



Forest Stewardship Plan: Habitat & Resilience Assessment Procedures

These habitat and resilience assessment procedures are designed to support forest stewardship plans that have a focus on bird habitat, climate adaptation, and/or forest carbon. These protocols were adapted from inventory procedures developed by Audubon Vermont. Data collected for this assessment can supplement data provided by a standard timber cruise. Data is collected over the visual acre (the viewable area within a radius of up to 104 ft) unless otherwise noted. These procedures can be used with the companion Habitat & Resilience Combined Data Sheet, but foresters may also create their own data collection tools to suit their workflow.

Overstory Data (All Plans)

Tree Plot and Stand Data: Collect tree, plot, and stand data that – at a minimum – meets Ch61 and Forest Stewardship requirements using your preferred forest inventory method.

Overstory Data (Additional Data for Bird/Climate Plans)

Photo(s): Take at least 1 north-facing photo at each plot. Photos taken in other directions or focusing on unique site features may also be helpful.

Canopy Height: Estimate canopy height: <20 feet, 20-60 feet, or >60 feet.

Canopy Cover: Record an ocular estimate of percent cover for overstory vegetation > 30 ft. in height; select the nearest range of percent cover. If desired, use the 5x5 checkerboard method (attached) to help calibrate your visual estimate as follows:

1. Hold the transparency in a horizontal position over your head,
2. Count the number of squares in which tree crowns (rather than sky) occupy more than half the square, then
3. Multiply that number times 4 to estimate percent crown closure for that point (be sure to record estimated % cover over the visual acre – not just directly over the plot center).

Stocking Level: Record an ocular estimate in the field and consider a desktop review of inventory data for stand-level consideration. Select “inadequate,” “adequate,” or “overstocked” based on a visual assessment.

Distribution: Select “uniform” or “patchy” based on the overstory’s arrangement.

Type: Enter whether midstory is hardwood, softwood, or mixedwood in type.

Overstory/Midstory Data (Additional Data for Climate Plans)

Forest Health: Select “concern” or “no concern” based on a rapid assessment of forest health and productivity. Look for and note signs of pests, disease, lack of vigor, or noteworthy stressors.

Species Diversity: Record an ocular estimate in the field and consider a desktop review of inventory data for stand-level consideration. Select “inadequate” if the number of species present and their abundance does not offer sufficient resilience to current and potential disturbance risks, “adequate” if the number of species present does offer a sufficient buffer against disturbance risk. This is a valuable but subjective measure.

Percent At-Risk Trees: Record an ocular estimate in the field and consider a desktop review of inventory data for stand-level consideration. Select the proportion of trees that are considered at-risk to climate change or other stressors; 25% increments are adequate:

- 0% - None; 25% - Low; 50% - Medium-Low; 75% - Medium-High; 100% - High.

Trees can be at-risk due to forest health issues, structural defects, and/or climate. Consider a tree to be at-risk if there is an immediate threat (e.g., host species for a specific pest that is in the vicinity or the tree is damaged in a way that reduces its viability or productivity during the current management period) and/or if climate change is anticipated to pose a long-term challenge to maintaining a species on site (e.g., species is located at the southern extent of the species range; species is highly vulnerable to a climate stressor like drought or flooding relevant to the site).

Projections of future habitat suitability (found on page 7 & in Appendix 1 of the “Managing Forests for Climate Change in Massachusetts” document) can serve as a starting point for identifying species that may be at-risk. These projections can inform which species are likely to have reduced habitat availability across Massachusetts by the end of the century. However, just because a species is projected to lose available habitat in the region does not necessarily imply the species is at-risk at your site (and vice versa); local factors should also be considered including site conditions and regeneration potential.

Midstory Data (Additional Data for Bird/Climate Plans)

Percent Cover: Record an ocular estimate of percent cover of foliage of woody stems in the 5-30’ midstory; select the nearest range of percent cover. Include non-native, invasive plants if present in this layer.

Distribution: Select “patchy” or “uniform” based on the midstory’s arrangement.

Type: Enter whether midstory is hardwood, softwood, or mixedwood in type.

Understory Data (Additional Data for Bird/Climate Plans)

Percent Cover: Record an ocular estimate of percent cover of foliage of woody stems in the 0-5’; select the nearest range of percent cover. Include non-native, invasive plants if present in this layer.

Distribution: Select “patchy” or “uniform” based on the understory’s arrangement.

Type: Enter whether understory regeneration is hardwood, softwood, or mixedwood in type.

Habitat & Invasives Data (Additional Data for Bird/Climate Plans)

Soft Mast: Select whether “present” or “absent.” List species present such as *Rubus* spp., elderberry, dogwood, apple, and pin cherry.

Woody Invasive Species: Record an ocular estimate of percent cover of foliage of non-native, invasive woody plants to the nearest range of percent cover. Include all height ranges. List species present.

Regeneration Data (Additional Data for Climate Plans)

Seedling/Sapling Abundance: Qualitatively assess seedling and sapling abundance and select:

- “closed canopy” - Indicates canopy density limits regeneration potential.

- “*inadequate*” - Indicates that seedling and sapling regeneration will be insufficient if a stand replacing event occurs.
- “*adequate*” - Indicates that seedling and sapling regeneration will be sufficient if a stand replacing event occurs.

Seedling/Sapling Diversity: List species of seedlings and saplings present.

Percent At-Risk Trees: Record an ocular estimate of the proportion of seedlings and saplings that are considered at-risk to climate change; 25% increments are adequate:

- 0% - None; 25% - Low; 50% - Medium-Low; 75% - Medium-High; 100% - High.

Consider a tree to be at-risk if there is an immediate threat (e.g., host species for a specific pest that is in the vicinity or the tree is damaged in a way that reduces its viability or productivity during the current management period) and/or if climate change is anticipated to pose a long-term challenge to maintaining a species on site (e.g., species is located at the southern extent of the species range; species is highly vulnerable to a climate stressor like drought or flooding relevant to the site).

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Browse Impact: Select the general level of forest impacts from deer browse:

- “*none*” - indicates no-sign of deer browse.
- “*low*” - indicates preferred hardwood tree seedlings and saplings such as maple, oak, ash, and hickory are growing up to and above 6 feet tall, with little to no sign of browsing.
- “*medium*” - indicates preferred hardwood tree seedlings and saplings such as maple, oak, and ash are not common, and when present show signs of moderate to heavy browsing. In their place are other tree species such as American beech, white pine, cherry, birch, etc. which may show evidence of browsing.
- “*high*” - indicates tree seedlings and saplings preferred by deer are almost non-existent, and when present show signs of heavy browsing. Less-preferred shrubs and trees show signs of browsing and/or most saplings are unable to grow above 6ft. Low preference trees, such as white pine may show evidence of browsing. A browse line is often visible below 6ft.

Habitat Data (All Plans)

Coarse Woody Material (CWM): Record number of logs/branches >3ft in length and >10 inches in diameter within a 10th acre fixed-radius (37.2 ft.) plot around overstory plot center. For the purposes of this project, it is sufficient to estimate the radius (~40 ft.) from the plot center; exact measurements are not required. Only count qualifying items. Any piece partially in the radius is included. Dead trees leaning >45° are consider CWM; otherwise, they are standing dead (snags).

Habitat Data (Additional Data for Bird Plans)

Fine Woody Material (FWM): Record number of piles of FWM within a 10th acre fixed-radius (37.2 ft.) plot around overstory plot center. For the purposes of this project, it is sufficient to estimate the radius (~40 ft.) from the plot center; exact measurements are not required. Piles are clustered groups of small

branches < 3” in diameter (tree tops, slash etc.) that would be sufficient to provide cover and feeding opportunities for birds. Only count qualifying items. Any pile partially in the radius is included.

Leaf Litter: Select whether “adequate” or “inadequate.” Adequate indicates deciduous leaf litter is present, thick, and moist over most of (>75%) of the visual acre. Conditions are well-suited for ovenbird nesting and wood thrush foraging; Inadequate indicates leaf litter is not deciduous OR is deciduous, but covers < 75% of the visual acre, is not thick, and/or is desiccated. Conditions are not well-suited for ovenbird nesting or wood thrush foraging.

Birds Observed: List all identified species (seen and/or heard) during your time collecting data.

Habitat Data (Additional Data for Bird/ Carbon Plans)

Standing Dead Wood: Count of dead trees >10” DBH by plot or basal area from inventory.

Cavity Trees: Count of cavity trees or basal area from inventory >10” DBH. Tally 12” to 18” and > 18” trees separately.

Climate Risks (Additional Data for Climate/Carbon Plans)

Climate Risks: Note if you think the site is especially vulnerable to a particular climate impact. (e.g., extreme precipitation events, short- or long- term drought, etc.). Consider and note timeframes and urgency of management actions (e.g., are at-risk species vulnerable to climate change in the near term (i.e. current management time frame – typically 10 years for stewardship plans) or over longer time horizons, are there immediate forest health threats, etc.).

Habitat & Resilience Combined Data Sheet

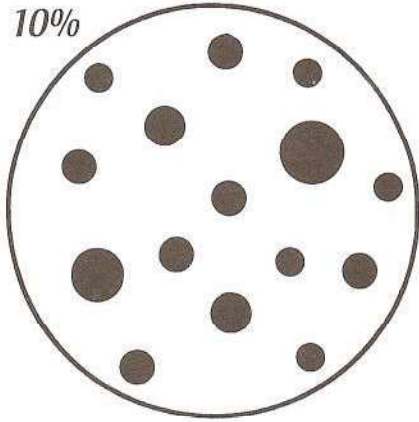
Property: _____ Plot ID: _____ GPS ID: _____ Technician: _____ Date: _____

Photo(s)	<20 ft	20-60 ft	>60 ft					
Canopy Height:	<20 ft	20-60 ft	>60 ft					
Overstory (30'+)								
% Canopy Cover:	0%	1% - 5%	6% - 20%	21% - 40%	41% - 60%	61%-80%	81% -100%	
Stocking Level	inadequate	adequate	overstocked					
Distribution:	uniform	patchy						
Type:	hdwd	softwd	mixed					
Overstory/Midstory (5'-30'+)								
Forest Health:	concern	no concern						
Note Issues:								
Species Diversity:	inadequate	adequate						
% At Risk Trees:	none	25%	50%	75%	100%			
Midstory (5'-30')								
% Cover(woody):	0%	1% - 5%	6% - 20%	21% - 40%	41% - 60%	61%-80%	81% -100%	
Distribution:	uniform	patchy						
Type:	hdwd	softwd	mixed					
Understory (0'-5')								
% Cover(woody):	0%	1% - 5%	6% - 20%	21% - 40%	41% - 60%	61%-80%	81% -100%	
Distribution:	uniform	patchy						
Type:	hdwd	softwd	mixed					
Soft Mast								
Presence:	absent	present						
Species:								
Woody Invasive Species								
% Cover:	0%	1% - 5%	6% - 20%	21% - 40%	41% - 60%	61%-80%	81% -100%	
Species:								
Regeneration								
Seedling/Sapling Abundance:	closed- canopy	inadequate	adequate					
Seedling/Sapling Diversity								
% At Risk Trees:	none	25%	50%	75%	100%			
Browse Impact:	none	low	medium	high				
Leaf Litter	inadequate	adequate						
Coarse Woody Material (CWM)								
# of pieces >10 in diameter & >3 ft long in 1/10th acre sub-plot:								
Fine Woody Material								
# of piles and tops in sub-plot:								
Standing Dead Wood & Cavity Trees								
# of standing dead trees >10" DBH:								
# of cavity trees 12-18" DBH:								
# of cavity trees >18" DBH:								
Birds								
	Climate Risks & Notes							

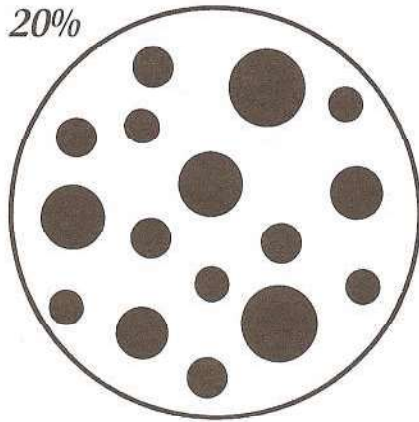
VISUAL ESTIMATES OF PERCENTAGE COVER

Use these reference figures to help estimate the percentage of canopy cover and the percentage of low vegetation cover. We suggest you laminate this copy so it will last longer in the field.

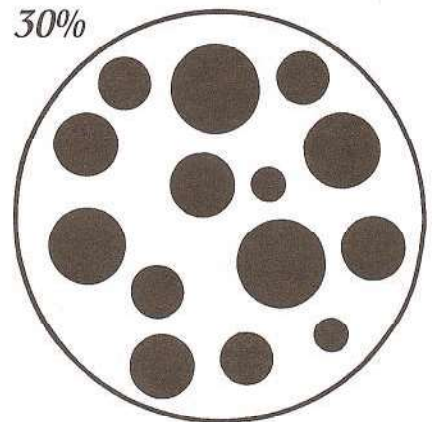
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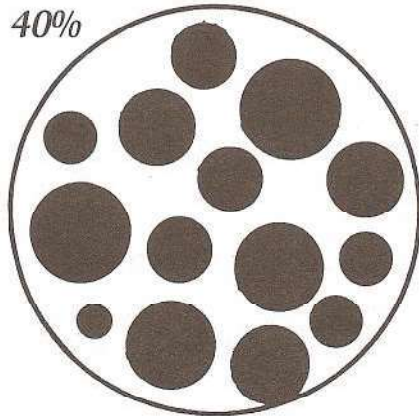
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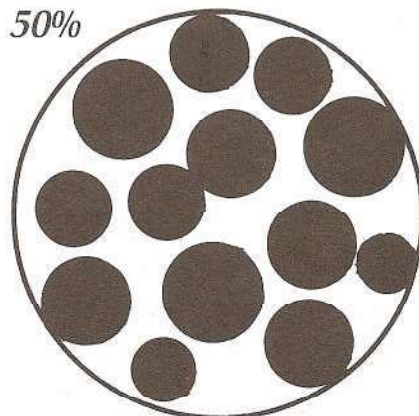
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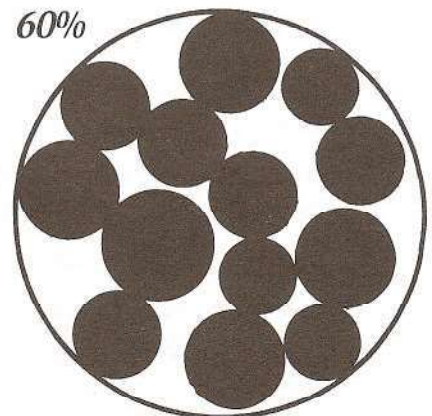
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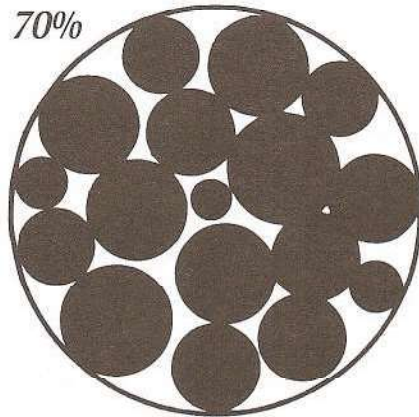
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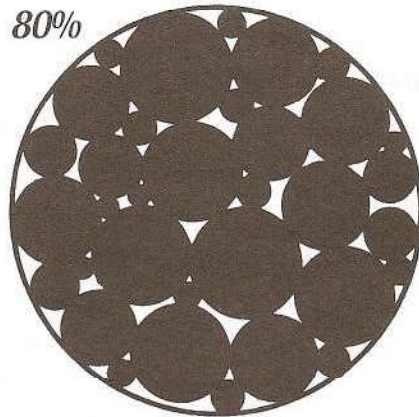
60%



70%



80%



90%

