7.6 HIGH-ELEVATION FORESTS

BACKGROUND

High-elevation forests are rare, distinct, and important ecosystems.

High-elevation forests occupy about 4 percent of New Hampshire. They are relatively undisturbed by human activities. Almost all high-elevation forests are on conservation lands, protected by conservation easements, or subject to zoning ordinances.

Soils are shallow and usually well- to moderately well-drained, nutrient-poor, acidic, and fragile. Shallow rooting disposes high-elevation forests to frequent windthrow. This natural disturbance is an important factor in determining forest structure. Linear patches of wind-induced mortality, called fir waves, are common in balsam fir stands. Moisture levels are high due to increased rainfall, snow, and cloud intercept. Moist conditions sometimes support ***acidic Sphagnum forest seeps*** (a wetland community found at high elevations).

A truncated growing season and harsh climate favor slow-growing conifers. The N.H. Natural Heritage Bureau (NHNHB) recognizes two conifer forest communities that are restricted to high-elevations, and one that occurs at lower elevations as well:

- A ***high-elevation balsam fir forest*** community typically occurs between about 3,500 to 4,500 feet, and locally higher or lower depending on site conditions such as topography and degree of exposure. Balsam fir dominates, although heartleaf birch and red spruce may be present. Moss and liverwort form a deep, spongy carpet over thick humus.
- A ***high-elevation spruce - fir forest*** community occurs from about 2,500 to 4,000 feet. Red spruce and balsam fir are the dominant species, with some heartleaf, paper, and yellow birch. The woody understory is sparse and mosses and liverworts are abundant.
- ***Montane black spruce - red spruce forest*** is an uncommon and rare community that occurs from 2,000 to 3,000 feet. Soils are wetter than in the other two high-elevation forest communities and the vegetation of the community resembles that of ***lowland spruce - fir forest***. This community occurs around heath woodlands and fens in high-elevation valleys in the White Mountains and the North Country.

High-elevation forests are important for wildlife. These forests are core habitat for the state-threatened American marten and American three-toed woodpecker. New Hampshire is within the range of the state-endangered and federally threatened Canada lynx. Lynx are associated with dense, undisturbed boreal forests with a mix of mature conifer stands and shrubby openings. Fir waves produce these early successional patches at these elevations. In New Hampshire, signs of lynx are occasionally documented in the White Mountain National Forest. Bicknell's thrush breeding is restricted to montane spruce-fir forests in New Hampshire, New York and parts of Quebec. Wildlife common to high-elevation forests include moose, deer, black bear, fisher, and spruce grouse.

Several rare plants occur in high-elevation forests. The state-threatened heart-leaved twayblade, Loesel's twayblade, and northern comandra occur in spruce-fir and balsam fir communities. The state-watch species Pickering's bluejoint occurs in ***acidic Sphagnum forest seeps***.

OBJECTIVE

Maintain the long-term ecological integrity of high-elevation forests.

CONSIDERATIONS

- Acid deposition is a threat to these forests.
- Thin soils, sensitivity to (and slow recovery from) physical disturbance, importance to wildlife, scarcity, and susceptibility to acid deposition, support careful management.
- The Coos County Unincorporated Towns Planning Board designated lands above 2,700 feet in elevation, or with slopes in excess of 60 percent over 10 acres, as Protected District 6 (PD6) zones. Forest management activities in PD6 zones require a permit from the Coos County Planning Board.
- Nutrient-poor soils of high-elevation forests may be especially sensitive to the removal of nutrients in wood harvests. Furthermore, acid rain exacerbates the leaching of nutrients through the soil. Minimizing soil erosion and leaving branches and needles on-site can minimize nutrient loss.
- Shallow, fragile soils render high-elevation forests sensitive to disturbance. Soil erosion and compaction can harm existing trees and limit the potential for stand regeneration.
- Pushing stands to older ages provides a more complex structure for American marten and three-toed woodpecker.
- Leaving mountain ash encourages black bear, American marten, fisher, and numerous bird species who favor the fruits. Moose favor the bark throughout winter months.
- Land below 2,700 feet may exhibit characteristics of high-elevation forests including shallow soils, steep slopes, and spruce-fir dominance. Adapt the following recommendations to lower elevation sites exhibiting high-elevation characteristics.

RECOMMENDED PRACTICES

✓ When planning or conducting harvests:
  - Apply best management practices, or more rigorous practices. Refer to *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*. Consult the latest version before harvesting timber.
  - Avoid pockets of old-growth forest.
  - Lay out the harvest during snow-free conditions.
  - As possible, schedule harvests for winter conditions.
  - Avoid removing limbs and tops from the harvest site.
  - Clearcutting should generally be avoided. Consult with N.H. Division of Forests and Lands and N.H. Fish and Game for guidance if clearcutting is necessary.
  - Leave large cull and cavity trees on-site.
  - If planning uncut reserve zones, incorporate prominent ridgelines, game trails, ledge outcrops, older stands, complex stands, wetlands, streams, and seeps.

✓ Direct management on high-elevation lands towards maintaining or increasing the proportion of softwoods.

✓ Direct spruce-fir management toward the following composition and structure goals:
  - At least 60 percent of the management area remains in stands with an average tree diameter of 4 inches or greater.
  - No more than 30 percent of the area with an average tree diameter less than 4 inches or without adequate stocking.
  - Designate at least 10 percent to remain unharvested.

✓ Consult with NHNHB to minimize impacts to protected plant species or exemplary natural communities and N.H. Fish and Game to minimize impact on protected wildlife.

CROSS REFERENCES

2.3 Regeneration Methods; 3.5 Soil Productivity; 6.2 Cavity Trees, Dens and Snags; 7.1 Natural Communities and Protected Plants; 7.2 Seeps; 7.5 Old-Growth Forests; 7.7 Steep Slopes.

ADDITIONAL INFORMATION

N.H. Dept. of Resources and Economic Development, Division of Forests and Lands. 2004. *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*. State of New Hampshire. http://extension.unh.edu/resources/files/Resource000247_Rep266.pdf Accessed March 13, 2010.

Sperduto, D.D., and W.F. Nichols. 2004. *Natural Communities of New Hampshire*. N.H. Natural Heritage Bureau, Dept. of Resources and Economic Development, Concord, N.H. 229 p.