

Objective: Tree species diversity.

The representation of the variety of species that are natural to the site will provide the best chance for survival of dependent species and long-term forest health. Species variety will improve the frequency of good seed and fruit crops on which an array of wildlife species depend. Management consideration is important during harvest and regeneration.

- Ironwood – full crowned on edges especially
- Black cherry – may disappear in many northern stands
- Pin cherry – temporary soft mast on roads and landings
- Juneberry – excellent fruit, long-lived, release to preserve
- Oaks – very valuable hard mast producer
- Yellow birch – catkins and seeds
- White birch – catkins and seeds
- White ash – squirrels, mice, birds consume seed
- Basswood – squirrels, mice, birds consume seed
- Maples – squirrels, mice, birds consume seed
- Beech – very valuable hard mast when it produces

Evergreens, such as white pine, hemlock, red pine, balsam fir, white cedar and white spruce significantly increase the number of wildlife species that will occupy an area by providing a very different kind of cover, food and dependent life forms.

Objective: Standing snags and den trees.

Thirty-three species of Michigan birds use sites in dead or decadent trees for nesting. In addition, many species of mammals make important use of tree cavities. Intensive management of hardwood stands that discriminates heavily against decadent trees can significantly reduce wildlife use and productivity. Hardwood management must provide for present and future snags and den trees.

- Soft snags for excavators like nuthatches and chickadees are required.
- Hard snags, including those on live trees, are necessary to foraging woodpeckers.
- Den trees and dead snags greater than 20" dbh provide the greatest value.
- If a stand has been previously TSI'd and is devoid of large snags, girdle low-grade log-sized trees.
- Girdled dead snags are inferior to naturally decayed trees because they tend to rot from outside in.
- Preserve current den trees but provide for future ones – look for bole defect, tops likely to split or die, decaying limb stubs, injury or decay at the butt, conks.
- Control loss to firewood cutting.
- Look for the “no-harm” den tree – small but live-crowned tops can provide dens for a long period without using much crown space.
- Species variety – each tree species has different decay characteristics and potential values. A hard maple with a den is likely to last decades because of rot resistance. A lightning split basswood could develop a hollow trunk relatively quickly.
- Every acre doesn't have to be treated equally. Areas around wetlands, watercourses, ponds, slopes or even roadways are places to consider leaving an abundance of snags and den trees.
- As a general rule, 3 to 6 den trees per acre should be provided. These den trees should be of a variety of species and condition. This does not include trees that are projected to become future den trees.

Objective: Adequate dead wood on the forest floor.

A great variety of organisms are dependent on the presence of dead wood on the forest floor. The popular feeling that wood is wasted if it rots has to be at least partially dismissed. Species as variety as the black bear, ruffed grouse, ring-necked snake, red-backed vole, salamanders, snails, slugs, and fungi use or depend on decaying wood as a source of food or shelter. A managed forest cannot provide the same volume of this material as a natural forest, but it must be a consideration.

- Avoid whole-tree harvest with slasher at landings (an unusual practice in hardwoods).
- Limit the percentage of tops that may be removed for fuelwood (in areas of heaving deer browsing they may shelter regeneration as well).
- Larger diameter material contributes more and lasts longer than small diameter.
- Girdling of cut trees will eventually lead to downed wood.
- Standing snags and den trees at risk of windthrow and breakage contribute to downed wood over time.
- Do not conduct, or conduct only partial, salvage of trees lost to an event such as a tornado or a disease or insect outbreak.

Objective: Structural variety within the stand.

Many of our hardwood forests are evenage. The unbroken brown closure prevents the development of a multi-layered vegetation structure that develops in a fully mature condition. An understory, both below crown level and near the ground, increases wildlife species diversity, especially birds. Pockets of tree seedlings and shrubs provide habitat for some species that would not utilize stands in a park-like condition. The addition of other layers of vegetation does not usually discourage species that are present in the closed-crown, single-layer condition.

- Gaps or regeneration holes of 40-150' diameter develop structural variety.
- Heavy uniform thinning will result in two age classes and not a long term structural variety.
- Structural differences do not have to occur on every acre to be important and areas of change will move in succeeding treatments. Some species, such as goshawk and red-shouldered hawk, prefer a closed canopy and open understory around nest trees.
- Linear oriented holes can contribute, i.e. haul roads and skidways, to structural variety.

CAVITY NESTING BIRDS OF MICHIGAN

Goldeneye
Wood duck
Hooded merganser
Common merganser
Turkey vulture
Kestrel
Screech owl
Barred owl
Log-eared owl-partial
Northern saw-whet owl
Common flicker
Pileated woodpecker
Red-bellied woodpecker
Red-headed woodpecker
Yellow-bellied sapsucker
Hairy woodpecker
Downy woodpecker
Black-backed tree-toed woodpecker
Great-crested fly catcher
Tree swallow
Black-capped chickadee
Boreal chickadee
Tufted titmouse
White-breasted nuthatch
Red-breasted nuthatch
Brown creeper
Winter wren
House wren
Carolina wren
Eastern bluebird
Starling
Prothonotary warbler
House sparrow

MICHIGAN MAMMALS USING CAVITIES OF STANDING TREES

Opossum
Bats – loose tree bark, hollows
Gray squirrel
Fox squirrel
Red squirrel

Northern flying squirrel
Southern flying squirrel
White-footed mouse
Deer mouse
Porcupine
Black bear
Raccoon
Marten
Fisher
Bobcat

ORGANIZING THE MARKING JOB

1. **PRIORITIZE STAND.** First priority should be accessible, high quality, high BA, high value sales.
2. **PRIORITIZE SEASON FOR THIS WORK.** Best time is when leaf-off and snow-off coincide. DO NOT! DO NOT! Mark unless bare leaf litter can be seen at least around the stump of the tree.
3. **REVIEW O.I. STAND DATA AND NOTES.** From ancillary data, determine which diameter classes need work to bring the stand into proper structure. Check for special conditions noted at compartment review, such as Red Shouldered Hawk nest.
4. **GATHER ALL NEEDED TOOLS, PAINT, HAND CLEANER, TALLY SHEETS, AND OTHER MATERIALS NEEDED.** If two or more people are working on the same sale, coordinate. Use same color paint, same method of tallying, grouping, or separating species, etc. Do not use the same color as used for a recreation trail through the stand.
5. **WHEN YOU REACH THE FIELD, COORDINATE AGAIN.** Establish stand boundaries, decide access routes and landing areas. From this, decide which side of the tree the marks should go on. Marks go on the side that the tree would normally be approached from. (Side toward road and toward downhill.) Loggers like marks on two sides to make it easier to spot trees, especially in deep snow country.
6. **PAINT NICE SOLID SPOTS, NOT NARROW STREAKS OR SPRINKLES.** Stump marks should be continuous from stump to litter. Place marks in a protective “cove” on tight clean bark. Make marks that will last 4 or 5 years of weather and the wear and tear of logging.
7. **VISUALIZE WHERE EACH CUT TREE WILL FALL.** What is in the way? Can the logger do what your paint and/or lack of paint requires?
8. **WATCH WIND DIRECTION AND DO NOT STAND IN BACK SPRAY!** Keep paint off of your skin as much as possible and wash hands before eating (paint and bug dope). Keep tally forms neat—they may end up as evidence in court!
9. **MARK IN NARROW STRIPS ABOUT 60 TO 100 FEET WIDE.** Keep paint toward the unmarked portion of the stand so you can see it while marking the next strip.
10. **WHEN MARKING WITH TWO OR MORE PEOPLE,** stay in line as much as you can, slightly staggered behind the lead marker. Avoid skips and crossing into the other person’s strip. DO NOT reach into the other person’s strip to mark a tree that you think they missed! Trees are marked and left for many reasons, some which you may not have observed from you vantage point.

11. **CHANGE LEAD MARKER ON EACH PASS.** Let the person that marked the last strip in the previous pass mark the first strip in the next pass. This reduces the chance of skips and helps coordinate decisions that cross over between passes. Talk to each other, or if marking alone, talk to yourself to keep in mind all of the variables to be considered.

12. **USE CODED PAINT OR TRAP TREES WHEN YOU HAVE STRONG REASON TO EXPECT A THIEF IN THE BUSH.** Trap trees need to be well documented with reference to landmark or buried iron marker that can be relocated by metal detector. Take photos!

A QUICK GUIDE TO HARDWOOD MARKING
SELECTION MANAGEMENT

I. GOAL

- A. Work to Improve Tree Quality & Growth of Present Stand
- B. Move Towards Regulation
 - 1. For a successful selection system, 35-50 potential #1 crop trees/acre are needed. Fewer number of #1 trees if the stand averages 12" DBH+.

II. GUIDING PRINCIPLE

- A. Always Manage for the Best Tree in Place

III. SELECTING TREES TO MARK

- A. Remove Risk Trees (Maple Borer, V-forks, etc.)
- B. Remove All Eutypella Canker from the Stand
- C. Retain 1-2 Cavity Trees Per Acre (Retain Snags)

****Note****These maybe clumped and not present on every acre. Concentrate on edges, type or habitat change. After marking or retaining the above, additional trees can be marked to achieve the desired residual B.A.

- D. Mark Poor Quality Trees (Poor form)
- E. Crown Release Crop Trees

- 1. Small log
- 2. Large Pole
- 3. Small pole
 - a. For trees 8" or less – 7 ft crown
 - b. For trees 9"+ -- remove two most important poor quality crown competitor.

- F. Remove less desirable Species (Species in order of desirability)
 - 1. Oak (22"-26") – Sugar Maple (22"-24") – Yellow Birch (20"-22") – White Ash (20") – Black Cherry
 - 2. Basswood (18"-20") – Red Maple (20"-22") – White Birch
 - 3. Bech

****Note****Retain 10-15 sq ft/acre for wildlife value

**DBH to Basal Area Relationship for
80% and 90% Crown Cover for Marking Even Aged Hardwoods**

DBH	PERCENT CROWN COVER	
	80%	90%
	Residual Basal Area	Residual Basal Area
4"	39.0	
5"	45.7	
6"	51.4	
7"	56.8	
8"	61.1	
9"		72.8
10"		76.6
11"		79.6
12"		82.5
13"		85.6
14"		87.3
15"		89.8
16"		91.5
17"		93.3
18"		95.2
19"		96.1
20"		97.1
21"		99.1
22"		100.0
23"		101.0
24"		102.0