Hubbard Brook Experimental Forest – Bartlett Experimental Forest

Site Name: Hubbard Brook Experimental Forest – Bartlett Experimental Forest (candidate core)
Domain: Northeast
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Web Page: www.hubbardbrook.org
Location: 43. 56 N -71.45 W

Hubbard Brook is a long-term research area established by the U.S. Forest Service in 1955 for research on forest hydroecology. Research expanded in 1963 with the addition of biogeochemistry and in 1969 with the addition of avian ecology; the NSF's Long Term Ecological Research sites was established in 1986 (see: http://www.hubbardbrook.org). Existing vegetation (northern hardwood and spruce-fir forests), soil/landform, ecosystem performance, land use history, and climatic features characteristic of Domain #1; bowl-shaped 3,160 ha valley; existing resources can help address climate, land-use (pollution), and invasive species themes; representative of the northern Appalachian Mountains; elevation range of 252 m to 1015 m; site is within White Mountain National Forest and is managed by the USFS, Northern Research Station for long-term ecosystem research.

Member of numerous existing networks including NADP, CastNet, SCAN; the site includes nine gauged watersheds (11.8 ha to 76.4 ha on headwater streams, with 6 on south-facing slopes and 3 on north-facing slopes); network of 25 weather stations; over 40 years of weekly measurements of precipitation and streamwater chemistry combined with the long-term hydromet data; long-term data on plant and animal populations, and ecosystem processes; historical data synthesized and accessible (www.hubbardbrook.org); sample archive (water, soils, foliage, wood, rock); established K-12 science education partnership servicing area students and teachers annually.

On-site structures provide housing, field laboratories, equipment fabrication, maintenance, repair, and storage, and logistical support; 5 FTE on site support; modern utilities including T1 fiber optics and wireless network distribution points; within 145 km of additional modern laboratories at USFS Forestry Sciences Laboratory (Durham, NH); year around road access to gauged watersheds (snowmobiles needed in winter); managed public access; additional sleeping (+60), meeting and workshop facilities owned by the Hubbard Brook Research Foundation located about 3 km below the Hubbard Brook Headquarters.

Bartlett Experimental Forest (BEF) was established in 1932 and expanded in 2006 to a total of 2,340 ha and now encompasses the entire watersheds of three brooks. The lower third of BEF was logged and some portions cleared for pasture. Although fires are relatively rare, the 1938 hurricane did widespread damage. An ice storm in 1998 was the most recent widespread natural disturbance, impacting mostly higher elevation stands. There are areas of old-growth northern hardwoods with beech, yellow birch, sugar maple, and eastern hemlock being the dominant species. Even-aged stands of red maple, paper birch, and aspen occupy sites that were once cleared. Red spruce stands cover the highest slopes. Eastern white pine is confined to the lowest elevations.

Facilities include office and lab space, a conference room, and quarters for up to 25 people. A 26.5 m high tower was installed in a low-elevation northern hardwood stand in November, 2003, for the purpose of making eddy covariance measurements of the forest-atmosphere exchange of CO2, H2O and radiant energy. Continuous flux and meteorological measurements began in

January, 2004, and are ongoing. In the tower footprint, the forest is predominantly classified into red maple, sugar maple, and American beech forest types. Leaf area index in the vicinity of the tower is 3.6 as measured by seasonal litterfall collection, and 4.5 as measured by the optically based Li-Cor LAI-2000 instrument.

On the permanent sample plots, all trees > 5 cm dbh were measured in 1931-32, 1939-40, 1991-92, and 2001-03. This is the main long-term database. There are a number of additional stand-level databases that follow responses to forest management, including: tree regeneration and stand dynamics, changes in woody shrub and herbaceous vegetation, and bird, small mammals, and amphibian use of habitats created by various silvicultural prescriptions. Larger scale databases from BEF and adjacent White Mountains include plot-based forest composition, productivity, and nutrient status measurements in conjunction with data collected by both airborne and spaceborne remote sensing instruments.