CENTRAL AND TRANSITION HARDWOODS EXEMPLARY FORESTRY: STANDARDS AND METRICS

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Defining Exemplary Forest Management in Central and Transition Hardwoods in New England

The Exemplary Forestry standards are NEFF's guidelines for its actively managed lands. They do not apply to ecological reserves, which NEFF also recognizes as an important component of the landscape and currently comprise approximately 9% of NEFF's landholdings.[i] These standards, which aim, over the long term, to diversify habitats and maintain approximately half of stands as sawtimber size trees, are intended to be implemented on NEFF's land holdings in the Central and Transition Hardwoods forest types[ii]. NEFF's management for these lands, its Community Forests, starts with an assessment of current and anticipated future conditions in the landscape surrounding these properties. We identify which wildlife habitats and critical forest stand structures—defined in the standards herein—are missing or inadequate in the landscape and hence should be emphasized in management planning and execution on NEFF parcels. In addition to implementing these standards, NEFF intends to maintain dual third-party certification of its lands. With these understandings, Exemplary Forestry in the Central and Transition Hardwoods includes[iii]:

1. **Implementing Best Management Practices to protect and improve forest conditions**. Employing accepted "Best Management Practices" to protect soils, riparian and aquatic habitat, special habitats, wildlife trees, and other resources as described in the Exemplary Forestry Best Management Practices.
2. **Implementing advanced silviculture**. Practicing forestry which, over time, results in:

a. **Continuously improving forest stands** in terms of both quality and quantity.

b. **Providing conditions which are well-suited to the umbrella wildlife species** known to be representative of the habitat needs of the great majority of native species[iv].

Umbrella Wildlife Species by Successional Stage

Successional Stage	Umbrella Wildlife Species	Target Habitat Block Size (in conjunction with meeting stand size class distribution recommendations, see d.)
Interior Forest	Scarlet tanager, Wood thrush, Black-throated blue warbler, Tree-dwelling bats (multiple species)[v]	>250 acre blocks of relatively mature, interior forest
Early Successional	Golden-winged warbler, Ruffed grouse, Woodcock, New England cottontail, Blanding's turtle	6-25 acre blocks of early successional forest
Edge and Transition	Red fox, Eastern box turtle, Rose-breasted grosbeak, native bumblebees (Bombus spp.)[vi]	Edge and transition stage forest resulting from the above

c. **Maintaining connectivity** between habitats.

d. Achieving a **diverse size class distribution** of 5-15% of stands in seedlings[vii], 30-40% in saplings and poles, 40-50% in sawtimber and including up to 10% of the landscape in large diameter multi-storied stands.

e. **Growing tree species[viii] well-suited to each site[ix]** (e.g., matched to soil and physiographic conditions as well as expected changes in climatic conditions).

f. **Stocking that fully occupies the sites**; this is an average of "B" line stocking for stands not currently being regenerated.[x] For example, in 8-10 inch diameter stands of mixed wood this would be approximately 20 cords per acre. Adequate regeneration is considered to be 600 seedlings of commercial species per acre.

g. **Growing and harvesting quality timber** at an average of 0.5 cords/acre/year[xi].

h. **Addressing climate change** by increasing the resilience to, adaptation for, and mitigation of climate change through forest management.[xii] For example, using forests and forest products—including products beyond solid wood (e.g., wood fiber insulation)—that can store more carbon and substitute for other more carbon-intensive materials like steel and concrete, thereby reducing greenhouse gas emissions.[xiii] Because many stands in the Central and Transition Hardwoods are heavily stocked, managing to mitigate climate change requires special attention; please see NEFF's analysis, "Harvesting in Heavily Stocked Stands in Southern New England to Reduce Greenhouse Gas Levels," in full 61-page *Exemplary Forestry for Central and Transition Hardwoods* report, subtitled

Exemplary Forestry for the 21st Century: Managing New England's Central and Transition Hardwood Forest for Bird's Feet and Board Feet at a Landscape Scale.

i. **Diverse management approaches**. In the long term, NEFF intends to manage significant portions of its properties using both the even-age (regular shelterwood) and multi-aged (irregular shelterwood) management approaches.[xiv] Different approaches to management are called for to meet the needs of umbrella wildlife species and may also be needed to accommodate specific site conditions. For example, the creation of large blocks of early successional habitat by harvesting heavily may be limited to stands that are not heavily stocked.[xv]

j. **Aesthetics.** Public support for forest management, its social license, depends in many cases on how forests look, particularly after harvest. In this regard, NEFF intents to manage its lands to maximize the appeal of managed forests to the public, including but not limited to their visual appeal, particularly in key areas (e.g., attractive roadsides, trails and shorelines). This means harvesting carefully with an eye toward respecting ecological values, avoiding site damage and the appearance of carelessness.[xvi]

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[i] The Wildland and Woodlands study by Harvard Forest (Foster, et al. 2005) recommends 10%.

[ii] The major forest types in New England's Central and Transition Hardwoods region are oak-pine, oak-hickory, white pine, hemlock, and lowland/riparian hardwood. Where Acadian forest types dominate within the area generally occupied by the Central and Transition Hardwoods, management will be based on the Exemplary Forestry standards for the Acadian Forest and adapted as appropriate for these landscapes.)

[iii] At the conceptual level these standards parallel those for the Acadian Forest, but, of course, the specifics differ.

[iv] These species may change over time as climate changes.

[v] Wide ranging species such as black bear not only require interior forest but also require even larger blocks of undeveloped land.

[vi] Habitat studies from the work of State and Federal agencies and numerous organizations and institutions.

[vii] Because "natural" disturbances are predicted to increase with climate change, it seems most appropriate to aim for the low end of this range for seedling size stands.

[viii] Decisions of what tree species are "best suited" to each site can be guided by the recommendations contained in soil surveys prepared by the Natural Resources Conservation Service with site conditions verified by a qualified forester or soil scientist. The selection of species should also take into account the changes expected in climatic conditions and their impact on tree growth (Anderson and Palik 2011, USDA NRCS n.d.).

[ix] This requires matching the silvicultural system to the site and may require controlling invasive species and/or excessive browsing (Leak 2014, Leak, et al. 2014, Bennett 2010, Rawinski 2014).

[x] 20 cords per acre (Leak et al. 2014).

[xi] Harvesting 0.5 cord per acre per year will not be possible on some properties when they are acquired, e.g., if stocking has been greatly reduced. Regarding timber quality, over time the value of the timber should be enhanced (more and better quality sawlogs). Overall, timber volume on NEFF's properties is currently estimated to increase by approximately 2% per year, or 1.25 tons per acre per year (Chris Pryor, pers. comm., 03/26/18). This is approximately 0.5 cord per acre per year depending on species.

[xii] USFS guidance on how to increase forest resistance and resilience and facilitate adaptation will be followed.

[xiii] To understand other ways that forests influence and hence could be used to mitigate climate change, see a PowerPoint NEFF has prepared on this topic.

[xiv] Because stands in the Central and Transition Hardwoods are commonly fully stocked or overstocked, avoiding potentially significant reductions in carbon stocking in the near term requires phasing the full scope of management specified herein in over time (decades) with light harvesting in the near term. See Attachment "Harvesting in Heavily Stocked Stands in Southern New England to Reduce Greenhouse Gas Levels" referred to in h. above.

[xv] For example, in cooperation with the Massachusetts Department of Fish and Game's efforts to recreate a grassland/shrub community for the benefit of certain rare or uncommon species, one NEFF property has been largely converted to an oak savannah and is now on a schedule for controlled burning.

[xvi] USDA Forest Service. 1995. Landscape aesthetics: A handbook for scenery management. Agriculture Handbook No. 701. 104p.