

METHODOLOGY

The Lyme Conservation Commission (LCC), including LCC chair, Lee Larson and Planning and Zoning Administrator, Victoria Davis assisted Watershed to Wildlife, Inc. (WTW) by providing general information, existing tax parcel maps, and additional sites for field verification and documentation within the Town. Lee Larson, Alice Schori, Mike Smith, and Alfred Balch joined WTW during field inventory work.

Field Work

Victoria Davis compiled all data collected from several Lyme residents who took the time to record information on natural resource features collected during their own field work and observations. Fieldwork included several years of song bird surveys and observations, rare plant documentation, black bear patterns and habitat observations, bobcat den site documentation, deer yards and migration pattern tracking, and other general wildlife habitat and movement observations. (See field observation documentation in Appendix IV.) This fieldwork was supported by a grant from the *Connecticut River Partnership Program*.

Fieldwork was conducted, first to get an overall view of Lyme and secondly with a focus on previously identified target areas. This work included inventories and assessments on several wetland complexes, beaver ponds, portions of the Connecticut River, forested habitats, rock outcrops, and agricultural uses of the land throughout the Town. Existing roads and trails were followed to access most field sites, while in some cases compass-based orienteering and topographic maps were used. One field day was dedicated to kayaking the entire Lyme reach of the Connecticut River for a unique perspective of natural resources from the water. GPS data were collected at points of interest including monuments, brook crossings, vernal pool locations, dense softwood stands, rare plant species, and unique or interesting habitats. In addition, photographs were taken with a digital camera along points of interest throughout the Town. During fieldwork sessions any unique habitat co-occurrences were noted and located on a map. Observed invasive plant species were also documented. Lyme residents volunteered by conducting winter documentation of wildlife movements taking advantage of the snow cover as a tracking medium. GPS points were collected as well as numerous photographs. All data collected from Lyme residents were drawn on a plot of the USGS topographic map or compiled as ArcView shape files (.shp) and were sent to WTW. WTW digitized the points or drawn lines into the GIS using ArcView as separate themes where appropriate and integrated the shape files into the main GIS Project.

All digital information belongs to Lyme and was delivered on CD-ROM(s) with hardcopy formats where appropriate.

Gather Existing Digital Data

Existing maps and data for the Town of Lyme were collected. The Town has some digital data including parcel data, commonly known as Tax Maps. The following table shows which maps were obtained, their scale, and the national mapping standard accuracy measure. Since many decisions are based on parcels as they relate to rivers, roads, trails, ponds, wetlands and other features, it is important to point out the working accuracies of these data sources. Combining these sources in various overlays provides an excellent overview and planning tool but does not replace the need to perform site-specific investigations for many subdivision requests. Please refer to the table below to better understand some of these accuracy issues.

Accuracies of Existing Maps

Data	Source	Ratio	Scale	National Mapping Standard Accuracy
1992, 1998, and 2003 Digital Orthophoto Quadrangle (DOQ)	GRANIT -.sid version	1:5,000	1" = 416.7'	Acceptable accuracy within 12.48 feet
Topographic Maps (DRGs)	GRANIT	1:24,000	1" = 2,000'	Acceptable accuracy within 60 feet
Roads and Trails, Power Lines, Railroads, Watershed Boundaries, Hydrology, and Conservation Lands	GRANIT	1:24,000	1" = 2,000'	Acceptable accuracy within 60 feet
Soils	Natural Resource Conservation Service (NRCS)	1:20,000	1" = 1,667'	Acceptable accuracy within 50 feet
Geology & Aquifers	USGS & NH –Dept. of Environ. Services	1:24,000	1" = 2,000'	Acceptable accuracy within 60 feet
National Wetland Inventory	U.S. Fish and Wildlife Service	1:24,000	1" = 2,000'	Acceptable accuracy within 60 feet
GPS Points	Garmin III plus	N/A	N/A	Generally within 30' but dependent upon satellite availability, PDOP, refraction, and topology.

Compile Existing Data into Arcview and ArcGIS

GIS analyses were conducted by WTW. Digital data were gathered from GRANIT, Natural Resource Conservation Service (NRCS), NH-DES, the US Fish and Wildlife Service, and Lyme. These data include the following:

1. DOQs – Aerial photography
2. Topographic maps
3. Hydrology (rivers, streams, lakes and ponds)
4. Roads and trails
5. Power lines and rail roads
6. Conservation lands
7. National Wetlands Inventory
8. Soil Information
9. Aquifers, and Subwatersheds
10. Geology

Existing available maps were then integrated using ArcView and ArcGIS software. Using the 1998 and 1992 Digital Orthographic Quadrants (DOQ), USDA 2003 aerial photography,

topographic maps, and soils maps, features were digitized and overlaid onto a base map. These include: permanent openings, dense softwood stands, and field verified wetlands. Potentially significant wildlife habitat areas were noted.

Wetlands – Wetlands were reviewed and analyzed using the Digital Orthophoto Quadrangles (DOQs), National Wetland Inventory (NWI), and Natural Resource Conservation Service (NRCS) soils maps (displaying hydric soil map units). New Hampshire state laws require that three parameters be met for classification as a jurisdictional wetland: the presence of hydric soil (very poorly and poorly drained soils); sufficient hydrology; and hydrophytic¹ vegetation. When soils maps alone are used, they could potentially over-estimate the number of wetlands throughout the Town. This is particularly true given that up to 35% of a soil classification can be inclusions (for example, upland areas within NRCS hydric soil units or wetland areas within NRCS upland units). On the other hand, examining the NWI data alone would under-represent the number of wetlands, due to the U.S. Fish and Wildlife Service's method of using aerial photography to identify wetlands. Open water, emergent, and scrub-shrub wetlands can readily be identified using aerial photography alone, but forested wetlands are often missed. Some types of wetland delineations require extensive fieldwork beyond the scope of this project. Despite differences and potential errors, data provided from these sources are important tools, and can be built-upon in future studies.

Farmland Soils – Prime farmland, farmland of statewide importance, and farmland of local importance throughout Lyme were determined using the NRCS soils map data. Data were displayed in ArcView and queried so only those soils classified as important farmland were displayed in the Town. Much of the prime farmland, farmland of statewide importance and some of the farmland of local importance are now used for crops (including hayland). Land used for pasture, woodland, recreation, or land uses other than urban, built-up or disturbed areas can still qualify as prime farmland, farmland of statewide importance, or farmland of local importance. The rationale for this approach is that land not already committed to irreversible (urban) uses is still available for cropping. Three categories of important farmlands have been described by the NRCS and they are:

1. Prime Farmland as defined by the U.S. Department of Agriculture is the land that is best suited for food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained yield of crops in an economic manner. These soils are generally flat and free of stones.
2. Farmland soils of statewide importance are lands, in addition to prime farmland, that are of statewide importance for the production of food, fiber, forage and oilseed crops. Criteria used to define this agricultural land were determined by State and local agencies in New Hampshire. The soils on the list are important to agriculture in New Hampshire, yet they exhibit some properties that exclude them from prime farmland. These soils can be farmed satisfactorily by greater inputs of fertilizer, soils amendments and erosion control practices than those necessary for prime agricultural farmland. They produce fair to good crop yields when managed properly.
3. Farmland of local importance is land, in addition to prime and statewide farmland, that is of local importance for the production of food, fiber, forage and oilseed crops. The criteria used to define this farmland were determined by local agencies in

¹ Hydrophytic vegetation are plants that grow in water or on a substrate that is at least partially deficient in oxygen as a result of excess water; plants typically found in and adapted to wet habitats.

Grafton County. Relative values from 100 to 0 were assigned to each of the county's soils based on each soil's potential to grow corn silage or grass-legume hay. The local agencies then determined that soils with relative value of 54 or greater would qualify as farmland of local importance.

Permanent Openings & Dense Softwoods – Permanent openings (areas dominated by grasses, forbs², brambles, or shrubs) were digitized from the DOQs with additional field verification. With the ability to utilize smaller map scale compilation and field verification, these data are more accurate than the coarser LandSat data often used in GRANIT analysis. The regions digitized include only those openings managed as permanent opening habitat. They do not include clear-cuts where the intent is for timber harvesting and regeneration for future logging. Dense softwood (or conifer) cover areas were also digitized from the DOQs. These areas have been recognized as significant wildlife habitat and could be deer and moose wintering areas. Steep slopes were determined using the NRCS soils maps. Data were displayed in ArcView and queried so only those soils map units with 15% slope and greater were displayed in ArcView.

Maps were created at the end of this project with the features described above. All information gathered, compiled, and mapped for this report was delivered to the Town of Lyme in digital format.

GIS Training Workshop and Installation of Project Data

A two-hour 'hands on' training session in accessing and viewing the data, and plotting maps was conducted on September, 2007 as part of this project for Conservation Commission, Select Board, and Planning Board members that had an interest in providing GIS access for the Town of Lyme. Future training was offered at a per diem rate.

Public Information Presentation

At the completion of the fieldwork, and GIS analyses for the natural resources, a public information meeting was held on September, 2007 to explain results from the NRI. The goal of this meeting is to increase public awareness of the importance of the natural resource inventory including; scenic and recreation areas, riparian habitat, dense softwood stands, wetlands, and associated wildlife habitat. In addition, work done for this project was displayed for public viewing at the meeting.

² A forb is a non-woody, broad-leaved plant other than a grass, especially one growing in a field or meadow.