The Nature Conservancy and New Hampshire Fish & Game Department
Spatial Data Notes

DATA LAYER: Low-elevation spruce-fir habitats of New Hampshire
COVER NAME: lowland_sprucefir
COVER CONTENTS: Low-elevation spruce-fir habitat polygons
COVER TYPE: Poly
SOURCE: TNC
SOURCE SCALE: 1:24,000 and 30-meter NED (projected)
SOURCE MEDIA: digital
COORDINATE SYSTEM: NH State Plane feet, horizontal datum NAD83
TILE: State
AUTOMATED BY: TNC-NH Chapter; attributed by NH Fish & Game Dept.-GIS Program
STATUS: Complete
LAST REVISION: October 2008; attributes revised December 2009

General Description of the Data

- Development of this coverage provides general lowland spruce-fir habitat locations within the state of New Hampshire. These habitat locations include existing lowland spruce-fir, as well as areas that are likely to have historically hosted lowland spruce-fir. Analysis was completed for incorporation into the New Hampshire Wildlife Action Plan. Funding for the Plan was provided by State Wildlife Grants administered by the US Fish & Wildlife Service.

- The 2001 NH Land Cover Assessment grid value 422 (spruce-fir) was selected and combined with elevations from 1,000' to 2,500' extracted from the USGS National Elevation Dataset. Only spruce-fir occurring in that elevation range is included.

- Coos County soil types related to lowland spruce-fir were added to include areas that, while not captured as spruce-fir in the NH Land Cover Assessment, have requisite features for spruce-fir habitat (Nichols, *CT Lakes*, 2005). Only those soils falling in the 1,000' to 2,500' elevation range were included.

Lowland spruce-fir forest system soils

765*	Monarda-Howland
590*	Cabot (~Monarda)
865*	Bemis-Surplus
825*	Pillsbury-Peacham-Peru
737*	Surplus-Bemis
779*	Dixmont-Bangor
773*	Bangor-Dixmont (gentle-moderate)
14*	Sheepscot
23*	Masardis

*Asterisk denotes a wildcard, indicating all soils with 2 or 3 digit prefix were included in the model.

- Ecological Land Units, created by The Nature Conservancy's Conservation Science Support, were also added to capture additional areas likely to have geo-physical conditions favorable to lowland spruce-fir. The Ecological Land Units included are:
  - Dry flats, acidic granitic
  - Dry flats, acidic sedimentary/metasedimentary
  - Dry flats, acidic shale
  - Dry flats, mafic/intermediate granitic
  - Dry flats, moderately calcareous sedimentary/metasedimentary
  - Wet flats

- The NH Fish & Game Department had previously completed a model to map high-elevation spruce fir in New Hampshire, based on a Vermont Institute of Natural Science (VINS: Lambert et al. in press) elevation threshold, which depicts the lower elevation limit of Bicknell's Thrush habitat, Hale's (in press) Bicknell's Thrush probability surface, and NH Natural Heritage Bureau (NHB) exemplary high-elevation spruce-fir natural communities. This layer was used to erase features in the lowland spruce-fir layer to ensure that there was no overlap between the two. However, overlap is minor because of the different elevation ranges that were used.

- Water bodies were used to erase the lowland spruce-fir layer, to remove areas coded as wet flats in the ELU layer that are actually open water.

- NH Natural Heritage Bureau mapped exemplary lowland spruce-fir systems were added to ensure that known locations were captured. These data do not capture all existing lowland spruce-fir locations, only those that have been mapped by NH NHB.

- Model results were checked against known areas of existing spruce fir, and areas of spruce fir delineated using 1955 black and white aerial photography. This was not a rigorous ground truthing exercise, but did reveal a good correlation between model results and expert-identified areas of spruce-fir.

- This version of the model is considered a first iteration, and further refinements may be developed in the future. To obtain additional information, please contact The Nature Conservancy or the NH Fish and Game Dept, Wildlife Division, 11 Hazen Dr, Concord NH 03301 (603) 271-2461.

Item definitions for LOWLAND_SPRUCEFIR polygon attributes:

ITEM NAME	DESCRIPTION
FGID	(*unique, sequential ID number*)
ACRES	area (acres)
HECTARES	area (hectares)
DENSROADS	Density of all DOT roads (km/km2)
IFESMEAN	Mean IFES score (Integrated Fragmentation Effects Surface TNC; Zankel, 2005)
POP00SQMI	Population density in 2000 (persons per square mile)
HU00SQMI	Housing units density in 2000 (houses per square mile)
PROXINDEX	Proximity index (1km distance)
WETPCT	Percent of polygon that is wetland (NWI palustrine)
ELU30VAR	Variety of Ecological Land Units (ELU30 = elevation, substrate, landform)
HG_TOT	Average total deposition of mercury (wet [precipitation + cloud water interception] + dry [GEM + RGM + aerosol]) (Miller et al, 2005)
CA_INDEX	Avg deposition index, rate of cation depletion per ha/per year (Miller et al, 2005)
MILLERPCT	Percent matching Miller forest types (listed below)
GAPVERTMAX	Vertebrate species maximum (VT/NH GAP Analysis)
A_RICH_BUF	Species richness of rare animals within their dispersal distances (2009)
A_RICH_POL	Species richness of rare animals within polygon (2009)
P_RICH_POL	Species richness of rare plants in polygon (2009)
C_RICH_POL	Richness of rare and exemplary natural communities in polygon (2009)
ECOSUB	Ecoregional subsection
CONS_AC	Conservation (acres)
CONS_PCT	Conservation (percent)
FORBLOCK	TNC forest block size (acres)

NOTES:

Condition of all matrix forest habitats was evaluated using a single, seamless matrix forest condition raster. This raster was used to select areas, or neighborhoods, of each forest type that are at least 100 acres in size, meeting original thresholds (below). If the contiguous area of top-ranked matrix forest habitat was less than 100 acres it was designated Tier 3 supporting landscape.

Tier 1 Top-ranked in NH = Top 15% in NH (by area, for each forest habitat type)
Tier 2 Top-ranked in biological region = Top 15% in subsection (by area, for each forest type)
Tier 3 Supporting landscapes = Top 30% in subsection (by area, for each forest type)

PLEASE REFER TO THE DOCUMENT "MATRIX_FOREST_datanotes.pdf" for explanation.

The list above represents the complete set of attributes developed for the WAP habitat data layer. Only select attributes are distributed in the public release version WAP data layers. For more information, please contact the NH Fish and Game Department, Wildlife Division, 11 Hazen Dr, Concord NH 03301 Phone: (603) 271-2461 E-mail: wildlife@wildlife.nh.gov

The fields: A_RICH_BUF, A_RICH_POL, P_RICH_POL and C_RICH_POL, provide species richness counts (number of different species potentially present in the habitat polygon) from the NH Natural Heritage Bureau as of December 2008. Care must be taken in interpreting these counts as most areas of NH have never been surveyed for biodiversity elements. See *Important Background Information for Interpreting Species Richness Counts based on NH Natural Heritage Bureau Data* for details.

Digital data describing atmospheric deposition of mercury were provided by Ecosystems Research Group, Ltd. using the methods described in Miller et al. (2005). Digital data describing the risk of calcium and other base cation depletion and limitation in forested ecosystems provided by Ecosystems Research Group, Ltd. using methods described in Miller (2005).

Miller Forest Type:	Description
B-NHW	beech, northern hardwoods
SM-NHW	sugar maple, northern hardwoods
NHW	northern hardwoods
CHW	central hardwoods
WP-HEM-RS	white pine, hemlock, red spruce
BF-RS-WP-HEM	balsam fir, red spruce, white pine, hemlock
NHW-WP-HEM	northern hardwoods, white pine, hemlock
NHW-BF-RS-HEM-WP	northern hardwoods, balsam fir, red spruce, hemlock, white pine
NHW-BF-RS	northern hardwoods, balsam fir, red spruce
BF-RS-B	balsam fir, red spruce, beech
BF-RS	balsam fir, red spruce

DATA SOURCES:

Complex Systems Research Center. 2001. *New Hampshire land cover assessment – 2001*. 30m raster data.   Available from GRANIT,University of New Hampshire.

Complex Systems Research Center, based on US Geological Survey and NH Dept. of Environmental Services data. 2004. *Surface Water Bodies.* 1:24,000 vector data. Available from GRANIT, University of New Hampshire.

Complex Systems Research Center, based on Natural Resources Conservation Service data. 2003. *Soil Units.* 1:24,000 vector data. Available from GRANIT, University of New Hampshire.

Lambert, J.D., K.P. McFarland, C.C. Rimmer, S.D. Faccio, and J.L. Atwood. In press. *A practical model of Bicknell's thrush distribution in the Northeastern United States.*

New Hampshire Natural Heritage Bureau. January 2005*. Exemplary Natural Community Data*. Scale varies, vector data. Available with permission from the NH Natural Heritage Bureau.

NH Natural Heritage Bureau BIOTICS database January 21, 2009 (species/community richness)

New Hampshire Fish and Game Dept. January 2005. *High-elevation spruce-fir habitats of New Hampshire.* 1:24,000 vector data. Available from NH F&G.

Nichols, William F. 2005. *Significant Biodiversity Features in the CT Lakes Headwaters Natural Areas*. The NH Natural Heritage Bureau and The Nature Conservancy.

Sperduto, D.D. and W.F. Nichols. 2004. *Natural communities of New Hampshire*. The NH Natural Heritage Bureau and The Nature Conservancy. 229pp.

The Nature Conservancy, Conservation Science Support. 2008. *Ecological Land Units*. 30m raster data. Available from TNC, Eastern Resource Office, Boston, MA.

The Nature Conservancy (J. Tollefson). 2005. GAP Status Assessment of NH Conservation Lands. Unpublished report to the NH Fish and Game Department.

The Nature Conservancy. 2006. NH Forest Block Model.

United States Geological Survey. Date varies, complete by 2003. *National Elevation Dataset*. 30m raster data. Projected by Complex Systems Research Center in January 2005, available from GRANIT, University of New Hampshire.

V-LATE 1.1 Vector-based Landscape Analysis Tools (Extension for ArcGIS 9). Dirk Tiede, Stefan Lang, Hermann Klug, Tobias Langanke. The development of V-LATE has been financed by the EU project SPIN (Spatial Indicators for European Nature Conservation, Contract No. EVG2-2000-0512, 2001-2004)

Wind power raster data provided by Massachusetts Technology Collaborative (data finalized June 2003). Developed by TrueWind Solutions, LLC under contract to AWS Scientific, Inc as part of a project jointly funded by the Connecticut Clean Energy Fund, Mass. Technology Collaborative, and Northeast Utilities System.

Zankel, M. 2005. Integrated Fragmentation Surface for the State of New Hampshire. The Nature Conservancy, Concord NH. Unpublished report to NH Fish and Game Department.