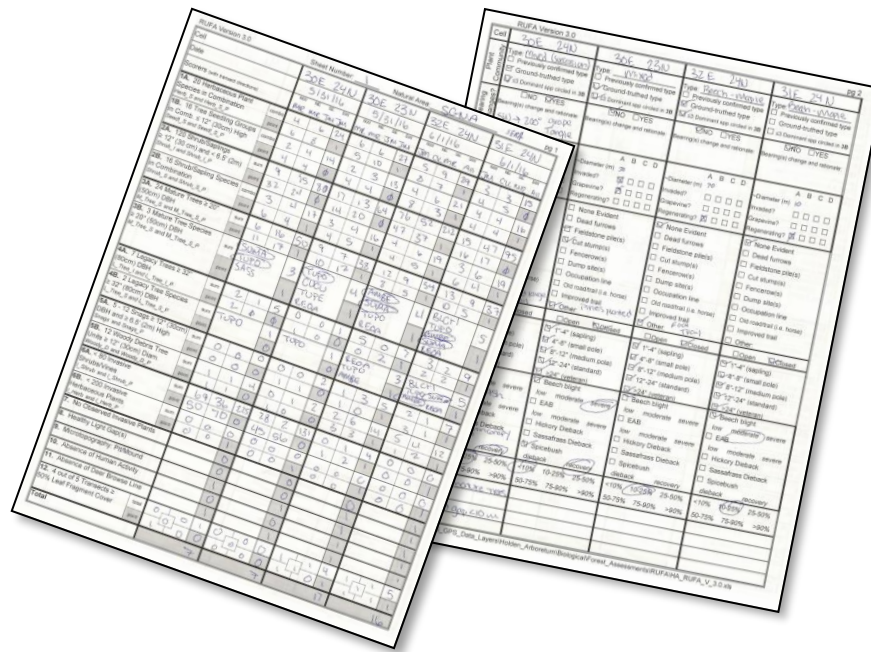


The Holden Arboretum's Rapid Upland Forest Assessment (RUFA)

Version 3.0

Draft Field Manual



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Field Sheet Data Recording

Designated cell number, representing the center of the 1-hectare plot

Date the field data was collected

Initials of the assessors, under the transect direction they are assigned and assess.

For each pair A.B., A is a 1 minute assessment along the assigned transect to the corner--

--and B is a 1 minute assessment back to the center along the assigned transect

3A. Assessors count individual mature native trees with a DBH $\geq 20''$ (50cm). Numbers are recorded and summed. **A score of 1 is assigned if the searches reveal a total of 24 or more mature trees.**

Plantation planted conifers do not count.

3B. Assessors identify species of mature native trees in their assigned transect. Species are named according to the 4-letter common name code (see page 5) and recorded. The total number of species is summed. **A score of 1 is assigned if the searches reveal a total of 3 or more species.**

Cell		32-E12-N			
Date		6/15/2015			
Scorers		NW	NE	SE	SW
		CK	MW	JM	SD
1A. 20 Herbaceous Plant Species in Combination	combo	5	5	20	
	point	5	5	1	
1B. 16 Tree Seedling Groups in Combination <12" (30cm) Species Combined Count	combo	4	3	14	
	point	2	4	0	
2A. 120 Individual Shrubs/Saplings 12" (30cm) to <6.5' (2m)	sum	30	30	120	
	point	30	30	1	
2B. 16 Shrub/Sapling 12" (30cm) to <6.5' (2m) Species Combined Count	sum	3	3	12	
	point	3	3	0	
3A. 24 Mature Trees $\geq 20''$ (50cm) DBH	sum	6	6	24	
	point	6	6	1	
3B. 3 Mature Tree Species $\geq 20''$ (50cm) DBH	combo	AMBE SUMA SHHI REDA			5
	point	BLCH			1
4A. 7 Legacy Trees $\geq 32''$ (80cm) DBH	sum	2	2	8	
	point	2	2	1	
4B. 2 Legacy Trees Species $\geq 32''$ (80cm) DBH	sum	SUMA AMBE			2
	point				1

Key:

Field Sheet Explanation: Text |

Example data: 6/15/2015

1A. Assessors identify and count species of native herbs (non-woody plants including upland sedges and ferns) in their 1 min transect search. Numbers are recorded in a square according to bearing (upper left hand # = NW, lower right hand # = SE) and the counts are combined in the top box of the next column. **A score of 1 is assigned if the combined total is 20 or more.** Grasses mosses, and heterotrophic plants do not

1B. Assessors count species of canopy tree seedlings groups less than or equal to 12" (30cm) in height in their assigned 1 min transect search. Counts are recorded and combined. **A score of 1 is given if the combined total is 16 or more.** Seedlings of such understory trees like *Carpinus sp.* are not counted.

2A. Assessors count individual native woody plants of height 12" (30 cm) to 6.5' (2m). Counts are recorded and summed. **A score of 1 is assigned if the four 1 min searches reveal a total of 120 or more shrubs/saplings.**

2B. Assessors identify species of native woody plants of height 12" (30cm) to 6.5' (2m) in their 1 min transect search. The counts of species are combined. **A score of 1 is assigned if the combined total is 16 or more.**

4A. Assessors count individual native trees with a DBH $\geq 32''$ (80cm), Legacy Trees (wolf trees are not counted in this category). Numbers are recorded and. **A score of 1 is assigned if the searches reveal a total of 7 or more legacy trees.**

4B. Assessors identify species of Legacy Trees in their assigned transect. Species are named and recorded. The total number of species is summed in the top box of the next column. **A score of 1 is assigned if the searches reveal a total of 2 or more legacy tree species.**

5A. Assessors count individual snags with a DBH $\geq 12''$ (30 cm) and $\leq 6.5'$ (2m) high. Numbers are recorded and summed. **A score of 1 is assigned if the searches reveal a total between 5 and 12 snags.** Greater than 12 snags represents the tipping-point of an unhealthy amount of mature-tree death.

5B. Assessors count coarse woody debris tree units $\geq 12''$ (30cm) across. **A score of 1 is assigned if the searches reveal a total of at least 12 woody debris tree units.**

7. If 6A and 6B have any counts of invasive plants recorded, a score of 0 is assigned. If the transect searches for 6A and 6B reveal no observed invasive plants, an additional untimed search in all directions from the center within the hectare is performed to find any evidence of invasive plants. **If there are none observed, a score of 1 is assigned.**

9. A score of 1 is assigned if there is pit-mound topography evident because of native tree tip-ups.

11. A score of 1 is assigned in the absence of a readily observable, heavy/definite browse line.

5A. 5<12 Snags $\geq 12''$ (30cm) DBH and $\geq 6.5'$ (2m) High	sum	1	1	6
	point	1	3	1
5B. 12 Woody Debris Tree Units $\geq 12''$ (30cm)	sum	3	3	12
	point	3	3	1
6A. < 80 Invasive Shrubs/Vines	sum	10	10	40
	point	10	10	1
6B. < 200 Invasive Herbaceous Plants	sum	20	20	80
	point	20	20	1
7. Observed Invasive Plants				0
8. Presence of Light Gap				1
9. Microtopography: Pit/Mound				1
10. Absence of Human Activity				0
11. Absence of Deer Browse Line				1
12. 4 out of 5 Places $\geq 50\%$ Leaf Fragment Cover	total	1	1	4
	point	0	1	1
Total				14

6A. Assessors count individual stems of State-listed invasive shrubs/vines. Numbers are recorded and summed. **A score of 1 is assigned if the searches reveal less than 80 invasive shrubs/vines.**

6B. Assessors count individual stems of State-listed invasive herbaceous plants. Numbers are recorded and summed. **A score of 1 is assigned if the searches reveal less than 200 invasive plants.**

8. A score of 1 is assigned if there is a presence of at least one healthy light gap (regenerating--dominated by native shrubs, seedlings, young trees etc. and absent of overly oppressive grapevine or invasive plants)

10. A score of 1 is assigned in the absence of human activity. Evidence of human activity (i.e. cut stumps, furrows, trash heaps, stone piles etc) scores 0.

12. A score of 1 (affirmative) is assigned to each of the 5 assessed areas (four areas 30 paces along each transect and one in the center) if the assessor finds $\geq 50\%$ leaf fragment cover (O_e) under the most recent leaf litter (O_i). If the assessor finds $< 50\%$ coverage, that area is scored 0. Each of these scores is recorded in the appropriate/corresponding location in the boxes. The total of these scores (a number from 0 to 5) is also recorded in the first box of the next column. **If 4 out of 5 scores are 1 (affirmative), then this metric scores 1.**

Total: Points of each metric (the 0 or 1 in each shaded box of the rows above) are added for a final score out of 18 possible points.

The RUFA scoring system holds an old-growth, unharvested forest as the highest quality, or ecological integrity, possible. Scores can be interpreted as follows:

Score Range	Forest Integrity
0-4	Low
5-9	Medium Low
10-13	Medium
14-16	Medium High
17-18	High

Designated cell number, corresponding to the cell scored on the first sheet.

Cell	32-E12-N																									
Plant Community	Type: <i>Beech-Maple</i> <input type="checkbox"/> Previously confirmed type <input checked="" type="checkbox"/> Ground-truthed type																									
Bearing Changes?	<input type="checkbox"/> NO <input checked="" type="checkbox"/> YES Bearing change(s) and rationale: <i>NW → 262°</i> <i>topography</i>																									
Light Gaps	<table border="0"> <tr> <td></td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>~Diameter (m)</td> <td><i>30</i></td> <td><i>10</i></td> <td></td> <td></td> </tr> <tr> <td>Invaded?</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Grapevine?</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>Regenerating?</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		A	B	C	D	~Diameter (m)	<i>30</i>	<i>10</i>			Invaded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grapevine?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Regenerating?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	A	B	C	D																						
~Diameter (m)	<i>30</i>	<i>10</i>																								
Invaded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Grapevine?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Regenerating?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Evident Past Land Use	<input type="checkbox"/> None Evident <input type="checkbox"/> Dead furrows <input type="checkbox"/> Fieldstone pile(s) <input type="checkbox"/> Cut stump(s) <input type="checkbox"/> Fencerow(s) <input type="checkbox"/> Dump site(s) <input type="checkbox"/> Occupation line <input type="checkbox"/> Old road/trail (i.e. horse) <input checked="" type="checkbox"/> Improved trail <input type="checkbox"/> Other:																									
Canopy	<input type="checkbox"/> Open <input checked="" type="checkbox"/> Closed																									

Record the plant community type, and whether this type is being recorded because it was "previously confirmed" by another authority or map, and/or if the type is identified from on-site observation.

Any light gaps, whether or not they are healthy and received a point under **8**, are noted along with their approximate/estimated diameter and if they are invaded with non-native spp (i.e. multiflora rose), have grapevine tangle, and/or are regenerating.

Regardless of whether metric **10** scored 0 (zero), or 1, this section must be filled out. If there was no human activity evident (score 1) then "None Evident" can be marked. Any other significant and evident past land use observed is marked, and any not listed is entered as "Other" and described.

If there were any alterations to the NW, SW, NE, SE transects they are noted here with the new degree bearing and the reason for the shift.

Mark whether the overall character of the canopy is broken or open, or closed

All represented age classes in the stand are marked.

Pests and pathogen of interest are noted. These may differ according to land management needs/conditions. Any pest or pathogen is indicated and the level of its severity/impact is circled.

Record any other relevant information observed during the assessment that wasn't otherwise indicated from the field sheet.

Age Classes (in DBH)	<input checked="" type="checkbox"/> 1"-4" (sapling)	dominant SUMA
	<input type="checkbox"/> 4"-8" (small pole)	AMBE
	<input checked="" type="checkbox"/> 8"-12" (medium pole)	BLCH
	<input checked="" type="checkbox"/> 12"-24" (standard)	SUMA AMBE
	<input checked="" type="checkbox"/> >24" (veteran)	
Pests and Pathogens	<input checked="" type="checkbox"/> Beech blight <u>low</u> moderate severe	
	<input type="checkbox"/> EAB low moderate severe	
Notes	<input type="checkbox"/> Dieback: _____	
	<input type="checkbox"/> Other: _____	
	Mostly beech root sprouts affected	
	by blight—not evident in	
	canopy.	

List the dominant tree species. The box is divided to represent the mature/overstory tree community and the upcoming generations. At least one species should be listed for those 2 broad categories. If the age classes demonstrate a marked difference in dominant species (i.e. there are many sapling and small pole AMBE and SUMA but there are a good number of medium pole BLCH) beyond the "overstory vs. younger generations" boxes, draw a line and write the different dominant species corresponding to that size class.

Clarification about terms used here and more detailed explanations of the metrics and what they measure can be directed to the RUFA User Manual.

Common Name	Scientific name	Species Code†	Seedling Grouping ††
Ash, Green	<i>Fraxinus pennsylvanica</i>	GRAS	ASH
Ash, White	<i>Fraxinus americana</i>	WHAS	ASH
Aspen, Bigtooth	<i>Populus grandidentata</i>	BIAS	ASP
Aspen, Quaking	<i>Populus tremuloides</i>	QUAS	ASP
Baldcypress	<i>Taxodium distichum</i>	BALD	
Basswood, American	<i>Tilia americana</i>	BASS	
Beech, American	<i>Fagus grandifolia</i>	AMBE	
Birch, Black	<i>Betula lenta</i>	BLBI	BIR
Birch, River	<i>Betula occidentalis</i>	RIBI	BIR
Birch, Yellow	<i>Betula allegheniensis</i>	YEBI	BIR
Boxelder	<i>Acer negundo</i>	BOXE	SMA
Buckeye	<i>Aesculus glabra</i>	BUCK	
Butternut	<i>Juglans cinerea</i>	BUTT	WAL
Catalpa, Northern	<i>Catalpa speciosa</i>	CATA	
Cherry, Black	<i>Prunus serotina</i>	BLCH	
Chestnut, American	<i>Castanea dentata</i>	AMCH	
Cottonwood, Eastern	<i>Populus deltoides</i>	COTT	
Cucumbertree	<i>Magnolia acuminata</i>	CUCU	
Eastern Hemlock	<i>Tsuga canadensis</i>	EAHE	
Elm, American/white	<i>Ulmus americana</i>	AMEL	ELM
Elm, Slippery/Red	<i>Ulmus rubra</i>	REEL	ELM
Hickory, Bitternut	<i>Carya cordiformis</i>	BIHI	HIC
Hickory, Pignut	<i>Carya glabra</i>	PIHI	HIC
Hickory, Shagbark	<i>Carya ovata</i>	SHHI	HIC
Hickory, Shellbark	<i>Carya laciniosa</i>	SLHI	HIC
Locust, Black	<i>Robinia pseudoacacia</i>	BLLO	
Locust, Honey	<i>Gleditsia triacanthos</i>	HOLO	
Maple, Black	<i>Acer nigrum</i>	BLMA	HMA
Maple, Sugar	<i>Acer saccharum</i>	SUMA	HMA
Maple, Red	<i>Acer rubrum</i>	REMA	SMA
Maple, Silver	<i>Acer saccharinum</i>	SIMA	SMA
Oak, Black	<i>Quercus velutina</i>	BLOA	RED
Oak, Bur	<i>Quercus macrocarpa</i>	BUOA	WHI
Oak, Chestnut	<i>Quercus montana</i>	CSEA	WHI
Oak, Chinquapin	<i>Quercus muehlenbergii</i>	CHOA	WHI
Oak, Pin	<i>Quercus palustris</i>	PIOA	RED
Oak, Red	<i>Quercus rubra</i>	REOA	RED

Native Tree Species List* and Abbreviation Codes**

*List is based off ODNR Division of Forestry "Common Ohio Trees". It includes only natives and represents trees expected to reach at least 20" DBH at maturity.

**4-letter abbreviations based on systems such as IBP's standardized species codes for birds. Other systems (i.e. USDA PLANTS database) usually use standardized codes from scientific names. These (like IBP's) are organized by English, or common, name.

†† Species groupings based on standard US forestry practices

†Species codes are essentially the first two letters of each word in the plant name. If the commonly used name is one word, the code is the first four letters of that name. Codes in italics don't follow those rules because the abbreviation was already taken by another species

Common Name	Scientific name	Species Code†	Seedling Grouping ††
Oak, Scarlet	<i>Quercus coccinea</i>	SCOA	RED
Oak, Swamp White	<i>Quercus bicolor</i>	SWOA	WHI
Oak, White	<i>Quercus alba</i>	WAOA	WHI
Osage-Orange	<i>Maclura pomifera</i>	OSOR	
Pawpaw	<i>Asimina triloba</i>	PAWP	
Pine, White	<i>Pinus strobus</i>	WHPI	
Redcedar, Eastern	<i>Juniperus virginiana</i>	REDC	
Sassafras	<i>Sassafras albidum</i>	SASS	
Sweetgum	<i>Liquidambar styraciflua</i>	SWGU	
Sycamore	<i>Platanus occidentalis</i>	SYCA	
Tamarack/Larch, Eastern	<i>Larix laricina</i>	TAMA	
Tulip Poplar	<i>Liriodendron tulipifera</i>	TUPO	
Tupelo/ Black Gum	<i>Nyssa sylvatica</i>	TUPE	
Walnut, Black	<i>Juglans nigra</i>	BLWA	WAL
Willow (all)	<i>Salix spp.</i>	WILL	WIL

Forest Plant Community Types (Lake Erie Allegheny Plateau Bioregion)

- Altered Beech-Sugar Maple
- Beech-Red Maple Forest
- Beech-Sugar Maple Forest Grape Vine Tangle
- Hemlock-Hardwood Forest
- Mixed Floodplain Forest
- Mixed Mesophytic Forest
- Mixed Swamp Forest
- Oak-Hickory Forest
- Oak-Maple Forest
- Pine Planting

Forest Integrity Categories

Integrity Category	Score Range
Low:	0-4
Medium Low:	5-9
Medium:	10-13
Medium High:	14-16
High:	17-18