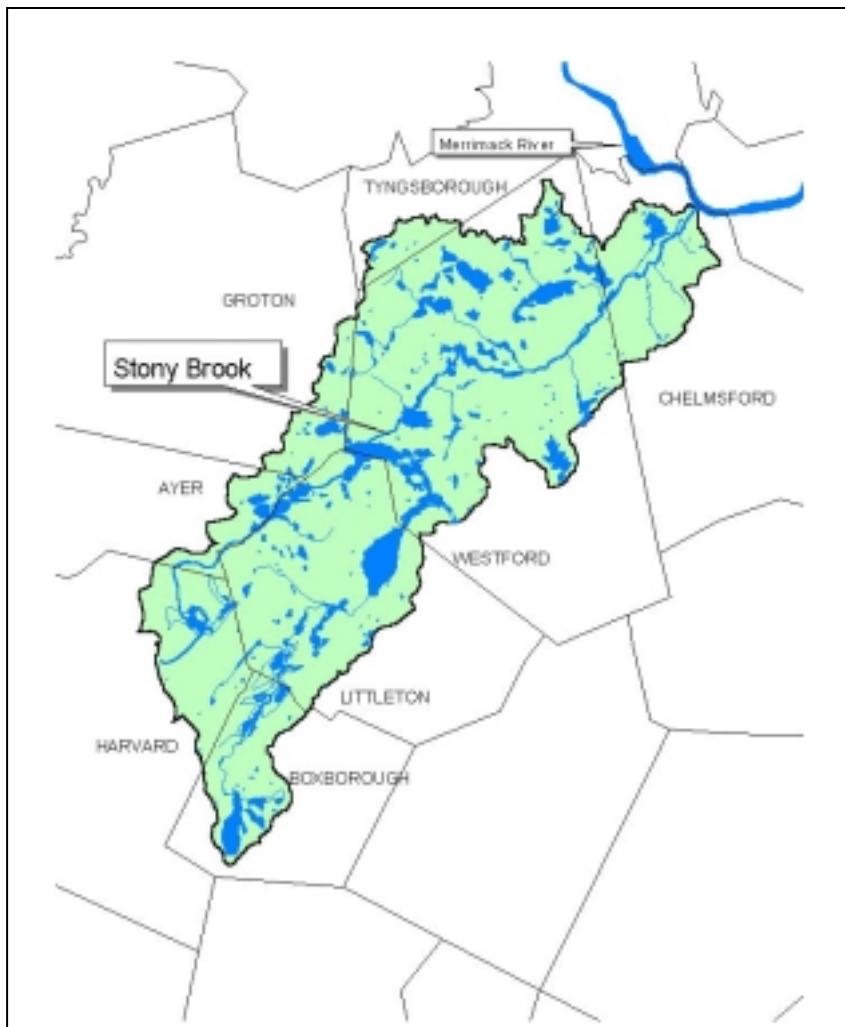


# Stony Brook Watershed Assessment



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## Executive Summary

The Stony Brook Watershed covers 45 square miles and includes all or part of eight communities, including Boxborough, Harvard, Ayer, Groton, Littleton, Westford, Tyngsboro and Chelmsford (Figure 1-1 and Table 1-1). At the heart of the watershed is the Stony Brook. The Stony Brook is a 22-mile long stream that twists its way from Wolf Swamp in Boxborough to the Merrimack River in North Chelmsford. Along the way it passes through ponds and lush wetlands and is joined by many tributaries. At its headwaters in Boxborough, where it drains Wolf Swamp, it is known as Beaver Brook. The Brook flows several miles north from Boxborough through Littleton and into Forge Pond in Westford, where it is joined by the other major branch, Bennett's/Gilson Brook. Bennett's Brook flows from Shaker Village in Harvard north to Ayer to Spectacle Pond where it becomes Gilson Brook and empties into Forge Pond. Downstream from Forge Pond, the brook- now known as Stony- grows as more tributaries add their waters. By the time it reaches the Merrimack, it is up to six and eight feet deep in places.

The Stony Brook is a river with a long history of use by its watershed towns. There are mills up and down its length that flourished during the industrial revolution. Today, many residents use the brook for a variety of recreation activities including fishing, canoeing and kayaking, and hiking its brook-side trails. In addition, many of the Stony Brook Communities rely on the regional aquifer as their primary source of drinking water.

The Merrimack River Watershed Council began a Watershed Assessment of the Stony Brook Watershed in 2000 because it plays such a prominent role in its watershed communities, yet has been historically threatened and its water quality has been degraded. Presently, the communities are rapidly growing and the brook is facing new threats from increased commercial and residential development.

The watershed assessment included three primary components:

- 1) Form a Watershed Advisory Committee
- 2) Organize and train volunteer Stream Teams to conduct shoreline surveys, collect water quality data, and complete action plans based on monitoring results
- 3) Write an Assessment Report including an action plan.

Our watershed assessment work has been supported by the Parker Foundation and the Executive Office of Environmental Affairs, Massachusetts Watershed Initiative. This document serves as the *Final Stony Brook Watershed Assessment Report*. Major findings of the assessment are summarized here and discussed further in the report.

### **Key Findings**

#### LAND

- Over the last twenty years, the primary land use trend has been conversion of open space (forest, cropland and meadows) into residential and some commercial development. Recently completed buildout results and census data indicate that this trend will continue.
- The watershed-wide percent impervious has increased substantially over the last twenty years. Currently estimated at 17 percent, it is approaching the maximum threshold of 25 percent recommended by the Center for Watershed Protection.

## WATER QUANTITY

- Five of eight Stony Brook communities are heavily dependent on Stony Brook groundwater resources for their public water supply. The Stony Brook Regional Aquifer provides 100 percent of Littleton and Westford's public water supply, over 50 percent of Ayer and Chelmsford's and over 40 percent of Boxborough's. In 1998, these five communities withdrew an average of over 2 billion gallons for the year (DEP Annual Statistical Reports, 1998).
- The regional, high yield aquifer supports over 50 public water supplies permitted to withdraw up to a cumulative total of 9.2 million gallons a day.
- The safe yield of the regional aquifer is not known.
- With some exceptions, the majority of water withdrawals have been increasing steadily over the period evaluated.

## WATER QUALITY

- The Stony Brook is classified under Massachusetts Surface Water Quality Standards (314 CMR 4.00) as a Class B, Warm Water System. Water quality data collected by stream teams in 2000 and 2001 show that the Stony Brook is not meeting state designated water quality standards for basic parameters including dissolved oxygen and fecal coliform bacteria.
- The Stony Brook and several ponds in the Stony Brook Watershed are listed as impaired on the Final 303(d) List of Waters (February, 1999). Pollutants listed include pH, Low dissolved oxygen, pathogens, turbidity and nutrients.
- Because the Stony Brook has very few point source discharges, stormwater runoff is likely to be the major factor contributing to impairment.
- Groundwater data were not analyzed for this report. Extensive groundwater data are collected by Public Water Suppliers in Littleton, Westford and Chelmsford and by businesses in Littleton.

## POTENTIAL CONTAMINATION SOURCES

- A total of 30 potential contamination sources were located within Wellhead Protection Areas, including, 3 solid waste sites, 2 permitted point discharges, 8 sites with release of oil or hazardous materials (i.e., 21-E sites), 11 underground storage tanks, and 6 facilities that are "Generators, transporters, treaters, storers, and disposers of hazardous waste" permitted under the Resource Conservation and Recovery Act (RCRA). This list is based on existing information available through Mass GIS and is therefore not all-inclusive.
- The 30 potential sources are *not necessarily* sources of contamination, but were flagged because of their potential to contaminate if mismanaged, and based on the potentially hazardous nature of the substances involved.

## PLANNING

- All planning (stormwater, wastewater, open space, land use, etc.) is conducted on a town by town basis and there is little or no coordination between towns in the watershed.
- Most local plans do not incorporate a watershed perspective (i.e., proposed actions are not evaluated with respect to their impact on the watershed either singly or cumulatively).

## POPULATION

- Every Stony Brook Community except Ayer is expected to grow by 10 to 85% over the next twenty years. We assume the expected loss of population for Ayer is influenced by the closure of Fort Devens.

## WILDLIFE AND ENDANGERED SPECIES

- There are stocked trout streams and ponds in all but one of the eight Stony Brook communities.
- Stony Brook Watershed communities have a total of 26 species identified by the Massachusetts Natural Heritage Program as Threatened, Endangered or Special Concern. The number of listed species in each Stony Brook Community ranges from 2 in Tyngsborough, to 14 in Harvard.
- There are 130 Certified Vernal Pools within Stony Brook Communities; only 39 of these are in the Stony Brook Watershed, and all 39 are in Westford.

## ***Recommendations***

A full set of recommendations is included in the body of the report. This list highlights those that are most critical.

- 1) Continue the Stony Brook Watershed Advisory Committee to oversee new projects.
- 2) Evaluate impacts of current and future land uses and impervious surfaces on water quality and quantity.
- 3) Develop priorities for land protection; focus on lands that protect water quality and quantity.
- 4) Conduct a hydrologic assessment to determine the cumulative impact of water withdrawals. The assessment should include development of a water budget for each Stony Brook Community and should determine the safe yield of the Regional Stony Brook Aquifer System.
- 5) Strengthen current septic system education and outreach programs.
- 6) Develop a watershed-wide wastewater management plan and/or policy recommendations that focus on protecting the watershed and maintaining a healthy hydrologic balance.
- 7) Establish a monitoring program to assess trout habitat and survivorship.
- 8) Implement recommendations from the Source Water Assessment Program.
- 9) Establish a coalition of Land Trusts for the Stony Brook Watershed.
- 10) Determine the population that depends on Stony Brook Water and Conduct Demand Projections for current and 2020 population.

## ***Acknowledgements***

This work was supported by a grant from the Massachusetts Watershed Initiative, Executive Office of Environmental Affairs and by the Parker Foundation. Without their generous support, this project would not have been possible. Most importantly, the Merrimack River Watershed Council would like to thank the many involved citizens, municipal officials, water suppliers, businesses and state officials who work and/or live in the Stony Brook Watershed and who gave their time and knowledge through participation on the Stony Brook Watershed Advisory Committee and the Stony Brook Stream Team. It is a positive sign that their names are too numerous to list here (a complete list is included in Appendix C).

Although this marks the completion of our first project, work in the Stony Brook is just beginning. Stream Teams continue their work, and two new projects will begin shortly:

- 1) Impervious Surface Reduction Pilot Project, and
- 2) Stony Brook Hydrologic Assessment.

We look forward to working with all of you on these and other watershed protection endeavors!

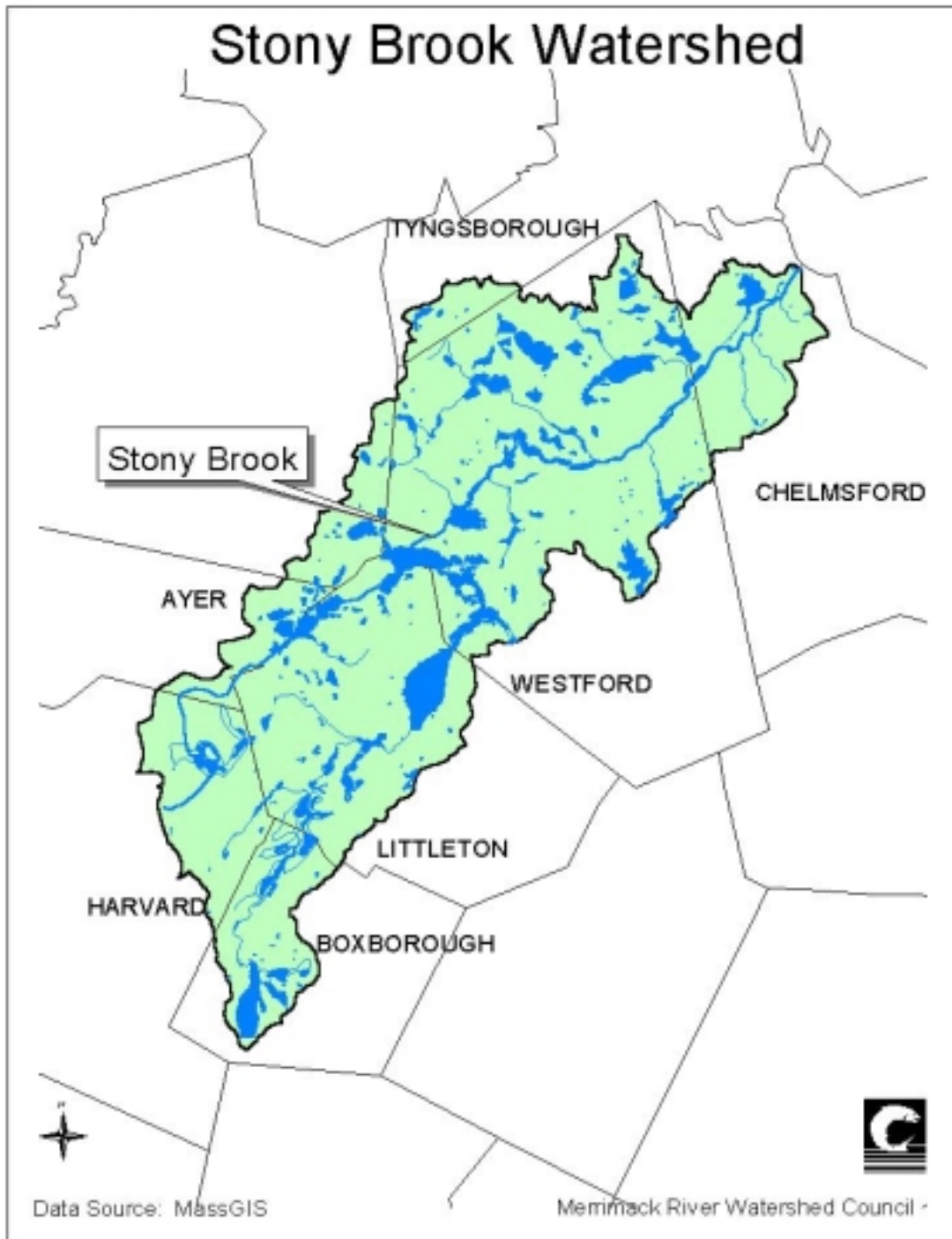


Figure 1-1. Stony Brook Watershed.

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# STONY BROOK WATERSHED ASSESSMENT

## Introduction

This final report presents the results of the Stony Brook Watershed Assessment, conducted by the Merrimack River Watershed Council. The goal of the watershed assessment was to draw on existing data sources to develop a “state of the watershed” report that evaluates the key factors influencing the health of the watershed and makes recommendations for improving protection and restoration of the watershed. The assessment compiled, reviewed and evaluated the following watershed information:

1. Land Use and Land Cover
2. Impervious Cover
3. Public Water Supplies
4. Aquifers and Wellhead Protection Zones
5. Wastewater and Stormwater Management
6. Natural Heritage and Endangered Species
7. Potential Contamination Sources
8. Surface Water Quality Data
9. Local Environmental Planning
10. Local Environmental Bylaws and Regulations
11. Population Trends

Although there are eight communities with land in the Stony Brook Watershed, only those that have more than 10 percent of their land within the watershed were included in this assessment. Therefore, the assessment does not include Groton or Tyngsborough. For each of the eleven categories, the report presents data sources, findings, gaps and recommendations. Figures are included in the body of the text, but all supporting data tables are included in Appendix A. Data sources are listed in the body of the report including internet links wherever possible. Detailed information about data sources is included in Appendix

## 1.0 LAND USE

Land use patterns are critical to evaluate because land use has a direct influence on water quality and water quantity.

### Data Sources

Tables 1.2 through 1.4 present summary information on land areas, land use and land cover in the Stony Brook Watershed. Data presented in these tables were obtained from the following sources:

- *Land Use (MassGIS, 1991, 1999)*  
<http://www.state.ma.us/mgis/lus.htm>
- *Land Use (EPA, ~1980)*  
<http://www.epa.gov/nsdi/projects/giras.htm>

### Findings

The breakdown of land uses in the part of each town that is within the Stony Brook Watershed is given in Table 1-2 and 1-3 for 1980 and 1991 land use respectively. Using these data, trends were estimated over 10- and 20-year periods from circa 1980 to 1999. It should be noted that comparisons between the EPA and MassGIS coverages are limited because the data are at different scales, and the land use classification systems are not identical. Therefore, numbers should be considered for planning level, regional trend assessment only. Keeping this caveat in mind, the following general trends were observed:

- The greatest loss was Open Space lands. The Stony Brook experienced a watershed-wide loss of open space: open spaces dropped from 82 percent, to less than 68 percent of watershed lands between 1980 and 1999 (see Table 1-4).
- The greatest increase was Residential Development. The Stony Brook experienced a watershed-wide increase in residential development from 13 percent of watershed lands in 1980 to 25 percent of watershed lands in 1990 (not all 1999 data available).

### Gaps

- As of April 2001, updated land use data (1999) remain unavailable to the public for Boxborough, Chelmsford, Tyngsborough and Westford.
- Digital land use data at an appropriate scale for environmental impacts analysis (ideally, 1:5,000) are unavailable or difficult to obtain.
- Digitized parcel data are not uniformly available. This level of detail is needed for prioritizing lands for protection at the local level.

### Recommendations

1. Obtain current land use covers (1999) as they become available, analyze and report trends.
2. Develop a future land use cover for the Stony Brook Watershed (use zoning and buildout data).
3. Evaluate impacts of current and future land uses on water quality and quantity (use various watershed models).
4. Develop priorities for land protection; focus on lands that protect water quality and quantity.
5. Set future land use goals to protect water quality and quantity.

## 2.0 IMPERVIOUS COVER

The amount of impervious cover in a watershed is a quick and useful general indicator of watershed health, especially for water because impervious surfaces (e.g., rooftops, parking lots, paved roads, etc.) directly influence the quality and quantity of runoff into our streams, lakes and aquifers. The Center for Watershed Protection (CWP) has conducted and evaluated numerous studies on the impact of impervious surfaces on water quality and quantity. Their research indicates that stream degradation (including loss of biodiversity, decrease in water quality, and increased channel instability) occurs at relatively low levels of imperviousness (10 to 25%) (Watershed Protection Techniques, 1994). They conclude that, “it is extremely difficult to maintain predevelopment stream quality when watershed development exceeds 10 to 15% impervious cover.” Their report proposes three categories for streams, based on the amount of imperviousness in their watershed. They are as follows:

- One to 10% impervious- Streams are not likely to be impacted, classified as “Sensitive Streams”
- 10 to 15% impervious- Streams are likely to experience some degree of impact, classified as “Impacted Streams”, and
- 15% to 25% impervious- Predevelopment conditions cannot be maintained and impacts are certain, classified as “Non-supporting”.

### Data Sources

Tables 2-1 and 2-2, and Figure 2-1 present summary information on impervious surfaces in the Stony Brook Watershed. Data presented in the tables and figure were obtained from the following sources:

- ***EPA-approved percent impervious values for land uses***  
Table 2-1 contains estimated percent impervious values for each land use type. These are EPA-approved for the Northeast Region of the United States. They are based on nationwide studies of runoff that have measured and estimated the average amount of impervious surface associated with different land uses such as residential vs. commercial.
- ***Land Use (MassGIS, 1991, 1999)***  
See Section 1 and Appendix B
- ***Land Use (EPA, ~1980)***  
See Section 1 and Appendix B

### Findings

This assessment considered only lands within the boundaries of the Powow River Watershed. EPA impervious values (Table 2-1) were used to estimate impervious cover based on land use. Note that the numbers presented are estimates that have not been field verified. Although it would increase accuracy, field verification is beyond the scope of this project. The numbers are useful for planning level assessment and to evaluate regional trends. In addition, note that water bodies are considered largely impervious. Clearly, runoff from a water body and a parking lot are not expected to have the same impact on water quality, although their impact on runoff quantity is expected to be similar.

Trends in impervious cover were graphed and compared to recommended thresholds by the Center for Watershed Protection. Table 2-2 and Figure 2-1 show that in 1990, five of the eight

Stony Brook communities were above the lower end of the CWP recommended impervious threshold (i.e., 10% or greater, resulting in a stream classification of “impacted”). These included:

- Ayer 23%
- Boxborough 15%
- Chelmsford 23%
- Littleton 19%, and
- Westford 16%
- Over a 10-year period from 1980 to 1990, imperviousness increased by a range of 0 to 9% per community.
- Over a 20-year period from 1980 to 1999, imperviousness increased by a range of 9 to 13% per community.
- Based on 1990 and 1999 Land Use Data, the Stony Brook Watershed is greater than 17% impervious, nearing the upper end of the recommended 20% threshold.

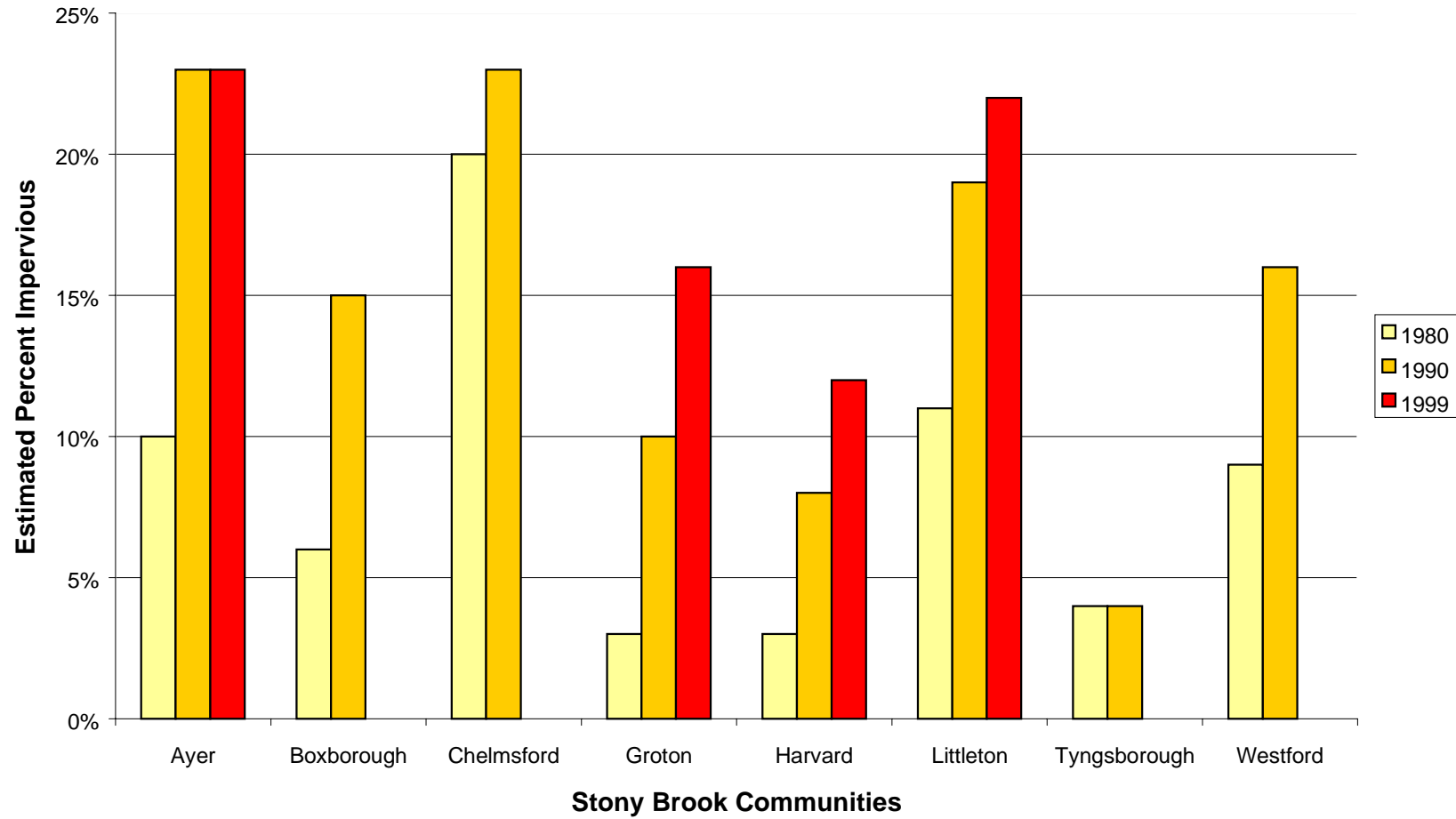
### **Gaps**

- More accurate impervious surface estimates would improve understanding of potential impacts. These could be obtained through measurements from orthophotos, or by conducting field measurements to create watershed-specific impervious estimates for each land use type.

### **Recommendations**

1. Future studies should conduct the following tasks:
  - Estimate future impervious cover (use zoning and buildout data).
  - Evaluate impacts of current and future impervious cover on water quality and quantity.
  - Use field verification to validate impervious coefficients for Stony Brook land uses.
  - Identify impervious hot spots (e.g., large impervious areas within Zone IIs) and develop mitigation plans for them.
2. The Stony Brook Impervious Surfaces Pilot Project will commence in Fall 2001 and should recommend and help communities implement Best Management Practices to minimize and mitigate current and future impacts of impervious surfaces.

**Figure 2-1: Estimated changes in Impervious Surfaces for Stony Brook Communities**



### 3.0 PUBLIC WATER SUPPLY

One of the most important natural resources of the Stony Brook Watershed is its extensive regional aquifer, which supports numerous public water supplies. An assessment of historical and current water use is important for evaluating water use trends to determine how much water was used in the past, how much is currently being withdrawn and how much we expect to need in the future.

#### Data Sources

Tables 3-1 through 3-4 and Figures 3-1 and 3-2 present summary information on public water supplies and private (i.e., non-community) water supplies in the Stony Brook Watershed. Data presented in these tables were obtained from the following sources:

- *Annual Statistical Reports (ASR) from 1994 through 1999 for Public Water Suppliers*
- *Registration Statements for Water Withdrawal*
- *DEP Water Withdrawal Permits*
- *Public Water Supply Datalayer ( MassGIS, 2000)*
  - **Community Water Supply:** part of a community water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.
  - **Non-Community Water Supply:** a single service connection that is potentially available to 25 or more persons, such as a school, factory or restaurant. Non-Community Water Supplies are further defined as being Transient or Non-Transient based on the usage period, with less than 6 months use on a yearly basis being considered Transient.

#### Findings

Three communities: North Chelmsford, Westford and Littleton rely 100 percent on the Stony Brook Watershed for their public water supplies. Three communities: Chelmsford, Ayer and Boxborough get about 50 percent of their public water supply from the Stony Brook Watershed. The remaining two communities: Harvard and Groton do not have any public water supplies in the Stony Brook Watershed. See Table 3-1.

- There are 32 Community Public Water Supply Sources in the Stony Brook Watershed (see Table 3-3 and Figure 3-1); all sources are groundwater.
- There are 25 Non-community Public Water Supply Sources in the Stony Brook Watershed (see Table 3-4 and Figure 3-1).
- The total approved withdrawal (registered and permitted) for Community and Non-community Water Supplies in the Stony Brook Watershed is 9.2 million gallons per day (mgd); the total withdrawn by these sources in 1998 was roughly 5.9 mgd (see Table 3-2).
- With the exception of Ayer and North Chelmsford, total water withdrawals have steadily increased over the five-year period evaluated from 1994 to 1999 (see Figure 3-2).

**Gaps**

- The majority of withdrawal data are not available electronically, which makes analysis cumbersome and time consuming.
- Data on withdrawal from individual sources are difficult to obtain and not available electronically.
- Little to no data are available on private well withdrawals.
- Most communities do not have published Water Conservation Plans.

**Recommendations**

1. Conduct a hydrologic assessment to determine cumulative impact of water withdrawals.
2. Develop a water budget for each Stony Brook Community and for the Stony Brook Watershed (follow Executive Order 418 recommended methodology).
3. Coordinate permits on a watershed basis that accounts for cumulative impacts, and establish better communication between regulators and watershed groups.
4. Estimate private well withdrawals.
5. Conduct demand projections for current and future Stony Brook populations.
6. Review and evaluate Water Conservation Plans and measures throughout the watershed.

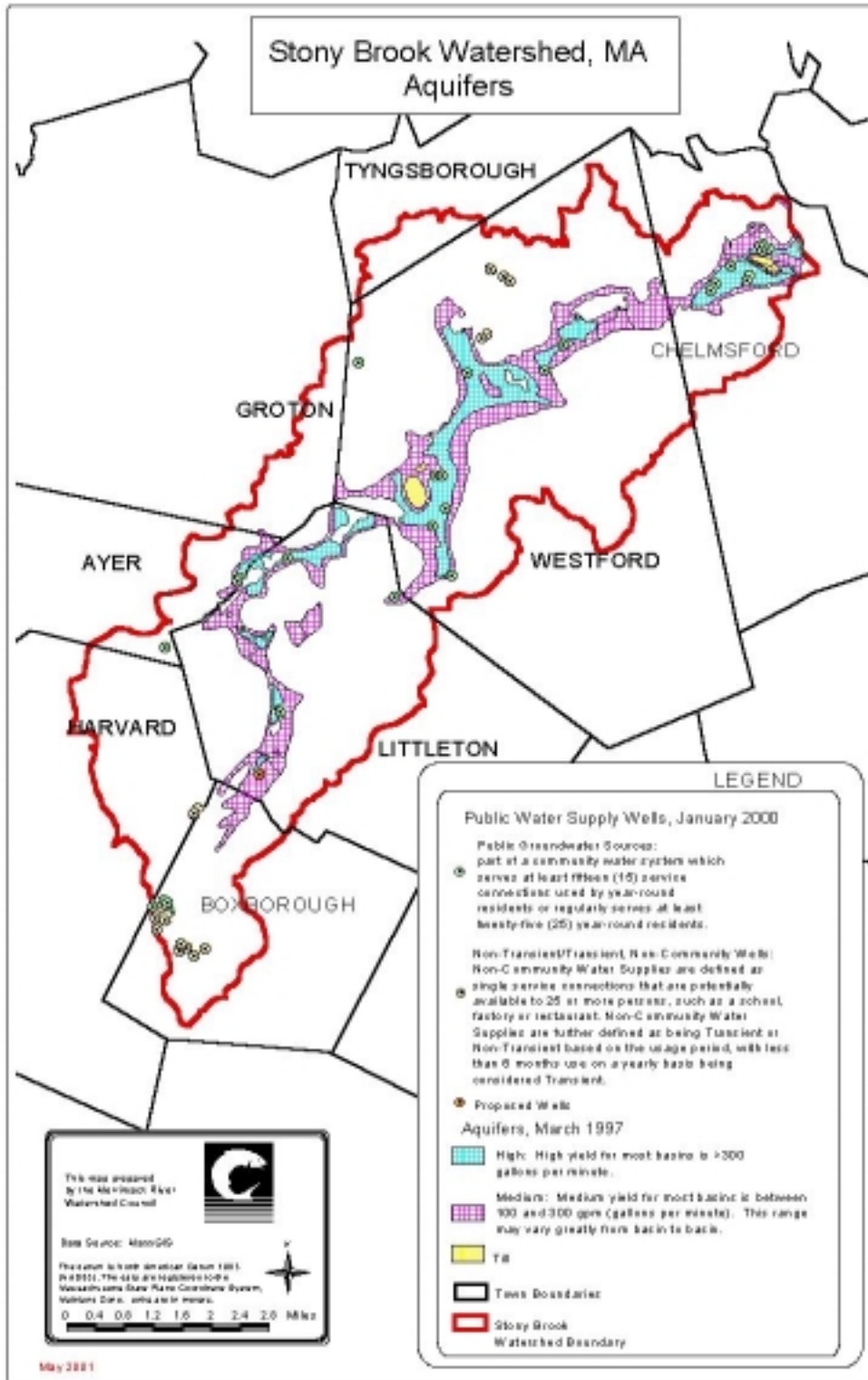
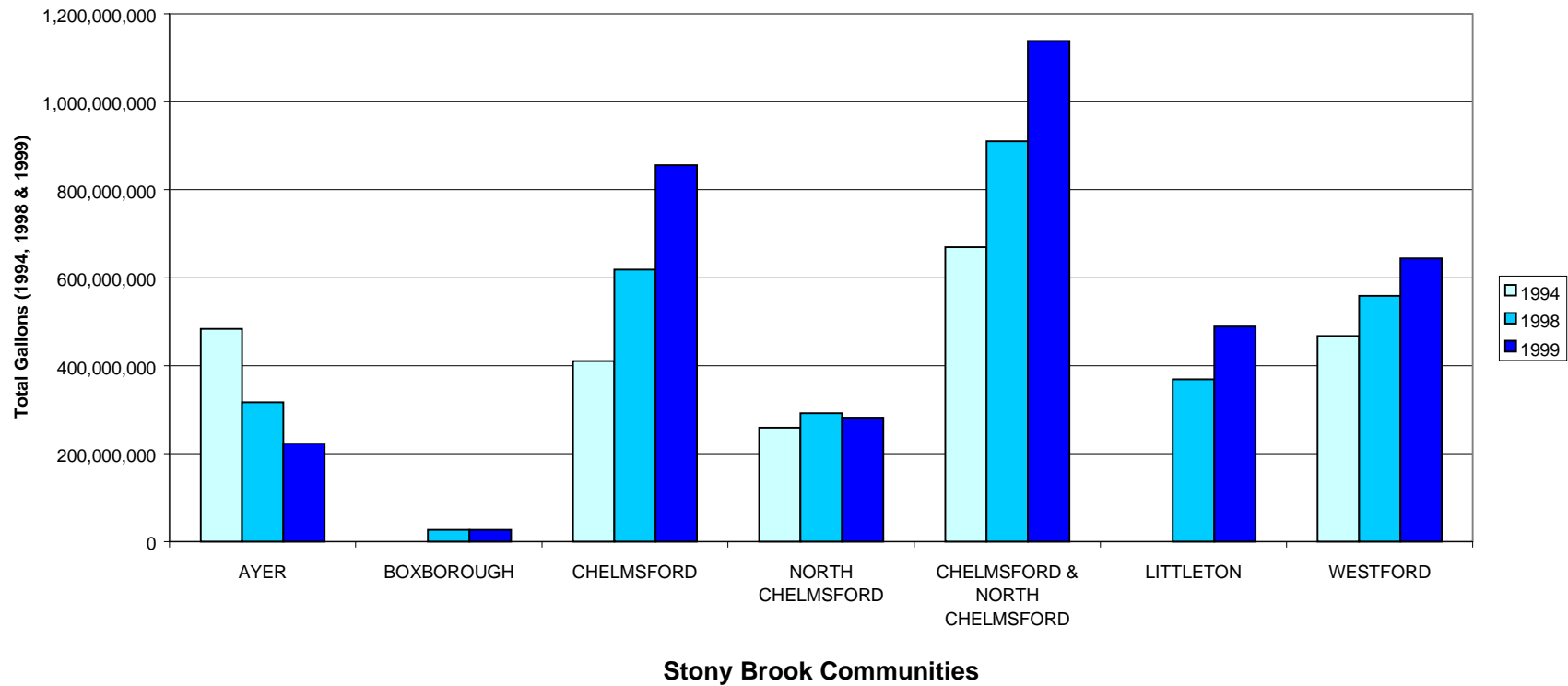


Figure 3-1. Stony Brook Watershed Aquifers.

**Figure 3-2: 1994, 1998 and 1999 Average Annual Community Water Supply Withdrawals from the Stony Brook Watershed**



## 4.0 AQUIFERS AND WELLHEAD PROTECTION ZONES

The Stony Brook Watershed is graced with a very productive regional aquifer that serves as the primary drinking water source for the majority of people in the Stony Brook Watershed. This assessment looks at the aquifer and the protective zones associated with the public water supply wells that are supported by the aquifer. The assessment attempts to answer a few key questions, namely: are there sufficient protection measures in place to maintain the quality and quantity of the aquifer and drinking water supplies? And, do we know enough about the aquifer to know whether it is adequately protected? If not, what additional information is needed?

### Data Sources

Figure 3-1 shows aquifers and Figure 4-1 shows wellhead protection zones in the Stony Brook Watershed. Data presented in these figures were obtained from the following sources:

- *Aquifers (MassGIS, 1997)*
- *DEP Wellhead Protection Areas (MassGIS January 2000)*  
[Department of Environmental Protection's \(DEP\) Drinking Water Program \(DWP\)](#)
  - *Approved Wellhead Protection Areas (Zone II)*
  - *Interim Wellhead Protection Areas (IWPA)*

### Findings

Substantial groundwater quality data are collected primarily by water suppliers and some businesses throughout the watershed. These data are generally not available electronically and were not evaluated for this assessment. However, groundwater monitoring data provided by the North Chelmsford Water District and the Water Resources Management Plan for Ayer (Tufts University, 1994), show high conductivity levels and high sodium levels in several groundwater monitoring wells. The Ayer report concludes that Ayer's groundwater quality in the Stony Brook subbasin has been somewhat degraded by various types of land use activities. These data indicate that further protection efforts for many wellhead areas are probably necessary.

The size and composition of the Stony Brook Aquifer are briefly summarized as follows:

- The High Yield Aquifer area covers 2.7 square miles (6% of the watershed)
- The Medium Yield Aquifer covers 5.4 square miles (12% of the watershed)
- The aquifer currently supports 32 public water supply wells yielding 5.9 mgd in 1998
- The aquifer covers 18% of the watershed and is composed of glacially deposited coarse gravel 30 to 60 feet thick. It has no overlying impervious layer and is therefore vulnerable to contamination (Mass GIS, USGS Hydrologic Investigations Atlas HA-662)

### Gaps

- Little information is available on the safe yield of the regional aquifer system.

### Recommendations

- Determine the safe yield of the Regional Stony Brook Aquifer System.
- Evaluate and consider strengthening use restrictions in Zone II Areas, in light of declining groundwater quality.
- Develop Wellhead Protection Plans for all groundwater sources.

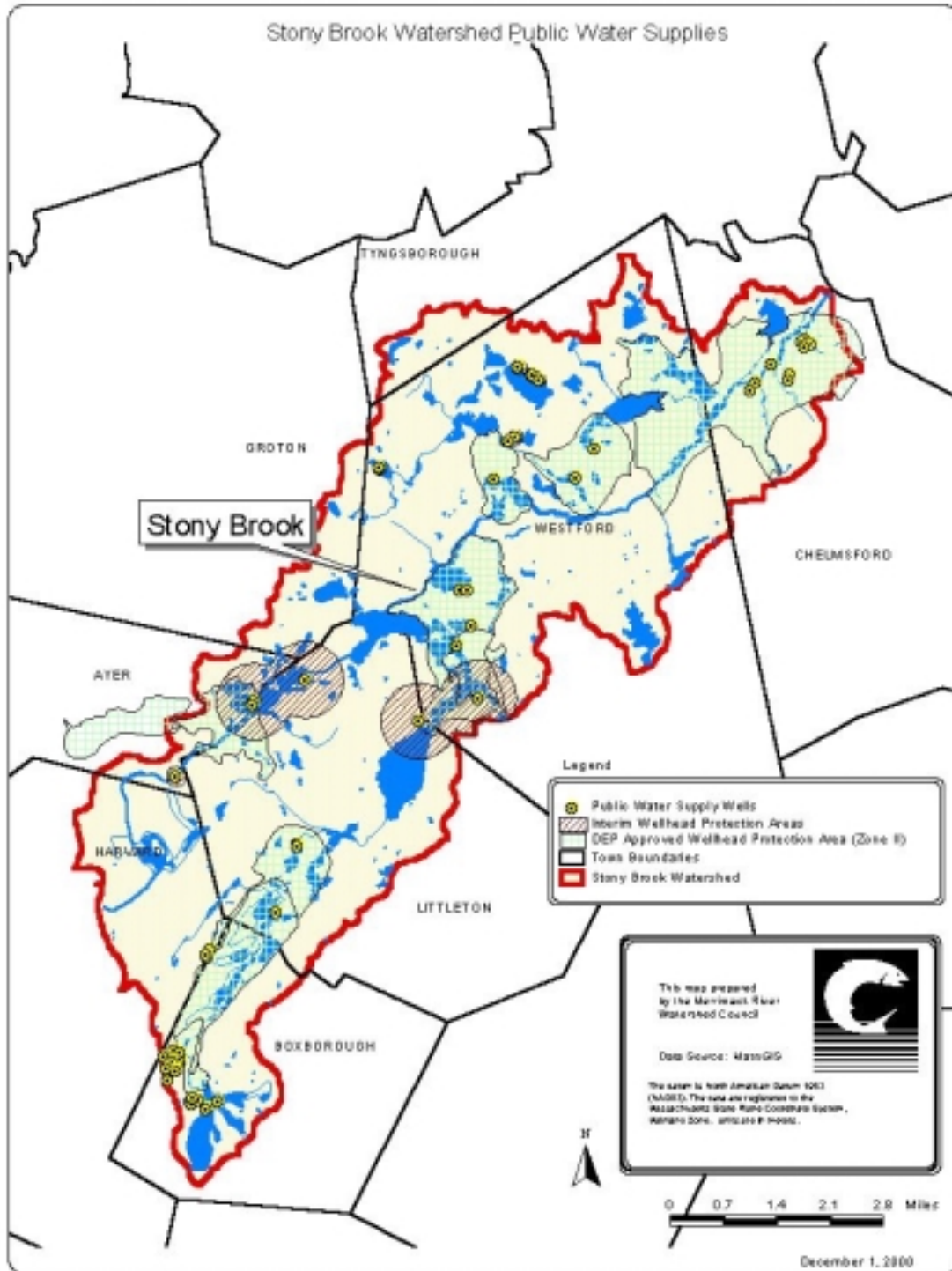


Figure 4-1. Wellhead Protection Zones in the Stony Brook Watershed.

## 5.0 WASTEWATER and STORMWATER MANAGEMENT

Wastewater management impacts the quality and quantity of water in a watershed. Water quality can be negatively impacted if wastewater is not properly treated, or if septic systems or sewer systems are not properly maintained. Water quantity can be impacted if water that originated in one watershed is removed from that watershed by sewers (i.e., interbasin transfer).

Stormwater management impacts the quality and quantity of water in a watershed. Water quality can be negatively impacted if stormwater is not properly treated, or if stormwater management systems are not properly maintained. Water quantity can be impacted if the balance of surface runoff vs. infiltration changes; and this balance is influenced by how stormwater is managed.

### Data Sources

Tables 5-1 and 5-2 present summary information on wastewater and discharges, and Title 5 Systems in the Stony Brook Watershed. Data presented in these tables were obtained from the following sources:

- **Ginny Scarlet, DEP Central Regional Office (CERO).** Through telephone conversations and review of tables, Ginny Scarlet (DEP CERO) provided information regarding ongoing and proposed sewer projects. The Town of Chelmsford provided additional information and maps of sewer projects in Chelmsford. This information is summarized in Table 5-1.
- **Marybeth Costello, DEP Watershed Permitting.** Marybeth maintains the DEP database of permits for treated wastewater discharge to groundwater. Permits are required for facilities discharging more than 10,000 gallons per day of wastewater to groundwater. Permit information for Stony Brook Communities is summarized in Table 5-2.
- **Discussions with local Board of Health officials.**
- **Discussions with Stony Brook Watershed Advisory Committee members and DPW representatives from Westford.**

### Findings

- Four Stony Brook Communities- Ayer, Chelmsford, Groton and Tyngsborough- are primarily sewerred.
- None of the four sewerred communities return wastewater to the Stony Brook Watershed. It is not clear to what degree these four communities remove water from the Stony Brook Watershed via sewers (other than Chelmsford, interbasin transfers are assumed to be minimal).
- Four Stony Brook Communities- Boxborough, Littleton, Westford, and Harvard- are primarily on Title 5 systems.
- In the four unsewerred communities, primary responsibility for wastewater management lies with the board of health. Education programs are held on an annual basis if at all. Most communities do not have requirements for regular inspection and pumping. Inspection typically occurs at the time of transfer.
- Currently, none of the communities track septic system information in an electronic database.

**Gaps**

- Accurate estimates of the amount of water removed from the watershed via sewers are necessary to develop a water budget for the Stony Brook Watershed and for each town.
- Stormwater Management plans are currently not available for any communities.

**Recommendations**

1. Strengthen current septic system education and outreach programs.
2. Evaluate the impact of sewerage on local water tables, especially in Chelmsford.
3. Develop a watershed-wide wastewater management plan and/or policy recommendations that focus on protecting the watershed and maintaining a healthy hydrologic balance.
4. Towns should begin planning to meet Phase 2 Stormwater Requirements per (EPA NPDES Program)

## 6.0 NATURAL HERITAGE AND ENDANGERED SPECIES

Presence of an abundant and diverse population of native species is a good indicator of overall watershed health because the creatures depend on an intact landscape and natural habitat and that type of natural or low impact land use in turn helps to protect water quality and quantity. Species included in this assessment represent some of those that are most sensitive to environmental degradation. For example, trout require clean, cold, well-oxygenated waters and their presence in the Stony Brook is a good indicator of stream health.

### Data Sources

Tables 6-1 through 6-3 and Figure 6-1 present summary information on State-designated Natural Heritage Areas and Endangered Species, Certified Vernal Pools, and Trout stocked water bodies in the Stony Brook Watershed. Data presented in these tables were obtained from the following sources:

- *Massachusetts Natural Heritage and Endangered Species Program (NHESP) Database*
  - *1999-2001 Massachusetts Certified Vernal Pools (last updated February 31, 2000)*
  - *1999-2001 Estimated Habitats for Rare Wildlife*
- *Massachusetts Division of Fisheries, Wildlife and Environmental Law Enforcement, Fisheries homepage.*
- *Massachusetts DEP, Merrimack River Watershed 1999 Biological Assessment*

### Findings

- Stony Brook Watershed Communities have a total of 26 species identified by MA NHESP as Threatened, Endangered or Special Concern.
- The number of listed species in each Stony Brook Community ranges from 2 in Tyngsborough, to 14 in Harvard.
- Approximately 10 percent of Stony Brook watershed land is within Estimated Habitat.
- There are 130 Certified Vernal Pools within Stony Brook Communities; only 39 of these are in the Stony Brook Watershed, and all 39 are in Westford.
- There are stocked trout streams and ponds in every Stony Brook Community except Tyngsborough.
- The DEP Merrimack River Biological Assessment (May, 2001) assessed the aquatic macroinvertebrate community in Stony Brook and concluded that the brook is slightly impacted, due to over-enriched conditions in upstream impoundments and direct nutrient/organic loadings to the Stony Brook itself.

### Gaps

- Maps showing stream reaches capable of supporting trout.

### Recommendations

1. Evaluate possible linkages between Estimated Habitats and assess estimated habitat areas to determine the level of protection for them.
2. Species and habitats should be listed in Open Space and Master Plans and plans should include goals and actions to provide protection.
3. Measure temperature and oxygen in Stony Brook to assess trout habitat.
4. Establish a monitoring program to assess trout survivorship.
5. Determine whether there are any ongoing efforts to certify Vernal Pools within the Stony Brook Watershed in Towns other than Westford.

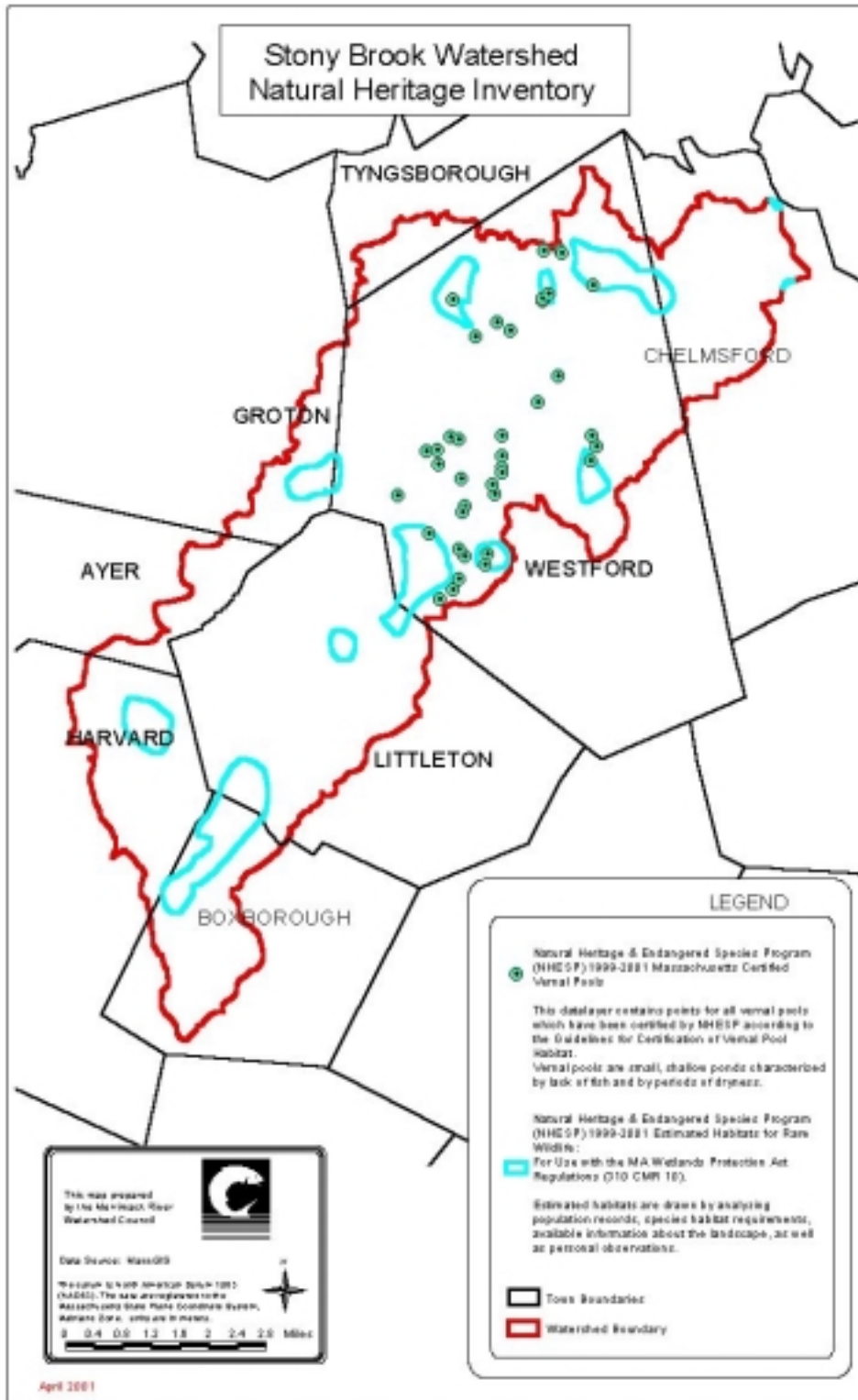


Figure 6-1. Certified Vernal Pools and Estimated Habitats in the Stony Brook Watershed.

## 7.0 POTENTIAL CONTAMINATION SOURCES

Essentially, almost anything other than clean water has the potential to become a contaminant if it enters the aquatic environment. Materials as seemingly harmless as soil or grass clippings can impact aquatic systems. Hazardous materials such as pesticides, herbicides and oil, clearly do not belong in aquatic systems and have the potential to cause significant damage to water quality and the health of the ecosystem if they are introduced into it, sometimes even in very small quantities. The first step to protecting watersheds from potential contamination sources is developing an understanding of the location and nature of potential threats in the watershed.

### Data Sources

Tables 7-1 to 7-4 and Figure 7-1 present summary information on potential contamination sources in the Stony Brook Watershed. Data presented in these tables and figures were obtained from the following sources:

- *DEP Source Water Assessment Program (SWAP) Report for the North Chelmsford Water District (July 2001)*
- *21E Sites (Mass GIS; DEP Tier Classified Oil or Hazardous Material Sites (MGL c. 21E) Datalayer, 2000)* Releases of oil and hazardous materials are reported to the [Department of Environmental Protection](#)'s (DEP) [Bureau of Waste Site Cleanup](#) (BWSC).
- *Solid Waste Sites (MassGIS; DEP Solid Waste Facilities datalayer (1997); provided by MassDEP and MassGIS)*
- *Underground Storage Tanks (Mass GIS, 1997)*
- *Mass DEP Permitted Groundwater Discharges (Marybeth Costello, Mass DEP, 2001)*
- *EPA National Pollution Discharge Elimination System (NPDES) Discharge Monitoring Reports from 1996 through 1998.*

### Findings

Please note that none of the above listed sources are *necessarily* sources of contamination, but we have evaluated them because of their potential to contaminate if mismanaged, and based on the nature of the substances involved. In addition, this list is not all-inclusive. It is based on data currently available through MassGIS and focuses on larger potential sources that are regulated by the State or Federal Government. Smaller potential contamination sources (e.g., household hazardous waste) are not included in this evaluation.

All of the above-listed potential contamination sources were mapped and screened using GIS analysis to identify any sites within Zone II or Interim Wellhead Protection Areas. Following is a summary of results.

- A total of 30 potential contamination sources were located within Zone II or Interim Wellhead Protection Areas (IWPA), broken down as follows:
  - 3 Solid Waste sites
  - 2 NPDES permitted discharges
  - 8 DEP Classified Oil and/or Hazardous Material Release Sites (i.e., 21-E sites)
  - 11 underground storage tanks

- 6 RCRA Facilities

In addition, the SWAP Report for North Chelmsford identified the following as potential threats:

- Improper salt storage and road salting
- Stormwater runoff from a major transportation corridor
- A railroad right of way located within a Zone II
- Stormwater catch basins
- DEP Classified Oil and/or Hazardous Material Release Sites

### **Gaps**

- Many potential contamination sources are not available through MassGIS and are therefore difficult to evaluate without extensive fieldwork.
- Information on status of cleanup efforts is difficult to obtain.
- No information is available on underground storage tanks (e.g., what was in them, status of cleanup, responsible party, etc.).
- Local programs to detect, prevent, and clean up potential contamination sources vary in scope and power.

### **Recommendations**

1. The DEP searchable database should include information on status of cleanup.
2. Communities that do not have floor drain and hazardous materials inspection programs and bylaws should develop them.
3. Implement recommendations from the SWAP reports.
4. Perform an extensive survey, including field visits to generate a watershed-wide database on potential contamination sources. This work could be done through the DEP Wellhead Protection Program.

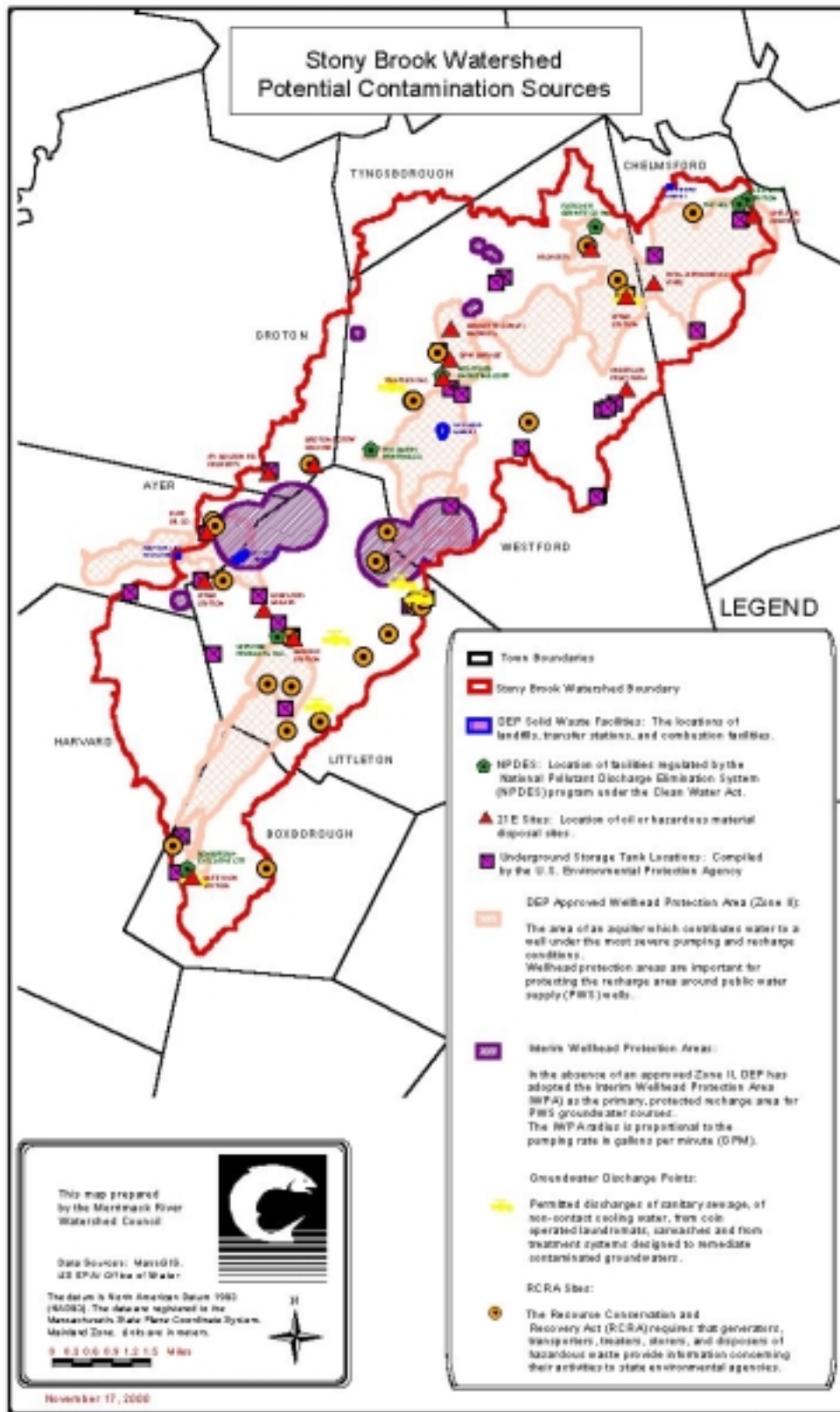


Figure 7-1. Potential Contamination Sources in the Stony Brook Watershed.

## 8.0 SURFACE WATER QUALITY DATA

Surface water quality is a simple but critical indicator of the overall health of a watershed and its potential to support healthy communities, including a multitude of human and wildlife uses such as providing aquatic habitat, recreation opportunities, and drinking water supply.

### Data Sources

- *Stony Brook Stream Team (2000 and 2001 Monthly Monitoring Results).*
- *Final Massachusetts Section 303(d) List of Waters 1998 (DEP, February 1999).*  
<http://www.state.ma.us/dep/brp/wm/wmpubs.htm>
- *Massachusetts Surface Water Quality Standards (314 CMR 4.00).*  
<http://www.state.ma.us/dep/brp/wm/wmpubs.htm>

### Findings

- The Stony Brook is classified under Massachusetts Surface Water Quality Standards (314 CMR 4.00) as a Class B, Warm Water System. Water quality data collected by stream teams in 2000 and 2001 show that the Stony Brook is not meeting state designated water quality standards for basic parameters including dissolved oxygen and fecal coliform bacteria.
- The Stony Brook and several ponds in the Stony Brook Watershed are listed as impaired on the Final 303(d) List of Waters (February, 1999). Pollutants listed include:
  - pH
  - low dissolved oxygen
  - pathogens
  - turbidity, and
  - nutrients
- Because the Stony Brook has very few point source discharges, stormwater runoff is likely to be the major factor contributing to impairment.

### Gaps

- Data collection frequency (monthly) limits trends analysis and ability to draw conclusions
- There is little to no data available for the following parameters:
  - Stormwater data (especially from end-of-pipe sampling)
  - Nutrient data
  - Streamflow data
- Limited information is available on land uses in the upstream drainage area to sampling sites.
- Subwatersheds within the Stony Brook have not been delineated.

### Recommendations

1. Develop and conduct in-depth water quality investigations to follow up on results that show non-attainment of State Water Quality Standards.
2. Establish flow monitoring at select sites along the Stony Brook.
3. Conduct stormwater sampling, especially end-of-pipe sampling in areas that have shown high fecal coliform counts in the past.
4. Obtain groundwater quality data from various sources, link them to a GIS map and evaluate for trends and display results.
5. Delineate major subwatersheds within the Stony Brook.

## 9.0 LOCAL ENVIRONMENTAL PLANNING

If done properly, environmental planning is one of a community's greatest resources for shaping and protecting their future environmental quality. The primary planning document available to communities is the Master Plan. A critical addition to the Master Plan is the Open Space Plan. Together, these two documents should provide the community's environmental vision and a plan to achieve it. If they are to lay the groundwork for protecting water resources they must also include objectives and actions that recognize and strive to preserve water resources and watershed functions.

### Data Sources

Tables 9-1 presents summary information on local environmental planning in the Stony Brook Watershed. Data presented in these tables was obtained from the following sources:

- Community Open Space Plans
- Community Master Plans
- Discussions with Town Planners from Boxborough, Littleton and Chelmsford

### Findings

- All open space and land use planning is conducted on a town by town basis and there is little or no coordination between towns in the watershed.
- All communities have completed Open Space Plans and Master Plans within the last five years.
- Most local plans do not incorporate a watershed perspective (i.e., proposed actions are not evaluated with respect to their impact on the watershed either singly or cumulatively).
- The "Smart Growth for Clean Water" Project (ongoing, concluding Fall 2001) is evaluating critical lands for water resources protection in the Stony Brook Watershed. The project coalition consists of the Executive Office of Environmental Affairs, The Trust for Public Lands, Eastern Research Group and MRWC.

### Gaps

- There does not appear to be any coordination between watershed communities regarding land use planning or open space protection.
- Local efforts to protect land often do not include a watershed focus or a focus on protecting water supplies.

### Recommendations

1. Develop a watershed-wide vision and plan for a greenway or open space linkages that protect the regional aquifer and water quality and quantity in the Stony Brook Watershed.
2. Implement recommendations from the Smart Growth for Clean Water Project.
3. Establish a coalition of Land Trusts in the watershed.

## 10.0 LOCAL ENVIRONMENTAL BYLAWS/REGULATIONS

Local environmental bylaws and regulations give communities regulatory authority at the local level. Bylaws and regulations are important to watershed protection for two key reasons: 1) They give communities the option to create additional protection for their natural resources, beyond what is required by state and federal regulations, and 2) they provide a means of enforcing principles and plans set forth in planning documents that themselves lack regulatory authority.

### Data Sources

Table 10 presents summary information on local environmental regulations in the Stony Brook Watershed. Data presented in this table were obtained from the following sources:

- Community Bylaws (e.g., wetlands, aquifer protection and water resources)
- Discussions with Town Administrators, Town Planners and Water Suppliers.

### Findings

- Boxborough, Chelmsford, Westford and Littleton have all adopted some type of aquifer/water resources protection bylaw; however, the scope and powers of these bylaws varies by community.
- Littleton's Aquifer and Water Resource District Bylaw is known as a national model and has received extensive recognition, praise and awards.

### Gaps

- None of the bylaws are available electronically
- Westford, Boxborough and Chelmsford do not have Hazardous Materials Bylaws

### Recommendations

1. Westford, Chelmsford and Boxborough should review Littleton's Aquifer and Water Resource Bylaw and consider adopting some of its additional provisions (e.g., required groundwater monitoring for new businesses wanting to locate within a wellhead protection area, and annual audits).
2. All communities should develop Hazardous Materials Bylaws and Floor Drain Regulations. This is especially important for Stony Brook Communities because they are 100 percent dependent on groundwater, which is vulnerable to improper disposal of hazardous materials, especially via floor drains.

## 11.0 POPULATION TRENDS

Population trends influence watershed health directly through demand on natural resources created by each resident (e.g., drinking water demand, wastewater management issues and land use). There are many additional indirect influences (e.g., influence of population on local economy and subsequent influence of local economy on environment) but assessment of these is beyond the scope of this project.

### Data Sources

Table 11 presents measured, estimated and predicted population data for communities in the Stony Brook Watershed. Data presented in this table were obtained from the following sources:

- *US Census*, 1995.
- *Massachusetts Institute of Social and Economic Research (MISER)* 2000, 2005 and 2010.
- *Regional Planning Agencies (RPAs)*.

### Findings

- Twenty-year projected population increases (from 1990 to 2010) range from 11 percent (Littleton) to 85 percent (Boxborough)
- Only one community (Ayer) is predicted to experience a twenty-year decrease, of 30 percent (from 1990 to 2010). This is believed largely due to the closure of Fort Devens.

### Gaps

- Census numbers are by community and are not geographically referenced; therefore, the number of people who live within the Stony Brook Watershed is not available.

### Recommendations

1. Determine the population *within* the Stony Brook Watershed
2. Tie expected growth within the watershed to water use.

## **Appendix A**

### **Data Tables**

Table 1-1. Land area of towns in the Stony Brook Watershed.

<b><i>Stony Brook Communities</i></b>	<b><i>Total Land Area of Town in Square Miles</i></b>	<b><i>Percent of Land Area in the Stony Brook Watershed</i></b>
Ayer	9.50	16%
Boxborough	10.39	34%
Chelmsford	23.09	17%
Groton	33.78	6%
Harvard	27.13	15%
Littleton	17.53	58%
Tyngsborough	18.10	5%
Westford	31.35	62%

The Stony Brook Watershed covers 45.53 square miles.

Data Source: Mass GIS Datalayers

Table 1-2. Percentage of land uses within Stony Brook Watershed per town (~1980).

EPA LAND USES	Stony Brook Watershed	EPA Land Use Percentages within the Stony Brook Watershed by Town						
		Ayer	Boxborough	Chelmsford	Groton	Harvard	Littleton	Tyngsborough
Cropland and Pasture		0	9	4	0	10	15	0
Decid. & Evergreen Forest Land		89	77	19	98	87	61	92
Lakes and Reservoirs		0	0	0	0	0	3	0
Nonforested Wetlands		8	0	3	0	0	0	0
Orchards		0	0	0	0	0	1	0
<b>SUBTOTAL OPEN SPACE</b>		<b>97</b>	<b>86</b>	<b>26</b>	<b>98</b>	<b>97</b>	<b>80</b>	<b>92</b>
Commercial Services		3	0	4	0	0	2	2
Industrial		0	0	0	0	0	0	0
Other Urban or Built-Up Land		0	0	0	0	0	0	0
Residential		1	4	56	2	2	8	6
Mining		0	1	0	0	0	1	0
Transitional Areas		0	4	10	0	0	4	0
Transportation		0	4	3	0	2	4	0
<b>Total Percentage Impervious Cover</b>		<b>10</b>	<b>6</b>	<b>20</b>	<b>2</b>	<b>3</b>	<b>11</b>	<b>4</b>

Source: US EPA Office of Water; BASINS 2.0

Scale: 1:250,000

Date: 1977-early 80's

1) "Open Lands" includes:

- Cropland and Pasture
- Decid. & Evergreen Forest Land
- Lakes and Reservoirs
- Nonforested Wetlands
- Orchards

Table 1-3. Percentage of land uses within Stony Brook Watershed per town (1991).

<b>MassGIS 1991 LAND USES</b>	<b>Stony Brook Watershed</b>	<b>Land Uses for Towns in the Stony Brook Watershed</b>						
		<b>Ayer</b>	<b>Boxborough</b>	<b>Chelmsford</b>	<b>Groton</b>	<b>Harvard</b>	<b>Littleton</b>	<b>Tyngsborough</b>
Cropland and Pasture	6	3	16	2	2	7	12	1
Forest & Forested Wetlands	50	48	55	24	67	64	42	83
Open Land	2	7	2	3	1	1	3	0
Recreation: golf, tennis, playgrounds, etc.	1	1	0	2	0	5	0	0
Urban Open: parks, cemeteries, etc.	1	5	0	3	3	0	1	2
Water	3	1	0	4	0	0	3	0
Wetland	5	10	9	2	5	3	6	0
<b>SUBTOTAL Open Lands<sup>1</sup></b>	<b>68</b>	<b>75</b>	<b>82</b>	<b>39</b>	<b>79</b>	<b>80</b>	<b>66</b>	<b>86</b>
Mining	1	0	0	1	0	0	3	0
Residential	24	3	9	54	21	18	19	14
Commercial	1	1	1	1	0	0	3	0
Industrial	2	7	2	1	0	0	5	0
Transportation: airports, divided highways	3	14	6	4	0	2	4	0

Source: Mass GIS Land Use, 1991

Scale: 1:25,000

Date: 1991

1) "Open Lands" includes:

- Cropland and Pasture
- Forest & Forested Wetlands
- Open Land
- Recreation: golf, tennis, playgrounds, etc.
- Urban Open: parks, cemeteries, etc.
- Water
- Wetland

Table 1-4. Changes in open space for Stony Brook Watershed Communities (1980 to 1999).

<b>Stony Brook Communities</b>	<b>Stony Brook Watershed Percent Open Space</b>			<b>Town-Wide Open Space</b>		<b>Stony Brook Watershed Change in Open Space</b>	
	<b>1980<sup>1</sup></b>	<b>1990<sup>2</sup></b>	<b>1999<sup>2</sup></b>	<b>1990<sup>2</sup></b>	<b>1999<sup>2</sup></b>	<b>Open Space</b>	<b>Time Period</b>
Ayer	97%	75%	72%	not available	70%	-25%	20-year
Boxborough	86%	82%	N/A	77%	not available	-4%	10-year
Chelmsford	26%	39%	N/A	43%	not available	13%	10-year
Groton	98%	79%	70%	not available	79%	-28%	20-year
Harvard	97%	80%	78%	not available	80%	-19%	20-year
Littleton	80%	66%	62%	not available	68%	-18%	20-year
Tyngsborough	92%	86%	N/A	74%	not available	-6%	10-year
Westford	81%	69%	N/A	70%	not available	-12%	10-year
<b>Stony Brook Watershed</b>	<b>82%</b>	<b>72%</b>	<b>less than 68%</b>				

**NOTES:**

The Stony Brook Watershed covers 45.53 square miles.

1) Data Source: US EPA Office of Water; Basins 2.0, 1977 to early 80's, Scale 1:250,000, includes the following land covers:

- Cropland and Pasture
- Decid. & Evergreen Forest Land
- Lakes and Reservoirs
- Nonforested Wetlands
- Orchards

2) Data Source: Mass GIS Land Use, 1991 and 1999, Scale 1:25,000, includes the following land covers:

- Cropland and Pasture
- Forest & Forested Wetlands
- Open Land
- Recreation: golf, tennis, playgrounds, etc.
- Urban Open: parks, cemeteries, etc.

Table 2-1. Impervious coefficients used to estimate impervious cover from land use.

<b><i>EPA LAND USES, circa 1980</i></b>	<b><i>MassGIS LAND USES, 1991</i></b>	<b><i>EPA-Approved % Impervious</i></b>
Mining	Mining	1%
Cropland and Pasture, Orchards	Cropland and Pasture	2%
Decid. & Evergreen Forest Land	Forest & Forested Wetlands	2%
Other Urban or Built-Up Land	Urban Open: parks, cemeteries, etc.; Recreation: golf, tennis, playgrounds, etc.	5%
<i>no equivalent</i>	Open Land	5%
Residential	<i>no equivalent (see below)</i>	13%
<i>no equivalent</i>	High-Density Residential	13%
<i>no equivalent</i>	Medium-Density Residential	25%
<i>no equivalent</i>	Low-Density Residential	35%
<i>no equivalent</i>	Multi Family Residential	45%
Transitional Areas	<i>no equivalent</i>	25%
Industrial	Industrial	50%
Transportation	Transportation: airports, divided highways	50%
Commercial Services	Commercial	60%
Nonforested Wetlands	Wetland	83%
Lakes and Reservoirs	Water	95%

Table 3-1. Average Annual Community Public Water Supply Withdrawals for 1994, 1998 and 1999 from the Stony Brook Watershed.

Town Name	Totals Gallons per year from Stony Brook Watershed			Percent of Total Stony Brook Withdrawals, 1998	Percent of Total Community Water Supply from the Stony Brook Watershed, 1998	Other Watersheds that contribute to community water supply
	1994	1998	1999			
AYER	483,659,200	316,415,800	223,000,000	15%	53%	Nashua
BOXBOROUGH	<i>no info</i>	27,308,400	27,308,400	1%	40%	Concord, Nashua
CHELMSFORD	410,734,507	618,440,000	856,100,000	28%	54%	Concord
NORTH CHELMSFORD	258,927,000	291,988,000	282,046,000	13%	100%	N/A
CHELMSFORD & NORTH CHELMSFORD	669,661,507	910,428,000	1,138,146,000	42%	See above	See above
LITTLETON	<i>no info</i>	368,800,000	489,100,000	17%	100%	N/A
WESTFORD	467,492,062	559,096,000	644,000,000	26%	100%	N/A
Total Stony Brook Withdrawal (MGD):	<i>add'l data needed</i>	5.98	6.91			
Total Stony Brook Withdrawal (GPY):	<i>add'l data needed</i>	2,182,048,200	2,521,554,400			

Data Source: DEP 1994, 1998 and 1999 Annual Statistical Reports, and Town of Chelmsford Water Service Study (SEA Consultants, June 2000)

Table 3-2. Summary of registered and/or permitted withdrawals for Community and Non-Community Water Suppliers in the Stony Brook Watershed.

<i>Public and Non-Community Water Supply</i>	<i>TOWN or CITY</i>	<i>Registered Amount<sup>1</sup> MGD</i>	<i>Permitted to 2/2004<sup>1</sup> MGD</i>	<i>Total Approved Withdrawal MGD</i>	<i>Total Withdrawal 1998<sup>2</sup> MGD</i>
Ayer DPW- Water Division	Ayer	0.66	NP <sup>3</sup>	0.66	0.86
Equmarc Joint Venture-Towermarc	Boxborough	NR <sup>4</sup>	0.14	0.14	not available
Cisco Development Partners	Boxborough	NR <sup>4</sup>	0.14	0.14	not in use (future)
Chelmsford Water District	Chelmsford	1.73	NP <sup>3</sup>	1.73	1.69
North Chelmsford Water District	North Chelmsford	0.94	NP <sup>3</sup>	0.94	0.80
Laughton Garden Center, Inc.	North Chelmsford	0.07	NP <sup>3</sup>	0.07	not available
Littleton Water Department	Littleton	0.84	0.50	1.34	1.01
Veryfine Products, Inc.	Littleton	0.22	0.22	0.44	not available
Aggregate Materials Corporation	Littleton	1.58	NP <sup>3</sup>	1.58	not available
Westford Water Department	Westford	1.18	0.98	2.16	1.53
<b>Totals</b>		7.22	1.98	9.20	5.90

Notes:

<sup>1</sup> From Duane LeVangie (DEP) 10/2000 and DEP CERO files. Note: permitted amount is in addition to registered amount.

<sup>2</sup> Amounts are from 1998 Annual Statistical Reports (ASR) to the MA Department of Environmental Protection (DEP), Bureau of Resource Protection Drinking Water Program.

<sup>3</sup> NP = Not Permitted, No permit required because total withdrawals are either under the Water Management Act threshold of 100,000 gallons per day (gpd) or less than 100,000 gpd over the registered amount.

<sup>4</sup> NR = Not Registered

MGD = millions of gallons per day

Table 3-3. All Community Public Water Supply Sources in the Stony Brook Watershed.

<b>TOWN</b>	<b>Supplier</b>	<b>SOURCE ID<sup>1</sup></b>	<b>SOURCE NAME</b>
AYER	Ayer DPW	2019000-03G	SPECTACLE POND WELL # 1
AYER	Ayer DPW	2019000-04G	SPECTACLE POND WELL # 2
AYER	Little Lyne Apts.	2019007-01G	LITTLETON LYNE APARTMENTS WELL #1
BOXBOROUGH	Brook Village Condos	2037007-01G	Brook Village Condos ROCK WELL # 1
BOXBOROUGH	Brook Village Condos	2037007-02G	Brook Village Condos ROCK WELL # 2
BOXBOROUGH	Brook Village Condos	2037007-03G	Brook Village Condos ROCK WELL # 3
BOXBOROUGH	Brook Village Condos	2037007-04G	Brook Village Condos ROCK WELL # 4
BOXBOROUGH	Eliot House	2037002-02G	ELIOT HOUSE WELL
BOXBOROUGH	Lowell & Dudley Houses	2037002-04G	LOWELL & DUDLEY HOUSES WELL
N. CHELMSFORD	N. Chelmsford Water District	3056002-01G	BOMIL GP WELL #1
N. CHELMSFORD	N. Chelmsford Water District	3056002-02G	BOMIL GP WELL #2
N. CHELMSFORD	N. Chelmsford Water District	3056002-03G	BOMIL GP WELL #3
N. CHELMSFORD	N. Chelmsford Water District	3056002-04G	BOMIL GP WELL #4
CHELMSFORD	Chelmsford Water District	3056000-06G	CROOKED SPRING GP WELL #1
CHELMSFORD	Chelmsford Water District	3056000-08G	CROOKED SPRING GP WELL #2
CHELMSFORD	Chelmsford Water District	3056000-03G	JORDAN RD. GP WELL
CHELMSFORD	Chelmsford Water District	3056000-12G	MEADOWBROOK RD. GP WELL #1
CHELMSFORD	Chelmsford Water District	3056000-10G	MEADOWBROOK RD. GP WELL #2
LITTLETON	Littleton Water Department	2158000-02G	GPW # 1
LITTLETON	Littleton Water Department	2158000-03G	GPW # 2
LITTLETON	Littleton Water Department	2158000-04G	GPW SPECTACLE POND
LITTLETON	Littleton Water Department	2158000-01G	TWF WHITCOMB AVE.
LITTLETON	<i>Digital</i>	<i>2158000</i>	<i>PROPOSED DIGITAL SITE 2-81</i>
WESTFORD	Westford Water Department	2330000-07G	COTE GPW
WESTFORD	Westford Water Department	2330000-04G	COUNTRY RD. GPW
WESTFORD	Westford Water Department	2330000-03G	DEPOT RD. GPW
WESTFORD	Westford Water Department	2330000-08G	FLETCHER WELL
WESTFORD	Westford Water Department	2330000-05G	FORGE VILLAGE RD. GPW
WESTFORD	Westford Water Department	2330000-01G	FORGE VILLAGE WELLFIELD 1.1
WESTFORD	Westford Water Department	2330000-06G	HOWARD ROAD WELLFIELD 6.1
WESTFORD	Westford Water Department	2330000-02G	NUTTING RD. GPW
WESTFORD	Haystack Estates	2330019-01G	HAYSTACK ESTATES WELL # 1
WESTFORD	Haystack Estates	2330019-02G	HAYSTACK ESTATES WELL # 2

1. Source ID is a unique number assigned by the Department of Environmental Protection for each water supply source.

Table 3-4. All Non-Community Public Water Supply Sources in the Stony Brook Watershed.

<i>TOWN</i>	<i>SOURCE ID</i> <sup>1</sup>	<i>SOURCE NAME</i>	<i>TYPE</i> <sup>2</sup>
BOXBOROUGH	2037020-01G	KURIAN LIMITED PARTNERSHIP	NTNC
BOXBOROUGH	2037020-02G	KURIAN LIMITED PARTNERSHIP	NTNC
BOXBOROUGH	2037017-01G	NEC TECHNOLOGIES INC.	NTNC
BOXBOROUGH	2037017-02G	NEC TECHNOLOGIES INC.	NTNC
BOXBOROUGH	2037017-03G	NEC TECHNOLOGIES INC.	NTNC
BOXBOROUGH	2037018-01G	SETRA SYSTEMS	NTNC
BOXBOROUGH	2037018-02G	SETRA SYSTEMS	NTNC
BOXBOROUGH	2037024-01G	SETRA SYSTEM 155 SWANSON RD	NTNC
BOXBOROUGH	2037024-02G	SETRA SYSTEM 155 SWANSON RD	NTNC
BOXBOROUGH	2037022-01G	WINSTANLEY ASSOCIATES	NTNC
<i>BOXBOROUGH</i>	<i>not available</i>	<i>PROPOSED CISCO SYSTEMS</i>	<i>NTNC</i>
BOXBOROUGH	2037026-01G	BOXBORO GREEN	TNC
BOXBOROUGH	2037030-01G	MASS. AVE. EXXON	TNC
HARVARD	2037025-02G	D&M/CHU TECHNOLOGIES*	NTNC
HARVARD	2037025-01G	D&M/CHU TECHNOLOGIES*	NTNC
HARVARD	2125001-01G	FRIENDLY CROSSWAYS CONFERENCE CENTER	TNC
WESTFORD	2330016-01G	RANCHO DE AMIGOS	TNC
WESTFORD	2330013-03G	WYMANS BEACH	TNC
WESTFORD	2330013-06G	WYMANS BEACH	TNC
WESTFORD	2330013-04G	WYMANS BEACH	TNC
WESTFORD	2330013-02G	WYMANS BEACH	TNC
WESTFORD	2330013-05G	WYMANS BEACH	TNC
WESTFORD	2330013-01G	WYMANS BEACH	TNC
WESTFORD	2330018-01G	YMCA CAMP WEETAMO*	TNC

1. Source ID is a unique number assigned by the Department of Environmental Protection for each water supply source.

2. Type is a water system classification. NTNC stands for Non-transient, non-community water supply and TNC stands for Transient, non-community water supply. See Section 3 for further definitions.

Note: Total 1998 reported withdrawals from all of the above sources is approximately 7 million gallons; however, astericks denote sources for which no withdrawal information was available.

Table 5-1A. Summary of wastewater discharge information for sewerred communities in the Stony Brook Watershed.

<b>Municipalities</b>	<b>Wastewater Disposal Status<sup>1</sup></b>	<b>NPDES<sup>2</sup> Discharge Information</b>		<b>Interbasin Transfer?</b>
		<b>NPDES Facilities</b>	<b>Receiving Water Body</b>	
Ayer	Title 5/ ~_% Sewered	Ayer WWTP	Nashua River	Yes
Chelmsford	Title 5/ ~85% Sewered	Lowell WWTP	Merrimack River	Yes
Groton/W. Groton	Title 5/ Sewered	to Pepperel WWTP	Nashua River	Yes
Tyngsborough	Title 5/Sewered	to Lowell WWTP	Merrimack River	Yes

Notes:

<sup>1</sup> Information on wastewater disposal system status provided by Ginny Scarlet (DEP CERO)

<sup>2</sup> National Pollution Discharge Elimination System (NPDES) permit information obtained from DEP CERO files.

Table 5-1B. Summary of Title 5 system information for communities in the Stony Brook Watershed.

<b>Municipalities</b>	<b>Wastewater Disposal Status<sup>1</sup></b>	<b>Requirement for Regular Inspection and Pumping</b>	<b>Education Program Type and Frequency</b>	<b>Title 5 Discharge information</b>
				<b>Receiving Basin</b>
Ayer	Title 5/ Sewered	unknown	unknown	Nashua/Stony
Boxborough	Title 5	No	None	Nashua/SuAsCo <sup>2</sup> /Stony
Chelmsford	Title 5/ ~85% Sewered	unknown	unknown	Stony/SuAsCo
Harvard	Title 5	unknown	unknown	Nashua/Stony
Littleton	Title 5	unknown	unknown	Stony/SuAsCo
Westford	Title 5	Done at time of transfer (average time 6.5 years)	Annual Seminar, Title 5 info provided at Annual Health Fair	Stony/SuAsCo

Notes:

<sup>1</sup> Information on wastewater disposal system status provided by Ginny Scarlet (DEP CERO)

<sup>2</sup> Sudbury Assabet and Concord Watersheds

Table 5-2. Groundwater discharge permits for treated wastewater in the Stony Brook Watershed.

APPLICANT	TOWN	CONTACT	PERMIT OVERSIGHT1
COMPAQ COMPUTER CORP (DIGITAL)	LITTLETON	SCOTT LEMAY	DEP Watershed Permitting
FIRST LITTLETON PARTNERSHIP	LITTLETON	KENNETH JAMESON	DEP Watershed Permitting
BROOK VILLAGE CONDOMINIUMS	BOXFORD	WARNER GUILD	DEP Watershed Permitting
TOWN OF WESTFORD SCHOOL DEPT	WESTFORD	EVERETT OLSEN	DEP Watershed Permitting
TJ MAXX PLAZA	TYNGSBORO	ROBERT AXELROD	DEP Watershed Permitting

- 1) Permit information provided by Marybeth Costello (DEP Watershed Permitting) October 2000, updated April 2001
  - Permit threshold is 10,000 gallons per day
  - Effluent is tested monthly for BOD, TSS, Nitrogen series, Fecal coliform bacteria, oil and grease, surfactants
  - Effluent is tested daily for pH and flow
  - Effluent is tested annually for organics
  - Permitees must install a minimum of 3 monitoring wells

Table 6-1. MA Natural Heritage and Endangered Species, Threatened, Endangered and Special Concern Species in Stony Brook Watershed Communities.

COMMON NAME	TAXONOMIC CLASS	STATE RANK								
			AYER	BOYBOROUGH	CHELMSFORD	GROTON	HARVARD	LITTLETON	TYNGSBOROUGH	WESTFORD
BLUE-SPOTTED SALAMANDER	Amphibian	Special Concern		X		X	X	X	X	X
MARbled SALAMANDER	Amphibian	Threatened						X		
ELDERBERRY LONG-HORNED BEETLE	Beetle	Special Concern					X			
AMERICAN BITTERN	Bird	Endangered					X			X
GRASSHOPPER SPARROW	Bird	Threatened					X			
LEAST BITTERN	Bird	Endangered								X
PIED-BILLED GREBE	Bird	Endangered					X			
UPLAND SANDPIPER	Bird	Endangered	X							
MYSTIC VALLEY AMPHIPOD	Crustacean	Special Concern			X	X	X	X		X
PERSIUS DUSKYWING	Lepidoptera	Threatened							X	
TRIANGLE FLOATER	Mussel	Special Concern					X			
BROOK SNAKETAIL	Odonate	Special Concern				X				
SPATTERDOCK DARNER	Odonate	Endangered				X				
ZEBRA CLUBTAIL	Odonate	Endangered				X				
BLANDING'S TURTLE	Reptile	Endangered		X		X	X			X
EASTERN BOX TURTLE	Reptile	Special Concern	X		X		X			
SPOTTED TURTLE	Reptile	Special Concern		X	X	X		X		X
WOOD TURTLE	Reptile	Special Concern	X				X			
CLIMBING FERN	Vascular Plant	Special Concern	X			X	X			
CULVER'S-ROOT	Vascular Plant	Special Concern					X			
HOUGHTON'S FLATSEdge	Vascular Plant	Endangered	X							
LOW BINDWEED	Vascular Plant	Endangered				X				
NEW ENGLAND BLAZING STAR	Vascular Plant	Special Concern	X							
OVATE SPIKE-SEdge	Vascular Plant	Endangered					X			
SMALL BUR-REED	Vascular Plant	Endangered				X	X			
TOOTHcup	Vascular Plant	Endangered								X
WILD SENNA	Vascular Plant	Endangered	X							
TOTAL NUMBER OF SPECIES			7	3	3	10	14	4	2	7

Table 6-2. Total number of Certified Vernal Pools in Stony Brook Communities and in the Stony Brook Watershed.

<b><i>Stony Brook Communities</i></b>	<b><i>Total Number of Certified Vernal Pools</i></b>	<b><i>Number of Certified Vernal Pools in Stony Brook Watershed</i></b>
Ayer	0	0
Boxborough	3	0
Chelmsford	3	0
Groton	14	0
Harvard	5	0
Littleton	13	0
Tyngsborough	4	0
Westford	88	39
<b>TOTALS:</b>	<b>130*</b>	<b>39</b>

\*Website Database Last Updated in February 2000

Table 6-3. Trout Stocked Waters- 2001, Division of Fisheries, Wildlife and Environmental Law Enforcement

<b><i>Stony Brook Communities</i></b>	<b><i>Streams, River and Ponds Stocked with Trout</i></b>
Ayer	Bennet Brook, Sandy Pond
Boxborough	Guggins Brook
Chelmsford	River Meadow Brook, Stony Brook, Crooked Spring Brook
Groton	Cow Pond Brook, Baddacook Pond, Unkety Brook Knops Pond, Squannacook River
Harvard	Bowers Brook, Mirror Lake
Littleton	Beaver Brook, Bennett Brook
Tyngsborough	none
Westford	Long Sought for Pond, Stony Brook

Table 7-1. 21-E sites in the Stony Brook Watershed.

21-E Site Name	Address	Town	Status
GROTON SCREW MACHINE	37 GILSON RD	GROTON	TIER 1A
B&F EXXON STATION	1425 MASS AVE	BOXBOROUGH	TIER 1C
SHELL OIL COMPANY	188 PRINCETON ST	CHELMSFORD	TIER 1C
SUNOCO STA	25 KING ST	LITTLETON	TIER 1C
DPW GARAGE	BEACON ST	WESTFORD	TIER 1C
AYER OIL CO	23 W FORD RD	AYER	DEF TIER 1B
NYES JAPENAMELAC (FMR)	11 SCHOOL ST	CHELMSFORD	DEF TIER 1B
GAUDETTE CONST/KNOWLES	GROTON RD	WESTFORD	DEF TIER 1B
871 BOSTON RD PROPERTY	871 BOSTON RD	GROTON	TIER 2
LONESTAR/SAN-VEL	80 AYER RD	LITTLETON	TIER 2
CITGO STATION	256 AYER RD	LITTLETON	TIER 2
CITGO STATION	169 PLAIN RD	WESTFORD	TIER 2
ANDERSON FRUIT FARM	160 MAIN ST	WESTFORD	TIER 2
PROPERTY	2 CARL THOMPSON RD	WESTFORD	TIER 2
RUSTLICK INC	10 NORTH MAIN ST	WESTFORD	TIER 2

Data Source: Mass GIS 21-E Datalayer (2000)

1) Data are from DRAFT MassGIS coverage for 21-E sites (January, 2000). Following are

Sites are usually Tier Classified using the Numerical Ranking System (NRS). The NRS scores

Tier 1A: A site/release receiving a total NRS score equal to or greater than 550.

Tier 1B: A site/release receiving a total NRS score less than 550 and equal to or greater than 450.

Tier 1C: A site/release receiving a total NRS score less than 450 and equal to or greater than 350.

Default Tier B: A site/release where the responsible party fails to provide a required submittal to DEP by a specified deadline.

Tier 2: A site/release receiving a total NRS score of less than 350, unless the site meets any of the Tier 1 Inclusionary Criteria.

Table 7-2. Solid waste sites in the Stony Brook Watershed.

Solid Waste Site Name	Address	Town	Status	Owner
CHEMSFORD LANDFILL	SWAIN ROAD	CHELMSFORD	CLOSED; CAPPED, NOT LINED	TOWN OF CHELMSFORD
WESTFORD LANDFILL	COLD SPRING ROAD	WESTFORD	CLOSED; CAPPED, NOT LINED	TOWN OF WESTFORD
LITTLETON LANDFILL	SPECTACLE POND ROAD	LITTLETON	CLOSED; CAPPED, NOT LINED	TOWN OF LITTLETON
ROUTHIER TIRE RECYCLING	WILLOW ROAD	AYER	ACTIVE; UNKNOWN	PJ ROUTHIER & SONS INC

Data Source: DEP Solid Waste Facilities datalayer (1997); provided by MassDEP and MassGIS

Table 7-3. Permit Compliance System sites in the Stony Brook Watershed.

Site Name	Address	Town	Owner	Receiving Waters <sup>1</sup>	Discharge Stat.	SIC Descript. <sup>2</sup>
BOXBOROUGH EXEC. CENTER	JUNCT I-95 & MASS AVE	BOXBOROUGH	PRIVATE	BEAVER BROOK	MINOR	NO DATA
D & R SHELL SERVICE STAT.	188 PRINCETON ST	CHELMSFORD	PRIVATE	COLD SPRINGS BRK	MINOR	NO DATA
MURRY PRINTING CO THE	NO DATA	NO DATA	NO DATA	NO DATA	MINOR	NO DATA
WESTFORD ANODIZING CORP.	12 NORTH MAIN ST	GRANITEVILLE	PRIVATE	STONY BROOK	MAJOR	ELECTROPLATING, PLATING, POLISHING, AND ANODIZING
VERYFINE PRODUCTS, INC.	HARVARD ROAD	LITTLETON	PRIVATE	REEDY MEADOW BRK	MAJOR	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS, AND JELLIES
FLETCHER GRANITE CO INC	GROTON ROAD	WESTFORD	PRIVATE	STONY BRK TO GILSUM BRK	MINOR	DIMENSION STONE
THE MILL	73 PRINCETON ST	N. CHELMSFORD	PRIVATE	STONY BROOK	MINOR	NO DATA

1. Receiving Waters: The name of the river, stream, tributary, lake or other body of water into which the effluent is discharged.

2. SIC Description: The principal activity causing the discharge at the facility as defined by the 1987 Standard Industrial Classification (SIC) Manual.

Data Source: US EPA/ Office of Water; Basins 2.0, 1998

Table 7-4. Potential contamination sources within Zone II recharge areas of the Stony Brook Watershed.

Site Name	Town	Potential Contamination Source	Notes
ROUTHIER TIRE RECYCLING	AYER	SOLID WASTE <sup>1</sup>	Active, Unknown
LITTLETON LANDFILL	LITTLETON	SOLID WASTE	Closed, Capped, Not Lined
WESTFORD LANDFILL	WESTFORD	SOLID WASTE	Closed, Capped, Not Lined
THE MILL	N. CHELMSFORD	NPDES <sup>2</sup>	Minor Discharge
FLETCHER GRANITE CO INC	WESTFORD	NPDES	Minor Discharge
AYER OIL CO	AYER	21E SITE <sup>3</sup>	Default Tier 1B
NYES JAPENAMELAC	CHELMSFORD	21E SITE	Default Tier 1B
SHELL OIL COMPANY	CHELMSFORD	21E SITE	Tier 1C
CITGO STATION	LITTLETON	21E SITE	Tier 2
DPW GARAGE	WESTFORD	21E SITE	Tier 1C
CITGO STATION	WESTFORD	21E SITE	Tier 2
PROPERTY	WESTFORD	21E SITE	Tier 2
GAUDETTE CONST/KNOWL	WESTFORD	21E SITE	Default
M.W. LEAHY CO INC	AYER	UNDERGROUND STORAGE TANK	no information
TOWN & COUNTRY STORE	CHELMSFORD	UNDERGROUND STORAGE TANK	no information
DONALD LOISELLE	CHELMSFORD	UNDERGROUND STORAGE TANK	no information
TOWN OF CHELMSFORD HWY. DPT	CHELMSFORD	UNDERGROUND STORAGE TANK	no information
N. CHELMSFORD WATER DISTRICT	CHELMSFORD	UNDERGROUND STORAGE TANK	no information
M D P W MAINTENANCE DEPOT	LITTLETON	UNDERGROUND STORAGE TANK	no information
TOWN OF LITTLETON	LITTLETON	UNDERGROUND STORAGE TANK	no information
NATIONAL FREIGHT INC #09	LITTLETON	UNDERGROUND STORAGE TANK	no information
NEFCO INC	WESTFORD	UNDERGROUND STORAGE TANK	no information
POWER TEST REALITY CO	WESTFORD	UNDERGROUND STORAGE TANK	no information
HARDING AUTOMOTIVE	WESTFORD	UNDERGROUND STORAGE TANK	no information
SILPRO MASONRY SYSTEMS	AYER	RCRA <sup>4</sup>	no information
DIGITAL EQUIPMENT CORP.	LITTLETON	RCRA	no information
GITCH'S BODY SHOP INC.	LITTLETON	RCRA	no information
MERRIMACK AUTO CO.	WESTFORD	RCRA	no information
TOMS AUTO REPAIR INC.	WESTFORD	RCRA	no information
HARDING AUTOMOTIVE	WESTFORD	RCRA	no information

**Data Sources: MassGIS and US EPA/ Office of Water**

1. DEP Solid Waste Facilities: Landfills, transfer stations, and combustion facilities.
2. NPDES: Facilities regulated by the National Pollutant Discharge Elimination System (NPDES) program under the Clean Water Act.
3. 21E Sites: Oil or hazardous material disposal sites.
4. RCRA Sites: Generators, transporters, treaters, storers, and disposers of hazardous waste that are required to provide information concerning their activities to state environmental agencies according to the Resource Conservation and Recovery Act (RCRA)

Table 9-1. Open space planning and protection by Stony Brook Watershed Communities.

Municipality	Land Trust (contact name, number)	Open Space Committee (contact name, number)	Open Space Plan Date	Town-wide Percent Open Space	Master Plan Date	Status of Build Out	Digitized Parcel Info?
Boxborough	Boxborough Conservation Trust	Have a "Land Use Team" headed by selectman Les Fox	1997	16%	RFP out for Master Plan 9/2000, currently they have separate plans for water resources and balanced	Completed	Partial
Chelmsford	Chelmsford Land Conservation Trust (Becky Warren)	No committee established	1998	15%	1996	Completed	Yes
Littleton	Littleton Land Trust	"Open Space Implementation Committee", chair is Rita Biajani 978-486-4148	1997	33%	A consultant is working on their MP to be completed Spring of 2001, last MP was 1965	Completed	Yes
Westford	Westford Conservation Trust (Marian Harman)	Have a "Land Use Committee" will get back to me with contact info.	1997	24%	Master Plan completed May 1995, no talk of update	Completed	Yes

Table 10. Local environmental zoning/bylaws/regulations of Stony Brook Watershed Communities.

Municipality	Aquifer and Water Resource Protection Bylaws	Does the bylaw meet or exceed state standards?	Other Resource Protection Bylaws
Boxborough	Watershed Protection Overlay Zoning District	Meets State Standards	Wetlands Protection Bylaw
Chelmsford	Aquifer Protection District	Meets State Standards	Wetlands Protection Bylaw
Littleton	Aquifer and Water Resource District	Exceeds State Standards	Hazardous Waste Bylaw
Westford	Water Resource Protection District	Meets State Standards	Wetlands Protection Bylaw

Table 11. Population Information for Stony Brook Communities

Stony Brook Communities	Census 1980	Census 1990	Estimated 1995	MISER Predicted			% Change (20 years)
				2000	2005	2010	
Ayer	6,993	6,871	5,565	5,256	4,998	4,766	-30.64%
Boxborough	3,126	3,343	4,372	4,978	5,554	6,186	85.04%
Chelmsford	31,174	32,383	34,638	36,376	37,551	38,045	17.48%
Harvard	12,170	12,329	11,477	13,105	14,818	16,707	35.51%
Littleton	6,970	7,051	7,503	7,749	7,832	7,827	11.01%
Tyngsborough	5,683	8,642	9,363	10,718	12,352	14,314	65.63%
Westford	13,434	16,392	18,506	20,674	22,584	24,295	48.21%

MISER: Massachusetts Institute of Social and Economic Research

## Appendix B

### Data Sources

#### Land Use and Land Cover

- **Land Use (MassGIS, 1991, 1999)** This land use coverage includes 37 land use classifications interpreted from 1:25,000 aerial photography taken in 1990, 1997 and/or 1999. Classifications of land use include areas of forest, wetland, residential, commercial, industrial, agriculture, etc. A complete list of the 37 land use classifications can be obtained from the Mass GIS website at: <http://www.state.ma.us/mgis/lus.htm>
- **Land Use (EPA, ~1980)** This land use coverage is provided at a 1:250,000 scale and includes digital data collected by the United States Geological Survey (USGS) and converted to ARC/INFO by the Environmental Protection Agency (EPA). Data were collected between 1977 and 1980. More information on these coverages can be obtained from the EPA website at: <http://www.epa.gov/nsdi/projects/giras.htm>

#### Impervious Cover

- **EPA-approved percent impervious values for land uses** Table 2-1 contains estimated percent impervious values for each land use type. These are EPA-approved (cite CDM report). They are based on nationwide studies of runoff that have measured and estimated the average amount of impervious surface associated with different land uses such as residential vs. commercial.

#### Public Water Supplies

- **Annual Statistical Reports (ASR) from 1994 through 1999.** These reports are required for all Public Water Supply sources that withdraw more than 100,000 gallons per day (gpd). The ASR typically includes the following information: monthly withdrawal volumes by source and an annual total; information on water bought and sold to other public water suppliers; estimates of water allocation by sector; source location; source type (i.e., groundwater or surface water); and may include information on water conservation programs.
- **Registration Statements for Water Withdrawal.** Public and Private Water Supplies that withdraw more than 100,000 gpd were required to register their average annual withdrawal volume for 1981-85 with the Department of Environmental Protection (DEP) following passage of the Water Management Act in 1986. These volumes are essentially considered “grandfathered”.
- **Water Withdrawal Permit.** Permits are required for all water supply sources that withdraw more than 100,000 gpd or exceed their registration by more than 100,000 gpd. The permitted volume is approved by DEP and is in addition to any registered volume. The current water withdrawal permits for the Stony Brook Watershed are valid from April 1999 through February 2004. Table 3-2 presents permitted volumes through the year 2004 for Public and Private Water Suppliers respectively.
- **Mass GIS Public Water Supply**  
The MassGIS Public Water Supply (PWS) datalayer was most recently updated in December 1999. It contains public community surface and groundwater supplies, as defined in 310

CMR 22.00, the Massachusetts Drinking Water Regulations, and 1528 public non-community sources (MassGIS, 2000). The coverages in this datalayer are defined as follows:

- **Community Water Supply:** part of a community water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.
- **Non-Community Water Supply:** a single service connection that is potentially available to 25 or more persons, such as a school, factory or restaurant. Non-Community Water Supplies are further defined as being Transient or Non-Transient based on the usage period, with less than 6 months use on a yearly basis being considered Transient.

#### Aquifers and Wellhead Protection Zones

- ***Aquifers (MassGIS, 1997)***  
This map (Figure 3-2) displays an aquifer datalayer, which maps areas of high and medium yield. For the Stony Brook Watershed, High Yield is defined as having a potential well yield greater than 300 gallons per minute. Medium Yield is defined as having a potential well yield between 100 and 300 gallons per minute (USGS Hydrologic Investigations Atlas HA-662, Sheet 2 of 2).
- ***DEP Wellhead Protection Areas (MassGIS January 2000)***  
Wellhead protection areas are important for protecting the recharge area around public water supply (PWS) wells. A Zone II is a wellhead protection area that has been determined by hydrogeologic modeling and approved by the [Department of Environmental Protection's \(DEP\) Drinking Water Program \(DWP\)](#). In cases where hydro-geologic modeling studies have not been performed and there is no approved Zone II, an Interim Wellhead Protection Area (IWPA) is established based on DEP DWP well pumping rates or default values. Certain land uses may be either prohibited or restricted in both approved (Zone II) and interim (IWPA) wellhead protection areas.
- ***Approved Wellhead Protection Areas (Zone II)*** As stated in 310 CMR 22.02, a Zone II is: "That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides that result from pumping the well, and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock, or a recharge boundary)."
- ***Interim Wellhead Protection Areas (IWPA)*** In the absence of an approved Zone II, DEP has adopted the Interim Wellhead Protection Area (IWPA) as the primary, protected recharge area for PWS groundwater sources. For PWS sources that pump less than 100,000 gallons per day (GPD), the IWPA radius is proportional to the pumping rate in gallons per minute (GPM). The minimum IWPA radius is 400 feet; the maximum (default) radius reached at is 2,640 feet.

#### Wastewater and Stormwater Management

- ***Ginny Scarlet, DEP Central Regional Office (CERO)***. Through telephone conversations and review of tables, Ginny Scarlet (DEP CERO) provided information regarding ongoing and proposed sewer projects. The Town of Chelmsford provided additional information and maps of sewer projects in Chelmsford. This information is summarized in Table 5-1.

- **Marybeth Costello, DEP Watershed Permitting.** Marybeth maintains the DEP database of permits for treated wastewater discharge to groundwater. Permits are required for facilities discharging more than 10,000 gallons per day of wastewater to groundwater. Permit information for Stony Brook Communities is summarized in Table 5-2.
- **Local Board of Health Officials.** Phone interviews were conducted with Board of Health officials from Westford, Littleton and Boxborough.

#### Natural Heritage and Endangered Species

- **Massachusetts Natural Heritage and Endangered Species Program (NHESP) Database**
  - **1999-2001 Massachusetts Certified Vernal Pools**  
This datalayer contains points for all vernal pools that have been certified by NHESP according to the Guidelines for Certification of Vernal Pool Habitat. Vernal Pools are small, shallow ponds characterized by lack of fish and by periods of dryness. Several endangered species including the spotted salamander and the wood frog depend on these pools for their breeding habitat.
  - **1999-2001 Estimated Habitats for Rare Wildlife**  
For use with the MA Wetlands Protection Act Regulations (310 CMR 10). Estimated habitats are drawn by analyzing population records, species habitat requirements, available information about the landscape, as well as personal observations.
- **Massachusetts Division of Fisheries, Wildlife and Environmental Law Enforcement, Fisheries homepage.** This page provides updated listings (by date and by county) of water bodies within each MA community that have been stocked with trout.

#### Potential Contamination Sources

- **21E Sites (Mass GIS; DEP Tier Classified Oil or Hazardous Material Sites (MGL c. 21E) Datalayer, 2000)** The DEP Tier Classified Oil or Hazardous Material Sites datalayer contains the approximate location of oil or hazardous material disposal sites that have been (1) reported and (2) Tier Classified under M.G.L. Chapter 21E and the Massachusetts Contingency Plan (MCP). Location types featured in this datalayer include the approximate center of a site, the center of a building on the property where the release occurred, the source of contamination, or the location of an on-site monitoring well. Releases of oil and hazardous materials are reported to the [Department of Environmental Protection's \(DEP\) Bureau of Waste Site Cleanup \(BWSC\)](#). The sites mapped in this datalayer represent only a subset of the total reported Chapter 21E sites tracked by DEP BWSC. Chapter 21E sites that have not yet been Tier Classified are not contained in this datalayer.
- **Solid Waste Sites (MassGIS; DEP Solid Waste Facilities datalayer (1997); provided by MassDEP and MassGIS)**  
The Solid Waste Facility Datalayer was compiled by the [Department of Environmental Protection \(DEP\)](#) to track the locations of landfills, transfer stations, and combustion facilities. The datalayer contains the majority of the facilities currently regulated under DEP's solid waste regulations (310 CMR 16.00 & 19.00). Thirteen specific types of solid waste facilities are included. Please note although the majority of the sites represent landfills, only a small fraction of those landfills are active. In addition, this datalayer does not contain all solid waste facilities known to DEP. The MassGIS land-use datalayer has waste site and mining classifications, which may represent landfills not in the solid waste datalayer.

- ***Underground Storage Tanks (Mass GIS, 1997)***  
The Underground Storage Tank Locations datalayer (UST) was compiled by the U.S. Environmental Protection Agency through a contract with Camp, Dresser and McKee Federal Systems, Inc.
- ***Mass DEP Permitted Groundwater Discharges (Marybeth Costello, Mass DEP, 2001)***
- ***EPA National Pollution Discharge Elimination System (NPDES) Discharge Monitoring Reports from 1996 through 1998.*** NPDES permits include major and minor reporting categories and are required for any discharge of pollutants to surface waters. Discharge Monitoring Reports include maximum, minimum and average daily flows and permit limits.

#### Surface Water Quality Data

- ***Stony Brook Stream Team (2000 and 20001 Monthly Monitoring Results).*** Data included in this assessment are from the Stony Brook Stream Team Water Quality Monitoring Program. The program trained almost forty volunteers who conducted shoreline surveys and sampled sixteen sites throughout the Stony Brook Watershed on a monthly basis from July through November 2000. The stream teams began conduct their second monitoring season in June 2001 and will continue through November 2001.
- ***Final Massachusetts Section 303(d) List of Waters 1998 (DEP, February 1999).*** Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDL).
- ***Massachusetts Surface Water Quality Standards (314 CMR 4.00).***

#### Local Environmental Planning

- ***Community Open Space Plans*** including Boxborough, Littleton, Westford, Chelmsford, Groton and Tyngsborough.
- ***Community Master Plans*** including Boxborough, Littleton, Westford and Chelmsford.

#### Local Environmental Bylaws and Regulations

- ***Community Bylaws*** including:
  - Littleton Hazardous Waste Bylaw
  - Littleton Aquifer & Water Resources District Bylaw
  - Westford Water Resource Protection Bylaw
  - Chelmsford Aquifer Protection District
  - Boxborough Aquifer Protection Zoning Bylaw

#### Population Trends

- ***US Census.*** Census data include 1980, 1990 and estimated population for 1995.
- ***Massachusetts Institute of Social and Economic Research (MISER).*** MISER data include predicted population for 2000, 2005 and 2010.

## Appendix C

### Stony Brook Watershed Advisory Committee and Stony Brook Stream Team Members

Stony Brook Watershed Advisory Committee Members and Affiliates

<b><i>First Name</i></b>	<b><i>Last Name</i></b>	<b><i>COMPANY</i></b>	<b><i>City</i></b>
Norman	Hanover	Boxboro Conservation Commission	Boxboro
David	Koonce	Chairman, Boxborough Conservation Commission	Boxborough
Andrew	Sheehan	Coordinator, Chelmsford Community Development	Chelmsford
Robert	Doak	Chelmsford Water District, Superintendent	Chelmsford
Dave	Westerling	Harvard Board of Selectmen	Harvard
Deborah	Bray	Littleton Light and Water	Littleton
Steven	Sussman	Littleton Pond Association	Littleton
Bruce	Harper	North Chelmsford Water District, Superintendent	N. Chelmsford
Becky	Warren	Chelmsford Land Conservation Trust	Pepperell
Kristin	Divris	Westford Water Department	Westford
Louis	Ashley	Westford Board of Health	Westford
Marian	Harman	Westford Conservation Trust	Westford
Marilyn	Frank	Westford Conservation Commission	Westford
Robin	Fullford	Water Department, Town of Westford	Westford
Anita	Wolovick	DEP SWAP Program	Wilmington
Bill	Dunn	DEP Merrimack Basin Team Leader	Worcester
Brian	Duval	DEP 319 Coordinator	Worcester
Ginny	Scarlet	DEP Phase II Coordinator	Worcester

## Stony Brook Stream Team Members- 2000 and 2001

<b>First Name</b>	<b>Last Name</b>	<b>City</b>
Julie	Corenzwit	Ayer
Graham	Grallert	Ayer
Steve	Magal	Ayer
Laurie	Nehring	Ayer
Gregory	Nonis	Ayer
Walter	Hoyt	Boxboro
Barbara	Warren	Boxboro
Caroline	Hampton	Chelmsford
Kevin and Laura	Palaia	Chelmsford
Alvaro	Valencia	Chelmsford
Kristen	Magro	Dunstable
Ann	Bousquet	Littleton
Deborah	Bray	Littleton
Barbara	Field	Littleton
Michael	Field	Littleton
Jeanine	Gilpatrick	Littleton
Noreen	Gilpatrick	Littleton
Robert	Lawlis	Littleton
John	Mohamed	Littleton
Dina	Samfield	Littleton
Larry	Sime	Littleton
Steven	Sussman	Littleton
Shurling	Watson	Littleton
Leon	Weaver	Littleton
Dave	Wilson	Littleton
Lyndsey	Roop	Lunenburg
Shelagh	Brady	Westford
Marc	Cajolet	Westford
Laurie	Carrick	Westford
Bob	Cunningham	Westford
Ken	Dews	Westford
Peter	Ewing	Westford
Derek	Fairchild	Westford
Robin	Fullford	Westford
Michelle	Gazarik	Westford
Mike	Gazarik	Westford
Mike	Graesser	Westford
Marian & Bill	Harman	Westford
Laura	Mattei	Westford
Mark	Rodman	Westford
Emily and Tom	Teller	Westford
Marcia	Walsh	Westford

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