Figure 1. Recording the coordinates of plot center and determining route to next plot.

Figure 2. Sighting the azimuth for the transects.

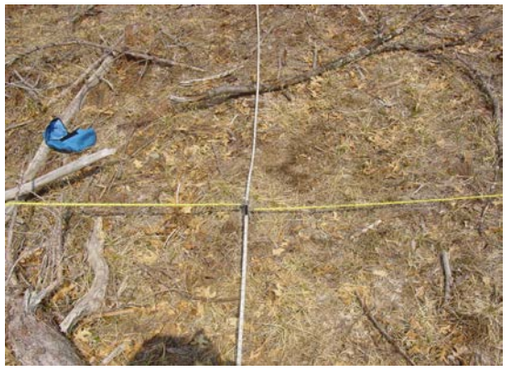


Figure 3. Lay out of four transects at 90° angles.

Figure 4. Using a ruler to measure duff and litter.

Before leaving the office:

1. Establish your sampling grid based on desired percent of stand sampled. It is very important to know the location of a starting point. All other plot locations will be referenced from the first plot.
2. Make enough copies of plot data sheets.
3. Fill in header information on plot data sheets with as much information as possible (compartment and stand numbers, fire history).
4. If you using a compass with declination make a note of declination used on plot data sheets.
5. Make sure GPS datum is forest standard or make note of one used if unsure.
6. Double check equipment list.

Equipment needed:

permanent stakes (1 for each plot)
50´ measuring tapes (in tenths of a foot)
compass
GPS
rulers
plot data sheets
tablet w/ charger
pencils/pens
DBH tapes
camera for photo points
coordinates of plots (or directions from first plot)
plastic bags for plant collection
clip board
20 Basal Area prism
plastic bags to protect plot data sheets
flagging

To sample the overstory using a 0.10 acre plot, bring the measuring tapes in to 37.2 feet.

1. Start in the 1st quadrant and measure DBH (to the 10th inch) on all trees greater than 2” DBH and at least 4.5´ tall.
2. Record DBH and species for all tallied trees in each quadrant
3. Estimate height of char along trunk (Char is the black staining on the trunk that rubs off)
4. Estimate percentage of crown scorch on the tree bole (look at browned needles, curled leaves and burned buds and twigs).

After arriving at plot center, record the coordinates in D° M" S.S" lat/long with the Datum set to WGS84 on the GPS. Also note the stand and compartment information (Figure 1).

If wearing an analog watch, the azimuth of the 1st transect is chosen by the direction of the minute hand. A random azimuth for the 1st transect can be selected by choosing a number between 0 and 360. The other 3 transects are laid out clockwise at 90° angles from the previous transect: 1st transect = 161°, 2nd = 251°, 3rd = 341°, 4th = 71° (Figures 2 and 3). A random number generator has been provided (Table 1).

Indicate the "Burn Status" to show if it is a pre-burn or post-burn measurement.

Place a permanent marker (stake, wire flag) at plot center. Measuring tapes should be laid out to 50´ from plot center.

Record the length of transects for time lag fuels, and the azimuth and slope for each transect.

Transect lengths	*Diameter of debris*		
Downed material	*0-1 in*	*1-3 in*	*>3 in*
Nonslash (naturally fallen material)	**1-6 ´**	**5-10 ´**	**25-50 ´**
Discontinuous light slash	**1-6 ´**	**5-10 ´**	**25-50 ´**
Continuous heavy slash	**1-3 ´**	**3-5 ´**	**15-25 ´**

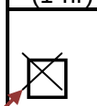
Plot ID: _____
Coordinates:_____ B/C (Circle One) Date: _____/_____/_____

Burn Unit: _____ Recorders: _____
Burn Status: Circle one and indicate number of times treated, e.g., 01-yr01, 02-yr01
00-PRE____Post ____ -yr01____-yr02____-yr05____-yr10____-yr20 Other:____-yr;____-mo_____

Transect lengths, in feet: 0-.025"_____0.25-1"_____1-3"_____3+s_____3+r_____

Transect 1 Azimuth _____°
Slope _____%

# of intercepts			Diameter (in)		Litter and Duff Depths (in)					
			3+s	3+r						
0-.25" (1-hr)	.25-1" (10hr)	1-3" (100hr)	(1000hr)			L	D		L	D
					1	1.5	.25	25		
					5			30		
					10			35		
					15			40		
13	7	3			20			45		



Record the number of intercepts for each time lag fuel class.

For the 1000+ fuels, a diameter and species is recorded for each intercept. The 1000+ fuels are also classified as "sound" or "rotten" and recorded in the appropriate column. If a species cannot be identified, note pine or hardwood.

Tally.

Record the number of intercepts using a "dot / box method" for speed. Each dot is 1 intercept and each line connecting a dot is 1 intercept. So a box with an X in it is 10 intercepts. Then document the total in the smaller space below.

Tally rules for fuel classes:

1. Only **downed, dead woody material** from trees and shrubs on the litter layer are recorded. Do not record:
   Leaves cones bark flakes needles grass forbs undisturbed stumps
   dead stems or branches still attached to standing trees or shrubs
2. Only record the 1-, 10-, and 100-hr fuels along the prescribed length of the transect (1-hr from 0-6´).
3. If a piece intersects the tape measure more than once, count all intercepts.
4. If the end of a piece intersects the taper, only record it if the central axis is crossed.
5. Estimate the diameter of rotten logs that fallen apart by visualizing a cylinder to contain the material.
6. Downed material can be sample up to any height, so be sure to look up from the ground. An upper cutoff of 6´ can be used; adjust as necessary in heavy slash.
7. Record diameters of 1000+ fuels to the nearest whole inch.

Litter and duff are also recorded at set intervals along the length of each transect (Figure 4).

The first measurement is taken 1 foot from the plot center and the next at the 5´ mark. After that measurements are taken every 5 feet, ending at the 45´ mark.

Tally rules for litter and duff:

1. Record duff and litter measurements after fuel intercepts have been tallied.
2. Record litter to the nearest whole inch.
3. Measure duff to the nearest 0.1 inch or .25 inch (depending on ruler used).
4. Litter is still recognizable as its former self before death (it still looks like a needle).
5. Duff is the decomposed litter (it is no longer recognizable as a needle).
6. When stumps, logs and trees occur at the points of measurement, offset 1´ perpendicularly to the right.
7. Measure through rotten logs whose central axis is in the duff layer.

Tree mortality monitoring starts from the center of the plot. A 20 BA prism is use to determine the trees that will be measured. The measurements start at true north and then proceeds in a clockwise manner numbering each tree “from north” that the prism identifies as a large enough tree.

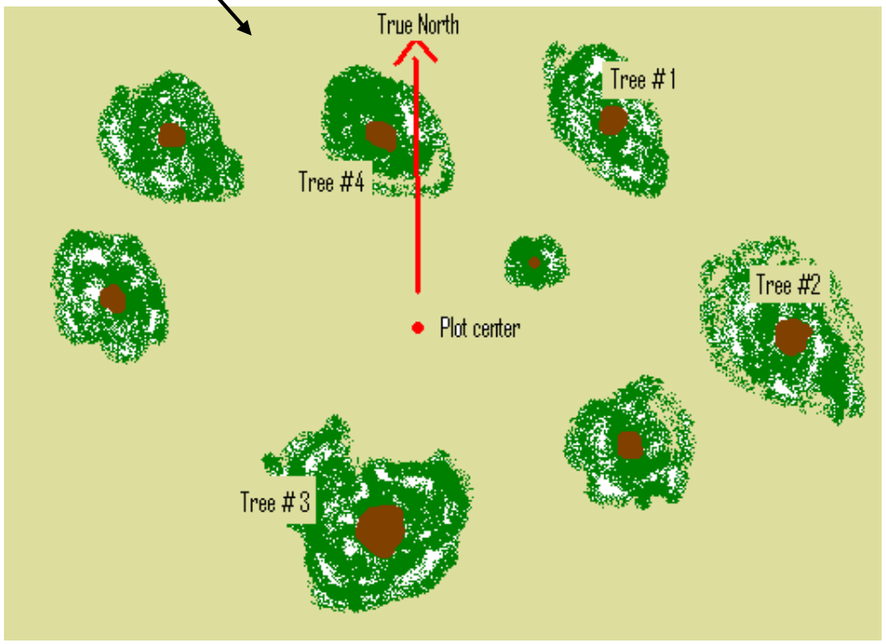


Photo plot protocols:

1. Start from the center of the plot and set the camera 3 feet above the ground facing true north.
2. Use the dry erase board to include the **project name**, **date, plot #, and direction** and position the board in the lower right corner of the photo.
3. Continue taking photos to the east, south, and then west.

HURON-MANISTEE

DOWNED WOODY DEBRIS/FIRE EFFECTS MONITORING PLOTS HANDBOOK

Feb 2013

This handbook is designed as a quick reference for fire effects monitoring protocol on the Huron-Manistee.
The sampling design is based on James K. Brown's "Handbook for Inventorying Downed Woody Material" (GTR-INT16, 1974), the National Park Service's "Fire Effects Monitoring Handbook," and field experience.

Huron Plot Standards:

ACTION / MEASURMENT	DISCRIPTION	FORM #	FORM LOCATION.
Plot Location Data Sheet	Used when establishing a new plot location.	FMH-5	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards
Plot Protocols	Used when establishing a new plot protocols.	FMH-4	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards
Forest Plot Fuels Inventory Data Sheet	Used for collecting fuels inventory data for calculating Fuel Loading.	FMH-19	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards
Photographic Record Sheet	Used for photo plots.	FMH-23	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards
Tree Mortality Monitoring Data Sheet	Used for collecting over-story data to help determine mortality	HSF-01	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards
Canopy Bulk Density	Used for collecting data to determine canopy bulk density	HSF-02	Q\FIRE\FUELS MANAGEMENT\Fire Monitoring\Fuels Plots\Forms & Standards

Archiving Data:

The Data collection sheets are entered into Fuels Measurement Spread Sheet. The spread sheet is saved on Huron Shores O: drive at **\\ \FIRE\FUELS MANAGEMENT\Fire Monitoring\monitoring results**

After the data is entered the date should be documented in the lower left corner of the data sheet and then archived in the Fuels Folder. The AFMO will know where the folder is located.

Table 1. Random number generator. To choose a random azimuth, pick a column and row. The number at the intersection is the azimuth for the 1st transect (http://www.random.org/nform.html).

115	171	196	142	32	88	336	322	239
59	224	21	60	192	248	288	278	277
247	276	92	173	16	231	38	358	44
36	51	39	14	337	11	272	274	169
58	156	189	289	241	320	223	72	143
79	233	342	86	156	298	247	34	199
336	233	320	91	209	98	351	284	29
202	221	5	307	324	310	178	68	309
181	301	76	279	229	145	18	322	220
251	288	125	225	60	256	86	283	78
220	343	245	44	262	304	266	186	207
89	8	313	32	178	49	102	284	342
119	298	277	230	100	142	288	213	3
326	42	325	62	67	139	252	103	165
127	65	197	93	338	70	32	111	55
341	287	207	34	55	78	343	358	141
226	281	34	141	88	168	112	48	151
11	150	189	103	36	322	257	32	289
169	96	184	131	265	208	354	11	354
251	204	117	206	6	165	39	292	128
38	120	234	326	216	245	249	239	78
97	95	161	124	66	6	87	57	53
6	253	73	250	210	221	37	272	144
150	14	206	302	224	332	267	158	353
105	320	205	178	186	104	282	358	102
89	88	87	78	71	326	330	146	68
190	233	58	171	165	70	260	49	294
310	79	147	221	187	164	145	211	22
225	234	30	217	163	115	13	162	331
329	74	94	203	265	359	44	315	102
66	75	79	288	150	261	97	171	124
316	63	119	294	245	238	0	142	110
75	48	261	353	176	244	116	64	239
136	8	309	174	119	126	125	247	349
4	345	340	8	41	280	184	184	154
261	9	191	241	144	74	53	142	4
281	297	198	355	30	267	185	147	79
54	282	124	192	126	288	170	146	252
345	242	183	237	138	315	230	257	252
174	108	257	14	152	356	104	210	234