

## Chapter 3 - Stage 1 Forested Field Guide

### Introduction

The staged survey approach was developed in the spirit of providing information at a scale appropriate for its use.

The purpose of Stage 1 Inventory is to provide a wall-to-wall assessment of stand characteristics to support our tactical and strategic planning and operations. This includes data necessary to conduct our Forest Management Unit Analyses or Eco-Regional Plan Monitoring, as well as identify potential areas of treatment within a Year-Of-Entry.

The goal is to accomplish this Inventory through a relatively quick qualitative assessment of **all** stands within a compartment. Information from the Stage 1 survey should be adequate to support decisions concerning when stands require further, more detailed sampling, and in some cases which stands may require treatment.

This chapter is divided into 3 sections:

- Definition of Terms
- Variables Measured
- Field Protocol (process)

### Definition of Terms

Understanding the following terms is important to understanding Stage 1:

**STAND** – A stand can be defined as a polygon representing a relatively homogeneous area of a similar cover type – a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure to be a distinguishable unit. In IFMAP, stands are inventory polygons and are **not** related to possible treatment lines.

**AREA OF INTEREST** – The “AOI” Layer documents decisions made during the post-Stage 1 process defining the boundaries of potential management activities. The activity may simply be the collection of more detailed data for any purpose, or the area may be a candidate for a proposed treatment.



**MULTI-POLYGON STANDS** – Certain situations, such as strip plantations, have made mapping stands that consist of multiple polygons difficult at best. In order to accommodate the use of multiple polygons that are indeed the same stand, multi-poly rules have been developed. Those rules are outlined in Chapter 3 under the Stand Mapping Rules.

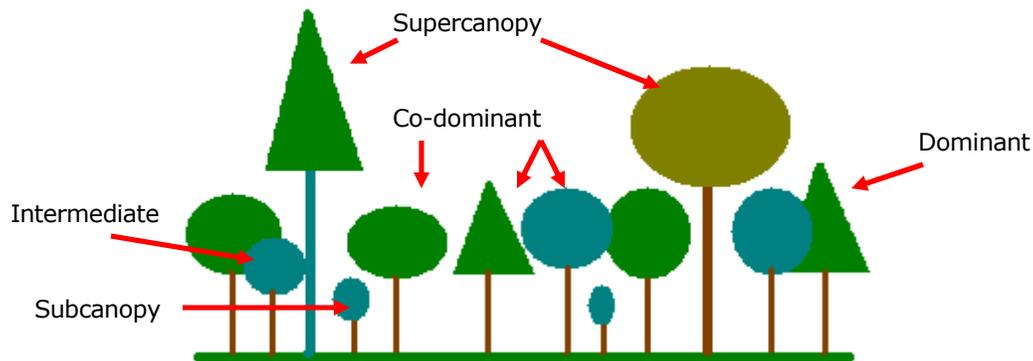
**COVER TYPE** – a categorization of the land based on the canopy percentage of the different species of vegetation. The IFMAP cover classification system is a layered, hierarchical system with specific rules to ensure inclusiveness. To the right is an example of the cover type list; see Appendix A for a complete listing of cover types and classification rules.

IFMAP Classification List	
<b>3 Upland Openland</b>	
310	Herbaceous Openland
3101	Poverty Grass, Cladonia
3102	Grass
31021	Cool Season Grass
31022	Warm Season Grass
3103	Rubus, Fern
3104	Degraded
3105	Mixed Upland Herbaceous
320	Upland Shrub
3201	Sweet Fern
3202	Autumn Olive/Honeysuckle
3203	Upland Blueberry
3204	Mast Producing Shrub
3205	Mixed Upland Shrub
<b>4 Upland Forest</b>	
<b>41 Upland Deciduous Forest</b>	
411	Northern Hardwood
4110	Sugar Maple Association
4111	Sugar Maple Hard Mast Association

**CANOPY, SUPERCANOPY, SUBCANOPY:** Vertical strata are important components of forest inventory. Definitions for these layers or strata are:

The **CANOPY** layer is composed of trees in the following crown classes (all canopy must be > 3 feet in height):

- **Dominant** trees' crowns extend above the general level of the main canopy, receiving full light from above and partial light from the sides.
- **Co-dominant** trees' crowns help to form the general level of the main canopy.
- **Intermediate** trees' crowns extend into the lower portion of the canopy, but are shorter in height than the co-dominant and, in full crown closure, receive little direct light from above and none from the sides.



The **SUPERCANOPY** layer is composed of trees in the **emergent** and/or **predominant** crown class - trees whose crowns are well above the general level of the main canopy, receiving full light from above and from the sides. These are usually trees remaining from an earlier stand.

NOTE: In Stage 1, the supercanopy is considered part of the canopy when determining the canopy call, recording species, average dbh, etc. When determining the age(s) of the stand, the supercanopy is aged as a separate layer if it represents a significant portion of the canopy (defined in Age measurement section below).

The **SUBCANOPY** layer is composed of understory trees and tall shrubs (>3 feet in height) that are not part of the canopy (i.e., cannot be seen from above and do not extend into the lower portion of the canopy). Exception: small (relative to the general canopy height) trees that occupy small gaps in the canopy are considered part of the subcanopy. **Note: For Forested**

**stands that are being surveyed following a Treatment, we also describe the tree seedlings less than 3 feet tall as being present in the subcanopy.**

In **Two-Aged** stands which is the canopy vs. subcanopy? Or are both layers considered canopy and supercanopy? The canopy is decided upon by using the same rule as for the overall canopy size as described later in the chapter:

Log: > 30% of the canopy is occupied by log-size (> 10" dbh) trees

Pole: < 30% of the canopy is log-sized, AND >30% of the canopy is occupied by pole-size (5-10" dbh) trees

Sapling: neither of the above applies

**Example 1:** Picture a seed tree harvest where there is a residual of 10 – 30 BA in red and white pine log sized trees. The regeneration consists of aspen 5 – 10 feet tall. Which size class do we favor? In this case, going through the above rule, we would not have > 30% of the canopy in log size trees; nor > 30% pole size trees; so the sapling size would be the default. The canopy species would be aspen saplings, red and white pine logs. The logs would be considered a supercanopy here, but are just recorded in the canopy species. The subcanopy may be non-existent unless there are some tall shrubs present. The overall size class is sapling.

**Example 2:** Picture a shelterwood harvest where the residual is 30 – 50 BA in log sized red maple and hemlock. The regeneration consists of red maple sprouts 5 – 20 feet tall and residual balsam saplings. In this case we would have > 30% of the canopy in log sized trees. The canopy species would be red maple and hemlock. The subcanopy would be the red maple sprouts and residual balsam saplings. The overall size class would be sawlog.

## Variables Measured

**Stage 1 Data** is broken into three categories:

**Stand Layer Data** describes the different vertical layers of the stand:

- Forest Canopy (includes supercanopy)
- Sub-canopy

**Stand Level Data** describes the features of the entire stand.

IFMAP Forested Field Data Form						Stand #
Cmpt:		Name:			Date:	
Vertical Layer	Species	%Cover	Size Class S P L X	Avg. Dbh	Age	<b>Stand Level Variables</b> <b>Survey Type:</b> field / edge / remote <b>Canopy Closure:</b> 25-50 50-75 75-100 <b>Snow Limited?</b> Yes / No <b>Estimated Cov type</b> <b>Plantation:</b> Yes / No <b>Stand of Interest?</b> yes / no / ? <b>Why of Interest?</b> Upland / Lowland <b>Slash?</b> <b>Overall Size:</b> Yes / no / too Snow Sap Pole Log <b>MultiStoried?</b> yes / no <b>BA SWINGS</b> 1) _____ 2) _____ 3) _____ <b>Source of 1st Age</b> _____ <b>Source of 2nd Age</b> _____
	Forest Canopy					
	must be >2%					
	must be taller than 3'					
Sub-Canopy	Species/Group	Density	Avg Ht.	Size Cls	Age	
		L M H F		L P S T		
		L M H F		L P S T		
		L M H F		L P S T		
		L M H F		L P S T		
OFS	Lat: N __ d _____ min	Long: W __ d _____ min	Desc:			<b>BA by Species</b> PT 1) _____ 2) _____ 3) _____ 4) _____ 5) _____ 6) _____ 7) _____ 8) _____ 9) _____ 10) _____
	General Stand Comments					
Management Considerations (Proposed Treatment)						

## STAND LAYER DATA

### Forest Canopy:

**Species** – The species breakdown for overstory foliage.

The database will allow up to 10 species. Be species specific. For convenience in recording (see percent cover), the data sheet can be broken into deciduous and coniferous.

**Percent Cover** – The percentage of the canopy in any one species. The total will always equal 100%. Remember that the frame of reference for these percentages is a "satellite view" – what percentage is seen from above. To be recorded, a species must occupy at least 2%.

Saplings that occupy small gaps in the canopy are NOT considered part of the canopy. For the canopy layer as defined on page 5.2:

1. Estimate the relative proportion of Conifer vs. Deciduous. This general breakout by major type is intended to help the examiner make the specific species itemization. This will equal 100%. The percentage (of coniferous versus deciduous) will not be recorded in the final information, but will help as you break down species in step 2 below.
2. Within the conifer and deciduous groups, estimate the relative proportion of each species.
  - Again, as seen from above, record and estimate of the percentage of crown that each species occupies. The total is to be 100%.
  - A species must be estimated to occupy at least 2% from a "satellite view" to be listed on the field form.

**Size Class** – For each species listed in the canopy call (remember, species must be > 3 feet in height), describe its average size class, using the following codes:

- S = Sapling (1 to 5 inches dbh)
- P = Pole (5 to 10 inches dbh)
- L = Log (10 to 18 inches dbh)
- X = Large log (over 18 inches dbh)

- Compound labels: If the trees of that species are fairly evenly split between size classes, compound labels may be used. Compound labels may include two or three classes in order of decreasing predominance. For example:
  - “P/L” would indicate that overstory trees of that species type were in both the pole and log class but primarily poles.
  - “P/L/S” would indicate that overstory trees of that species were distributed in pole, log, and sap classes, but representation was largest in poles and the smallest amount was in saps.
- Do not use compound labels when a class constitutes less than 10% of the canopy for that species
- A compound class may NOT skip size classes (e.g. P/X).

**Average DBH** – For each species, record the average species diameter.

Note: The size class field is intended to describe the range of each canopy species while Average DBH provides a mean.

**First Age** – For all stands, **record the age of the species most prevalent in the canopy**

- Identify the species most prevalent in the canopy (species with greatest percentage). This is the species for which an age will be recorded.
- Selection of the tree(s) to age is left to the judgment of the examiner. The tree(s) should appear to be representative of the most prevalent species in the canopy, and in the co-dominant class of the canopy.
- **Measure enough representative trees of this species to be confident of the age.** For example, if there appears to be a

mixed age classes of clones within an aspen stand, core more than one tree to better identify the age structure of this stand.

**Second Age** – A second age is often very helpful in determining treatments, habitat value, old growth characteristics, and other information. If there is another distinct age class (differs by at least 10 years) within the canopy that makes up a significant portion of the cover type, record an age for the most prevalent species in that age class. Enter it as the Second Age.

You may also want more than one species aged if you are unsure of what the “most prevalent” species will be when you have finished stage 1 examination of the stand.

Guidance to obtaining a second age in multi-aged stands is based on the definitions for the canopy layers defined earlier and on stand structure:

If a stand has a distinct layer other than the canopy (supercanopy, subcanopy), an age should be taken on that layer. A layer is considered distinct in the following cases:

**Supercanopy** - fits the definition for supercanopy and composes at least 10% of the canopy. In many cases, supercanopy trees will be in the extra-large log class. Examiners need to plan ahead to carry longer increment borers based on imagery assessments. See Age Source for instructions on measuring a tree with a radius greater than the length of the available increment borer.

**Subcanopy** – To be aged, a sub-canopy must meet the following requirements:

- at least 70% of the subcanopy strata appear to have an age **range** of 10 yrs or less. In effect, this judgment would have to be based on consistency in height for the strata. Therefore, the species that make up the strata should have a recorded average height. The only way to conclusively determine that the sapling-sized sub-canopy strata meets our “even-aged” requirement is to be able to age the strata on the basis of an actual measurement, or a plantation, disturbance, or cut record. If the subcanopy is pole or log sized, the age should be determined with an increment borer.

AND

- Has a canopy closure greater than 10%; i.e. has at least a "medium" density rating.

If a stand is composed of **3 distinct layers**, a choice for the second age will need to be made between the supercanopy and the subcanopy based on the relative importance of the layer.

**Site Index** – Site index was a Stage 2 measurement in the first few years of IFMAP, **however**, it is now recommended that any data needed to make and defend a management decision should be collected while performing the stage 1 inventory. The site Index of a particular species in a stand is often used in determining a management direction for a stand. For instance, while inventorying a heavily stocked (>160 square feet) red pine plantation that is obviously ready for an initial third row thinning, record site index measurements during Stage 1. In plantations this is an easy measurement to make since if plantation age is known from records, the only measurement needed is height. Record these height measurements in the general comments field.

Site index measurements should be well distributed throughout the stand. Note the location of the measurements using either GPS coordinates or by marking the map as described under OFS.

Guidelines for the number of site index/height measurements to take:

- 40 acres, take a minimum of 2 SI measurements for red pine
- 41-80 acres, minimum is 3
- Add one more measurements for every 40 acres (i.e., 81-120 – min 4, etc)

### **Subcanopy:**

Subcanopy is defined as trees and shrubs greater than 3 feet tall, which are not a part of the Forest Canopy (over-story). These typically do not touch the live limbs of the Forest Canopy. Subcanopy data provides a quick assessment of sub-canopy characteristics and, in two-aged stands, a second age.

Tree species that are present as seedlings (meaning they are less than 3 feet tall) are also described subcanopy, IF THE STAND BEING SURVEYED WAS **TREATED IN THE LAST 10 YEARS** WITH A GOAL OF ESTABLISHING REGENERATION. Tree seedlings less than 3 feet tall can be noted in any forested stand, but it is not a requirement to note them unless the stand was recently treated.

If no subcanopy elements meet the minimum threshold of 2% "canopy closure", then record "none" in the species box - do not leave it blank. You will be required to enter a "none" in the species field of the DISCO data entry module to note that there was no significant vegetation in the subcanopy.

The two key functions of the subcanopy assessment are to complete the stand's vertical structure profile and to indicate what tree species are viable candidates for overstory recruitment.

**Species/Group** – The subcanopy species group is similar to species in the canopy layer.

- The Subcanopy layer also includes tall shrubs (>3 ft tall).
- No breakdown is needed on the form for conifer vs. deciduous.
- Be species specific wherever possible.
  - Species must always be specified for any tree types used to assess subcanopy age.
  - Species information is particularly important for trees that are viable and significant candidates for recruitment.
  - Subcanopy species are not utilized for determining Level 4 cover type calls, and often the shrubs and young deciduous saplings can be difficult to precisely identify in leaf-off conditions. Therefore, examiners may lump species of similar form into groups (e.g. Genus groups like Maples, Oaks, etc. or if necessary, upland hardwoods, lowland hardwoods, alder, crataegus) when they are not viable and significant candidates for recruitment or are not used for subcanopy age.

**Density** – Density is based on the same concept as the canopy call, that is, the percent of the "sky" that is occupied. In estimating this percentage, assume the canopy layer does not exist. These can add up to greater than 100% due to the structure of the subcanopy.

For the subcanopy, use classes for density of that species:

Low: 2-10% foliage occupancy  
Medium: 11-40% occupancy  
High: 41-70% occupancy  
Full: >70% occupancy

**Avg. Ht** – If at least 70% of that species or group is within one of the height ranges below, record that range. Otherwise, record “V” for “Variable”. Ranges:

3-5 feet  
5.1-10 feet  
10.1 to 20 feet  
20.1 to 30 feet  
30.1 to 40 feet  
>40 feet  
< 3 feet\*  
3-10 (expired) – DO NOT USE!!!

*\*only required to be noted for tree seedlings following a regeneration treatment in the past 10 years.*

**Size class** – For each species or group listed in the subcanopy call, describe its average size class. Use the following codes:

S=Sapling (1-5 inches dbh, defined as over 3’ tall)  
P=Pole (5-10 inches dbh)  
L=Log (over 10 inches dbh)  
T=Tall Shrub (over 3 ft tall)  
Sd=Seedling (defined as less than 3’ tall)\*

*\*only required to be noted for tree seedlings following a regeneration treatment in the past 10 years.*

## STAND LEVEL DATA

**Too Snowy** – If deep snow prevents an accurate survey, circle the “Too Snowy” check box. Any time a survey is conducted when the snowpack is 3’ or greater, “Too Snowy” should be “yes”.

**Slash** – Unusual concentrations of downed woody material resulting from such natural events as wind, fire, or snow breakage or such human activities as logging or road construction.

- Slash is not the same as coarse woody debris.
- Continuity is an important concept - slash continuity will dictate spread rate for fire.
- “Fuel” is a narrow definition assuming a certain use or potential use of the downed woody material. Slash contributes more than fuel to the site.
- Typically slash is predominantly composed of smaller stems and branches.
- Evaluate the entire area within view as you traverse the stand and record the presence or absence of slash as yes or no.

**Basal Area Swings** – In certain cover types where management decisions are often on basal area, a quick assessment of total basal area is required to support decisions as to whether this polygon meets silvicultural criteria and should become an “area of interest”. The following IFMAP level 3 classes should be included (others can be added):

411 Northern Hardwoods

412 Oak

421 Planted Pines (except jack pine or scotch pine)

422 Natural Pines (except jack pine)

- If it is not immediately apparent if BA is needed, err on the side of caution by making the BA measurements.
- This quick assessment will be based on recording the total BA on 3 prism sweeps at representative points within the stand (see Field Protocol in this chapter).
- No species breakdown is needed.

- Since this is a rough BA, the BA will be reported by the application as a basal area range to be used to determine whether the stand meets silvicultural criteria. The seven ranges reported will be:

0-50	111-140
51-80	141-170
81-110	171-200
200 plus	

**Survey Type** – How was the data collected or coverytype call made? Was the information collected with a *remote* method, from the *edge* of the stand, or from an actual *field* walk through?

**Field** – the examiner followed field procedures outlined in Forested Field Protocol below to gather Stage 1 variables.

**Remote** – The goal in Stage 1 is to provide wall to wall descriptions of forested and non-forested types by visiting every site. Unfortunately, in certain instances, this is not possible. The following rules will help guide personnel in making sound decisions on when it is acceptable and prudent to make remote calls:

If there is no legal access to a stand AND permission was sought and refused to access the stand across private lands

*OR*

If access to a stand is physically blocked by such things as rock ledges, rivers, beaver ponds, excessively steep terrain, or flooding to an extent that access would be dangerous, excessively arduous, or so time consuming as to be deemed impractical and inefficient

*THEN*

A remote call may be made based on imagery and knowledge of adjacent lands. Age will need to be estimated based on the best available information. Age Source will be “remote”, as will Survey Type. Entering a “remote” survey type requires a valid reason. You will be prompted to enter a reason. If the stand identified as a remote call appears to have the same texture and tone on imagery as a nearby

accessible stand, data from the nearby stand may be used. If not, the stand examiner should fill in the stand level data: plantation yes/no, upland/lowland, overall size class, canopy closure, estimated level 4 call, stand of interest, multistoried, first age and age source. The Canopy and Subcanopy inputs are disabled for data entry.

Note: a remote cover type call should be to level 4 if possible, but we may need to accept level 3 in some cases.

**Edge** – in some instances, a stand may be accessible along the perimeter or a portion of the perimeter. Stands that are covered in standing water or stands that are across a river with no means of access are examples of possible edge call candidates. These stands would meet the conditions spelled out above for the remote call, but some data may be collected from the edge of the stand that would not be available in a remote call.

In addition to the general stand level information (plantation yes/no, upland/lowland, overall size class, canopy closure, estimated level 4 call, stand of interest, multistoried, first age and age source), data collected in edge calls also includes visual estimates of canopy and subcanopy species and percent cover. You will be prompted to enter a valid reason for taking “edge” data.

Decision to use “remote” and “edge” calls should be documented clearly by the stand examiner. The decision must stand up to scrutiny during the quality control process. Keep in mind that a complete inventory includes accurate information on all cover types, regardless of treatment plans.

**Plantation** – The *Dictionary of Forestry*<sup>1</sup> defines a plantation as “a stand composed primarily of trees established by planting or artificial seeding”. It further notes that “a plantation may have tree or understory components that have resulted from natural regeneration, and a plantation may be pure or mixed species, treated to have uniform or diverse structure and age classes”.

First and foremost, in IFMAP the “yes” or “no” plantation code is used in upland conifers to determine cover type. Where possible, it also provides valuable information on stand origin and structure.

To code plantation, the following rules apply:

For stands with less than 25% of the ground covered by tree canopy (non-forested stands), code plantation "yes" when a majority of the trees were established by planting or seeding.

For stands with greater than 25% of the ground covered by tree canopy (forested stands), code plantation "yes" when a majority (either by basal area or canopy percentage) of the canopy trees were established by planting or seeding.

ELSE code "no"

**TIP:** Remember that it isn't always easy to determine whether or not a stand is a plantation in older stands by just looking at the trees. In the office before going to the field, check plantation records, the old land record cards, survey notes, and other records. In the field, look for evidence of trenching, uniform spacing and structure, and other "clues".

**TIP:** In a young plantation, natural seedlings are often abundant – and plantations/seedings do fail. There may be a point when the number of natural trees may shift the coding to plantation "no" in a stand that was planted or seeded.

**TIP:** Being planted or seeded does not make the stand forested. A plantation will be considered non-forested until at least 25% of the ground is covered by tree canopy – so a freshly planted stand could code out as an herbaceous openland with a plantation code of "yes".

**Upland/Lowland** – For IFMAP purposes, lowlands are defined as lands that are periodically flooded (**for two weeks or more during the growing season**) and/or have hydric soils or lowland indicator plants. This call is an important part of the cover type designation – and a difficult decision to make at times. Upland/lowland calls should be made in the field whenever possible. Make sure you go to the field prepared by analyzing available information sources (available as tables or layers in the GDSE):

- Michigan Hydric Soils List
- NRCS Soil Maps
- National Wetlands Inventory Maps
- USGS Topography Maps

Primary field indicators that a site is lowland include:

- Standing water
- Soil saturation
- Watermarks on trees
- Drift marks along the ground
- Sediment deposits
- Drainage patterns

Secondary indicators include:

- Water stained leaves
- Local soil survey hydrology data
- Bare soil areas
- Morphological plant adaptations like the buttressing of tree roots.

**Overall Size class** – For “Overall Size” record (circle) just 1 class (sap, pole, log – there is no “large log” option here). No compound codes are used to represent the entire stand.

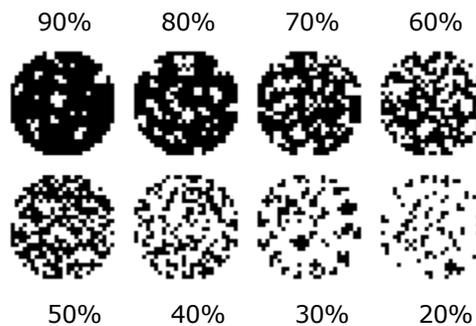
The decision rule for size class is:

Log: > 30% of the canopy is occupied by log-size (> 10” dbh) trees

Pole: < 30% of the canopy is log-sized, AND >30% of the canopy is occupied by pole-size (5-10” dbh) trees

Sapling: Stand is forested, but neither of the above applies.

**Canopy closure** – Select the percentage of the sky occupied by overstory foliage using 1 of the 3 forested canopy closure classes (25-50%, 50-75%, 75-100%). It is important to use the imagery as well as visual estimation when deciding which class applies. The following graphic may help with estimation:



**Multi-Storied** – should be marked as 'Yes' for stands that are 'all-aged' or 'uneven-aged', and consist of multiple (3 or more) structural classes that are indistinct and not easily discerned. All layers and ages are present, but none of them are distinct or predominate. One indicator of this attribute would be current or historic evidence of gap dynamics occurring within this stand. Stands coded as 'yes' will be considered "Uneven-aged" in analyses of the data.

Stands that are 'Two-aged' SHOULD NOT be coded as 'Multi-Storied'. Two-aged stands are identified by the presence of two distinct age classes. A second age should be recorded for these types of stands.

Northern Hardwood stands are not inherently 'Multi-storied' or 'uneven-aged'. While that may be a desired future condition for many stands, it is uncommon. Currently, northern hardwood stands that qualify as 'multi-storied' are found in the northwestern portion of the Upper Peninsula, with some very rare exceptions in the Lower Peninsula.

Other covertypes that may meet the criteria to be considered 'Multi-storied' include Natural White Pine types (4220), upland fir types (42330), and some lowland types that have developed variable age structure through natural disturbance. While there may be other types that could qualify, they are the exception.

Finally, regardless of whether a stand is coded as Multi-storied, it is still essential to record an appropriate 'First-Age' for that stand.

**Age Source** – the source of the age determination. The following are the preferred methods, **in order**, by which age should be determined. If a type of record does not apply (e.g.- plantation or cutting), move down to the next method. If you do not have records, or are unable to obtain them for some reason for the first method of age determination, move down to the next method as well.

- **Plantation Record** – Age was obtained from actual plantation record. Record actual plantation year of origin (planting year, without age of planting stock added).
- **Cutting Record** – Record the actual year of origin from the timber harvest cutting record. For naturally regenerated stands, this may be estimated from harvest to stand establishment depending on species and site conditions.
- **Current measurement** (increment borer) – select a co-dominant tree from species of interest. Count the number of rings at dbh, then add on the appropriate number of years to get to dbh based on the site and the species measured. Record the year of origin. See USFS table below for years to dbh for Great Lakes species.

**TIP:** You can record the number of rings in the field and add the appropriate years when you return, but be sure to note on the field sheet that the number written is rings, not years.

Average Number of Years to Reach Breast Height  
by Species and Site (Lake States)

Species	Good Site	Average Site	Poor Site and Suppressed Trees
Aspen	1	1	2
Ash	8	10	15
Balsam Poplar	1	1	2
Balsam Fir	10	10	15
Basswood	2	3	4
Birch, Yellow	8	10	15
Birch, Paper	2	3	4
Cedar, Northern White	10	15	20
Elm	4	6	8
Maple, Hard	8	10	15
Maple, Soft	2	3	4
Oak	3	3	6
Pine, Jack	5	6	8
Pine, Red	6	8	10
Pine, White	8	10	12
Spruce, Black	10	15	20
Spruce, White	10	12	15
Tamarack	5	7	10

Source: USFS Timber Management Field Book, 1975 edition

If the radius of the tree is greater than the length of the available increment borer, use the following procedure:

- Bore into the tree as far as possible, extract core and count rings.
- Measure the diameter of the tree using a diameter tape, divide by 2, and then subtract the bark thickness. This is the radius of the tree.
- Measure the length of the core, and subtract from the radius to determine how much longer the core would have to be to reach the pith.
- Count the number of rings in the innermost inch and extrapolate to the center.

Example: Determine the age of a 40" DBH tree with a bark thickness of 2.0 inches when a core 16" long has 200 rings and the innermost inch has 5 rings.

- |                                |   |
|--------------------------------|---|
| 1. DBH/2                       | $40.0/2 = 20.0$                                 |
| 2. Bark thickness              | 2.0"  |
| 3. Difference                  | $20.0 \text{ minus } 2.0 = 18 \text{ (radius)}$ |
| 4. Core length                 | 16"   |
| 5. Radius minus core           | $18"-16" = 2$                                   |
| 6. Rings in innermost inch     | 5   |
| 7. Product step 5 times step 6 | $5 \times 2 = 10$                               |
| 8. # Rings on core + step 7    | $200 + 10 = 210 \text{ (tree age)}$             |

- **Previous Inventory** – record year of origin from operations inventory or other inventory (note source in comments). Use this only if you are confident it is correct and the age will stand up to further scrutiny.
- **Remote** – stand meets criteria to allow a remote call. Age estimated from: nearby stand, imagery, historical data other than previous inventory. Note source of age in comments.
- **Estimate** – use as last resort when the stand does not meet remote call criteria, but you are unable to obtain the actual age. Describe the reason the age was estimated in comments. Age should be based on nearby stand, imagery, or historical record other than previous inventory.

**Estimated Cover Type** – This is the stand examiner’s “gut call” as to what is the appropriate Level 4 species association classification for that stand. The actual Level 4 cover call will be calculated from the species canopy percentages and the classification scheme decision rules. Don’t go through the decision rules to get this call right. This call will be used as a feedback check to see that our decision rules appropriately define that class. Refer to the IFMAP classification list for full enumeration of available types. Be sure to use the appropriate upland/lowland call (e.g. if you called the stand “upland”, don’t use a “lowland” level 4 call).

## MANAGEMENT FIELDS

There are three management fields:

- 1) a stand of interest assessment,
- 2) a reason for the interest box, and
- 3) a management considerations box.

**Stand of Interest:** Available checkboxes are “yes”, “no”, and “maybe”. This checkbox is used to record that the examiner thinks the stand should be considered during the post-Stage 1 AOI nomination process as a potential area of interest. Stands identified as “yes” or “maybe” will automatically populate a list of stands of interest later.

**Why of Interest?** – Why the examiner thinks this should be an area of interest. This box must be used when the Stand of Interest box is recorded as “yes”. The pick-list of choices includes:

**Silvicultural Criteria** – area of interest (AOI) meets minimum silvicultural criteria to warrant potential treatment consideration. (i.e. those stands typically managed by basal area)

**Age Criteria** – AOI meets minimum age criteria to warrant potential treatment consideration. (i.e. those stands typically managed by age)

**Habitat Management** – AOI is identified as having potential for habitat management activities including non-commercial forest regeneration, shrub planting, and/or herbaceous planting and/or mowing.

**Regeneration Concern** – AOI is identified as desirable for conversion, for natural succession, or as having potentially inadequate regeneration to meet vegetation goals.

**Pest Concern** – AOI is identified as having potential pest concerns which may compromise/modify/affect vegetation goals.

**Unique Site** – AOI is identified as a locally or regionally unique site. More information may be needed at to aid in management or designation decisions.

**Ecological Restoration** – AOI is identified as potentially desirable to manage for the purpose of assisting the recovery of an ecosystem that has been damaged, degraded, or destroyed, with the goal of enhancing or restoring the site to better allow natural processes to function.

**See Comments** – clarify fully in comments.

**Management Considerations:** Record any management recommendations, draft treatment notes, and obvious management constraints (potential limiting factors) here. The more you record here, the easier it will be to write treatment prescriptions later. There are often obvious constraints on management activities that are observed while in the stand. If you find obvious/possible constraints, record comments for later uses in determining any limiting factors for the stand. Examples

include "possibly landlocked - will need to contact landowner for access", "high water level", "very steep in the west end", "very poor quality trees", etc. See Chapter 16 for details on digitizing Site Conditions, and Appendix O for a listing of Site Conditions.

***These comments will not be a part of the public web posting***, so please record draft treatment prescriptions here. Noting them here will prevent you from having to come back and delete comments about prescriptions that are never coded and/or approved later in the decision making process.

## ADDITIONAL INFORMATION

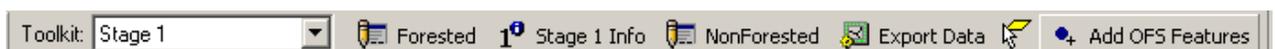
**OFS (Opportunistic Field Survey) Type:** OFS features are not a stand attribute, but a separate point layer. OFS is included on the stand field sheet as a convenient place to note that an OFS feature was encountered and recorded.

If you encounter any notable features (e.g. an illegal dump site, a vernal pond, etc.) mark the location on your Stage 1 map. Record the feature name or description in your comments. If you have more accurate easting & northing (x,y) coordinates for the location from GPS (make sure GPS unit is displaying GeoRef coordinates), you could write those coordinates in your comments as well.

Please refer to the OFS tool for current pick-list items. If the current pick-list is inadequate for describing a notable feature, there will be mechanisms to add additional pick-list items.

To record an OFS point when you return from the field:

1. Add the OFS layer to your document and make it your target layer.
2. Start an edit session and select the OFS tool from the Stage 1 toolkit.



3. Follow the screens to map and record the OFS.

Coordinates can be determined by using the graticules and tics on your 1:7920 scale Stage 1 field map (Figure 1.5), GPS (make sure GPS unit is displaying GeoRef coordinates) or marks on the field map.

**General Comments:** Comments are an excellent way to characterize stand conditions and attributes that cannot be coded, or that coding does not make clear. Use comments to describe the stand, to note special conditions, and/or to explain unclear/confusing coding.

Keep in mind that while unstructured comments are valuable, they are not consistently retrievable in the database. To avoid potential confusion later on, **do not put draft management recommendations in this section** as ***these comments will be posted*** on the Internet as part of our web posting process, and may contradict later treatment decisions.

## Stage 1 Field Protocol

This section outlines the general protocol or process to use when doing Stage 1 inventory.

### RESPONSIBILITY

- Stage 1 inventory of **forested** stands will be the primary responsibility of FMFMD staff.
- Stage 1 inventory of **non-forested** stands (e.g. upland openings, non-forested wetlands, etc.) are the responsibility of staff that have a need for more information beyond a field-verified cover type call. The determinations of which stands will have detailed Stage 1 data collection will be made locally.
- Stage 1 inventory of **non-forested** stands that have a **forested** management objective will be the primary responsibility of FRD staff. This protocol will be covered in the next chapter.
- All stands that were treated in the last 10 years, with a goal of establishing tree regeneration, must be surveyed during conditions that will allow accurate observations about species presence and condition to be noted. **Often times this will mean visiting these specific stands when no snow is present.**

- While collecting Stage 1 inventory data every effort should be made to identify Site Conditions that can be digitized using the Site Condition layer. See Chapter 16 for further detail on digitizing this layer and Appendix O for a listing of Site Conditions.

## FIELD PROTOCOL

1. All **non-forested** types should be remotely classified to a Level 3 canopy call **prior** to visiting the field. The cover meta field for these stands will default to "pre-inventory" to show they were coded at that time. Level 4 cover types will be attained during field visits where possible (not snow limited) and cover meta will be changed to "field" at that time. In addition, any available age data from planting or treatment records should be recorded on the field form. Refer to the Non-Forested Stage 1 Field Guide (chapter 4) for more information.

IFMAP Classification List	
<b>3 Upland Openland</b>	
310 Herbaceous Openland	
3101	Poverty Grass, Cladonia
3102	Grass
31021	Cool Season Grass
31022	Warm Season Grass
3103	Rubus, Fern
3104	Degraded
3105	Mixed Upland Herbaceous
320 Upland Shrub	
3201	Sweet Fern
3202	Autumn Olive/Honeysuckle
3203	Upland Blueberry
3204	Mast Producing Shrub
3205	Mixed Upland Shrub

2. Establishing a route:
  - transects should be laid out to efficiently sample multiple stands.
  - transects should pass through a representative portion of the stand (based on the imagery).
  - stops can be semi-randomly plotted along the transect in advance or determined in the field.
3. Sampling:
  - the first stop should be established shortly after entering the stand, 2-4 chains
  - the second stop should fall near the center of the transect, distance from plot one will vary with stand size
  - the third stop should be near the end of the transect, but no closer than 2 chains within the edge of the stand (to avoid possible edge bias)
  - These "stops" are more of a training tool to take the stand data. As you get more familiar with the data collection procedures your method may change. The "stop" method is to remind you to take BA swings in those stands that require it.

The concept of stage 1 sampling is more qualitative than quantitative so actual stop location is not critical. Some element of randomness is necessary to avoid bias of the basal area samples.

It is recommended that as you approach the approximate location of each stop, you continue pacing one chain to more randomly determine the actual plot center. While traveling between stops, consciously evaluate the canopy to get a "feel" for the composition and structure of the stand.

#### 4. Stop 1:

- approximate the percentage of deciduous vs. coniferous species in the canopy
- enter species, and begin estimating percentages for each (it is not necessary to enter the percentages at this time, or you may lightly pencil them in)
- list species groups present in the sub-canopy, and begin estimating density, average height, and size category (it is not necessary to enter this at this time, or you may lightly pencil them in)
- measure basal area for cover types where management is influenced by BA. Record BA.
- begin navigating to stop 2. While walking, emphasis should be placed on evaluating canopy, not on trying to precisely navigate to a specific point. Pacing and compassing is sufficient to give the examiner a sense of location. If you feel you are biasing the location of the second stop, continue on for one more chain and stop there.

#### 5. Stop 2:

- add any additional species you may have encountered to the canopy species list.
- assign or adjust percentages to each species.
- record size class and average dbh for each species
- if predominant species is obvious at this point, get age, if not wait until stop three
- add any additional species/groups to the sub-canopy and record density, average height, and size category.
- measure and record basal area.
- if second age class is evident at this point, get age, if not wait until stop three.
- while walking to stop 3 continue to evaluate the canopy.

## 6. Stop 3:

- make final adjustments to species and percentages, size class and dbh.
- make final adjustments to sub-canopy, density, average height, and size category.
- measure and record basal area.
- record whether or not slash is present. Slash should be a fairly continuous feature throughout the stand to be marked as present.
- age the predominant species if it was not already done at stop 2, or if the stop 2 measurement appears incorrect after evaluating more of the stand.
- obtain a second age if applicable and if it was not already recorded at stop 2, or if stop 2 measurement appears incorrect.
- complete source fields for age and survey type.
- estimate the cover type without actually going through the classification key, enter your "best guess" at the level four canopy call using the "Forested Class List" tatum guide.
- record whether plantation or not.
- record upland or lowland.
- record overall size.
- record percent canopy closure for the stand.
- record whether or not the examiner feels this is a stand of interest.
- if yes, record why it is a stand of interest.
- record any obvious management recommendations/constraints. Comments should include draft treatment notes if applicable, and/or possible limiting factors.
- record any general comments. Comments are very useful in describing stands and potential management, as well as interesting characteristics and special features of the stand. Use of comments is highly recommended and encouraged.

## 7. Move on to next stand.

Initial determinations of whether stands are forested or non-forested are made prior to field inventory using imagery, OI records, and other tools. In some cases, a stand expected to be forested may turn out to have less than 25% tree cover and will have to be inventoried using the non-forested stand forms and procedures. It would be wise to carry some blank non-forested stage 1 forms in case this happens.

**Stage 1 Forested Tatum Guide.** See excel file "New St1 Forested Field Form and Tatum Guide\_(date).xls" in I:\IFMAP Inventory Manual \ 2009 Revision

<p><b>Canopy Species</b> List species that make up at least 2% of the crown. Record to species (may use genus for fifth type of deciduous or coniferous if necessary, but use comments to explain)</p>	<p><b>Canopy Species Percent Cover</b> Total must add to 100%</p>	<p><b>Canopy Species Size Class</b> S= Sapling (1-5" DBH) P= Pole (5-10" DBH) L= Log (10-18" DBH) X= Large Log (&gt;18") Compound classes (P/L) may be used, but may not skip classes.</p>	<p><b>Canopy species Average DBH</b> Mean DBH for the species</p>	<p><b>Canopy Closure</b> Percent of sky occupied by overstory foliage. Don't include saps in canopy gaps as part of estimate. 25-50% 50-75% 75-100%</p>																												
			<p><b>Canopy Species Age</b> Record age of most prevalent species(s). Also record supercanopy age, if applicable.</p>	<p><b>Est. Cover Type</b> Gut call on covertype Use LVL 4 Code</p>																												
			<p><b>Stand of Interest?</b> Do you want to do anything beyond stage 1 data collection on this stand?</p>																													
<p><b>Subcanopy Species/Group</b> List species/species groups that make up at least 2% of the crown. Includes tall shrubs. Be species specific if possible, especially for any tree types that are used to assess subcanopy age. Species info is also imp't for trees that may be recruited into the canopy in the future.</p>	<p><b>IFMAP Forested Field Data Form</b></p> <table border="1"> <thead> <tr> <th>Count</th> <th>Species</th> <th>Name</th> <th>Class</th> <th>DBH</th> <th>Age</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td colspan="7"><b>Forest Canopy</b></td> </tr> <tr> <td colspan="7"><b>Sub-Canopy</b></td> </tr> <tr> <td colspan="7"><b>O/S</b></td> </tr> </tbody> </table> <p><b>General Stand Comments</b> <i>Use this text field to describe attributes of the stand not already described by stage 1 data. Usually these comments are not related to vegetation. Example: "Spoke with landowner to the North, did not go where corners were."</i></p> <p><b>Management Considerations (Proposed Treatment)</b> <b>Management Considerations and Proposed Treatment (If needed)</b> <i>Comments that describe obvious constraints on management</i> <b>Record proposed treatment details here which will later be copied into the treatments layer</b></p>			Count	Species	Name	Class	DBH	Age	Date	<b>Forest Canopy</b>							<b>Sub-Canopy</b>							<b>O/S</b>							<p><b>Why of Interest?</b> -Silvicultural criteria -Age criteria -Habitat Mgt -Regeneration -Pest concern -Unique site -See comments</p>
Count	Species	Name	Class	DBH	Age	Date																										
<b>Forest Canopy</b>																																
<b>Sub-Canopy</b>																																
<b>O/S</b>																																
<p><b>Subcanopy Density</b> Percent of "sky" occupied, ignoring canopy layer: L=Low: 2-10% M=Medium: 11-40% H=High: 41-70% F=Full: &gt;70%</p>				<p><b>Slash?</b> Unusual concentrations of downed woody material from wind, fire, snow breakage, logging, road construction, etc. If deep snow prevents an accurate survey of slash, circle "too snowy".</p>																												
<p><b>Subcanopy Average Height</b> If at least 70% of the species or group is in a range below, record that range. Otherwise, record "V" for variable. 3-5 ft            10.1-20 ft 5.1-10 ft        20.1-30 ft (+additional 10 ft increments)</p>				<p><b>MultiStored?</b> - Circle only if stand appears to consist of multiple (3+) structural classes, but distinct classes or layers cannot be discerned. All layers are present, but none of them are distinct or predominate.</p>																												
<p><b>Subcanopy Size Class</b> Record average size class for that species/group: S= Sapling (&gt; 3 ft tall, 1-5" DBH) P= Pole (5-10" DBH) L= Log (&gt; 10" DBH) T= Tall Shrub (over 3 ft tall)</p>				<p><b>Source of Ages</b> -Plantation Record, -Cutting Record, -Current Measurement, -Previous Inventory, -Remote, -Estimate (last resort)</p>																												
<p><b>Subcanopy Age</b> Record age of subcanopy species if it meets criteria (70% of subcanopy species appears to have an age range of 10 years or less AND density is at least medium).</p>				<p><b>Survey Type</b> - How was the data collected? Remote and edge calls require specific circumstances (see manual). State reason field call was not possible in comments.</p>																												
<p><b>Opportunistic Field Survey Type:</b> Use OFS tatum guide for list. For point specific feature, record coordinates from map graticules or GPS to comments. Record clear descriptive comments.</p>				<p><b>Snow Limited?</b> &gt; 3' Snow Cover during survey, Snow may be covering sub canopy species in the 3-5' height class</p>																												
		<p><b>Plantation?</b> Yes if ground was furrowed, Trees were planted</p>	<p><b>Upland/Lowland</b> - Don't make this decision with just the current condition - look at species, landscape position, evidence of flooding, etc.</p>																													
			<p><b>Overall Size</b> No combined types. <b>Log:</b> &gt;30% of the canopy log size (&gt;10"DBH) trees. <b>Pole:</b> &lt;30% of canopy is log sized AND &gt;30% of canopy is pole-sized (5-10"DBH). <b>Sapling:</b> stand forested, but neither of above is true.</p>																													
			<p><b>Basal Area Swings</b> - record total basal area. Take on ALL oak, red pine, white pine and northern hardwoods stands. Other stands if treatment may be BA dependant. Err on the side of caution by taking measurements if in doubt. Use 3 sweeps at representative points in the stand. <b>Use BA by Species if species breakdown is needed for a management decision.</b></p>																													