

- 1) Poorly drained-signs of perched water or soggy walking.
- 2) Well drained-water is removed from the soil readily, but not rapidly and is available to plants through most of the season.
- 3) Excessively drained coarse textured, rocky or shallow.

Take soil characteristics as seen in auger boring into account when making this determination.

24. Crown Closure

- 1) Open ( 25%)
- 2) Partial (25-74%)
- 3) Closed ( 75%)

25. Roads

- 1) Present
- 2) Absent

As visible within the plot as defined by a circular area with a radius that extends from plot center to the bole of the furthest tree within the prism plot.

26. Logging History

- 1) No evidence
- 2) Recent-slash present
- 3) Recent-stumps present but not decayed
- 4) Old stumps (decayed) only

As visible within the plot as defined under Roads (10).

27. Defoliation History (last 5 years for old cells, 15 years for new cells  
- from records.

- 1) None known
- 2) Gypsy moth
- 3) Forest tent caterpillar
- 4) Saddled prominent
- 5) Maple leaf cutter
- 6) Frost
- 7) Other-record name under remarks
- 8) Pear thrips

- 28-32. Site Index - not to be collected in 1991 except for new cells.

Core the first healthy (if available) dominant/codominant tree of choice (where you can easily obtain total height and bore to the tree center) in plots 3 and 5 (one tree per plot). Avoid off-site trees so if a plot is a typical of the cell, select a tree on one of the other plots. Measure the distance from the tree to your observation point with a tape or rope to obtain correct height (usually 50 or 100 feet for clinometers). Record tree number, species, and height only on the data form. Collect the core, store in core holder, and label next to the core as to Point No., Cell No., Plot No., and Tree No. (i.e., F-2, A3 5 - 7).

33. Site Indicator Plants - record all indicator plants present within 20 feet of plot center (between milacre plot locations and center-may be easiest to search this area in each of four quadrants). Record presence of up to five different species from the provided list for those plants that you are positively able to identify.

Good Site Indicators

- 1) Blue cohosh
- 2) Wild ginger
- 3) Wild leek
- 4) Maidenhair fern

Dry Site Indicators

- 5) Wild sarsaparilla
- 6) Wild (false) lily-of-the-valley (or wet infertile site)
- 7) Staghorn clubmoss
- 8) Bracken fern
- 9) Wintergreen
- 10) Starflower (or wet infertile site)

(Site Indicator Plants continued/next page)

33. Site Indicator Plants (Continued)

Wet Site Indicators

- 11) Meadow-rue
- 12) False hellebore
- 13) Ostrich fern
- 14) Interrupted fern
- 15) Cinnamon fern
- 16) Royal fern
- 17) Jewel weed

34-35. Ground Cover (Milacre Plots) - go out 20 feet from plot center in each of the four cardinal compass directions and record regeneration (or ground cover) presence for a 3.7' radius plot. Take the fifth milacre plot at the prism plot center.

34. Regeneration - record the lowest number that applies for each of the five milacre plots:

- 1) Advanced commercial hardwood regeneration (over 3' but <1" diameter).
- 2) Any commercial hardwood regeneration under 3'.
- 3) Conifer
- 4) Raspberry
- 5) Other woody plants
- 6) Fern
- 7) Grass
- 8) Other

35. No. Present - record actual number of advanced hardwood regeneration stems (category 1) present only. If none present, record 0.

TREE DESCRIPTION DATA

Record all information for every tree greater than 1" DBH that fall into each prism point. For borderline trees, measure the distance to the tree and refer to the "Limiting Distance Guide" (separate handout). Count windthrown trees within the plot if they are living, recently dead, or older dead. Do not count, if they are snags.

FIELD NO.

43. Tree No. - record consecutively, clockwise from tree 1 for each plot.

44. Tree History - used to track the status of tally trees through time.

0) Living tree

1) Ingrowth tree from last visit to the plot.

2) Stump, tree cut since last visit to the plot.

3) Recently dead - Fine branches (former leaf-bearing portions of twigs) present.

4) Older dead - No fine branches and more than two lateral branches present.

5) Snag - Only the mainstem and one or two lateral branches remaining.

6) Do not record volume for snags.

45. Species - record code from species list.

46. DBH - record diameter at breast height to the nearest tenth of an inch.

47. Crown Class

1) Dominant-receiving light

2) Codominant

3) Intermediate

4) Overtopped

- Dominant - crowns above the general level, receiving full light from above and partly from the sides.

- Codominant - crowns forming the general level and receiving full light from above.

- Intermediate - trees shorter than dom/codom and receiving a little Direct light from above.

- Overtopped - receiving no direct light.

48-49. Height - record sawlog height to the nearest eight feet (min. 12" DBH for hardwoods except 10" for white ash and white birch and min. 10" for conifers) and pulpwood height to the nearest four feet. Record pulpwood height on sawtimber trees above sawlog height. If multiple stems exist above 4.5', tally for the predominant stem. If the butt log of a sawtimber-size tree is cull, call it all pulp.

50. Crown Dieback - dieback is defined as branch mortality that begins at the terminal portion of the branch and proceeds toward the trunk. When whole branches are dead in the upper exposed portion of the crown, it will be assumed that they also died from the terminal down (dieback). Dead branches that have died from the base out within the crown will be assumed to have been killed by suppression.



Crown dieback will be estimated in 5% classes as in the New England Forest Health Monitoring program, as follows:

% Code	% Dieback Observed	% Code	% Dieback Observed
00	0	50	46 - 50 %
05	1 - 5 %	55	51 - 55 %
10	6 - 10 %	60	56 - 60 %
15	11 - 15 %	65	61 - 65 %
20	16 - 20 %	70	66 - 70 %
25	21 - 25 %	75	71 - 74 %
30	26 - 30 %	80	75 - 80 %
35	31 - 35 %	85	81 - 85 %
40	36 - 40 %	90	86 - 90 %
45	41 - 45 %	95	91 - 95 %
		99	96 - 99 %

Estimates will be made by two observers on opposite sides of the tree, using binoculars as an aid.

51. Crown Transparency - transparency is the amount of skylight visible through the foliated portion of the tree crown. Transparency will be estimated in the same 5% classes as used for the dieback ratings, using two observers and binoculars. Foliage transparency standards should be used as an aid in making these estimates.

52, 56,  
60, &

64. Crown Symptoms - record crown symptoms observed in descending order of suspected importance, with Symptom 1 the most important.

For example, if a beech tree has beech bark disease present, obvious crown dieback, stem rot, fine twigs killed by oyster-shell scale, and dead branches, record branches dead under Symptom 1. If a causal agent is not known for the recorded symptom, record (23) unknown under causal agent.

#### Symptoms

- 1) Leaf scorch - marginal reddening or browning of the leaves.
- 2) Chlorosis - any chlorotic leaf appearance, including bleaching, stippling, mottling, and flecking.
- 3) Small leaves - stunted or smaller than normal leaves.
- 4) Tattering - as seen with frost or thrips damage. If thrips damage is present, record the most important symptom present (i.e., stunting, tattering, chlorosis).
- 5) Defoliation - record, if greater than 10 percent. Record defoliators responsible for lighter defoliation than this under Injury Agents.
- 6) Off-color leaves - leaves abnormal in color, other than just chlorotic (ex.-premature fall color).

### Symptoms (Continued)

- 7) Dead areas in leaves - record for anthracnose, leaf spots, partial leaf kill by frost, etc.
- 8) Dead leaves - whole leaves killed, as by frost or petiole borer.
- 9) Fine twigs dead
- 10) Branches dead
- 11) Flagging - leaves on an entire branch turning color, as with white pine blister rust or Dutch elm disease. Include wilting symptoms here.
- 12) Broken branches - include broken tops and main stems in this category.

### Location of Symptoms - record for all symptoms listed

- 1) Upper half of tree
- 2) Lower half of tree
- 3) Side of tree
- 4) Whole tree

### Percent of Crown Affected

- 1) 1-10%
- 2) 10-25%
- 3) 25-50%
- 4) 50-75%
- 5) over 75%

If the only crown symptom is dead twigs on branches as reflected in the crown condition rating, you need not repeat the percent of crown affected, as already listed for Crown Condition. If, however, a portion of the crown is affected by a known agent such as a canker or stem rot, separate the percentage of crown affected by this agent from that portion with general dieback of twigs or branches.

Injury Agents - record here other injuries or injury agents not recorded as associated with crown symptoms. Record in descending order of suspected importance, with agent 1 the most important. Most of these will be stem or root problems, although defoliators responsible for less than 10 percent defoliation or other minor pests that are present may be recorded here.

### Injury and Causal Agents

- 1) Logging damage - look for presence of stumps nearby
- 2) Bird/animal - porcupine, sapsucker, etc.
- 3) Other wounds or mechanical damage
- 4) Stem rot - as determined by presence of fruiting bodies, open wounds with decay present, etc. Do not record as such if not sure
- 5) Canker - such as caused by Nectria, Eutypella, and Hypoxylon

### Injury and Causal Agents (Continued)

- 6) Sugar Maple Borer - wounds on sugar maple resulting from borer attack, from open wounds to diagonal raised areas. See USFS "How To" No. NA-GR-1 for symptom descriptions
- 7) Beech Bark Disease - record for presence of beech scale, Nectria fruiting bodies, or scars left by Nectria infection. Refer to USFS Forest Insect & Disease Leaflet 75 for description of symptoms. Do not record as cause of dieback if only the scale is present.
- 8) Dutch Elm Disease - look for wilting, flagging, etc. Do not confuse browning of leaves as caused by elm leaf beetle (a leaf skeletonizer) with browning of whole leaves caused by this disease. Refer to USFS "How To" No. NA-FB/P-11 for symptom descriptions and how to differentiate from elm phloem necrosis.
- 9) White Pine Blister Rust - look for flagging and cankers. Refer to USFS leaflet by Nicholls and Anderson on "How To Identify White Pine Blister Rust and Remove Cankers".
- 10) Leaf disease-record if anthracnose (browning between veins) or a leaf spot organism such as Tar Spot of maple can be identified.
- 11) Other disease - list under Remarks.
- 12) Ice/snow damage - storm breakage.
- 13) Wind-windthrow or shredded leaves.
- 14) Wet feet - standing water problem.
- 15) Lightning
- 16) Tapping wounds
- 17) Oystershell scale - look for twig dieback, especially on beech and presence of hard oystershell-shaped scales.
- 18) Birch Leaf Miner (BLM)
- 19) Maple Leaf Cutter (MLC)
- 20) Pear Thrips - look for presence of brown necrotic spots on the veins on the undersides of leaves and small round feeding punctures between the veins to separate from frost damage. Stunting, bleaching, and tattering are also symptoms, but some of this can be caused by frost.
- 21) Frost damage - presence of large numbers of refoliated small leaves on maple may indicate damage from late spring frost. Aspens make good indicator plants, since they still exhibit damaged leaves.
- 22) Other insect - list under Remarks
- 23) Unknown
- 24) Other weather related or environmental

### Quality Assurance

This will be achieved by proper training and independent spot checking of field crews. For critical dieback and transparency measurements, field crews will cross-check a portion of each other's ratings, similar to NAMF quality checks. Field checks by an independent crew will also be conducted. In addition, all field data sheets will be checked for proper and consistent recording.

VERMONT HARDWOOD DIEBACK AND MORTALITY SURVEY

1 PHOTO POINT NO. \_\_\_\_\_ 2 PHOTO FRAME NO. \_\_\_\_\_ 3 CELL NO. \_\_\_\_\_ 4 CREW \_\_\_\_\_  
 5 LANDOWNER \_\_\_\_\_ 6 FOREST TYPE \_\_\_\_\_ 7 DATE \_\_\_\_\_  
 8 TOWN \_\_\_\_\_ REMARKS \_\_\_\_\_

Show landmarks, roads, bearings, distances, and North arrow

SKETCH MAP OF CELL LOCATION

Check if CNIA would not make a good permanent plot. Topographic Map No. \_\_\_\_\_

Plot Data		Outcropping or		Drainage	
Stand Contiguity		Nodes			
1) hillside	3) plateau	1) present	1) poor	1) none	3) NAC
2) rolling	6) cove	2) absent	2) w-1	2) forest-slack	2) CRT
3) swamp	7) flat	4) bench	3) excessive	3) recent-slump	3) RTC
4) mtn. top	8) bench			4) old-slump	4) SP

9	PILOT NO.		
10	ELEVATION (100s of feet)		
11	SLOPE (Z)		
12	ASPECT (Azimuth)		
13	DISTANCE TREE 1 TO CENTER (ft)		
14	BEARING-TREE 1 TO CENTER (Oaz)		
15	STAND GEOGRAPHY		
16	OUTCROPPINGS		
ACTUAL OR GREATER THAN _____			
17	DEPTH TO BEDROCK (Inches)		18
18	HARDPAN (Inches)		20
19	MOTTLES (Inches)		22
23	DRAINAGE		
24	CROWN CLOSURE		
25	ROADS		
26	LOGGING HISTORY		
27	DEPOLIATION HISTORY		
SITE INDEX	28	TREE NO.	
	29	SPECIES	
	30	HEIGHT (feet)	
FOR TREES 3 & 5	31	AGE	
	32	SITE QUALITY	
		SPECIES	
		33	
		34	
		35	

INDICATOR PLANTS	MILACRE PLOTS	REG. NO.
1	1	34
2	2	
3	3	
4	4	
5	5	

- GROUND COVER
- 1) Adv. Com. Hdw. J\*
  - 2) conifer
  - 3) other woody
  - 4) raspberry
  - 5) fern
  - 6) grass
  - 7) other

- INDICATOR PLANTS
- 1) blue cohosh
  - 2) wild ginger
  - 3) wild leek
  - 4) maidenhair fern
  - 5) wild asparagus/lilia
  - 6) wild lily-of-the-valley
  - 7) eastern clubmoss
  - 8) bracken fern
  - 9) wintergreen
  - 10) aster/lower
  - 11) red-top
  - 12) blue bellflower
  - 13) rock-rose
  - 14) scattered fern
  - 15) interrupted fern
  - 16) fern
  - 17) jewel weed

- FOREST TYPES
- 11) aspen-w. birch
  - 20) w. pine-t. oak-w. ash
  - 23) s. maple-beech-y. birch
  - 27) maple
  - 100) r. maple
  - 29) ash-blm-r. maple
  - 34) t. oak-basswood-w. ash

