

Town of Henniker
Natural Resources Inventory

**A Report by the
Henniker Conservation Commission**

October 2002

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Acknowledgments

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Members of the Henniker Conservation Commission

Denise Rico, Chairman, term expires 2004
Holly Green, term expires 2003
Roni Hardy, (alternate) term expires 2005
Dawn Nelson, term expires 2004
Mark Mitch, term expires 2005
Martha Sunderland, term expires 2004
Peter Walker, (alternate) term expires 2005

About the Henniker Conservation Commission

In 1969, residents of Henniker voted at town meeting to establish a Conservation Commission as advisors to aid the other town boards, developers and land owners in the protection of the natural resources in town. The seven members of the Henniker Conservation Commission (HCC) are appointed by the Board of Selectmen and serve 3-year terms. The HCC is composed of town residents having a variety of interests and experience. The Commission's primary goal is to work with town residents to provide for the protection and appreciation of natural resources. To that end, the HCC is committed to broadening public awareness of the natural resources of Henniker in the belief that it will inevitably lead to greater commitment to their careful stewardship.

Activities of the HCC include:

- Reviewing applications for wetlands permits from property owners and developers, and making recommendations to the applicant and the N.H. Department of Environmental Services Wetlands Bureau for reducing wetlands impacts.
- Inventorying and planning for the protection of the town's natural resources. These resources include the river and streams, the wetlands and wildlife, forests, trails and open space.
- Assisting property owners seeking to protect their land with conservation easements.
- Sponsoring programs and events to educate Commission members, the public, town boards and other local commissions.

Recent activities of the HCC include technical consultations related to logging operations and residential development and reviews of planned water withdrawals for irrigation and snow-making. Recent projects include the French Pond Episode Assessment Project, a US EPA grant-funded study of the potential sources of phosphorus input into French and Keyser Ponds.

If you are interested in learning more about the HCC's activities, the Commission encourages you to attend one of their meetings. Public meetings are held on the first Wednesday of each month at 7:00 pm at the Town Hall and on the third Wednesday at 7:00 pm at the Grange Hall. Special work sessions are occasionally held more frequently. Meeting agendas are posted in the Town Hall and Post Office on the Tuesday before each meeting.

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1. PROJECT DESCRIPTION AND OVERVIEW

1.1 Resource Significance

The Town of Henniker is situated in an area of great natural beauty and encompasses a wide variety of natural resources. These natural resources played a significant role in shaping the development of the town and its economic base, and they continue to play a significant role today. The river, which once powered mills, now supports white-water boating and fishing; the woodlands support the forest products industry; the geologic formations yield sand and gravel; and the rural character and convenient location attracts residents and businesses to the town. Clearly, the town's economic base is closely linked to the quality of its environment and natural resources.

As the population of Henniker has grown and become more mobile, the natural resources and the economy they support are threatened by development pressures. Other New Hampshire communities have already experienced negative consequences from this pressure including wildlife displacement, loss of recreation corridors and scenic vistas, surface and groundwater contamination, and increased erosion and flooding.

As understanding of the importance and value of natural resources has increased, so too has awareness of how land use can affect them. Various state agencies, such as the Department of Environmental Services, Fish & Game, Department of Resources & Economic Development, and Office of State Planning can provide technical assistance and information; however, primary control and decision-making regarding land use is vested in the municipality.

The Town of Henniker Natural Resources Inventory (NRI) is a comprehensive, geographically-based catalog of land use and natural resources in Henniker. It provides scientifically valid, timely, and relevant information that will enable town officials to monitor and assess the status of natural resources, such as public drinking water supplies, wildlife habitat and water quality. As such, the NRI can be a basis for assessing local land use proposals, updating plans for future growth and economic development, developing town policies and programs, and enhancing residents' understanding of natural resources and environmental conditions.

1.2 Approach Used

The NRI began in March 2000 with funding from the Town of Henniker. Over the next two years, the Henniker Conservation Commission (HCC) and its consultant compiled and analyzed existing digital information and documents about natural resources town wide. This progress report summarizes the information produced and available to date.

To map land uses and natural resources in the Town of Henniker, the HCC used existing digital geographic data from several sources, including the Central NH Regional Planning Commission (CNHRPC), NH Department of Environmental Services (NH DES), US Geological Survey (USGS),

and UNH Complex Systems. On the basis of this information, the HCC prepared eleven maps, reduced versions of which are depicted in Maps I – XI at the end of this report. The following sections summarize the natural resources information that was found in the course of the inventory.

Documents used in the course of preparing this report and of potential interest to the reader are listed in Appendix B, “Resources.”

1.3 Project Objectives

The objective of the NRI has been to gather and present data regarding Henniker’s natural resources. In this two phase project, the HCC and its consultant undertook to compile existing information and produce a set of large-format natural resource maps for public display.

Uses for the data compiled in the NRI include:

- Developing a Conservation Plan,
- Screening development proposals,
- Informing and supporting the Comprehensive Master Plan,
- Evaluating land use and land use regulations,
- Evaluating potential effects of land use and zoning changes, and
- Informing and supporting changes to existing Zoning Ordinances.

Future updates to the NRI may include:

- Compiling, analyzing and/or digitizing information not presently available (i.e., historical and archaeological sites, soil types, tax maps, land use);
- Ascertaining critical natural resources and potentially significant habitat through review of digital data, surveys, and reports;
- Identifying issues affecting ecologically sensitive areas; and
- Encouraging community participation in efforts to identify and quantify additional natural resources in the Town of Henniker.

2. NATURAL RESOURCES INVENTORY

2.1 WATER RESOURCES

2.1.1 Rivers, Streams & Floodplains

Rivers, streams, 100- and 500-year floodplains are illustrated in Map II, "Water Resources". Perennial rivers and streams are identified and described in Table 1.

Table 1. Rivers & Streams

<u>Name</u>	<u>Length (mi)</u>	<u>Stream Order</u>	<u>Flow (cfs)</u>	<u>Watershed Unit</u>
Contoocook River	10.8	2	400.6 ^a	Merrimack River
Amey Brook	6.1	3	-- ^b	Contoocook River
Black Brook	2.3	3	-- ^b	Contoocook River
Cascade Brook	1.4	3	-- ^b	Contoocook River
Chase Brook	2.4	3	-- ^b	Contoocook River
Colby Brook	2.7	3	-- ^b	Contoocook River
Bean Brook	2.2	4	-- ^b	Amey Brook
Brown Brook	1.9	4	-- ^b	Amey Brook

^a Annual-mean 1940-1976, US Geological Survey gauging station, West Henniker

^b No recorded data available

CNHRPC 1998, with HCC updates 2002.

Fly-fishing, paddling, and tubing on the Contoocook River are increasingly important recreational activities generating local economic activity. Best known is a 6.5 mile reach of the river extending from Hillsboro to West Henniker that presents paddlers with challenging and technical Class III-IV whitewater:

"The Contoocook is one of New Hampshire's largest rivers and offers some of the best heavy water canoeing in all of New England. Because it holds water much better than smaller streams, the Contoocook can be run late in the season and even after heavy rains. In terms of personality, this section is definitely schizophrenic and manic-depressive; it is either disquietingly calm or ravagingly mad, changing almost without warning. Rocks of all shapes and sizes populate this people-eating run, and the level of the water determines how they affect the boating. Low or medium water requires much maneuvering. At higher levels the rocks are responsible for the extreme turbulence. This trip is short: the first part can easily be eliminated and it can be repeated several times in a day. The lower half can be viewed from [Old] Route 202 except for two or three places and, as things would have it, these places are Class 4."

(AMC New England White Water River Guide, 1981)

Anglers and paddlers seeking calmer waters of the Contoocook can gain access via a small boat launch on River Road in the Hopkinton Dam Reservoir area ("accessible by conventional vehicles," NH F&G, 2002). Access to smaller streams and brooks is gained via public lands, stream crossings and rights-of-way. Access across private property is at the discretion of the property owner.

Surface water quality is characterized on the basis of class designations. Class A waters are of the highest quality and are considered potentially acceptable for water supply use after disinfection. Class B waters are of the second highest quality and are considered to be "acceptable for fishing, swimming and other recreational purposes, and after adequate treatment, for use as water supplies" (NH DES, 2000). All surface waters in the town of Henniker are designated 'Class B' by the State of New Hampshire.

Numerical standards and narrative criteria set forth in state and federal water quality regulations serve as benchmarks for assessing whether a waterbody is supporting its designated uses. Water quality information from a variety of sources is assembled and reviewed. Sources include the: NH DES Ambient Monitoring Program, Nonpoint Source Program, and Coastal Shellfish Program; New Hampshire Estuaries Project; NH Department of Health and Human Services; US Fish and Wildlife Service; USDA Natural Resources Conservation Service; US Geological Survey; and various volunteer monitoring groups. The data gathered is used cumulatively to determine whether there is an exceedance or a violation of State water quality standards.

Rivers, streams and estuaries that are not fully supporting all designated uses (i.e., 'impaired') are listed by the NH DES. This list, called the '305(b) List', includes: the location of impairment, the cause of impairment, the probable source of impairment, the estimated miles (or square miles) that are considered impaired, and recommended abatement action.

In Henniker, a 1-mile reach of the Contoocook River in the vicinity of the Dean Edna Proctor Bridge (Route 114) is considered “Partially Supporting” one or more uses. Ambient surface water samples taken in 1995, 1996, and 1999 revealed zinc concentrations that exceed the US EPA recommended levels for protection of aquatic life (NH DES, 2000). The probable source is “unknown” and further investigations will be required to determine the source(s).

2.1.2 Ponds & Wetlands

Ponds and wetlands are illustrated in Map II, “Water Resources.” Ponds are identified and described in Table 2.

Table 2. Ponds

<u>Name</u>	<u>Area (acres)</u>	<u>Max. Depth (ft)</u>	<u>Avg. Depth (ft)</u>
Blaisdell Pond	2.2	11.5	6.5
Mud Pond 2	3.8	10.0	3.5
Colleague Pond	7.0	23.0	13.1
Middle Pond	7.2	20.0	13.1
Mud Pond 3	7.8	11.8	7.9
Morrill Pond	9.3	20.0	15.1
Mud Pond 1	10.8	20.0	15.1
Carr Pond	11.0 (1.9 ^a)	6.9	4.9
Grassy Pond	13.4 (2.9 ^a)	17.7	13.1
Craney Rookery	17.7	3.5	3.5
Keyser Pond	19.8	18.4	9.8
Upper Pond	26.7	20.0	10.8
Craney Pond	36.5	29.9	9.2
French Pond	38.0	38.7	14.1
Pleasant Pond	85.1	3.5	16.0
Long Pond	91.1	20.0	7.9

^a Area in the Town of Henniker

NH DES Lake and Pond Inventory data and CNHRPC 1998, with HCC updates 2002.

The New Hampshire Department of Fish and Game maintains two small boat ramps in Henniker that provide access to anglers and paddlers. The French Pond ramp is located off French Pond Road and the Keyser Pond ramp, off Old Concord Road (“accessible by conventional vehicles,” NH F&G, 2002). Access to Pleasant Pond is via a town-owned right-of-way on Quaker Street. Access across private property to the remaining ponds is at the discretion of the property owner. There are no designated public swimming areas in the Town of Henniker.

A survey of water quality of Henniker ponds was conducted in the fall of 2000 and 2001 as part of the Natural Resources Inventory. Members of the Conservation Commission, volunteers from the community, and New England College students and staff collected water samples and measured dissolved oxygen, temperature, and clarity in 12 of the town's lakes and ponds. Samples were tested for phosphorus, chlorophyll A, specific conductivity, pH, and turbidity. The information establishes baseline data for all the major ponds in town. Ponds that were sampled include: Colleague, Craney, French, Keyser, Long, Middle, Morrill, Mud, Pleasant, Upper, and two other unnamed ponds--designated "Craney Rookery" and "Mud Pond 2". (See Map II.)

Based on the results of this survey the water quality of Henniker ponds is good. No specific water quality problems (e.g., algal blooms) were reported during the period of the fall 2000 and fall 2001 surveys though, according to the 2000 NH DES 305(b) Report, Keyser Pond is considered "Partially Supporting" one or more designated uses. It fails to fully support swimming use due to periodic excessive algal growth. The probable source is "unknown" and further investigations are underway to determine the source(s).

Craney Pond and Pleasant Pond have very low total phosphorus concentrations. There are three ponds with very high total phosphorus concentrations: French Pond, Morrill Pond, and Mud Pond 1. Although Mud Pond 1 had high total phosphorus levels measured in fall 2000, the fall 2001 survey results were lower. Considerable efforts continue to be put forth to address the high total phosphorus concentrations in French Pond.

The clarity of Henniker ponds was less than the mean of NH VLAP (NH Volunteer Lake Assessment Program) lakes and ponds sampled in 2000. Clarity is influenced by a number of factors including algae, suspended sediment, and the color of the water. The lower levels of clarity are consistent with levels of turbidity that are greater than the VLAP mean value. However, there is no indication that there is a single cause for decreased clarity or that these results indicate a problem with water quality. The clarity measurements of Keyser Pond and French Pond have historically been low and attributed to excessive algae growth. However, in the fall 2000 and fall 2001 surveys the transparency levels for both of these ponds were comparable to other Henniker ponds.

Acid Neutralizing Capacity (ANC) is a measure of the ability of a solution to neutralize acids entering the lakes from an acidic input such as acid deposition -- the higher the ANC the greater the acid neutralizing ability. The lowest levels of ANC were measured in Craney Pond and the Craney Rookery. Mud Pond 1 was the only Henniker pond categorized as not sensitive to acidification. However, based on the available water chemistry data there is no indication that any of Henniker's ponds are impacted or influenced by acidic inputs.

The report summarizing the results of the 2000 and 2001 surveys and comparing the results with lakes and ponds that were sampled statewide in the NH VLAP in 2000 can be found in Appendix D.

Wetlands greater than 20 acres in size are illustrated in Map VIII, "Riparian & Wetland Habitat" and are identified and described in Table 3.

Table 3. Wetlands

<u>Location</u>	<u>Area (acres)</u>	<u>NWI Class^a</u>
Mink Hill Rd	21	PEM ^b , PFO ^c
Colleague Pond	23	PSS ^d
Blaisdell Pond	24	PSS
Pleasant Pond	25	PSS, PEM
Weare Town Line	26	PEM, PFO, PSS
Brown Brook	27	PEM, PFO
Colby Brook	29	PSS, PFO
Colby Station	32	PSS, PFO
Gould Pond Rd	33	PEM, PSS, PFO
Village Green	34	PSS, PEM
Craney Pond	42	PFO, PSS, PEM
Amey Brook	51	PSS, PEM, PFO
Mud Pond complex	180	PSS, PFO
Long Pond complex	213	PSS, PFO, PEM

^a NWI classes listed in order of predominance within wetland system.

^b PEM - Palustrine Emergent

^c PFO - Palustrine Forested

^d PSS - Palustrine Scrub-Shrub

NWIS data, with HCC updates 2002.

Wetlands in Henniker are identified on the basis of the US Fish & Wildlife Service National Wetlands Inventory and Survey (NWIS) data. Large isolated wetlands are found just north of Upper Pond, south of the Contoocook River by Mud Ponds 1 and 2, and in lands lying between the Contoocook River and US Route 202. Based on the NWIS mapping, seven hundred seventy acres of wetlands, excluding surface water and streams, exist in Henniker. Wetlands depicted in the NWIS mapping were identified by interpretation of 1985 and 1986 aerial photographs at the 1:58,000 scale. Forested wetlands, which are more difficult to identify from aerial photographs, may be under-represented. Small wetlands may have also been omitted. Changes to wetlands which may have occurred since the data were assembled will not be represented. Thus, the NWIS data is not all-inclusive and unmapped wetlands, such as vernal pools, certainly exist throughout town. Field investigations are necessary in order to confirm the locations of both mapped and unmapped wetlands.

Soil drainage classes are a commonly used tool for identifying potential wetlands. When complete in 2003, the revised USDA NRCS Merrimack County Soil Survey Map will show the location of poorly-

and very poorly drained soils thereby providing an indication of the location of some of these smaller riparian and isolated palustrine wetlands, as well as intermittent drainages.

Between 1990 and 1994, the HCC conducted evaluations of thirty-four wetlands greater than 1 acre in size (twenty-two wetlands 1-10 acres in size; eight wetlands 11-25 acres; and four wetlands over 25 acres). The evaluations were performed by HCC members and other volunteers using the manual, *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire* ("The New Hampshire Method") by the USDA NRCS and the Audubon Society of New Hampshire. The results were compiled into a database and graphed by the CNHRPC.

The NH Method is a wetland evaluation process designed for use as a tool to compare the relative Functional Values that wetlands within a defined study area perform. The results produced by the method are a set of relative Functional Values for up to 14 different functions: Ecological Integrity, Wildlife Habitat, Finfish Habitat, Educational Potential, Visual/Aesthetic Quality, Water-based Recreation, Flood Control Potential, Ground Water Use Potential, Sediment Trapping, Nutrient Attenuation, Shoreline Anchoring and Dissipation of Erosive Forces, Urban Quality of Life, Historical Site Potential, and Noteworthiness. Each of these functions is assigned a numerical value based upon the answers to a series of questions. The questions are answered using existing data (e.g. soils, topographic, and NWIS) and by conducting field surveys. The results for a particular wetland can then be compared with the results for other wetlands in the study. An overall score for each wetland is not determined thus allowing the study to focus on those functions deemed most important.

The graphs depicting the results of the NH Method wetlands evaluation will be available for the next update of this document.

2.1.3 Ground Water

Aquifers are geologic formations that have the potential to yield significant amounts of groundwater. The Hopkinton Lake sub-watershed unit underlying most of Henniker, southern Warner and West Hopkinton contains one large contiguous aquifer along the main Contoocook River valley ('Henniker-Contoocook aquifer') and three separate small aquifers. The 6.23 mi² Henniker-Contoocook aquifer begins in western Henniker and continues to the Hopkinton Dam (USGS, 1995). There, it joins a long, continuous aquifer extending eastward to the Merrimack River in Concord. It and the small aquifer located in West Henniker along the Contoocook River are depicted in Map II, "Water Resources".

The sediments composing the aquifers in Henniker were deposited at the waning end of the last ice age some 15,000 years ago. They were deposited as 1) ice-contact deposits in western Henniker along the Contoocook River, 2) deltaic deposits near the confluence of Amey Brook and the Contoocook River, 3) eskers and kames in the valleys of Colby Brook and Hopkinton Reservoir, 4) glaciolacustrine deposits along the Contoocook River valley in eastern Henniker, and 5) a large ice-contact delta on the northern side of Craney Hill (USGS, 1995).

The sorted and layered sediments of the aquifers include 1) coarse-grained sand and gravels intermixed with till in the small, isolated aquifer along the Contoocook River in western Henniker, 2) interlayered coarse- and fine-grained sediments in the large, contiguous main valley of the Contoocook River in central Henniker (coarse-grained deltaic deposits border this aquifer on the north and south sides), 3) a thin upper layer of sand underlain by fine-grained silts and clays in eastern Henniker, and 4) layers of coarse-grained sand and gravel in the Colby Brook valley (USGS, 1995).

Henniker depends on the high yield Henniker-Contoocook aquifer for its drinking water supply. Two gravel packed wells, located on the south side of Route 114, supply water to Henniker Village. Other wells are found on Depot Hill Road and off of the Foster Hill Road Extension. The Town does not use any surface water bodies for its public drinking water supply.

Ground water withdrawals include the three municipal wells for the town of Henniker and domestic supplies. The three municipal wells withdraw 0.24 Mgal/d. Domestic use, estimated at 0.19 Mgal/d, is primarily from bedrock water supplies. Commercial withdrawals also are from bedrock (USGS, 1995).

Groundwater recharge to the aquifers is from precipitation. The effective recharge rate is 7.5 in/yr – the lowest rate for any subbasin within the Contoocook River basin. Except where streams enter the main valley aquifer, horizontal rates of flow are probably slow in the principal aquifer along the Contoocook River and groundwater residence time is probably longer than other subbasins (USGS, 1995).

According to the USGS, the potential for increased aquifer yield is probably greatest near Mud Pond in southeast Henniker. Using a ground water flow model, the agency estimated aquifer yield in this vicinity to range from 1.13 to 1.14 Mgal/d (1995). The three municipal-supply wells consume less than 5 percent of the average annual precipitation recharge to the aquifer, and withdrawals from these wells would not interfere with aquifer yield in the model area (USGS, 1995).

Ground water quality from the aquifers is generally suitable for drinking and for other domestic and commercial uses. Concentrations of sodium in excess of the USEPA Health Advisory limit and concentrations of iron and manganese in excess of the USEPA Secondary Maximum Contaminant levels occur throughout the sub-watershed and are relatively common. Sodium is introduced through natural atmospheric deposition and anthropogenic sources (i.e., road salt). Iron and manganese are common elements in minerals of bedrock and stratified drift in NH and are common dissolved and suspended solids in ground water of these deposits (USGS, 1995).

The US EPA requires that the NH DES assess all sources of public drinking water for susceptibility to contamination by materials regulated in the federal Safe Drinking Water Act, 1996. The NH DES maintains a geographically-referenced database of potential contamination sources to aquifers and public drinking water supplies. The map, "Drinking Water Resources and Potential Contamination Sources: Henniker, NH", is available for review at Town Hall and from the NH DES.

2.1.4 Water Use Registration and Water Use Reporting

Per state regulation, Env-Wr 701 'Water Use', any person using an average of 20,000 gallons of water or more per day averaged over a 7 day period, or 600,000 gallons in any 30 day period, must register and report the use with the following exemptions:

- one time or occasional uses of water in excess of 600,000 per 30 day period (such as filling swimming pools or fire fighting);
- water used for irrigation that does not exceed 140,000 gallons per week, or the area irrigated does not exceed 5 acres.

Table 4. Registered Water Uses

<u>Facility</u>	<u>Average Daily Use (thousands of gallons)</u>					
	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
Cogswell Springs WW – Town of Henniker						
Well #1	115.845	112.137	102.963	127.488	98.063	91.35
Well #2	112.34	108.008	82.074	128.495	89.824	89.988
Waste Water Treatment Plant - Town of Henniker						
Contoocook River	217.156	211.274	218.396	197.524	213.392	205.552
Collection System	171.279	162.606	165.52	149.528	161.197	157.811
Michie Corp. Onsite Well	64.956	120.97	120.649	113.529	129.323	91.338
Pats Peak Ski Area ^a						
Stream	72.222	56.257	35.417	57.778	85.417	41.667
Chase Brook	88.889	147.222	98.100	102.500	125.000	104.839
Craney Pond	0	0	0	0	158.710	88.710

^a Average daily withdrawal is seasonally adjusted.

"Average daily use for a specific source calculated from actual monthly values. Months with missing values are ignored in the computation of this average but months with zero usage are included."

"'Seasonally adjusted' average daily withdrawal. All facilities which report their usage on an annual rather than quarterly basis [such as water used for irrigation or snow-making] have zeros entered during the months of their respective 'off-seasons'. No usage takes place during these months so zeros are appropriate. The computation of ADJUSTED AVERAGE DAILY is based on all the months where non-zero data exist, so the averages for these classes can be significantly higher than if the off-season non-use were included in the averaging."

NH DES, 2002

2.2 LAND RESOURCES

2.2.1 Soils

In 1981, the Farmland Protection Policy Act (“Farm Bill”) was enacted with provisions to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with state, local and private programs and policies to protect farmland. In New Hampshire, ‘farmland’ is categorized as Prime, Unique, Statewide Important, or Locally Important based on county-specific soils criteria (Appendix C).

Prime Farmland Soils

Prime farmland is land that 1) has the best combination of physical characteristics for producing food, feed, forage, fiber and oilseed crops and 2) is available for these uses. New Hampshire had 142,400 acres of soils classified as prime farmland in 1997, which represents over 2 percent of the state's total land area. Nationally, 64 percent of soils classified as prime farmland are being used as cropland. In New Hampshire, 25 percent (35,300 acres) of the prime farmland soils are used as cropland. New Hampshire also has 89,500 acres of prime farmland soil used as forest land and 10,100 acres used for pastureland.

Statewide, a total of 17,700 acres of prime farmland became unavailable for production of food, feed, forage, fiber and crops between 1982 and 1997. Most was converted to urban and rural development. The converted prime farmland came from cropland (7,800 acres), pastureland (8,100 acres) and forest land (1,800 acres).

Unique Farmland Soils

This is farmland other than prime that is used for the production of specific high-value food and fiber crops in NH. Sites represent a special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. In order to qualify as unique farmland, a high-value food or fiber crop must be actively grown. In NH, unique farmland crops include, but are not necessarily limited to apples, peaches, pears, plums, strawberries, raspberries, cranberries, blueberries, pumpkins, squash, and tomatoes. There is no farmland in Merrimack County designated as ‘unique’.

Statewide Important Soils

This is land that is not prime or unique but is considered farmland of statewide importance for the production of food, feed, fiber, forage and oilseed crops. Criteria for defining and delineating farmland of statewide importance are determined by a state committee chaired by the Commissioner of the NH Department of Agriculture with members representing the UNH Cooperative Extension, NH

Association or Conservation Districts and the NH Office of State Planning. The NRCS State Soil Scientist serves on this committee in an advisory capacity.

Soils of statewide importance are soils that are not prime or unique and:

- Have slopes of less than 15 percent
- Are not stony, very stony or bouldery
- Are not somewhat-poorly, poorly or very-poorly drained
- Includes soil complexes comprised of less than 30 percent shallow soils and rock outcrop and slopes do not exceed 8 percent
- Are not excessively drained soils developed in stratified glacial drift, generally having low available water holding capacity.

Locally Important Farmland Soils

Farmland of local importance is farmland that is not prime, unique or of statewide importance, but has local significance for the production of food, feed, fiber and forage. Criteria for the identification and delineation of local farmland are determined on a county-wide basis by the individual County Conservation District Boards.

In October 2001, the Merrimack County Conservation District Board of Supervisors adopted the following criteria for Locally Important Farmland:

- Have slopes less than 25%
- Are not extremely bouldery or stony
- Are not poorly or very poorly drained
- Complexes consisting of less than 40% shallow soils and rock outcrop and slopes do not exceed 25%
- Includes excessively drained soils developed in stratified glacial drift.

Soil types and locations are published in the Merrimack County Soil Survey on maps prepared from aerial photographs. Soil units are delineated and identified by numeric symbols; all areas marked with the same symbol are the same kind of soil. Prime farmland and important agricultural soils that occur in Merrimack County are listed with their respective symbols in Appendix E.

A digital overlay of soil types is not currently available. The HCC is coordinating with the USDA NRCS which is currently updating and revising the Merrimack County Soil Survey and its digital maps. The Survey and maps are scheduled for completion in late 2002 or early 2003. When completed, wet soils and soils categorized as Prime, Unique, Statewide Important, and Locally Important will be mapped and appended to this report.

2.2.2 Promontories & Steep Slopes

In 2000, members of the HCC analyzed digital topographic data and identified mountains and hills over 1000 feet in elevation. The analysis revealed nine such landforms (Table 5).

Table 5. Promontories

<u>Name</u>	<u>Elevation</u>
Bear Hill	1380'
Buck Hill	1020'
Colby Hill	1256'
Craney Hill	1402'
Liberty Hill	1193'
Morrill Hill	1040'
Mount Misery	1080'
Mount Hunger	1350'
Wadsworth Hill	1160'

HCC, 2000.

In 2001, the HCC coordinated with New England College (NEC) to identify and characterize steep slopes using the existing digital topographic data and spatial analysis software. Slopes were grouped and analyzed by the following classes: 1) 0-8%, 2) >8-15%, 3) >15-20%, and 4) >20%.

Steep and very steep slopes occur in the following areas:

- In the northwest portion of town known as the 'Mink Hills' and vicinities of Mount Misery, Liberty, Colby and Wadsworth Hills;
- Vicinity of Buck Hill;
- Vicinity of Mount Hunger;
- Ridge south of the Contoocook River valley, including Bear and Morrill Hills; and
- Ridge west of the Black Brook valley west of Route 114, including Craney Hill.

Promontories and steep slopes are depicted in Map V.

2.2.3 Conservation Land, Parks & Other Public Open Space

Conservation land, parks, recreation and other public open space are illustrated in Map III, "Land Resources." The total number of acres held for conservation or public open space is about 10 to 12% of the entire Town.

Information regarding the location, ownership, and area of restricted use and conservation lands is presented in Tables 6 and 7, respectively. Restricted use lands are those parcels that are currently public open spaces. They are tax exempt in the town and their use is restricted in such a way as to make future development unlikely. Conservation lands are parcels that are protected as open space through deeds or other legal measures.

Table 6. Restricted Use Lands

<u>Name</u>	<u>Owner</u>	<u>Area</u> <u>(acres)</u>	<u>Lot #</u>
Azalea Park	Town	5.0	413
Cemeteries	various	26.5	434, 422, 237A/251, 414/415, 573, 703, 635
Cogswell Springs	CSWW	40.0	501, 499B, 517E, 582A, 517F, 571X1
Community Park	Town	0.6	242A
Craney Hill Tower	Town	3.6	654A
French Pond Access	NH F&G	0.4	313A
Keyser Pond Access	NH F&G	0.1	618B
Vincent Mem Grove	Town	0.3	721B
Western Avenue	Town	0.4	349J
Woodman Park	Town	1.0	421

Total Acreage: 77.6

CNHRPC 1998, with HCC updates 2000.

Table 7. Conservation Lands

<u>Name</u>	<u>Owner</u>	<u>Area (acres)</u>	<u>Lot #</u>
Ames State Forest	NH DRED	16.6	608
Buehler/Salmen Forest	Town of Henniker	52.0	739
Colby Hill Forest	SPNHF	98.0	62/63
Craney Pond Town Forest	Town of Henniker	5.5	735
Craney Hill State Forest	NH DRED	20.0	606
Davis Easement ^a	Private	98.0	639, 639A, 639B, 639X
Foster Conservancy	SPNHF	155.0	116, 117X, 118, 79, 80, 55
Hopkinton-Everett Flood Control Reservoir	US Govt.	1778-2415 ^c	391X, 256, 301, 599A, 495, 527, 462, 465
H-E FCR Flowage Easements ^b	Private	316.0	Numerous
Meadow's End Ltd. Easement ^a	Private	19.2	759
Preston Memorial Forest	Town of Henniker	16.5	48
Totten Trails State Forest	NH DRED	109.0	646
Vincent State Forest	NH DRED	4.5	721F
Marshall Fund Easement ^a	Private	108.0	755
Contoocook Village Precinct	Town of Hopkinton	40.0	27
Wells Easement ^a	Private	10.8	706/706X

Total: 2847 to 3484 acres

^a Easement held by SPNHF

^b Easements held by the US Govt.

^c Range based on variations among Town Hall, US Govt., and CNHRPC reports

CNHRPC 1998, with HCC updates 2001.

2.2.4 Trails & Recreational Rights-of-Way

Trails and recreational rights of way are illustrated in Map IV, "Trails & Recreational Rights-of-Way." In July, 1999, the Henniker Trails Steering Committee, comprised of members of the public and town boards, and the CNHRPC produced a document titled "Open Space Trail System Plan: Henniker, NH." The purpose of creating the Plan was to focus attention on what needs to be done in order to protect the open space in Henniker and to create a trail system that gives residents and visitors the opportunity to enjoy and appreciate the Town's open space.

The Open Space Trail System Plan had three goals to accomplish:

- Inventory existing public lands, easements, rights-of-way, and trails;
- Determine where linkages to the lands and trails should be obtained; and,
- Provide recommendations on how to obtain the linkages and maintain a trail system.

By using the Town's tax maps and associated tax assessor's index, information was extracted on the conservation land easements and permanently protected lands of the Town; on public or private parcels, such as those owned by utility companies, that could potentially be available for public use with landowner permission; on rights-of-way parcels such as those that encompass former railroad rights-of-way and utility line easements and those that abut Class VI roads; and finally, on the parcels that have existing non-motorized and motorized trails. All sources of information were public and readily available at Town Hall.

The extensive inventorying and data collection process culminated in a series of General Recommendations and a Proposed Open Space Trail System Map. The recommendations were intended to help Henniker retain its rural character, to create a trail system, to encourage a greater sense of community, and to enlarge its undeveloped open space landscape. In addition, specific Recommendations were made based upon the identified opportunities within Town including the Railroad/Contoocook River Corridor, US Army Corps of Engineers Land, Power line Corridors, Conservation and Public Land, Class VI Roads, and Snowmobile Trails.

A copy of the report can be viewed at the Town Hall, the Tucker Free Library, or the NEC Danforth Library.

2.2.5 Unfragmented Land

Unfragmented land resources are illustrated in Map III, "Land Resources". Using a method developed by the UNH Cooperative Extension, the HCC digitally analyzed unfragmented land resources in 2000. Five hundred foot road buffers were created on each side of all but Class VI roads. These road corridors were then removed from the area of the town. The acreages of the remaining parcels were then calculated. Parcels over ninety acres in size are shown on the map.

Henniker has nine parcels greater than 500 acres in size, five parcels 100-500 acres, four parcels 150-300 acres, and eight parcels 90-150 acres. Henniker's largest unfragmented parcel, over 5000 acres in size, is located in the northwest quadrant of town. Unfragmented land resources do not end at town boundaries and most of Henniker's undeveloped lands are just a small part of larger, regional forest blocks.

Large areas of contiguous, undeveloped land can support numerous game and 'charismatic' species, such as moose, bear, turkey, white-tailed deer, gray fox, and raptors. While included but not specifically analyzed, the unfragmented floodplain forests and wetlands of the Hopkinton-Everett Flood Reservoir Area are important habitat for beaver, otter, amphibians and migratory neotropical birds.

2.2.6 Agricultural & Other Open Land

Agricultural and other non-forested areas are illustrated in Map VII. The total number of acres in agriculture or open land is about 13.1% of the entire Town. Information regarding acreage by cover type is presented in Table 8.

Table 8. Agricultural & Other Open Land

<u>Cover Type</u>	<u>Area (acres)</u>	<u>Percent</u>
Row crops	133	0.5%
Hay / pasture	2003	7.0%
Orchards	29	0.1%
Non-forested wetland	613	2.1%
Disturbed	195	0.7%
Other cleared	786	2.7%

UNH Complex Systems and HCC 2002.

2.3 BIOTA

2.3.1 Land Cover Types

In fall 2001, the UNH Complex Systems Research Center released the results of the NH Land Cover Assessment project. The objective of the project was to produce a digital, statewide land cover data set based on satellite imagery collected over a ten year period (1990-1999). The imagery was processed to derive a 23-class land cover classification which places particular emphasis on the forested and agricultural classes (Appendix F).

Map VI depicts land cover classes in the Town of Henniker. Information regarding percent land cover, by class, is presented in Table 9.

Table 9. Land Cover Classes & Percent of Total Area

<u>Cover Class</u>	<u>Area (acres)</u>	<u>Percent</u>
Residential / commercial / industrial	450	1.6
Transportation	904	3.1
Row Crops	133	0.5
Hay / pasture	2003	7.0
Orchards	29	0.1
Beech / oak	6335	22.1
Paper birch / aspen	266	0.9
Other hardwoods	1018	3.6
White pine / red pine	2442	8.5
Spruce / fir	149	0.5
Hemlock	1930	6.7
Mixed forest	10484	36.6
Open water	769	2.7
Forested wetland	164	0.6
Open Wetland	613	2.2
Disturbed land	195	0.7
Other cleared	785	2.7

UNH Complex Systems Research Center and HCC, 2002.

2.3.2 Fishery Resources & Aquatic Habitat

Henniker waterbodies offer outstanding opportunities for sport fishing. Well known 'hot spots' are:

- The Contoocook River - Largemouth bass, smallmouth bass, pickerel, horned pout (brown bullhead), brook trout, brown trout and rainbow trout.
- Pleasant Pond - Largemouth bass, pickerel and horned pout.
- French Pond - Brook trout and rainbow trout.

Table 10 lists fish stocked in Henniker from the six state hatcheries as well as fish transferred from other water bodies within the state. According to officials at the NH Department of Fish & Game, stocking rates vary little from year to year and the numbers can be considered typical for any one year.

Table 10. Fish stocking data

<u>Waterbody</u>	<u>Species</u>	<u>Age</u>	<u>Number</u>	<u>Pounds (total)</u>
Amy Brook	Eastern brook trout	1+YR	300	154
Contoocook River	Brown trout	1+YR	921	657
	Eastern brook trout	1+YR	690	313
	Rainbow trout	1+YR	2425	1976
	Eastern brook trout	1+YR	2000	712
French Pond	Rainbow trout	1+YR	2000	1833

NH F&G, 2001 Fish Stocking Report

French Pond is designated a 'Trout Pond' by the NH Department of Fish & Game and is managed for trout. Special lake and pond fishing rules apply. Special fishing rules also apply to a segment of the Contoocook River in Henniker. From a point 2,500 feet above the paper mill dam in West Henniker, upstream approximately one mile, only flies and single hook artificial lures with no more than 3 hook points are permitted. The daily limit for brook trout is 2 fish. The minimum length for brook trout is 12 inches. (*Anglers should consult the New Hampshire Freshwater Fishing Digest regarding current rules and regulations.*)

2.3.3 Natural Heritage Data

The NH Natural Heritage Inventory (NHI) is a program in the Division of Forests & Lands that finds, tracks, and facilitates the protection of New Hampshire's rare plants and exemplary natural communities (which are different types of forests, wetlands, grasslands, etc.). The mission of the NHI is to:

- determine protective measures and requirements necessary for the survival of native plant species in the state;
- investigate the condition and degree of rarity of plant species; and,

- distribute information regarding the condition and protection of these species and their habitats.

The NHI also maintains information on rare wildlife in cooperation with the NH Fish & Game Department's Nongame & Endangered Wildlife Program, which has legal jurisdiction over New Hampshire wildlife. As such, the NHI data represents the best available information for location and status of species of concern and natural communities in NH.

NHI data on record for the Town of Henniker is presented in Table 11. Areas where occurrences of rare species and exemplary natural communities have been recorded are depicted in Map X. There are no known occurrences of federally listed threatened or endangered species in Henniker.

Table 11. Natural Heritage Data

<u>Species or Community</u>	<u>Federal / State status</u>	<u># reported, Henniker^a</u>	<u># reported statewide^a</u>
SNE Acidic Level Fen**	none	1	14
SNE Basin Shrub Swamp**	none	1	2
SNE Level Bog**	none	1	19
Farwell's milfoil	State-listed, threatened	Historical	10
Great blue heron (rookery)	none	Historical	37
Wood turtle**	none	1	24

^a In the last 20 years

** Assigned "Very high importance" by NHI based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town.

NH Natural Heritage Inventory, February 2002

It should be noted that a lack of documented occurrences does not mean that there are no rare species present. It simply means that none have been reported and documented by NHI. Not all information about the presence of rare species is found in state databases. Though unconfirmed, anecdotal evidence suggests other rare and uncommon species may inhabit portions of town. Gathering information from local sources and conducting a more definitive habitat characterization could help identify the potential presence of rare species and exemplary natural communities.

2.3.4 Significant Wildlife Habitat

In New Hampshire, significant wildlife habitat is described as having one or more of the following characteristics:

- Habitat used by listed, rare or special concern wildlife species.
- Large tracts of unfragmented and undeveloped land.
- Riparian areas adjacent to water courses, ponds and wetlands.
- Croplands, large fields, grasslands and shrublands.
- Unusual landscape features; scarce, unique or critical habitat.
- Wildlife travel corridors.

Humans affect the distribution and quality of wildlife habitat primarily through development, agriculture, road construction, gravel extraction and forestry. Of all these, development creates the most permanent effects on habitat. Good land management practices can minimize long-term habitat impacts, but even periodic poor forestry and agricultural practices have far less impact than poorly-planned land development. When houses, roads, shopping centers and schools go in, there is a permanent change to the plant and animal communities.

Most obvious are the visible, direct effects such as the elimination of vegetative cover and alteration of water courses. Less obvious is how development often fragments existing habitat into parcels that are too small or isolated to support populations of some native species. Small area may not meet all habitat requirements. Populations may be cut off and disassociated from the larger gene pool. Wide ranging species become increasingly marginalized and may venture into populated areas.

Following the methods described in “Identifying and Protecting New Hampshire’s Significant Wildlife Habitat: A Guide for Towns and Conservation Groups” (NH F&G 2001), the HCC prepared a composite overlay indicating potentially significant wildlife habitat areas (Map XI). Site specific information regarding mast-producing groves, vernal pools, ledges and outcrops, deer yards, aeries, river bank overhangs, feeding and spawning areas will be added to this base of information as it becomes available.

The map and site specific information will be used to develop habitat protection strategies such as:

- setting priorities for protection;
- applying appropriate land management techniques;
- altering the timing or extent of activities so as to avoid impacts;
- maintaining roadless areas;
- connecting already protected lands;
- promoting buffers and setbacks; and,
- restoring degraded habitats.

3. CONCLUSIONS AND FUTURE WORK

The primary goal of the 2002 Natural Resources Inventory was to compile a comprehensive catalog of the Town's natural resources for use in creating future planning documents such as a Master Plan and an Open Space/Conservation Plan. While the completion of the project has met this goal, it should not be viewed as being 100% complete. Rather, it is on-going project in which additional information will be added as it becomes available in the following areas:

Rivers, Streams, Floodplains

Additional information will be compiled/collected to further characterize Henniker streams including origin, stream order, perennial flow status, nearby land disturbance, habitat importance, public access, and water and sediment quality data if available.

Ponds and Wetlands

Additional information to be compiled/collected for ponds and wetlands will include tributaries, undeveloped area, aquatic resources, habitat importance (such as feeding and spawning areas), and public access. The HCC will continue to monitor water quality via the annual Henniker Pond Survey.

The HCC is working toward completing a field-verified digital map of wetlands. Further field investigation will confirm the wetland locations supplementing the 1987 wetland survey. Wetlands features and functions will continue to be evaluated and inventories per the NH Method in order to identify ecologically significant wetlands in Henniker.

Ground Water

Except for the medium yield aquifer along the west side of Route 114 immediately adjacent to Bradford, all aquifers are digitally mapped and depicted in Map II, "Water Resources." More in-depth information regarding the extent of the Route 114 aquifer is needed to complete the aquifer map. Additional information will be compiled to supplement the NH DES work on identifying potential threats to ground water quality including, underground storage tanks, industrial and commercial activity, and limits of existing well head contribution areas.

Significant Wildlife Habitat

A digital overlay of significant wildlife habitat areas is being developed in collaboration with the NH Natural Heritage Program and NH Fish and Game to identify and characterize significant habitat, such as unfragmented floodplain forests, groves of mast-producing trees, vernal wetlands, ledges and outcrops, deer yards, aeries, dens, roosts, nesting and feeding areas.

Archeological or Historical Sensitivity

The HCC will coordinate with the NH Division of Historical Resources and the Henniker Historical Society to identify and map known historical sites within the community.

Soils

The US Natural Resources Conservation Service (NRCS) is presently updating the Merrimack County Soil Survey. The information expected to be available in 2003 will be incorporated into a digital map and will note the location of hydric (wet) soils, and agricultural soils characterized as prime, unique, statewide important, and locally important.

