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.

Forest Structure 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.

Overstory

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 'Visual Estimates of Percentage Cover' reference (attached) to help calibrate your visual estimate.
Distribution: Select "uniform" or "patchy" based on the overstory's arrangement.

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

Midstory

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

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 Features (Additional Data for Bird Plans)

Coarse Woody Material (CWM) (also Climate Plans): 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).

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.

Standing Dead Wood (also Climate Plans): 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.

Soft Mast: Select whether "present" or "absent." List species present such as rubus spp., elderberry, dogwood, apple, and pin cherry.

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.

Overstory/Midstory Vulnerability Data (Additional Data for Climate Plans)

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.

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 of decline, over both the short term (due to forest health threats) and over the long-term (reduced habitat suitability as a result of climate change).

For trees at risk of decline over the short term, look for and note signs of pests, disease, lack of vigor, or noteworthy stressors.

Trees are at-risk of decline if climate change is anticipated to pose a mid-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). Consider trees-at risk if habitat suitability is projected to decline in modeling done for the Climate Change Tree Atlas.

These projections of future habitat suitability are found on page 7 & in Appendix 1 of the "Managing Forests for Climate Change in Massachusetts" document. They 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 including site conditions and regeneration potential will influence the viability of a species at your site.

Regeneration Vulnerability 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.

Browse Impact (Also for Bird Plans): 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.

Woody Invasive Species (Also for Bird Plans): 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.

Percent At-Risk Trees: Record an ocular estimate of the proportion of seedlings and saplings that are considered at-risk of decline, over both the short term (due to forest health threats) and over the long-term (as a result of climate change), as well as those that are particularly well adapted to climate change. List the species of seedlings and saplings present in each category.

For trees at risk of decline over the short term, look for and note signs of pests, disease, lack of vigor, or noteworthy stressors.

Trees are at-risk of decline if climate change is anticipated to pose a mid-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). Consider trees-at risk if habitat suitability is projected to decline in modeling done for the Climate Change Tree Atlas.

Trees are adapted to climate change at the site if the site is expected to support the species over the long-term even with projected changes in climate. Consider trees adapted to climate change if habitat suitability is projected to remain unchanged or increase in modeling done for the Climate Change Tree Atlas.

These projections of future habitat suitability are found on page 7 & in Appendix 1 of the "Managing Forests for Climate Change in Massachusetts" document. They 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 including site conditions and regeneration potential will influence the viability of a species at your site.

Stand Vulnerability (Additional Data for Climate Plans)

Site Conditions: Provide an evaluation of whether site conditions are unfavorable, neutral, or favorable for maintaining the mix of species in the stand over the short (next 10-20 years) and mid-long term (20-80 years). For the short term, consider whether tree productivity is being limited by current site conditions. For the mid-long term, consider how projected climate changes will change site productivity and forest health threats for the species present.

Overall Vulnerability: Make a qualitative assessment (low-medium-high) of the vulnerability of the stand over the short (next 10-20 years) and mid-long term (20-80 years). Consider the above observations, keeping in mind that vulnerability is the combination of potential impacts and adaptive capacity. For example, the risk to individual species, as well as site conditions that may favor or disfavor the mix of species on the site are elements of vulnerability that should be taken into account.

Notes:

Climate Risks (Additional Data for Climate Plans): 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.).

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

Habitat & Resilience Combined Data Sheet

Photo? Y / N Date:

Property: Plot ID: GPS ID: Technician:

Forest Structure

Canopy Height <20 feet 20-60 feet >60 feet

	% Canopy cover							Distribution		Type		
	0%	1-5%	6-20%	21-40%	41-60%	61-80%	81-100%	uniform	patchy	Hrdwd	Sftwd	Mixed
Overstory												
Midstory												
Understory												

Habitat Features

Coarse Woody Material (1/10 acre subplot)		Fine Woody Material (1/10 acre subplot)		Standing Dead Wood		Cavity Trees			
# pieces >10 in diameter & >3 ft long		# of piles and tops		# trees > 10' DBH		# trees 12-18" DBH		# trees > 18" DBH	

Soft Mast: present absent Species:

Leaf litter: inadequate adequate

Overstory/Midstory Vulnerability

Stocking: inadequate adequate overstocked

Species Diversity: inadequate adequate

	0-25%	25-50%	50-75%	75-100%	Issues:
Trees At-risk					
Short term (forest health)					
Long term (habitat suitability)					

Regeneration Vulnerability

Seedling/Sapling Abundance: closed-canopy inadequate adequate

Browse Impact: none low medium high

Woody Invasive Species Species:

Percent Cover	0%	1-5%	6-20%	21-40%	41-60%	61-80%	81-100%

	0-25%	25-50%	50-75%	75-100%	Species:
Seedlings/Saplings At-risk					
Short term (forest health)					
Long term (habitat suitability)					
Adapted to Climate Change					

Stand Vulnerability

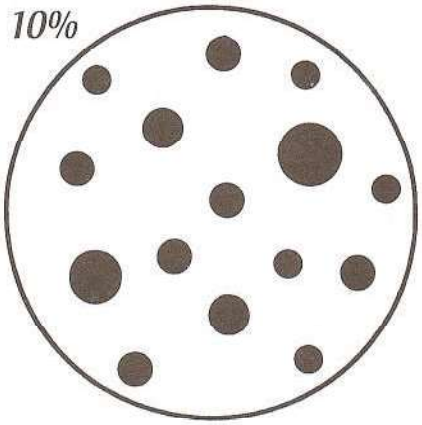
	Site Conditions			Overall Vulnerability		
	Unfavorable	Neutral	Favorable	Low	Medium	High
Short term						
Long term						

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.

10%



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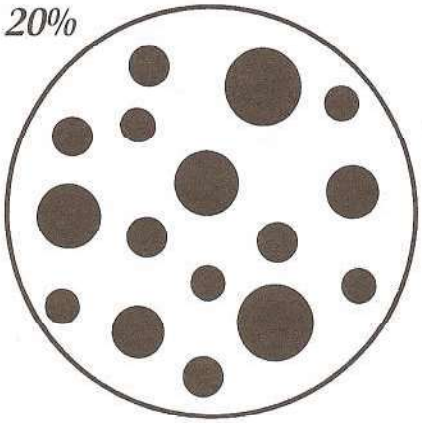

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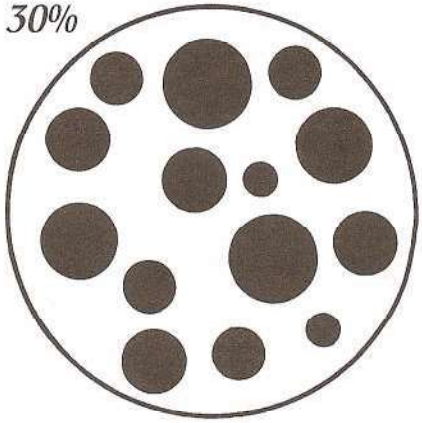

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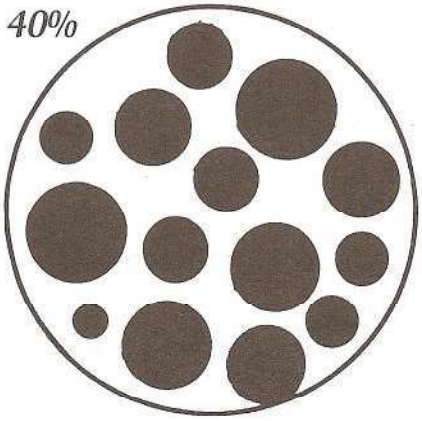

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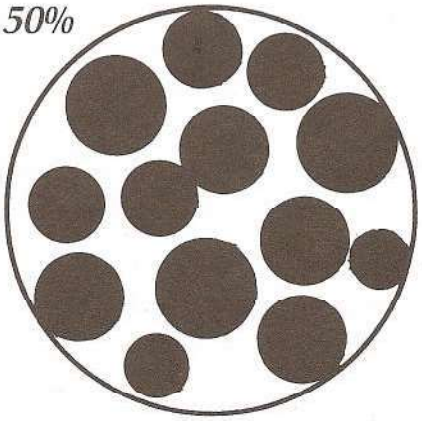

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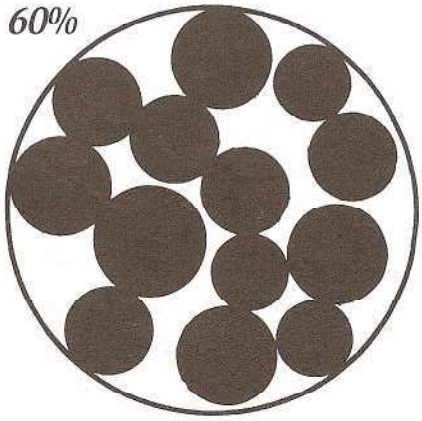

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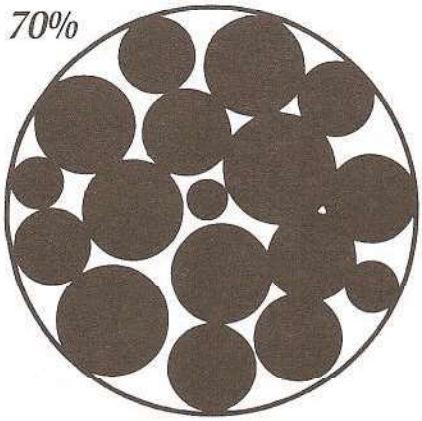
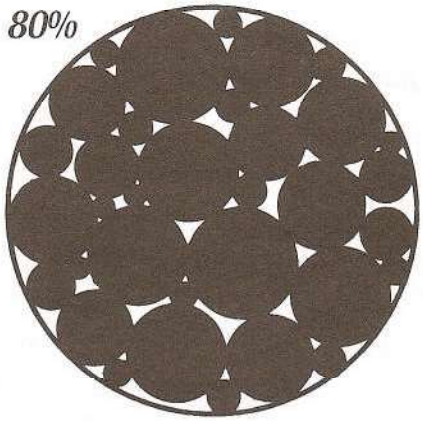
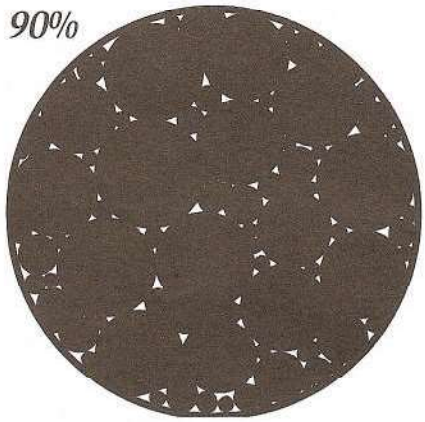


80%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