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:	May 2005; attributes revised April 2006 (NHFGD)

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 LOWELEV_SPRUCEFIR polygon attributes

ITEM NAME	WDTH	TYPE	N.DEC	DESCRIPTION
FGID	5	I	0	(*unique, sequential ID number*)
STATUS	9	C	0	KNOWN or POTENTIAL
UNITNAME	40	C	0	Name of planning unit
AREA_FEET	8	F	3	area (square feet) calculated by software
PERIMETER	8	F	3	perimeter length (feet) calculated by software
ACRES	8	N	1	area (acres)
HECTARES	8	N	2	area (hectares)
COUNT	2	I	0	number of polygons that comprise the unit
LANDHA	8	N	2	land area (hectares)
LANDSQKM	8	N	2	land area (square kilometers)
DOTROADKM	8	N	2	Km of all NHDOT roads
DENSROADS	5	N	2	Density of all DOT roads (km/km2)
DOTMAJORKM	8	N	2	Km of all state and town roads
DENSMAJOR	5	N	2	Density of all state and town roads
DISTROUTE	8	I	0	Distance to nearest route (meters)
DOTMINORKM	8	N	2	Km of all unmaintained roads and private roads
DENSMINOR	5	N	2	Density of unmaintained and private roads
DISTROAD	8	I	0	Distance to nearest road (meters)
CONSFO	8	N	2	Area in conservation/fee ownership (hectares)
CONSFO_PCT	5	N	1	Percent in conservation/fee ownership
CONSCE	8	N	2	Area in conservation/easement or other (ha)
CONSCE_PCT	5	N	1	Percent in conservation/easement or other
CONSHA	8	N	2	Area in conservation (ha)
CONS_PCT	5	N	1	Percent in conservation
GAP123HA	8	N	2	Area in GAP management status 1, 2, or 3 (TNC 2005)
GAP123PCT	5	N	1	Percent in GAP management status 1, 2 or 3 (TNC 2005)

Item definitions for LOWELEV_SPRUCEFIR polygon attributes (continued)

ITEM NAME	WDTH	TYPE	N.DEC	DESCRIPTION
BUILDHA	8	N	2	Buildable area (hectares)
CONSTRNDHA	8	N	2	Buildable with constraints (ha)
BUILDPCT	5	N	1	Percent of area that is buildable (incl constrained)
NREL4HA	8	N	2	Natl' Renewable Energy Laboratory wind power class 4
NREL4PCT	5	N	1	hectares and percent (commercial turbine potential)
NREL2HA	8	N	2	Natl' Renewable Energy Laboratory wind power class 2
NREL2PCT	5	N	1	hectares and percent (small turbine potential)
NREL4DIST	5	N	1	Distance to nearest NREL class4 of 4+ acres in size (m)
TOWERCNT	3	I	0	Number of communication towers in the unit
TOWERHT	3	I	0	Max height of communication towers in the unit
TOWERDIST	8	I	0	Distance to nearest communication tower (m)
CLRCUTHA	8	N	2	Area of clear cut timber harvest (hectares)
PARCUTHA	8	N	2	Area of partial cut timber harvest (hectares)
DHSKIHA	8	N	2	Area of downhill ski operation (hectares)
DHSKINAME	40	C	0	Name(s) of downhill ski area(s)
HIKEKM	8	N	1	Total length of hiking trails in the unit (km)
HIKEDENS	5	N	2	Density of hiking trails in the unit (km/km2)
DISTHIKE	8	I	0	Distance to nearest hiking trail (meters)
TRANSKM	8	N	1	Total length of power transmission lines
TRANSDENS	5	N	2	Density of power transmission lines (km/km2)
DISTTRANS	8	I	0	Distance to nearest power transmission line or pipeline (m)
RAILKM	8	N	1	Total length of active and abandoned railroad (km)
RAILDENS	5	N	2	Density of railroad (km/km2)
DISTRAIL	8	I	0	Distance to nearest railroad (meters)
ELU30VAR	3	I	0	Variety of Ecological Land Units (ELU30 = elevation, substrate, landform)
A_RICH_BUF	3	I	0	Species richness of rare animals within their dispersal distances from the polygon
A_SF_BUF	3	I	0	Number of source features of rare animals within their dispersal distances from the polygon
A_SHAN_BUF	3	N	3	Shannon diversity index of rare animal source features within their dispersal distances from the polygon
A_RICH_POL	3	I	0	Species richness of rare animals within polygon
A_SF_POLY	3	I	0	Number of source features of rare animals within polygon
A_SHAN_POL	3	N	3	Shannon diversity index of rare animal source features in poly
P_RICH_BUF	3	I	0	Species richness of rare plants within 1km of polygon
P_SF_BUF	3	I	0	Number of source features of rare plants within 1km of polygon
P_SHAN_BUF	3	N	3	Shannon diversity index of rare plant source features within 1km
P_COND_BUF	2	C	0	Average rank of rare plant source features within 1km of polygon
P_DISP_BUF	3	N	3	Dispersal of rare plant source features within 1km of polygon
P_RICH_POL	3	I	0	Species richness of rare plants in polygon
P_SF_POLY	3	I	0	Number of source features of rare plants in polygon
P_SHAN_POL	3	N	3	Shannon diversity index of rare plant source features in polygon
C_RICH_BUF	3	I	0	Richness of rare and exemplary natural communities within 1km
C_SF_BUF	3	I	0	Number of source features of rare and exemplary natural communities within 1km of polygon
C_COND_BUF	2	C	0	Average rank of rare and exemplary natural community source features within 1km of polygon
C_AREA_BUF	3	N	3	Percent of area within 1km of polygon that is rare or exemplary natural community
C_AREA_POL	6	N	3	Percent of polygon that is rare or exemplary natural community
C_RICH_POL	3	I	0	Richness of rare and exemplary natural communities in polygon
C_SF_POLY	3	I	0	Number of source features of rare and exemplary natural communities in polygon

Item definitions for LOWELEV_SPRUCEFIR polygon attributes (continued)

ITEM NAME	WDTH	TYPE	N.DEC	DESCRIPTION
AREA_M2	12	N	2	Total dissolved area (square meters)
PERIM_M	12	N	2	Total perimeter of dissolved area (meters)
NEARDIST	8	I	0	Distance to nearest dissolved area (meters)
NEARDSLVID	4	I	0	Unique ID of nearest dissolved polygon area
SHAPEINDEX	8	N	1	Shape index of dissolved area
PROXINDEX	8	N	1	Proximity index
UNFRAGAC	8	N	1	Unfragmented acres (NHFG coarse filter habitat analysis 2004)
UNFRAGHA	8	N	1	Unfragmented hectares (NHFG coarse filter habitat analysis)
UNFRAGPCT	5	N	1	Percent of polygon that is unfragmented (NHFG coarse filter)
WETPCT	5	N	1	Percent of polygon that is wetland (NWI palustrine)
IFESMEAN	2	I	0	Mean IFES score (Integrated Fragmentation Effects Surface The Nature Conservancy; Zankel, 2005)
POP90X00	8	I	0	Change in population 1990 to 2000 (2000 US Census)
POPDENSX	8	I	0	Change in population density 1990 to 2000 (2000 US Census)
POP00SQMI	8	I	0	Population density in 2000 (persons per square mile)
HOUSES00	8	I	0	Housing units in 2000 (total count)
HU00SQMI	8	I	0	Housing units density in 2000 (houses per square mile)
HG_GEM	16	N	6	Average deposition of gaseous elemental mercury (GEM) via assimilation into tree foliage by land cover type within the polygon (Miller et al, 2005)
HG_TOT	16	N	6	average total deposition of mercury (wet [precipitation + cloud water interception] + dry [GEM + RGM + aerosol]) by land cover type within the polygon (Miller et al, 2005)
CA_INDEX	16	N	6	avg deposition index, rate of cation depletion per ha/per year (Miller et al, 2005)
B_NHW	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
SM_NHW	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
NHW	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
CHW	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
WP_HEM_RS	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
BF_RS_WP_H	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
NHW_WP_HEM	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
NHW_BF_RS_	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
NHW_BF_RS	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
BF_RS_B	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
BF_RS	7	N	3	hectares of this forest type, 1992 NLCD (Miller 2005)
GAPVERTRCH	7	N	1	Vertebrate species avg richness (VT/NH GAP Analysis)
GAPVERTMAX	3	I	0	Vertebrate species maximum (VT/NH GAP Analysis)
HAB	8	C	0	Habitat name (abbrv)
BIO	8	N	2	Raw biological score (high score = high quality)
LAND	8	N	2	Raw landscape score (high score = high quality)
HUMAN	8	N	2	Raw human impact score (high score = low impact)
COND	8	N	3	Raw habitat condition score (high score = good condition)
DEV	8	N	3	Raw development risk (high score = high risk)
RISK	8	N	3	Raw risk score (high score = high risk)
SUBBIO	3	I	0	Subsection biological rank (high rank = high quality)
SUBLAND	3	I	0	Subsection landscape rank (high rank = high quality)
SUBHUMN	3	I	0	Subsection human impact rank (high rank = low impact)
SUBCOND	3	I	0	Subsection habitat condition rank (high rank = good condition)
SUBDEV	3	I	0	Subsection development risk (high rank = high risk)
SUBRISK	3	I	0	Subsection risk rank (high rank = high risk)
NHBIO	3	I	0	Statewide biological rank (high rank = high quality)
NHLAND	3	I	0	Statewide landscape rank (high rank = high quality)

Item definitions for LOWELEV_SPRUCEFIR polygon attributes (continued)

ITEM NAME	WDTH	TYPE	N.DEC	DESCRIPTION
NHHUMN	3	I	0	Statewide human impact rank (high rank = low impact)
NHCOND	3	I	0	Statewide habitat condition rank (high rank = good condition)
NHDEV	3	I	0	Statewide development risk rank (high rank = high risk)
NHRISK	3	I	0	Statewide risk rank (high rank = high risk)
PRIORITY	50	C	0	WAP Priority (Tier 1, Tier 2, or Tier 3)
ECOSUB	40	C	0	Ecoregional subsection
S1	1	C	0	Contains an EO of an S1 rank wildlife species
S2	1	C	0	Contains an EO of an S2 rank wildlife species
LEVEL1	1	C	0	Contains an EO of a WAP Level 1 wildlife species
LEVEL2	1	C	0	Contains an EO of a WAP Level 2 wildlife species
LEVEL3	1	C	0	Contains an EO of a WAP Level 3 wildlife species
LEVEL4	1	C	0	Contains an EO of a WAP Level 4 wildlife species

NOTES

BIO2 Condition = ($A\_RICH\_BUF_R$*.1666) + ($A\_RICH\_POL_R$*.1666) + ($P\_RICH\_POL_R$*.1666) + ($C\_RICH\_POL_R$*.1666) + ($MILLERPCT_R$*.1666) + ($GAPVERTMAX_R$*.167)
where all biological variables are positive indicators of biological quality and subscript R denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0)

LAND1 Condition = ($HECTARES_R$*.25) + ($PROXINDEX_R$*.25) + ($WETPCT_R$*.25) + ($ELU30VAR_R$*.25)
where all landscape variables are positive indicators of landscape integrity and subscript R denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0)

HUMAN2 Condition = ($IFESMEAN_R$*.167) + ($ROAD\_DENSITY_R$*.1666) + ($POP00SQMI_R$*.1666) + ($HU00SQMI_R$*.1666) + (HG_TOT_R*.1666) + (CA_INDEX_R*.1666)
where deleterious human impact variables have been transformed so that all variables are positive indicators of ecological integrity and subscript R denotes percentile rank, thus “good” sites score high (maximum percentile rank=100) and “poor” sites score low (minimum percentile rank=0)

COND2 Condition index = (BIO1+LAND1+HUMAN2)/3 as defined above

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: wilddiv@wildlife.state.nh.us

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).

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