PEMIGEWASSET RIVER CORRIDOR MANAGEMENT PLAN

Pemigewasset River Local Advisory Committee

2013

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The Pemigewasset River Corridor Management Plan

Developed by the Pemigewasset River Local Advisory Committee
With assistance from
the Lakes Region Planning Commission and North Country Council

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List of Acronyms:

303(d) list – federal list of "impaired" waterbodies
AADT – Average Annual Daily Traffic
BMP – Best Management Practices
CSPA – Comprehensive Shoreland Protection Act
DO – Dissolved Oxygen
DRED – Department of Resources and Economic Development
EPA – Environmental Protection Agency
FEH – Fluvial Erosion Hazards
FEMA – Federal Emergency Management Agency
FERC – Federal Energy Regulatory Agency
GPD – Gallons per day
ILU – Innovative Land Use planning techniques
LID – Low Impact Development
LRPC – Lakes Region Planning Commission
NCC – North Country Council
NFIP – National Flood Insurance Program
NH DES – New Hampshire Department of Environmental Services
NH DOT – New Hampshire Department of Transportation
NH F&G – New Hampshire Fish & Game
NHNHB – New Hampshire Natural Heritage Bureau
NPDES – National Pollutant Discharge Elimination System
PSU – Plymouth State University
PRLAC – Pemigewasset River Local Advisory Committee
PSNH – Public Service of New Hampshire
RMPP – Rivers Management and Protection Program
SWQPA – Shoreland Water Quality Protection Act
USACE – United States Army Corps of Engineers
VRAP – Volunteer River Assessment Program
WAP – Wildlife Action Plan

Cover images by B. Draper.

I. Executive Summary

This Plan is the first update to the original Pemigewasset River Management Plan prepared by the Pemigewasset River Local Advisory Committee (PRLAC) in 2001. The entire river was designated for additional protection in 1991 under the New Hampshire Rivers Management and Protection Program (RMPP), with the exception of the section through Lincoln and Woodstock. The RMPP covers the towns of Franconia, Thornton, Campton, Plymouth, Holderness, Ashland, Bridgewater, New Hampton, Bristol, Hill, Sanbornton, and Franklin. The stretch from Hill to Franklin, while designated under RMPP, is managed by the U.S. Army Corps of Engineers as part of the Franklin Falls Dam flood control system. RMPP designation requires that a citizens committee made up of local representatives nominated by the Selectmen or City Council, appointed by the NH DES Commissioner, and representing diverse interests draft a plan that protects the river characteristics most valued by corridor communities and periodically update that plan.

At the beginning of 2011, it became clear that the original Management Plan did not address the many changes to the river corridor that had occurred over the decade. Corridor towns had made changes to local zoning regulations which affected the river. A major change occurred in July of 2008 when the Pemigewasset (Pemi) River was included in a major legislative overhaul of the Comprehensive Shoreland Protection Act RSA 483-B (CSPA). This provided the river with a substantial improvement in water quality protection through CSPA's significantly enhanced regulations for shoreland management. Invasive variable milfoil was discovered in the middle of the decade and has spread through several slow moving reaches of the river, particularly the impoundment areas above Ayers Island Dam. Land use conditions within the river corridor have changed. Each corridor community has experienced population growth and an increase in both residential and commercial land uses – most notably in the area north of Plymouth. Growth is expected to continue. Through the efforts of the volunteer water quality assessment team, eleven years of water quality data over a major section of the river and its key tributaries have been recorded. Our understanding of the existing water quality conditions in the river has improved greatly since the last plan.

Plan development started at the beginning of 2011 with a request for a watershed planning grant organized with the assistance of the Lakes Region Planning Commission (LRPC). PRLAC receives ongoing administrative and technical support from LRPC. A key initial step was development of a comprehensive PRLAC survey providing local input on what river characteristics were most valued, how the river was being used, and how respondents viewed a variety of threats to river water quality. The majority of survey respondents expressed support for serious regulatory water quality protection from threats associated with a variety of sources – pesticides, herbicides, stormwater runoff, and faulty septic systems. The majority of survey respondents also expressed concern about climate change with its frequent, more intense storms contributing to major flood damage throughout New Hampshire over the last decade. Thirty-four percent of respondents reported using the river twelve times or more per year, another thirty-six percent are on or in the river three to twelve times per year. The survey input is an important component of the Plan.

Given that stormwater runoff was identified by a 2008 NH DES report as the major contributor to degradation of water quality throughout the state PRLAC's focus is on what can be done to address surface water quality throughout the watershed and encourage infiltration into the ground. A set of less protective shoreland protection rules were developed by the legislature in 2011. Accommodating increased population growth has to be a key consideration in addressing water quality issues. In

addition, the US Forest Service conducted a major study of watersheds across the country and listed fifteen watersheds that could experience the most change in water quality as a result of increases in housing density on private forest land. The Merrimack watershed, which includes the Pemi, is listed as fourth on that list.

Water quality in the Pemi generally meets Class B Standards. Class B waters are considered acceptable for fishing, swimming, and other recreational purposes, and for use as water supplies after adequate treatment has been applied. As with all surface water in the state, it does not meet the standard for mercury. Several sections of the Pemi are listed as impaired either for high acidity or for low dissolved oxygen.

Under state law, the purpose of the LAC is to advise the communities within the watershed and NH DES on matters pertaining to management of the river, comment on governmental plans within the corridor, develop a corridor management plan which communities may adopt as an adjunct to their master plan, and report to NH DES and communities on the status of compliance to laws and regulations. There are five major sections in this Plan starting with resources associated with the river, followed by a review of pertinent laws and regulations, moving to results of the survey. The final section of the text includes a summation of concerns regarding the river and a series of recommendations intended to guide PRLAC and communities towards addressing the various concerns, leading to continued stewardship over the next decade. There are a number of appendices to this plan with supplemental information and an implementation matrix.

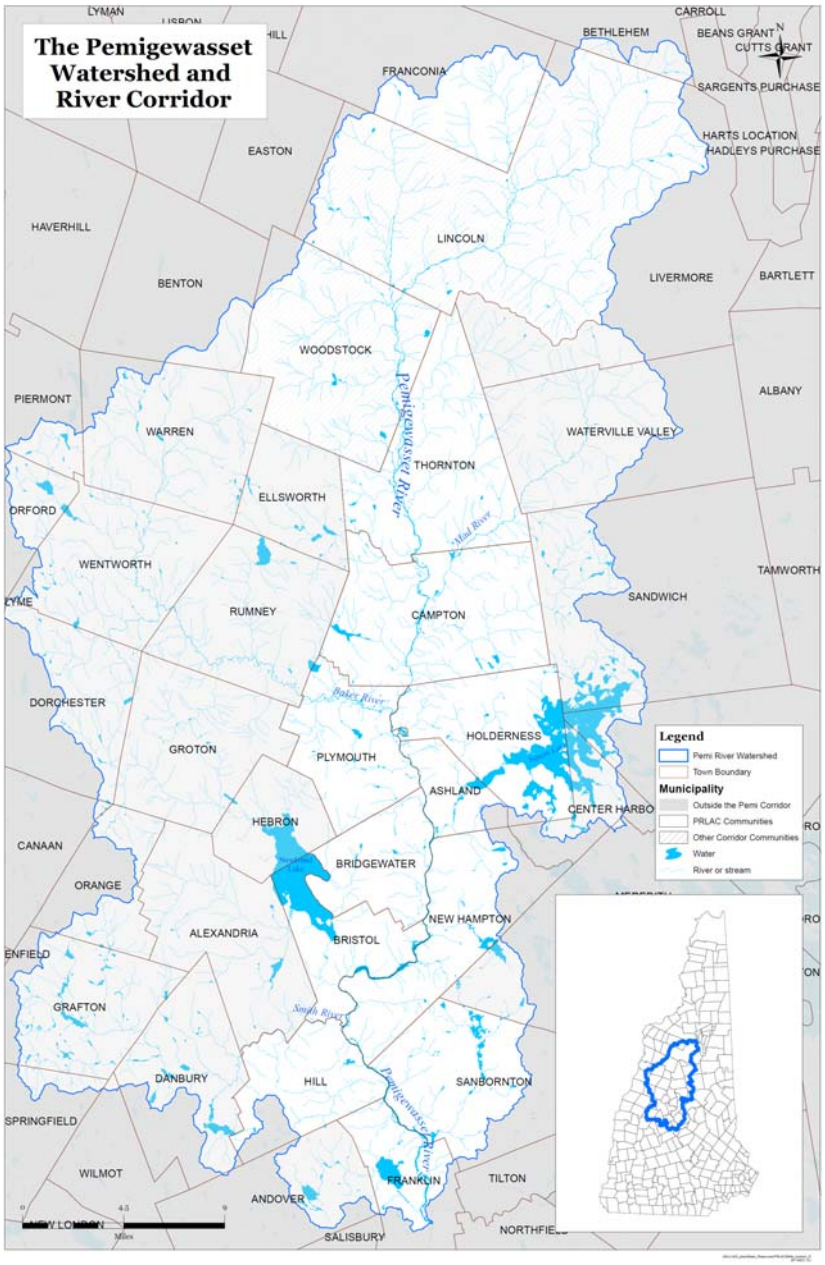
The concerns expressed included several aspects of water quality, flooding and erosion, access and trash, and stewardship. Many of the recommendations related to water quality and flooding and erosion boil down to enhanced stormwater management throughout the watershed – slowing down runoff, giving it the opportunity to be absorbed into the ground. Many of the other recommendations stress the need to enhance communication between boards, commissions, communities, residents, visitors, and various state agencies.

While this plan is the result of many hours of research, study, and discussion, we recognize that no plan is perfect or unchanging. The committee also recognizes the need to make the unique value of this regional resource more apparent to the corridor community. Planning for river protection is a dynamic process, much like the preparation of a town master plan, and we therefore anticipate periodic updating to address changes along the river and in public attitudes toward this resource.

We appreciate the ongoing support of the Pemi River communities.

PRLAC representatives: Fred Gunter, Thornton; Jane Kellogg, Campton; John Kelly, Plymouth; Carl Lehner, Mike O'Donnell, Marty Riehs, Holderness; Paul Branscombe, Dan Stack, Ashland; Barry Draper, New Hampton; Dan Paradis, Max Stamp, Bristol.

II. Introduction



The Pemigewasset watershed drains approximately 1,000 square miles as the river flows through three counties: Grafton, Belknap, and Merrimack. The Pemi River's headwaters are in Profile Lake in Franconia Notch State Park, and the East Branch originates in the Pemi Wilderness area. Leaving the Notch, the river widens as it moves south along its approximately 70-mile route to its confluence in Franklin with the Winnipesaukee River, thereby forming the Merrimack River. Major tributaries to the Pemi include the East Branch of the Pemi, the Mad, Beebe, Newfound, Smith, Squam, and Baker Rivers, plus several brooks.

The Pemigewasset River Local Advisory Committee (PRLAC) was established under the New Hampshire Rivers Management and Protection Program (RMPP) in 1992; this program was enacted in 1988 by the New Hampshire Legislature as RSA 483. The Act is designed to help communities accommodate a wide range of uses for the river without adversely affecting the very qualities that make rivers such rich resources. The Act divides responsibility into two jurisdictions:

- the state protects instream resources
- community representatives develop river corridor management plans to further protect shorelines and adjacent lands.

The Pemigewasset (Pemi) River and its corridor comprise the river and the land surrounding the river. The width of the corridor is considered to accord with the New Hampshire Department of Environmental Services (NH DES) standard, 1,320 feet from the normal high water mark of the

river, or to the landward extent of the 100-year floodplain, whichever distance is larger. The entire river except a ten-mile segment through Lincoln and Woodstock is protected under the New Hampshire Rivers Management and Protection Program (RMPP) as of June 1991. When the term 'corridor' is used in this document, it refers to this definition.

PRLAC is made up of volunteers representing diverse interests from the communities within the designated section of the river. These are the communities of Franconia, Thornton, Campton, Holderness, Plymouth, Bridgewater, Ashland, New Hampton, Bristol, Hill, Sanbornton and Franklin. Each member of the committee is nominated by his or her municipal officials and is appointed to a three-year term by the Commissioner of the NH DES.

Our task in updating this plan was to document the current state of the river corridor and propose guidelines for stewardship over the next decade, while also acknowledging the fact that the river and its corridor are ever-changing. Our objective is to balance sensible environmental and economic goals while respecting the rights and desires of riparian property owners of the region as a whole. This plan provides town officials with a common thread that they can use in preparing their master plans, or can adopt as an adjunct to their master plan (RSA 483:8a).

III. Resources

A. Geology

The bedrock geology history of the Pemigewasset River Valley is long and complex. This area of northeastern North America was joined and separated from the early European continental masses several times as the Atlantic Ocean opened, closed, and reopened.

Mountain building periods (orogenies) occurred when the continents were thrust together, and sediments were deposited as the mountains eroded away when the continents drifted apart. These sediments were later metamorphosed through the heat and pressure of deep burial and subsequent orogenies into the metamorphic rocks such as schist and gneiss common in the area. In addition, volcanic activity occurred at times to create the granitic and volcanic rocks found in the White Mountains.

An unusual feature of the area is a unique metamorphosed section of rock through Livermore Falls which was first discovered in 1879. This rock, Camptonite, named after the town of Campton in which it was found, is a dark intrusive rock with unusual chemical composition. Geologists have discovered this rock type in other regions, and it is known as Camptonite throughout the world.

Once mountain building ceased, millions of years of subsequent erosion shaped the mountains and valleys that we see today. Periods of glaciation over the last two million years made the final geological modifications to the area by eroding the bedrock, moving some sediments and depositing others. The ice sheets eroded the bedrock, smoothing its surface and creating the gouges and scrapes often seen. Much of the soil and loose rock here before the ice ages was scraped off by the ice sheets and deposited in southern New England. Some of the deposits created a dam that formed Glacial Lake Merrimack as the ice sheets melted.

The southern Pemigewasset River Valley was once part of that Lake Merrimack, which extended north from Manchester to Plymouth. Many of the river valley sediments south of Plymouth were thus deposited in a lake environment, where the ice sheets left behind sand deposits in the form of dunes, deltas, and terraces, sometimes 100 feet deep in the valley. North of Plymouth, where the ice sheets deposited sediments on land, there were left behind large outcroppings, basins, erratics (glacial boulders), and deposits of undifferentiated glacial till throughout the northern Pemigewasset River Valley.

Sand and gravel deposits form a stratified-drift aquifer, a layered deposit of sand, gravel, and silt adjacent to the river through most of its length. Bedrock often lies about 100 feet below the surface, although in some areas it may be as much as several hundred feet below. Wells in these aquifers provide municipal water for many communities along the river's length. These and adjoining aquifers also provide domestic water for numerous household wells. The flow in the aquifers also serves to recharge the river.

B. Water Resources

Water quality "standards" are goals and criteria for measuring the health of the state's surface waters. Standards consist of three parts: designated uses, numerical or narrative criteria to protect the designated uses, and an anti-degradation policy which aims to maintain existing high quality

water. There are six designated uses for freshwaters: aquatic life, fish consumption, drinking water supply after adequate treatment, swimming, boating, and wildlife.

1. Water Quality

The entire length of the Pemigewasset River covered in this plan is classified as Class B water quality by the NH DES. Class B waters have high aesthetic value and are acceptable for swimming and other recreational activities, fish habitat, and for use as a water supply after treatment.

The NH DES is charged with developing and enforcing water quality standards and monitoring New Hampshire rivers for compliance with the Clean Water Act. For the past decade, NH DES has provided support for the Volunteer River Assessment Program (VRAP), which provides education, equipment loans, and technical assistance for hundreds of volunteers endeavoring to supplement the state ambient sampling program. Testing was identified as a high priority objective in the 2001 Pemi River Corridor Management Plan. PRLAC started its water testing program on the Pemi in the summer of 2002 with loaned equipment from VRAP. At that time, river water quality testing by the state was sporadic. PRLAC acquired its own test equipment through grants from local banks in 2004. The eleven years of accumulated Pemi water quality data provides sufficient base to detect whether key elements of our water quality are showing signs of deterioration.

PRLAC volunteers begin testing in April and continue on a bi-weekly schedule through early September. Tests are conducted at nine sites (Appendix B) and provide the following elements considered key indicators of river health:

A. Dissolved Oxygen (mg/L) - Dissolved oxygen (DO) is vital to bottom dwelling organisms, fish, and amphibians.
B. Specific Conductance (µS/cm) - High specific conductance indicates pollution from road salt, septic systems, waste water treatment plants, and urban or agricultural runoff.
C. Turbidity (NTU) - High turbidity increases water temperature because suspended particles absorb more heat.
D. pH is a measure of acidity, which affects chemical/biological processes in water important to survival and reproduction of fish and other aquatic life.
E. Temperature (°C) - Increased temperature reduces DO and determines which fish and macro-invertebrate species can survive in a given river or stream.

VRAP volunteers at work.

Tests for *E. coli* and Phosporus are conducted at three separate sites three times per season.

F. *E.coli* (Cts/1,000 mL) – This bacteria is an indicator of fecal pollution and other pathogens.
G. Total Phosphorous (mg/L) - This nutrient is an indicator of pollution; it causes algae blooms, which consume oxygen, reducing DO.

Appendix C lists the standards for each of these indicators. There are some sections of the Pemi that do not meet Class B standards because of low pH and low dissolved oxygen. Low pH readings are found throughout much of New Hampshire and are generally linked to acidic precipitation. Low

DO values tend to be found in slower moving water where less aeration occurs. Regular collection of water quality data allows for early detection of water quality changes, allowing NH DES to trace potential problems to their source. The most likely source of mercury is emissions from coal-fired power plants.

NH DES reports to the US Environmental Protection Agency every two years on impairments to water quality for the state's surface waters as part of the requirements of the Clean Water Act; PRLAC's testing data is used in this assessment. This report, known as the 303(d) list, identifies impairments based on a variety of parameters relating to pollutants, nutrients, oxygen content, and other factors. The draft 2012 303(d) list identifies sections of the Pemigewasset River as being impaired for dissolved oxygen, pH, and aluminum (see Appendix D). Additionally, fish consumption in New Hampshire's surface waters is discouraged because of high mercury content. Using this and other data, NH DES has developed a "Watershed Report Card" for each HUC12 watershed (approximately 34 square miles). There are 17 of these small watersheds that intersect the Pemigewasset River corridor; these report cards can be reviewed at http://des.nh.gov/organization/divisions/water/wmb/swqa/report_cards.htm.

Water quality can be adversely affected by a) stormwater runoff, b) siltation resulting from flood events, and c) scouring of the banks due to water level fluctuations resulting in slumping and siltation. Other factors that can influence water quality include pollutant loading (point source and non-point source), the presence or absence of naturally vegetated riparian buffers, water quantity, invasive plant and animal species, and litter.

Stormwater runoff is one of the most significant threats to surface water quality in New Hampshire, accounting for or contributing to approximately 80% of listed impairments.[1] Sediments and pollutants are carried into streams and rivers following rainfall events, particularly in developed areas where impervious surfaces (concrete, pavement, roofs, lawns) prevent the infiltration of stormwater into the ground. Vegetated areas along river banks, called riparian buffers, help to slow and filter runoff as it drains into the river.

It is estimated that a minimum of 250,000 gallons of water per year (equivalent to nine inches of rain water) is lost per acre of impervious surface if the runoff is channeled to a river or stream. The increase in impervious surfaces related to development is a concern. New Hampshire's basic water supply, in the form of annual precipitation, is not expected to grow appreciably in years to come - certainly not at the rate of the state's population increase.

Other possible causes of non-point source pollution include septic systems, road salt and sand application, agriculture, and timber harvesting. While best management practices (BMPs) are either recommended or required by the state or municipality when new projects are undertaken, existing sites may not be following such BMPs and inspections may be sporadic.

Taken as a whole, the water quality of the Pemigewasset River has remained good throughout the past decade. VRAP monitoring efforts demonstrate that, despite these impairments, the river generally meets its required water quality standards under the RMPP. Continued monitoring, maintenance of facilities, and landowner education are critical to maintaining and enhancing quality.

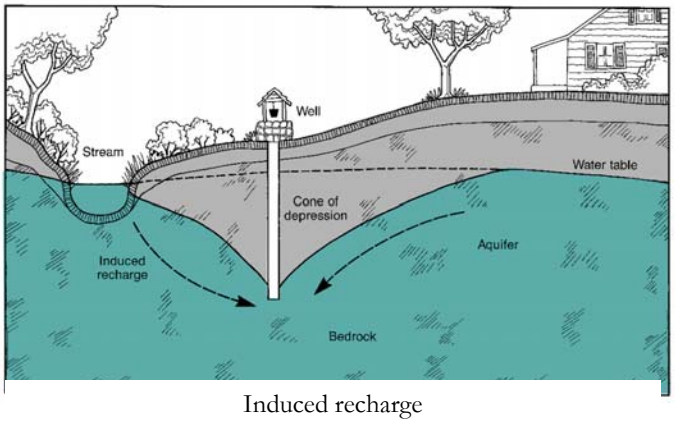
[1] NHDES, 305(b) Surface Water Quality Report, 2008
http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-08-5.pdf.

2. Drinking Water

Statewide, two-thirds of New Hampshire's population is served by public water systems and NH DES records indicate that a similar proportion of the population in the Pemi corridor communities (roughly 27,000 out of 39,000 people) receive their water from community water systems. Public water supplies are required to test for and treat many contaminants, including radon and arsenic. The costs of this type of treatment as well as those of infrastructure improvements are borne by the users and sometimes the community as a whole. Private wells have no regulations and the responsibility for testing and addressing quality falls to the well owner.

New Hampshire is a nationally recognized leader in protecting the groundwater and surface water that are the sources of drinking water. Still, landscape change has the potential to degrade our sources of drinking water by contributing contaminants and changing hydrology.[2]

Many public supply wells are located in buried valley aquifers that are associated with a nearby stream or river. Most of those wells draw surface water from the stream in a process called induced recharge. Induced recharge occurs when the cone of depression reaches as far as the stream, thereby lowering the water table beneath it. If there are no impermeable barriers such as clay or thick deposits of organic muck in the streambed, the pump will pull water from the stream down through the aquifer and into the well. Under these conditions, polluted surface water can enter the well and degrade the quality of the water supply.[3]



Induced recharge
Image from: http://wren.palwv.org/download/ill7.pdf

The aquifers associated with the Pemigewasset River follow the path of the river and in some areas extend beyond the corridor. Records from NH DES indicate that these aquifers supply 43 registered water users (those exceeding 600,000 gallons/month) and at least 281 individual wells.

There is increased awareness and concern around the state regarding the levels of chlorides (such as salt) and personal care products found in New Hampshire's drinking water supplies. After noting dramatic increases in salt levels in water bodies, NH DES established the New Hampshire Road Salt Initiative.[4] While less is known about the impact of personal care products on water quality, the ability to detect these substances is improving and several studies are exploring these substances and their distribution in the environment.[5]

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[2] From the NH Water Resources Primer, 2008 http://des.nh.gov/organization/divisions/water/dwgb/wrpp/primer.htm.
[3] Adapted from http://www.oars3rivers.org/sites/default/files/groundwatertour.pdf
[4] NH DES webpage, http://www.des.state.nh.us/organization/divisions/water/wmb/was/salt-reduction-initiative/index.htm
[5] NH DES Fact Sheet, http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-22-28.pdf

3. Impoundments

There are three major dams along the Pemigewasset: Ayers Island (Bristol/New Hampton), Franklin Falls, and Eastman Falls (the last two both in Franklin); all are classified as High Hazard Class where "failure or misoperation would likely result in loss of human life".[6] The Ayers Island and Eastman Falls dams are used for generation of electricity. The Franklin Falls Dam is a flood control dam built and operated by the U.S Army Corps of Engineers. The dam's significance extends well beyond this section of the river corridor as it is part of a coordinated system of reservoirs designed to protect communities along the Pemigewasset and Merrimack Rivers as far downstream as Lowell, Lawrence, and Haverhill, Massachusetts.

Ayers Island Dam
Image: B. Draper

The 1,740-foot long, 140-foot high Franklin Falls dam impounds a permanent pool of 440 acres. The spillway level, which sets the maximum upstream water level, is 82 feet above the normal pool level. This allows a maximum storage of about 50 billion gallons in the flood storage area behind the dam. Although this dam is quite large, it has limited storage capacity considering the large size of the watershed. This fact impacts the operation of the dam, which is operated to reduce downstream maximum peak flows and alter the timing of when peak flows impact downstream properties and populations. Since its construction in 1943, the dam has prevented over $165 million in damages.[7]

Although the ultimate responsibility for management of the project's natural resources rests with the Corps of Engineers, the New Hampshire Department of Resources and Economic Development (DRED) is licensed by the Department of the Army to utilize and manage the fish, wildlife, forest and other natural resources in the flood storage area. Their current 25-year license expires in June 2014. The hydroelectric power generation dams at Ayers Island and Eastman Falls are owned by Public Service of New Hampshire (PSNH) and licensed by the Federal Energy Regulatory Commission (FERC). The Eastman Falls Dam license was issued in 1987 and expires in 2017 and the Ayers Island Dam license was issued in 1996 and expires in 2036. In 2011 PSNH invested several million dollars to reinforce Ayers Island dam against earthquakes.

4. Flow Characteristics

The section of the Pemigewasset River covered by this plan is free-flowing until it reaches the impoundment area behind the Ayers Island Dam. The natural flow of the river from the Ayers Island impound area to its confluence with the Winnipesaukee River is greatly affected by the operation of the dams. As part of its Federal Energy Regulatory Commission (FERC) license agreement, the Ayers Island Dam is required to maintain minimum flows to accommodate the needs of salmon migration and the requirements for whitewater boating. All of the short section between the Franklin Falls Dam and the Eastman Falls Dam is an impoundment area. The last section of the river, downstream from the Eastman Falls Dam, is dam-controlled quickwater down to where the Pemi joins the Winnipesaukee River, becoming the Merrimack River.

[6] NH DES Dam Bureau, http://des.nh.gov/organization/commissioner/pip/factsheets/db/documents/db-15.pdf
[7] US Army Corps of Engineers http://www.nae.usace.army.mil/recreati/ffd/ffdhome.htm.

There are numerous tributaries which contribute to the Pemigewasset and impact its flow characteristics; some of them are the Mad, East Branch of the Pemi, Baker, Beebe, Squam, Newfound, and Smith Rivers.

Flow volume or "discharge" is measured by the U.S Geological Survey (USGS) at Plymouth and by the U.S. Army Corps of Engineers (USACE) at Franklin Falls Dam. Data from Plymouth's gauge is particularly useful, as continuous records exist from October 1903 to the present. Typically the lowest monthly flows occur in August and the highest discharges in April. Table 1 shows that the last ten years have had a slightly higher Mean Daily Discharge than the historical average.

Table 1: Plymouth Stream Gauge Data

Mean Daily Discharge (cubic feet per second - cfs)

	1904 - 2000	2001 - 2011
Monthly Low	512	543
Monthly High	3,944	3,940
Annual Mean Daily Discharge	1,369	1,518

In 2011 instantaneous flows ranged from 154 – 30,000 cfs. The threshold for flood stage at Plymouth corresponds to a mean daily discharge of 20,800 cfs.

The United States Geological Survey (USGS) monitors stream flow at stream gauge locations along the Pemi in Woodstock and Plymouth. There are also gauges on the East Branch of the Pemi (Lincoln), Baker (Rumney), and Smith (Bristol) Rivers.[8]

Flooding at Plymouth occurs with some regularity.[9] The Federal Emergency Management Agency (FEMA) describes the Pemigewasset River Corridor as "one of the most flood prone areas in the state." Flooding events have been associated not only with spring runoff and ice jams, but have also occurred at other times. Flooding is a serious problem, causing erosion and damage to bridges, culvert dikes and railroad beds, as well as to structures located in the floodplain. The September 2011 floods associated with Tropical Storm Irene resulted in substantial erosion and damage to property along the river.[10] State and municipal entities are undertaking substantial repair work on the Blair Covered Bridge in Campton to reduce erosion to the bridge abutment foundations.

Floodplains provide a storage area for water when it exceeds the river's banks, allowing the river to gradually return to its normal levels. All of the eleven PRLAC communities have adopted floodplain ordinances that meet Federal Emergency Management Association (FEMA) guidelines. Having a floodplain ordinance in force provides the opportunity for property owners throughout the community to purchase flood insurance. Local ordinances can place even more stringent requirements on development to protect property owners, residents, emergency personnel,

[8] USGS National Water Information System, http://waterdata.usgs.gov/nh/nwis/current/?type=flow for data and location maps.
[9] Image source, http://www.plymouth.edu/center-for-the-environment/files/2011/09/Exit-25-Betsy-Ayotte.jpg.
[10] Video of flooding in Holderness can be viewed at http://www.youtube.com/watch?v=Wl_qIqmhq2c.

taxpayers, and the floodplain.

Stream channel integrity fluctuates naturally in rivers, depending on soil types, topography, and stream flow characteristics. Stable stream channels help to minimize sedimentation caused by erosion as well as reducing impacts to riparian land uses. Peak flows and flood events represent the most significant threats to channel integrity. River banks can be quickly eroded or even breached during these events causing a change in the river's course. While erosion and sedimentation are part of the natural life cycle of any river, the best methods for riparian landowners to prevent erosion and promote stream channel integrity are to maintain vegetated riparian buffers, practice proper erosion control methods during alteration of terrain, and protect floodplains to manage water flow and storage during storm events. In 2009 the course of the river was altered in the vicinity of I-93 Exit 31 in Thornton to restore a more natural habitat and flow characteristics.

NH Route 175 in Holderness, September 2011
Image: B. Ayotte

DES has begun to conduct fluvial erosion hazard studies along the state's rivers to identify areas prone to erosion or channel relocation during storm events. The purpose of these studies is to provide local municipal planners with information on erosion-prone areas so that fluvial erosion hazard overlay districts could be locally established where appropriate. In such districts, underlying zoning would not change; however, limits on structures, land use activities, or even vegetative conditions could be employed through locally adopted ordinances to mitigate erosion hazards.[11]

5. Withdrawals and Discharges

Withdrawals - The water user registration and reporting program authorized by RSA 482:3 went into effect in 1987. All facilities which use more than 20,000 gallons per day (gpd), averaged over a 7-day period, or 600,000 gallons in any 30-day period, must register with NH DES. Once registered, the user must measure the amount of water used monthly and report these figures to the Water Division quarterly. The information collected under this program is a fundamental element in the overall assessment of water availability. Potential future problems relating to well interference, declining water tables, and/or diminished stream flows can be identified at an early stage and corrective action taken. Currently there are 111 Registered Water Users in the Pemigewasset River watershed ranging from municipal water suppliers and industries to golf courses and ski areas. Seventeen of these registered water users are within the PRLAC corridor and are listed in Appendix F. It should be noted that these water users include the hydroelectric dams where water travels through the dam and is then released below.

Discharges - The National Pollutant Discharge Elimination System (NPDES) requires that all dischargers have an NPDES permit. Permitted dischargers on our section of the Pemi (and its

[11] Fluvial Erosion Hazards Program at NH DES http://des.nh.gov/organization/commissioner/gsu/fegh/index.htm.

tributaries) include five wastewater treatment plants: Lincoln, Woodstock, Plymouth, Ashland, and Bristol. Changes since 2001 include an upgrade to the Bristol wastewater system and Plymouth's stormwater is now separated from its wastewater.

The complexity of interactions among water quality, quantity, and stream channel integrity must be taken into consideration when tackling resource protection for the Pemigewasset River. Because the river system supports such a wide variety of uses and natural services, a systematic, watershed-level approach is recommended to address issues affecting the river's elemental water resources.

6. Instream Flow Program

"The purpose of the Instream Flow Program is to ensure that rivers continue to flow in spite of the uses and stresses that people put on them. Under natural conditions, rivers flow freely with source waters coming from precipitation via lakes, ponds, wetlands, small streams and groundwater. River levels vary greatly through the seasons, and native plants and animals have adapted to low summer flows, as well as to the typical spring floods. But the rivers remain hydrologically connected to water storage areas, such as wetlands, so that some flow is maintained even during the hot summer months.

Under human influences, however, river dynamics can change drastically. People frequently withdraw large amounts of water for drinking and irrigation directly from rivers, as well as from the sources that supply the rivers, particularly lakes and groundwater. Many rivers have dams that restrict the amount and timing of water flowing downstream. In addition, the loss of wetlands to land development reduces the amount of water that would normally augment rivers during dry periods."[12]

The Pemi has been designated for protection under the Rivers Management and Protection Act RSA 483 since 1991. As such, flow "shall be established and enforced to maintain water for instream public uses and to protect the resources for which the river is designated" (RSA 483:9-c). The Department of Environmental Services was assigned responsibility for developing standards, criteria, and procedures to protect flows necessary to maintain the river's designated uses.

There are three broad areas of flow dependent instream use: human use, fish and aquatic life, and riparian wildlife and vegetation. These are used to set recommended protected flows. The three broad flow dependent uses include these specific uses: (human uses) hydropower, pollution abatement/ wastewater dilution, recreation such as boating, fishing, swimming, (fish and aquatic life) the maintenance and enhancement of aquatic fish and life, fish and wildlife habitat, rare threatened and endangered fish, and (riparian wildlife and vegetation) wildlife, vegetation, and natural/ ecological communities.

There are many variables to be considered when establishing protected instream flow. The rules must recognize the natural variability shown in the stream's hydrograph. These natural changes are then expressed in terms of frequency, duration, timing, rate-of-change, and magnitude. Timing, for example, would be biologically significant periods for fish spawning and their critical need to reach spawning areas. Duration and magnitude could come into play when dealing with wastewater dilution during low flow periods.

[12] NHDES Fact Sheet WD-R&L-28 (2012)
http://des.nh.gov/organization/commissioner/pip/factsheets/rl/documents/rl-28.pdf.

Description of current instream flow protection on the Pemi:

- RSA 488 applies to any person/entity
- A person/entity must register if the cumulative incoming/outgoing water exceeds an average of 20,000 GPD in any 7-day period or exceeds total volume of 600,000 gallons in any 30-day period.
- Reports of water use activity must be recorded monthly and submitted quarterly
- Water withdrawal/return location is within 500' of a river or stream or its drainage area
- DES shall track the estimated average monthly aggregate water use and average monthly stream flow
- A designated river shall not be in compliance with the general standard if it does not meet average flows equivalent to lowest average flow rate for a period of seven consecutive days on an annual basis (7Q10) – determined at a fixed location on the river/stream expressed in terms of volume per time period. Such conditions can trigger aggregate use restrictions.[13]

Instream Flow Pilot Protection Program

In 2002 legislation was enacted by the New Hampshire Legislature calling for an Instream Flow Protection Pilot Program. The goal of the program is to:

- compile a comprehensive list of instream public uses, for example, navigation, recreation, fishing, conservation, aquatic habitat, water quality,
- propose methods to assess their flow dependence, and
- develop a water management plan to implement the protected instream flow.

Two designated rivers, the Lamprey and Souhegan Rivers, were chosen and the pilot program is currently in progress. The pilot program is in the final stages. The years this has taken speaks to the effort required to accommodate all special interests related to river flows. The pilot protocols, once established, may eventually be adapted to conditions on the Pemi.

C. **Plant and Wildlife Resources**

1. Vegetation

New Hampshire's Wildlife Action Plan (WAP), developed by NH Fish & Game Department identifies more than a dozen different habitat types found in the state. Examples of most of these habitat types are found within the Pemigewasset River Corridor. The WAP identifies a number of these habitat areas within the Pemi Basin as "highest ranked habitat in the biological region" (See map in Appendix I).

The hemlock-hardwood-pine habitat is dominant south of Campton. Associated tree species include red maple, silver maple, ironwood, white ash, white pine and basswood. From Campton north, a far greater proportion of the land is covered by the northern hardwood-conifer habitat. The species primarily associated with this habitat are sugar maple and balsam fir.

[13] Source: Chapter Env-Wq 1900 Rules for Protection of Instream Flow on designated rivers.

Within the river corridor itself, the hemlock-hardwood-pine forest frequently gives way to floodplain forests, grasslands, and wet meadow-shrub wetland habitats. The flood plain forest is known for its rich soil. Native flora benefits from the silt deposits left by recurrent flooding. Common flowers include boneset, Joe Pye weed, buttonbush and spectacular cardinal flowers. Other native plants such as elderberry, blueberry and shadbush provide an important food source for deer, bear and birds. The warbling vireo, chestnut-sided warbler and cedar waxwing eat the berries. Red-shouldered hawks hunt rodents attracted to berries and seeds.

A Science Teacher's Journal
August 5, 2011 3 p.m.
Kayak south of the Mooney-Clark Boat Launch.
Bristol/New Hampton town line.

Wildlife Sightings:
black ducks
belted kingfisher
mallards
eastern forktail damsel fly
Canada geese
slaty skimmer dragonfly
little green heron
painted turtle
great blue heron
North American beaver
pileated woodpecker
otter
bullfrog.

The New Hampshire Natural Heritage Bureau (NHNHB) tracks exemplary natural communities as well as rare plants and animals. In the Pemigewasset River watershed, NHNHB lists:

- two exemplary ecological systems
- fourteen exemplary natural communities
- nine threatened species
- three state endangered species.

For more detailed information, see Appendix G.

Invasive aquatic and upland plant species have become increasingly problematic along the Pemi. These plants proliferate and crowd out native species, often dominating large areas of impoundments, flowing water, and shore banks. Common invasive plant species within the Pemi corridor include variable milfoil, Oriental bittersweet, Japanese knotweed and purple loosestrife.

The river has not had a comprehensive invasive species survey to date, although NH DES has documented and mapped the occurrence of variable milfoil in the Pemigewasset in Sanbornton and at the Ayers Island impoundment, as well as the Squam River in Ashland and Lake Pemigewasset in New Hampton. Both of these water bodies drain into the Pemi.

2. Wildlife

The NHNHB lists five occurrences of species of special concern north of the I-93 bridge in Plymouth and three occurrences south of the bridge. There were no threatened or endangered species observed in the corridor (Appendix G).

The Pemigewasset River is a species rich area - an ecotone - a place where two habitats meet. Within this ecotone, the watershed supports endangered and threatened species (i.e. dwarf wedge mussels, Blanding's turtles) and a wide diversity of non-threatened plants and wildlife at various points in their life cycles.

The habitats along the Pemi River Corridor provide havens for breeding, feeding, nesting, and cover. Migratory birds rely on this habitat, as do American redstarts, red-shouldered hawks and veery. Wood turtles, a New Hampshire species of special concern, choose very specific sites for laying eggs. They require a shrub-lined shore near sandy outcroppings.

Bullfrog in the Pemi
Image: B. Draper

Within the Pemigewasset River Corridor, we find a number of species of particular interest, including the bald eagle, common loon, osprey, wood turtle, red-shouldered hawk, cerulean warbler, bridler shiner, northern harrier, purple martin and eastern red bat.

There are current and future challenges to wildlife in the Pemigewasset River Corridor due to development, climate fluctuation and habitat loss/fragmentation. Community and agency planning must address species diversity - maintenance, restoration, and supervision - as a fundamental measure of the health and long-range success of the watershed.

3. Fish

The river, especially south of Campton, supports a fish population of at least 28 species. This includes: darters, small mouth bass, trout, salmon, hornpout, perch and a wide variety of shiners and suckers. This diversity of species attracts fisherman for sport. Fish are also an important food source for wildlife along the corridor.

D. **Recreational Resources**

The Pemigewasset River corridor supports a number of recreational uses. Those reported by survey respondents include boating, swimming, fishing, bird or wildlife watching, boating, hiking, hunting, camping, mountain biking, nature photography, cross-country skiing, snowshoeing and snowmobiling. Over 86% of survey respondents reported recreational activities on or along the rivers. While the descriptions below capture the breadth of the recreational resources provided by the Pemi, such a compilation is by its nature incomplete and ever-changing.

1. Land-based Recreational Resources

Land-based recreational activities are supported by a number of trails and secondary roads in the river corridor. The 3,900 acres of land associated with the Franklin Falls Dam and its potential water storage area (described under *Impoundments*) are the setting for several multiuse trails. One of the most popular trails is the 1.8 mile Piney Point Nature Trail which loops around a scenic peninsula just downstream of the dam. All of the trails maintained by the Army Corps are open to mountain bikes and some trails designed specifically for mountain biking are available as well. A section of the New Hampshire Heritage Trail, a program of the NH Division of Parks and Recreation to create a trail connecting communities from Massachusetts to Canada, extends 3.8 miles north of the dam to Shaw Hill Road in Sanbornton on the easterly side of the river. On the westerly side of the river, the abandoned road extending from Old Hill Village to the Smith River to the north provides opportunities for mountain biking, hiking, snowmobiling, cross-country skiing, snowshoeing and dog sled running. Plans have been made to extend this trail to the center of Bristol following an abandoned rail line. A recently completed section of the Heritage Trail in Plymouth forms a 5.6 mile loop which has sections along both the Pemi and Baker Rivers.

The US Army Corps of Engineers maintains a total of six recreation areas between New Hampton

and Franklin.[14] This includes picnic areas at the Franklin Falls Dam, at Piney Point on the hiking trail, at the Ledgeview Overlook off Rte. 3A in Franklin, and near the confluence with the Smith River on the Bristol/Hill town line. PSNH maintains picnic areas at the Ayers Island Dam in Bristol and at the Eastman Falls Dam in Franklin. There is a one mile loop trail available in Campton's Blair Woodlands Natural Area. Picnicking is available to Bridgewater residents at the Sahegenet Falls Recreation Area off River Road. Privately owned campgrounds are located in Bristol, New Hampton, Campton and Thornton. Four golf courses are located in this section of the river corridor: the Jack O'Lantern Resort in Thornton, the Owl's Nest Golf Club in Campton and Thornton, the White Mountain Country Club in Ashland and the Den Brae Golf Course in Sanbornton. Hunting is a popular activity at the Franklin Falls Reservoir and elsewhere in the river corridor. Pheasant, black bear, white-tailed dear and small game species are plentiful in the area.

Many landowners generously allow access on or through their property for various uses, if permission is requested. This is a wonderful practice because it opens up much larger areas for recreation beyond publicly owned facilities.

2. Water-based Recreational Resources

There is extensive boating activity along the entire section of the Pemigewasset River covered in this management plan. Virtually this entire segment of the river is suitable for canoeing and kayaking, although some sections are useable only at times of high flow. Between North Woodstock and Plymouth, there are two stretches with challenging rapids. The more popular one begins at North Woodstock and is usually a good Class II run. Above Livermore Falls in Campton there are more fine rapids. From Plymouth to the confluence with the Squam River there is quickwater, but the current weakens over the next three miles. The Ayers Island Dam creates a flatwater section for several miles upstream allowing for use by motorboats, which are restricted to a 6 mph maximum speed. In the first 1.5 miles below the Ayers Island Dam there are several nice Class II rapids. Adequate instream flows for whitewater paddling are maintained on this section at peak hours on weekends and holidays between May 1st and August 1st by the Ayers Island Dam, in compliance with PSNH's FERC license. Below the rapids to Old Hill Village, there is quickwater most of the way. The river becomes flatwater again behind the Franklin Falls Dam and the Eastman Falls Dam, and continues as a mile-long series of rapids to its confluence with the Winnipesaukee River. Numerous access points (See Section D.4) allow for either whitewater or quiet water paddling. Guided kayak trips are offered by at least one outfitter on the Plymouth to Bristol stretch of the river.

Fishing is a very popular activity along the river's entire length, drawing anglers from across the state and the region. Many areas that do not provide easy boat access still support shorebank fishing and wading, both on public lands and informally on privately owned land.

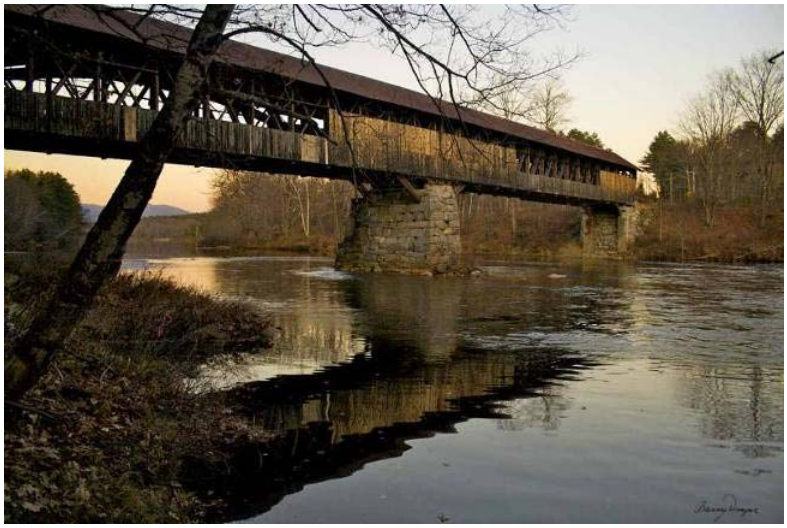
In summer months, many residents and visitors also use the river for swimming and tubing. This occurs at public facilities such as the Sahegenet Falls Recreation Area in Bridgewater, as well as at some of the campgrounds and boat access points.

3. Scenic

Scenic vistas abound along the Pemigewasset River corridor, both from the river itself and from the roads and trails along the river valley. NH DOT owns and maintains two scenic easements in New

[14] US Army Corps of Engineers: http://www.nae.usace.army.mil/recreati/ffd/ffdmap.htm.

Hampton and Bridgewater just north of the Bristol-Bridgewater town line. US Route 3 in Campton and Thornton has been designated as a Scenic and Cultural Byway and affords excellent views of the Franconia Ridge and Mt. Lafayette. In fact, the entire stretch of US Route 3 between Franconia and Plymouth forms part of the River Heritage Trail described on the NH DOT website. Livermore Falls Gorge in Campton offers one of the most outstanding scenic and historic resources on the river. This gorge boasts the river's largest falls, with a drop of 50 feet. Four miles north of Plymouth, the Blair Bridge, a 283-foot covered bridge built in 1869, provides another focal point of scenic interest. These regional highlights attract visitors from across the country.



Blair Covered Bridge in Campton
Image: B. Draper

4. Public Access

Public access to the Pemigewasset River is found in a number of locations. Boat launch facilities are provided at various points along the river by NH Fish & Game, PSNH, the US Army Corps of Engineers, and others. In addition to these designated facilities, several bridge crossings serve as informal access points to the river, and a number of spots along the Coolidge Woods Road in New Hampton are used as take-out points by whitewater paddlers who put in just below the Ayers Island Dam. Portage paths are available around all three dams. Most of the launch facilities are designed for carry-in or car-top access but some of them accommodate boat trailers. More information about the launch sites can be found in Appendix H.

5. Educational Uses

Local public and private schools and the state universities draw upon the Pemigewasset River for a variety of educational and recreational uses. The river is a kayak-training course for the Holderness School and the New Hampton School.

Sant Bani School in Sanbornton has held "river clean-up" days with its high school students.

The Newfound Area School District has used the natural resources and local agencies (NH Fish and Game, rangers from the Franklin Falls Dam) for River Day, an introduction to New Hampshire history and ecology of the Pemi.

Here's what fourth graders write about their River Day experiences:

River Day
Image: B. Draper

"The water smelled like a really good smell, wet and muddy.
I stepped in the water and I could feel pointy little stones under my feet."

"I loved New Hampshire River Day, and my brain wants to go back for more."

"I liked River Day because I got to feel the fur of different animals, like skunk, beaver, coyote, red fox and weasel."

"I saw a wonderful white waterfall. I was on top of a huge boulder. The water was so loud."

"I caught a whirlygig beetle. It kept spinning in the water, then stopping, then spinning, then stopping. It was hilarious."

E. **Land Use and Development**

1. Land Use

Although much of the land in the Pemigewasset River corridor remains undeveloped, the developed land supports a variety of uses. In addition to several highways and a seasonal railroad line along parts of the river corridor, there are agricultural, residential, recreational and industrial uses. The flood storage area behind the Franklin Falls Dam historically was used for agriculture, even after construction of the dam, but now supports mainly recreational use. The map in Appendix I shows ten categories of land cover/land use in the Pemigewasset River corridor.

The level of development and distribution of land uses along the rivers directly affects all aspects of the rivers' resources. Impervious surface area associated with development affects the land's ability to absorb and filter stormwater. The closer development is to the river's edge or to a tributary, the greater the impact on water quality unless buffers or some other technique to enhance infiltration are installed. Developed areas pressure or eliminate habitat for plants and animals and can disrupt wildlife from their natural life cycles, impeding movement. Land uses involving hazardous materials or extensive excavation pose a threat to water quality as well unless Best Management Practices (BMPs) are followed.

There are 17,583 acres of land within the Pemi Corridor. Since 2001 there has been an increase in the amount of developed land along the Pemi corridor. In 2001 there were 14,418 acres of land classified as wetland or natural vegetation (74% of the land); by 2010 this figure had dropped to 13,196 (67% of the land). Residential land increased 46% from 1,579 acres in 2001 to 2,311 acres in 2010. During this same time period, commercial, institutional, and industrial land increased from 524 acres to 790 acres. More than 30% of the land within the corridor (5,755 acres) is held in conservation today.

2. Development Trends

Throughout the 1980s and 1990s, New Hampshire had the fastest rate of population growth in New England. This trend continued in the 2000s but at a slower pace. Similar patterns are seen in the population growth rates among communities along the Pemi, including Lincoln and Woodstock (Table 2).

Table 2: Population in the Corridor

Year	Population	Percent Change
1970	23,308	
1980	28,565	23%
1990	32,702	14%
2000	35,608	9%
2010	39,971	12%

If the rate of growth seen over the last forty years continues for the next two decades, the communities from Franklin through Franconia could expect to see about another 4,000 residents during the next decade (Figure 1).

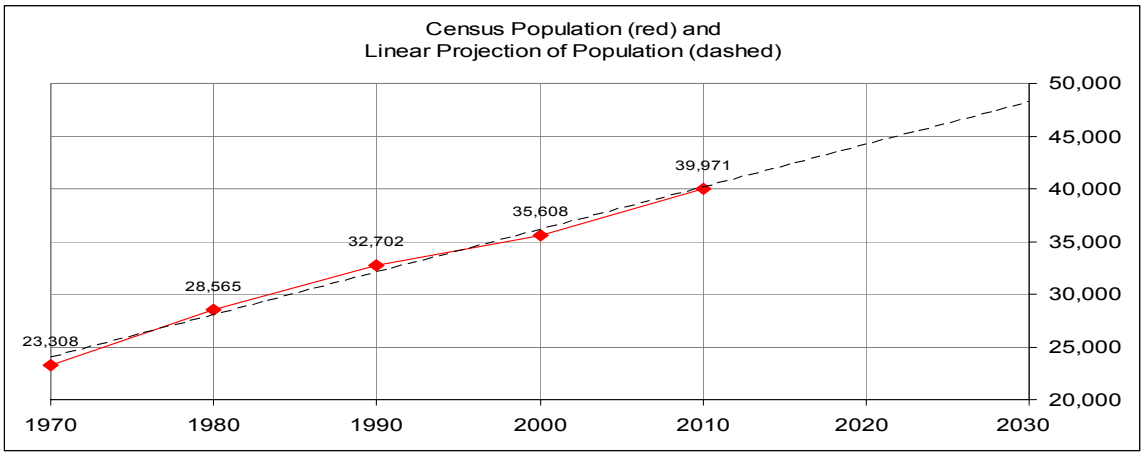


Figure 1: Population Change in Pemi Corridor Communities

For a variety of reasons, different communities have differing rates of population growth. Generally speaking, the communities from Holderness south and those from Plymouth north have grown at similar rates over the past several decades. There was, however, a substantially higher growth rate in the northern communities during the past decade (Table 3).

Table 3: Population in the Southern and Northern Sections of the Corridor

	South		North	
YEAR	Total	% Change	Total	% Change
1970	13,377		9,931	
1980	16,175	21%	12,390	25%
1990	18,108	12%	14,594	18%
2000	19,890	10%	15,718	8%
2010	20,910	5%	19,061	21%

The number of housing units in PRLAC communities rose slightly in the 1990s and at a much higher rate between the 2000 and 2010 Census (Table 4). In the 1990s this rate of growth in housing units was below the rate of population growth. It should also be noted that while the rate of housing development mirrored the population growth rate in the northern portion of the corridor, the rate

of housing development in the southern portion of the corridor was much higher than the population growth rate.

Table 4: Housing Units in PRLAC Communities – Southern and Northern Sections

	All PRLAC		South		North	
YEAR	**Total**	**Percent Change**	**Total**	**Change**	**Total**	**Change**
1990	17,193		**11,477**		**5,716**	
2000	17,544	2%	**11,695**	2%	**5,849**	2%
2010	20,653	18%	**13,493**	15%	**7,160**	22%

While the population figures reflect year-round residents, this region also attracts many visitors throughout the year. The volume of traffic along the roads in the corridor is one measure of the pressure placed on the land in the corridor by residents and visitors alike. Interstate 93 is a major artery bringing people into the area and crosses the Pemi at several locations. NH DOT reports Average Annual Daily Traffic (AADT) volumes in the neighborhood of 24,000 vehicles per day in the Franklin-Tilton area, 17,000 around Campton, and about 8,000 in the Lincoln and Franconia sections of the interstate. Traffic levels have remained consistent for much of the past decade.

3. Open Space

Within the Pemigewasset River Corridor, there are many areas of open space. While concepts of what comprises open space will vary, it is generally considered to be undeveloped land. The river corridor has the following types with natural cover on undeveloped land: forests, wetlands, grasslands, forested floodplains, and shrubland. Farmland, parks, athletic fields, and golf courses are also considered open space by many people. In 2001, 83% of the land in the corridor (16,180 acres) was considered open land; in 2011 the amount of open land stood at 15,532 acres (79%). All of these public and private areas can provide habitat for wildlife, and most contribute to local economies and support the health of the river ecosystem in a variety of ways.

F. **Historical, Archeological, and Cultural Resources**

1. Historical and Archeological

Numerous Native American tribes traditionally passed along the Pemigewasset River, most of them from the Algonquin group. Trails, campsites and tools of these indigenous people have been discovered along the river, presenting artifacts illustrating historical uses of the river. As settlers moved north into the valley during colonial times, logging and paper mills flourished. The Pemigewasset River was a highly valued resource to settlers, who used it to transport logs to various mills downstream.

Construction of the three dams on this section of the river in the first half of the 20th century brought a great deal of change to the southern part of the river corridor. Construction of the Franklin Falls Dam necessitated moving the entire village district of Hill in 1941, leaving behind the old cellar holes, sidewalks, and trees. A popular account of the move entitled "The Story of Hill, New Hampshire" by Dan Stiles was published in 1942. A more comprehensive account entitled "Hill Reestablishment: Retrospective Community Study of a Relocated New England Town" was prepared for the U.S. Army Corps of Engineers in 1978. A 1989 report prepared by the Lakes Region Planning Commission called "A Report on Hill Village - The Historical Significance of this

New England Village" describes the relocation of Hill.

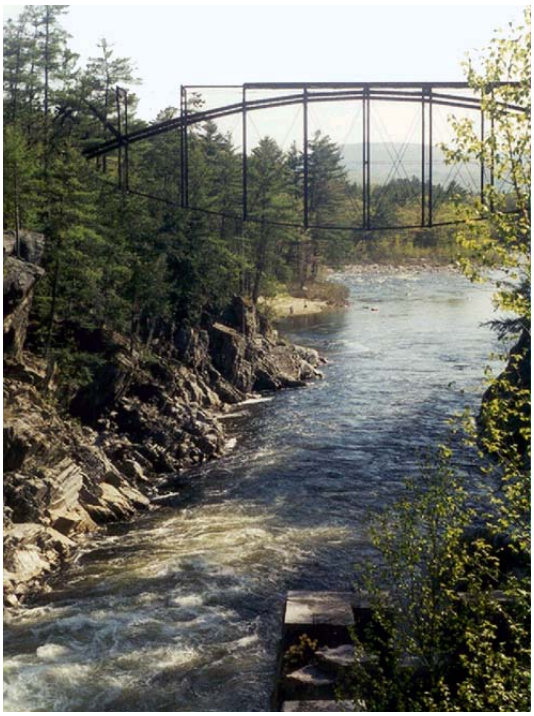
One indicator of historical significance is a site's listing in a historic register. Eight sites within the Pemigewasset River Corridor are listed in the National Register of Historic Places, including the Plymouth Historic District and the Central Square Historic District in Bristol. A town-by-town description of sites on the National and State Historic Register is included as Appendix K.

In November 2007, a group of University of Maine students and professors discovered tool fragments they believed may date back to the Late Paleoindian period. The site on the Pemi had been known as an important Native American encampment for summer fishing. However, the University of Maine dig gathered evidence that pushes our understanding of when people began using Pemigewasset River resources as far back as 7000 B.C.

2. Cultural and Community Resources

Historically, the Pemigewasset River and its corridor had great importance to the towns through which it passes. Before roads were built, the river served as a primary means of transportation, so that town centers naturally evolved along its banks, particularly at the confluence with other rivers. In addition to providing transportation, the river was used for fishing and provided water power for mills along its banks. When roads (and later railroads) were extended to this part of New Hampshire, the rugged terrain made the river valley their logical route, further supporting the development of towns located along the river.

In the first half of the 20th century, the historical uses of the river became less important to the communities in the river corridor. As the towns grew and became more industrialized, there was a need to dispose of municipal sewage and industrial waste, and the communities looked to the river to fulfill that need. Because of inadequate treatment technology and increased use, pollution levels in the Pemi eventually rose to the point that it could be fairly described as an "open sewer," particularly in times of low flow. Legislation passed in the 1960s set strict standards on discharges into the river and has resulted in the restoration of the river to its current class B status. A history of the restoration effort and its effects was compiled in 1979 for the EPA and is included as Appendix J.



The Pumpkin Seed Bridge at Livermore Falls
Image: Thomas B. Smith

Today, the river is seen as a community resource mainly for its aesthetic and recreational values, which in turn make it a magnet for tourism. For many of the towns along the river corridor, the Pemigewasset is one of their most important natural resources. In addition to the general tourism industry, there are several outdoor recreation businesses that focus directly on the river.

The Pemigewasset River and its tributaries are an outstanding community and cultural resource, offering beautiful scenery, wildlife viewing opportunities, and recreational activities throughout the corridor. Recreation areas in particular constitute important

community resources. The river corridor communities contain a couple of parks, a town recreation area, several state forests, a wildlife management area, land associated with the Franklin Falls Reservoir, and the White Mountain National Forest, all of which offer activities such as hiking, canoeing and wildlife viewing.

G. **River Corridor and Watershed Planning**

The Pemigewasset River runs through fourteen communities (twelve are PRLAC members), but the Pemigewasset watershed extends even wider, encompassing all or part of 40 municipalities. What happens in one area of the watershed can affect the rest of the river system, especially in the headwaters and on major tributaries. Concerns about water quality, open space conservation, habitat preservation, and recreational access ideally should be addressed at the watershed level. While this is practical for certain efforts, other management strategies may need to start in riverfront communities and work outward as momentum builds. PRLAC members, who act as liaisons between the local advisory committee and their local boards, serve an invaluable role in management planning efforts. They make the effort to remain informed about statewide and regional river management issues and they report back to conservation commissions, planning boards, and boards of selectmen. It should be remembered that PRLAC representatives are all volunteers. While they may spark local interest and spur action, dedicated community engagement will be the key to implementing the outreach and education recommendations made in this plan.

IV. Existing Laws and Regulations

A. Federal

1. Clean Water Act

The Clean Water Act has several provisions to restore and maintain the chemical, biological, and physical integrity of U.S. waters. It establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The US Environmental Protection Agency (EPA) regulates the discharge of pollutants from point sources as well as the disturbance of land in certain situations. If clearing, grading, excavation, or stockpiling will disturb one or more acres of land, a Construction General Permit under the National Pollution Discharge Program (NPDES) is required. This includes disturbance of less than one acre but part of a larger "common plan of development or sale" totaling one or more acres. This requirement applies to private entities as well as municipalities.[15] The Clean Water Act also established permitting processes for the construction of dams and bridges as well as certain dredge and fill activities in navigable waters.

2. Federal Power Act

Every hydroelectric project on a navigable stream requires a Federal Energy Regulatory Commission permit.

B. State

The New Hampshire Department of Environmental Services (NH DES) issues permits for activities in the shoreland area and in and around wetlands.

1. Shoreland Protection

All lakes, ponds, and impoundments greater than ten acres and all rivers and streams greater than 4th order are subject to the Shoreland Water Quality Protection Act. (RSA 483-B). This establishes a permitting process for new construction, excavation, or filling. It limits certain uses, establishes structural setbacks, requires some vegetated buffers, and limits the use of impervious surfaces.

2. Wetlands

The wetland rules were established to protect the public trust and other interests of the state of New Hampshire, by: (a) Establishing requirements for the design and construction of structures in order to prevent unreasonable encroachment on surface waters of the State; (b) Preserving the integrity of the surface waters of the state by requiring all structures to be constructed so as to ensure safe navigation, minimize alterations in prevailing currents, minimize the reduction of water area available for public use, avoid impacts that would be deleterious to fish and wildlife habitat, and avoid impacts that might cause erosion to abutting properties; and (c) Ensuring that all projects are constructed using the least impacting alternatives, in a manner that meets the requirements of RSA 483-B and shoreline and bank alteration or stabilization requirements. [16]

3. Alteration of Terrain

Permits are issued by the NH DES Alteration of Terrain (AoT) Bureau to protect New Hampshire's surface waters, drinking water supplies and groundwater by controlling soil erosion and managing stormwater runoff from developed areas. An AoT permit is required whenever a project proposes to disturb more than 100,000 square feet of contiguous terrain (50,000 square feet, if any portion of the project is within the protected shoreland), or disturbs an area having a grade of 25 percent or greater

[15] NH DES Stormwater, http://des.nh.gov/organization/divisions/water/stormwater/construction.htm and US EPA NPDES program, http://cfpub.epa.gov/npdes/stormwater/const.cfm.

[16] Wetland Rules Env-Wt 400 Statement of Purpose http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wt100-900.pdf.

within 50 feet of any surface water. In addition to these larger disturbances, the AoT Permit by Rule applies to smaller sites.

This permitting program applies to earth moving operations, such as industrial, commercial, and residential developments as well as sand pits, gravel pits, and rock quarries. Permits are issued by DES after a technical review of the application, which includes the project plans and supporting documents.[17]

C. **Local Land Use Controls**

PRLAC members, LRPC, and NCC conducted a review of local zoning ordinances as well as subdivision and site plan regulations to assess the types and levels of protection provided to the Pemigewasset River. This section summarizes the findings of the regulatory audit. A matrix of local regulations by community follows this text.

1. Permitted Uses

All communities permit residential uses within the corridor (except that the Franconia section is within Franconia State Park). Commercial activities are permitted in the corridor by most communities and industrial uses are permitted in several. Of course, those with Pemi Overlay zones or Aquifer Protection Overlays (see Section 2 below) do limit certain activities that are most likely to impact the river or groundwater.

2. Pemi Overlay Districts

Ten of the fourteen communities along the Pemi have some form of a Shoreland Overlay District which protects the land abutting the river with greater restrictions than the state restrictions. These districts are locally defined areas which enhance the regulations of the underlying local zoning districts based on environmental characteristics. Thornton, Franconia, Sanbornton, Hill and Franklin do not have an overlay district. While Franconia and Sanbornton do not have this overlay, they do have an aquifer overlay district (see Section 3 below) and much of the riverfront land in Hill and Franklin are under federal control through the US Army Corps of Engineers.

In Campton, Plymouth, Holderness, Ashland, New Hampton, and Bristol the protections extend at least 500' out from the river's edge. In Woodstock and Bridgewater the overlay extends 250' from the river's edge. Common uses prohibited in these districts are automobile repair shops or junkyards; underground petroleum tanks; excavation of sand, gravel or other earth materials; the use of common fertilizers on lawns; landfills and other solid and hazardous waste facilities; and various industrial uses. In a couple of communities, their local ordinances mirror earlier versions of the state's Shoreland Protection Act. Even where local standards are stricter, enforcement or lack thereof play a critical role in the effectiveness of the regulations.

3. Aquifer Overlay Districts

Aquifer protection overlay districts protect groundwater resources in three communities in the river corridor (Franconia, Holderness, and Sanbornton). The areas under protection are commonly land overlaying stratified drift aquifers. The districts typically ban the same types of facilities as Shoreland Protection Districts: automobile repair shops or junkyards, underground petroleum tanks, excavation of sand, gravel or other earth materials, landfills and other solid and hazardous waste facilities, and other industrial uses.

[17] NH DES Alteration of Terrain Bureau http://des.nh.gov/organization/divisions/water/aot/index.htm.

4. Minimum lot size

There is a great deal of variation in terms of lot size requirements ranging from less than half an acre up to six acres. Some of these are based on historical patterns of development while others are related to the availability of utilities or the desire to protect environmentally sensitive areas. Five communities have a minimum lot size of at least two acres. Several communities have sewage treatment systems, enabling more dense development patterns.

5. Setbacks

While the state-wide setback for primary structures is 50 feet, Holderness, Ashland, New Hampton, and Bristol require greater distances. A substantial amount of vegetated buffer permits more time for water to percolate into the ground, reducing the amount of runoff from a particular property. There is; however a substantial difference between a setback and a vegetated buffer. A setback is merely a linear measurement, what covers the ground between the river and the structure plays an important role in how much absorption of stormwater and filtering of pollutants occurs.

6. Impervious Surface limits

There are state-wide standards regarding impervious surfaces through the Shoreland Water Quality Protection Act; however, communities may establish stricter limits. Four communities along the river (Franconia, Holderness, Bristol, and Sanbornton) do exceed the state limits within their overlay districts. Holderness and six others (Lincoln, Plymouth, Ashland, Bridgewater, New Hampton, and Franklin) have some form of impervious limitation in at least one of the districts elsewhere in the community. In many cases, if a developer wishes to exceed a particular threshold of impervious surface, they must present a plan for retaining and slowing the stormwater runoff.

7. Stormwater Management

NH DES requires a Stormwater Management Plan on large projects through the Alteration of Terrain permit program. Seven corridor communities (Lincoln, Thornton, Plymouth, Holderness, New Hampton, Hill, Sanbornton, and Franklin) have Stormwater Management regulations for smaller projects; most are incorporated into both their Subdivision and Site Plan Review regulations.

8. Floodplain Management

Regulating development within floodplains assists in the protection of property from flood damage as well as in keeping people safe from floods. Maintaining undeveloped floodplains also offers benefits for the health of the river and its ecosystem, as well as for the total watershed, as floodplains absorb and store runoff. The land regulated by floodplain ordinances typically includes land with an annual 1% likelihood of flooding (also referred to as the "100-year floodplain"). Minimum flood regulation standards under the National Flood Insurance Program (NFIP) do not prohibit new buildings, wells, or septic systems within the floodplain, but require that they be developed to certain standards to reduce flood damage.

All of the communities in the corridor have a floodplain development ordinance in effect. The Federal Emergency Management Agency (FEMA) oversees the NFIP program, to which local ordinances must conform. These requirements were designed primarily to protect property rather than to protect the environment; however, local floodplain ordinances can require development to be outside of the 100-year floodplain.

Pemi Regulation Matrix See Note and Key at end.	Floodplain Regulation	Steep Slopes Ordinance	Erosion & Sediment Control	Stormwater Management Plan	Cluster or Conservation Subdivision	Wetlands Ordinance	Prime Wetlands	Aquifer or Groundwater Protection Ordinance	Dimensional			Pemi Overlay	Ground Cover/Green Space Min.	Open Space Min. Requirements
	Adopted?	Adopted?	Adopted?	Required?	Permitted?	Adopted?	Designated ?	Adopted?	River Frontage Min./Max.	Min. Setback, Structures	Impervious Surface Max.	Distance from river		
State									150' if no sewer	SWQPA - 50'	SWQPA - 30%	SWQPA - 250'		
Franconia	Yes	No. *	State regs would control.	State regs would control.	Planned Unit Development (PUDs)	Yes. ZO.	No	Yes	n/a	n/a	15% in Aquifer District; 10% for building on minimum lot size	n/a	n/a	n/a
Woodstock (not in RMPP but included in plan for information purposes)	Yes	No	Yes. Sub and Shoreland District	No	n/a	No	No	No	150'	25'	n/a	250 ft	Where exsiting, all reasonable attempts shall be made to maintain a natural woodlands buffer within 150' of the River	n/a
Lincoln (not in RMPP but included in plan for information purposes)	Yes	No	Yes. Sub	Sort of - SPR requires plan for retention and gradual release if existing drainage system inadequate (Sub regs - carry to existing storm drains/ watercourse)	Yes	No	No	No	n/a	Primary buildings 50' from River; accessory bldgs 15'	RR Zone: 50%, GU Zone:70%	Shoreland Protection District	Where exsiting, all reasonable attempts shall be made to maintain a natural woodlands buffer within 150' of the River	n/a
Thornton	Yes	No	No	Yes. Sub & SPR	Yes	No	No	No	n/a	n/a	n/a	n/a	n/a	n/a
Campton	Yes	No *	No	No. Sub regs encourage clearing and increasing size of water courses to take care of runoff	Yes	No. Wetlands cannot count toward minimum lot size	No	No	n/a	n/a	n/a	River Corridor Protection Zone - 100-year floodplain and 500' from normal channel (with some exclusions)	n/a	only in open space development - 15 acres, and cluster 25%
Plymouth	Yes	No	Yes. Sub & SPR	Yes. Sub & SPR	Yes	No	No	No	150 ft/unit	Depends on zone and septic	75% maximum lot coverage	Environmentally Sensitive Zone - 500' out from all river banks w/ prohibitions in zoning	No	Formula in ZO Article V Open Space Development
Holderness	Yes	Yes. No development on slopes> 25%	Yes. SPR	Yes. SPR	Cluster - Yes	No. However, PB notifies CC on all applications involving wetlands. CC may request Wetlands Inventory if digging will occur.	Yes	Yes. ZO Covers most of Pemi Corridor except for a section E. of NH 175 in CD. Extends beyond corridor in some areas.	200'	In Pemi Overlay: 150'	In Groundwater Protection Dist: 15%. Elsewhere ranging from 15 - 50% depending on the zone.	500' or 1,000' in floodplain mirrors the CSPA (pre-2008).	GR: ≥65% CD ≥ 50%	GR: ≥ 65% CD ≥ 50%

Pemi Regulation Matrix See Note and Key at end.	Floodplain Regulation	Steep Slopes Ordinance	Erosion & Sediment Control	Stormwater Management Plan	Cluster or Conservation Subdivision	Wetlands Ordinance	Prime Wetlands	Aquifer or Groundwater Protection Ordinance	Dimensional			Pemi Overlay	Ground Cover/Green Space Min.	Open Space Min. Requirements
	Adopted?	Adopted?	Adopted?	Required?	Permitted?	Adopted?	Designated ?	Adopted?	River Frontage Min./Max.	Min. Setback, Structures	Impervious Surface Max.	Distance from river		
State									150' if no sewer	SWQPA - 50'	SWQPA - 30%	SWQPA - 250'		
Bridgewater	Yes	No	Yes. ZO	No	Cluster - Yes	No	No	No. ZO: The aquifer is referenced in the Pemi Overlay description.	150' + 20' for each add'l unit	50'	GR Zone: 30% C/I Zone: none	250'	GR, C/I: none; Pemi Overlay yes (CSPA)	No
Ashland	Yes	ZO: Pemi & Squam Overlays - No structures on slopes > 25%. Unrestricted elsewhere.	Sub: General statement on the topic. Elsewhere not required.	No	Yes	No	No	No	No	RR Zone: 200' from river I/C Zone: can be reduced to 50' through Special Exception.	RR: 30% building coverage	500'	No	No
New Hampton	Yes	Yes. ZO Construction prohibited on 15% within the 250" protected shoreline.*	Yes. Sub & SPR	Yes. Sub & SPR	Yes	No ZO. Sub: Addressed in detail. SPR: 0.25 ac., 25'; 1 ac., 75'	No	No	200'	200' (Industrial Park: 500')	GR - 30% RR - 15% (building, parking, driveway)	Yes. ZO. 500' from normal high water mark	"Open Area devoted to landscaping or natural growth"	No
Bristol	Yes	Yes. ZO Restricts development when > 15% and forbids any structures where > 25%.	Yes. The controls which exist in the Pemi Overlay were extended townwide in 2012.	No requirement, although it has been requested by the planning board at times.	Cluster - Yes	Yes. ZO.	No	No	200'	100'	Within Pemi Overlay 10%.	Extends 500 ft. back unless the 500' line crosses Merrimack St., Summer St. or River Road.	No	No reference to "open space" is made, but the 10% limit on impervious surfaces guarantees open space.
Hill	Yes	Yes. ZO 15%	No	Yes. ZO: Under Steep Slopes Ordinance SPR	No	No	No	No	n/a	n/a	No	No Overlay	No	No
Sanbornton	Yes	Yes. ZO 15% (6 acre minimum) Stormwater Plan required.	Yes. ZO, Sub, SPR	Yes. ZO Required in Steep Slope Conservation District	Cluster - Yes	Yes. There are a variety of specific buffers from 50' - 150' plus Watershed Protection Area.	Yes	Yes. Aquifer Conservation District - Overlay District (6 acre minimum)	n/a	n/a	In AqCD: No more than 10% of lot	No Pemi Overlay. AqCD follows the boundaries of the aquifer.	No	50% for Cluster Development
Franklin	Yes	Sub 15%	Yes. Sub & SPR	Yes. Sub & SPR	Cluster - Yes.	Yes	No	No	n/a	n/a	No. Only in the Webster Lake Overlay	No	SPR: "adequate green space"	Sub: Addressed in Cluster Subdivision ordinance (66%). SPR: "adequate open space".

Notes: * Steep slopes may not be counted as part of area.

Key:

ZO:	Zoning Ordinance	GR:	General Residential
Sub:	Subdivision Regulations	RR:	Rural Residential
SPR:	Site Plan Review Regulations	I/C:	Industrial/Commercial
PB:	Planning Board	CD:	Commercial District
CC:	Conservartion Commission	AqCD:	Aquifer Conservation District
SQWPA:	Shoreland Water Quality Protection Act		

V. Community Survey Results

A. Method

The goal of the survey was to gather local input about the Pemi River corridor, how the river gets used, and a variety of issues that may impact the corridor in the future. Since the 2001 Pemi River Corridor Management Plan was developed there have been some changes along the river corridor. PRLAC developed this survey by adapting its 1998 questionnaire with input from the public, NH DES, the LRPC, and NCC; the survey was available for the public to complete electronically and in paper format for five weeks in October and November 2010.

B. Key Points

One hundred seventy-one people responded to the survey, more than 80% of whom were residents of corridor communities. One-third of the respondents said they use the river at least 12 times per year. Forty-two of the people filling out the survey reported that they own frontage along either the Pemi or one of its tributaries.

Of the eight objectives presented to respondents, the three that were rated most important were: protecting water quality, protecting aquifers (drinking water), and protecting scenic beauty. Opinions were mixed regarding the need to increase public access.

A majority of the survey respondents expressed concern about each of the ten potential threats to the river ecosystem that were listed. Those potential threats that were of the greatest concern (when the two highest ratings were combined) included: failing septic systems; the use of pesticides and herbicides near the water; erosion from development activities; and increased polluted runoff from impervious surfaces such as roads, parking lots, and roofs.

When presented with a list of eighteen different river and shoreland uses, most respondents felt that the current levels of use for most activities were appropriate. Respondents would, however, support more walking, bird watching, canoeing, and kayaking. They would prefer to have less high density residential development, motor boating, and commercial or industrial withdrawals of water.

Of the 42 respondents who own land along the river or a tributary, half reported that they maintained vegetated buffers along the shorefront (a requirement of the Comprehensive Shoreland Protection Act), 40% had their land in Current Use, a few people had conservation easements or restrictions on their land, and a majority of these riparian landowners had not considered donation as a protection measure for their property.

When asked whether they might support several regulatory measures intended to enhance the protection of water quality in the Pemigewasset River, a majority of the survey respondents expressed full support for: prohibiting the use of fertilizers, pesticides, or herbicides within 50' of any surface water; ensuring the protection of natural resource areas identified as important for watershed health; establishing more stringent regulations of development on steep slopes; and requiring a vegetated buffer on larger tributaries to the Pemi. There was much more of a mixed response to the concept of requiring inspection and reporting of septic systems every three to five years. Full survey results are available at http://www.lakesrpc.org/documents/pdfs/PemiSurvey_Q_01_24.pdf.

VI. Recommendations

A. Method

Input was received by PRLAC regarding a variety of concerns that either exist today or are anticipated to be factors impacting the river corridor in the future. These concerns came from a variety of sources: a) responses to the Pemi River Corridor Survey; b) discussions with the planning boards in the six riparian communities from Plymouth north to Franconia; c) water resource initiatives undertaken by the state; d) input from members of the public; and e) PRLAC members themselves. An effort has been made to distill these concerns down to their essential components and to group them. Like many complex systems there are overlaps.

After identifying the various present and anticipated concerns associated with the river, recommendations were developed to address these concerns. These were developed by PRLAC members and with public input. Some recommendations are very specific and target one particular problem. In some cases, implementing one recommended action could help address several concerns; this is particularly true with stewardship activities.

B. Summary

Looking ahead at the next decade, we expect management of the Pemi corridor will involve a somewhat different set of problems than those anticipated in 2001 when our original PRLAC Management Plan was developed but some challenges have remained consistent. The pressures identified in the 2001 plan related to development and growth will continue to be a challenge that needs to be confronted as New Hampshire's population grows. More than 80,000 people were added to New Hampshire's population between 2000 and 2010 (4,300 in communities along the Pemi) and this growth is projected to continue into the foreseeable future. Although two-thirds of the population increase is likely to occur in the southern part of the state, the Lakes Region is expected to see one of the state's fastest rates of growth in terms of population and development. Inevitably, the Pemi Corridor can be expected to share in this growth and development along with the potential problems they bring.

Although our 2001 plan identified the maintenance of water quality as a major challenge, the exact nature of the threat was not clearly identified. Research conducted in the last few years points clearly toward stormwater runoff as the most serious cause of impairments to water quality in the United States. In New Hampshire, stormwater has been identified as contributing to over 80% of the surface water quality impairments in the state.[18] Increases in stormwater runoff are often associated with development and, as noted earlier, development is expected to continue in New Hampshire over the next decade.

Whether New Hampshire has an adequate, sustainable supply of clean water and a healthy terrestrial and aquatic eco-system will be determined, in large part, by the long term implications of what takes place on land. Water quality degradation occurs as land use in the watershed changes from its natural state to a developed state and resulting changes in runoff are not properly managed. This long term concern has sparked several key legislative initiatives in recent years which, if subscribed to, will guide us through what could be a challenging decade ahead.

[18] NHDES, 305(b) Surface Water Quality Report, 2008.
http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-08-5.pdf .

C. Concerns and Recommendations

1. Water Quality and Quantity – Impacts of development

1.1. Concern - With a growing number of people living, working, and playing in the river corridor, there is concern about the potential increase in water usage. An increase could put pressure on the aquifers that are associated with the river. These aquifers supply many of the community wells in the region as well as the numerous individual private wells.

Recommendations

1.1.1. Learn more about the recent US Army Corps of Engineers modeling regarding low flow conditions, the volumes required for proper dilution of wastewater treatment facility effluents, and the impacts of increased withdrawals.

1.1.2. Keep abreast of Large Groundwater Withdrawal activities and policies.

1.2. Concern - There is concern about increased runoff into the river from impervious surfaces (roads, parking lots, roofs, etc.). Such runoff tends to travel quickly and transport pollutants into the river or groundwater. Factors contributing to this concern include: continued population growth and development, the relatively large amount of forested land with the potential for development; and the recent relaxation of state regulations to minimize runoff from impervious surfaces, along with the ability to enforce these regulations.

Recommendations

1.2.1. Encourage increased use of pervious pavement and other methods to eliminate increases in runoff.

1.2.2. Encourage dialogue with and among local boards about the importance of ensuring that stormwater infrastructure is constructed in accordance with approvals and then properly maintained after construction.

1.2.3. Partner with emergency service providers to encourage communities to limit the slope of driveways.

1.2.4. Encourage communities to adopt a locally adapted version of the Shoreland protection model ordinance (from Innovative Land Use Guide[19]) to restore critical shoreland protection to levels achieved with the CSPA.

1.2.5. Provide communities with resources to encourage the use of development techniques designed to enhance infiltration of stormwater runoff – Low Impact Development (LID), infiltration ponds/bio-collection areas, all with an objective of eliminating any increase in stormwater runoff.

2. Flooding and Erosion

2.1. Concern - Flooding does occur along the Pemi, causing damage to property and infrastructure such as bridges and roads. Some buildings are at risk of damage from flooding. In some areas ice jams are also involved. Many expect to see more frequent heavy rain events in New England during the next decade as the climate changes.

Recommendations

2.1.1. Educate communities on the hazards and costs of allowing people to build in the mapped floodplain, including the loss of floodplain storage capacity in one place that increases flood levels in another.

2.1.2. Encourage towns to incorporate LID principles into local regulations and plan review. These techniques can slow runoff, reducing flooding.

[19] http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_chpt_2.5.pdf.

2.1.3. Encourage communities to consider the impacts of more frequent or more severe flooding events.

2.1.4. Encourage communities to pursue opportunities for fluvial erosion hazard (FEH) mapping, a process that identifies serious erosion problem areas and possible solutions. Use the results to educate communities on the costs and hazards of allowing people to build in fluvial erosion hazard areas.

2.1.5. Encourage the adoption of stormwater management ordinances.

3. Water Quality – Impairments

3.1. Concern - Some sections of the Pemi are identified as impaired; this has not yet led to state action but might if it persists or worsens.

Recommendation

3.1.1. Consider ways that the Volunteer River Assessment Program (VRAP) monitoring might be expanded to help identify sources of pollution, e.g., adding a data logger to the current sampling or sampling at additional sites.

3.2. Concern - Impairments such as low pH and low dissolved oxygen have been detected at a number of locations along the Pemi. This could lead to changes in the populations of certain fish species and other aquatic organisms. State support for monitoring of the water quality has been dropping. Note: low pH is found in many of the waters of New Hampshire due to acid rain and local geology.

Recommendations

3.2.1. Consult with PSNH about dissolved oxygen associated with impoundments.

3.2.2. Learn more about NH DES monitoring to ensure coordination of efforts.

3.2.3. Encourage outdoor recreation groups such as Trout Unlimited and boating groups to help people understand the impacts of impairments.

3.3. *Concern - The growth of invasive milfoil in the southern part of the river is impacting the river's recreational value and may impact fish habitats. This was not a problem ten years ago and the area of impact is expanding. Eliminating variable milfoil in a riverine environment can be very difficult and expensive.*

Recommendations

3.3.1. Consider expanding education and outreach to recreational users. Specific educational needs were noted where visitors need to be notified *before* coming to the area e.g. to not bring invasive plants with them on boots, waders, boats, and propellers. This might include adopting something similar to the successful "Lake Host" program[20].

3.3.2. Work with NH DES to identify a quiet water segment of Pemi for possible milfoil herbicide treatment. Explore state/grant funding.

3.4. Concern - There is some concern that E. coli and other pathogens may be getting into the river either at concentrated recreation areas, through inadequate septic systems, or stormwater overflow.

Recommendations

3.4.1. Maintain volunteer efforts such as VRAP through state support.

3.4.2 Make sure that keeping up with septic system maintenance is a top priority at state facilities even as budgets are cut.

[20] NH Lakes Association, http://nhlakes.mylaketown.com/uploads/tinymce/nhlakes/Lake%20Host/2.2%20Lake%20Host%20Summary%202002%20to%202012.pdf.

3.4.3 Develop a public education program on use/care of private septic systems.
3.4.4 Expand the VRAP program to include more sites, more testing for *E coli* and salt.
3.4.5 Develop a program to use NH DES underwater testing devices (in-situ dataloggers) for continuous monitoring in select sensitive areas such as downstream from waste water treatment facilities or agricultural areas.

3.5. Concern - Chemical and biological impairments can impact the recreational and economic value of the river.
Recommendation
3.5.1. Identify and publish location of all impaired waters along the Pemi and communicate the implications of these impairments locally.

3.6. Concern - There is concern that the groundwater associated with the Pemi River is at risk of contamination from a number of sources, including petroleum leaks or spills, improperly applied pesticides, fertilizers, or salt, and medications which have been disposed of improperly. Groundwater is the source for many public and private drinking water wells. Removal of such contaminants can be very difficult and expensive.
Recommendations
3.6.1. Encourage towns/road agents to develop low salt areas of roadways.
3.6.2. Assist communities in developing and adopting aquifer protection ordinances.

4. Water Quality – Cumulative impacts

4.1. Concern - Just because a project is beyond the ¼-mile corridor designated for LAC permit review does not mean it cannot impact the river. Likewise, several small projects may have just as much, if not more impact on the river as one large project. There is concern that the SWQPA, NH DES rules, and the RMPP may not account for the cumulative effects of activities along tributaries and throughout the watershed. This issue is regional in scope and needs to be dealt with accordingly.
Recommendations
4.1.1. Work with communities to encourage the use of development techniques designed to enhance infiltration of stormwater runoff along tributaries.
4.1.2. Expand the Shoreland Protection Act to cover third order streams.
4.1.3. Encourage communities to strengthen local code enforcement.
4.1.4. Increase education for road crews regarding Best Management Practices.
4.1.5. Ensure that setbacks and vegetative buffers are adequate while development continues.
4.1.6. Consider watershed-wide impacts to the river.

4.2. Concern - There is concern that statewide regulations were not being applied fairly. The CSPA was perceived as difficult to understand locally. Concern was expressed regarding the fact that some communities have different rules than others and the perception that enforcement is not consistent.
Recommendations
4.2.1. Build a culture of river stewardship so that people want to comply with water quality protection regulations.
4.2.2. Support restored funding for NH DES staff for education and outreach about what the rules are and why they are important.
4.2.3. Encourage the restoration of the Shoreland Protection Act to 2008 protections and an increase in both enforcement and outreach.
4.2.4. Encourage consistent enforcement of state and local rules to be fair to landowners.

5. Access/Trash

5.1. Concern - People access the river at a limited number of public access points and a variety of unofficial access points on private property or along roadsides.

Recommendations

5.1.1. Consider whether the pros of more public accesses, e.g., being able to manage access and greater (long-term) public appreciation of the river, would outweigh the increased use that might result.

5.1.2. Encourage owners of informal accesses to grant easements to an organization such as the Rivers Council capable of organizing stewardship by partnering with, e.g., scouts and schools with public service requirement.

5.1.3. Explore the possibility of NH Fish and Game funding for an access.

5.1.4. Consider working with a large landowner on the river to provide another public access.

5.1.5. Increased availability of boating/fishing access maps might decrease trespassing on private lands. More information is needed as to where public access points are located for fishing, swimming and boating.

5.2. Concern - Underage drinking, littering, and conflicts between the experience types sought by various user groups (families, sportsmen, teens and college students) are some growing problems (this is especially true in the Livermore Falls area).

Recommendations

5.2.1. Work with local organizations, businesses and PSU to make Livermore Falls more state park-like.

5.2.2. Maintain a dialogue with the newly-formed Friends of Livermore group

5.2.3. Provide trash containers and trash removal.

5.2.4. More signage and public education regarding carry in – carry out was also suggested.

5.2.5. More public outreach would be helpful regarding clean-ups and trail maintenance activities to raise public awareness and increase involvement. One suggestion was to have those planning the activities, such as AMC notify local conservation commissions who can then help spread the word to others who might be interested in participating.

5.2.6. Review current community/PSU plans to protect the area long term. Determine if PRLAC needs to have a role in this effort.

5.3. Concern - State funds for Fish and Game patrols have been cut; some municipalities are devoting substantial resources to patrolling the river area.

Recommendations

5.3.1. Engage local boat rental businesses in oversight and building culture of stewardship.

5.3.2. Use "river hosts," i.e., like campground hosts, for user education and oversight.

6. Stewardship and Outreach

6.1. Concern - Some people are not aware of why it is important or what they can do to help protect the quality of the river. This can include visitors, residents, landowners, lawmakers, businesses, and some town boards.

Recommendations

6.1.1. Increase community engagement/outreach and PRLAC participation, especially from planning board members..

6.1.2. Multiple avenues are needed for public education, including pamphlets, school programs, town websites, and involvement of the conservation commissions.

6.1.3. Enhance local communication to communities so that towns are more likely to adopt this plan and work towards implementation.
6.1.4. Encourage closer collaboration between all town boards and commissions.
6.1.5. Meet with planning boards, school nature clubs, scouts, chambers and other groups.
6.1.6. Arrange for public presentations and outdoor workshops on topics of interest, including some for children that will engage parents as well.
6.1.7. Discuss research opportunities with PSU Center for the Environment as a way to also engage students in building a culture of stewardship.
6.1.8. Make better use of VRAP monitoring as a public education tool, e.g., include some results with the annual report, engage more volunteers, publicize the program and test results in the newspapers.
6.1.9. Make sure towns know what each other is doing in regard to shoreline regulations and enforcement. PRLAC needs to be a resource for the towns.
6.1.10. Continue efforts to include Lincoln and Woodstock in the river stewardship conversation. While these planning boards do not support joining the RMPP, they share the PRLAC towns' value of the river as a local and regional resource.
6.1.11. Make a deliberate effort to exchange information and concerns with corridor landowners. Since funding was not available to do a corridor landowner survey, perhaps some other avenue could be explored.
6.1.12. To ensure that the next generation also values the river and understands their role as river stewards, conduct outreach through the schools, including educational events where parents are invited, and also through the scouts.
6.1.13. Outreach to residents could also be conducted through the town website, including contact information for concerns about the river (PRLAC chair and DES).
6.1.14. Opportunities identified to increase outreach and education for residents and visitors include:
6.1.14.1. have planning boards and conservation commissions host a one-day training workshop on a special topic and rotate these among the towns;
6.1.14.2. get in the newspapers as feature articles on specific river-related topics;
6.1.14.3. include pamphlet in sewer and water bills;
6.1.14.4. develop and continue school programs like the storm drain stencils;
6.1.14.5. use bulletin boards and info booths at libraries, town halls, Cannon Mountain, the chamber of commerce, and local stores.
6.1.15. Explore opportunities to supplement the PRLAC income (administration, outreach, monitoring) through businesses and industry that have interests associated with the river.
6.1.16. Increase public involvement and education in protection of water resources through local workshops, and other media. This would include threats to water quality as well as trash/litter issues. This would most likely involve solicitation of grant money.

7. Other

Recommendation

7.1. Some scenic views of the river need to be reopened.

D. **Implementation**

An Implementation Matrix was developed to help identify potential partners, any costs associated with a recommendation, and to give a sense of when implementation might occur. PRLAC representatives recognize that in implementation of any given recommendation may depend upon

several factors including local interest, political will, and funding. Exactly which recommendations will be addressed at any given time may vary depending upon the factors noted above. PRLAC representatives viewed this matrix as a dynamic portion of this document; it was, therefore placed in the Plan as Appendix N. It should be reviewed annually to update the status of progress on each recommendation and to guide the development of an annual work plan.

VII. Appendices

A. Protection Measures by River Classification

ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

R&L-14 2009

River Classifications and State Regulated Protection Measures As They Apply To Each Classification

	RIVER CLASSIFICATIONS			
	Natural	Rural	Rural-Community	Community
Activities Allowed				
Dams & Encroachments				
Construction of New Dams	No	No	No	Yes
Reconstruction of Breached Dams	No	Yes (within six years)	Yes (within six years)	Yes
Channel Alterations	No (excluding repair)	Yes (with conditions)	Yes (with conditions)	Yes (with conditions)
Water Quality/ Water Quantity				
Water Quality	Class A or B	Class B	Class B	Class B
Interbasin Transfers	No	No	No	No
Protected Instream Flow	Yes	Yes	Yes	Yes
Waste Disposal				
New Landfills	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)
New Hazardous Waste Facilities	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)
Other New Solid Waste Facilities	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)
New Septic Systems	No (within 75 ft.)	No (within 75 ft.)	No (within 75 ft.)	No (within 75 ft.)
New Auto Junk Yards	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)	No (within 250 ft.)
Fertilizer				
Limestone	Yes	Yes	Yes	Yes
Sludge and Septage	No (within 250 ft.) Conditions apply	No (within 250 ft.) Conditions apply	No (within 250 ft.) Conditions apply	No (within 250 ft.) Conditions apply
Low Phosphorus, Slow Release Nitrogen	No (within 25 ft.)	No (within 25 ft.)	No (within 25 ft.)	No (within 25 ft.)

B. **Water Quality Monitoring Sites and Results**

PRLAC's volunteers begin testing in April and continue on a bi-weekly schedule through early September. There currently are nine test sites, ranging from Thornton to Hill:

- Pemi River: Memorial Bridge Thornton (21-PMI)
- Mad River: Rte 49 Bridge Thornton (03G-MAD)
- Pemi River: Blair Bridge Campton (18-PMI)
- Pemi River: Holderness Road Bridge Plymouth (15-PMI)
- Pemi River: Sahegenet Falls Bridgewater (11A-PMI)
- Newfound River: Pleasant Street Bridge Bristol (01-NFD)
- Pemi River: Mooney-Clark Landing Bristol (09A-PMI)
- Pemi River: Central Street Bridge Bristol (07-PMI)
- Smith River: Profile Falls Bristol (00M-SMT)

The results of PRLAC's water monitoring for the past five years can be found at http://des.nh.gov/organization/divisions/water/wmb/vrap/pemigewasset/index.htm.

C. **Water Quality Standards**

A Quick-Reference Guide to VRAP Water Quality Standards

<table>
<tr><th>Parameter</th><th>Class A Standard</th><th>Class B Standard</th></tr>
<tr><td>Chloride
(mg/L)</td><td colspan="2">Chronic standard is 230 mg/L
Acute standard is 860 mg/L</td></tr>
<tr><td>Chlorophyll-a
(mg/L)</td><td colspan="2">No Numeric Standard
<table><tr><th>Unit</th><th>Category</th></tr><tr><td>< 3</td><td>Excellent</td></tr><tr><td>3 – 7</td><td>Good</td></tr><tr><td>7 – 15</td><td>Less than desirable</td></tr><tr><td>> 15</td><td>Nuisance</td></tr></table></td></tr>
<tr><td>Conductivity/
Specific Conductance
(µS/cm as chloride surrogate)</td><td colspan="2">No Numeric Standard
Although in many fresh surface waters, specific conductance can be used as a surrogate to predict compliance with numeric water quality criteria for chloride.
<table><tr><th>Unit</th><th>Category</th></tr><tr><td>0 – 100</td><td>Normal</td></tr><tr><td>101 – 200</td><td>Low Impact</td></tr><tr><td>201 – 500</td><td>Moderate Impact</td></tr><tr><td>> 501</td><td>High Impact</td></tr><tr><td>Approximately 850</td><td>Likely exceeding the chronic chloride standard</td></tr></table></td></tr>
<tr><td>Dissolved Oxygen
(mg/L & %)</td><td>6 mg/L
75% Minimum Daily Average; Unless Naturally Occurring</td><td>5 mg/L
75% Minimum Daily Average; Unless Naturally Occurring</td></tr>
<tr><td>E. coli
(Counts/100mL)</td><td>Geometric mean of ≤47 E. coli cts/100 mL based on at least 3 samples obtained over a 60-day period
≤153 E. coli cts/100 mL in any 1 sample</td><td>Geometric mean of ≤126 E. coli cts/100 mL based on at least 3 samples obtained over a 60-day period
≤ 406 E. coli cts/100 mL in any 1 sample</td></tr>
<tr><td>pH (Units)</td><td colspan="2">6.5 – 8.0
Unless Naturally Occurring
<table><tr><th>pH (Units)</th><th>Category</th></tr><tr><td><5.0</td><td>High Impact</td></tr><tr><td>5.1 – 5.9</td><td>Moderate to High Impact</td></tr><tr><td>6.0 – 6.4</td><td>Normal; Low Impact</td></tr><tr><td>6.5 – 8.0</td><td>Normal;</td></tr><tr><td>6.1 – 8.0</td><td>Satisfactory</td></tr></table></td></tr>
<tr><td>Total Phosphorus
(mg/L)</td><td colspan="2">No Numeric Standard. As Naturally Occurs
<table><tr><th>Unit</th><th>Category</th></tr><tr><td>< 0.010</td><td>Ideal</td></tr><tr><td>0.011 – 0.025</td><td>Average</td></tr><tr><td>0.026 – 0.049</td><td>More than desirable</td></tr><tr><td>≥0.050</td><td>Excessive "NHDES Level of Concern"
(potential nuisance concentration)</td></tr></table></td></tr>
<tr><td>Total Kjeldahl Nitrogen
(mg/L)</td><td colspan="2">No Numeric Standard. As Naturally Occurs
<table><tr><th>Unit</th><th>Category</th></tr><tr><td>< 0.25</td><td>Ideal</td></tr><tr><td>0.26 – 0.40</td><td>Average</td></tr><tr><td>0.41 – 0.49</td><td>More than desirable</td></tr><tr><td>≥ 0.50</td><td>Excessive
(potential nuisance concentration)</td></tr></table></td></tr>
<tr><td>Turbidity
(NTU)</td><td>As Naturally Occurs</td><td>Shall not exceed naturally occurring conditions by more than 10 NTU</td></tr>
</table>

New Hampshire Volunteer River Assessment Program

29 Hazen Drive/PO Box 95 - Concord, NH 03302-0095

http://des.nh.gov/organization/divisions/water/wmb/vrap/index.htm

2006

D. 303(d) List of Impaired Waters [2012 Draft]

Assessment Unit Name	Water Size	Size Unit	Town	Use	Impairment Name	DES category*	Source Name	TMDL priority	TMDL Schedule
PEMIGEWASSET RIVER	8.128	MILES	WOODSTOCK	Aquatic Life	Aluminum	5-M	Source Unknown	LOW	2017
PEMIGEWASSET RIVER	8.128	MILES	WOODSTOCK	Aquatic Life	pH	5-M	Source Unknown	LOW	2016
PEMIGEWASSET RIVER	5.137	MILES	CAMPTON	Aquatic Life	pH	5-P	Source Unknown	LOW	2017
PEMIGEWASSET RIVER	4.23	MILES	NEW HAMPTON	Aquatic Life	pH	5-P	Source Unknown	LOW	2017
PEMIGEWASSET RIVER	1.14	MILES	NEW HAMPTON	Aquatic Life	Dissolved oxygen saturation	5-M	Source Unknown	LOW	2019
PEMIGEWASSET RIVER	1.14	MILES	NEW HAMPTON	Aquatic Life	pH	5-M	Source Unknown	LOW	2025
PEMIGEWASSET RIVER	9.836	MILES	NEW HAMPTON	Aquatic Life	pH	5-M	Source Unknown	LOW	2017
PEMIGEWASSET RIVER - AYERS ISLAND DAM POND	500	ACRES	NEW HAMPTON	Aquatic Life	Dissolved oxygen saturation	5-M	Impacts from Hydrostructure Flow Regulation/ modification	LOW	2021
PEMIGEWASSET RIVER - AYERS ISLAND DAM POND	500	ACRES	NEW HAMPTON	Aquatic Life	Dissolved oxygen saturation	5-M	Municipal Point Source Discharges	LOW	2021
PEMIGEWASSET RIVER - AYERS ISLAND DAM POND	500	ACRES	NEW HAMPTON	Aquatic Life	Dissolved oxygen saturation	5-M	Source Unknown	LOW	2021
PEMIGEWASSET RIVER - AYERS ISLAND DAM POND	500	ACRES	NEW HAMPTON	Aquatic Life	pH	5-P	Atmospheric Deposition - Acidity	LOW	2017
Pemigewasset River, CWF	7.917	MILES	THORNTON	Aquatic Life	pH	5-P	Source Unknown	LOW	2017
Pemigewasset River, W/CWF	4.437	MILES	ASHLAND	Aquatic Life	pH	5-P	Source Unknown	LOW	2017

Source: NH DES 303(d) page http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/index.htm

* Category 5 indicates that a TMDL is required for this pollutant; 'M' indicates that it is marginal and 'P' means that it is poor.

E. Active Dams along the River[21]

HAZCL	NAME	TOWN	RIVER	STATUS	HEIGHT (ft)	DRAIN_AREA (acres)
H	AYERS ISLAND DAM	BRISTOL	PEMIGEWASSET RIVER	ACTIVE	90	746
H	FRANKLIN FALLS FLOOD CTRL	FRANKLIN	PEMIGEWASSET RIVER	ACTIVE	140	1000
H	EASTMAN FALLS DAM	FRANKLIN	PEMIGEWASSET RIVER	ACTIVE	27	1013
S	ASHLAND SEWAGE LAGOON DAM	ASHLAND	NA	ACTIVE	15	<1
S	NEWFOUND RIVER DAM	BRISTOL	NEWFOUND RIVER	ACTIVE	7	98
L	GILES POND DAM	FRANKLIN	SALMON BROOK	ACTIVE	37	24
L	NEW HAMPTON SCHOOL LOWER POND	NEW HAMPTON	TRIB TO PEMIGEWASSET	ACTIVE	6	<1
NM	CATES BROOK DAM	FRANKLIN	CATES BROOK	ACTIVE	6	<1
NM	COLD SPRING BROOK DAM	ASHLAND	COLD SPRING BROOK	ACTIVE	4	1
NM	PROFILE LAKE DAM	FRANCONIA	PEMIGEWASSET RIVER	ACTIVE	1	1
NM	BRIDGEWATER POWER COMPANY	BRIDGEWATER	RUNOFF	ACTIVE	13	<1
NM	LIZOTTE POND DAM	BRIDGEWATER	RUNOFF	ACTIVE	6	<1
NM	LANDFILL DET POND	THORNTON	RUNOFF	ACTIVE	17	<1
NM	FLUME DAM	LINCOLN	UNNAMED STREAM	ACTIVE	6	20
	WESTVIEW RIDGE DET POND 1	FRANKLIN	RUNOFF	EXEMPT	3	<1

[21] Source: NH DES Dams Bureau database, 2012. Direct contact. Contact information at http://des.nh.gov/organization/divisions/water/dam/index.htm.

F. Registered Water Users Along the River[22]

USERNAME	FACILITY	Secondary NAME
PUBLIC SERVICE CO OF NH	EASTMAN FALLS HYDRO	PEMIGEWASSET RIVER
PUBLIC SERVICE CO OF NH	AYERS ISLAND HYDRO	PEMIGEWASSET RIVER
BRIDGEWATER POWER CO LP	BRIDGEWATER BIO MASS	ON-SITE WELL
NEWFOUND HYDROELECTRIC CO		NEWFOUND RIVER
FRANKLIN WATER WORKS	FRANKLIN WATER WORKS	ACME WELL #1
PIKE INDUSTRIES INC	CAMPTON SAND & GRAVEL	SETTLEMENT PONDS
PLYMOUTH VILLAGE W&S DIST	WATER WORKS	FOSTER STREET WELLS
BRISTOL WATER WORKS	WATER WORKS	STORM CENTER WELL
PLYMOUTH VILLAGE W&S DIST	POTW	PEMIGEWASSET RIVER
ASHLAND WWTF	WASTE WATER TREAT PLANT	SQUAM RV
JACK O'LANTERN INC	GOLF COURSE PUMP STATION	GOLF COURSE (D3)
BRISTOL WWTF	WASTE WATER TREAT PLANT	PEMIGEWASSET RIVER
WHITE MTN COUNTRY CLUB		IRRIGATION
ASHLAND WATER WORKS	ASHLAND WATER WORKS	GRAVEL WELLS
OWL STREET ASSOCIATES LLC	OWL'S NEST GOLF COURSE	PEMIGEWASSET RIVER
PLYMOUTH STATE COLLEGE	PHYSICAL EDUCATION CENTER	ATHLETIC FIELDS
PERSONS CONCRETE LLC	CAMPTON PLANT	ON-SITE WELL

[22] Source: NH DES Registered Water Users database. A searchable version of the database is available at the NH DES One Stop Data and Information site http://des.nh.gov/onestop/index.htm.

G. **Known Occurrences of Rare Species and Exemplary Natural Communities**

NEW HAMPSHIRE NATURAL HERITAGE BUREAU

Known occurrences of rare species and exemplary natural communities mapped within the quarter-mile corridor of the Pemigewasset River from the I93 bridge in Plymouth north to Profile Lake

Name - Occurrence # (unique identifier)	Quality Rank	Mapping Precision	Conservation Rank State	Conservation Rank Global	Listing Status State	Listing Status Federal	Last Seen
Ecological System							
High-gradient rocky riverbank system - 005	AB	S	S3	–	–	–	1993
Invertebrate Species							
Pink Sallow (Psectraglaea carnosa) - 004	U	M	SH	G3	–	–	0
Natural Community							
Dwarf cherry river channel - 001	B-	S	S2	–	–	–	1999
mixed alluvial shrubland - 001	B	S	S4	–	–	–	1999
montane - subalpine circumneutral cliff - 005	A	S	S2	–	–	–	1995
Silver maple - false nettle - sensitive fern floodplain forest - 032	B	S	S2	–	–	–	1997
subalpine cold-air talus shrubland - 001	A	S	S1	–	–	–	1984
Plant species							
American ginseng (Panax quinquefolius) - 018	NR	M	S2	G3	T	–	1899
Canada mountain-rice grass (Piptatherum canadense) - 002	–	M	S1	G5	E	–	1966
dwarf blueberry (Vaccinium cespitosum) - 008	NR	M	S2	G5	T	–	1916
green adder's-mouth (Malaxis unifolia) - 041	H	M	S2	G5	T	–	1949
northern neglected reed grass (Calamagrostis stricta ssp. inexpansa) - 009	CD	S	S2	T5	T	–	1993
northern neglected reed grass (Calamagrostis stricta ssp. inexpansa) - 012	C	S	S2	T5	T	–	1993
northern neglected reed grass (Calamagrostis stricta ssp. inexpansa) - 013	AB	S	S2	T5	T	–	1992
northern neglected reed grass (Calamagrostis stricta ssp. inexpansa) - 015	NR	M	S2	T5	T	–	1960
Silverling (Paronychia argyrocoma) - 005	D	S	S2	G4	T	–	2000
violet butterwort (Pinguicula vulgaris) - 003	A	S	S1	G5	E	–	2007
violet butterwort (Pinguicula vulgaris) - 005	NR	M	S1	G5	E	–	1956
White Mountain avens (Geum peckii) - 017	A	S	S2	G2	T	–	2002
Vertebrate species							
Smooth Green Snake (Opheodrys vernalis) - 032	–	S	S3	G5	SC	–	1999
Smooth Green Snake (Opheodrys vernalis) - 042	–	S	S3	G5	SC	–	2009
Wood Turtle (Glyptemys insculpta) - 065	B	S	S3	G4	SC	–	2007
Wood Turtle (Glyptemys insculpta) - 067	A	S	S3	G4	SC	–	2003
Wood Turtle (Glyptemys insculpta) - 068	NR	S	S3	G4	SC	–	2005

NEW HAMPSHIRE NATURAL HERITAGE BUREAU

Known occurrences of rare species and exemplary natural communities mapped within the quarter-mile corridor of the Pemigewasset River from the Franklin Falls Dam north to the I93 bridge in Plymouth, NH

Name - Occurrence # (unique identifier)	Quality Rank	Mapping Precision	Conservation Rank State	Conservation Rank Global	Listing Status State	Listing Status Federal	Last Seen
Ecological System							
Major river silver maple floodplain system - 001	NR	S	S2	–	–	–	1996
Natural Community							
Aquatic bed - 001	B-	S	S5	–	–	–	1996
Aquatic bed - 002	B	S	S5	–	–	–	1996
Dry river bluff - 002	B	S	S2	–	–	–	1996
Dry river bluff - 005	B	S	S2	–	–	–	1996
Dry river bluff - 006	B	S	S2	–	–	–	1996
Dry river bluff - 007	B	S	S2	–	–	–	1996
Herbaceous riverbank/floodplain - 002	AB	S	S4	–	–	–	1996
Rich mesic forest - 030	C	S	S3	–	–	–	1996
Silver maple - false nettle - sensitive fern floodplain forest - 025	B+	S	S2	–	–	–	1996
Vertebrate species							
Osprey (Pandion haliaetus) - 159	–	S	S3B	G5	SC	–	2010
Osprey (Pandion haliaetus) - 164	–	S	S3B	G5	SC	–	2010
Wood Turtle (Glyptemys insculpta) - 014	A	S	S3	G4	SC	–	2006

Quality Ranks
A-D = Excellent (A) to poor (D)
H = Historical (not observed within the last 20 years)
X = Extirpated
NR = Not ranked

Mapping Precision
S = Location known to within ca. 300 feet
M = Location known to within ca. 1.5 mile

Listing Status
T = Threatened, E = Endangered, SC = Special Concern

25 April 2012

Conservation Rank Prefix:

G = Global Rank
S = State Rank
T = Global or State rank for a subspecies or variety.

Conservation Rank Suffix:

1 = Critically imperiled
2 = Imperiled
3 = Vulnerable
4 = Apparently secure
5 = Secure
B = Breeding population
N = Nonbreeding population
H = Occurred historically
X = Extirpated
NR/U = Not ranked / Unknown
Q = Questionable taxonomy
? = Uncertain

H. **Conservation Land, Recreation Land, and Access Points**

Conservation Land

NAME	TYPE
City of Franklin Land	Municipal or County
Drew	Municipal or County
Egan Property	Municipal or County
Franklin Wellfield	Municipal or County
Merrill	Municipal or County
Morrell	Municipal or County
Pemi Valley View Open Space	Municipal or County
River Street River Frontage	Municipal or County
Sahegenet Falls Rec. Area	Municipal or County
Swain	Municipal or County
Franklin Falls Reservoir	Federal
White Mountain National Forest	Federal
Ballou	State
Blair State Forest	State
Livermore Falls State Forest	State
New Hampton - Bridgewater Scenic Easement	State
New Hampton Fish Hatchery	State
New Hampton Scenic Easement	State
Pemigewasset Wildlife Management Area	State
Plymouth State College - Langdon Park	State
Scribner-Fellows State Forest	State
Sugar Hill State Forest	State
William H Thomas State Forest	State
Conkling	Private
Martin Easement	Private

Recreation Land

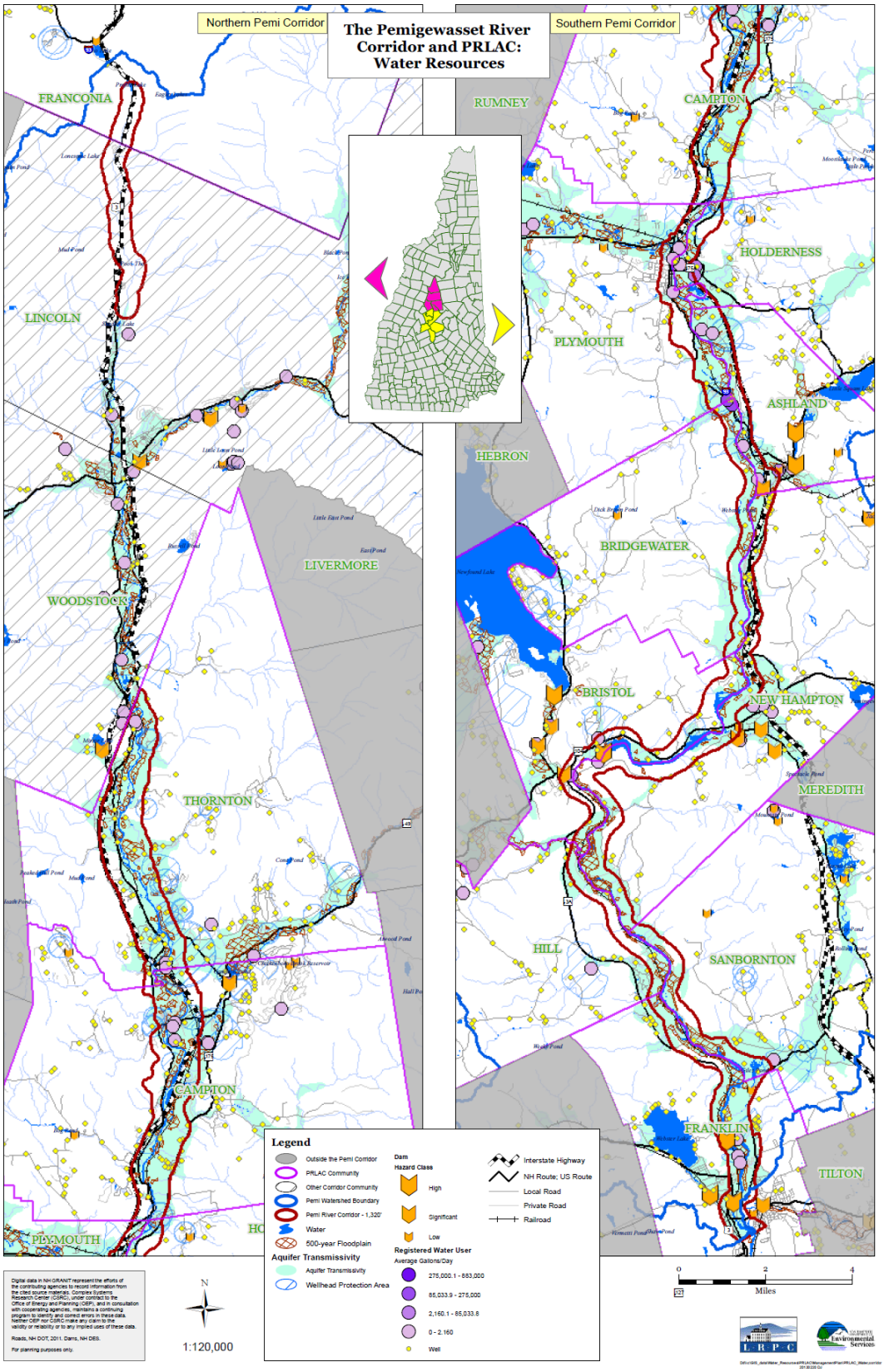
Municipality	Site	Operator	Owner Type	Primary Use	Primary Activity	Acres in Corridor
Ashland	Scribner-Fellows State Forest	NH DRED	State	Natural Area	Hunting Area	0.09
Bridge-water	New Hampton-Bristol Scenic Easement	NH DOT	State	Natural Area	Natural Area	19.28
Bridge-water	Sahegenet Falls Recreation Area	Town of Bridgewater	Municipal	Picnic Area	Beach Swimming	14.30
Bristol	Franklin Falls Reservoir	US ACE	Federal	Natural Area	Fishing, access pt	227.38
Bristol	Sugar Hill State Forest	NH DRED	State	Natural Area	Hunting Area	10.22
Campton	Blair State Forest	NH DRED	State	Natural Area	Hunting Area	114.89
Campton	Livermore Falls State Forest	NH DRED	State	Natural Area	Hunting Area	165.80
Campton	Pemigewasset Wildlife Mgt. Area	NH F&G	State	Hunting Area	Natural Area	93.19
Franconia	Franconia Notch State Park	NH DRED	State	Park	Fishing, access pt	455.38
Franklin	Franklin Falls Reservoir	City of Franklin	Federal	Natural Area	Fishing, access pt	1,099.79
Hill	Franklin Falls Reservoir	US ACE	Federal	Natural Area	Fishing, access pt	581.58
Holderness	D & M Park	Plymouth State Univ.	State	Field Sports	Baseball, softball	2.90
Holderness	Livermore Falls State Forest	NH DRED	State	Natural Area	Hunting Area	30.16
Lincoln	Franconia Notch State Park	NH DRED	State	Park	Pack Camp	1,306.57
Lincoln	White Mountain National Forest	US Forest Service	Federal	Natural Area	Pack Camp	10.81
New Hampton	Franklin Falls Reservoir	US ACE	Federal	Natural Area	Fishing, access pt	540.15
New Hampton	New Hampton Fish Hatchery	NH F&G	State	Fishing	Fishing, access pt	28.72
New Hampton	Scenic Easement	NH DOT	State	Natural Area	Desig. Scenic Vista	7.47
New Hampton	Scenic Easement	NH DOT	State	Natural Area	Desig. Scenic Vista	10.36
New Hampton	Scenic Easement	NH DOT	State	Natural Area	Desig. Scenic Vista	1.37
Plymouth	Langdon Park	Plymouth State Univ.	State	Park	Passive	4.56

Municipality	Site	Operator	Owner Type	Primary Use	Primary Activity	Acres in Corridor
Sanbornton	Franklin Falls Reservoir	US ACE	Federal	Natural Area	Fishing, access pt	610.61
Thornton	Ballou Property	NH F&G	State	Natural Area	Fishing, access pt	24.42
Thornton	Pemigewasset Wildlife Mgt. Area	NH F&G	State	Hunting Area	Hunting Area	1.52
Thornton	White Mountain National Forest	U.S. Forest Service	Federal	Natural Area	Fishing, access pt	4.59

Access Points

TOWN	FACILITY	LOCATION	OWNERSHIP	ACCESS TYPE
Woodstock/Thornton	The Ledges	NH Route 175 & Station Road	Uncertain	Carry-in
Thornton	Memorial Bridge	West Shore near bridge	Town - Thornton	Carry-in
Campton	Blair Bridge	West Shore near bridge	Town - Campton	Carry-in
Campton	Route 49 Bridge	West Shore near bridge	Town - Campton	Carry-in
Holderness	Livermore Falls	Route 175 to Livermore Rd.	State – NHFG	Walk-in
Plymouth	Pemi River Cartop Facility	Off Green St.in Plymouth	State – NHFG	Cartop
Bridgewater	Sahegenet Falls Recreation Area	Off River Rd.	Town – Bridgewater	Carry-in
Bristol	Mooney-Clark Landing	Route 104 Bridge	Private - PSNH	Ramp
Bristol	Ayers Island Dam	Off Route 104 1 mi. E of Bristol	Private – PSNH	Carry-in
New Hampton	Coolidge Woods Cartop facility	Coolidge Woods Rd.	Federal-Army Corps/ State – NHFG	Cartop
Sanbornton	Shaw Cove Cartop facility	Off Shaw Hill Rd.	Federal-Army Corps/ State – NHFG	Cartop
Franklin	Franklin Falls Dam	Off Route 127	Federal – Army Corps	Walk-in
W. Franklin	Eastman Falls Dam	Off Route 3A	Unknown	Ramp
Franklin (Winnipesaukee R.)	Franklin High Lower Field	Behind High School	Town – Franklin	Ramp

I. Maps


Northern Pemi Corridor
The Pemigewasset River Corridor and PRLAC: Water Resources
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FRANCONIA
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LIVERMORE
WOODSTOCK
THORNTON
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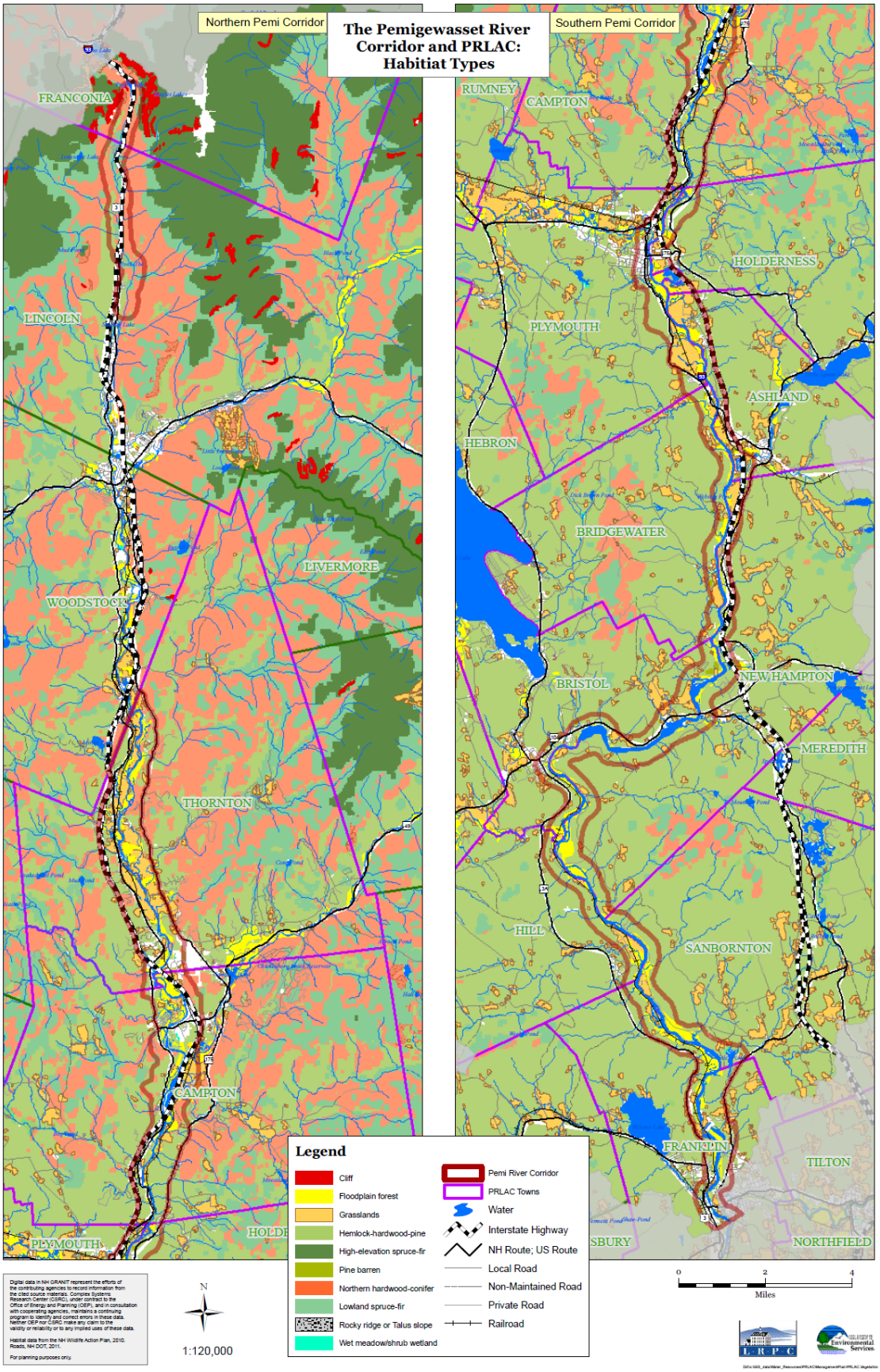
PLYMOUTH
RUMNEY
CAMPTON
HOLDERNESS
PLYMOUTH
ASHLAND
HEBRON
BRIDGEWATER
BRISTOL
NEW HAMPTON
MEREDITH
HILL
SANBORNTON
FRANKLIN
TILTON
Legend
Outside the Pemi Corridor
PRLAC Community
Other Corridor Community
Pemi Watershed Boundary
Pemi River Corridor - 1,320'
Water
500-year Floodplain
Aquifer Transmissivity
Aquifer Transmissivity
Wellhead Protection Area
Dam
Hazard Class
High
Significant
Low
Registered Water User
Average Gallons/Day
275,000.1 - 883,000
85,033.9 - 275,000
2,160.1 - 85,033.8
0 - 2,160
Well
Interstate Highway
NH Route; US Route
Local Road
Private Road
Railroad
N
1:120,000
0
2
4
Miles
LRPC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BRISTOL
NEW HAMPTON
MEREDITH
HILL
SANBORNTON
FRANKLIN
TILTON
NORTHFIELD
Legend
Cliff
Floodplain forest
Grasslands
Hemlock-hardwood-pine
High-elevation spruce-fir
Pine barren
Northern hardwood-conifer
Lowland spruce-fir
Rocky ridge or Talus slope
Wet meadow/shrub wetland
Pemi River Corridor
PRLAC Towns
Water
Interstate Highway
NH Route; US Route
Local Road
Non-Maintained Road
Private Road
Railroad
N
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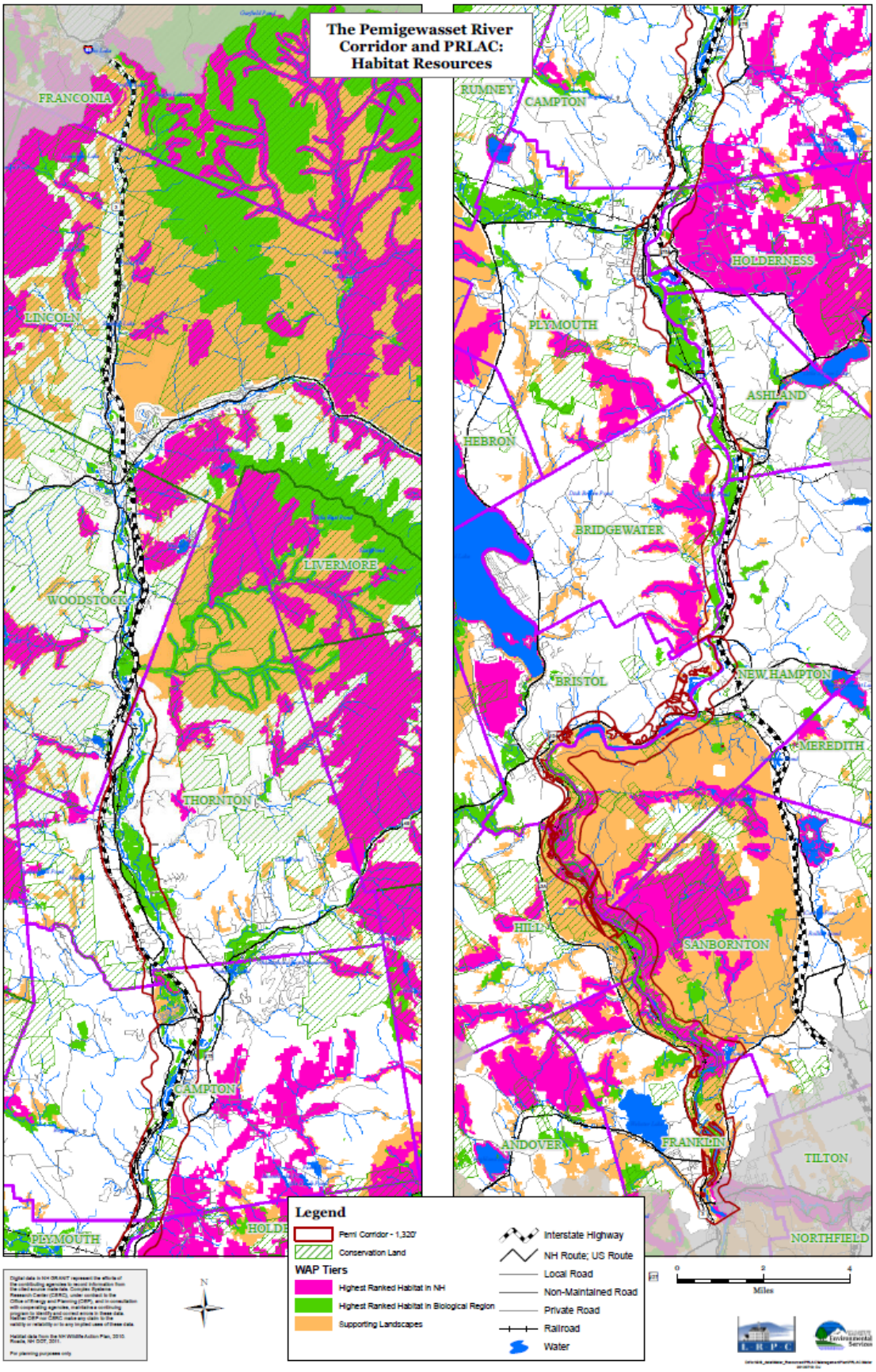
0
2
4
Miles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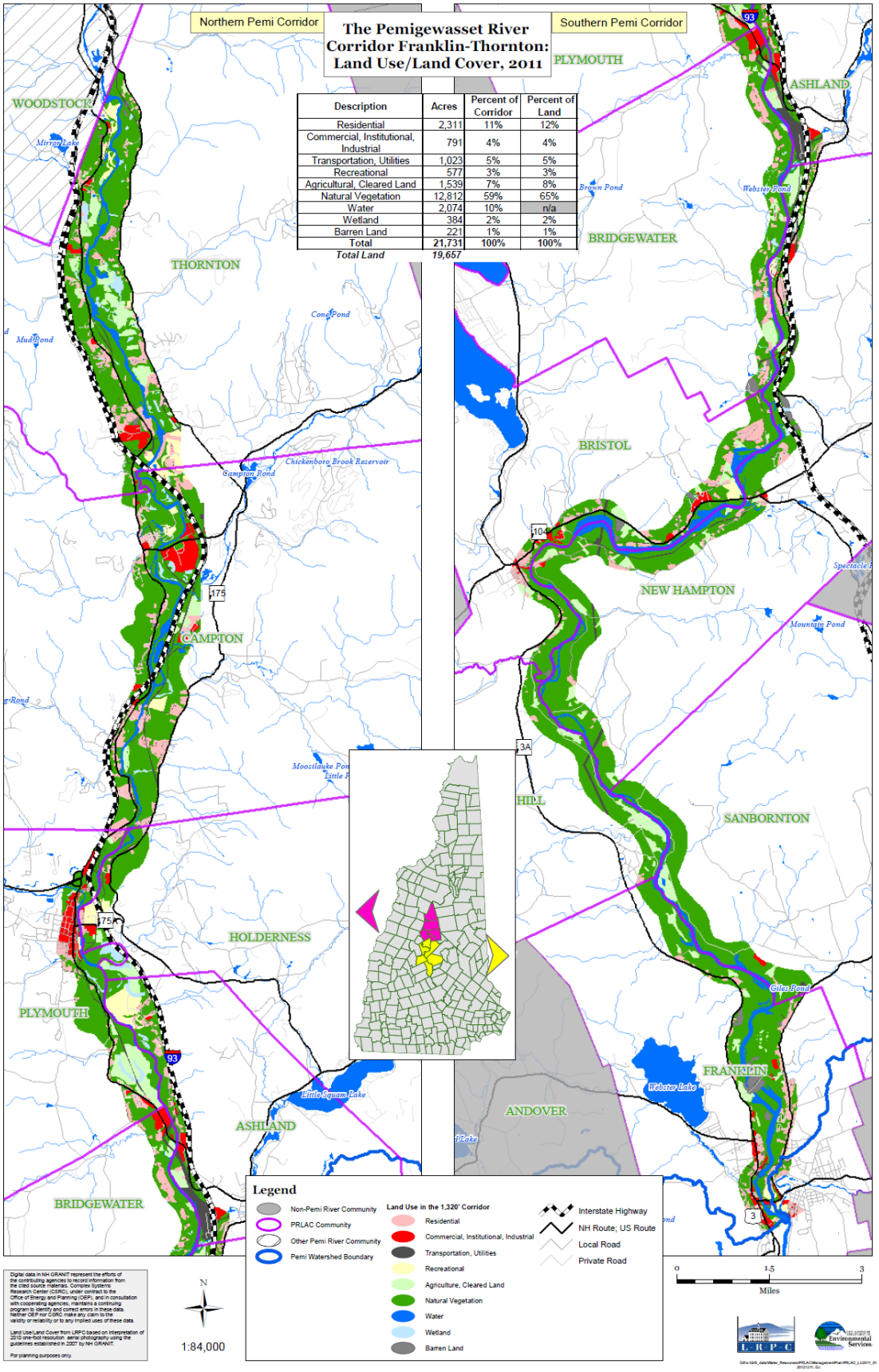
ASHLAND
HEBRON
BRIDGEWATER
BRISTOL
NEW HAMPTON
MEREDITH
HILL
SANBORNTON
ANDOVER
FRANKLIN
TILTON
NORTHFIELD
Legend
Perri Corridor - 1,320'
Conservation Land
WAP Tiers
Highest Ranked Habitat in NH
Highest Ranked Habitat in Biological Region
Supporting Landscapes
Interstate Highway
NH Route; US Route
Local Road
Non-Maintained Road
Private Road
Railroad
Water
N
Miles



Description	Acres	Percent of Corridor	Percent of Land
Residential	2,311	11%	12%
Commercial, Institutional, Industrial	791	4%	4%
Transportation, Utilities	1,023	5%	5%
Recreational	577	3%	3%
Agricultural, Cleared Land	1,539	7%	8%
Natural Vegetation	12,812	59%	65%
Water	2,074	10%	n/a
Wetland	384	2%	2%
Barren Land	221	1%	1%
Total	21,731	100%	100%
Total Land	*19,657*		

J. History of Pemi Restoration

United States
Environmental Protection
Agency

Office of Water
Planning and Standards (WH-551)
Washington, DC 20460

October 1979

EPA

A Water Quality Success Story

APPENDIX F History of Pemi Restoration

Written for EPA by Malcolm Taylor of Holderness, NH

Pemigewasset River New Hampshire

"Dead fish are a symptom of what is happening. If fish die, so will people in time. You have to stop pollution (in the Pemigewasset River) before it gets beyond all control if you want to live."

Former State Representative
H. Thomas Urie

Valley News, March 29, 1972

"I don't care about the fish," said a logger in a Lincoln (New Hampshire) tavern. "If the paper mill closes I'll be out of a job, and I can't feed just fish to my wife and kids."

Valley News, March 29, 1972

Spawned by hundreds of clear, cold springs in the heart of New Hampshire's great White Moutains, cradled beneath the shadow of the "Old Man" rock formation in Franconia Notch, fed by swift tumbling brooks and wild mountain streams, the 62 mile-long Pemigewasset River joins the Winnepesaukee River at Franklin to form the Merrimack River.

Historically, the Pemigewasset was known as a beautiful New England waterway, one of the nation's finest rainbow and brown trout streams, but well over 70 years of raw sewage discharges from the towns of Lincoln, North Woodstock, Plymouth, Ashland, Bristol and Franklin -- and untreated industrial pollution from the Franconia Paper Corporation at Lincoln, and the Ashland Pape: Mills and the L.W. Packard & Company textile mill at Ashland -- eventually turned the Pemigewasset into an aquatic cesspool.

In 1959, the New Hampshire State Legislature classified the Pemigewasset as a Class D stream, fit only for navigation and commerce.

According to the State of New Hampshire Water Supply and Pollution Control Commission's (WSPCC) Assistant Chief Engineer Robert Cruess, "although the river runs through the heart of a prime New Hampshire vacation area, the tourist and sportfishing public had avoided it since 1920. There were no fish kills to investigate in recent times because there were practically no fish left to kill. Swimming in these waters was a dim memory and boating and canoeing became ancient history.

"Industrial wastes from the mills," Cruess says, "placed a tremendous oxygen-demanding load of spent sulfite liquor (a byproduct of pulp and paper-making) and suspended solids on the Pemigewasset.

"Dissolved oxygen, which fish need to breathe and live was seriously depressed, and the pollution loading placed on these waters by the Franconia, Ashland, and L.W. Packard mills in terms of biochemical oxygen demand (BOD) -- a measure of the organic matter in water which consumes oxygen during biological processes that break it down -- equalled the untreated sewage load produced in one day by cities with a population of 348,000, 24,250, and 10,725 respectively.

"Due to the extremely high BOD load, the Pemigewasset became anaerobic," Cruess continues. "Rafts of paper mill sludge floated downstream along discolored waters, degrading the shoreline. Sludge deposits littered the river bottom, and over the years the state WSPCC recorded high coliform counts (a measure of bacteriological pollution) from raw sewage discharges along the river.

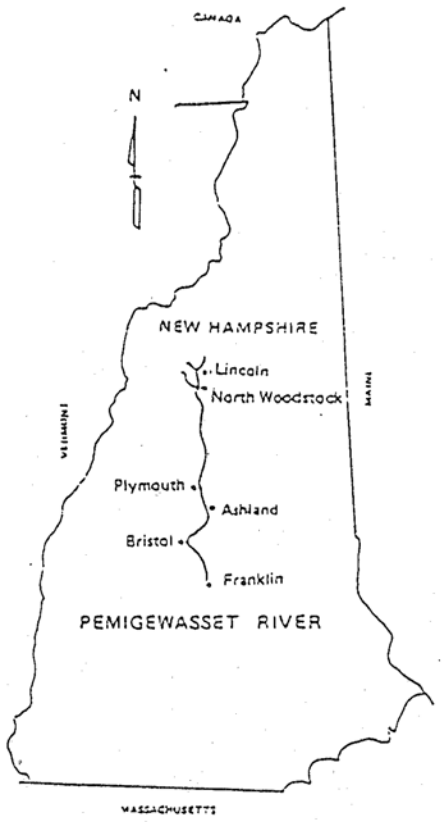
"Bristol was one of the worst areas," Cruess concludes. "Here, the hydrogen sulfide gas released to the air by paper mill sludge not only fouled the air with its characteristic 'rotten eggs' odor, but reacted with lead-based house paints, turning houses black."

LOCAL, STATE AND FEDERAL CLEANUP ACTIONS

Legislative Acts and Pollution Abatement

Public reaction to this gross environmental degradation came to a head in the mid-1960's as concerned conservation groups and sportsmen's clubs strongly urged that the Pemigewasset be cleaned up.

It was during this period that Congress passed the Water Quality Act of 1965, which required that water quality standards



be established for all of the nation's interstate waterways and, in addition, required that the program of authorizing federal grants to municipalities to help finance sewage treatment plant construction previously authorized by the Federal Water Pollution Control Act of 1956 be expanded.

In 1967 the New Hampshire Legislature reclassified the Pemigewasset. The Legislature assigned a Class C water quality standard -- which allows fishing, recreational boating and use of the river as a source of industrial water supply -- to the 15-mile stretch of the Pemigewasset from Lincoln at the headwaters to Hubbard Brook in the Town of Thornton. The Legislature then assigned a Class B water quality standard -- which allows swimming and use of a stream as a source of domestic water supply after adequate treatment -- to the remaining 47 miles from Thornton to the Pemigewasset's mouth at Franklin.

Largely financed by federal and state sewage treatment plant construction grant funds, the towns along the Pemigewssset complied with the Legislature's standard, which mandated compliance by 1969.

During the mid-to-late 1960's, the Federal Water Pollution Control Administration (FWPCA), the predecessor agency to the present U.S. Environmental Protection Agency (EPA), awarded $4 million to the six municipalities on the Pemigewasset to construct waste treatment facilities which included stabilization ponds, oxidation ditches and aerated lagoons, as well as ancillary facilities such as pumping stations, force mains and sewer interceptors. On line in the early 1970's, these secondary facilities removed 85 percent of the suspended solids and BOD in their wastes.

Industry also cleaned up along the river. Ashland Paper Mills went out of business in 1969, and the L.W. Packard & Company textile mill at Ashland tied in to the town's new secondary plant, which now treated the mill's effluent as well as its own domestic wastes.

In 1967, the Economic Development Administration (EDA) and the State of New Hampshire provided the funds to construct two on-site pollution control facilities at the Franconia Paper Corporation at Lincoln. These consisted of a primary treatment plant with flocculation (separating suspended solids by chemical means) to treat the company's paper-making wastes, and a separate facility which used the Copeland process (a technique used to evaporate and incinerate spent sulfite liquor) to treat its pulp-making wastes.

Unfortunately, the system did not work and Franconia Paper Corporation was forced to close its plant in mid-1970.

Results

In 1969, the New Hampshire Fish and Game Department began restocking the river with trout, and by early 1971, the entire Pemigewasset River -- including the 15-mile portion below Lincoln which the New Hampshire Legislature had previously reclassified as Class C waters -- met the state's Class B water quality standards.

To everyone's surprise the Pemigewasset had rebounded in spectacular fashion.

One elderly man who had lived along the river all his life said "we always thought that the Pemi stank so we stayed away from it. Last year I saw the bottom for the first time. I couldn't believe it."

"This is a river the nation can look at as an example of the most remarkable improvement possible," said Clarence Metcalf, former director of the WSPCC's Division of Municipal Services. "There aren't many -- if any -- other waterways which have shown such results so quickly."

Former New Hampshire Fish and Game Department Director Bernard Corson agreed enthusiastically. "Our success on the Pemigewasset," he said, "is just a start which should give us the confidence to move ahead and meet the pollution problems of New Hampshire's waters head on."

In an article written during that period, Field and Stream magazine also praised the Pemigewasset's recovery. "Badly polluted for years, New Hampshire's Pemigewasset River should evolve as that state's finest trout water this season. A three-year cleanup, plus heavy annual stocking since 1969, promises spectacular results in the 40-mile stretch from I-93 between Lincoln and New Hampton. Easily waded in most sections, the river is a fly-fisherman's dream. Look for some of the best trout fishing in the East during June."

Then suddenly, disaster struck.

THE PEMIGEWASSET IS POLLUTED AGAIN

Events to April, 1972

In July, 1971, another firm, the Franconia Manufacturing Corporation reopened at Lincoln as a paper-making plant, and on October 18 the state WSPCC issued the new firm a permit to discharge an industrial effluent into the Pemigewasset that did not exceed Class C water quality standards.

In December, however, the Franconia Manufacturing Corporation reactivated its Copeland pulp treatment plant and immediately began violating the terms of its permit. Within 24 hours, state biologists monitoring the Pemigewasset recorded highly acidic pH levels (a measure of acidity or alkalinity in water) and heavy sulfite concentrations in the river. Fish began to die, and within a few days further tests indicated the possible loss of all fish life as far as 20 miles below the mill.

The resulting controversy which swept across the Pemigewasset Valley for the next few months became one of the most important social and environmental issues which faced New Hampshire in the early 1970's.

Motel owners, who had invested heavily on the premise of the Pemigewasset's permanent recovery, bitterly complained that they were losing business. "We're going to have to close down," said one owner. "We've lost all of our customers because of the horrible stench from from the river."

The state WSPCC now gave the new firm until March 7, 1972, to stop polluting the Pemigewasset or face shutdown, but the company requested an extension into 1975 to meet cleanup goals.

The state disagreed. "Our job," the WSPCC said, "is to get the river cleaned up again. This just can't wait until 1975."

Faced with the possibility of closure, the company's 275 employees voted to support it by taking a temporary 20-percent pay cut. Now there occurred a widening gap in the Pemigewasset Valley between two opposite camps of public opinion where neighbor now vehemently debated against neighbor -- one side urging cleanup, the other side questioning the "right of conservation groups and motel and recreational campground owners to put almost 300 people out of work."

During February, 1972, several hundred residents of the Lincoln-North Woodstock area signed a petition addressed to the Governor and members of the Congressional Delegation.

"If any one of you had visited this area last winter," the petition read in part, "you would have seen economic depression. By what right of divine ordinance do the ...ecologist campground and motel owners ...deny people the right to work? Whoever said the Pemi had to be so clean as to support fish? Which is more important, fish or people?"

In reply to statements by the Franconia Manufacturing Corporation that it had invested more than a half million dollars in the mill, businessmen downriver responded that investments in their areas, made on the premise that the river would be clean, amounted to a great deal more. One campground owner said his investment totaled $350,000. Another owner declared that "a single campground catered last summer to 20,000 people who brought a million dollars into the area."

The state WSPCC also responded. "To say that ...we are not concerned with the people of Lincoln is utterly false. We are making every effort to cooperate with the company and the company is working with us, but the Legislature has given us the responsibility for restoring water quality and we have to remain within that framework. We are trying to strike a balanced view."

Far stronger words came from H. Thomas Urie of New Hampton, chairman of the newly formed Pemigewasset River Council and a former state legislator who had waged a determined battle for years to clean up the Pemigewasset. "I could care less," he said, "if anyone ever catches a fish in the Pemi. People are my concern. Dead fish are a symptom of what is happening. If the fish die, so will people in time. You have to stop pollution before it gets beyond all control if you want to live."

On February 28, 1972, the WSPCC granted the Franconia mill a final 60-day variance after the March 7 deadline with this stipulation: "Within one year from the expiration of the 60-day

variance (the mill) will have designed and completed construction of facilities that will allow full compliance with the river's classification."

On March 11, the Franconia Manufacturing Corporation indicated that it could not meet the state's antipollution deadline. Exactly one month later, the firm's board of directors — citing lack of operating capital -- announced that it would discontinue operations on April 14. A week later the company closed.

"They must be happy now," said an embittered mill worker. "Maybe the fish can pay the bills."

Succeeding Events at Lincoln

During November, 1973, the Profile Paper Corporation assumed ownership of the Lincoln mill's paper-making facilities. The new firm installed equipment providing complete recirculation of paper wastes in a new on-site facility, with no discharge to the Pemigewasset. This firm, however, closed in early 1975.

Late that year, New England Pulp and Paper Company, Inc. took ownership. This firm used Profile's recirculating equipment and, in addition, installed a de-inking process for producing newsprint from waste paper. This process operated on a closed loop, with no discharge to the river. In May, 1976, this firm also went out of business.

During mid-1977, officials of the New England Pulp and Paper Company approached the WSPCC with the following proposal: That it begin operating again on the premise that up to 250,000 gallons per day of its waste effluent be removed from the closed loop system, and that these wastes be pretreated, then discharged into the Town of Lincoln's secondary wastewater treatment facility.

The WSPCC now informed the town and the company that this proposal required that the Lincoln treatment plant be upgraded and that Lincoln's discharge permit, previously issued by the EPA under the provisions of the National Pollutant Discharge Elimination System (NPDES) be modified to allow the town to increase its treated discharge by 100,000 gallons per day and by approximately 25 pounds per day of BOD. A major requirement to be met in modifying Lincoln's permit was that both the town and the company obtain WSPCC approval for a contractual agreement between them to handle pretreated paper mill wastes.

On February 4, 1978, the EPA issued the Town of Lincoln its modified NPDES permit. Shortly after, a new corporation -- the Franconia Paper Company, Inc. -- assumed operation of the paper

mill as well as the responsibilities defined in the WSPCC-approved agreements between the town and the mill. Built with funds provided by the new company, the Town of Lincoln's upgraded treatment plant went on line at the end of 1978.

To date, the company has lived up to the letter and the intent of the WSPCC's approved agreement between the town and the paper mill. Frequent monitoring performed by the EPA and the WSPCC clearly shows that the Pemigewasset River is receiving adequately treated secondary effluent from the town's facility, with no detectable degradation of water quality in these waters.

EPILOGUE

While the cleanup of the Pemigewasset River during the early 1970's was marked by crisis and contention, one date -- April 20, 1972 -- stands out as the turning point for the river.

"In spite of successive managerial takeovers, " says the WSPCC's Robert Cruess, "from that time on there have been no more polluted discharges from the Lincoln area, or any other area, to these waters. By the summer of 1972, the Pemigewasset had recovered to the point that it fully met our Class B swimmable and fishable water quality standards."

So much for improved water quality. But what about the impact of environmental cleanup in terms of economic displacement on the lives and fortunes of the people who live and work along the river's banks?

"Today, we have 200 people on our payroll, including about 40 percent of the original mill workers who previously lost their jobs," says Franconia Paper Company, Inc. President Peter E. Gould. "Other, formerly displaced workers, as well as many newcomers presently work for new industries in the Pemigewasset Valley.

"There's the Burndy Corporation at Lincoln, a metal-plating firm that provides pretreatment for its wastes prior to discharge to the municipal system. Burndy employs about 200 people.

"There's also been a significant expansion of job-creating light industry at Plymouth and Holderness," Gould says. "None of these new industries discharge directly to the Pemigewasset."

Following close on the heels of restored fishing, swimming, boating, canoeing, and hiking and camping, a host of tourist and recreation-associated businesses have appeared along the Pemigewasset.

Today, new motels and restaurants provide food and lodging for hundreds of trout fishermen, and employment for many service workers.

Swimmers, picnicers and sightseers enjoy wildlife vistas along clean, sandy beaches, and five new major campgrounds featuring boating, canoeing and swimming have appeared up and down the river. There are now a number of public access points along the Pemigewasset, allowing boating and canoeing enthusiasts to float downriver to specified pickup points.

Since many newcomers have bought summer homes, and others now choose to live here year-round, property values have gone up. And for sportsmen who enjoy winter sports, condominium units associated with the local ski industry are going up in resort areas located in the center of one of New England's most spectacularly scenic forest and river environments.

(This story reflects the progress made by the State of New Hampshire in cleaning up conventional pollutants such as oxygen-demanding materials, suspended solids, and bacteria. Other non-conventional pollutants may be present, and as the guidance for monitoring these pollutants develops, the State of New Hampshire will conduct a monitoring program and take whatever corrective actions are necessary to abate them.)

K. **Historical Resources within the Corridor by Community**

Community	National Register	Year	New Hampshire Register	Year
Franklin	Franklin Falls Historic District	1982		
Hill	Hill Center Church	1985		
Bristol	Central Square Historic District	1983	Whipple House (75 Summer St)	2005
Bristol	Minot-Sleeper Library	1988		
New Hampton	Washington Mooney House	1997		
Plymouth	Plymouth Historic District	1986	Mary Lyon Hall (3 Highland St.)	2012
Plymouth	Old Grafton County Court House	1982		
Campton	None		Blair Covered Bridge	2009
Franconia	Abbie Greenleaf Library	2003		

Source: The National Register of Historic Places database http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome and the New Hampshire State Register of Historic Places http://www.nh.gov/nhdhr/programs/state_register.html.

L. State and Federal Initiatives

1. **Shoreland Protection Study Commission 2006-7.** After a year long study, the New Hampshire Legislature enacted amendments to the 1992 Comprehensive Shoreland Protection Act (CSPA) effective July, 2008. The new CSPA focused on better management of the critical area 250' from lakes, ponds, streams greater than 3rd order, and tidal waters. The bulk of the changes were broad in scope, and designed to strike a balance between the preferences of shoreland property owners and the need to protect our water resources. The amendments established a permit program for many construction, excavation, and filling activities within the protected shoreland (250'), a 50' waterfront buffer in which vegetation removal and application of pesticides and herbicides were restricted, and it set limits on impervious surfaces. Forested buffers served to control erosion, promote stormwater infiltration, retain sediment, take up excess nutrients, moderate near shore surface water temperature, provide wildlife habitat and help facilitate groundwater recharge. In short, native trees and vegetation provide us with essential ecologic services. This very effective program was severely compromised by changes made in 2011 – to the point it is considered by many to no longer be capable of sustaining surface water quality. The damage done by these changes was further magnified when resources needed to manage shorelands at the state level were severely cut.

2. **Storm Water Commission Report 2010**. Stormwater is rainfall or snowmelt that runs over the land surface and does not soak into the ground. Through its work, the Commission found that stormwater is recognized as one of the leading causes of pollution in the United States**.** The NH DES 2008 Surface Water Quality Assessment reported that 83% of the surface water quality impairments in New Hampshire are primarily due to stormwater runoff. The conversion of open space to impervious surfaces (roads, roofs, parking lots, sidewalks, lawns) has become the largest threat to surface water quality. Imperviousness and other land use development has contributed to stormwater runoff which has increased the frequency and magnitude of flooding in the last several years resulting in loss of life and millions of dollars of damage to our road and highway systems, private residences and business properties.

One of the Commission's key recommendations is to establish Stormwater Utilities that could assess and collect fees from property owners based on the costs to manage stormwater to mitigate effects on surface waters. This is typically determined by the percent impervious cover of a lot. Such fees would serve to address the funding needs identified by a separate Infrastructure Commission. The commission's primary recommendations were: 1. Amend State law to define the term "stormwater". 2. Amend State law to clarify that all property owners are responsible for stormwater originating from their property. Create statutory definitions that will provide the underpinning for local and statewide stormwater management based on property owner responsibility. 3. Amend State law to create a statewide, watershed based, stormwater utility program with local options that could be phased in over a period of years. If a statewide utility program is not implemented, amend State law to create a statewide stormwater discharge permit system administered by NH DES. 4. Amend State law to clearly enable and require municipalities to regulate stormwater within their boundaries.

To adapt to these changes and to restore our water resources there must be a paradigm shift away from the conventional stormwater management and land development practices that have degraded our water resources. A comprehensive watershed-based strategy that equally distributes the responsibility and cost of stormwater management across all users is essential to restoring and protecting the state's water resources.

The full report is at the NH Office of Energy and Planning website: http://www.nh.gov/oep/legislation/2008/hb1295/final_report/november_2010.pdf and the summary report is available at http://www.nh.gov/water-sustainability/publications/documents/hb1295-stormwater-factsheet.pdf.

3. New Hampshire Water Sustainability Commission 2011. Established in April, 2011, this 14 member commission's primary charge is to "identify strategies and management measures for ensuring that the quality and quantity of New Hampshire's water resources in 25 years are as good as or better than they are today". The Sustainability Commission's final report was published in December 2012 and outlines actions that can be taken in the areas of education, infrastructure investment, future-focused management (as opposed to short-term management), and data and monitoring. http://www.nh.gov/water-sustainability/publications/documents/wsc-final-report.pdf

4. Upper Merrimack and Pemigewasset River Study (UMPS) 2009-2012. The UMPS river study is a jointly funded cost-sharing effort by the federal government through the US Army Corps of Engineers (USACE), the NH Department of Environmental Services, and various communities in the watershed. This study is similar in scope to detail to one recently completed on the Lower Merrimack water quality. The purpose of this new effort is to extend the evaluation of instream water quality in the main stem Pemi and Merrimack Rivers upstream to Lincoln, NH, close to the headwaters. One of the goals is to create a time dependent model of flow and water quality of the Upper Merrimack and Pemi Rivers that can be used to guide the following activities and decisions:

- The model will be used as a tool to identify the sources of the dissolved oxygen deficit in reaches of the river that are listed on the 303(d) list of impaired waters, and plan for the expected needs of several wastewater treatment facilities for updated discharge permits.
- Assess the water quality and quantity impacts of potential future increases in water withdrawals from the main stem Merrimack by communities south of Concord.
- Evaluate alternative usage of USACE reservoirs in the watershed to mitigate impacts of treated wastewater discharges and/or water supply withdrawals.

The field sampling program consists of the following components:

- Impoundment studies
- Continuous dissolved oxygen and temperature monitoring
- Low-flow water quality surveys
- High-flow water quality surveys
- Sediment Oxygen Demand and Nutrient Flux monitoring

There are 86 total sampling stations: 52 in the main stem, 18 in tributaries, and 14 wastewater treatment plant sites.

M. **Results of the Pemigewasset River Corridor Survey (2010)**

A survey was developed by PRLAC with assistance from LRPC staff and was distributed. The stated audience was "anyone who lives, works, or plays" in the Pemi corridor. The primary method of distribution was electronically, although paper versions were made available at Town Halls and libraries. The survey was available for six weeks in the fall of 2010. A total of 171 people submitted responses. The full results of the survey are available at http://www.lakesrpc.org/documents/pdfs/PemiSurvey_Q_01_24.pdf.

N. Implementation Matrix

The following matrix shows each of the recommendations developed in Section VI of this Plan along with the entities that would likely be involved in implementing the action, estimated costs and potential funding sources needed for implementation, and a general timetable for implementation. The timetable is stated as Annual, Short-term (12 – 18 months), Medium-term (within three years), and Long-term (will take four or more years to implement). This is a 'working section' of the plan and should be reviewed and updated annually.

Pemigewasset River Corridor Management Plan - Implementation Matrix

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
1	**Water Quality - Impacts of Development**			
1.1.1	Learn more about the recent US Army Corps of Engineers modeling regarding low flow conditions, the volumes required for proper dilution of wastewater treatment facility effluents, and the impacts of increased withdrawals.	PRLAC, USACE, NHDES	Staff/ Volun. Time	Medium
1.1.2.	Keep abreast of Large Groundwater Withdrawal activities and policies.	PRLAC, NHDES	Staff/ Volun. Time	Annual
1.2.1.	Encourage increased use of pervious pavement and other methods to eliminate increases runoff.	PRLAC, PBs	Staff/ Volun. Time	Medium
1.2.2.	Encourage dialogue with and among local boards about the importance of ensuring that stormwater infrastructure is constructed in accordance with approvals and then properly maintained after construction.	PRLAC, PBs, CCs	Staff/ Volun. Time	Medium
1.2.3.	Partner with emergency service providers to encourage communities to limit the slope of driveways.	PRLAC, EMDs	Staff/ Volun. Time	Medium
1.2.4.	Encourage communities to adopt a locally adapted version of the Shoreland protection model ordinance (from Innovative Land Use Guide) to restore critical shoreland protection to levels achieved with the CSPA.	PRLAC, PBs, CCs, LRPC, NCC	Staff/ Volun. Time	Medium
1.2.5.	1.2.5. Provide communities with resources to encourage the use of development techniques designed to enhance infiltration of stormwater runoff – Low Impact Development (LID), infiltration ponds/bio-collection areas, all with an objective of eliminating any increase in stormwater runoff.	PRLAC, PBs, CCs, LRPC, NCC	Staff/ Volun. Time + $250 materials	Short

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
2	**Flooding and Erosion**			
2.1.1.	Educate communities on the hazards and costs of allowing people to build in the mapped floodplain, including the loss of floodplain storage capacity in one place that increases flood levels in another.	PRLAC, NH Floodplain Coord., NHHSEM	Staff/ Volun. Time	Medium
2.1.2.	2.1.2. Encourage towns to incorporate LID principles into local regulations and plan review. These techniques can slow runoff, reducing flooding.	PRLAC, PBs, CCs	Staff/ Volun. Time	Medium
2.1.3.	Encourage communities to consider the impacts of more frequent or more severe flooding events.	PRLAC, NH Floodplain Coord., NHHSEM	Staff/ Volun. Time	Medium
2.1.4.	Encourage communities to pursue opportunities for fluvial erosion hazard (FEH) mapping, a process that identifies serious erosion problem areas and possible solutions. Use the results to educate communities on the costs and hazards of allowing people to build in fluvial erosion hazard areas.	PRLAC, NH DES	>$10,000	Long
2.1.5.	Encourage the adoption of stormwater management ordinances.	PRLAC, PBs, CCs	Staff/ Volun. Time	Medium
3	**Water Quality - Impairments**			
3.1.1.	Consider ways that the Volunteer River Assessment Program (VRAP) monitoring might be expanded to help identify sources of pollution, e.g., adding a data logger to the current sampling or sampling at additional sites.	PRLAC, NHDES	$500	Medium
3.2.1.	Consult with PSNH about dissolved oxygen associated with impoundments.	PRLAC, PSNH	Staff/ Volun. Time	Short
3.2.2.	Learn more about NHDES monitoring to ensure coordination of efforts.	PRLAC, NHDES	Staff/ Volun. Time	Short
3.2.3.	Encourage outdoor recreation groups such as Trout Unlimited and boating groups in helping people understand the impacts of impairments.	PRLAC/ local groups	Staff/ Volun. Time, $100 printing	Medium

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
3.3.1.	3.3.1. Consider expanding education and outreach to recreational users. Specific educational needs were noted where visitors need to be notified before coming to the area e.g. to not bring invasive plants with them on boots, waders, boats, and propellers. This might include adopting something similar to the successful “Lake Host” program .	PRLAC, local volunteers, NHLA, NH Rivers Council	Staff/ Volun. Time, $10,000 grant	Long
3.3.2.	Work with NH DES to identify a quiet water segment of Pemi for possible milfoil herbicide treatment. Explore state/grant funding.	PRLAC, NHDES	Staff/ Volun. Time, $10,000 grant	Long
3.4.1.	Maintain volunteer efforts such as VRAP through state support.	PRLAC, NHDES	Staff/ Volun. Time, $1,000 grant	Annual
3.4.2	Make sure that keeping up with septic system maintenance is a top priority at state facilities even as budgets are cut.	PRLAC, NHDES	Staff/ Volun. Time	Annual
3.4.3	Develop a public education program on use/care of private septic systems.	PRLAC, NHDES, local businesses	Staff/ Volun. Time + $2,500	Medium
3.4.4	Expand the VRAP program to include more sites, more testing for E coli and salt.	PRLAC, NHDES, PSU, local businesses	Staff/ Volun. Time + $1,000	Medium
3.4.5	Develop a program to use NH DES underwater testing devices (in-situ dataloggers) for continuous monitoring in select sensitive areas such as waste water treatment plants or agricultural areas.	PRLAC, NH DES	Staff/ Volun. Time	Medium
3.5.1.	Identify and publish location of all impaired waters along the Pemi and communicate the implications of these impairments locally.	PRLAC, NH DES	Staff/ Volun. Time	Annual

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
3.6.1.	Encourage towns/road agents to develop low salt areas of roadways.	PRLAC, NH DES, CCs	Staff/ Volun. Time	Short
3.6.2.	Assist communities in developing and adopting aquifer protection ordinances.	PRLAC, NH DES, PBs, CCs, LRPC, NCC	Staff/ Volun. Time, >$10,000 grant	Medium
4	**Water Quality - Cumulative Impacts**			
4.1.1.	Work with communities to encourage the use of development techniques designed to enhance infiltration of stormwater runoff along tributaries.	PRLAC, NH DES, PBs, CCs, LRPC, NCC	Staff/ Volun. Time, >$10,000 grant	Medium
4.1.2.	Expand the Shoreland Protection Act to cover third order streams.	PRLAC, NH DES	Staff/ Volun. Time	Long
4.1.3.	Encourage communities to strengthen local code enforcement.	PRLAC, municipalities	Staff/ Volun. Time	Medium
4.1.4.	Increase education for road crews regarding Best Management Practices.	PRLAC, NH DES, municipalities	Staff/ Volun. Time + $1,000	Medium
4.1.5.	Ensure that setbacks and vegetative buffers are adequate while development continues.	PRLAC, NH DES, municipalities	Staff/ Volun. Time	Short
4.1.6.	Consider watershed-wide impacts to the river.	PRLAC, NH DES, municipalities	Staff/ Volun. Time	Annual
4.2.1.	Build a culture of river stewardship so that people want to comply with water quality protection regulations.	PRLAC, local organizations, municipalities	Staff/ Volun. Time + $100 printing	Annual
4.2.2.	Support restored funding for NH DES staff for education and outreach about what the rules are and why they are important.	Legislature		Short

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
4.2.3.	Encourage the restoration of the Shoreland Protection Act to 2008 protections and an increase in both enforcement and outreach.	PRLAC, Legislature		Short
4.2.4.	Encourage consistent enforcement of state and local rules to be fair to landowners.	PRLAC, NH DES, municipalities	Staff/ Volun. Time	Annual
5	**Access/Trash**			
5.1.1.	Consider whether the pros of more public accesses, e.g., being able to manage access and greater (long-term) public appreciation of the river, would outweigh the increased use that might result.	PRLAC, NH DES, NH F&G, NH DRED, municipalities	Staff/ Volun. Time	Long
5.1.2.	Encourage owners of informal accesses to grant easements to an organization such as the Rivers Council capable of organizing stewardship by partnering with, e.g., scouts and schools with public service requirement.	PRLAC, NH Rivers Council, municipalities	Staff/ Volun. Time + legal fees	Long
5.1.3.	Explore the possibility of NH Fish and Game funding for an access.	PRLAC, NHF&G, municipalities	Staff/ Volun. Time + legal fees	Long
5.1.4.	Consider working with a large landowner on the river to provide another public access.	PRLAC, municipalities	Staff/ Volun. Time + legal fees	Long
5.1.5.	Increased availability of boating/fishing access maps might decrease trespassing on private lands. More information is needed as to where public access points are located for fishing, swimming and boating.	PRLAC, NHF&G, municipalities	Staff/ Volun. Time + $100 printing	Medium
5.2.1.	Work with local organizations, businesses and PSU to make Livermore Falls more state park-like.	PRLAC, PSU, local org. and businesses	Staff/ Volun. Time	Annual
5.2.2.	Maintain a dialogue with the newly-formed Friends of Livermore group	PRLAC, Friends of Livermore	Staff/ Volun. Time	Annual

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
5.2.3.	Provide trash containers and trash removal.	Municipalities, land owners, local org., businesses	Staff/ Volun. Time + $500	Annual
5.2.4.	More signage and public education regarding carry in – carry out was also suggested.	PRLAC, municipalities, NH the Beautiful	Staff/ Volun. Time + $500	Short
5.2.5.	More public outreach would be helpful regarding clean-ups and trail maintenance activities to raise public awareness and increase involvement. One suggestion was to have those planning the activities, such as AMC notify local conservation commissions who can then help spread the word to others who might be interested in participating.	PRLAC, municipalities, NH the Beautiful, business, local org.	Staff/ Volun. Time + $500	Annual
5.2.6.	Review current community/PSU plans to protect the area long term. Determine if PRLAC needs to have a role in this effort.	PRLAC, PSU, municipalities	Staff/ Volun. Time	Short
5.3.1.	Engage local boat rental businesses in oversight and building culture of stewardship.	PRLAC, local business	Staff/ Volun. Time	Short
5.3.2.	Use “river hosts,” i.e., like campground hosts, for user education and oversight.	PRLAC, local volunteers, NHLA, NH Rivers Council	Staff/ Volun. Time, $10,000 grant	Medium
6	**Stewardship and Outreach**			
6.1.1.	Increase community engagement/outreach and PRLAC participation, especially from planning board members.	PRLAC, municpalities	Staff/ Volun. Time	Annual
6.1.2.	Multiple avenues are needed for public education, including pamphlets, school programs, town websites, and involvement of the conservation commissions.	PRLAC, municpalities	Staff/ Volun. Time + $250 printing	Annual

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
6.1.3.	Enhance local communication to communities so that towns are more likely to adopt this plan and work towards implementation.	PRLAC, municpalities	Staff/ Volun. Time	Medium
6.1.4.	Encourage closer collaboration between all town boards and commissions.	PRLAC, municpalities	Staff/ Volun. Time	Annual
6.1.5.	Meet with planning boards, school nature clubs, scouts, chambers and other groups.	PRLAC, municpalities, local org.	Staff/ Volun. Time	Annual
6.1.6.	Arrange for public presentations and outdoor workshops on topics of interest, including some for children that will engage parents as well.	PRLAC, local org., school, NH DES, NH F&G	Staff/ Volun. Time	Annual
6.1.7.	Discuss research opportunities with PSU Center for the Environment as a way to also engage students in building a culture of stewardship.	PRLAC, PSU	Staff/ Volun. Time	Medium
6.1.8.	Make better use of VRAP monitoring as a public education tool, e.g., include some results with the annual report, engage more volunteers, publicize the program and test results in the newspapers.	PRLAC, municipalities, media	Staff/ Volun. Time	Annual
6.1.9.	Make sure towns know what each other is doing in regard to shoreline regulations and enforcement. PRLAC needs to be a resource for the towns.	PRLAC, municipalities, LRPC, NCC	Staff/ Volun. Time	Annual
6.1.10.	Continue efforts to include Lincoln and Woodstock in the river stewardship conversation. While these planning boards do not support joining the RMPP, they share the PRLAC towns' value of the river as a local and regional resource.	PRLAC, municipalities, NCC	Staff/ Volun. Time	Annual
6.1.11.	Make a deliberate effort to exchange information and concerns with corridor landowners. Since funding was not available to do a corridor landowner survey, perhaps some other avenue could be explored.	PRLAC, municipalities	Staff/ Volun. Time + $500 printing/ mailing	Medium
6.1.12.	To ensure that the next generation also values the river and understands their role as river stewards, conduct outreach through the schools, including educational events where parents are invited, and also through the scouts.	PRLAC, local org., NH DES, NH F&G, County Conservation Districts	Staff/ Volun. Time + $2,500	Medium

ID	Action	Responsible Parties	Estimated Cost/ Funding Source	Time Frame*
6.1.13.	Outreach to residents could also be conducted through the town website, including contact information for concerns about the river (PRLAC chair and DES).	PRLAC, municipalities	Staff/ Volun. Time	Annual
6.1.14.1.	Opportunities identified to increase outreach and education for residents and visitors include: have planning boards and conservation commissions host a one-day training workshop on a special topic and rotate these among the towns;	PRLAC, municipalities	Staff/ Volun. Time + $500	Annual
6.1.14.2.	Opportunities identified to increase outreach and education for residents and visitors include: get in the newspapers as feature articles on specific river-related topics;	PRLAC, media	Staff/ Volun. Time	Annual
6.1.14.3.	Opportunities identified to increase outreach and education for residents and visitors include: include pamphlet in sewer and water bills;	PRLAC, municipalities, utilities	Staff/ Volun. Time + $250 printing	Medium
6.1.14.4.	Opportunities identified to increase outreach and education for residents and visitors include: develop and continue school programs like the storm drain stencils;	PRLAC, NH DES, UNH Coop. Ext., schools, scouts, CC, local businesses	Staff/ Volun. Time + $250 materials	Medium
6.1.14.5.	Opportunities identified to increase outreach and education for residents and visitors include: use bulletin boards and info booths at libraries; town halls, Cannon Mountain, the chamber of commerce, and local stores.	PRLAC, municipalities, Chambers, local businesses	Staff/ Volun. Time + $250 printing	Annual
6.1.15.	Explore opportunities to supplement the PRLAC income (administration, outreach, monitoring) through businesses and industry that have interests associated with the river.	PRLAC, local businesses	Staff/ Volun. Time	Short
6.1.16.	Increase public involvement and education in protection of water resources through local workshops, and other media. This would include threats to water quality as well as trash/litter issues. This would most likely involve solicitation of grant money.	PRLAC, local org., NH DES, NH F&G, County Conservation Districts	Staff/ Volun. Time + $2,500	Medium
7	**Other**			
7.1.	Some scenic views of the river need to be reopened.	PRLAC, municipalities, landowners, NH DOT, power companies	Staff/ Volun. Time	Medium