Appendix E
Attributes of High-Quality Bat Habitat in Managed Lake State Forests

This appendix provides information on the habitat features that comprise high quality habitat for covered bats. Attributes are described at the site (or tree) level and at the landscape level. The information contained in this appendix is not prescriptive or binding. This appendix provides information that might be useful for land managers interested in knowing key features of high-quality roosting habitat.

Tree Attributes Contributing to High-Quality Summer Bat Habitat

Table E-1 describes key features of high-value roost trees for covered bats. These features provide the most long-term value for bats—good habitat both while the trees are healthy and as they senesce over the course of the permit term. Key features are listed in order of priority for tree retention.

Table E-1. Attributes of Trees that Provide High-Quality Roosting Habitat for Covered Bats

Retention Priority	Key Features[1]	Example Species	Notes
1	Trees that provide multiple types of roosting features (e.g., loose bark, cavities, crevices, broken limbs, and hanging dead foliage) and remain viable for multiple years.	Oaks, hickories, walnuts, and basswood.	These species are known to provide habitat suitable for all four covered species, although habitat for different species may occur during different periods in the life of a single tree.
2	Trees that tend to develop cavities as they age.	Aspen, basswood, maples (except box elder), beech, birches, cherries, hackberries, and sycamore.	Live and cavity trees are especially important for northern long-eared bats and dead or dying trees provide roosts for northern long-eared bats, Indiana bats, and little brown bats.
3	Trees that, following death, provide sheets of bark under which bats roost	Elms, pines, ash, and cottonwood.	These trees provide habitat for little brown bats, Indiana bats, and northern long-eared bats. Larger trees with substantial solar exposure are more valuable than smaller trees in the shade.
4	Trees that provide cavities but are heavily shaded until they die.	Hemlock	In the Lake States, this species is often retained between rotations due to its value to many species of wildlife. Live individuals are rarely used by bats.

Retention Priority	Key Features[1]	Example Species	Notes
5	Trees that provide bark habitat (curls or shags) used by individual bats.	Birches and shaggy-barked hickories	These trees provide habitat for tri-colored bats (birches) and Indiana bats (hickories). These species are assigned the lowest retention priority as they are suitable habitat for only one of the four covered bat species.

Landscape-Level Attributes of High-Quality Summer Bat Habitat

Attributes of high-quality summer bat habitat are present in Lake States forests in which the following conditions are achieved:

- Bats have access to multiple roosts, including some areas where there are 25[1] or more potential roosts within a 1-to-2-acre area for sheltering and escape cover. These areas should include the following:
    - Trees of multiple sizes and "health" categories, with cavities and crevices for northern long-eared bats and little brown bats. At least some (4-5 trees per acre) of the retained trees should be large (greater than 12 inches diameter at breast height (dbh)). These can be located within reserve islands or within stands that are scheduled for future harvest.
    - Within the range of the Indiana bat (southern Michigan), at least some of the retained trees should be greater than 16 inches dbh with exfoliating bark and receiving direct sunlight during much of the day. These can be located within the reserve islands or within stands that are scheduled for future harvest.
    - Within the range of tri-colored bats, trees that provide clusters of leaves.
- Bats have access to open, non-turbulent water for drinking within approximately 2 miles of roosts.
- Bats have access to high-quality foraging habitat. High-quality foraging habitat includes the following:
    - Forested habitat through which bats can easily navigate.
    - Edge habitat such as small trails, edges along harvested stands and lakes, and areas above streams that are not overgrown with vegetation.
    - Wetlands and other habitats that provide moths, flies, and beetles.
- There is connectivity among the elements described above so that bats do not have to cross open areas of 300 feet or more to access key resources. While bats have flown long, circuitous, routes along wooded edges to connect to high-quality habitat, most covered species rarely cross non-forested areas wider than 1,000 feet.

[1] In Wisconsin, these areas may be limited to 20 potential roosts per acre. Analysis of data from the Forest Inventory Analysis indicate that the average stand in Wisconsin contains more than 15 snags per acre and that even regenerating stands contain at least 5 snags per acre of 5 inches or greater dbh. Similarly, the state-wide average of cull trees (those that are not harvested due to poor condition) is 5 trees per acre. Many of these are culled due to the presence of cavities and other defects that provide habitat for bats.