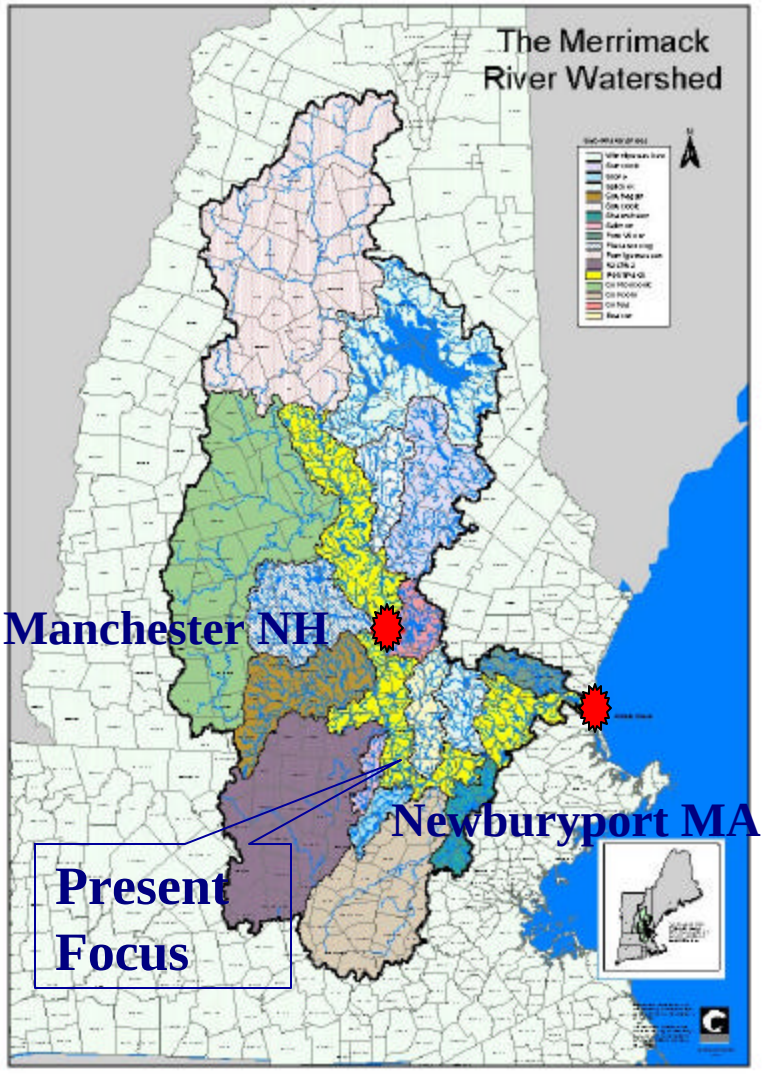
Merrimack River Watershed Council

A report on
Data and Literature on the Water Use of the Merrimack River Watershed

Prepared for
Merrimack Watershed Team

April 2001

Water Demand Analysis on Merrimack River Watershed



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About Merrimack River Watershed Council (MRWC)

MRWC is a nonprofit 501(c)(3) charitable conservation organization founded in 1976. MRWC's mission is… *the protection and restoration of the Merrimack River Watershed for the enjoyment of people, the benefit of its communities and the health of the ecosystem*.

MRWC is the only private organization that provides linkages between New Hampshire and Massachusetts on watershed and river related issues. MRWC has established collaborative relationships among regional planning agencies on both sides of the state line, and with conservation organizations, state and federal agencies, municipal governments and businesses. We are governed by a Board of Directors elected annually by our 1700 members throughout the watershed. We have a professional staff of 8 people, mostly located in our headquarters offices in Lawrence, Massachusetts. Our storefront Watershed Information Center is located in Manchester, New Hampshire.

Our professional staff includes individuals with job experience in community organizing, civil engineering, water resources, computer modeling, GIS mapping, open space planning, environmental permitting, stream team development, data collection and analysis, training and support, publications, community education, regional planning, landscape design, meeting and project facilitation and water quality sampling and analysis.

Our only focus is on the Merrimack River Basin, which includes the mainstem Merrimack River Watershed and all 16 sub watersheds. All of MRWC's effort, whether it is scientific data collection, analysis, watershed modeling, community organizing, media or education, is focused on the Merrimack and its sub-watersheds. MRWC has the motivation and capability to continue implementation, data collection and further scientific analysis long after studies are complete.

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1. Introduction

Historically, the Merrimack River has endured a lot of use and abuse. The cities of Lowell, Lawrence, and Haverhill in Massachusetts and Manchester in New Hampshire emerged as major industrial centers in the mid-1800s by exploiting Merrimack River waterpower and the river as a transportation system for natural resources including timber and stone from quarries. They are still major urban centers today, but now the entire lower watershed in New Hampshire and Massachusetts is facing rapidly spreading suburban growth. Notably, the rapid development in southern New Hampshire and the suburban growth in northwest of the Boston metropolitan area are striking threats to this watershed . Construction of interstate highways 93 and 495, and state highways like Route 3 and the "Everett Turnpike" brought additional development pressure to the watershed. Proposed expansions of routes 3, 93, and 495 in Massachusetts and New Hampshire will have significant impact on this watershed as well. Sustainability of our water resources is especially threatened by these highway expansion projects when you consider the development that will follow. There are debates and discussions regarding whether the Merrimack River can bear the development pressure and supply water to the needs of our future generations while still safeguarding in-stream uses and values from hydropower generation and water supply to fisheries and recreation. Concerns for balancing water use was recognized with passage of the New Hampshire River Protection and Management Act that is administered by the NH Department of Environmental Services. This Act introduced the requirement to adopt and implement "In-stream Flow Rules" to efficiently manage the rivers, including a significant portion of the Merrimack.

Little or no scientific effort has been made to answer the question whether the Merrimack River will meet its future demand. Therefore, the Merrimack Watershed Team of the Massachusetts Watershed Initiative (MWI) program recommended the present study as a preliminary effort to begin understanding the effect of current and future water withdrawals in the mainstem watershed.

This study focuses on filling a long-recognized need among municipalities, agencies, and economic interests to understand the cumulative effect of water withdrawals from the Merrimack River. This information is needed to guide stakeholders and decision-makers that are concerned about maintaining minimum flows that sustain river related ecological, economic, and social benefits. In addition, this study provides basic information on water use for a detailed flow simulation of the Merrimack River that is the next step in understanding and evaluating the effect of the water use on in-stream flows.

Spatial and temporal flow simulation is an essential component in our attempt to understand the dynamics of the Merrimack River whether we are interested in

combine sewer overflows (CSOs), in-stream flow rules, dam operation, or water supply. However, one of the most critical and not readily available data needed for a detailed flow simulation is the effect of water withdrawal. Therefore the present study multiplies its importance as the communities in the Merrimack have issues on CSOs, in-stream flow rules, dam operations, and water supply.

The geographical focus of this study is limited to the mainstem lower Merrimack, from Manchester, NH to Newburyport, MA, due to the limitation of budget and time. However, the present study will provide the recommendations on the data gap to be filled and it may recommend extending the study to include sub watersheds and the rest of the mainstem north of Manchester, NH.

Communities in New Hampshire and Massachusetts are seeking to increase their water use over time to met projected demand. Examples include proposals for new or expanded withdrawals from the Merrimack River in Manchester, Nashua, Lowell, Lawrence, Methuen, Andover, Tewksbury, Chelmsford and other communities. All this just for water supply alone. Other proposals are coming from energy facilities including AES in Londonderry, Nickel Hill Energy, and others.

How do we respond to these requests without understanding the impact on the river and other users. We must understand the dynamics of supply and demand, but we also must understand the needs of in-stream uses and the health of the river if we are to make good long-term judgements.

The objectives can be summarized into four major elements:

- Build a permanent collaboration among water users, water use regulators, and interested parties
- Estimate the current water use, including withdrawals and discharges, of the Merrimack River Watershed between Manchester, NH and Newburyport, MA
- Estimate the water demand by 2020 for all mainstem communities
- Analyze future demand Vs historical flow scenarios

This report provides the status of water use data collection and processing as well as a summary on the literature review.

2. Water Use Data

2.1 Water Withdrawals

The Massachusetts Department of Environmental Protection, Water Management Program (MADEP-WMP) and the New Hampshire Departmental Services, Water Management Bureau (NHDES-WMB) maintain records of water withdrawals in this study area.

In MA, major water use, withdrawals in excess of 100,000 gallons per day (GPD) averaged over a ninety day period, is regulated under the Water Management Act. MA regulates only the major water uses, which are self-supplied. Northeast Regional Office (NERO) and Central Regional Offices of MA DEP have the Annual Statistical Reports (ASR) of water users within the communities of the Merrimack River Mainstem Watershed. The ASR has information on total monthly withdrawal, monthly withdrawal by source, and breakdowns by the type of use. In general, the reports for the past five years contain sufficient details for the present study, such as monthly and yearly withdrawals, withdrawals by sources, and supply by type of use. For the purposes of this and future work, MRWC digitized the withdrawal data (1994-1999) for all Merrimack communities in Massachusetts with the permission of MA DEP.

In NH, a water registration and reporting program is administered by the NHDES-WMB. All facilities, which use 20,000 GPD averaged over any seven day period or 600,000 gallons in any thirty day period, must register and report their monthly water use by each source and destination to the WMB. This reporting program includes self-supplied facilities, facilities receiving water from public supply, and water returns. NHDES-WMB created a computer data base with all information acquired by this program. In general, the database provides detailed information covering about 5-10 years (1990-2000). Since the database was generated based on the user supplied information, the readers are recommended to perform data verification before using them in a scientific study. MRWC verified the data with individual major water users located in the study area.

The difference in the threshold volumes between MA and NH generates an information gap. Based on the scope of this study, filling the information gap is not essential to meet our goals. This was discussed and decided upon during the second Technical Advisory Committee (TAC) meeting held on January 10, 2001. A list of water users in each community is provided in Table 1. Compiled and processed withdrawal data (1995-1999) for each community in the lower

mainstem Merrimack River Watershed is available at the Merrimack River Watershed Council (MRWC) either as a text file or a Microsoft excel file.

2.2 Water Discharges

The United States Environmental Protection Agency (US EPA) maintains a Permit Compliance System (PCS) database in Envirofacts regarding facilities holding National Pollutant Discharge Elimination System (NPDES) permits. The Water Discharge Permits Query Form (http://www.epa.gov/enviro/html/pcs/pcs_query_java.html) allows us to retrieve selected data by using any combination of facility name, geographic location, standard industrial classification, and chemicals. The database contains discharge information from 1995 to date. A summary of discharges in 1990 was compiled and analyzed by Medalie[1]. This report provides site-specific data on municipal wastewater collection systems, municipal wastewater treatment facilities, and wastewater return flows by State and river basin. The report also compiles the daily mean discharges for each month by facility. A list of facilities, which discharge into the Merrimack Watershed, in each community is provided in Table 1.

[1] Medalie, L., Wastewater Collection and Return Flow in New England in 1990, USGS Water Resources Investigations Report 95-4144, 1996.

Table 1a. A list of self-supplied water users in each Merrimack community of Massachusetts, type of use, and data source. Table was prepared based on the records of 1995-1999.

Community	User Name	Withdrawal	Discharge	Data Source
Amesbury	Amesbury Utility Water District	X		MA DEP
	Amesbury WWTP		X	US EPA
Andover	Andover Water Department	X		MA DEP
Chelmsford	North Chelmsford Water District	X		MA DEP
	Laughton Garden Center, Inc.	X		MA DEP
Dracut	Dracut Water Supply District	X		MA DEP
	P J Keating Company	X		MA DEP
Groveland	Groveland Water Department	X		MA DEP
	Mill Pond GW INTER		X	US EPA
Haverhill	Haverhill Water Department	X		MA DEP
	Haverhill Paperboard Corporation	X		MA DEP
	Bradford Country Club	X		MA DEP
	Ogden Martin Systems of Haverhill	X		MA DEP
	Spring Hill Farm Dairy Inc.	X		MA DEP
	Haverhill WPCF		X	US EPA
	Vernon Plastics		X	US EPA
Lawrence	Lawrence Water Works	X		MA DEP
	Malden Mills Industries, Inc.	X		MA DEP
	Merrimac Paper Company	X		MA DEP
	Newark Atlantic Paperboard Corp.	X		MA DEP
Lowell	Lowell Regional Water Utility	X		MA DEP
	Western Avenue Dyers, LP	X		MA DEP
	Lowell REG. WW		X	US EPA
	Lowell Cogene PL		X	US EPA
Merrimac	Merrimac Water Department	X		MA DEP
	Merrimac WWTF		X	US EPA
Methuen	Methuen Water Department	X		MA DEP
	Hickory Hill Golf Course	X		MA DEP
N. Andover	North Andover Water Department	X		MA DEP
	Lucent Technologies, Inc.	X	X	MA DEP / US EPA
	Greater Lawrence Sanitary District		X	US EPA
	AEP IND. Proponite		X	US EPA
Newburyport	Newburyport Water Department	X		MA DEP
	Gould Elect INC.		X	US EPA
	Newburyport WPC		X	US EPA
Salisbury	Salisbury Water Supply	X		MA DEP
	Salisbury WWTF		X	US EPA
Tewksbury	Tewksbury Water Department	X		MA DEP
	Tewksbury Hospital	X		MA DEP
Tyngsborough	TJ Maxx	X		MA DEP
	Browning Ferris		X	US EPA
West Newbury	West Newbury Water Department	X		MA DEP
Westford	Westford Water Dept.	X		MA DEP
	Laughton Garden Center, Inc.	X		MA DEP
	Vinebrook Estates	X		MA DEP
	Fletcher Granite		X	US EPA

Table 1b. A list of self-supplied water users in each Merrimack community of New Hampshire, type of use, and data source. Table was prepared based on the records of 1995-1999.

Community	User Name	Withdrawal	Discharge	Data Source
Bedford	Manchester Country Club	X		NH DES
Hudson	Green Meadow Golf Club In	X		NH DES
	Brox Industries Inc	X		NH DES
	Coastal Concrete Company	X		NH DES
Litchfield	Wilson Farm of NH	X		NH DES
	Passaconaway Country Club	X		NH DES
	Continental Paving Inc.	X		NH DES
	Pennichuck Water Works	X		NH DES
	Lockheed Martin Corp	X		NH DES
	Derry WWTF		X	NH DES
Londonderry	Pennichuck Water Works	X		NH DES
	Century Village Comm Assn	X		NH DES
	Moose Hill Orchards Inc	X		NH DES
	Londonderry Country Club	X		NH DES
	Continental Paving Inc	X		NH DES
Manchester	Public Service Co. NH	X		NH DES
	Intervale Country Club	X		NH DES
	Nylon Corp of America	X	X	NH DES
	Manchester Water Works	X		NH DES
	Saint Anselm College	X		NH DES
	Costal Material Corporation	X		NH DES
	F&S Transit Mix Co.	X		NH DES
	Manchester WWTF		X	NH DES
Merrimack	Pennichuck Water Works	X		NH DES
	Merrimack Village District	X		NH DES
	Anheuser-Busch Inc	X	X	NH DES
	Jones Chemicals Inc	X	X	NH DES
	Lockheed Sanders	X		NH DES
	Texas Instruments Inc.	X		NH DES
	Merrimack WWTP		X	NH DES
	Nashua Corporation		X	NH DES
Nashua	Nashua Country Club	X		NH DES
	Pennichuck Water Works	X		NH DES
	Brox Industries Inc	X	X	NH DES
	Redimix Concrete Serv Inc	X		NH DES
	Nashua Ntl Fish Hatchery	X	X	NH DES
	Unifirst Corporation Advanced Circuit Tech.	X		NH DES
	Beebe Rubber Company	X		NH DES
	Coca-Cola USA	X		NH DES
	Compaq Computer Corp	X		NH DES
	GL&V Impco-Jones Inc	X		NH DES
	Hampshire Chemical Corp	X	X	NH DES
	Kollsman	X		NH DES
	Lockheed Sanders	X	X	NH DES
	Nashua Corporation	X		NH DES
	Owens-Brockway	X		NH DES
	Sanmina Corporation	X	X	NH DES
	Teradyne Connect Systems	X		NH DES
	Rivier College	X		NH DES
	Saint Joseph Hospital	X		NH DES
	Southern NH Medical Ctr.	X		NH DES
	Sky Meadow Country Club	X		NH DES
	Mine Falls Ltd Partnershp	X		NH DES
	Nashua Hydro Associates	X		NH DES
	Nashua WWTF		X	NHDES

3. Studies on Water Use

3.1 Merrimack River Initiative (MRI)

The MRI was a management and planning effort for the Merrimack River watershed, covering the watershed in Massachusetts and New Hampshire. Key partners in the MWI included US EPA, MA DEP, NH DES, United States Geological Survey (USGS), New England Interstate Water Pollution Control Commission (NEIWPCC), MRWC and Nashua Regional Planning Commission (NRPC). Many other agencies, organizations and businesses participated in the project. The In-stream Flow Subcommittee of MRI, chaired by Ralph Goodno of MRWC, carried out a study[2] with an objective of identifying and verifying all major water use within the Merrimack River watershed as single unit, which was divided into 54 sub units (sub watersheds). The MRI was the only study that had been carried out on a watershed and sub watershed scale to identify and quantify the significant water uses within the Merrimack River Watershed. The progress can be summarized as follows;

- Quantitative and descriptive data about water use were collected
- The results were analyzed and compiled to create a database that includes measured and estimated water uses of all facilities with the usage of more than 20,000 GPD.
- Records were aggregated by type of use, type of source, and season of use for each of all 54 sub watersheds comprising the entire Merrimack River Watershed.

An extensive effort was made in filling the data gap due to the different threshold volumes between the two states. Dun and Bradstreet Information Service was contracted to identify businesses and industries in MA that use more than 20,000 GPD. NH data was collected via questionnaires and site visits.

The study estimated the total average use of the Merrimack River Watershed as 658.86 MGD. The summary on the overall watershed results as follows;

Public Supply	391.9 MGD	Agriculture	2.5 MGD
Aquaculture	15.0 MGD	Thermoelectric	221.7 MGD
Industrial	19.1 MGD	Mining	3.9 MGD

[2] NH DES, MA DEP, USGS, and NEIWPCC, Verification of Water Use in the Merrimack River Watershed, Merrimack River Initiative-Watershed Connections, 1996.

Commercial	1.2 MGD	Snow Making	1.3 MGD
Golf Course	2.3 MGD		

Total ground water use	63.7 MGD
Total surface water use	595.1 MGD

Fall water use	494.2 MGD
Winter water use	655.9 MGD
Spring water use	584.4 MGD
Summer water use	723.1 MGD

Although an extensive effort was made in data collection and analysis, the report only provides the results on a watershed scale. Therefore the results can only be employed to make decisions on watershed scale, which rarely occurs in practice. The lack of documentation on collected and processed data significantly undermines the benefit of the study, as future efforts should duplicate the data collection process. However, the methodology provides an avenue to carry out the data collection efficiently.

Results from the MRI help us understand the overall pattern of the water use of the Merrimack River Watershed. However, it does not provide specific information that can be used to understand the future water demand in parallel to population increase and all other developments.

3.2 Estimated Water Withdrawals and Uses by United States Geological Survey

The USGS National Water-Use Information program was originated to provide reliable data on water use to water-resources managers and water supply planners as they strive to ensure that water supplies are adequate to meet demands. As a part of this program, each state compiles data on significant types of water use every 5 years. The data from the 1995 water-use compilation for New Hampshire[3] was published in 1997 and the data for Massachusetts will be soon published[4].

The water use data was compiled in the NH report[3] by major river basin, including the Merrimack, and by county. This report provides the information on population and population with public supply by major river basin and by county. The report[3] estimates the overall average withdrawal of the Merrimack River Basin of NH portion is 320 MGD. A summary on type of use is as follows;

[3] Medalie, L., Estimated Water Withdrawals and Use in New Hampshire-1995, USGS Water Resources Investigations Report 97-4177, 1997.
[4] Personal communication with Lisa Bratton, USGS, Northborough, Massachusetts.

Domestic use	53 MGD	Commercial	14 MGD
Industrial	4.2 MGD	Thermal electric	230 MGD
Mining	3.2 MGD	Irrigation	2.4 MGD
Live-stock	0.2 MGD		

These reports provide basic information for projecting the future demand of water use by major river basin or by county. However, specific information that can be used to understand the future water demand in parallel to population increase and all other developments is, in general, only available by community. In addition, historical trend in the water use by type varies significantly among communities within a watershed. It is generally based on policies and by laws of the communities.

Performing a water demand projection by major river basin will be very complex as the population changes and the development trends are not uniform over a watershed. Therefore, the present study first focuses on compiling and analyzing the water use data by community and then aggregates them by watershed as we attempt to answer whether the Merrimack River Watershed will meet the demand of its communities by 2020.

4. Studies on Water Demand Projection

4.1 Water Demand Projection in Massachusetts (by MA Department of Environmental Management)

Massachusetts Department of Environmental Management (MA DEM) carried out a study[5] to assess the need for improved management of the Merrimack. The study also focused on identifying key water policy issues facing the region as well as alternative institutional frameworks capable of solving anticipated water problems.

The estimates of current and future water supply have been arrived at through interviews with water suppliers and an analysis of several secondary sources by MA DEM, MA DEP and regional planning commissions. Table 2 provides the water demand projection for seventeen communities adjoining the Merrimack River in Massachusetts. The water demand projection was made based on the population projections taken from 1980 census data. Furthermore, the MA DEM reviewed the projections and the final approval was made by the Massachusetts Water Resources Commission (MA-WRC) in 1994. Information used for those projections were provided by municipal governments based upon their forecast of needs over the next twenty years. The plan was approved by the WRC despite concerns of stakeholders that analysis was insufficient and inadequate attention was paid to water conservation. A comparison of the actual five-year mean water use data and the summary of MD DEM[4] projection is given in Table 2. The comparison reveals that the projections were very reasonable in the communities, which use water mainly for domestic purposes. However, the projections significantly differ from the actual use in the communities with considerable other uses such as commercial, industrial, etc. Predicting industrial water use is a complex phenomenon. Because it involves several factors, such as type of industry, focus of the community, regional development, economy, etc. Therefore, predictions based on population change may not always provide an appropriate information. In stead of population prediction, historical industrial water use, prediction on number of employees, or prediction on industrial area (through build outs) can be used to predict the industrial water demand. However, the success of these approaches depends on the availability of data and its quality.

This study employs IWR-MAIN Water Demand Management Suite[6] to project the future demand for each community in the mainstem Merrimack River

[5] Based on information collected through the personal communication with Mr. Mike Gildesgame, Director, Office of Water Resources, MA DEM.

[6] IWR-MAIN Water Demand Management Suite, Planning and Management Consultants Ltd., PO Box 1316, Carbondale, IL 62903, 1999.

Watershed. This software was designed to provide an easy to use, yet flexible and powerful, suite of tools for forecasting water demand and evaluating water conservation alternatives at the level of complexity desired by user according to the data availability. Based on available data for a community, a simple or a complex and very realistic model can be developed by employing this software.

Table 2. Summary on MA DEM water demand projections and a comparison with five year mean (1995-1999) water use of the Merrimack Watershed communities (based on MA DEM).

Community	WMA REG	Base	2000	2005	2010	2015	WD Mean*	Total Mean**
Amesbury	1.23	1.49	1.61	1.65	1.69	1.73	1.64	1.64
Andover	4.56	4.82	6.41	6.97	7.55	8.15	5.11	5.11
Ayer	1.48	1.47	2.47	2.48	2.87	3.06		
N.Chelmsford	0.94	0.79	0.86	0.9	0.93	0.96	0.75	0.77
Groton WD	0.22	0.33	0.48	0.5	0.53	0.55		
Groveland	0.41	0.38	0.38	0.4	0.42	0.43	0.43	0.43
Haverhill	6.06	6.2	7.16	7.43	7.7	8.1	6.37	9.01
Lawrence	9.46	7.77	8.55	8.63	8.71	8.74	7.02	9.06
Littleton	0.84	0.98	1.27	1.35	1.44	1.51		
Lowell	13.84	15.53	17.78	18.25	18.72	19	14.88	15.24
Merrimac	0.36	0.6	0.64	0.66	0.68	9	0.45	0.45
Methuen	4.59	4.24	4.41	4.54	4.67	0.7	4.80	4.85
Newburyport	2.2	2.18	2.38	2.43	2.48	4.8	2.21	2.21
North Andover	2.66	2.85	3.54	3.97	4.4	2.5	3.16	3.45
Tewksbury	1.74	2.44	2.86	2.98	3.1	4.79	2.50	2.72
West Newbury		0.17	0.19	0.19	0.2	3.19	0.10	0.10
Westford	1.18	1.36	1.93	2.22	2.4	0.2	1.49	1.55
Total	**51.77**	**53.6**	**62.92**	**65.55**	**68.49**	**2.45**	**51.31**	**56.98**

* WD Mean – Average water withdrawal by community water department
** Total Mean – Total average water withdrawal all permitted water users in the community
Note: The above table excludes the WD Mean and Total Mean data for Ayer, Groton, and Littleton as the MRWC's focus for this study is limited to communities located in the mainstem Merrimack Watershed.

In addition to the MA DEM's study, a few communities (Amesbury, Andover, Groveland, and Haverhill) have conducted and are conducting studies on future demands and the sources to meet these demands.

4.2 Water Demand Projections in New Hampshire

In NH, water users carried out their own projections for the areas supplied by them. Pennichuck Water Works Inc. (PWW), and Manchester Water Works (MWW) supply water to all communities, except the town of Merrimack, in the lower Merrimack River Watershed of NH. Merrimack Village District (MVD) supplies water to the major portion of the town of Merrimack. The water demand projections were made based on either historical water use or

population demand forecast. PWW[7] believes that the population demand forecast is the most likely scenario for future demand expectations. MWW projection[8] also was made based on the population forecast by Southern New Hampshire Regional Planning Commission. MVD recently updated their master plan with a detailed analysis[9] on historical water use and future water demands. The future demand projections were made separately for residential and industrial/commercial sectors. For a community with a significant use other than residential, the approach by Comprehensive Environmental Inc. (CEI)[8] provides a reasonable forecast. However the success of these realistic approaches depend upon data availability. For example, CEI[8] used the acreage of the industrial sector as the model variable for the projection. Similarly, number of employees or number of connections can also be used as model variables for the demand projection of industrial water use. MRWC works with water users and planning agencies to collect as much information as possible to make realistic water demand projections for each community in the mainstem Merrimack River Watershed from Manchester NH to Newburyport MA.

Acknowledgements

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[7] Pennichuck Water Works, Inc., Integrated Water Resources Plan, 1998.
[8] Personal Communication with Robert Beaurivage, P.E., Assistant Director, Manchester Water Works.
[9] Comprehensive Environmental Inc., Merrimack Village District Master Plan Update, 2001.

Appendix A

Technical Advisory Committee (TAC)

Members	Organization
Moni Sharma	Southern New Hampshire Planning Commission
Andrew Singelakis Mark Archambault	Nashua Regional Planning Commission
Alan Macintosh	Merrimack Valley Planning Commission
Larissa Brown	Northern Middlesex Council of Governments
Ted Van Nahl Tom Rogers	Town of Amesbury
John Pollano Jack Petkus	Town of Andover
William J. Pauk Robert E. Ward	City of Haverhill
Linda Soucey	Town of Merrimac
Glenn F. Smith	Town of Groveland
Mark R. Riopelle	City of Methuen
Lewis Zediana	Town of Tewksbury
David Denommee	Town of Tyngsborough
Bob Lazco Frank McAnn	City of Lawrence
Ned Tarmey	Lowell Water Utility
Brian Goetz	Town of Salisbury
Robin Fullford	Town of Westford
Dennis Bedrosian	Town of N. Andover
Bob Doak	Town of Chelmsford
Bob Beaurivage	Manchester Water Works
Chris Countie Stephen Densberger	Pennichuck Water Works
Brian Wilson	Merrimack Village District
Jim McLaughlin	Public Service of New Hampshire
Donald B. Walters	Constellation Power
Kevin Webb Patrick Nutter	Chi Energy
Bob Vang	AES Londonderry
Gary Mercer	Camp Dresser and McKee
Ted Barten Jessie Cadigan	Epsilon Associates
Eileen Pannetier Cynthia Rainville	Comprehensive Environmental Incorporated
Marilee A. Horn	United States Geological Survey , New Hampshire
Lisa Bratton	United States Geological Survey , Massachusetts
Barbara Blumeris	Army Corps of Engineers
Bill Easte Libby Robinson	Massachusetts Fish and Wildlife

Ralph Abele	United States Environmental Protection Agency
Donald Morris Joseph Okeefe Bill Stansfield	United States Air Force Environmental Flight, Hanscom Base
Bill Dunn	Massachusetts Executive Office of Environmental Affairs
Wayne Ives Paul Currier	New Hampshire Department of Environmental Services
Mike Gildesgame	Massachusetts Department of Environmental Management
Mark A. Casella Kelli O'Keefe	Massachusetts Department of Environmental Protection
Carl Paulsen	New Hampshire River Council
Scott Decker Stephen G. Perry	New Hampshire Fish & Game
John J. Shaughnessy	New Hampshire Office of Emergency Management