Nashua, Squannacook, and Nissitissit Rivers

Stewardship Plan Appendices

Appendix A: Dams

Ayer Ice House (now Grady Research) on the Nashua River in Harvard, MA.

Falls at Ayer Ice House Dam.

Two historic run-of-river hydropower dams are located on the reach of the Nashua River proposed for designation: Ice House Dam in Ayer, owned by Ice House Partners, Inc. and Pepperell Dam in Pepperell, MA, owned by Pepperell Hydro Co. (a subsidiary of Eagle Creek Renewable Energy).

On the Squannacook River, there is one working run-of-river dam owned by Hollingsworth and Vose in West Groton, and four non-working historic run-of-river dams, including: the Squannacook Dam in West Groton and the Townsend Dam, Adams Dam and Mason Road Dam in Townsend.

The Turner Dam on the Nissitissit River was removed in 2015 with federal, state, local and private funding and partnerships. The only other dam on the Nissitissit, the Guarnottas Dam, is breached; only remnants remain below the waterline.

All of the existing dams have important historical and cultural values deeply rooted in the history of the communities and their early development.

Working Dams

Pepperell Dam

The first paper mill was established at the site near the current Pepperell Dam in either 1834 or 1835.[1] Historical documents indicate the first dam was built at Babbitasset Falls (on the Nashua River) in the early 1860s. The location and layout of the dam changed over the years, and the current dam and powerhouse were built in 1920 by the Pepperell Paper Company.[2] The Pepperell Paper Company closed in the early 2000s, and Pepperell Hydro Company, LLC (PHC) purchased the property in 2004. The power plant was grandfathered for operation under the Federal Energy Regulatory Commission (FERC) until upgrades were begun in 2007 by PHC, triggering the need for a FERC license.

At the request of the NPS, the PHC project area was excluded from the Nashua River Wild and Scenic Rivers Study Act, so as not to have the Wild and Scenic River Study efforts interfere with PHC obtaining a FERC license. Subsequently, the NPS confirmed to FERC by letter dated July 17, 2015 that the licensing of the Pepperell Project would

1 Pepperell "History of the Town," *http://www.town.pepperell.ma.us/131/History-of-the-Town.*

2 Pepperell Hydro Company, LLC; FERC Order Issuing Original License Project, P-12721-006, Sept. 8, 2015.

not be in conflict with the Wild and Scenic River Study. PHC received a FERC license in 2015 (FERC Project Number P-12721), and in 2016 PHC was sold to Eagle Creek Renewable Energy (retaining the PHC name for the project).

The dam operates as run-of-river (outflow from the project equals inflow at all times) and is 23.5-feet high, with 3-foot-high flashboards, and is 251-feet long. Flow from the Nashua River flows through a gated intake structure to a 565.5-foot long penstock. Pepperell Hydro releases a minimum flow of 15 cubic feet per second (cfs) or inflow (whichever is less) into the bypassed reach over the spillway year round. The project includes a partially constructed permanent downstream passage facility for river herring.[3]

A Recreational Plan for the dam project area has been accepted by the FERC, and will include canoe and kayak portage areas around the dam as well as new parking facilities for paddlers. The FERC licensing requires eel passage and fish passage facilities, once enough anadromous fish have reached the dam from downriver.

There are numerous cultural, recreational, and scenic values associated with the river above and below the Pepperell Dam. These include the Nashua River Rail Trail, which follows the river on the east side; J. Harry Rich State Forest, which also abuts the river on the east; the historic Covered Bridge downriver from the dam; and the Petapawag Conservation Area and boat launch in Groton. Each year, approximately 1,200 students and adult chaperones paddle the Nashua River in the dam project area as part of the Nashua River Watershed Association's River Classroom® activities. The river is the site of numerous yearly bass fishing tournaments, and is a popular destination for hunting waterfowl. Thousands of canoeists and kayakers take to the river to enjoy the quiet and scenery, and it is a destination for birders to witness osprey and bald eagles fishing the river.

Challenges upriver from the dam include the nearly one hundred acres of invasive water chestnut plants and four other invasive aquatic plants that have taken hold there. As part of the FERC licensing for the dam, PHC reached a Settlement Agreement with Stakeholders and is providing funding to address the invasive plants through the established Nashua River Regional Aquatic Invasives Alliance.

The Study Committee and the National Park Service (consistent with the NPS letter of 7-2015) deem the facility to be compatible with a Wild and Scenic River designation as currently licensed and operating. The NPS Report to Congress will further document this finding. As such, the Pepperell Project will effectively be "grandfathered" as concerns the Wild and Scenic River designation, and the NPS will recommend a technical "exclusion" area be incorporated into the designation legislation to further codify this. This will in no way hinder the post-designation Stewardship Council from working cooperatively with Pepperell Hydro Company to protect and enhance river values consistent with the intent of the Stewardship Plan, including maintaining and improving river access, controlling invasive plants in the area above the dam, preventing migration of invasive plants below the dam, and otherwise enhancing the already remarkable values associated with the river into the future for the benefit of public use.

Ice House Dam

The first dam at the current site of Ice House Dam dates back to the 1790s. The dam was used as a reference marker in laying out the towns, probably due to the rock outcrop in the riverbed, which served to anchor the dam.[4] In 1907, a powerhouse was built to power trolley cars, and ice production began in the 1920s. Power production for ice manufacturing was stopped mid-century when refrigerators became popular.[5]

3 ibid

4 Low Impact Hydropower Institute Certificate #44–Ice House Hydropower Project, Massachusetts, *http://lowimpacthydro.org/lihi-certificate-44-ice-house-hydropower-project-massachusetts-ferc-12769/.*

5 ibid

Ice House Partners, Inc. restored the hydropower facility in the early 2000s, and received a FERC license exemption in 2008 (FERC Project Number P-12769). The facility is operated as run-of-river and consists of a 190-foot long, 12-foot high dam topped with 24-inch stoplogs. The Nashua River reach that is bypassed by operating the project (measured from the dam to the tailrace outlet) is about 300 feet long. A million gallon per day flow to the Nashua River is maintained in the bypassed reach year-round. [6]

The Ice House project lies fully within the Oxbow National Wildlife Refuge. The river immediately up and down from the dam is riverine in nature, and affords paddlers and anglers every opportunity to enjoy the serene benefits of the Nashua River within the ONWR. Ice House Partners maintains a canoe put-in and take-out and fishing access on the opposite side of the river from the project works. Eel passage is maintained for elvers traveling upriver, but fish passage has not been required at the facility due to the existence of downstream fish blockages at other dam projects. The NRWA has hosted canoe and kayak-guided hand-pulls of small patches of invasive water chestnut plant upriver from the dam the past three years, which has nearly eliminated the plant from the reach.

The Study Committee and the National Park Service deem the facility to be compatible with a Wild and Scenic River designation as currently licensed and operating. The NPS Report to Congress will further document this finding. As such, the Ice House Project will effectively be "grandfathered" as concerns the Wild and Scenic River designation, and the NPS will recommend a technical "exclusion" area be incorporated into the designation legislation to further codify this. The exclusion area begins 700 feet upriver of the dam (latitude 42.55185; longitude -71.62135) and concludes 500 feet downriver of the dam (latitude 42.55325; longitude -71.61735). This will in no way hinder the post-designation Stewardship Council from working cooperatively with Ice House Partners to protect and enhance river values consistent with the intent of the Stewardship Plan, including maintaining and improving river access, controlling invasive plants in the area above the dam, and otherwise enhancing the already remarkable values associated with the river into the future for the benefit of public use. The dam is deeded to Ice House Partners, Inc. and includes historical water rights, which will not be extinguished, impaired or interfered with by this designation.

Hollingsworth and Vose Dam

The West Groton village, known as the Hollingsworth and Vose area mill village, was originally the site of a Federal Period starch mill. Paper manufacturing began at the site before the original mill burned in 1846, and continues today.[7] The village, consisting of the mill and approximately 20 houses, grew up around this industry.

H&V is now a specialty filter paper manufacturing company. The company maintains a small impoundment for process water. The dam was first constructed in the 1840s for the previous starch factory, but no original construction records are available. The dam's hydraulic height is 15 feet, and is 225 feet long, with the impounded volume of 350 acre-feet. Each year, 15-inch flashboards are installed in May and removed again in November. Water is withdrawn from the impounded area, and returned to the river downstream through a water treatment facility. H&V holds a National Pollutant Discharge Elimination System (NPDES) permit for this discharge.

Upriver of the dam, the H&V impoundment provides access to the Squannacook River for the NRWA's River Classroom® activities. Over 1,100 students and adult chaperones each year paddle north from the impoundment to learn about the

6 Federal Energy Regulatory Commission, 122 FERC 62,262, Order Granting Exemption From Licensing, *https://lowimpacthydro.org/assets/files/lihi-cert-app-files/APPENDIX-OrderGrantingExemption.*

7 Groton Historical Commission, *http://books.gpl.org/GPLDL3/HollingsworthVoseAreaFormA.pdf.*

natural environment of the Squannacook River and its environs.

The Study Committee and the National Park Service deem the facility to be compatible with a Wild and Scenic River designation. The NPS Report to Congress will further document this finding, and although this project is not licensed by FERC, it does have a federal permit in the form of its NPDES discharge permit. As such, the H&V dam, together with its NPDES permit, will effectively be "grandfathered" as concerns the Wild and Scenic River designation, and the NPS will recommend a similar technical "exclusion" area be incorporated into the designation to further codify this. The exclusion area for the H&V dam is proposed to be approximately 2,665 feet downriver from the dam (latitude 42.60791; longitude -71.63240) and approximately 1,200 feet upriver to the shore of the impounded area (latitude 42.61421; longitude -71.63899). This will in no way hinder the post-designation Stewardship Council from working cooperatively with H&V to protect and enhance river values consistent with the intent of the Stewardship Plan into the future for the benefit of the public.

Non-Working Dams

All the dams described below are run-of-river dams with no active current use.

Townsend Dam

Dams have been recorded on this site back to the 1730s. The adjacent building called the Cooperage was built in 1733 as a mill for sawing boards.[8] An historic gristmill is located at the site. The current dam, owned by Hollingsworth and Vose, was constructed in the 1870s and has no current active use. The dam's hydraulic height is 8.3 feet and its length is 93 feet.

The impoundment created by the dam is Harbor Pond, which is the end-point for the Squannacook River Canoe Race held each year by the Townsend Lions Club. Paddlers can maneuver up the Squannacook River above the dam, or put in below the dam and paddle down to Bertozzi Wildlife Management Area. The Squannacook River is a popular coldwater fishery. Groundbreaking for the Squannacook River Rail Trail will be held in late 2018, and will run alongside the river for three miles.

Squannacook River Dam

Straddling the Groton-Shirley line in West Groton, this dam powered the former Groton Leatherboard Company. Currently having no active use, the dam is maintained by the Town of Groton. The dam is approximately 150 feet long and 18 feet high. It includes a concrete spillway on the left side that leads to a concrete outlet works.[9] A low-level wooden outlet structure about 40 inches square is operated once each year, and is generally kept open a couple of inches. River Court Residences, a senior housing facility, abuts the dam on the eastern downriver side.

8 Townsend Historical Society Properties, *http://www.townsendhistoricalsociety.org/properties.html*.

9 Haley & Aldrich, "Squannacook River Dam Phase I Inspection/Evaluation," for the Town of Groton (October 17, 2017).

Adams Dam

The run-of-river Adams dam was built in the early 1800s, and was used by Adams Mill. A mill building was present on the site until the 1970s, when it was torn down. The dam is currently owned by the Town of Townsend.

Mason Road Dam

The Mason Road run-of-river dam was built in the early 1800s or earlier, and has no current active use. The stone dam is approximately 7.5 high. A 1915 Report to the Board of Water Commissioners of the City of Fitchburg, Massachusetts mentions this dam was no longer in active use at that time.[10]

Non-working Dams Recommendation

These non-working run-of-river dams need not be excluded from the proposed designation because they have little impact on the free-flowing character of the river and have important historical character that contributes to the proposed Wild and Scenic River designation. No federal permits or licenses exist related to these facilities. The Wild and Scenic River designation would not inhibit the maintenance and/or repair of these structures, nor would it inhibit dam removal in the event that a dam owner chose to pursue such removal. Any dam removal consideration must be consistent with state dam removal guidance and local interests.

10 Fitchburg, Massachusetts, "Report to the Board of Water Commissioners of the City of Fitchburg upon Water Power Privileges affected by the diversion of the waters of Ashby Reservoir" (August 12, 1915).

Appendix B: Regulatory Review

So-called "nursery log" in a local wetland is a miniature ecosystem. Photo: Kim King.

State Regulations for Resource Protection

This chapter is a snapshot review of existing laws, regulations, programs and policies in Massachusetts and New Hampshire that enable and inform planning and resource protection efforts in the towns within this Stewardship Plan. It is designed to be useful as an information resource to communities and the future Stewardship Council.

Municipalities have important regulatory powers authorized under state laws governing land use that impact water quality and habitat. These include the framework to produce local Master Plans and Open Space Plans, as well as authority to adopt local by-laws including those addressing zoning, subdivision, Low Impact Development (LID), and wetlands.

Wetland Protection

The **Commonwealth of Massachusetts**, through its Wetlands Protection Act, regulates all activities within a 100-foot buffer zone to all wetlands as defined in the Act. These include "…*bank, riverfront area, fresh water wetland, coastal wetland, beach, dune, flat, marsh, meadow, or swamp bordering on the ocean or on any estuary, creek, river, stream, pond or lake, or any land under said waters of any land subject to tidal action, coastal storm flowage, or flooding.*"[1]

The **Rivers Protection Act** protects all land within 200 feet of the high water mark of rivers and perennial streams. Isolated lands subject to flooding greater than one-quarter acre with a water depth of six inches are also protected.

1 Wetlands Protection Act, Massachusetts General Law Chapter 131 Section 40.

The Massachusetts **Wetlands Protection Act** identifies eight interests, which ideally all projects proposed within wetland resource areas must meet:

1. Protection of public and private water supplies
2. Protection of groundwater
3. Flood control
4. Prevention of storm damage
5. Prevention of pollution
6. Protection of land containing shellfish
7. Protection of wildlife habitat
8. Protection of fisheries

Home Rule powers under Article 89[2] of the Massachusetts Constitution have allowed more than half of Massachusetts's 351 cities and towns to adopt general (non-zoning) local wetland bylaws or ordinances. These bylaws and ordinances give Conservation Commissions further power to protect wetlands through enhanced buffer zones and other means.

The State of New Hampshire, on the other hand, has no statewide official buffer zone, although its Department of Environmental Services has a Wetlands Bureau that regulates activities in wetlands themselves. The New Hampshire legislature, through Revised Statutes Annotated RSA 482-A, allows municipalities to adopt local wetland protection ordinances, which can include provisions for buffer zones of various widths to provide additional protection above and beyond that afforded by the State. About 84 New Hampshire cities and towns have local wetland protection ordinances.

Since towns in both states can adopt local wetland protection bylaws and ordinances, the question then arises as to what width a buffer zone should be. Several studies have been conducted through the years to determine just how wide a buffer zone needs to be to protect certain values and functions of wetlands. These studies have shown that different wetland values and functions require buffer zones of varying width. For instance, in order to filter out sediments and pollutants that would reach water bodies, wetlands may require a modest buffer zone of only 50 to 100 feet.

In order to protect the widest possible diversity of wildlife species that breed and live in wetlands, including amphibians that breed in wetlands but spend part of their life cycle in adjacent uplands, a wider buffer zone up to 700 feet wide is recommended. However, as such extremely wide buffers are often difficult to implement in many towns, the general practice is that a buffer of 100 feet provides a good deal of protection to wetlands and their associated wildlife habitat functions, while being a reasonable width to regulate.

In both Massachusetts and New Hampshire, the local Conservation Commissions are on the front lines of wetlands protection. In New Hampshire, their function is more advisory, whereas in Massachusetts they have the ability to issue permits for activities in and adjacent to wetlands. In both states, the Conservation Commissions are likely to draft local wetland protection bylaws and ordinances, although adoption requires approval of Town Meeting.

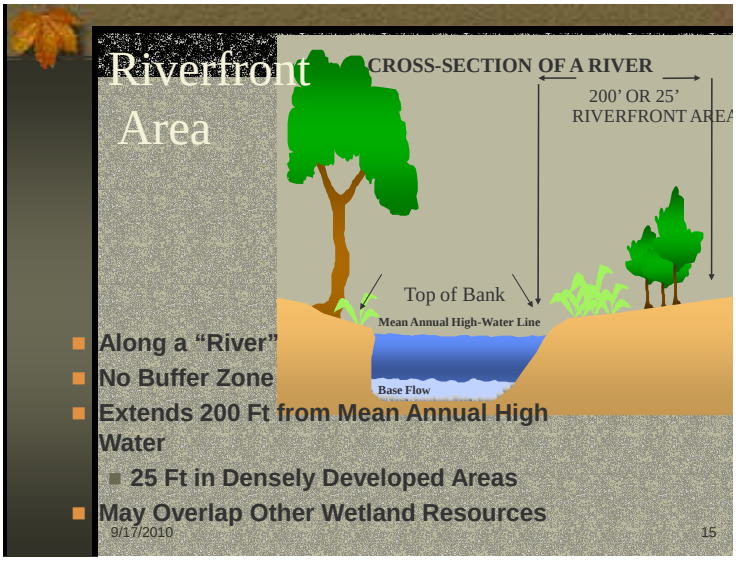
In each town, the Conservation Commission must weigh the environmental threats to wetlands against the political will to protect them. Some towns have public support for a reasonably wide buffer zone, whereas in others that is currently politically impractical. In the latter case, the Conservation Commission can set out to educate citizens on the important functions of wetlands and their contribution to our quality of life. Once people fully understand how valuable wetlands are, they are more likely to vote to approve a local wetlands bylaw or ordinance that provides more protection than state law provides.

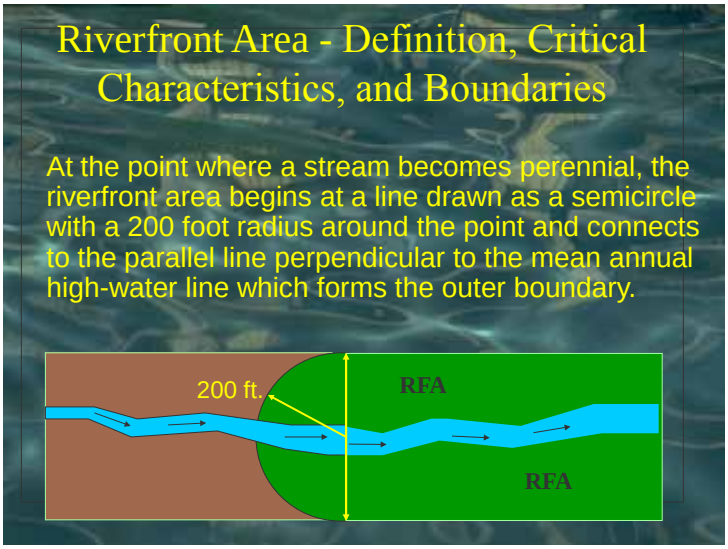
2 Massachusetts Department of Revenue, Division of Local Services, Technical Assistance Section, (online PDF) "What is Home Rule" *http://www.mass.gov/dor/docs/dls/mdmstuf/technical-assistance/best-practices/homerule.pdf.*

River and Shoreland Protection

In the Commonwealth of Massachusetts, the **Rivers Protection Act** (RPA), Chapter 258 of the laws of 1996, protects the shoreland areas along rivers and streams. The RPA creates a 200-foot wide riverfront area that extends along both banks of perennial rivers and streams. In certain urban areas where it is recognized that a natural buffer is no longer possible, a riverfront area of 25 feet has been designated.

The RPA does not set up a new permitting process or reviewing authority, but is administered by local Conservation Commissions and the Massachusetts Department of Environmental Protection, under the same procedures as the Wetlands Protection Act. Projects proposed within the riverfront area must meet the eight (8) purposes of the Massachusetts Wetlands Protection Act, which are listed in the preceding discussion of wetlands. The following figures illustrate the jurisdictional areas under the Massachusetts Rivers Protection Act.





Figures 1 and 2 Riverfront areas in the Massachusetts Rivers Protection Act. Source: Philip Nadeau, Massachusetts Dept. of Environmental Protection

In Massachusetts, the 1975 **Squannacook and Nissitissit Rivers Sanctuary Act** provides some additional protection to land adjoining those rivers in several of the participating towns in Massachusetts. The Act prohibits direct discharges of pollutants and stormwater into the waters of the two rivers. The short text of the act (MA Gen Law Chap. 132A § 17) follows:

> **Section 17**. There is hereby established in the towns of Ashby, Groton, Pepperell, Shirley, Townsend and Lunenburg a protected area to be known as the Squannacook and Nissitissit Rivers Sanctuary. Said Squannacook and Nissitissit Rivers Sanctuary shall be comprised of the waters of the Squannacook River and its tributaries, to wit: Ash swamp, Ashby reservoir, Bayberry Hill Brook, Bixby Brook, Flat pond, Flat Pond Brook, Fitchburg reservoir, Locke Brook, Mason Brook, Pearl Hill Brook, Pumpkin Brook, Trap Fall Brook, Trout Brook, Walker Brook, Willard Brook, Witch Brook with the exclusion of that section of the Squannacook River from the Hollingsworth and Vose Dam at West Groton located approximately North 42° 36" 45º, West 71° 38" 7º on the U. S. Geological Survey map Shirley quadrangle to the confluence of the Nashua River; and the waters of the Nissitissit River and its tributaries to wit: Coon Tree Pond, Gulf Brook, Heald Pond, Mine Brook, Pork Barrel Pond, Park Barrel Pond Brook, Stewart Brook, Sucker Brook, Wolf Brook.
>
> After the effective date of this act, no new discharge of treated or untreated sewage or other wastewater will be permitted to be discharged to the Squannacook and Nissitissit Rivers Sanctuary. For the purpose of this section, sewage shall mean the water-carried waste products or discharges from human beings, sink wastes, wash water, laundry wastes and similar so-called domestic waters; wastewater shall mean sewage, liquid or water-carried waste products or discharges from human beings, sink wastes, wash water, laundry wastes and similar so-called domestic wastes, and also sewage, liquid or water-carried waste from industrial, commercial, municipal, private or other sources; and person shall mean any individual, association, partnership, corporation, company, business, organization, trust, estate, the commonwealth or any political subdivision thereof, any administrative agency, public or quasi-public corporation or body or any other legal entity or the legal representatives, agents, or assignees thereof.
>
> No person shall install or construct, or cause to be installed or constructed, any new outfall, drainage pipe, ditch, channel or other conveyance to carry stormwater runoff, either directly or indirectly from any structure, parking lot, or storage yard, other than from a one- or two-family residence and appurtenant parking and storage facilities, into the Squannacook and Nissitissit Rivers Sanctuary or any tributaries thereof until plans have been approved by the planning board and conservation commission of the affected town in which the pipe, ditch, channel or other conveyance is located.
>
> Said town may require the construction of any structure or structures or treatment works which it deems necessary to prevent the pollution of the Squannacook and Nissitissit Rivers Sanctuary by matter carried by such storm water runoff.
>
> The attorney general shall take such action as may be necessary from time to time to enforce the provisions of this section. The superior court shall have jurisdiction in equity to enforce the provisions of this section. [3]

3 Massachusetts Gen Law Chap. 132A § 17.

In New Hampshire, the **Comprehensive Shoreland Protection Act** (CSPA), RSA 483-B, is the State's regulatory approach to shoreland protection. It applies to all streams of fourth order[4] and greater, designated rivers, tidal waters and lakes, ponds and impoundments over 10 acres. The State maintains a directory of water bodies that are subject to the CSPA.

The CSPA applies to all development and land-use activities within 250 feet of the water's edge or the high water mark, which is called the "reference line." This entire 250-foot wide area is termed the protected shoreland. Within this protected shoreland, levels of protection vary, depending on the distance between the proposed impact and the reference line.

The most restrictive area is the "waterfront buffer," which extends from the reference line 50 feet landward. Within this zone, a natural buffer of native vegetation and natural ground cover must be maintained, with only minimal disturbance allowed. The next area out is the "natural woodland buffer," which must maintain a certain percentage of native vegetation and natural ground cover between 50 and 150 feet from the reference line. In order to determine the quantity of trees to remain within the waterfront buffer, the State has developed a point system that applies different scores to trees based on their diameter at breast height. A description of how this point system works can be found at the linked documents below. Between 150 and 250 feet of the reference line, there are no limitations on vegetation removal.

The CSPA places restrictions on impervious surfaces, lot subdivision, excavation, and filling within the protected shoreland. Lots may not have greater than 30% impervious cover. Developments proposing more than 20% impervious surfaces must install a stormwater management system to the satisfaction of the State. The guidance document prepared by the New Hampshire Department of Environmental Services (NH DES) emphasizes low-impact development (LID) systems as the preferred stormwater management methodology. The New Hampshire DES recently published an environmental fact sheet detailing how vegetation must be maintained within the various areas of the protected shoreland: *http://des.nh.gov/organization/commissioner/pip/factsheets/sp/documents/sp-5.pdf*

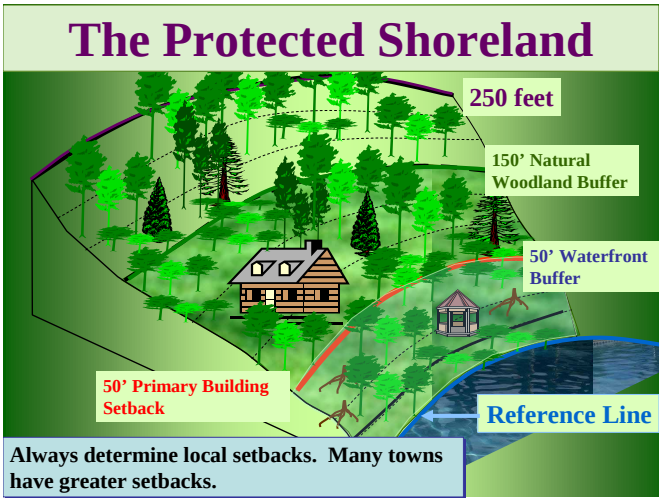


Figure: Jurisdictional areas in New Hampshire Comprehensive Shoreland Protection Act. Source: Jay Aube, Shoreland Protection Specialist, New Hampshire DES.

In addition to the Comprehensive Shoreland Protection Act, New Hampshire also has a **Rivers Management and Protection Program**, which was established in 1988 with the passage of RSA 483 to protect certain rivers, called designated rivers, for their outstanding natural and cultural resources. The program is administered by New Hampshire DES. More information on the New Hampshire statute, the Rivers Management and Protection Program, and a list of Designated Rivers can be found at the following URLs:

http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-L-483.htm

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

https://www.des.nh.gov/organization/divisions/water/wmb/rivers/designiv.htm

4 Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams, while the largest river in the world, the Amazon, is a twelfth-order waterway. First- through third-order streams are called headwater streams.

A similar program, called the Lakes Management and Protection Program, is applicable to New Hampshire lakes.

http://des.nh.gov/organization/divisions/water/wmb/lakes/categories/overview.htm

Municipal Regulations for Resource Protection in the Study Area

This review summarizes the existing municipal regulations and planning documents in the towns participating in the Nashua, Squannacook, and Nissitissit Rivers Stewardship Plan. It shows how each town addresses the protection of the Outstandingly Remarkable Resource Values (ORRVs) and assesses the town's capacity to enforce and enhance regulatory measures to protect the ORRVs and the river corridors proposed for inclusion in the Nashua River Wild and Scenic River Corridor. Low Impact Development also helps retain and protect natural habitat for native plants and animals. The narrative analyzes the relevant municipal land use regulations, Master Plans, Open Space Plans, Recreation Plans, and other plans and policies of the participating towns.

The following major subjects and aspects of regulatory land-use controls are described for each participating towns:

a. **Master Planning -** The municipal Master Plan, Open Space and Recreation Plans, and other related pertinent plans.
b. **Land-Use Controls -** Provisions in municipal zoning bylaws (called ordinances in New Hampshire) and regulations
c. **Water Resources Zoning and Regulations** – Provisions for local wetland protection and stormwater management.
d. **Protection of Key Habitat and Natural Communities** – Relevant land protection and natural resource protection.
e. **Planning Capacity** – The town's resources in terms of a Town Planner or other planning official, Wetland or Conservation Agent or Administrator and other staff, and whether towns have adopted programs, such as the Community Preservation Act in Massachusetts, that can provide some funding for conservation efforts.

Master Planning

In both Massachusetts and New Hampshire, the municipal Master Plan serves as the framework that supports a town's regulatory measures, goals, and objectives relating to land use and development. Ideally, Master Plans are updated on a regular basis, with ten years considered the desired interval for assessing whether such Plans or sections of Plans are still current or need to be revised. For purposes of this Stewardship Plan, town **Master Plans** with a chapter devoted to the protection of water resources are considered superior to Plans in which water resources are described more generally under the chapter devoted to Natural Resource protection.

In Massachusetts, but not New Hampshire, towns are required to adopt State-approved "Open Space and Recreation Plans" if they want to be eligible for certain state-funded grant programs for the acquisition and improvement of open space and the development of recreational facilities.

The **Community Preservation Act** (CPA) is a smart growth tool that helps Massachusetts communities preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities.

CPA allows communities to create a local Community Preservation Fund for open space protection, historic preservation, affordable housing and outdoor recreation. Community preservation monies are raised locally through the imposition of a surcharge of not more than 3% of the tax levy against real property, and municipalities must adopt CPA by ballot referendum. To date, 172 municipalities in Massachusetts have adopted CPA. (See "Where Does CPA Funding Come From?" at *http://www.communitypreservation.org/CPA_Funding*.)

The CPA statute also creates a statewide Community Preservation Trust Fund, administered by the

Department of Revenue (DOR), which provides distributions each year to communities that have adopted CPA. These annual disbursements serve as an incentive for communities to pass CPA.

Each CPA community creates a local Community Preservation Committee (CPC) upon adoption of the Act, and this five-to-nine member board makes recommendations on CPA projects to the community's legislative body. This report will not describe each committee, but will note which towns have qualified and are participating in these programs as a wider indicator of their conservation-mindedness. (See "Community Preservation Committees - Composition and Duties" at *http://communitypreservation.org/CPCs*.)

Land-Use Controls

Rather than examine the entirety of the scope of each town's zoning ordinance or bylaw, this Stewardship Plan focuses on those types of zoning and regulations that are most directly related to or can be used to enhance the protection of the ORRVs identified in this Stewardship Plan.

The first zoning tool that is examined is **Open Space Residential Development** (OSRD), also known as Natural Resource Protection Zoning, which is related to older, more basic approaches such as cluster zoning, conservation subdivision, or flexible zoning. Under this variation of subdivision development, a certain percentage of the entire parcel subject to development must be preserved as permanently protected open space, while generally permitting a similar number of housing units to be developed as in a conventional "grid" subdivision.

Over the years, the practice and standards for OSRD have evolved. The amount of open space preserved in early OSRDs was often low, in the range of 25% to 30% of the total tract area, often including large areas of wetlands and other undevelopable areas. The most recent standards for OSRD call for the preservation of at least 50% of the total tract being developed as open space, with no more than 50% of it, sometimes less, allowed to be wetlands or other undevelopable land. The open space areas thus set aside can be linked to other protected land, preserving networks of open space across an entire town or on a regional level.

Early OSRD bylaws usually required that such developments obtain both subdivision and special permit approval, which can be a time-consuming, expensive, and uncertain permitting process for landowners and applicants. As a result, such bylaws often are not utilized for most development. Best practice now calls for OSRDs to be allowed "by right," meaning they are considered a preferred form of subdivision development that need only obtain subdivision approval.

Another important land-use control subject to regulation is development on steep slope areas, usually defined as slopes in excess of 15% or 20%. Development on steep slopes often leads to erosion problems that require expensive engineering solutions to prevent or correct. Development on slopes also often requires more extensive clearing and grading than development in more level areas, thereby removing more natural habitat and reducing the capacity of plants and soils to absorb precipitation.

Most towns do not specify a maximum slope for development per se (although some do), but rather limit the percentage maximum slope of roads and driveways, which indirectly helps to minimize development of such steep areas. These maximum permissible road and driveway slopes are often in the range of 10% to 15%. Some towns do a better job of addressing erosion control measures in their subdivision and site plan regulations. In general, the more specific such provisions are, the greater the erosion control.

Another important land use control is the maximum percent of a lot that may be rendered impervious to water. Hard surfaces such as asphalt, concrete, and even hard packed gravel can prevent water from infiltrating into the soil, resulting in rainwater running off the impervious surfaces. The runoff often is contaminated with petroleum products, road salt, pesticides, herbicides, lawn fertilizers, and other pollutants, which are then released into nearby

water bodies. Increased imperviousness also reduces recharge of groundwater, which is important to maintain stream flows and water supplies. Reducing impervious surfaces by specifying a maximum lot coverage for buildings and parking lots can help to prevent stormwater runoff, which is now a leading cause of surface water pollution[5] according to the US Environmental Protection Agency. Parking requirements that reduce the number of required parking spaces or allow for shared parking between adjacent lots can also help reduce stormwater pollution.

Many towns have adopted aquifer protection overlay districts to protect their most important groundwater resource areas from pollution. These bylaws often prohibit the most risky land-uses, such as gas stations, underground storage tanks, certain industrial processes, dry cleaning, etc. from being sited over porous sand and gravel deposits (aquifers) that can supply a clean source of public drinking water. For other land uses, such overlay districts require a greater degree of care when building or undertaking certain activities.

As groundwater often supplies a large degree of "baseflow" to rivers and streams, especially in summer, protecting groundwater aquifers can help to safeguard water quality in coldwater streams hosting many of the ORRVs identified in this Stewardship Plan.

Floodplain overlay districts are used to restrict development in low-lying areas subject to flooding or adjacent to rivers and streams in upland areas that can also be subject to flash flooding. While not often prohibiting development outright, such districts can require that any building in a floodplain be elevated above the base flood level and require such buildings to have flood insurance. To prevent aggravated flooding in adjoining areas, filling is generally prohibited in regulated floodplains.

Changes in the hydrological cycle resulting from climate disturbance are leading to a greater number of intense rainfall events in many regions, including New England[6]. It is important that towns make sure they are using up-to-date floodplain maps and stormwater calculations that reflect this new reality. Because the standardized mapping only considers historic flood data, communities should consider including additional safety factors to plan for future flood events.

Water Resource Zoning and Regulations

In both Massachusetts and New Hampshire, towns can adopt local **Wetland Protection bylaws/ ordinances** that supplement and expand upon the protection offered wetlands through the respective State Acts. As New Hampshire does not set a minimum regulatory buffer zone of 100 feet, as does Massachusetts, such bylaws are perhaps of even greater value in that state. However, bylaws are also important in Massachusetts, where the buffer zone is subject to review but not actual protection. Such bylaws can specify no-build and no-disturbance buffers, within which new buildings or disturbances to the land are prohibited within a specific distance to the edge of wetlands. Recent science on the performance of such buffers in protecting both wetlands and surface waters from degradation supports making the buffers as wide as possible, up to several hundred feet in some studies. The summary table and town descriptions provided in this document list the buffers, if any, of each town within the Nashua River Wild and Scenic area.

Stormwater management programs are also a vital part of water resource protection. The leading cause of water pollution today comes not from point sources such as outfall pipes of factories, but from runoff from impervious surfaces such as roads and parking lots, which carry loads of sediment

5 "Stormwater Problems and Impacts: Why All The Fuss?" *http://riverlink.org/wp-content/uploads/2014/01/stormwaterseriesfinal1.pdf.*

6 See presentation by David Vallee, Hydrologist-in-Charge of National Weather Service's Northeast River Forecast Center, on the topic of "Climate Trends in New England and Their Impact on Our Rivers" at the 2017 NRWA Annual Meeting at *http://nashuariverwatershed.org/images/pdf/Vallee_NashuaRvrBasin_Climotalk_Nov2.pdf.*

and pollution into surface water bodies. Many of the larger towns within the Nashua River Wild and Scenic area are subject to the Federal National Pollutant Discharge Elimination System (NPDES) Phase II program. As such, they must prepare local stormwater management bylaws as well as institute programs to clean catch basins, inspect for illegal (illicit) discharges, and otherwise educate municipal authorities and the public on how they can help to minimize stormwater pollution.

Low-Impact Development (LID) is an approach to development design that minimizes disruption of natural vegetation and soils and maintains water flow and infiltration patterns as much as possible. LID for stormwater management relies predominantly on vegetative approaches, such as rain gardens, as well as the use of natural features and naturalized areas like grassed swales, to both reduce the amount of and treat stormwater runoff. The table and town summaries describe the LID provisions, if any, of each of the participating Wild and Scenic towns.

Protection of Key Habitats and Natural Communities

The protection of key habitats and natural communities is usually addressed at the Master Planning level (including Open Space Plans) and is reflected in each town's efforts to protect the resources thus identified. Identification of such features in local plans is an important first step. Actual protection requires further actions; such as acquisition for conservation purposes or imposition of regulatory protections. The majority of participating towns in both Massachusetts and New Hampshire place a high priority on conservation and the protection of wildlife habitat, even if their regulatory framework currently needs to catch up to the Master Plan goals and objectives.

Various resources to assist with this include BioMap2 and the rare species Priority Habitat maps available by town and periodically updated by the Massachusetts Natural Heritage and Endangered Species Program (NHESP).[7] Note the importance of reporting rare species observation to NHESP and certifying vernal pools. Advance documentation is required to ensure regulatory jurisdiction.

Planning Capacity

This analysis describes the ability of a town, by having appropriate staff and by participating in programs that provide funding for planning and conservation, to implement the planning and regulatory tools that have been previously mentioned. Having either a full-time or a part-time **Town Planner** greatly enhances a town's ability to implement all types of planning, such as programs related to water resource and wildlife habitat protection. A **Conservation Agent** is someone trained in wetland science and management who assists local Conservation Commissioners with their responsibilities under state and local law. Conservation Agents can also assist their Commissions with identifying high value lands for conservation and in preparing and implementing Open Space and Recreation Plans.

Town-by-Town Review of Regulatory Framework

This section presents a town-by-town narrative description of the municipal regulations in the towns participating in the Nashua, Squannacook, and Nissitissit Rivers Stewardship Plan. It describes the plans, policies, local planning capacity, zoning and regulations, and opportunities for potential improvement for each of the following communities:

- Ayer, Massachusetts
- Bolton, Massachusetts
- Brookline, New Hampshire
- Devens Enterprise Zone, Massachusetts
- Dunstable, Massachusetts
- Groton, Massachusetts
- Harvard, Massachusetts
- Hollis, New Hampshire
- Lancaster, Massachusetts

7 *www.mass.gov/service-details/ma-endangered-species-act-mesa-overview*

- Pepperell, Massachusetts
- Shirley, Massachusetts
- Townsend, Massachusetts

Ayer, Massachusetts

Ayer is a small to medium-size town on the outskirts of the greater Boston area, about 35 miles from Boston, with easy access to interstate Route 495 and Route 2. As of 2016, Ayer's population stood at ~8,119. Ayer is fortunate in being situated on the Boston - Fitchburg Commuter Rail Line, which not only provides a commuting alternative to local residents, but can also serve as an incentive to economic development. The former Fort Devens Army Base abuts the town. Devens has since been turned into an Enterprise Zone and is a regional employment center.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. The town of Ayer is in the process of revising its master planning documents, including the Master Plan itself, as well as its Open Space and Recreation Plan. Approval of both master planning documents is anticipated in early 2018. These Plans will serve as the basis for future planning efforts for many years. Ayer is a designated Massachusetts Green Community[8].

Local Planning Capacity. The town of Ayer has a full-time Planner and a full-time Conservation Administrator. The Town is part of the Montachusett Regional Planning Commission. Ayer was an early adopter of the CPA, which the town approved in 2002. A Community Preservation Committee oversees the acquisition and preservation of open space, the creation and support of affordable housing, the acquisition and preservation of historic resources, and the creation and support of outdoor recreational uses. The Ayer Community Preservation Committee has a mission to maximize the benefits of the CPA funds for the citizens of Ayer.

Zoning and Regulations

Ayer has an Open Space Residential Development bylaw, which allows this type of development by Special Permit from the Planning Board. It requires that 50% of the total tract area be preserved as permanently protected open space, which is in line with the most recent recommendations from the Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw.

Although the town does not set a maximum slope for development per se, it does set a maximum slope of 12% for new subdivision roads, which helps to keep development out of particularly steep areas subject to erosion. Ayer has good zoning provisions for the regulation of land clearing and grading. The erosion control section of the bylaw addresses disturbances over 10,000 square feet or approximately ¼ acre. The town sets maximum building coverage as a percentage of lot area, as well as requiring a minimum percentage of open space or vegetated area on a lot, both of which help minimize impervious surfaces.

Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment. Ayer has both floodplain and aquifer protection overlay districts, both of which date back to 1999 and as such should be reviewed in light of the latest science and models for these districts.

The town is in the process of a comprehensive update of its Zoning Bylaw, with a Town Meeting vote anticipated in March of 2018. This new bylaw

8 "The MA Green Community Designation and Grant Program provides a road map along with financial and technical support to municipalities that 1) pledge to cut municipal energy use by an ambitious and achievable goal of 20 percent over 5 years and 2) meet four other criteria established in the Green Communities Act. The benefits of designation extend beyond the program itself, inspiring cities and towns to undertake additional energy-related initiatives, improve coordination between municipal staff and departments, and increase messaging with the public at large about energy-related issues and actions." *https://www.mass.gov/guides/becoming-a-designated-green-community*

will provide the framework for greater protection of natural resources in the development review process. Ayer's subdivision and site plan regulations are also in need of updating. Revising those parts of these regulations that pertain to reducing impervious surfaces, limiting the cutting of vegetation, encouraging shared parking, and otherwise retaining green space in the development process will help to reduce stormwater runoff and its attendant impacts on water resources. Ayer's floodplain maps date to 1982 and are out of date. The Town should contact the Federal Emergency Management Agency (FEMA) and state agencies responsible for updating the flood insurance maps to determine when Ayer is scheduled for a map update.

The Ayer Conservation Commission attempted to pass a new local wetlands protection bylaw in 2017, but decided to withdraw it. Ayer is subject to the federal NPDES Phase II stormwater permit, and has both a standard Stormwater Management Bylaw and a bylaw addressing illicit discharges. Low-impact development techniques are mentioned and encouraged in the bylaw, but are not required. Activities disturbing greater than 40,000 square feet (about one acre) or disturbing more than 1,000 square feet on slopes greater than 15% require a stormwater permit to be issued by the Department of Public Works. This latter requirement is a good measure to help prevent and address erosion on steep slopes.

Opportunities for Potential Improvement

The Ayer Conservation Commission should complete the process of revising the local Wetland Protection Bylaw and bringing it to Town Meeting for a vote in the near future. Additional public education and outreach may help to ensure a positive outcome to this effort.

The town should check on when the 1982 Flood Insurance Rate Maps (FIRM) are scheduled to be revised and then consider rewriting its existing floodplain overlay district provisions in light of the latest science and practices for floodplain protection.

Those sections of the subdivision and site plan regulations that pertain to reducing impervious surfaces, encouraging shared parking, and retaining green space in the development process should be added or enhanced.

Bolton, Massachusetts

Bolton is a small town on the outskirts of the greater Boston area, just south of the town of Harvard and northeast of Worcester. Bolton is bisected by interstate Route 495, which benefits commuters but also has increased development pressure in towns along its route. Between 1984 and 2004, Bolton's population increased by 80%, making it one of the fastest growing towns in Massachusetts. As of 2010, Bolton's population stood at 4,897. Most of Bolton is zoned for low-density residential use, although there are a small central business district and other non-residential zones. The western one-third of Bolton is within the Nashua River watershed, while most of central and eastern Bolton is within the Concord River watershed.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. The town of Bolton Master Plan dates back to 2006, which makes it just over 10 years old. Bolton may want to consider revising this Plan in the near future, as ideally Master Plans should be revisited every ten years or so in order to stay current and reflect the latest available planning tools. Bolton's most recently approved Open Space and Recreation Plan (OSRP) dates to 2005, though the town has recently completed a new draft OSRP that has yet to be approved by the Massachusetts Division of Conservation Resources. Bolton is a designated Green Community (*see last footnote above*).

Local Planning Capacity. Bolton has a full-time Planner as well as a Conservation Agent, which positions it well in terms of addressing the resource protection and planning efforts needed to safeguard the outstanding resource and recreational values of the Nashua River. Bolton is the only town in the

eleven town area that is part of the Metropolitan Area Regional Planning Commission based in Boston. Bolton has not yet adopted the Community Preservation Act, which could provide needed funds to help protect open space and cultural and historic resources. The Capital Planning Committee oversees land acquisition in the town. Bolton has a Trails Committee as well as an all-volunteer Conservation (Land) Trust.

Zoning and Regulations

Bolton has a "Farmland and Open Space Planned Residential Development" bylaw, which is basically an OSRD-type bylaw that allows this type of development by Special Permit from the Planning Board. It requires that 33% of the total tract area be preserved as permanently protected open space, less than the 50% recommended by the Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw.

Although the town does not set a maximum slope for development per se, it does set a maximum slope of 10% for minor subdivision roads and 5% for major roads, which helps to keep development out of particularly steep areas subject to erosion. Bolton's subdivision regulations were last revised in 2015.

The town of Bolton has a Local Wetlands Protection Bylaw, which is administered by the Conservation Commission. This bylaw features a 75-foot upland jurisdictional area, within which land-disturbing activities must be approved by the Commission. The bylaw also contains a 25-foot no-build area from wetlands and river areas subject to the Massachusetts Wetlands Protection Act.

Bolton is not subject to the federal NPDES Phase II stormwater permit and currently has no local Stormwater Management Bylaw or Regulations. However, the use of Low-Impact Development stormwater techniques is strongly encouraged in Section 5230.3 of the Subdivision Regulations. This section is quite comprehensive in addressing stormwater management in new subdivisions.

The Bolton Zoning Bylaw, in Section 250.23, features provisions that go into detail on environmental protection and design standards for business, commercial, and industrial development. Bolton has a Floodplain Overlay District, which was most recently revised in 2011. It also has a general town-wide performance-based bylaw for groundwater protection (Chapter 147 of the General Bylaws), which lists Best Management Practices to safeguard the town's groundwater resources. This bylaw is administered by the Board of Health.

Opportunities for Potential Improvement

Directly defining and limiting impervious surfaces in all of Bolton's zoning districts may be even more effective than the current regulations in safeguarding water quality impacts resulting from development and redevelopment.

Brookline, New Hampshire

Brookline is a small town of approximately 5,260 people located to the west of Hollis, New Hampshire, and north of Townsend, Massachusetts. State Route 13 that extends south through Townsend to Fitchburg and State Route 130 that extends west from Hollis, New Hampshire are the main routes serving Brookline. The Nissitissit River flows from Lake Potanipo in central Brookline, through the town, to its confluence with the Nashua River in Pepperell, Massachusetts.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Brookline's most recent Master Plan update dates to 2012. This Master Plan contains very detailed chapters on the protection of natural and water resources. Unlike in Massachusetts, towns in New Hampshire are not required to have up-to-date Open Space and Recreation Plans in order to qualify for State conservation funds. Nonetheless, Conservation Commissions often adopt their own land acquisition and stewardship plans to guide them in their conservation efforts.

Brookline's Conservation Commission has been

proactive in protecting valuable riparian and wildlife habitat in the town, which for many decades was one of the fastest growing in New Hampshire. The Conservation Commission has a stated goal of conserving 25% of the land in town and has made substantial progress toward this goal over the past 20 years.

Local Planning Capacity. Brookline has both a full-time Town Planner and Conservation staff person, which positions the town well for planning and conservation efforts aimed at better protecting the outstanding resources associated with the Nissitissit River and other valuable riparian areas. The Town updates its Zoning Ordinance, Subdivision Regulations and Site Plan Regulations on a regular basis. The town belongs to the Nashua Regional Planning Commission, which serves the towns in south-central New Hampshire.

Zoning and Regulations

Brookline has an OSRD ordinance, termed "Open Space Development." Under Open Space Development, proposed subdivisions must preserve at least 35% of their area as permanently protected open space. Unless it is not feasible due to topography and the character of the land, all subdivisions on tracts greater than 20 acres must be submitted to the Planning Board as Open Space Developments.

Brookline's Local Wetlands Protection ordinance features a 50-foot regulatory buffer, within which there is twenty-five foot no-build zone. Unlike the Commonwealth of Massachusetts, the State of New Hampshire does not set a mandatory 100-foot wide regulatory buffer. While wetlands themselves are protected from development, it is up to New Hampshire towns to decide whether to have a local wetlands protection bylaw and how strict it will be. Local Conservation Commissions can also designate "Prime Wetlands," which can be afforded greater local protections. Brookline has designated 11 such prime wetlands since 1992.

The Zoning Ordinance also features a very detailed Aquifer Protection section, which oversees development over the town's widespread stratified drift aquifers. Several high-risk land uses such as new underground petroleum tanks are prohibited. The Aquifer Protection zone has limits on impervious surfaces.

The town has previously not been subject to the federal NPDES Phase II stormwater permit, although it has detailed Stormwater Management provisions in Section 6.4 of the Planning Board's Site Plan Regulations. This section places strong emphasis on the use of "green" LID stormwater control techniques. LID is considered the default practice, unless applicants can demonstrate that it will not be effective in a particular case.

Brookline has a floodplain overlay district and the floodplain maps were updated in 2009.

Opportunities for Potential Improvement

The first recommendation is for Brookline to consider increasing the 50-foot wetland protection regulatory buffer to 100 feet, and if possible, increasing the no-build zone from 25 to 50 feet. Doing so would provide even greater protection to wetlands and riparian habitats associated with the Nissitissit River. The Planning Board may also want to consider increasing the amount of permanently protected open space in Open Space Developments from 35% to 45% or 50%, in line with best practices for this planning technique. Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment.

Devens, Massachusetts

The Massachusetts Legislature established the Devens Regional Enterprise Zone in 1993 to guide and foster the successful reuse of the former Fort Devens military installation in a sustainable manner, achieving a balance of economic, social and environmental needs while maintaining and enhancing the natural resource base. Devens is located 35 miles outside of Boston, with a population of 1,840 as of the 2010 US Census. A focus on job re-creation, to make up for the over 7,000 military jobs that were lost since the closure of the US Army Base, has resulted in approximately 5,000 jobs.

Governance

Chapter 498 of the Acts of 1993 established a legal framework for the governance and development of a Devens Regional Enterprise Zone to promote the expeditious and orderly clean-up, conversion, and redevelopment of Fort Devens for non-military uses. This includes but was not limited to housing, industrial, institutional, educational, governmental, recreational, conservation, and commercial or manufacturing uses. Objectives were to prevent further blight, economic dislocation, and additional unemployment, while helping to strengthen the local economy, the regional economy, and the economy of the Commonwealth.

Chapter 498 also established the Devens Enterprise Commission (DEC), the regulatory and permit granting authority for the redevelopment of Devens. The DEC acts as a local planning board, conservation commission, board of health, zoning board of appeals, historic district commission and in certain instances, as a board of selectmen. The DEC carries out these duties in the context of a unique and innovative one-stop, expedited Unified Development Permit System, which greatly streamlines the local regulatory process. Under this system, complete permit reviews for development projects are to take place within 75 days.

MassDevelopment is the state economic development agency that manages real estate, assessment, taxation, utilities and public works in Devens. Together MassDevelopment and the DEC share the municipal government functions of a typical city or town.

Plans, Policies and Local Planning Capacity

Master Planning:

- Devens Reuse Plan (1994): *www.devensec.com/development/Devens_Reuse_plan.pdf* - Master Plan for the orderly and sustainable redevelopment of Devens Regional Enterprise Zone.
- Devens Open Space and Recreation Plan (2008-2013): *www.devensec.com/development/Devens_OSRP_1-23-08.pdf* -. 1,800 acres of the 4,400 acres to be permanently protected as open space (natural resource protection, green infrastructure connections, recreation). To date, over 1,400 acres have been permanently protected, including over 900 acres along the Nashua River (US Fish and Wildlife Service and Massachusetts Division of Fisheries and Wildlife). Devens Open Space and Recreation Advisory Committee is comprised of representatives from MassDevelopment, DEC, Ayer, Harvard, Shirley, US Fish and Wildlife Service (USFWS), Massachusetts FWS, NRWA and Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA).
- Devens Water Resource Protection Report: *www.devensec.com/development/Water_Resources_Protection_Report.pdf* - Focus on specific strategies for development to ensure groundwater protection for a high quality and drinking water source.

Local Planning Capacity. Devens Enterprise Commission is a regional board appointed by the governor with representatives from Ayer, Devens, Harvard, Shirley, and the surrounding region. The DEC has a full-time Director of Planning and an Environmental Planner.

Zoning and Regulations

Devens Bylaws (1994): *www.devensec.com/bylaws/bylawstoc.html* - Provide broad authority to help achieve reuse plan objectives, including 25% affordable and special-needs housing.

Devens Rules and Regulations (2013): *www.devensec.com/rules-regs/decregstoc.html* - Detailed development regulations use innovative approaches for:

1. Stormwater management (LID and green infrastructure): *www.devensec.com/rules-regs/decregs408.html*
2. Energy efficient, smart and sustainable residential development: *www.devensec.com/rules-regs/decregs502.html*
3. Natural resource protection (Massachusetts Department of Environmental Protection SMS

apply to all areas defined as resource areas – not just wetlands) *www.devensec.com/rules-regs/decregs406.html*

4. Landscape preservation, viewshed preservation and construction management: *www.devensec.com/rules-regs/decregs304.html*
5. Green building incentives.
6. Water resource protection districts: *www.devensec.com/rules-regs/decregs409.html*
7. Water use and water efficiency regulations: *www.devensec.com/rules-regs/decregs809.html*
8. Greenhouse Gas Mitigation regulations: *www.devensec.com/rules-regs/decregs411.html*
9. Renewable Energy regulations: *www.devensec.com/rules-regs/decregs411.html*
10. Steep slope regulations: *www.devensec.com/rules-regs/decregs306.html*
11. Complete Street Standards (narrow road widths, connectivity, multi-modal, universal accessibility) *www.devensec.com/rules-regs/decregs207.html*
12. Transportation demand management programs: *www.devensec.com/development/TMI_Overview.pdf*
13. Parking maximums as opposed to minimums (pavement reduction).

Eco-Industrial Development (EID). Devens is internationally recognized as an Eco-Industrial Park, a sustainable development approach to traditional industrial parks. The "eco" of eco-industrial relates to its key concept, which is to learn from and model industrial development on natural systems ecology. Natural systems use resources so efficiently that there is no waste; all byproducts produced by nature are consumed or reused by other plants, animals or organisms. By applying this efficiency/no-waste model to industrial parks, EID can decrease or eliminate pollution and waste, while improving our economy and quality of life at the same time. *www.devensec.com/sustain/EID_As_a_Sustainable_Development_Approach.pdf*

Dunstable, Massachusetts

Dunstable is a small town on the Massachusetts/New Hampshire border, located north of Groton and east of Pepperell, Massachusetts. As of 2017, Dunstable's population stood at 3,199. Dunstable's current land use consists mainly of forest, agriculture and low-density residential use. The zoning is primarily residential, with a few very small areas devoted to commercial development.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. The town of Dunstable's Planning Board is in the process of updating its 1999 Master Plan. The town's Master Plan Committee is overseeing the process. Much of the new Master Plan exists in draft form and is very comprehensive. The Master Plan Committee is aiming for approval of the Master Plan at the 2018 Annual Town Meeting. Dunstable's most recently approved Open Space and Recreation Plan (OSRP) dates up to 2017, though the town has begun the process of updating this Plan. Dunstable is not a designated "Green Community."

Local Planning Capacity. Dunstable does not have any professional planning and zoning or conservation staff beyond an Administrative Assistant and therefore relies on the work of citizen volunteers in addressing local permitting and planning. The town belongs to the Northern Middlesex Council of Governments (NMCOG), which functions as a regional planning commission. The town adopted the Community Preservation Act in 2006, which provides additional funding for land acquisition.

Zoning and Regulations

Dunstable has an OSRD bylaw, which allows this type of development by Special Permit from the Planning Board on tracts of at least 14 acres. It requires that 35% of the total tract area be preserved as permanently protected open space, less than the 50% recommended by the Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw.

Dunstable has a Local Wetlands Protection Bylaw, administered by the Conservation Commission. The bylaw features a sixty-foot (60) wide setback from wetland resource areas for new permanent structures. This is a good measure, one that could be enhanced by an accompanying no-disturbance buffer of 40 feet or more.

Although Dunstable is not currently subject to the federal NPDES Phase II stormwater permit, it will be subject to the 2016 permit for the "Urbanized Areas" in town. Dunstable is preparing the Municipal Separate Stormwater Sewer Systems (MS4) permit application. Dunstable also has a local Stormwater Management Bylaw in its general bylaws. This bylaw has two tiers of permitting; one for relatively minor projects ("Tier 1") disturbing from 22,000 to 40,000 square feet of area and one for major projects ("Tier 2") disturbing more than 40,000 square feet of area. Any activity disturbing land on slopes greater than 15% that results in greater than 200 square feet of disturbance is also subject to a (major) stormwater permit. Dunstable also has a Water Supply Protection Bylaw, administered as an overlay district with permitting through the Planning Board.

The town has a floodplain overlay district in the Zoning Bylaws [15.2. Floodplain District [Amended ATM May 10, 2010] 15.2.1]. The Floodplain District is established as an overlay district effective in all districts. The uses permitted in the underlying district are allowed with the provision that they meet additional requirements. The Floodplain District includes all special flood hazard areas designated as Zone A or Zone AE on the town of Dunstable Floodplain District Overlay Map.

Opportunities for Potential Improvement

Dunstable should adopt its updated Master Plan as soon as possible, which will enable the town to better propose and adopt innovative land-use controls to protect its outstanding resources. The Planning Board may also wish to increase the amount of permanently protected open space in OSRD subdivisions from 35% to 50%, and perhaps require permanent protection in environmentally sensitive zones that could be regulated as overlay districts (aquifer, riparian, etc.).

Dunstable's Local Wetlands Protection Bylaw has a 60-foot setback for new permanent structures, which could be enhanced by a somewhat less wide no-disturbance buffer, perhaps 40 feet or greater.

Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment.

Groton, Massachusetts

Groton is a mid-sized town near the Massachusetts/New Hampshire border, located north of Ayer and south of Dunstable, Massachusetts. As of 2012, Groton's population stood at 10,873. Groton's diverse mix of land uses includes substantial active agricultural lands, forests, and residential and commercial development in its downtown. Groton has a very comprehensive set of zoning bylaws and regulations, reflecting the importance the town places on planning and conservation.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. The town of Groton completed its most recent Master Plan in 2011. This Master Plan is organized around the concept of sustainability, as reflected in the three-legged stool of sustainable environmental, economic, and societal factors. As described in the introduction, "*Sustainability* is the overarching focus of Groton's Master Plan and a common thread in all of the plan's elements. To facilitate a wide-ranging discussion of sustainability, the Groton Planning Board adopted the well-known Brundtland Commission's definition of sustainable development, originally published in *Our Common Future* (1987): "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*"

Groton's most recently approved Open Space and Recreation Plan (OSRP) dates to 2012. The 2011 Master Plan has a comprehensive chapter devoted to open space and recreation. Groton has protected

about 7,790 acres of land, representing about 30% of its land area.

Local Planning Capacity. Groton has had a full-time Town Planner for several decades, as well as a full-time Conservation Agent/Administrator. The town belongs to the Montachusett Regional Planning Commission. The town adopted the Community Preservation Act in 2004 and has an active Community Preservation Committee to oversee and plan projects using CPA funds. Groton has always placed strong emphasis on municipal planning and as such has a very strong planning capacity to address the aims of Wild and Scenic River designation.

Zoning and Regulations

Groton has an OSRD bylaw, termed "Flexible Development," which provides for this type of development through Special Permit from the Planning Board. The bylaw requires that 35% of the total tract area be preserved as permanently protected open space, less than the 50% recommended by the Massachusetts EOEEA for this type of bylaw.

Groton recently revised its Local Wetlands Protection Bylaw, which is administered by the Conservation Commission. This bylaw features a 50-foot combined no-disturbance/no-build buffer from all wetland resource areas. The bylaw also treats upland areas within the 100-foot regulatory buffer as resource areas, affording them and adjacent wetlands greater protection from the adverse impacts of land disturbance.

The town addresses erosion control measures in Section 352-19 of its Stormwater Regulations. Limits on impervious surfaces are specified in Section 218-20 of the Groton Zoning Bylaws. These limits range from a low of 25% for low-density residential uses to a high of 75% for industrial uses. Section 218-23 of the Zoning Bylaws contains provisions for shared parking for non-competing abutting uses, which can also reduce the creation of new impervious surfaces.

Groton also has thorough groundwater and aquifer protection measures in its zoning bylaws. The town is subject to the federal NPDES Phase II stormwater permit and does have a local Stormwater Management Bylaw, both for land disturbing activities and illicit discharges to the storm drain system and receiving waters. This bylaw has two tiers of permitting: one for relatively minor projects disturbing from 20,000 to 40,000 square feet of area and one for major projects disturbing more than 40,000 square feet of area. LID techniques must be incorporated into development and redevelopment projects unless it can be demonstrated that the use of such techniques is not feasible in a given situation. LID must also be used for stormwater management in the Town Center Overlay District centered on Station Avenue.

The Town does have a floodplain overlay district that the Building Inspector shall review for reasonable utilization toward meeting the elevation or floodproofing requirements and that no building or structure shall be erected in the one-hundred-year floodplain designated as Zones A and Zone A and AE on the Flood Insurance Rate Map.

Opportunities for Potential Improvement

Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment.

Harvard, Massachusetts

Harvard is a small to mid-sized town in north-central Massachusetts, with State Route 2 running through the town from east to west and Interstate Route 495 slicing its eastern border. As of 2017, Harvard's population stood at 6,021.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Harvard most recently updated and approved its Master Plan in 2016, making it one of the most recent Master Plans of the Nashua River Wild and Scenic River area towns. This Master Plan contains a very detailed water resources protection chapter. Harvard has a very comprehensive set of zoning bylaws and regulations, reflecting the importance

the town places on planning and conservation. In 2016, Harvard also adopted a new Open Space and Recreation Plan. This Plan is very comprehensive and focuses in particular detail on protection of the Bare Hill Pond watershed.

Local Planning Capacity. Harvard has recently contracted for a part-time Town Planner after many years of having a Land Use Administrator/Conservation Agent. The town belongs to the Montachusett Regional Planning Commission. It was an early adopter of the Community Preservation Act in 2001. The Conservation Commission functions as a land acquisition and management body, in close cooperation with the non-profit Harvard Conservation Trust.

Zoning and Regulations

Harvard has an OSRD bylaw, termed "Open Space Conservation and Planned Residential Development" (OSP-PRD), which provides for this type of development through Special Permit from the Planning Board. It requires that 50% of the total tract area be preserved as permanently protected open space, one of the highest such requirements found in the Nashua River area towns. OSD-PRD can be undertaken on tracts as small as 4.5 acres, and the Planning Board does not establish a minimum building lot area per se, which is a very innovative approach.

Harvard's Local Wetlands Protection Bylaw, which is administered by the Conservation Commission, is also one of the more stringent in the Nashua River watershed. This bylaw features a 50-foot no-disturbance zone as well as a 75-foot no-build zone. The bylaw also treats upland areas within the 100-foot regulatory buffer as resource areas, affording them and adjacent wetlands greater protection from the adverse impacts of land disturbance.

One of Harvard's most unique zoning provisions is the **Nashua River Watershed Greenspace Buffer District**, which is a component of Harvard's Watershed Protection and Flood Hazard overlay district. This buffer district extends along the Nashua River, from its highest point in Harvard northward to its lowest point in Harvard, and includes an area 300 feet from the centerline of the Nashua River. Detailed provisions for this overlay district are found in Section 125-25 c. of the Harvard Zoning Bylaws, which states that:

"No building for human occupancy and no sewage disposal system or other potential source of substantial contamination is permitted. However, if an applicant proves satisfactorily that his land is in fact not subject to inundation and not unsuitable for residential use because of drainage conditions and not an inland wetland under Chapter 131 G.L., the Planning Board may authorize by special permit (see §*125-46*, Special permits) the use of such land as if in an AR District or, if such land does not abut an AR District but does abut a district other than a W District, as if in the other district."

Harvard's zoning does not explicitly describe limits on impervious surfaces per se, although it effectively limits such areas by requiring that the floor area of all new buildings not exceed 10% of the lot area (Sec.125-30a). The town is presently not subject to the federal NPDES Phase II stormwater permit. The town has a floodplain overlay district, which uses recently undated Flood Insurance Rate Maps (FIRM) dating to 2011 and 2014 for delineation of floodplain and floodway boundaries. No new permanent structures are permitted in the floodplain overlay district. Harvard presently does not have an aquifer or groundwater protection overlay district.

Opportunities for Potential Improvement

In general, Harvard has an excellent set of bylaws, regulations, and an up-to-date Master Plan. Its wetlands protection bylaw features the most protective no-disturbance and no-build buffers in the Nashua River watershed region. Though the town is not subject to the federal NPDES Phase II stormwater general permit, adopting a stormwater control bylaw and regulations would offer even greater protection for Harvard's surface water resources. The town should consider adopting an aquifer and/or groundwater protection overlay districts. Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding

water quality impacts resulting from development and redevelopment.

Hollis, New Hampshire

Hollis is a small town of 7,817 people located west of Nashua, New Hampshire and to the east of Brookline, New Hampshire, with Pepperell, Massachusetts bordering on the south. The Nissitissit River flows through southwestern Hollis after entering the town from Brookline before flowing into the Nashua River in Pepperell. Southern and central Hollis contain extensive agricultural land encouraged by the presence of agricultural soils of extensive prime and statewide importance, while northern Hollis is more forested.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Hollis's most recent Master Plan update dates to 1998. Though not up to date, this Master Plan contains very detailed chapters on the protection of natural and water resources.

Unlike in Massachusetts, towns in New Hampshire are not required to have up-to-date Open Space and Recreation Plans to qualify for state conservation funds. Nonetheless, Conservation Commissions often adopt their own land acquisition and management plans to guide them in their conservation efforts. Hollis's Conservation Commission and Land Protection Study Committee have been proactive in protecting valuable riparian and wildlife habitat in the town. Approximately one-third of Hollis's land area is protected open space, much of it held by the non-profit Beaver Brook Association.

Local Planning Capacity. Hollis has a part-time Town Planner as well as a Conservation Commission staff person, which enables the Town to better implement its plans and enforce the provisions of the zoning ordinance and related regulations. The town updates its Zoning Ordinance, Subdivision Regulations, and Site Plan Regulations on a regular basis. The town belongs to the Nashua Regional Planning Commission, which serves the towns in south-central New Hampshire.

Zoning and Regulations

Hollis has an OSRD ordinance, termed "Hollis Open Space Planned Development" (HOSPD). Under HOSPD, all proposed major subdivisions must preserve from 40-50% of their area as permanently protected open space, depending on the density of units proposed on the tract. Major subdivisions are those creating five or more new building lots.

Hollis's Local Wetlands Protection ordinance features a 100-foot regulatory buffer zone. While wetlands themselves are protected from development, it is up to New Hampshire towns to decide whether to have a local wetlands protection bylaw and how strict it will be. The wetlands ordinance prohibits new primary structures that are not "grandfathered" by virtue of being proposed on lots predating the wetland ordinance.

Local Conservation Commissions can also designate "Prime Wetlands"[9] through a state-approved process that affords these wetlands additional scrutiny in the permitting process. Although Hollis has not designated Prime Wetlands meeting the State definition, it has designated certain wetlands as sensitive environmental areas that should be given special consideration and protection during the permit application process.

The Zoning Ordinance also features a very detailed Aquifer Protection section, which oversees development over the town's widespread stratified drift aquifers. Several high-risk land uses such as new underground petroleum tanks are prohibited. Limits on impervious surfaces are found in the Aquifer Protection zone. The town has previously

9 From Hollis, New Hampshire wetland ordinance definitions: PRIME WETLAND: Under the New Hampshire statute (RSA 482-A) for protecting wetlands from "despoliation and unregulated alteration", municipalities are able to designate some of their high value wetlands as "Prime Wetlands" (RSA 482-A:15). These designated wetlands are given special consideration by the Wetlands Board in permit application reviews.

not been subject to the federal NPDES Phase II stormwater permit, although it has had a Stormwater Management Committee. Hollis has a floodplain overlay district and the floodplain maps were updated in 2009.

Lancaster, Massachusetts

Lancaster is a small to mid-size town in north central Massachusetts that is close to Routes 2, I-190, and I-495, and has been growing steadily for more than 10 years. Lancaster aims to shape and guide its growth so that the town retains its character and identity, while fostering the expansion of the tax base and citizen services. As of 2016, Lancaster's population stood at 8,186.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Lancaster completed its most recent Master Plan in 2007, its first new Master Plan in 40 years. Although 10 years old, this plan is extremely comprehensive and still suitable as the basis for current and future planning, zoning and regulatory efforts. The Master Plan does not have a dedicated Water Resources chapter, as these are discussed in the more comprehensive Open Space and Natural Resources chapter. The town will begin the process of updating the Plan in 2018, to reflect new planning practices and trends.

Lancaster's most recently approved Open Space and Recreation Plan (OSRP) dates to 2010. This Plan includes detailed chapters on water resource and wildlife habitat protection. Massachusetts recommends that OSRPs be revised every seven years in order to serve as the basis for state-funded grant applications. Lancaster's Open Space and Recreation Committee have been working on an update since January 2017 and expects to have a copy ready for re-certification by the end of 2017.

The 2014 Lancaster Green Belt Vision Plan was created to form a continuous, contiguous greenway of parcels that run from south Lancaster, along the Nashua River, to north Lancaster. The Green Belt will provide town-wide recreational trails, as well as a corridor for migratory wildlife.

Local Planning Capacity. Lancaster has a full-time Town Planner as well as a Conservation Agent. The Town land use boards and commissions (Planning Board, Conservation Commission, and Zoning Board of Appeals) regularly update their respective bylaws and regulations. Lancaster is also a member of the Montachusett Regional Planning Commission (MRPC), which is chartered to carry out comprehensive regional planning. MRPC offers technical and professional services to its members, including planning in the areas of community development, economic development, transportation, housing, environment, and geographic information systems.

Zoning and Regulations

Flexible Development Bylaw. Lancaster's open space residential development bylaw provides for this type of development through a Special Permit from the Planning Board. This bylaw, called "Flexible Development," requires that 40% of the total tract area be preserved as permanently protected open space, in exchange for smaller lot sizes in a clustered arrangement.

Wetlands Protection Bylaw. Lancaster's local Wetlands Protection Bylaw was last revised in 2007. The bylaw features a 25-foot no-disturbance buffer from all wetland resource areas. Although this is certainly better than not having a no-disturbance buffer, the latest science on wetland buffer zones supports a wider no-disturbance buffer for adequate protection of water quality and habitat values of wetlands adjacent to development.

Stormwater Management Bylaw. The town is subject to the federal NPDES Phase II stormwater permit. As such, the town adopted a Stormwater Management Bylaw in 2007, an Illicit Discharge Bylaw in 2007, and a Water Withdrawal Bylaw in 2010. All of the bylaws serve the town well in the protection of its rivers and water bodies, as they are heavily enforced.

Overlay Districts. Lancaster has a Water Resource

Protection Overlay District in the Zoning Bylaw. This bylaw primarily addresses the protection of groundwater, most specifically the stratified drift aquifers in town. Any use that would render any lot in the overlay district with 15% or greater impervious surfaces requires a special permit from the Planning Board. The Town also has a Floodplain Overlay District and Bylaw that was recently revised in 2011, coincident with the town's floodplain (FIRM) map revisions by FEMA.

Other Initiatives

Green Community. In 2010, Lancaster was designated as a Green Community by the Massachusetts Department of Energy Resources, one of the first municipalities in the state to receive that distinction. The designation mandates that the town's municipal facilities and vehicles must reduce energy consumption by 20%. The town has undertaken several actions to meet this goal, such as new heating systems, upgraded lighting, insulation and weatherization measures, LED street lighting, and electric vehicles with a docking station.

Complete Streets. In 2017, Lancaster was designated as a "Complete Streets"' community by the Massachusetts Department of Transportation (DOT). The Complete Streets program provides funding to municipalities for construction of pedestrian- and bicycle-friendly roads, sidewalks, and connections to places of public interest. A prioritization plan was adopted, and in its first year the town will start sidewalk reconstruction on Main Street, along with curb ramps and cross walks. Bicycle racks will also be installed at the library, Community Center, and elementary and middle schools.

Land and Water Conservation Fund Grant. In 2016, a Land and Water Conservation Fund (LWCF) grant was received from the National Park Service and administered by the Massachusetts Department of Conservation Services, for the construction of a multi-purpose, multi-generational park space called the Nathaniel Thayer Memorial Park. Phase 1 of the park project, a playground with a splash pad and bathroom facility, will be constructed in 2018. Other pieces of the park will include athletic fields, passive recreation fields, a basketball court, tennis courts, dog park, walking paths, and an amphitheater.

Bartlett Pond Dam Removal. In 2014, the dam at the Bartlett Pond Recreation Area was removed. The dam removal has improved the water quality of the Wekepeke Brook, which was classified as a distressed waterbody. The removal of the dam and concrete impoundment has allowed for the replacement of warm still water with free-flowing, oxygenated, cooler, deeper water, which has had a large-scale benefit for local habitat.

Designated Blue Trail. In 2016, the Lancaster Friends of the Nashua River officially designated the Town's first "blue trail," or water trail, on the North Nashua River. The blue trail runs from a launch point at I-190 to a take-out point some miles downstream at the Pellechia Recreation Area, south of the Cook Conservation Area along the North Nashua River. Signs along the roadside and riverside direct the public to these locations.

Opportunities for Potential Improvement

The first recommendation is that Lancaster should consider updating its 2007 Master Plan. Although the existing Master Plan reflects the first major revision in decades, several sections would likely benefit from updating. The town should continue its efforts to update the 2010 Open Space and Recreation Plan, which is due to be completed by the end of 2017. The town should also continue its efforts to plan for the Green Belt as outlined in the 2014 Green Belt Vision Plan.

The Conservation Commission may also want to consider increasing the no-disturbance buffer in its local Wetlands Protection Bylaw to greater than 25 feet. The science supports having much more extensive no-disturbance buffers, especially for the protection of riparian habitats and their associated assemblage of species. Finally, directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment.

Pepperell, Massachusetts

Pepperell is a mid-sized town on the Massachusetts/New Hampshire border, located north of Groton and south of Brookline and Hollis, New Hampshire. As of 2016, Pepperell's population stood at 12,152. Like other older mill towns once dependent on waterpower for industry, Pepperell has several villages within its borders, including East Pepperell near the Pepperell Dam on the Nashua River, Pepperell Center, and Pepperell's Historic District to the west of the center. Over the decades, the Pepperell Conservation Commission and other land protection entities such as MassWildlife, Nashoba Conservation Trust, and Nissitissit River Land Trust have protected several thousand acres of land, much of it centered on Gulf Brook, a trout stream that flows into the Nissitissit River. This conservation land forms a linear network of protected land, which can serve as a good model for effective protection of wildlife habitat.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Pepperell—designated a Green Community in 2015—completed its most recent Master Plan in 2007. This plan, although now 10 years old, is very comprehensive and still suitable as the basis for future planning and zoning and regulatory efforts. This Master Plan does not have a Water Resources chapter per se, though water resources are described in the Natural Resources chapter. The Northern Middlesex Council of Governments (NMCOG) has been contracted to update Pepperell's Master Plan. A Master Plan Committee has been organized as of 2018 and a new Master Plan should be ready for adoption by Town Meeting in the near future.

Pepperell recently updated its Open Space and Recreation Plan (OSRP) in 2016, which has been approved by the State. OSRPs are considered current for seven years. This Plan includes detailed chapters on water resource and wildlife habitat protection.

Local Planning Capacity. Pepperell has a full-time Town Planner as well as a part-time Conservation Administrator. The Town Land Use Boards (Planning, Conservation Commission, and Zoning Board) regularly update their respective bylaws and regulations. Unlike most of the other towns in the Nashua River Wild and Scenic area that belong to the MRPC, Pepperell, along with Dunstable, are members of the NMCOG, a regional planning agency.

Zoning and Regulations

Pepperell's OSRD bylaw provides for this type of development through Special Permit from the Planning Board. It requires that 40% of the total tract area be preserved as permanently protected open space, slightly less than the 50% recommended by the Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw.

Pepperell's Local Wetlands Protection Bylaw, last revised in 2002, features a combined 50-foot no-disturbance/no-build buffer from all wetland resource areas. This is one of the wider such no-disturbance buffers within the Nashua River watershed region.

Pepperell also has a thorough groundwater and aquifer protection bylaw, termed the Water Resource Protection Overlay District (WRPOD). The WRPOD covers much of the western part of the town and an area around the Jersey Street wells and the Nashua Road well, which is on the Hollis, New Hampshire state line.

Section 5530 of Pepperell's Zoning Bylaw has a good section on erosion control. The town is subject to the revised federal NPDES Phase II stormwater permit, which it will need to address in 2018, if the current federal schedule holds. The town was able to obtain an exemption from the previous version of the permit issued in 2004. Pepperell will need to adopt a local Stormwater Management Bylaw and undertake the other minimum controls specified in the stormwater permit. The town will need to comply with the new stormwater permit, which is currently under appeal. Pepperell has contracted with a consulting firm to assist in preparing its Notice of Intent (NOI).

The town is a member of the Northern Middlesex Stormwater Collaborative and participates in meetings and training sessions related to stormwater regularly. Pepperell is planning to adopt a Stormwater Bylaw and exploring ways to fund efforts (perhaps a stormwater utility) to comply with the permit. All zoning regulations will be reviewed to determine which regulations will require updating, changes, etc. for compliance with the Permit or to address minimizing impervious surface impacts.

The town floodplain overlay district, included in the Code of the town of Pepperell, was adopted on June 7, 1993 and amended on May 3, 2010. This floodplain bylaw only addresses construction in the floodway, however, and not within the wider 100 and 500-year floodplain zones.

Opportunities for Potential Improvement

Pepperell might consider revising its floodplain protection bylaw and/or regulations to address all impacts within the 100 and 500-year floodplains, not just within the floodway itself.

Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment. This will be addressed as part of the review process under stormwater.

Shirley, Massachusetts

Shirley is a small to mid-sized town of approximately 5,700 town residents and 1,458 prison inmates located to the west of Ayer and Harvard and adjacent to Devens in north-central Massachusetts.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. The Shirley Planning Board adopted a revised Master Plan in late 2017. The town's Open Space and Recreation Plan (OSRP) has also recently been updated; it was approved by EOEEA and accepted by the Shirley Town Meeting voters in late 2017. The OSRP includes detailed chapters on water resources and wildlife habitat protection as well as broad recommendations in regard to recreation. Shirley is a designated "Green Community."

Local Planning Capacity. Shirley currently lacks a Town Planner. A part-time or full-time Planner would be very useful in ensuring the successful implementation of recommendations made in the revised Master Plan. The town is part of the Montachusett Regional Planning Commission. Shirley has not adopted the Community Preservation Act.

Zoning and Regulations

Shirley has an OSRD bylaw, termed "Low-Impact Development," not to be confused with stormwater-related low-impact development. It requires that 35% of the total tract area be preserved as permanently protected open space, less than the 50% recommended by the Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw. LID is allowed through Special Permit from the Planning Board. Amendments to the bylaw are recommended in the new Open Space and Recreation Plan.

Shirley's Non-Zoning Wetlands Bylaw was originally adopted in 2005 and was amended March 16, 2015. This bylaw features a 25-foot no-disturbance and a 40-foot no-build buffer from all wetland resource areas. Lots in existence when the bylaw was adopted are exempt from its provisions. Shirley also has a Water Supply and Wellhead Protection Overlay District for the protection of its groundwater resources.

The Town is subject to the federal NPDES Phase II stormwater permit and does have a local Stormwater Management Control Bylaw, adopted March 16, 2015, both for land-disturbing activities and illicit discharges to the storm drain system and receiving waters. Activities disturbing one or more acres of land are required to obtain a stormwater management permit. Shirley has a floodplain overlay district and the floodplain maps were updated in 2010.

Opportunities for Potential Improvement

There are many opportunities to meet goals of this Stewardship Plan through implementing recommendations found in Shirley's new Master Plan and Open Space and Recreation Plan. One of these recommendations includes considering revisions to the town's Low Impact Development bylaw to protect more open space, and perhaps to rename the bylaw to alleviate confusion with the stormwater management use of the term. Revisions to the Shirley Non-zoning Wetlands Bylaw are also recommended. A no disturbance zone wider than 25 feet in the Local Wetlands Protection Bylaw would provide better protection to Shirley's wetlands and surface waters. Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment. Review of all of the town's land-use and resource-protection bylaws and regulations in the next few years is anticipated. Opportunities for increasing public and town officials' awareness about natural resources, especially the protection of water quality, have also been identified, as have measures to increase public access to and recreational use of conservation lands and waterways. Alternative economic uses for undeveloped forest land, such as outdoor recreation and forest management, and options for land protection by entities other than the town, are also being discussed.

Townsend, Massachusetts

Townsend is a mid-sized town on the Massachusetts/New Hampshire border, located north of Lunenburg and south of Brookline and Mason, New Hampshire. As of 2010, Townsend's population stood at 8,926. Townsend features several villages within its borders, such as the Harbor Pond area on an impoundment of the Squannacook River, West Townsend near the Ashby border, and Townsend Center with its classic town common at the intersection of Routes 13 and 119. Much of Townsend's land area is protected land within the Townsend and Willard Brook State Forests, which are administered by Massachusetts Department of Conservation and Recreation.

Plans, Policies and Local Planning Capacity

Summary of Master Planning. Townsend completed its most recent Master Plan in 2001. An attempt to update the Master Plan in 2008 was not brought to completion. The 2001 Master Plan should be revised as soon as practicable. Townsend's most recently approved Open Space and Recreation Plan (OSRP) dates to 2013. This Plan includes detailed chapters on water resource and wildlife habitat protection. Townsend is a designated Green Community.

Local Planning Capacity. Townsend has a full-time Planning Administrator as well as a Conservation Agent. Much of the Planning Administrator's function is related to plan review and the clerical functions of the Planning Board rather than Master Planning and other long-range projects. The town is part of the Montachusett Regional Planning Commission. The town attempted, but failed, to adopt the Community Preservation Act in the mid-2000s.

Zoning and Regulations

Townsend has an OSRD Bylaw, termed "Open Space Preservation Development," which provides for this type of development through Special Permit from the Planning Board. It requires that 30% of the total tract area be preserved as permanently protected open space, less than the 50% recommended by Massachusetts Executive Office of Energy and Environmental Affairs for this type of bylaw. The bylaw also requires applicants to demonstrate that an Open Space Planned Development (OSPD) is at least as good as or superior to a conventional development, which is a burden of proof that could discourage this type of development. The bylaw dates to 1986, with some revisions since then, and should be revisited in light of current recommended planning practices.

Townsend's Local Wetlands Protection Bylaw was originally adopted in 1983 and has been revised periodically since then. This bylaw features a 35-foot no-disturbance buffer from all wetland resource

areas. This no-disturbance buffer is a good provision, although the latest wetland science supports a wider buffer to protect water quality and riparian wildlife habitat. Townsend has thorough groundwater and aquifer protection measures in its zoning bylaws.

The town is subject to the federal NPDES Phase II stormwater permit and does have a local Stormwater Management Bylaw, both for land disturbing activities and illicit discharges to the storm drain system and receiving waters. Activities disturbing 40,000 square feet or more of land, or 1,000 square feet or more on slopes greater than 15%, require a stormwater management permit. LID techniques are recommended but not absolutely required in the Stormwater Management Bylaw.

The town does have a floodplain overlay district, although the Building Inspector must check on whether construction is proposed in a floodplain and whether flood insurance is required. Townsend does have a floodplain overlay district and the floodplain maps were updated in 2010.

Opportunities for Potential Improvement

The first recommendation is to update the Master Plan, which dates to 2001 and is perhaps no longer an effective basis for zoning and other regulatory amendments that could help to safeguard the outstanding resource values identified in this report. Secondly, Townsend's Open Space Planned Development Bylaw should be revised to reflect the latest planning practices such as protecting a greater amount of open space and providing for more flexible dimensional requirements. Directly defining and limiting impervious surfaces in all zoning districts may be even more effective in safeguarding water quality impacts resulting from development and redevelopment.

Regulatory Summary Tables

This review provides tables for New Hampshire and Massachusetts that summarize the planning and regulatory matters for each town participating in the Stewardship Plan.

New Hampshire Regulatory Summary for Brookline and Hollis

Category	Brookline	Hollis
Regulatory Measure	Valerie Rearick, Town Planner, 603-673-8855 x 215	Wendy Trimble, PB Secretary; 603-465-2209 x 108
Master Planning		
Current Master Plan?	YES – 2012.	NO – dates to 1998.
Water Resources Protection Chapter?	YES	YES
Current Open Space Plan?	YES	YES
Has the Zoning Bylaw been revised in the last five years?	YES	YES
Land-Use Controls		
Does the town have OSRD zoning?	YES	YES
If so, what is protected open space requirement?	35%	40% - 50% depending on overall density of housing.
Is OSRD allowed by right or Special Permit?	By right – follow subdivision Process.	Special Exception (SP).
Does the town have a maximum slope for development?	Not per se – limits on new road and driveway slopes.	Not per se – limits on new road and driveway slopes.
Does the town have Erosion Control measures for construction on steep slopes?	It has a Stormwater Management section 6.4 in Site Plan Regs. LID is default method. Very good.	Good standards for construction on steep slopes and hillsides in "Rural Character Preservation Ord." Follow BMPs.
Does the zoning limit the % or area of impervious surfaces?	Industrial – Commercial District Not >75% impervious; Aquifer protection District Not >15% or 2,500 square feet or a stormwater plan is required.	Max. Building coverage in Commercial Zone; Except for Industrial Zone, impermeable surface may cover Not >15% of any lot in the Aquifer Protection Overlay Area and Wetland Conservation Overlay Zone. All other districts Not >25%.

Category	Brookline	Hollis
Do parking requirements for commercial devt. provide for shared or alternative parking?	YES – good provisions for such in Site Plan Regs sec. 4.6.01.	YES – shared parking is encouraged when possible.
Any resource protection overlay zones (besides wetlands)?	YES – Aquifer Protection and Floodplain.	YES – Aquifer Protection Overlay Zone and Wetland Conservation Overlay Zone.
Water Resource Zoning and Regulations		
Does the town have a local Wetlands Protection Bylaw?	YES (Zoning Ordinance).	YES
If so, are there no-disturbance or no-build setbacks?	There is a 50 foot no-build area.	Not per se – but the bylaw is otherwise comprehensive.
If yes to a WPB, are upland areas adjacent to wetlands considered resource areas?	NO – may not be applicable in NH law?	NO – may not be applicable in NH law?
Does the town have an Aquifer or general groundwater protection bylaw?	YES	YES
Does the town have wellhead protection as part of this?	YES	YES
Does the town have a Stormwater Control Bylaw with LID provisions?	YES – Section 6.4 of Site Plan Regulations. Pretty good example.	There was a stormwater committee that has since disbanded.
What area of land disturbance triggers Stormwater Review?	NO	> 1acre. If proposal will impact wetlands or resources areas < 1 acre triggers stormwater review.
Is minimizing impervious surfaces a goal of the stormwater bylaw or regs?	YES – right up front	YES
Is the use of LID required in certain circumstances?	YES – it is the default method	NO
Protection of key wildlife habitat and natural communities?		
Is protection of wildlife habitat and natural communities specified in OSRD or other zoning?	YES	YES
Is such addressed in Open Space or Master Plans?	YES	YES
If so, what areas are called out in such plans?	See Natural Resource Chapter	Good provision for “Wildlife Habitat Inventory and Assessment” in Site Plan Regs (page 4)

Category	Brookline	Hollis
Planning Capacity		
NH programs?		
Does the Town have a full or part-time Town Planner or Planning Administrator?	YES	YES - Full-time Planning Secretary and part- time Planner.
Does the Town have a full or part-time Conservation Administrator?	YES – Kristin Austin 603-673-8855 x 216	YES – Connie Cain 603-465-2209 x 105
Does the Town have a land acquisition Committee and/or fund for open space?	YES to both: 100% of Land-Use change tax goes to fund	YES to both: 50% of Land-Use change tax goes to fund.
Which RPC does the Town belong to?	NRPC	NRPC
OTHER		Hollis has a “Rural Character Preservation Ordinance” that is quite innovative.

Massachusetts Regulatory Summary for Ayer, Bolton, Devens, Dunstable, and Groton

Category	Ayer	Bolton	Devens	Dunstable	Groton
Regulatory Measure	Heather Hampson, Planning Admin. 978-772-8218 Mark Archambault, Town Planner 978-772-8218	Erica Uriarte, Town Planner 978-779-3308	Peter Lowitt, Director Neil Angus, Planner Devens Enterprise Commission	Cheryl Mann, Secretary 978-649-4514 x 230	Takashi Tada, Town Planner 978-448-1105
Master Planning					
Current Master Plan?	YES – it is in the process of being updated as of 2017. Set for adoption in 2018.	YES – revised in 2006.	YES - 1994 Devens Reuse Plan, Revised most recently in 2016.	YES- in the process of being updated. Expected to be approved at fall STM 2017. Previous Master Plan dates to 1999.	YES – revised in 2011.
Water Resources Protection Chapter?	YES	NO – though water resource protection is mentioned.	YES – in Reuse Plan, Bylaws, Rules and Regulations, and Open Space and Recreation Plan.	NO – but water resources covered in Natural Resources.	YES
Current Open Space and Recreation Plan	NO – though it is slated for adoption in 2018.	YES	YES – Plan is 2008 to 2013 but is still active (2 parcels remaining for permanent protection). Will be updated in 2018.	YES – covers the period 2010 – 2017. Will be updated this year.	YES – revised in 2012.
Designated "Green Community"?	YES	YES	N/A	NO	NO
Has the Zoning Bylaw been revised recently?	YES – in the process of being comprehensively updated as of 2017 and scheduled for a Town Meeting vote in 2018.	YES	YES – as recently as 2016.	YES – as recently as 2016.	YES

Category	Ayer	Bolton	Devens	Dunstable	Groton
Land-Use Controls					
Does the town have OSRD zoning?	YES	YES - called "Farm-land and Open Space Planned Res. Devt."	YES – called 'Innovative Residential Develop-ment'	YES – section 6.6 Min of 14 acres.	YES – called "Flexible Development".
If so, what is protected open space require-ment?	50%	33% (*Master Plan recommends increas-ing to 50%*)	Not fixed	35%	35%
Is OSRD allowed by right or Special Permit?	Special Permit. (OSRD is optional)	Special Permit.	'Unified Permit' – OSRD is optional but incentiv-ized though this process	YES – by Special Permit. (OSRD is optional)	Special Permit.
Does the town have a maximum slope for development?	NO	Maximum slope of 10% for the smallest subdiv. lanes, other max. slopes specified in Sec. 5220.4 Subdiv. Regs.	YES – Steep Slope Protection Regulations (974 CMR 3.06) http://www.devensec.com/rules- regs/de-cregs306.html	YES – under Stormwater and Erosion Control Bylaw (in General bylaw) ≥15% slope and >200 square feet distur-bance in slope	Maximum slope of 10% for subdivision roads and driveways
Does the town have Erosion Control mea-sures for construction on steep slopes?	YES – Ayer has good zoning provisions for regulation of land clearing and grading. Covers disturbances over 10,000 square feet.	NO – Not per se.	YES – Steep Slope Protection Regulations (974 CMR 3.06) http://www.devensec.com/rules- regs/ decregs306.html and Erosion and Sediment Control Requirements [974 CMR 3.02(3)(e)] www.devensec.com/rules- regs/decregs302.html	Regulations for Stormwater and erosion control bylaw are currently be drafted.	YES – Section 352-19 in Stormwater Regula-tions

Category	Ayer	Bolton	Devens	Dunstable	Groton
Does the zoning limit the % or area of impervious surfaces?	Percentage of 'open space' (non- impervious) required on a lot specified in Dim. Table. Also max. building coverage.	YES – there is a maximum 50% impervious in Comm. Zone.	YES – varied provisions in the Density / Intensity Regulations	There is a 25% lot coverage reqt. For buildings. (Sec. 11.4)	YES – described in the Schedule of Intensity Regulations: Sec. 218-20.
Do parking requirements for commercial devt. provide for shared or alternative parking?	YES, by Special Permit. See Sec. 9.1.5 (D) in zoning bylaw.	NO	YES – parking regulations emphasize shared parking as well as alternative pavement.	No commercial development in town.	YES – good guidelines for shared parking in Section 218-23.
Any resource protection overlay zones (besides wetlands)?	Floodplain and Aquifer Protection Overlay Districts	Floodplain and Mixed-Use Village Overlay Districts	Floodplain and Water Resources Protection.	Section 15.2.1 of Zoning bylaw- Floodplain District Overlay	Floodplain and Water Resources Protection.
DATE of FIRM maps flood zoning is based on	1982	2011	2011	2010	2010
Water Resource Zoning and Regulations					
Does the town have a local Wetlands Protection Bylaw to supplement the WPA?	NO	YES	YES	YES – the wetland protection bylaw was revised in 2013.	YES
If so, are there no- disturbance or no- build setbacks?	The Bylaw proposes a 100 foot *regulatory* buffer.	100 foot regulatory buffer with a 25 foot wide no disturbance zone from the edge of WPA juris. wetlands.	100 foot regulatory buffer with a 50 foot no-build zone and a 25 foot no-disturbance zone.	100 feet *regulatory* buffer zone. 60' No new permanent structure setback.	YES – there is a 50 foot combined no-disturbance / no-build zone.
If yes to a WPB, are upland areas adjacent to wetlands considered resource areas?	YES – within the 100 foot buffer zone.	YES – land within 75 feet of a wetland is considered a resource areas subject to review and permitting.	YES – land within 100 feet of wetlands are presumed important to the protection of Resource Areas and any activity requires permitting.	NO	YES

Category	Ayer	Bolton	Devens	Dunstable	Groton
Does the town have an Aquifer or general groundwater protection bylaw?	YES – Section 8.1	YES – there is a general town-wide bylaw for groundwater protection. General good practices listed.	YES – Devens Bylaws Chapter XI: Water Resource Protection Requirements http://www.devensec.com/bylaws/bylawstoc.html	YES – Water Supply Protection Bylaw. Aquifer protected under this.	YES
Does the town have wellhead protection as part of this?	YES	YES	YES	YES – Zone 1 and 2 wellhead delineation protection.	YES
Does the town have a Stormwater Control Bylaw with LID provisions?	YES and NO – has stormwater control bylaw, but LID not emphasized.	NO – though Sec. 5230.3 of the Subdiv. Regs. Has good provisions for such.	YES – 2012 – excellent Stormwater Management Section in 974 CMR 3.04(4) and 974 CMR 4.08. www.devensec.com/rules-egs/decregstoc.html	Has Stormwater and Erosion control bylaw but does not include LID.	YES
What area of land disturbance triggers Stormwater Review?	Typically 40,000 sq.ft. except for slopes > 15% then 1,000 sq.ft.	N/A	All development is subject to stormwater review.	>20, 000 square feet requires Land disturbance permit from PB	> 20,000 square feet requires minor permit / > 40,000 square feet major permit
Is minimizing impervious surfaces a goal of the stormwater bylaw or regulations?	NO	N/A	YES	In Water Supply Protection Bylaw 15% or 2500 square feet (whichever greater) imperv. requires authorization if the water supply area.	YES

Category	Ayer	Bolton	Devens	Dunstable	Groton
Is the use of LID required in certain circumstances?	NO	LID is required in the Commercial Zone and is strongly encouraged in Section 5230.3 of the Subdiv. Regs.	YES – emphasis on bioretention and biofiltration. LID is considered the default stormwater management technique in Sec. 4.08 2 ix.	NO	YES - Low-impact development (LID)/ green infrastructure techniques must be incorporated into development and redevelopment projects in the Town unless it can be shown per § 352-9A(1) that the use of LID techniques is not feasible
Protection of key wildlife habitat and natural communities?					
Is protection of wildlife habitat and natural communities specified in OSRD or other zoning?	YES – in the Erosion Control section.	NO	YES – in Site Plan design standards there are requirements to preserve trees and reduce edge habitat on new development sites.	YES – purpose in OSRD to preserve natural features and conditions. Not specific for wildlife habitat though.	YES
Is such addressed in Open Space or Master Plans?	YES	YES – Open Space and Recreation Plan (OSRP) is currently being revised. Town has excellent planning process.	YES – especially the Open Space and Recreation Plan.	Preserving open space, protecting natural communities and resource conservation are primary objectives in both Open Space and Master plans.	YES
If so, does it describe areas recommended for further protection in detail?	YES	The OSRP goes into great detail on recommended land for protection.	See Devens Open Space and Recreation Plan.	YES - endangered wildlife habitat, groundwater and aquifers, fields and forests, river greenways, shorelines, scenic roads and views, etc.	YES

Category	Ayer	Bolton	Devens	Dunstable	Groton
Planning Capacity					
Has the Town adopted the Community Preservation Act (CPA)?	YES – adopted in 2002.	NO	N/A	YES	YES – adopted in 2004.
Does the Town have a full or part-time Town Planner or Planning Administrator?	YES	YES	YES	NO	YES
Does the Town have a full or part-time Conservation Agent?	YES	YES – Rebecca Longvall	YES	NO	YES
Does the Town have a land acquisition committee and/or fund for open space?	There is a Community Protection Advisory Committee (CPAC).	Capital Planning Committee oversees land acquisition	YES – Devens Open Space and Recreation Advisory Committee. DEC acting as local Conservation Commission has a fund for maintaining open spaces that it holds CR's on but not a separate fund for acquisition of land).	Neither. Town has a local land trust, the Dunstable Rural Land Trust.	YES – a Conservation Fund. No separate land acquisition committee as this is done by Conservation Commission.
Which Regional Planning Commission is the town part of? Does it actively engage with the RPC?	Montachusett Regional Planning Commission (MRPC)	Metropolitan Area Regional Planning Commission (MAPC)	MRPC	Northern Middlesex Council of Govts.	MRPC

Massachusetts Regulatory Summary for Harvard, Lancaster, Pepperell, Shirley, and Townsend

	Harvard	Lancaster	Pepperell	Shirley	Townsend
Regulatory Measure	Bill Scanlan, Town Planner: 978-456-4100 x 329	Noreen Piazza, Planner: 978-365-3326 x 1311	Steve Parker, Planner: 978-433-0336	Michael Gibbons, PB Clerk: 978-425-2600 x 240	Beth Faxon, Admin. Assist. To PB, 978-597-1700 x 1722
Master Planning					
Current Master Plan?	YES	YES – revised in 2007.	A committee has formed to update such.	Presently being revised. Draft as of May, 2016.	NO – adopted in 2001. The update of 2008 was never adopted. Presently being updated by PB in 2018.
Water Resources Protection Chapter?	YES – revised in 2016.	YES	Not per se. Water resources mentioned but not explicitly addressed.	YES. In the Open Space and Recreation Plan.	YES
Current Open Space and Recreation Plan	YES	YES – 2014–2024.	YES – completed in 2016.	YES – draft as of 2014.	YES. Adopted in 2013.
Designated "Green Community"?	YES	YES	YES	YES	YES
Has the Zoning Bylaw been revised recently?	YES	YES – annually.	YES – most recently in 2016.	YES – as recently as 2016.	YES
Land-Use Controls					
Does the town have OSRD zoning?	YES. OSC-PRD section 125-35) In the process of being revised.	YES. It's called 'Flexible Development', Sec. 220-15.	YES.	YES – though they call it 'Low Impact Devt.' Section 4.2A, page 40.	YES, though it dates to 1986. See Zoning Bylaw Sec. 145-39.

	Harvard	Lancaster	Pepperell	Shirley	Townsend
If so, what is protected open space requirement?	50%	40%	40%	35%	30%
Is OSRD allowed by right or Special Permit?	Special Permit. (OSRD is optional)	Special Permit.	Special Permit	Special Permit (OSRD is optional)	Special Permit (OSPD is optional)
Does the town have a maximum slope for development?	Maximum slope for new roads and driveways / not development per se	Maximum slope for subdivision roads of 10%.	Has a good Erosion Control section in the Zoning Bylaw: Sec. 5530	Bylaws section 4.,4.0.1 Design Guides:1.b.: …shall reduce, to the extent reasonably possible, land having a slope of more than 15%.	15% slopes with > 1,000 sq.ft. of disturbance require stormwater permit.
Does the town have Erosion Control measures for construction on steep slopes?	NO	There is an Erosion and Stormwater Control section of the Zoning Bylaw: Sec. 220-37.2.	YES – Section 5530:	Bylaws section 4., 4.0.1 Design Guides: 1. L. …reduce to the extent reasonably possible, soil loss or instability during and after construction.	20% maximum impervious surfaces in OSPD. Also a section in Stormwater Bylaw regarding erosion control and slopes.
Does the zoning limit the % or area of impervious surfaces?	Not explicitly. There is a maximum floor / area ratio of .1.	NO	Yes – 1.5% in Water Resource Protection Overlay District. No more than 15% of a lot shall be impervious.	YES -- for developments in the WHPOD. See Sec. 4.13.4 c	YES
Do parking requirements for commercial devt. provide for shared or alternative parking?	See the Community Design Guidelines for the Commercial District off PB page.	NO	YES, and parking requirements can be reduced by Special Permit.	YES – See page 148 in Master Plan.	Check Zoning Bylaw Section 145-33 Provisions Applicable to All Districts.

	Harvard	Lancaster	Pepperell	Shirley	Townsend
Any resource protection overlay zones (besides wetlands)?	Floodplains	Water Resource Protection and Floodplain Overlay District	Water Resource Protection Overlay District (WRPOD)	YES – Water Supply and WHPOD, section 4.13 and Floodplain.	Aquifer Protection Overlay District; Floodplain District and Groundwater Protection Overlay District.
DATE of FIRM maps flood zoning is based on	2011 and 2014	2011	June 2010	2010	2010
Water Resource Zoning and Regulations					
Does the town have a local Wetlands Protection Bylaw to supplement the WPA?	YES	YES – 2007	YES – adopted in 2002.	YES – adopted in 2005.	YES – originally adopted in 1983, revised since then.
If so, are there no- disturbance or no- build setbacks?	YES – there is a 50 foot no-disturbance zone as well as a 75 foot no- build zone.	YES – there is a 25 foot no-disturbance zone.	YES – there is a 50 foot combined no-disturbance / no-build zone.	YES – there is a 25 foot no-disturbance zone and a 40 foot no-build zone.	YES – there is a 35 foot non-disturbance zone.
If yes to a WPB, are upland areas adjacent to wetlands considered resource areas?	(See Riparian project table)	Sort of. See section 215-4 of Wetland Bylaw. Talk to Conservation Agent.	YES – if within the above 50 feet.	NO	NO
Does the town have an Aquifer or general groundwater protection bylaw?	NO	YES – Water Resource Protection District, sec. 220-39.	YES – the WRPOD overlay district.	YES – Water Supply and WHPOD, section 4.13	YES – Section 145-40. Aquifer Protection Overlay District.
Does the town have wellhead protection as part of this?	NO	YES	YES – wellhead protection for Zone IIs, 3 of which are specified.	YES – a good one.	YES – Section 145-54 Groundwater Protection District.

	Harvard	Lancaster	Pepperell	Shirley	Townsend
Does the town have a Stormwater Control Bylaw with LID provisions?	NO – not subject to Phase II.	YES	NO – though subject to new permit	YES	YES – for Phase II stormwater control.
What area of land disturbance triggers Stormwater Review?	One acre under State permit only.	One acre or 43,560 square feet.	Not applicable yet	One acre (43,560 square feet).	40,000 square feet.
Is minimizing impervious surfaces a goal of the stormwater bylaw or regulations?	N/A	YES	Not applicable yet	YES – See General Town By-Laws, Article XXXII. Stormwater Mgmt. Control Bylaw, Sec. 1.0. Purpose	Not explicitly.
Is the use of LID required in certain circumstances?	N/A – NO	NO	Not yet applicable.	YES -- See Protective Zoning By-laws (November 2015) in section 4.2A. Low Impact Development.	Not required but encouraged. (See SW by-law).
Protection of key wildlife habitat and natural communities?					
Is protection of wildlife habitat and natural communities specified in OSRD or other zoning?	YES	YES	YES	YES -- See Protective Zoning By-laws (November 2015) in section 4.2A. Low Impact Development.	YES – See Zoning Bylaw Section 145-41.
Is such addressed in Open Space or Master Plans?	YES – in the Master Plan and 2016 Open Space & Recreation Plan.	YES	YES	YES	YES -- in OS Plan; approved in 2014.
If so, does it describe areas recommended for further protection in detail?	YES - 2016 Open Space & Recreation Plan.	YES	Gulf Brook, Sucker Brook, Nashua River, Nissitissit River watersheds and Bio-map2 core areas.	In the recently updated Open Space Plan it includes several remaining large blocks of forest and habitat connections E-W across the middle part of town and N-S along the western boundary.	Not included in OS Plan, but see Appendix B re: endangered species.

	Harvard	Lancaster	Pepperell	Shirley	Townsend
Planning Capacity					
Has the Town adopted the Community Preservation Act (CPA)?	YES – adopted in 2001.	NO	NO	NO	NO
Does the Town have a full or part-time Town Planner or Planning Administrator?	YES	YES	YES	NO	YES
Does the Town have a full or part-time Conservation Agent?	YES	YES	YES	YES	YES
Does the Town have a land acquisition committee and/or fund for open space?	Conservation Commission. There is also a local land trust - Harvard Conservation Trust.	Conservation Commission, Conservation Trust Fund	Conservation Commission.	YES – Conservation Commission has a dedicated "Conservation Land Acquisition Fund". No dedicated land acquisition committee. Land acquisition handled by Conservation Commission at present.	YES -- Conservation Land Fund. Contributions voted at Town Meeting intermittently.
Which Regional Planning Commission is the town part of? Does it actively engage with the RPC?	MRPC	MRPC	Northern Middlesex Council of Govts.	MRPC	MRPC

Appendix C:
History of Water Quality in the Nashua River and Tributaries

by Warren Kimball

Nashua River. Photo: Cindy Knox Photography.

Water Quality Standards

This Appendix describes the development of water quality standards in Massachusetts and summarizes several decades of classification data on water quality for representative segments of the Nashua River and its tributaries. Water Quality Standards were first established for the Commonwealth of Massachusetts by the Division of Water Pollution Control (DWPC) in 1967. They created four inland water classifications as water quality goals:

- Class A waters were designated as sources of public water supply.
- Class B waters were designated for aquatic life, recreation (swimming and boating) and aesthetics.
- Class C waters were designated for indigenous aquatic life, limited recreation (boating) and aesthetics.
- Class D waters were designated for aesthetic enjoyment only.

Table 1 shows the original Classifications assigned to certain segments of the Nashua River Watershed in 1967. It also shows the current condition of these waters in the early 1970s as listed in the first DWPC Nashua River Basin Management Plan[1]. A "U" designation signified "unacceptable," meaning the current condition did not meet any of the existing

1 Camp, Dresser and McKee Inc., prepared for New England Interstate Water Pollution Control Commission, "Water Quality Management Plan Nashua River Basin," December 1975.

Classifications. Waters in the Nashua River Watershed not listed here were Classified either A or B and were generally thought to meet those Classifications.

It can be seen that the condition of the main body of the Nashua River was grossly polluted at the time. Furthermore, the expectation for the river's future was below Class B. Class B coincided with the national "fishable/swimmable" goal established in the Federal Clean Water Act of 1972.

During the public hearing process for the 1967 Massachusetts Water Quality Standards, Marion Stoddart testified on behalf of the Nashua River Clean-Up Committee. She presented a comprehensive package prepared by the Committee that showed overwhelming evidence for support of a B classification for the river. She also called for the elimination of Class D from the Standards.

When the Water Quality Standards were revised in 1974, Class D was eliminated. Also, Class C segments on the mainstem of the Nashua River, the South Branch, and the lower Squannacook River were reclassified to a new Class B1 designation. Class B1 had all the same criteria as Class B except for dissolved oxygen, which was held at a Class C level. The North Branch of the River remained at Class C.

The Standards were revised again in 1978. In this revision, all Class C and B1 segments of the river were upgraded to Class B. This was to reflect the desire to attain the national "fishable/swimmable" goal and did not indicate the current condition of the river.

The Squannacook and Nissitissit Rivers are both designated Class B, coldwater fisheries. This affords these rivers more stringent dissolved oxygen and temperature criteria within the B Classification. Other waters in this discussion are designated warmwater fisheries and have less stringent criteria than coldwater fisheries. Class C waters are not assigned a "fisheries" designation and have less stringent dissolved oxygen and temperature criteria than warmwater fisheries.

Water Quality Report Cards

In order to show the history of water quality of the Nashua River Watershed, the DWPC created water quality report cards to graphically display the water quality of the river at a point in time. Four report cards were created in order to show the existing water quality during each decade from the early 1970s to the early 2000s. They display the results of water quality surveys conducted primarily by the DWPC (and its successor agencies) during this time.

Reports selected for this Appendix single out the information on historically polluted portions of the river including the South Branch, North Branch, and mainstem of the Nashua River as well as two relatively clean tributaries, the Squannacook and Nissitissit Rivers. These rivers were divided into nine segments for the sake of discussion. Information on fish tissue was available only in the more recent assessments, and was spotty. Therefore, for the sake of trend analysis it is shown as "not assessed" on all the report cards in order to make the assessment more comparable.

For each of the nine segments, eight categories of pollutants are assessed for the aquatic life use and three categories of pollutants for the recreational uses. The level of pollution is color coded to verbal categories of "good," "fair," "poor," and "very poor," "Good" means meeting Class B criteria and the other categories roughly coincide with Class C, Class D, and U respectively. In order to provide a uniform basis of comparison, all water quality was assessed using criteria for a modern Class B water, meaning the criteria that would be used today.

Severity points were also assigned to these categories (1, 2, and 3 respectively) indicating the level of impacts depending on the degree to which Class B criteria are violated. Severity points in a segment can be totaled to compare with other segments or to the same segment over time. Total severity points can be further weighted by multiplying by the segment's length. In this manner, the number of parameters

violated, the severity of the violation, and the river miles affected can be tallied to glean additional useful information.

Caution should be used in viewing the report cards so that they are not afforded a degree of precision that is unwarranted. Water quality is highly variable and the data sets used to fill out the report card were seldom uniformly comparable. In a few instances, the information was contradictory. Additionally, the criteria used to assess the segments have changed over time as well as the Classifications of the waters. Considerable judgment was used in formulating the report cards. The use of broad verbal categories such as "good," "fair," and "poor" water quality and "slight," "moderate," and "severe" impacts is intentional and meant to envelop all the above considerations and sources for error. These same terms were often used in the source material to describe the river, the levels of pollution and the judgments used in the report cards.

The report cards are aimed at showing the relative change in water quality over time. For this purpose they are quite demonstrative.

Early Water Quality History

The Nashua River watershed was once settled by the Nashaway native members of the Algonquin Tribe. One commonly accepted translation for their name for the river is "the river with the beautiful pebbled bottom." They harvested plentiful salmon and alewives from the river. The area was subsequently settled and cleared by Massachusetts Bay colonists for farming and raising livestock.

During the 19th century, the watershed experienced extensive industrial development including gristmills, textile mills and paper manufacturing mills. It seems water quality at this time met the fishable/swimmable goal, according to a nineteenth century account from the history of the Town of Lancaster: "Some value the river for its enriching qualities, and some for its abundant water power, and some because they can idle away their time catching pout and pickerel. There are some also who delight in it as 'a thing of beauty' and a 'joy forever." They love to wander on its banks, to plunge into its depths and float upon its surface. They return again and again to gaze on its flow when its shimmers in the sun, or is mottled by the raindrops, or ruffled by the breeze". [2]

Unfortunately, the increased industrial development profoundly impacted the river. Paper manufacturing became the leading industry in the basin and numerous dams were built along the river and its tributaries to create storage impoundments for industrial process and cooling water and hydroelectric power. The paper mills discharged untreated process wastes to the river that coated the bottom with paper sludge. The use of dyes in the Fitchburg Mills made the river notorious for changing color downstream in accord with the color of paper being manufactured that day.

The City of Fitchburg installed one of the first wastewater treatment plants in the United States (1915). The plant provided secondary treatment, a degree of treatment rare at that time. In 1932, the City of Leominster installed an activated sludge treatment plant for its municipal wastes. However, the industries did little or nothing to treat their discharges, largely negating the attempts by Fitchburg and Leominster to improve water quality. These two towns have combined sewer systems, a type that is purposely designed to overflow to the river during heavy rainfall, further exacerbating pollution problems. The severity of this pollution gave the river the dubious distinction of being the most polluted stream in Massachusetts.

By the 1970s, the Division of Water Pollution Control listed 40 municipal and industrial discharges to the river and its tributaries. There were also numerous potential nonpoint sources of pollution

2 Rev. Abijah Marvin, *History of the Town of Lancaster: From the First Settlement to the Present Time, 1643–1879*, (Lancaster: Published by the town, 1879).

Rank	WasteLoad	ReceivingWater
1	FitchburgPaperMills	NorthBranch
2	FitchburgWastewaterTreatmentPlant	NorthBranch
3.	LeominsterWastewaterTreatmentPlant	NorthBranch
4.	ClintonWastewaterTreatmentPlant	SouthBranch
5.	AyerWastewaterTreatmentPlant	Mainstem
6.	FitchburgCombinedSewers	NorthBranch
7.	PepperellPaperMills	Mainstem
8.	LeominsterCombinedSewers	NorthBranch

such as urban storm water from Fitchburg, Leominster, Clinton, and Ayer; agricultural runoff (apple orchards); malfunctioning on-site disposal systems; as well as landfills and open dumps near the riverbanks. However, nonpoint source pollution was largely masked by the much more prominent point sources of pollution.

The table above is a ranking of the most significant pollutant loads to the river in the early 1970s.

As can be seen, by the 1970s municipal treatment plants contributed high levels of pollution to the river. These treatment plants were antiquated, overloaded, and provided inadequate treatment of municipal wastewater.

Dams are another factor affecting water quality. They can increase water temperature, increase sedimentation of sludge, decrease oxygen levels and, in some cases, stimulate eutrophication. The North Branch of the Nashua is punctuated by eleven dams. The South Branch has two dams. The Wachusett Reservoir Dam is the largest in the watershed and has been implicated in contributing to water quality problems due to the meager minimum release of water. The mainstem has two dams: the Ayer Ice Company Dam and the Pepperell Pond Dam. The Pepperell Pond impoundment is long (over four river miles) and shallow. River velocities slow in this segment and pollutants settle to the bottom, affording time for biochemical reactions.

Water Quality in the Early 1970s

The figure on page 8 shows the Report Card for water quality in the Nashua River in the early 1970s. The information for this report card comes primarily from a water quality survey conducted by Massachusetts Division of Water Pollution Control 1973 and its Management Plan from 1975. It also draws from a 1975 Management Plan by Camp, Dresser, and McKee Inc., prepared for New England Interstate Water Pollution Control Commission[3].

Data from the early 1970s serves as a snapshot of water quality before major clean-up efforts were initiated by state and federal programs. Municipal treatment plants in Fitchburg, Leominster, Clinton and Ayer were present, but they were antiquated and ineffective. Industrial pollution was largely unabated.

The report card shows that the Nashua River in the early 1970s is biologically dead. Fish cannot live in the river. Dissolved oxygen, necessary for the survival of aquatic life, has been depleted by oxygen-demanding paper waste and sewage. Aquatic habitat has been destroyed by the coating of the river bottom with paper sludge and in the water column with turbidity. Even if fish could survive in the water column, they would not be able to lay eggs and propagate in this degraded habitat. Domestic wastewater has added levels of ammonia to the water column that were toxic to fish.

3 "Water Quality Management Plan Nashua River Basin," December 1975.

The most severe pollution is to the North Nashua Branch from the paper mills, municipal systems, and combined sewer overflows. The South Branch also has similar, but not quite as severe, water quality problems. Industrial cooling water discharges on the North and South Branches contribute to high instream water temperature, unsuitable for fish survival. Together, the North and South Branches combine to pollute the Mainstem. The Mainstem shows signs of recovery along its length as the river's natural processes attempted to clean the river, only to be insulted again below Pepperell Pond by more paper mill wastewater.

Recreational uses on the river fare no better than the aquatic life. Bacteria from urban runoff and combined sewer over overflows on the North Branch combined with dyes, turbidity, odors, and paper sludge repel people from the river. The South Branch contributes to bacterial problems because the Clinton Treatment Plant is not practicing chlorination at the time. Again, the North and South Branches combine to pollute the Mainstem, with effects lingering through Pepperell Pond. Below Pepperell Pond, more discharges of paper mill wastewater and malfunctioning onsite private septic systems contribute to more degraded conditions.

Compared with the Nashua River, the Squannacook and Nissitissit Rivers are relatively pristine. There are slight excursions from the stringent dissolved oxygen and temperature criteria for coldwater fisheries and occasional elevated bacteria levels from faulty onsite septic systems. A paper company downstream on the Squannacook River provides generally good treatment for its wastewater, but occasionally contributes to some slight turbidity. These rivers are considered fishable and swimmable in stark contrast to the rest of the assessed waters.

Water Quality in the Early 1980s

In 1975, the City of Fitchburg completed construction of two new wastewater treatment plants. The Westerly Plant was designed primarily to process paper manufacturing waste. The Easterly Plant was designed to treat domestic wastewater at an advanced level that included both phosphorus removal and nitrification (ammonia removal). Leominster was rebuilding its treatment facility at the turn of the decade to increase its capacity and add phosphorus removal. Pepperell was also constructing a modern facility. Clinton and Ayer were planning upgrades to their facilities.

The upgrades of the Fitchburg treatment facilities make a huge difference in pollution loads to the North Branch. DWPC estimates that total suspended solids are decreased by 90% and oxygen-demanding wastes are decreased by 50%. Bottom deposits of sludge are replaced by pollution-tolerant insects. The river's habitat is recovering but still not up to water quality goals. The dissolved oxygen levels begin to recover in the lower portion of the North Branch but are again depressed when it joins the South Branch. They then recover in Pepperell Pond and remain good in the lower portion of the river. Temperature problems in the river are largely eliminated.

Recreational uses of the river remain impaired. Urban runoff and combined sewer overflows keep bacterial levels high on the North Branch. In the South Branch, bacterial levels remain high until the Clinton Treatment Plant adds chlorination to its treatment process. Start-up problems with this upgrade, however, contribute to toxicity problems in the river. The removal of sludge in the North Branch reduces aesthetic nuisance conditions considerably. The North Branch recovers considerably in its lower segment and even the turbidity from South Branch does not diminish the recovery.

Aesthetic problems are less severe in the Mainstem. However, as Pepperell Pond recovers from one type of pollution, it becomes susceptible to another. The

abundance of nutrients compiled in the sediments contributes to sever eutrophication of the pond. Nuisance vegetation, such as duckweed, covers the surface of the impoundment, impairing recreational uses.

In the Squannacook River, nutrients in the lower part of the river create some slight aesthetic issues. Faulty septic systems continue to be an issue. The Nissitissit River is referred to by DWPC in 1977 as one of the cleanest rivers in the state. Minor temperature and bacteria excursions form criteria are noted in the survey data.

In the Nashua River Watershed, the recovery from the 1970s is evident. Two segments, the South Branch above Clinton and the Mainstem below Pepperell Pond, are largely fishable and approaching swimmable. The rest of the river is still not fishable/swimmable but improvements are evident. The total weighted severity points for the system drop from 1027.9 to 808.4, a better than 20% improvement. The appearance of more green areas on the report card shows that most of these improvements were to the aquatic life use (see page 9).

Water Quality in the Mid 1990s

The information for this report card (page 10) comes from a comprehensive survey conducted in 1998 by the Massachusetts Division of Watershed Management, the Massachusetts Water Resources Authority, the Nashua River Watershed Association and the U.S Environmental Protection Agency.

In the South Branch, urban runoff causes slight problems above the Clinton treatment plant, but problems below the plant persist because of lack of instream dilution and high nutrient loadings from the facility. Recreational uses continue to be impaired by urban runoff.

Remarkably, the North Branch, once the most polluted system in the Nashua River watershed, now has recovered to pollution levels equal to or below other portions of the river. This can be seen by examining the total severity points in the various segments. Above Leominster, the two Fitchburg facilities have drastically reduced pollution in the river, but the combined sewer overflow problems have not been addressed. The aquatic life is impacted by apparent instream toxicity, perhaps from a legacy of pollutants trapped in the sediments. Recreational uses are impaired by the bacteria, turbidity, and odors from the combined sewer overflows. Below Leominster, nutrients from the treatment facility and continued impacts by combined sewers impair uses.

In the mainstem of the river, carryover pollution from the North and South Branches and high nutrient levels from the Ayer treatment facility contribute to water quality problems above Pepperell Pond. Within the pond, recycling of nutrients creates a highly eutrophic condition with the water becoming choked with nuisance vegetation. This, in turn, reduces benthic dissolved oxygen and adversely affected aquatic life. Very poor aesthetic conditions adversely affect recreation. In terms of total severity points, Pepperell Pond now becomes the most polluted segment of the river. Below Pepperell Pond, carryover pollution from the pond and rapid flow fluctuations from the hydropower operation are sources of problems but these are characterized as slight.

Both the Nissitissit and the Squannacook Rivers have slight temperature and pH perturbations causing slight impacts to aquatic life. The water quality problems of the Nashua River are shifting from the impacts from paper companies and municipal wastewater on the North Branch to the impacts of combined sewer overflows (CSO) on the North Branch.

CSO's were once ranked sixth most important source of pollution. These impacts carry over to the mainstem of the river. Nutrients remain high through most of the watershed due to inadequate removal at municipal facilities and from the combined sewer overflows. The focus of abatement actions in the watershed is shifting from the North Branch to the Clinton facility and to Pepperell Pond.

The weighted severity points for the watershed show an approximate 50% reduction in pollution from the early 1970s—a remarkable achievement.

Water Quality in the Early 2000s

The information for this report card (page 11) comes primarily from the Massachusetts Department of Environmental Protection' 2003 Assessment Report or the Nashua River Watershed Association. The South Branch above the Clinton wastewater facility was assessed as fishable/swimmable, although there are some lingering concerns about flow releases from Wachusett Reservoir. Below the facility, phosphorus concentrations are still high due to the discharge and there are slight impacts to recreational uses from urban runoff.

In the North Branch, evidence of instream toxicity persists in the segment above Leominster, impairing aquatic life. Recreational uses suffer from the continued discharge of combined sewer overflows. Below Leominster, nutrients levels are high due to municipal wastewater discharges and aesthetic concerns are derived from odors from combined sewer overflows. The severity points show that the pollution level on the North Branch is about a third of the level of the early 1970s.

In the Mainstem of the river, nutrient levels remain high due to carryover from upstream sources and recycling from the sediments in Pepperell Pond. The adverse effect of these nutrients are largely shown in Pepperell Pond, in the form of massive blooms of nuisance and nonnative vegetation. This condition impairs both the aquatic life and recreational uses of the waterbody. Pepperell Pond continues to be the focus of pollution issues in the river with other sections of the Mainstem generally reaching fishable/swimmable status.

The most recent fish sampling both the Squannacook and Nissitissit Rivers displays a lack of coldwater species. This is disturbing, for these rivers are thought to be relatively pristine. Water quality monitoring reveals higher-than-desired temperatures for coldwater populations. The source of this impairment is unknown and suspected sources include dams, beaver activity or climate change.

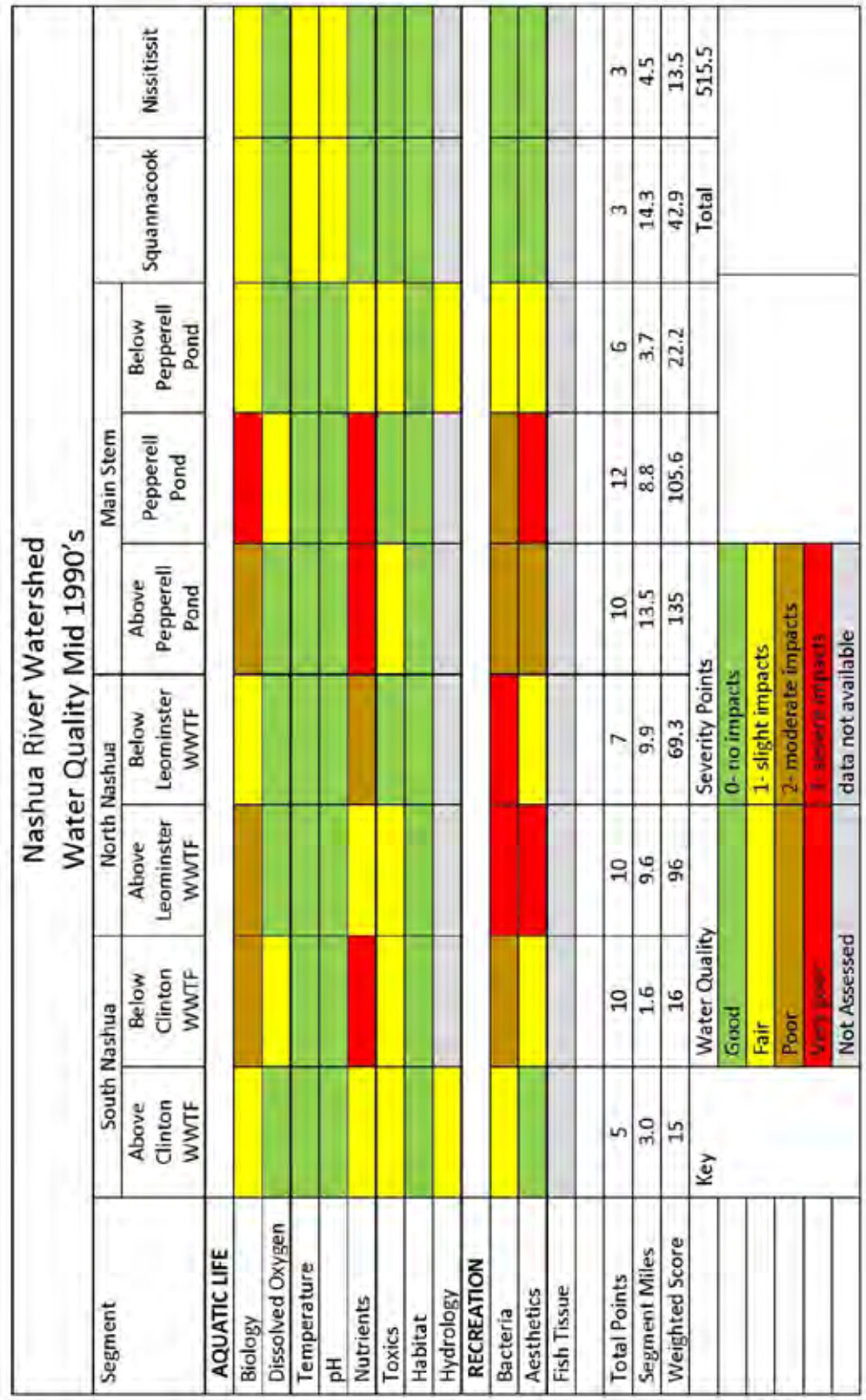
The South Branch, North Branch, and Mainstem of the Nashua River have undergone an approximate 70% reduction in pollution levels during the period of the early 1970s to the early 2000s, as demonstrated by the weighted score on the report cards. This dramatic reduction is largely brought about by the treatment of industrial and municipal wastewater mandated by the National Pollutant Discharge Elimination System permit program. The problems that persist are largely due to high phosphorus levels and untreated combined sewer overflows. The phosphorus levels are from several municipal wastewater sources but adverse effects are largely exerted in Pepperell Pond. The combined sewer overflows are on the North Branch but effects carryover to the Mainstem.

Nashua River Watershed
Water Quality- Early 1970's

Segment	South Nashua		North Nashua		Main Stem			Squannacook	Nissitissit
	Above Clinton WWTF	Below Clinton WWTF	Above Leominster WWTF	Below Leominster WWTF	Above Pepperell Pond	Pepperell Pond	Below Pepperell Pond		
AQUATIC LIFE									
Biology									
Dissolved Oxygen									
Temperature									
pH									
Nutrients									
Toxics									
Habitat									
Hydrology									
RECREATION									
Bacteria									
Aesthetics									
Fish Tissue									
Total Points	11	17	22	22	20	15	20	3	3
Segment Miles	3.0	1.6	9.6	9.9	13.5	8.8	3.7	14.3	4.5
Weighted Score	33	27.2	211.2	217.8	270	132	74	42.9	13.5
	Key	Water Quality		Severity Points				Total	1027.9
		Good		0- no impacts					
		Fair		1- slight impacts					
		Poor		2- moderate impacts					
		Very poor		3- severe impacts					
		Not Assessed		data not available					

Nashua River Watershed
Water Quality Early 1980's

Segment	South Nashua		North Nashua		Main Stem			Squannacook	Nissitissit
	Above Clinton WWTF	Below Clinton WWTF	Above Leominster WWTF	Below Leominster WWTF	Above Pepperell Pond	Pepperell Pond	Below Pepperell Pond		
AQUATIC LIFE									
Biology									
Dissolved Oxygen									
Temperature									
pH									
Nutrients									
Toxics									
Habitat									
Hydrology									
RECREATION									
Bacteria									
Aesthetics									
Fish Tissue									
Total Points	7	19	22	15	14	16	9	7	2
Segment Miles	3.0	1.6	9.6	9.9	13.5	8.8	3.7	14.3 (3.6)	4.5
Weighted Score	21	30.4	211.2	148.5	189	140.8	33.3	25.2	9
	Key	Water Quality		Severity Points				Total	808.4
		Good		0- no impacts					
		Fair		1- slight impacts					
		Poor		2- moderate impacts					
		Very poor		3- severe impacts					
		Not Assessed		data not available					


Nashua River Watershed
Water Quality Mid 1990's
Segment
South Nashua
North Nashua
Main Stem
Squannacook
Nissitissit
Above Clinton WWTF
Below Clinton WWTF
Above Leominster WWTF
Below Leominster WWTF
Above Pepperell Pond
Pepperell Pond
Below Pepperell Pond
AQUATIC LIFE
Biology
Dissolved Oxygen
Temperature
pH
Nutrients
Toxics
Habitat
Hydrology
RECREATION
Bacteria
Aesthetics
Fish Tissue
Total Points 5 10 10 7 10 12 6 3 3
Segment Miles 3.0 1.6 9.6 9.9 13.5 8.8 3.7 14.3 4.5
Weighted Score 15 16 96 69.3 135 105.6 22.2 42.9 13.5
Key
Water Quality
Severity Points
Total 515.5
Good
0- no impacts
Fair
1- slight impacts
Poor
2- moderate impacts
Very poor
3- severe impacts
Not Assessed
data not available

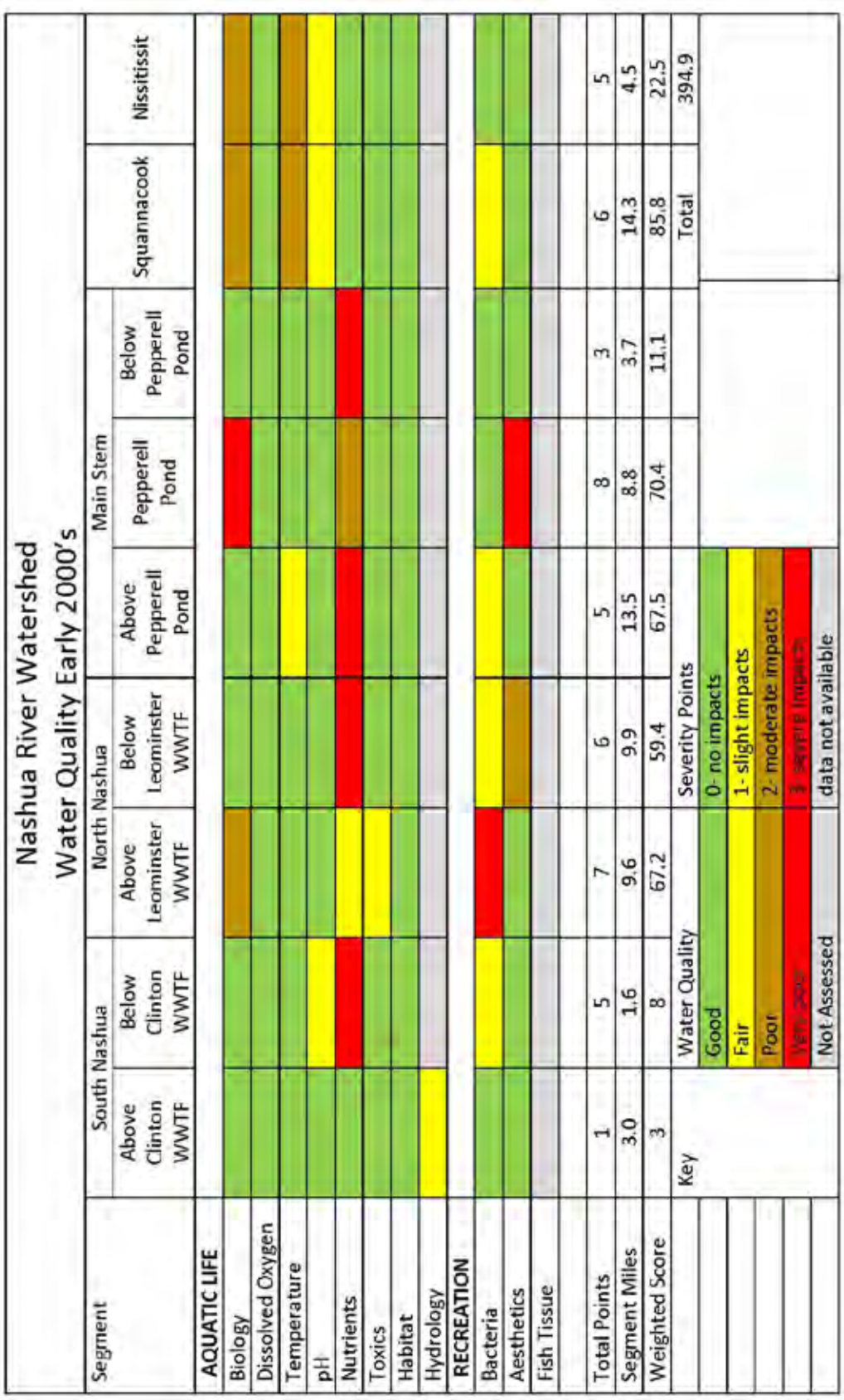

Nashua River Watershed
Water Quality Early 2000's
Segment
South Nashua
North Nashua
Main Stem
Squannacook
Nissitissit
Above Clinton WWTF
Below Clinton WWTF
Above Leominster WWTF
Below Leominster WWTF
Above Pepperell Pond
Pepperell Pond
Below Pepperell Pond
AQUATIC LIFE
Biology
Dissolved Oxygen
Temperature
pH
Nutrients
Toxics
Habitat
Hydrology
RECREATION
Bacteria
Aesthetics
Fish Tissue
Total Points 1 5 7 6 5 8 3 6 5
Segment Miles 3.0 1.6 9.6 9.9 13.5 8.8 3.7 14.3 4.5
Weighted Score 3 8 67.2 59.4 67.5 70.4 11.1 85.8 22.5
Total 394.9
Key
Water Quality
Good
Fair
Poor
Very Poor
Not Assessed
Severity Points
0- no impacts
1- slight impacts
2- moderate impacts
3 severe impacts
data not available

Table 1: Nashua River Watershed Water Use Classifications (by Warren Kimball)

Segment Number	Description	River Miles	Classification			Early 1970's Condition
			1967	1974	1978	
1	**South Branch** Outlet Lancaster Mill Pond, Clinton, to Clinton WWTF, Clinton	3.0	B	B	B	U
2	Clinton WWTF to confluence with North Nashua River, Lancaster	1.6	C	B1	B	U
3	**North Branch** Fitchburg Paper Co. Dam #1, Fitchburg to Leominster WWTF, Leominster	8.4	C	C	B	U
4	Leominster WWTF to confluence with the Main Stem Nashua River, Lancaster	9.9	C	C	B	U
5	**Main Stem Nashua River** Confluence of North and South Branches, Lancaster to Confluence with Squannacook River, Shirley/ Groton	13.5	C	B1	B	U
6	Confluence with Squannacook River to Pepperell Pond Dam, Pepperell	8.8	C	B1	B	U
7	Pepperell Pond Dam to New Hampshire State Line	3.7	C	B1	B	U
8	**Squannacook River** Entire length	14.3	B/C	B/B1	B	B/C
9	**Nissitissit River** Massachusetts portion	4.5	B	B	B	B

Table 2: Nashua River Report Card Severity Point Criteria (by Warren Kimball)

Indicator	1 slightly impacted	2 impacted	3 severely impacted
I. Aquatic Life			
A. Biology Invertebrates	Diversity-medium Density-low/medium 54-79% reference	Diversity-low Density-medium/high 21-50% reference	Diversity-low/absent Density-high/absent 17% reference
B. Chemistry Baseline Dissolved Oxygen minimum daily average Temperature maximum weekly average pH standard units	 < 5.0 mg/l < 75% saturation > 80.6°F >75 °F 6.0-6.5 or 8.0-8.5	 < 3.0 mg/l < 5.0 mg/l >83°F >77°F 5.5-6.0 or 8.5-9.0	 < 2.0 mg/l > 90 °F < 5.5 > 9.0
Nutrients Total Phosphate-P	> 0.05 mg/l	> 0.10 mg/l	> 0.20 mg/l
Toxics Ammonia-N	> 0.5 mg/l	> 1.0 mg/l	> 2.0 mg/l
Sediments	> threshold effects	> probable effects	> 2 x probable effects
C. Hydrology	Criteria not available-BPJ		
D. Habitat Suspended Solids Sludge Deposits	 > 10 mg/l rare	 > 25 mg/l occasional	 > 80 mg/l common
II. Recreation			
A. Bacteria (Geometric mean) Total Coliform Fecal Coliform E. coli	 > 1000/100 ml > 200/100 ml > 126/100 ml	 > 5,000/100 ml > 1000/100 ml > 630/100 ml	 > 10,000/100ml > 2,000/100ml > 1260/100 ml
B. Aesthetics Color/odor/turbidity Nuisance conditions	rare	occasional	common
C. Fish Flesh	Limited Advisory	Full Advisory	Best Professional Judgment (BPJ)

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Appendix D:

Special Designations in the Massachusetts Portion of the Nashua River Watershed

by Warren Kimball

Two anglers on the Nissitissit River. Photo: Cindy Knox Photography.

The Nashua River and its tributaries have received numerous designations by Massachusetts agencies that substantiate its significant resource value. This Appendix describes several special designations that are most relevant to this Wild and Scenic Rivers study.

Outstanding Resource Waters

Outstanding Resource Waters (ORWs) are designated in the Massachusetts Surface Water Quality Standards [314 CMR 4.04(3)]. These waters are determined by the Massachusetts Department of Environmental Protection based on their outstanding socio-economic, recreational, ecological and/or aesthetic values. These are waters whose high quality will be protected and maintained. With minor exceptions new or increased discharges of pollutants are prohibited to these waters assuring that existing high water quality is preserved. Those waterways designated in the Squannacook and Nissitissit Rivers Sanctuary (see below) are designated as ORW's.

Coldwater Fisheries Resources

A Coldwater Fisheries Resource (CFR) is a body of water that is used by coldwater fish species to fulfill one or more of their life history requirements. These species include trout and slimy sculpin, among others. These fish require cold, well-oxygenated water and suitable habitat for spawning, feeding and refuges. Such requirements make these habitats particularly sensitive to alterations or pollution. Changes in land and water use can reduce the ability of these waters to support coldwater fish. The Massachusetts Division of Fisheries and Wildlife identifies CFR's and maintains a list that is updated annually.

Coldwater Fisheries are also designated in the Massachusetts Surface Water Quality Standards

(SWQS) and are given more stringent temperature and dissolved oxygen criteria than other inland waters. However, these SWQS regulations (314 CMR 4.00) are updated less frequently and do not reflect the most recent information available from Massachusetts Fish and Wildlife. There are 90 CFR's in the Nashua River watershed, although many are unnamed streams, since naming a water body as a CFR is generally considered to include its unnamed tributaries.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACEC) are designated by the Massachusetts Executive Office of Environmental Affairs pursuant to 301 CMR 12.00. ACECs are those areas within the Commonwealth where unique clusters of natural and human resource values exist and which are worthy of a high level of concern and protection. The aim is to preserve and restore these areas and all EOEEA agencies are directed to take actions with this in mind.

Three ACECs exist in the Nashua River Watershed:

- The Squannassit ACEC includes over 37,000 acres on the west side of the Nashua River in Ashby, Ayer, Groton, Harvard, Lancaster, Lunenburg, Pepperell, Shirley and Townsend.
- The Petapawag ACEC includes over 25,000 acres in Ayer, Dunstable, Groton, Pepperell and Tyngsborough on the east side of the Nashua River.
- The Central Nashua River valley ACEC contains nearly 13,000 acres in Bolton, Harvard, Lancaster and Leominster.

It is important to state that the Nashua River corridor is a central feature of all three ACEC's.

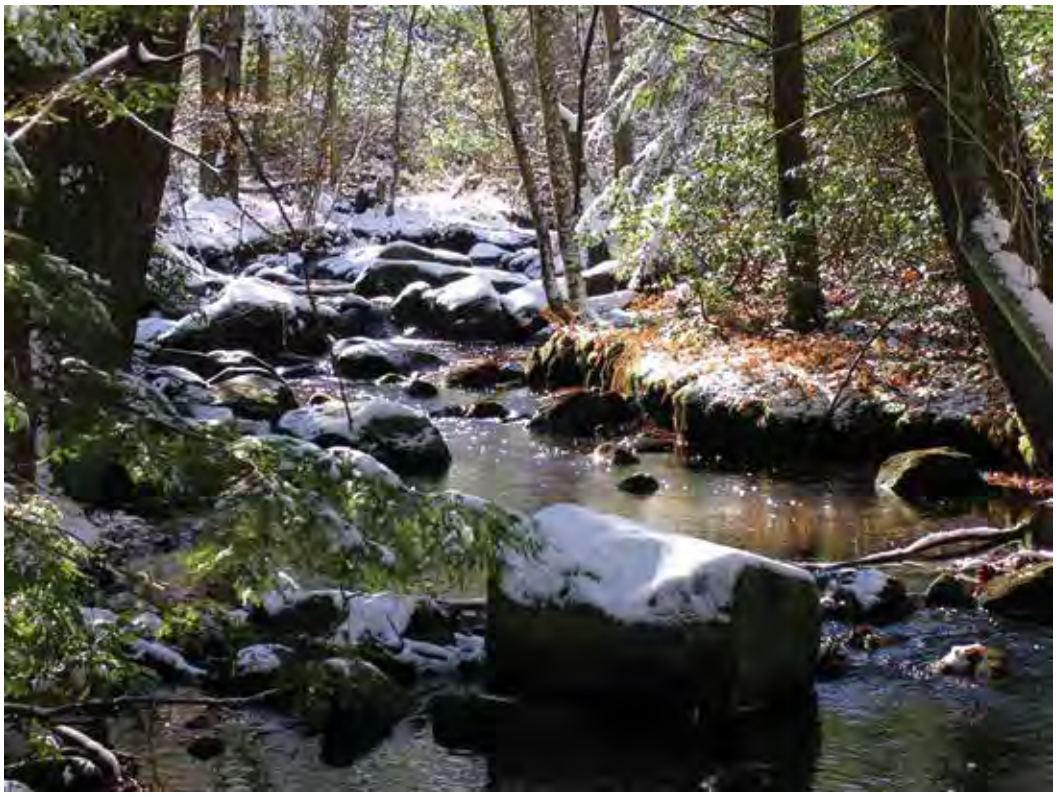
The Squannacook and Nissitissit Rivers Sanctuary

The Massachusetts General Laws Chapter 132A, Section 17 establishes the Squannacook and Nissitissit Rivers Sanctuary (SNRS). The sanctuary comprises the surface waters of both rivers and their tributaries. A small section of the Squannacook River is excluded: from the Hollingsworth and Vose Dam to the confluence with the Nashua River.

In these sanctuary waters, no new discharge of treated or untreated sewage or other wastewater is permitted. Storm water discharges and conveyances must be approved by the planning board and conservation commissions of the affected towns. The Attorney General has the authority to enforce these rules. This sanctuary was subsequently designated as an ORW in the Surface Water Quality Standards underscoring the desire to preserve these waters.

Appendix E:

Special Designations of Massachusetts Rivers and Tributaries



Pearl Brook, a headwater tributary of the Squannacook River, in Townsend, MA. Photo: Joan Wotkowicz.

This Appendix lists the Massachusetts-recognized water bodies that are located entirely or partially within the towns participating in the Wild and Scenic Rivers study. The following table gives the river mileage and special designation for each river and tributary. (Note that there are additional miles of the Nashua and Nissitissit Rivers in New Hampshire that are not included below.)

Abbreviations:

ORW - Outstanding Resource Waters:

CFR - Coldwater Fisheries Resource

ACEC - Areas of Critical Environmental Concern

Sanctuary - Squannacook and Nissitissit Rivers Sanctuary

Stream Name	Miles	ORW	CFR	ACEC	Sanctuary
Nashua River	30.5			X	
Unkety Brook	6.5		X	X	
Reedy Meadow Brook	2.2		X	X	
Nissitissit River	4.2	X	X	X	X
Mine Brook	0.5	X	X	X	X
Sucker Brook	3.7	X	X	X	X
Beaver Brook	0.1	X		X	X
Gulf Brook	2.5	X	X	X	X
Stewart Brook	2.1	X		X	X
Varnum Brook	0.9			X	
Greens Brook	1.3			X	
Robinson Brook	1.7			X	
Bancroft Brook	2.2			X	
Wrangling Brook	2.3			X	
Dead River	0.8			X	
James Brook	4.3			X	
Squannacook River	14.1	X	X	X	X
Trap Swamp Brook	0.6	X		X	X
Pumpkin Brook	2.0	X		X	X
Witch Brook	2.8	X		X	X
Trout Brook	1.6	X		X	X
Bixby Brook	2.3	X		X	X
Bayberry Hill Brook	1.9	X	X	X	X
Mason Brook	1.5	X	X	X	X
Walker Brook	2.5	X		X	X
Willard Brook	5.6	X		X	X
Pearl Hill Brook	6.3	X	X	X	X
Locke Brook	4.3	X	X	X	X
Trapfall Brook	5.0	X	X	X	X
Mulpus Brook	9.5		X	X	
Nonacoicus Brook	1.4			X	
Willow Branch Brook	1.4			X	
Cold Spring Brook	1.2			X	
Bowers Brook	6.3				
Walker Brook	1.9		X		
Morse Brook	1.4		X		
Trout Brook	1.3				
Catacunemaug Brook	5.4		X		
Still River	3.3		X	X	

Appendix F:
Noteworthy Federal Involvement in the Nashua River Watershed

Wood ducks can be found on beaver ponds and river floodplains, along slow-moving streams, and in deep marshes throughout the state. Photo: Gaynor Bigelbach.

The Nashua River as a tributary of the Merrimack River is listed as part of the North American Atlantic Salmon Anadromous Fish Program. The Nashua River is also recognized as having international importance as a migratory flyway as it provides breeding and migration habitat for migratory waterfowl in the form of open palustrine and emergent wetlands. The extensive and regionally significant wetlands occurring on and adjacent to the Oxbow National Wildlife Refuge (ONWR), including its associated tributary headwaters, have been listed as a priority for protection under the Emergency Wetlands Resources Act of 1986 (P.L.) 99-645 (100 Stat. 3582). It is also named as a priority for protection due to their importance to the Atlantic Flyway for migrating birds under the North American Waterfowl Management Plan: an agreement between Canada, Mexico, and the United States. Indeed, the ONWR was initially created to support the national migratory bird management program. In 2016 the "Bill Ashe Visitor Facility" at ONWR and associated boat launch on the Nashua River were built.

The Nashua River is listed in the 1987 US Environmental Protection Agency (EPA) Priority Wetlands of New England, in recognition of the value of its wetland habitats to northeast waterfowl populations (*Central Nashua River ACEC Nomination Report*, pg. 10). As we understand it, the US Fish and Wildlife Service (USFWS) is pursuing a goal to reintroduce alewife and American shad to the Nashua River in the next ten years (personal communication with Michael Bailey, USFWS Assistant Project Leader, 2016) and has a river herring restoration program in place on the Nashua River; passage for river herring may be required in the future. The USFWS has already stocked alewife and American shad in Lake

Potanipo, Brookline, New Hampshire headwaters of the Nissitissit River since 2014.

> As part of the large scale plan for fish restoration in the Merrimack River, the Nashua River Watershed is a current and future release location for river herring. Anadromous fish restoration is a cooperative effort among state agencies including the Massachusetts Division of Marine Resources, MassWildlife, and federal agencies including the Service, National Marine Fisheries Service and U.S. Forest Service. The Nashua River is considered a self-sustaining river in that it has existing fish passage facilities at dams which need to be modified or improved as part of the plan. This watershed will also be monitored and evaluated to ensure effective and efficient upstream and downstream passage of fish. Fish that would benefit from this effort include the river herring (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*) and American eel (*Anquilla rostrata*).[1]

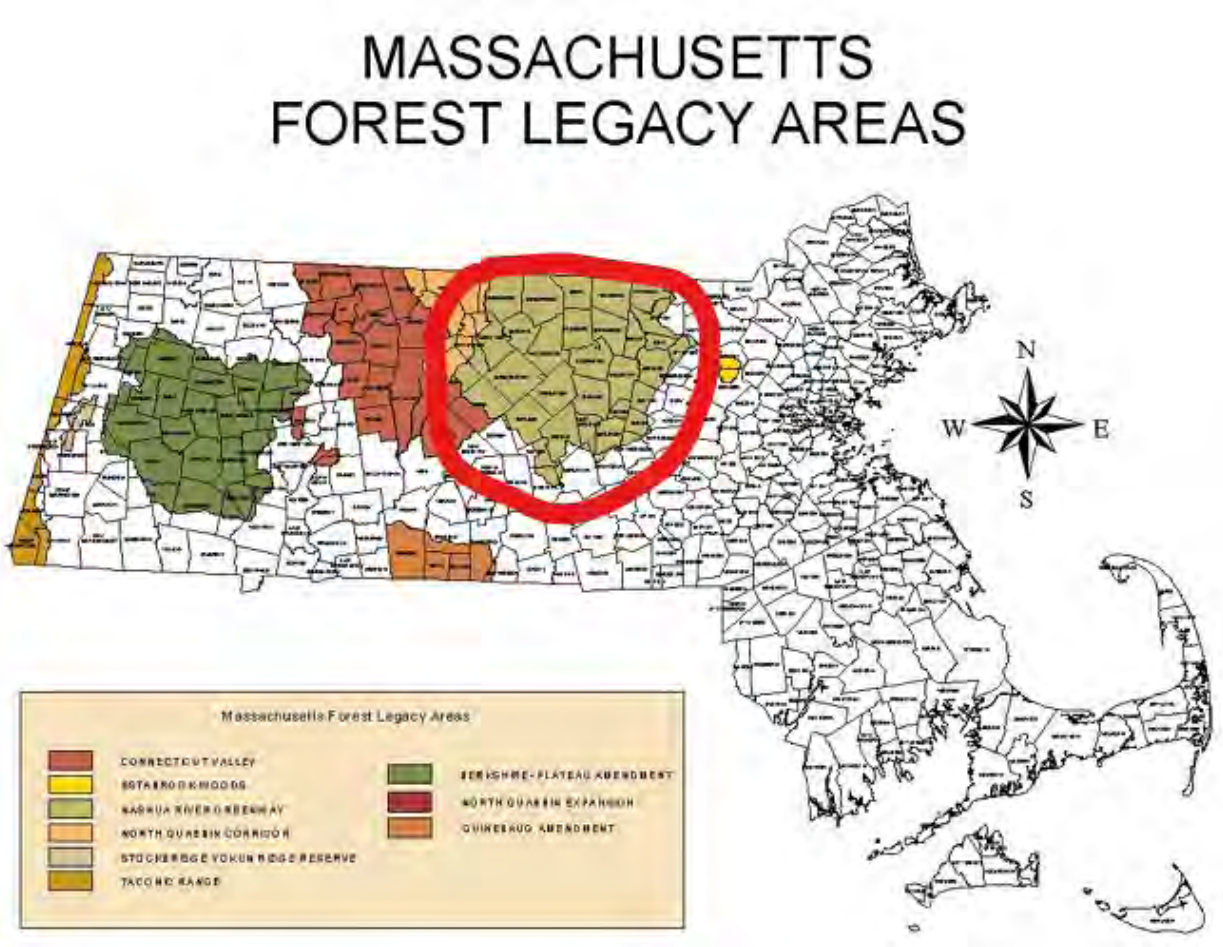
Nearly the entire Nashua River watershed has been included as the "Nashua River Greenway Forest Legacy Area" under the US Forest Service administered Forestry Legacy Program in partnership with Massachusetts Department of Conservation and Recreation's Bureau of Forestry (see *www.mass.gov/eea/docs/dcr/stewardship/forestry/other-reforest/nashua-river-greenway-expansion-2001.pdf*).

Note: This Forest Legacy Area met the eligibility criteria for a Forest Legacy Area as follows:

1. Forests are threatened by immediate and future conversions to non-forest, house lots.
2. Individual landowners have been approached about selling conservation easements and are interested in selling easements.
3. Scenic resources … are recognized as distinctive.
4. Public has traditionally utilized the … areas for recreation and there are opportunities to extend the existing greenway systems.
5. Numerous private wells, six public water supply wells, and designated Zone 2 drinking water protection areas lie within the sections, protection of the water supply sources.
6. Riparian habitat for fish, waterfowl and migratory songbirds, and associated forested wetland plants and animals.
7. Contain rare and endangered flora and fauna.
8. Provide river access to all types of passive recreation including fishing.
9. Contain significant historic sites and potential sites of archaeologic importance.
10. Have highly productive floodplain soils for forestry and agriculture.

There are two Forest Legacy protected tracts in our study area: Belmont Springs tract (bisected by Gulf Brook, a tributary to Nissitissit River; 255 acres in Pepperell) and Pumpkin Brook Link tract (tributary to Squannacook River; 174 acres in Shirley).

1 USFWS Oxbow National Wildlife Refuge, Final Comprehensive Conservation Plan, Feb. 2005, pg. 33



The Nashua, Squannacook, and Nissitissit Rivers are all included in the federally designated Freedom's Way National Heritage Area (FWNHA) as are all our participating towns. The FWNHA extends from metro-Boston, through the site of "the shot heard round the world" in Concord, to Mount Wachusett. One ongoing project is to build a trail following Henry David Thoreau's famous 1842 walk there through Bolton, Lancaster, and the Still River village within Harvard. FWNHA describes itself as:

> …intimately tied to the character of the land as well as those who shaped and were shaped by it. Here landform and climate combined to create an environment propitious to settlement, with a network of natural features, including river systems and forests, sustaining successive generations of inhabitants. Like veins on a leaf, the paths of those who settled the region are connected, providing both tangible and intangible reminders of the past. Their stories can be found on village commons, along scenic roadways lined with stone walls, in diaries and artifacts, in a cabin by a pond, along a battle road or hidden deep within a secret glen by the bank of a meandering river.[2]

In regards to previous federal grant-awarded projects in our study area, the Environmental Protection Agency (EPA) Targeted Watersheds Grants program funded the Nashua River 2004-2007 "Protecting Today's Water for Tomorrow: Combating Threats to Source Water in the Squannacook Nissitissit Sub-basin of the Nashua River Watershed" project. The NRWA and three partner organizations—Beaver Brook Association, New England Forestry Foundation, and the Trust for Public Land—were one

2 *http://freedomsway.org*

of only fourteen awarded nationwide to combat threats to drinking water and protecting key water resources by conserving key land parcels. The project was highlighted in The Trust for Public Land's *Source Protection Handbook Using Land Conservation to Protect Drinking Water Supplies*, 2005. This project built upon an earlier federal EPA 2001 Source Water Stewardship Project focused on the Squannacook-Nissitissit Rivers: one of four such sites awarded nationally.

Finally, there are two US Geological Service (USGS) river gages in our area: one on the Nashua River in East Pepperell *https://waterdata.usgs.gov/ma/nwis/uv/?site_no=01096500&PARAmeter_cd=00065,00060* and one on the Squannacook River in West Groton *https://waterdata.usgs.gov/nwis/uv?site_no=01096000*. The former gage has been operating and providing water flow records since 1935; the latter gage has been there since 1949 and is considered by USGS to be a reference gage which is described as follows:

> [l]ong periods of unmodified streamflow, … natural forest and wetland landcover with no water withdrawals, return flows, dams, or development. Few stations in southern New England meet these criteria, however, given population the density and history of land use in the region. GIS data for water withdrawals, water returns, dams, and land-use characteristics were evaluated to indicate difference in potential flow alteration in records for selected stations in MA.[3]

3 Characteristics and classification of least altered streamflow in MA. Armstrong, D.S., Parker, G.W. and Richards, T.A. USGS Scientific Investigations Report 2007, pg 11.

Appendix G:
Existing Major Protected Conservation Areas in the Towns in the Stewardship Plan

Nashua River and greenway corridor. Photo: Cindy Knox Photography.

River Segment	Protected Area	Acreage	Features
Nashua Mainstem in MA	Bolton Flats WMA	~1,335	"…extends along the Nashua River in Harvard, Lancaster, and Bolton. The river here is slow and meandering, with adjacent High-Terrace Floodplain Forest and Low-Energy Riverbank. The combination of a slow river, floodplain forest, and dry sand makes for excellent turtle habitat. In fact, 3 state-listed rare turtle species Blanding's Turtles, Wood Turtles, and Spotted Turtles have all been documented from this stretch of river."
	Oxbow National Wildlife Refuge	~1,667	"...particular value in carrying out the national migratory bird management program…." along nearly 8 miles of the Nashua River, the Refuge's interspersion of wetland, forested upland and old field habitats is ideally suited for this purpose. There are a number of non-contiguous sections in Shirley, Ayer, Harvard and Lancaster on both sides of the river, some of which was acquired as part of the decommissioning of portions of Fort Devens. Rare species. Hunting and the fact that the Refuge has different rules (no dogs, etc…)

River Segment	Protected Area	Acreage	Features
	Portion of Mulpus Brook WMA	124-acres portion of 517-acre total	Mulpus Brook is an important coldwater tributary to the Nashua. However, note that the majority of Mulpus Brook WMA is outside the ¼ mile corridor of the Nashua River.
	J. Harry Rich State Forest	~679	"…along the Nashua River is wooded with broad level trails for easy walking. It offers excellent views of the river and surrounding area as it winds along the banks" through a portion of which linear Nashua River Rail Trail passes. One of the few state-owned tree farms in the nation and one of the first such in MA….and described as "…the most intensively managed forest acreage in New England". *www.nashuariverwatershed.org/recreation/hiking-walking.html*
	Groton Town Forest	~513	"…provides protection for the watershed, educational activities, recreation, and wildlife habitat…created by vote of the Town Meeting in 1922, was among the first dozen such town forests in the Commonwealth". As part of the Surrenden Farm protection effort, the town of Groton granted the MA Dept of Fish and Game a Conservation Restriction on the Groton Town Forest, thereby opening it up to hunting and permanently protecting it as open space.
	Sabine Woods and Groton Place (abutting properties)	~146 and ~54, respectively	"…owned and managed by the New England Forestry Foundation (NEFF), is a former estate featuring open fields and river vistas, broad trail…. with ~1,800 feet of frontage on the east side of the Nashua River…proclaimed "Wild Life Sanctuary for The Benefit and Pleasure of the People of Groton".
	Ayer Game Farm & MA DFW NE Headquarters	~116 91 + 15.7	Previously used to raise pheasants for stocking, this property is now used as offices for the DFW Office of Fishing & Boating Access. This property directly abuts the Groton Town Forest and Surrenden Farm. Another section abuts the DFW Northeast District Headquarters.
	Surrenden Farm/ General Field	~325	Sitting prominently in a 1,500-acre block of contiguous protected open space, 360-acre Surrenden Farm was Groton's highest conservation priority until it was purchased by the town and several conservation organizations in 2006. With 3/4 mile of Nashua River frontage, forest and scenic rolling hayfields, Surrenden Farm had been one of the largest remaining unprotected landscapes in town. The General Field is 143 acres of agricultural land that has survived since early colonial times. DFW has a CR on 10 acres of Groton Water Dept. land and a Conservation Restriction on 159 acres on Surrenden Farm West.
	Unkety Brook WMA	Portion = 185 acres of a total of 527 acres	In Dunstable and Pepperell, a 185-acre portion of the Unkety Brook WMA is located along the eastern bank Nashua River. These parcels lie between the river and DCR's rail trail, providing important wildlife habitat south of the confluence of Unkety Brook with the Nashua.

River Segment	Protected Area	Acreage	Features
Nissitissit in MA	Nissitissit River WMA	~447 acres total 22 parcels acquired from 1974 to 2017	Very popular for catch and release, hunting, bird watching, and hiking on abandoned rail bed which runs along the river. The section of the river from the NH border to the Prescott bridge in Pepperell is one of only 9 designated catch and release areas in the state. In addition, in this section anglers must use a conventional fly rod and fly line. The former Turner dam was removed in 2015, benefitting fish passage and restoring coldwater habitat.
Nissitissit in NH		~309 acres total (with ~ 171 acres in Brookline and ~138 acres in Hollis)	The Brookline parcels are held by the Town of Brookline Conservation Commission, Beaver Brook Association and the Nissitissit River Land Trust. The Hollis parcels are held by Beaver Brook Association and the Nissitissit River Land Trust. These holdings are nearly contiguous along the entire river.
Squannacook in MA	Squannacook River WMA, WCR and WCE	~1,934 comprised of 1,641 in fee, 49 parcels from 1965 to 2017	This non-contiguous WMA extends from Shirley through Groton and Townsend to Ashby, consisting of almost 50 different fee-owned parcels. The Squannacook WCR is a 68-acre donated restriction on development of the South Fitchburg Hunting and Fishing Club that does not allow public access. The Squannacook WCE consists of 4 Conservation-Restricted parcels totaling 299 acres, which are open to the public, 2 in Shirley at the confluence with the Nashua and 2 in Townsend, 1 of which is located in the headwaters. (2,008 total)
	Townsend State Forest	~3,082	Non-contiguous parcels owned by the MA Dept. of Conservation and Recreation. Portions are located across the river from and adjacent to portions of the Squannacook River WMA, while other large blocks extend away from the river to the NH border and include many small tributaries to the river and hiking trails.
	Willard Brook State Forest	~2,930	Willard Brook State Forest established through state purchases in the 1930's sits on 2,930 acres in Ashby and Townsend, MA. Visitors can enjoy developed recreational features at Damon Pond, Trap Brook Falls, and the adjacent 1,000+ acre Pearl Hill State Park and campground managed by MA Department of Conservation and Recreation.
	Bertozzi Conservation Area	~56 (42 acres in Groton and 14 acres are across the river in Shirley)	Municipal land adjacent to state Squannacook River WMA; popular swimming hole.

Appendix H:

Lists of Endangered, Threatened, and Special Concern Species in the Watershed Wild and Scenic Communities by State

Blanding's turtle (Emydoidea blandingii). Photo: Arthur, Wikimedia Commons.

Table 1: List of Riparian Associated Endangered, Threatened, and Special Concern Species in Massachusetts Nashua River Watershed Communities

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
AYER	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2007
AYER	Bird	*Ixobrychus exilis*	Least bittern	E	1947
AYER	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1928
AYER	Mussel	*Strophitus undulatus*	Creeper	SC	2006
AYER	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2011

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
AYER	Reptile	*Terrapene carolina*	Eastern box turtle	SC	1979
AYER	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2006
AYER	Vascular Plant	*Lygodium palmatum*	Climbing fern	SC	2011
AYER	Vascular Plant	*Senna hebecarpa*	Wild senna	E	2010
BOLTON	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2006
BOLTON	Amphibian	*Ambystoma opacum*	Marbled salamander	T	2014
BOLTON	Beetle	*Cicindela duodecimguttata*	Twelve-spotted tiger beetle	SC	2007
BOLTON	Bird	*Botaurus lentiginosus*	American bittern	E	2015
BOLTON	Bird	*Gallinula chloropus*	Common moorhen	SC	2011
BOLTON	Bird	*Rallus elegans*	King rail	T	1999
BOLTON	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2013
BOLTON	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2013
BOLTON	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2013
BOLTON	Reptile	*Glyptemys insculpta*	Wood turtle	SC	1999
BOLTON	Vascular Plant	*Corallorhiza odontorhiza*	Autumn coralroot	SC	2010
BOLTON	Vascular Plant	*Carex typhina*	Cat-tail sedge	T	1999
BOLTON	Vascular Plant	*Carex typhina*	Cat-tail sedge	T	1999

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
DUNSTABLE	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2016
DUNSTABLE	Dragonfly/Damselfly	*Ophiogomphus aspersus*	Brook snaketail	SC	2011
DUNSTABLE	Dragonfly/Damselfly	*Gomphus abbreviatus*	Spine-crowned clubtail	SC	2015
DUNSTABLE	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1988
DUNSTABLE	Mammal	*Synaptomys cooperi*	Southern bog lemming	SC	1976
DUNSTABLE	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2016
DUNSTABLE	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2004
DUNSTABLE	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2010
DUNSTABLE	Vascular Plant	*Scheuchzeria palustris*	Pod-grass	E	1928
GROTON	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2016
GROTON	Bird	*Botaurus lentiginosus*	American bittern	E	2001
GROTON	Bird	*Gavia immer*	Common loon	SC	1915
GROTON	Bird	*Podilymbus podiceps*	Pied-billed grebe	E	Historic
GROTON	Crustacean	*Eubranchipus intricatus*	Intricate fairy shrimp	SC	2014
Groton	Crustacean	*Eubranchipus intricatus*	Intricate fairy shrimp	SC	2014
GROTON	Dragonfly/Damselfly	*Ophiogomphus aspersus*	Brook snaketail	SC	2003
GROTON	Dragonfly/Damselfly	*Somatochlora forcipata*	Forcipate emerald	E	2001

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
GROTON	Dragonfly/Damselfly	*Gomphus abbreviatus*	Spine-crowned clubtail	SC	2015
GROTON	Dragonfly/Damselfly	*Neurocordulia obsoleta*	Umber shadowdragon	SC	2004
GROTON	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1986
GROTON	Mammal	*Sorex palustris*	Water shrew	SC	2007
GROTON	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2016
GROTON	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2004
GROTON	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2005
GROTON	Vascular Plant	*Lygodium palmatum*	Climbing fern	SC	2010
GROTON	Vascular Plant	*Amelanchier sanguinea*	Roundleaf shadbush	SC	1905
GROTON	Vascular Plant	*Sparganium natans*	Small bur-reed	E	2006
HARVARD	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2016
HARVARD	Amphibian	*Ambystoma opacum*	Marbled salamander	T	2002
HARVARD	Bird	*Rallus elegans*	King rail	T	2005
HARVARD	Bird	*Ixobrychus exilis*	Least bittern	E	2005
HARVARD	Bird	*Podilymbus podiceps*	Pied-billed grebe	E	1984
HARVARD	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1928
HARVARD	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2016
HARVARD	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2008
HARVARD	Reptile	*Glyptemys insculpta*	Wood turtle	SC	1995

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
HARVARD	Vascular Plant	*Carex typhina*	Cat-tail sedge	T	1999
HARVARD	Vascular Plant	*Lygodium palmatum*	Climbing fern	SC	2015
HARVARD	Vascular Plant	*Alnus viridis ssp. crispa*	Mountain alder	SC	1932
HARVARD	Vascular Plant	*Eleocharis ovata*	Ovate Spike-sedge	E	1991
HARVARD	Vascular Plant	*Platanthera flava var. herbiola*	Pale green orchis	T	2009
HARVARD	Vascular Plant	*Amelanchier sanguinea*	Roundleaf shadbush	SC	1947
HARVARD	Vascular Plant	*Sparganium natans*	Small Bur-reed	E	1994
LANCASTER	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2011
LANCASTER	Beetle	*Cicindela duodecimguttata*	Twelve-spotted tiger beetle	SC	2007
LANCASTER	Bird	*Bartramia longicauda*	Upland sandpiper	E	1994
LANCASTER	Mammal	*Sorex palustris*	Water shrew	SC	1986
LANCASTER	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2003
LANCASTER	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2009
LANCASTER	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2009
LANCASTER	Vascular Plant	*Carex typhina*	Cat-tail sedge	T	1999
LANCASTER	Vascular Plant	*Arceuthobium pusillum*	Dwarf mistletoe	SC	1924
LANCASTER	Vascular Plant	*Eragrostis frankii*	Frank's lovegrass	SC	1939

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
LANCASTER	Vascular Plant	*Eleocharis ovata*	Ovate spike-sedge	E	1991
LANCASTER	Vascular Plant	*Platanthera flava var. herbiola*	Pale green orchis	T	1944
LANCASTER	Vascular Plant	*Panicum philadelphicum ssp. philadelphicum*	Philadelphia panic-grass	SC	1995
PEPPERELL	Amphibian	*Ambystoma opacum*	Marbled salamander	T	1999
PEPPERELL	Dragonfly/Damselfly	*Ophiogomphus aspersus*	Brook snaketail	SC	2003
PEPPERELL	Dragonfly/Damselfly	*Somatochlora kennedyi*	Kennedy's emerald	E	2007
PEPPERELL	Dragonfly/Damselfly	*Gomphus abbreviatus*	Spine-crowned clubtail	SC	2016
PEPPERELL	Dragonfly/Damselfly	*Neurocordulia obsoleta*	Umber shadowdragon	SC	2003
PEPPERELL	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1998
PEPPERELL	Mussel	*Alasmidonta varicosa*	Brook floater (swollen wedgemussel)	E	2011
PEPPERELL	Mussel	*Strophitus undulatus*	Creeper	SC	2010
PEPPERELL	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2016
PEPPERELL	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2003
PEPPERELL	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2016
SHIRLEY	Amphibian	*Ambystoma laterale*	Blue-spotted salamander	SC	2006
SHIRLEY	Dragonfly/Damselfly	*Ophiogomphus aspersus*	Brook snaketail	SC	2006
SHIRLEY	Dragonfly/Damselfly	*Somatochlora kennedyi*	Kennedy's emerald	E	1939

Massachusetts Town	Taxonomic Group	Scientific name	Common Name	Status	Most Recent Observation in Town
SHIRLEY	Dragonfly/Damselfly	*Neurocordulia obsoleta*	Umber shadowdragon	SC	2004
SHIRLEY	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1954
SHIRLEY	Mussel	*Strophitus undulatus*	Creeper	SC	2006
SHIRLEY	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2017
SHIRLEY	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2016
SHIRLEY	Vascular Plant	*Lygodium palmatum*	Climbing fern	SC	Historic
TOWNSEND	Bird	*Botaurus lentiginosus*	American bittern	E	2014
TOWNSEND	Dragonfly/Damselfly	*Ophiogomphus aspersus*	Brook snaketail	SC	2005
TOWNSEND	Fish	*Notropis bifrenatus*	Bridle shiner	SC	1996
TOWNSEND	Mussel	*Strophitus undulatus*	Creeper	SC	1996
TOWNSEND	Reptile	*Emydoidea blandingii*	Blanding's turtle	T	2016
TOWNSEND	Reptile	*Terrapene carolina*	Eastern box turtle	SC	2009
TOWNSEND	Reptile	*Glyptemys insculpta*	Wood turtle	SC	2016

Abbreviations: E=Endangered, T=Threatened, SC=Special Concern

The MESA List is the official list of Endangered, Threatened, and Special Concern species as defined in Section 10.60 of Chapter 321 of the Code of Massachusetts Regulations.[1] The MESA List is prepared under the authority of the Massachusetts Endangered Species Act (MESA). Under this act (MGL c. 131A and its implementing regulations (321 CMR 10.00)), MESA-listed species are protected from "take."[2]

1 See *https://www.mass.gov/service-details/list-of-endangered-threatened-and-special-concern-species*

2 "Take is defined as the following: In reference to animals, means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture,

Table 2: List of Riparian Associated Endangered, Threatened, and Special Concern Species in New Hampshire Nashua River Watershed Wild and Scenic Communities[3]

New Hampshire Town	Taxonomic Group	Scientific Name	Common Name	Status
BROOKLINE	Amphibians	*(Ambystoma opacum)*	** Marbled salamander	E
BROOKLINE	Fish	*Enneacanthus obesus)*	** Banded sunfish	SC
BROOKLINE	Fish	*(Etheostoma fusiforme)*	** Swamp darter	SC
BROOKLINE	Fish	*(Anguilla rostrata)*	**American eel	SC
BROOKLINE	Reptiles	*Emydoidea blandingii*	** Blanding's turtle	E
BROOKLINE	Reptiles	*Clemmys guttata)*	** Spotted turtle	T
HOLLIS	Amphibians	*(Ambystoma opacum)*	** Marbled salamander	E
HOLLIS	Birds	*(Pandion haliaetus)*	** Osprey	SC
HOLLIS	Dragonfly/ Damselfly	*(Rhionaeschna mutata)*	** Spatterdock darner	-- --
HOLLIS	Dragonfly/ Damselfly	*(Argia apicalis)*	** Blue-fronted dancer	-- --
HOLLIS	Dragonfly/ Damselfly	*Calopteryx dimidiata)*	** Sparkling jewelwing	-- --
HOLLIS	Fish	*Enneacanthus obesus)*	** Banded sunfish	SC
HOLLIS	Fish	*(Esox americanus americanus)*	** Redfin pickerel	SC
HOLLIS	Fish	*Rhionaeschna mutata)*	** Spatterdock darner	
HOLLIS	Fish	*(Etheostoma fusiforme)*	**Swamp darter	SC
HOLLIS	Mussel	*(Alasmidonta varicosa)*	** Brook floater	E
HOLLIS	Natural Communities	*Palustrine*	** Black gum - red maple basin swamp	
HOLLIS	Natural Communities	*Palustrine*	** Kettle hole bog system	
HOLLIS	Natural Communities	*Palustrine*	Sand plain basin marsh system	Historical
HOLLIS	Reptiles	*Emydoidea blandingii*	** Blanding's turtle	E
HOLLIS	Reptiles	*(Glyptemys insculpta)*	* Wood turtle	SC

Abbreviations: E=Endangered, T=Threatened, SC=Special Concern

* High - A marginal example of a state rarity

** Very High - A marginal example of a global rarity or a good example of a state rarity

*** Extremely High - A good example of a global rarity or an excellent example of a state rarity

collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct,….and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat." *www.mass.gov/service-details/ma-endangered-species-act-mesa-overview*

3 New Hampshire Natural Heritage Bureau DRED - Division of Forests and Lands, "Rare Plants, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns" (July 2013)*www.nhdfl.org/library/pdf/Natural%20Heritage/Townlist.pdf*

Appendix I:
List of Canoe Launches by Town

Canoes on Squannacook River. Image: Nancy Ohringer.

Directions to and descriptions of these launch sites can be found in the NRWA Canoe and Kayak Guide. [See: *www.NashuaRiverWatershed.org/Recreation/Paddling*]. View launch locations and directions on Google map: *www.google.com/maps/d/viewer?mid=14jIr9h4POKSFESqlGeqwnswU8M0&ll=42.583252250551965%2C-71.71002070263063&z=10*

Massachusetts

Devens

On the Nashua River:

- Hospital Road/Oxbow National Wildlife Refuge Launch

Groton

On the Nashua River:

- Nashoba Paddler Private Launch
- Petapawag Boat Launch

On the Squannacook River:

- West Groton Water Dept. Launch

Harvard

On the Nashua River:

- Still River Depot Road - Oxbow National Wildlife Refuge Launch

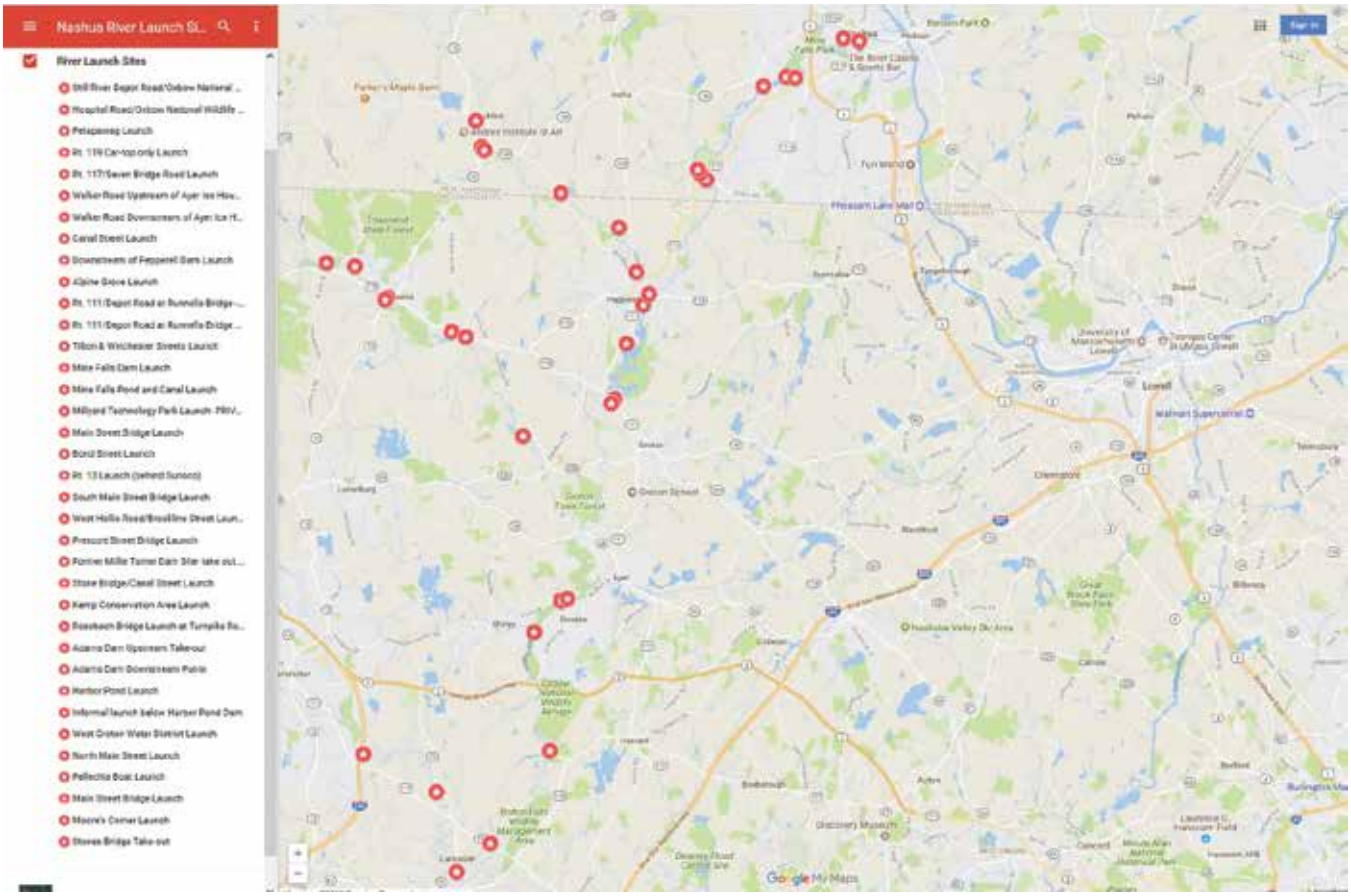
Lancaster

On the Nashua River:

- Rt. 117/Seven Bridge Road Launch

On the North Nashua River:

- North Main Street Launch
- Pellechia Canoe Launch
- Main Street Bridge/Rt. 70 Launch



Canoe Launch Sites throughout the Nashua River Watershed. Source: NRWA 2018 http://nashuariverwatershed.org/recreation.

Pepperell

On the Nashua River:

- Rt. 119 Car-top Only Launch
- Kemp Conservation Area Launch (future status unclear as of 2016)
- Canal Street Launch
- Downstream of Pepperell Dam Launch

On the Nissitissit River:

- Prescott Street Bridge Launch

Shirley

On the Nashua River:

- Walker Road Upstream of Ayer Ice House Dam Launch
- Walker Road Downstream of Ayer Ice House Dam Launch

Townsend

On the Squannacook River:

- Stone Bridge/Canal Street Launch
- Off Elm Street Launch
- Harbor Pond Church (above Harbor Pond Dam) Launch
- Rt. 119/Main Street (below Harbor Pond Dam) Launch

New Hampshire

Brookline

On the Nissitissit River:

- Bond Street Launch
- Rt. 13/Fire Road Launch
- South Main Street Bridge Launch

Hollis

On the Nashua River:

- Rt. 111/Depot Road at Runnells Bridge

On the Nissitissit River:

- West Hollis Road Launch

Appendix J:
Archaeological Sites in the Former Fort Devens Area

Catecunemaug Brook. Photo: MA RIFLS Program.

As of 2013, there were 20 recorded pre-contact Native American archaeological sites within the former Fort Devens section of the Nashua River drainage. All of these sites were identified as a result of local collector activities going back to the early 1940s and Cultural Resource Management (CRM) investigations conducted within the former Fort Devens lands in the past two decades. These sites include five areas along the Catacunemaug Brook near its confluence with the Nashua River, which represent probable short-term, task-specific occupations, and two sites along Nonacoicus Brook near its confluence with the Nashua River, which may be larger year-round base camps.

Based on the data collected through avocational activities, academic archaeological studies, and CRM surveys, generalizations about site types and distribution within the Nashua River drainage can be made. Archaeological and documentary evidence of pre-contact settlement patterns and land use in the Nashua River valley spans the earliest human occupations during the PaleoIndian Period (ca. 10,000 years before present [B.P.]) through the Late Woodland (ca. 1000 B.P.) and contact (ca. 400 B.P.) periods. Native American populations appear to have exploited the diverse natural resources of the Nashua River valley. Settlement/land use patterns associated with temporal periods or specific cultural groups consisted of sites of varying internal complexity and size. These include large base camps, as well as less complex sites of various sizes used temporarily during hunting or other foraging and resource collection activities and lithic manufacture.

Also, as of 2013, there were 89 recorded post-contact Euro-American archaeological sites within the former Fort Devens section of the Nashua River in the towns of Ayer, Harvard, Shirley, and Lancaster. Most of these sites appear on eighteenth and nineteenth century town maps and consist of residential home-farmsteads related to former villages and neighborhoods. For example, the lands on the east side of the Nashua River on the former Fort Devens

Main Post were formed from lands situated in the northwestern portion of the town of Harvard, historically known as the Shabikin District. This historic neighborhood was on the periphery of the principal civic-institutional and manufacturing village centers in the town and attempted to secede to the town of Shirley in the mid-1700s. It contained scattered home-farmsteads during the eighteenth and nineteenth-centuries, most of which were still standing at the time of military acquisition for the formation of Camp Devens in 1917.

In addition to recorded residential and small-scale industrial (mill) sites, expected types of undocumented early Euro-American sites in this same general area could include scattered farmsteads, garrison houses, fur trading posts (locally known as truck houses), and saw/gristmill features. The archaeological remains of such sites would typically consist of cellar holes and dry-laid fieldstone foundations related to wood-frame structures, privies, wells, animal pens, dams, wheel pits, tail and head races, and associated artifact assemblages (domestic, architectural, and/or trade-good items).

Suzanne G. Cherau, MA, RPA
Senior Archaeologist/Principal Investigator

Appendix K:
Historic Flood Crests

The flood of 2010 on the Nashua River below Pepperell Dam. Photo: Pam Gilfillan.

Nashua River Historic Crests (flood stage = 8)

(1) 19.10 ft on 03/20/1936

(2) 16.19 ft on 04/07/1987

(3) 15.75 ft on 03/17/2010

(4) 14.08 ft on 09/23/1938

(5) 13.78 ft on 04/01/2010

(6) 13.10 ft on 04/18/2007

(7) 11.86 ft on 06/26/1944

(8) 11.77 ft on 03/20/1968

(9) 11.73 ft on 06/02/1984

(10) 11.40 ft on 06/08/1982

(11) 11.02 ft on 10/17/1956

(12) 10.81 ft on 04/03/2004

(13) 10.75 ft on 04/06/1960

(14) 10.56 ft on 03/08/1979

(15) 10.38 ft on 02/28/2010

(16) 10.26 ft on 04/18/1996

(17) 10.16 ft on 10/22/1996

(18) 10.10 ft on 04/01/1993

(19) 9.95 ft on 04/03/1962

(20) 9.88 ft on 03/21/1983

(21) 9.85 ft on 09/13/1954

(22) 9.76 ft on 03/12/1998

(23) 9.64 ft on 03/09/2011

(24) 9.51 ft on 03/24/2001

(25) 9.38 ft on 05/16/2006

(26) 9.21 ft on 04/02/2014

(27) 9.06 ft on 04/05/2005

(28) 9.00 ft on 10/17/2005

(29) 8.95 ft on 04/24/2000

(30) 8.90 ft on 03/17/1953

(31) 8.79 ft on 03/10/1942

(32) 8.63 ft on 04/04/1959

(33) 8.52 ft on 03/31/2005

(34) 8.43 ft on 03/10/2008

(35) 8.23 ft on 06/16/1998

(36) 8.23 ft on 04/04/1970

(37) 8.20 ft on 12/14/2008

(38) 8.18 ft on 03/25/2010

(39) 8.17 ft on 03/17/1986

(40) 8.15 ft on 03/23/1948

Squannacook River Historic Crests

(flood stage = 7)

(1) 8.50 ft on 04/17/2007

(2) 8.16 ft on 04/06/1987

(3) 8.07 ft on 04/02/2004

(4) 8.04 ft on 10/16/1955

(5) 8.03 ft on 03/15/2010

(6) 7.62 ft on 10/21/1996

(7) 7.56 ft on 03/31/2010

(8) 7.46 ft on 04/17/1996

(9) 7.41 ft on 03/20/1983

(10) 7.32 ft on 01/10/1956

(11) 7.31 ft on 02/26/2010

(12) 7.30 ft on 04/01/1987

(13) 7.22 ft on 03/14/1977

(14) 7.21 ft on 04/06/1984

(15) 7.21 ft on 03/08/2011

(16) 7.07 ft on 05/15/2006

(17) 7.00 ft on 09/12/1954

Appendix L:
Highlights of Outreach Events, Forums, and Activities
January 12, 2015 through February 15, 2018

Paddle for municipal officials on Nashua River arranged as an outreach event by the Study Committee in October 2017. Photo: Al Futterman.

Establishing a Transparent Process

January 12, 2015 Congresswoman Tsongas's announcement and celebration of the passage and signing into law of the Nashua River Wild and Scenic River Study Act, held at the NRWA River Resource Center, Groton, MA and covered by the press. *

The appointment of Representatives and Alternates to the Study Committee was discussed with and made by each participating town's Board of Selectmen.

The first formal meeting of the Study Committee was held October 8, 2015. The Study Committee meetings, held on the first Thursday of each month, are open to the public. Notes from all Study Committee meetings are posted on the Committee's website: *www.WildandScenicNashuaRiver.org*. Twenty-five meetings of the Study Committee have been held through February 15, 2018.

Links from each Town's web-site to the Committee's web-site were established.

Link from the Nashua River Watershed Association's web-site to the Committee's web-site was established.

All Study Committee and related events were listed on the web-site.

The Study Committee's Activities were Highlighted at Special Events

May 27, 2016 Bill Ashe Visitor Facility Dedication, Oxbow National Wildlife Refuge, Devens: Outreach Sub-Committee displayed materials, and Study

(Free and Open to the Public)*

Committee Chair included Wild and Scenic in her remarks*

September 17, 2016 Congresswoman Tsongas's 10th Annual River Day at Oxbow National Wildlife Refuge, Devens; focus was on Wild and Scenic, Elizabeth Ainsley Campbell outlined the Study Process, and a videotape of that was produced for posting on the Committee's web-site* The Study was also highlighted at Congresswoman Tsongas's 2017 River Day event.

November 2, 2017, Nashua River Watershed Association's Annual Meeting, held at Devens, included a featured speech by the Study Committee Chair on the status of the Study Committee's work.

Displays Were Made for Many Events and Situations, for example:

September 2016 and September 2017 Grotonfest, Groton, MA: Outreach Sub-Committee displayed materials*

June 2016 and June 2017 Groton Greenway Festival along the Nashua River in Groton: Outreach Sub-Committee displayed materials*

March 5, 2017 NRWA's special "For the Common Good" event held at the Bull Run Restaurant in Shirley

May 31, 2017 Harvard Environmental Fair (and a similar Fair earlier in the year in Acton)

Updates on the Study's findings were periodically displayed in the Lobby of the NRWA's River Resource Center in Groton

Lobby of the Bull Run Inn and Restaurant in Shirley requesting public input on the Stewardship Plan

Wild & Scenic Information was included in many presentations, sometimes as a major focus and other times as just a shorter mention. Such presentations include:

Series by NRWA Staff/Study Committee members: *Protecting Your Waterways: Water Quality Issues and How You Can Help*

August 1, 2017 at Groton Public Library: Protecting Groton's Waterways *

August 3, 2017 at Ashby Free Public Library, "Protecting Ashby's Waterways (which include headwater tributaries to the Squannacook River) *

August 15, 2017 at Pepperell's Lawrence Library: Protecting Pepperell's Waterways*

August 17, 2017 at Dunstable Free Public Library: Protecting Dunstable's Waterways *

May 4, 2017 at Townsend Public Library: Protecting Townsend's Waterways *

October 18, 2017 at Ayer Public Library: "Protecting Ayer's Waterways"*

November 28, 2017 at Shirley Hazen Memorial Public Library: "Protecting Shirley's Waterways"*

Spring 2017, Presentation by NRWA Staff to the Squann-a-tissit Chapter of Trout Unlimited

July 13, 2017, Presentation by Study Committee member/NRWA Staff at Public Meeting of Townsend's Conservation Commission about Large Woody Material Management on the Squannacook River

January 25, 2018 Presentation by NRWA Staff to the Pepperell Rotary, Pepperell

On–River Events were held

July 19, 2017 Study Committee group paddle on the Nashua River with invited guests

October 16, 2017 Study Committee group paddle on the Nashua River with municipal officials

Walks were Held

November 12, 2017 Fall walk along the Squannacook River; co-sponsored by the Study Committee and the non-profit organization Squannacook Greenways*

January 27, 2018 Keyes Trail hike along Nissitissit River in Hollis and Brookline with Beaver Brook Association trip leader, co-sponsored with Hollis Conservation Commission*

Major Public Update and Listening Sessions Held by the Study Committee to Gather Input for the Stewardship Plan:

April 27, 2017 Public Update and Listening Session*

October 24, 2017 Recreation and Scenic Resource Values Public Input Meeting, at NRWA*. Event was videotaped for local cable stations, and also put on Study Committee web-site.

November 29, 2017 Historical and Cultural Resource Values Public Input Meeting at Nashua River Watershed Association* Event was videotaped for local cable stations, and also put on Study Committee web-site.

November 28, 2017 Biodiversity Resource Values Public Input Meeting at Nashua River Watershed Association* Event was videotaped for local cable stations, and also put on Study Committee web-site.

Presentations to Boards of Selectmen by the Study Committee, Including Requests for Input on Stewardship Plan

Ayer: November 1, 2016

Bolton: June 29, 2017

Brookline: August 28, 2017

Dunstable: November 2, 2016

Groton: July 24, 2017

Harvard: December 6, 2016

Hollis: September 11, 2017

Lancaster: December 5, 2016

Pepperell: November 14, 2016

Shirley: November 21, 2016

Townsend: May 23, 2017

Presentations to Conservation Commission and Planning Boards by the Study Committee, Including Requests for Input on the Stewardship Plan

July 25, 2017: Brookline Conservation Commission

September 11, 2017: Hollis Conservation Commission

December 5, 2017: Bolton Conservation Commission

December 6, 2017: Townsend Conservation Commission

December 7, 2017: Harvard Conservation Commission and Harvard Conservation Trust

December 11, 2017: Dunstable Conservation Commission

December 12, 2017: Pepperell Conservation Commission

December 18, 2017: Devens, Devens Enterprise Commission (DEC)

January 22, 2018: Harvard Planning Board

January 24, 2018: Shirley Planning Board

February 5, 2018: Dunstable Planning Board

February 20, 2018: Hollis Planning Board

Outreach to all Heads of Departments of Public Works (aka Highway Department) and Water Departments was done via phone and/or email.

Other Presentations and Requests for Input on the Stewardship Plan Addressed by the Study Committee

February 6, 2018: Brookline Lion's Club presentation

February 14, 2018: Hollis-Brookline Rotary Club presentation

February 15, 2018: Meeting with Brookline Fire Department Chief

Organizations and Agencies, in addition to the Town Boards above, and in addition to the Experts Consulted, who were specifically alerted to the opportunity to give input on the draft Stewardship Plan and invited to comment:

Appalachian Mountain Club; Mass Bass Fishing Club members; Beaver Brook Association; Bolton Conservation Trust; Ducks Unlimited; Dunstable Rural Land Trust; Forbush Bird Club; Freedoms Way Heritage Association; Friends of the Oxbow NWR; Groton Conservation Trust; Groton School; Groton Trails Committee; Groton Turtle Conservation; Harvard Conservation Trust; Johnny Appleseed Trail Association; Lancaster Land Trust; Lancaster Trails Committee; Massachusetts Audubon; MA Department of Transportation; MA Rivers Alliance; MA Watershed Coalition; Metropolitan Area Planning Commission; Montachusett Regional Trails Coalition; Montachusett Regional Planning Commission; Nashoba Conservation Trust; Nashoba Paddler, LLC; Nashua Rail Trail friends group; Nashua Regional Planning Commission; New England Forestry Foundation; New England Mountain Bike Association - Wachusett Chapter; NH Department of Transportation; Nissitissit River Land Trust; North Central MA Chamber of Commerce; North County Land Trust; North Middlesex Regional Council of Government; Other sports groups (including 30+ Bass Fishing groups); Pepperell Horse Owners Association; Piscataquog Land Conservancy; Squannacook Greenways Rail Trail; The Nature Conservancy; The Trustees of Reservations; Townsend Conservation Land Trust; Trailwrights;.Trout Unlimited; Trust for Public Land

Related Press Work

Websites

The Nashua River Wild and Scenic River Study Committee created and maintained its own website, *www.WildandScenicNashuaRivers.org*

Programs and announcements were routinely posted on NRWA website, *www.NashuaRiverWatershed.org*

PSAs

PSAs sent to eleven town public access cable channels requesting public input for the River Stewardship Plan

Earned Press

"Move to Highlight the Squannacook River"— *Lowell Sun* December 3, 2017

"Nashua, Squannacook, & Nissitissit Rivers Should Receive 'Wild & Scenic' Protection"—*Groton Herald* May 19, 2017

NRWA e-news (4,000)—enews used as basis for upcoming events flyers used in thank you letters and handed out at public programs

Lead story

January 2018—call for images for Stewardship Plan and Study Committee's video

December 2017—call for input on Stewardship Plan

September 2017— "River Day" with update on Wild and Scenic project

April 2017-- public update and input meeting; one water quality program including info on Wild and Scenic

June 2015—mention of passage of Study Act as part of a recent highlights story

March 2015—mention of passage of Study Act in opening line of story about Squannacook River Rail Trail

February 2015—passage of Nashua River Wild and Scenic River Study Act

Other story

February 2018—image banner, and thank you for image sharing

November 2017—Squannacook River Rail Trail walk; two Public Input meetings for Stewardship Plan- one on biodiversity and one on history/culture

October 2017—three water quality programs in three communities including info on Wild and Scenic; Recreationalists Public Input Meeting

August 2017—2 water quality programs in 2 communities including info on Wild and Scenic

July 2017—one water quality program including info on Wild and Scenic

May 2017—public update and input meeting; one water quality program including info on Wild and Scenic

NRWA hardcopy newsletter (3,000+)

Fall 2017—cover story on Outstandingly Remarkable Resource Values and process update—graphic created for Wild and Scenic process

Fall 2015—short paragraph on the Wild and Scenic project in updates list

NRWA Annual Report (3,000+)

2017 Annual Report—cover story

2016 Annual Report

2015 Annual Report

NRWA E-invites

2018 Feb—einvite to Hollis and Brookline contacts regarding informational guided hikes

2018 Jan—einvite to Hollis and Brookline contacts about first informational guided hike

2017 Nov—einvite to NRWA enews list regarding Wild and Scenic Public input sessions

2017 Nov—einvite to Shirley contacts regarding program on water quality in Shirley and Wild and Scenic project

2017 Oct—einvites to Ayer and Ashby contacts regarding program on water quality in Ayer and Ashby Wild and Scenic project

2017 Sept—einvites for River Day where update on Wild and Scenic project was highlighted

2017 Sept—envite to Dunstable contacts regarding program on water quality in Dunstable and Wild and Scenic project

2017 August—einvite to Pepperell contacts regarding program on water quality in Pepperell and Wild and Scenic project

2017 May—einvite to Townsend contacts regarding program on water quality in Townsend and Wild and Scenic project

2017 April—einvite to NRWA enews list regarding Wild and Scenic update and informational meeting

2015 January—einvite to NRWA enews list regarding Congresswoman Tsongas's press event to announce passage of the Nashua River Wild and Scenic River Study Act

Press Releases

2018 Feb—press release about Wild and Scenic project and public meetings in Brookline and Hollis submitted to *Hollis-Brookline Journal*

2018 Jan—press release about the Stewardship Plan, public input sought, sent to nine media outlets

2017 Nov—press release on two Stewardship Plan public input sessions on topics of biodiversity and history & culture sent to 20+ media outlets

2017 Nov—press release regarding program on water quality in Shirley and Wild and Scenic project sent to *Nashoba Valley Voice*

2017 Oct—press release on Stewardship Plan public input session for recreationalists sent to 20+ media outlets

2017 Oct-- press release regarding program on water quality in Ashby and Wild and Scenic project sent to *Sentinel and Enterprise*

2017 Sept—press release regarding program on water quality in Ayer and Wild and Scenic project sent to *Nashoba Valley Voice*

2017 August—press release regarding program on water quality in Dunstable and Wild and Scenic project sent to *Groton Herald*

2017 July—press releases regarding program on water quality in Pepperell and Groton and Wild and Scenic project sent to *Nashoba Valley Voice* and *Groton Herald*

2017 April—press release regarding program on water quality in Townsend and Wild and Scenic project sent to *Nashoba Valley Voice*

2015 Jan—press release about Congresswoman Tsongas's press event to announce passage of the Nashua River Wild and Scenic River Study Act sent to 20+ media outlets

Miscellaneous

Multiple posts were made on the topics listed above on NRWA's Facebook page

All programs were posted to town listserves Talk about Groton and NextDoor Harvard

Hollis and Brookline events were posted to community Facebook page

NRWA had displays on the Wild and Scenic project in its lobby for the public to view during education programs or other visits to the NRWA's River Resource Center

Sample

E-Blast to 4,000 NRWA subscribers:

Stewardship Plan Being Drafted for the Nashua, Squannacook, and Nissitissit Rivers

Your Input Requested!

Do you care about the biodiversity, history & culture, or recreational & scenic opportunities that are tied to the Nashua, Squannacook, and Nissitissit Rivers? Maybe you love to paddle, fish, or hike along these rivers. Maybe you love the variety of wildlife that makes its home in the river and along the banks. Or maybe you love the history of this area, the stories of the early inhabitants, the rise of the mills, and the story of the Nashua River's clean-up. **The Nashua River Wild and Scenic River Study Committee is looking for your input on its draft Stewardship Plan for sections of these three rivers.**

As part of the Nashua River Wild and Scenic River Study, this locally-driven Stewardship Plan is being drafted for two purposes. One is to provide necessary background information to the National Park Service as part of the process for Partnership Wild and Scenic Rivers designation. The other is to provide guidance to volunteers focused on river stewardship actions going forward.

The importance of the Nashua, Squannacook, and Nissitissit Rivers goes well beyond the confines of the rivers' corridors, and a number of resources contribute to give these river sections regional and national significance. These include:

- Public, permanently protected lands in the "greenway" corridor, including private and municipal conservation areas and forests, four state forests, three state wildlife management areas, and other "wild-like" parcels.
- Outstanding fisheries, which are the best for trout in eastern Massachusetts and are being improved through local restoration projects.
- High quality biodiversity, recreation & scenic, and historic & cultural experiences in close proximity to Boston MA, Worcester

MA, and Nashua NH, thus providing local economic stimulus from visitors from these nearby urban areas.
- Varied canoeing and boating opportunities.

A Stewardship Plan for these three rivers is needed, particularly for the Nashua River which is so intensively used, because the residents of this region are concerned about maintaining and enhancing the unique resources. According to this draft Plan, people are seemingly most concerned about sustaining the relatively high water quality, gains that have been decades long in the making, but that are still and increasingly threatened today; and, most people participating in this locally-determined study expressed support for a concerted effort to conserve the key resources of the rivers' for future generations.

What's important to you? How can we work together across community lines to conserve and enhance these outstanding resources? Representatives from 11 communities in MA and NH are working together on this Plan, and they welcome your input to help make the Plan as robust as possible. You can read the draft Stewardship Plan online. Please share your comments by email with Al Futterman, NRWA Land Programs Director, at AlF@NashuaRiverWatershed.org.

(Disclaimer: Outreach events that occurred after February 15, 2018 are not included here, but will be listed in the National Park Service's Study Report to Congress and will be listed on our website: *www.wildandscenicnashuarivers.org*)

The Groton Line

Nashua Study Takes the River A Step Closer to Wild & Scenic

Jan132015

Carolyn Perkins

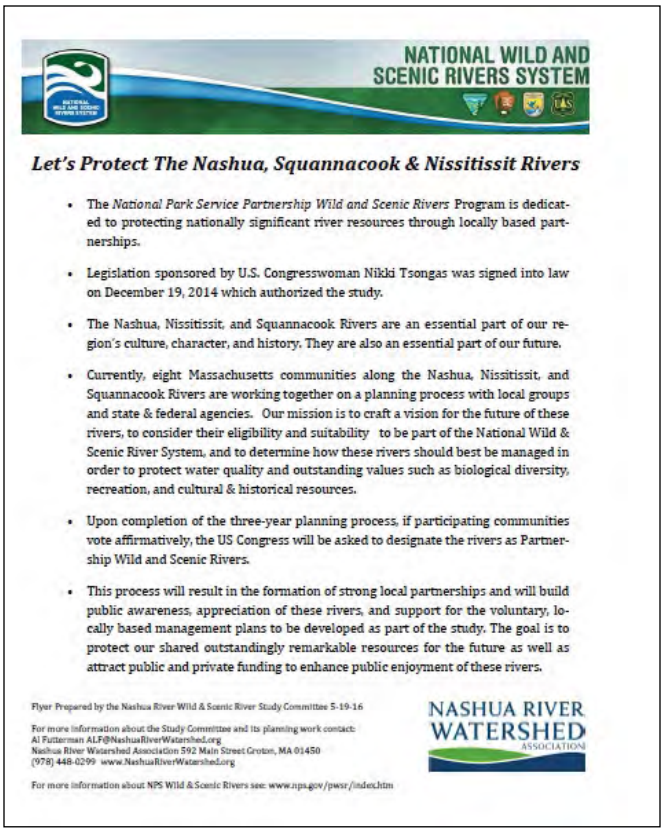
Congresswoman Niki Tsongas, NRWA founder Marion Stoddart and Executive Director Elizabeth Ainsley Campbell

The Nashua River took another step toward becoming a national "Wild and Scenic River" Monday, when Congresswoman Niki Tsongas and representatives of local conservation organizations announced the passage and signing of the Nashua River Wild and Scenic River Study Act.

Tsongas backed a reconnaissance survey by the National Park Service that gave the Nashua a thumbs up, qualifying it for this study. According to a June, 2014 letter to Congresswoman Tsongas from the Department of the Interior: "the elements for a

"Nashua Study Takes the River a Step Closer to Wild & Scenic", The Groton Line news article on passage of the Nashua River Wild and Scenic River Study Act, January 13, 2015.

Frontpage of www.WildandScenicNashuaRivers.org, the website of the Nashua River Wild and Scenic River Study Committee.



NATIONAL WILD AND SCENIC RIVERS SYSTEM

Let's Protect The Nashua, Squannacook & Nissitissit Rivers

- The *National Park Service Partnership Wild and Scenic Rivers* Program is dedicated to protecting nationally significant river resources through locally based partnerships.
- Legislation sponsored by U.S. Congresswoman Nikki Tsongas was signed into law on December 19, 2014 which authorized the study.
- The Nashua, Nissitissit, and Squannacook Rivers are an essential part of our region's culture, character, and history. They are also an essential part of our future.
- Currently, eight Massachusetts communities along the Nashua, Nissitissit, and Squannacook Rivers are working together on a planning process with local groups and state & federal agencies. Our mission is to craft a vision for the future of these rivers, to consider their eligibility and suitability to be part of the National Wild & Scenic River System, and to determine how these rivers should best be managed in order to protect water quality and outstanding values such as biological diversity, recreation, and cultural & historical resources.
- Upon completion of the three-year planning process, if participating communities vote affirmatively, the US Congress will be asked to designate the rivers as Partnership Wild and Scenic Rivers.
- This process will result in the formation of strong local partnerships and will build public awareness, appreciation of these rivers, and support for the voluntary, locally based management plans to be developed as part of the study. The goal is to protect our shared outstandingly remarkable resources for the future as well as attract public and private funding to enhance public enjoyment of these rivers.

Flyer Prepared by the Nashua River Wild & Scenic River Study Committee 5-19-16

For more information about the Study Committee and its planning work contact:
Al Futterman ALF@NashuaRiverWatershed.org
Nashua River Watershed Association 592 Main Street Groton, MA 01450
(978) 448-0299 www.NashuaRiverWatershed.org

For more information about NPS Wild & Scenic Rivers see: www.nps.gov/pwsr/index.htm

NASHUA RIVER WATERSHED ASSOCIATION

Squannacook

The Squannacook River is a 16.4-mile-long river in northern Massachusetts. It is a tributary of the Nashua River. Its subbasin covers 73 square miles. Currently, 16.4 miles of the Squannacook are included in the Study Area.

Nashua

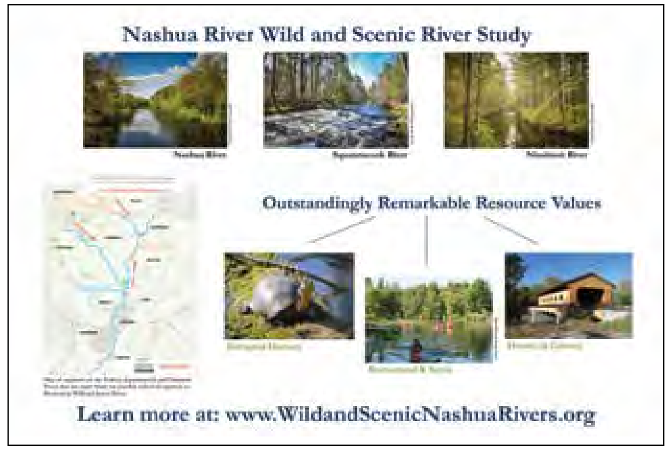
The Nashua River is a 37.5-mile-long river in Massachusetts and New Hampshire and is a tributary of the Merrimack River. Its watershed covers 66 square miles. Currently, ~33 miles of the Nashua are included in the Study Area.

Nissitissit

The Nissitissit River is a 10.5-mile-long river located in southern New Hampshire and northern Massachusetts. It is a tributary of the Nashua River. Its subbasin covers 60 square miles. Currently, ~4.5 miles of the Nissitissit are included in the Study Area.

Front and back of Nashua River Wild and Scenic River Study flyer used at early public outreach events.

Audience at the US Fish and Wildlife Service's Bill Ashe Visitor Facility dedication ceremony in May, 2016. The facility is on the banks of the Nashua River. The Study Committee had a display on the Study at this event, and many others. Photo left to right in front row: US Representative Niki Tsongas, then USFWS Director Dan Ashe, Betty Ashe, and honoree Bill Ashe. Image: Wynne Treanor-Kvenvold.



"River Day" 2016 (held on Sept. 19, 2016), hosted by Representative Niki Tsongas, at the Bill Ashe Visitor Facility on the Nashua River within the Study Area. Image left: Audience for presentations portion of the event, that included an update on the Study by Elizabeth Ainsley Campbell, NRWA Executive Director and Study Committee member (seen center in black hat); seated behind Campbell (far left) is then USFWS Deputy Director Jim Kurth. Campbell's remarks were videotaped and posted to the Study Committee's website. Photo: Wynne Treanor-Kvenvold. Image right: Nashua River Wild and Scenic River Study display piece at River Day event, and other events.

Wild and Scenic e-invite
Subject line: Your Input Requested: Nashua, Squannacook, and Nissitissit "Wild and Scenic" Public Meeting

"WILD AND SCENIC" NASHUA RIVERS STUDY COMMITTEE:
PUBLIC UPDATE AND INPUT SESSION

When: Thursday, April 27, 2017 from 7:00 to 9:00 p.m.

Where: NRWA's River Resource Center, 592 Main Street (Rt. 119) in Groton, MA

What: Do you think that the history of the Nashua River's restoration, from one of the ten most polluted rivers in the 1960s to the sparkling river today, is remarkable? Do you like to fly fish and you find the cold water fisheries of the Squannacook and Nissitissit Rivers outstanding? Are you amazed at the diversity of turtles, birds, plants, and unique habitats that are found in and around our rivers? When you paddle on the Nashua, Squannacook, or Nissitissit River, do you feel revitalized?

The Nashua River "Wild and Scenic" River Study Committee invites you to join a public conversation on April 27th to discuss our rivers' cultural history, outstanding biological and ecological resources, and extensive recreational opportunities.

The locally-appointed Study Committee was formed after the U.S. Congress passed legislation authorizing the National Park Service to commence a study of sections of the Nashua, Squannacook, and Nissitissit Rivers to determine if they are eligible and suitable for designation as part of the federal Partnership Wild and Scenic River Program. Appointees to the Study Committee come from eight riverfront towns: Ayer, Dunstable, Groton, Harvard, Lancaster, Pepperell, Shirley, and Townsend. The Nashua River Watershed Association is playing a lead role along with the National Park Service. The Committee also includes representatives from the US Fish & Wildlife Service, the MA Department of Fish & Game, the MA Division of Ecological Restoration, USGS, and volunteers.

Committee members are combing through any and all pertinent local, regional, state, and federal records, reports, historical documents, and related data to clarify which resources are considered "outstanding and remarkable"-- all to help make the case for the federal designation of "Wild and Scenic."

Those attending the April 27th event will hear about the Committee's findings to date and also have the opportunity to share thoughts on the findings and suggest additional resources that may have been overlooked so far. The Study and designation process will be explained and next steps outlined.

RSVP: RSVP requested for planning, though walk-ins are welcome. RSVP to Al Futterman, NRWA Land Programs and Outreach Director, at 978-448-0299 or email [illegible]

Learn more: [illegible]

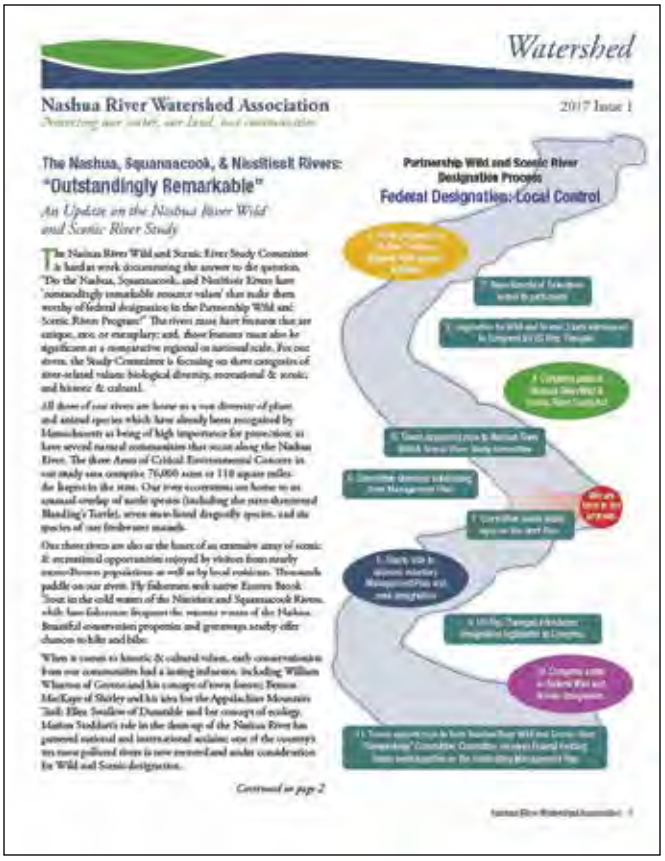
E-invitation to Nashua River Wild and Scenic River Study Public Update and Input Session held on April 27, 2017, emailed to list of approximately 4,000.

The Groton Herald is also available at: www.grotonherald.com

The Groton Herald

Nashua, Squannacook & Nissitissit Rivers Should Receive 'Wild & Scenic' Protection

"Nashua, Squannacook, & Nissitissit Rivers Should Receive 'Wild & Scenic' Protection" from The Groton Herald, May 19, 2017, by Mary Metzger.



Watershed

Nashua River Watershed Association

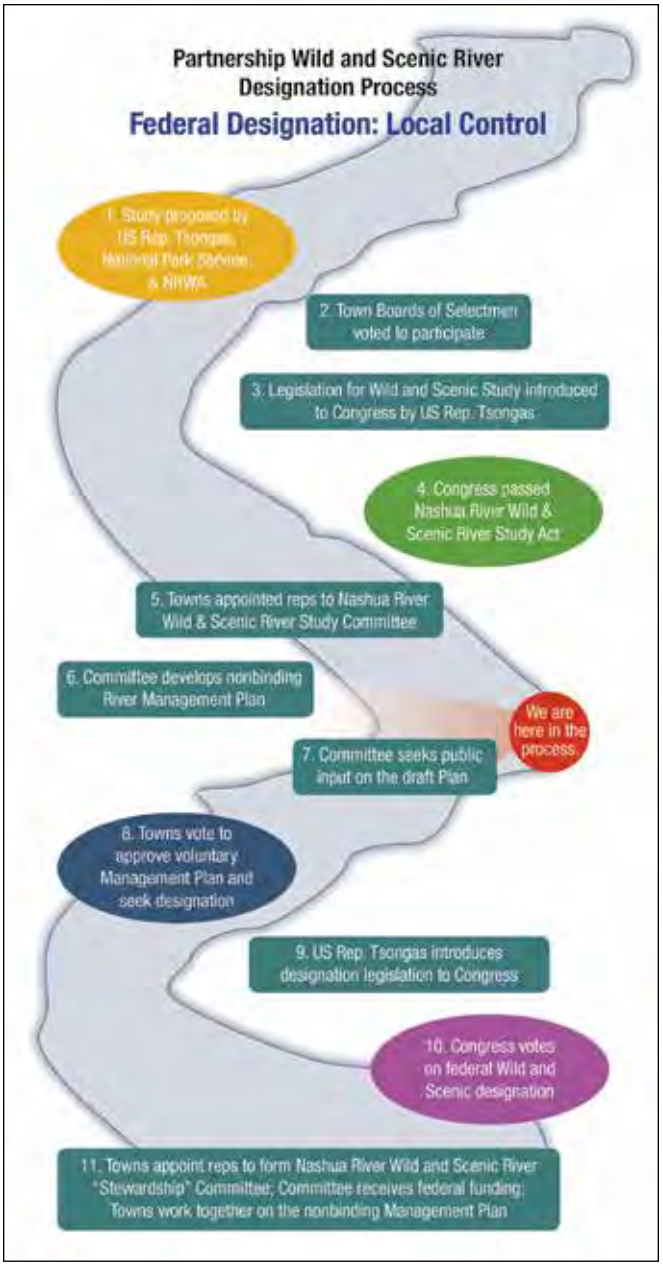
2017 Issue 1

The Nashua, Squannacook, & Nissitissit Rivers:
"Outstandingly Remarkable"

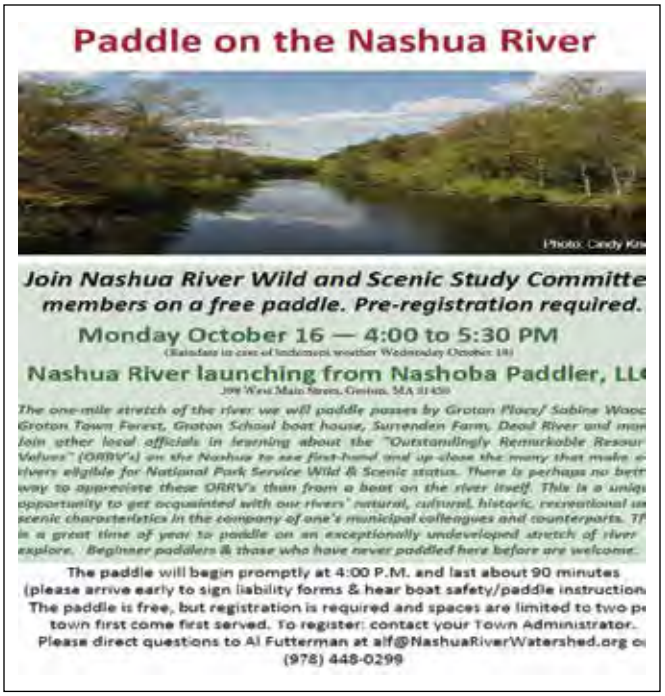
An Update on the Nashua River Wild and Scenic River Study

Partnership Wild and Scenic River Designation Process
Federal Designation: Local Control

Frontpage of NRWA's Fall 2017 newsletter with story on progress of the Nashua River Wild and Scenic River Study, including graphic created to clarify the designation process. Mailed to 3,000 NRWA supporters and local community offices and libraries, posted to NRWA website, and used as handout at outreach events.



Close-up of Wild and Scenic designation process graphic for NRWA newsletter. Graphic design: Geralyn Miller Design.



Nashua River Wild and Scenic River Study Committee invitation sent to municipal officials inviting them on a paddle as part of outreach efforts to town officials.

Municipal officials paddle held in October 2017. Photo: Martha Morgan.

Flyer for Nashua River Wild and Scenic River Study Committee public input session on Recreation and Scenic outstandingly remarkable resource values, held in October 2017.

Flyer for Nashua River Wild and Scenic River Study Committee public input sessions on Biological Diversity and Historical and Cultural outstandingly remarkable resource values, held in November 2017.

The Sun | Local Sports | Sunday, December 3, 2017 17

Move to highlight the Squannacook River

BILL BISWANGER
Field & Stream

In Townsend and West Groton flows one of the finest rivers in the United States. It is full of trout and a few bass, with anglers from all over coming to this area to fish for the prizes found within the banks and it's tributaries.

The Squannacook River starts in West Townsend and empties its contents some nine miles later into the now beautiful Nashua River. This is a secret no more as thousand upon thousand of sportsmen and people who just love the river come here and love its shores.

The folks at the Nashua River Watershed, led by Al Futterman, have done a study to get the river a "Wild and Scenic" designation. Their 34-page report pointing out all the reasons why the river should be is one of the most compressive you will ever read.

The study went over the biodiversity, recreational, scenic historic and cultural aspects of this fine river. One of the positive things they are going to look at is the rail trail that will be built this spring along the banks.

Also the river can reproduce trout and bass. Brown and brook trout can reproduce here and largemouth bass have for decades in West Groton. Some bass here grow past five pounds.

There were two public meetings held this past week about the proposal and citizens gave their thoughts on the project. There was no negative comments, all positive ones, and people added things to help get the project to go forward.

Once this is all completed Futterman and his crew will go to Board of Selectmen in the region and look for approval for them to take this to Town Meeting for approval as well. If they all approve, then it will be on to Washington, D.C.

This designation will help with projects as far away as a 1/4 mile away from the center of the river.

The Harbor Pond now inundated with weeds could get money to help clean out the weeds and repair the river area to what it used to be.

If designated by the president of the United States, it is hoped it will take place by the summer of 2018 this will allow for federal money to come this way to help with river projects.

To see the draft conversation, or to comment, go to alf@wildandScenicnashuarivers.org.

❑

This has been a good fall hunting shotgun only deer season. It opened last Monday and will run another week. Hunters are seeing quality deer and lots of them. Well, not all of them, I have not seen one yet but the fat lady has not sung yet.

New Hampshire deer hunters are having a great season. So far they have taken 11,385 deer, which is up 12 percent over last year and the season does not end until the archery season closes Dec. 15.

Hunters are finding deer in all the typical spots like apple orchards, but the white oaks and acorn crop seems to be best.

One hunter, Russ Philbrick of Ashby, took a buck of a lifetime. This animal was 11 points, with a well over 20-inch spread, a gross score over 188 inches, and weighed 193 pounds. It is being measured again for status for the top scoring in the North East Big Bucks Club.

Scot Lieb, a New Hampshire resident, did something I had never heard of before but since then I have confirmed it is possible. He shot a pregnant doe. There were twins in the sack. Biologists state it is a doe that either had a very late breed or more likely never dropped her fawn.

❑

Massachusetts hunting and fishing licenses for 2018 are now for sale. You can buy now online.

❑

I recently was on a local cable channel called the "Buzz," which is fed into homes in Chelmsford and Lowell. The program will air in the very near future. There was talk about deer and bears and we just starting talking salmon when we ran out of time.

Bill Biswanger's email address is bboutdoor1@aol.com

The Squannacook River: Protecting a jewel in our own backyard

Nashoba Publishing Posted 12/08/2017 07:36:35 AM EST

In Townsend and West Groton flows one of the finest rivers in the United States. It is full of trout and a few bass, with anglers from all over coming to this area to fish for the prizes found within the banks and its tributaries.

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The study went over the biodiversity, recreational, scenic historic and cultural aspects of this fine river. One of the positive things they are going to look at is the rail trail that will be built this spring along the banks.

Also the river can reproduce trout and bass. Brown and brook trout can reproduce here and largemouth bass have for decades in West Groton. Some bass here grow past five pounds.

There were two public meetings held this past week about the proposal and citizens gave their thoughts on the project. There were no negative comments, all positive ones, and people added things to help get the project to go forward.

Once this is all completed Futterman and his crew will go to Board of Selectmen in the region and look for approval for them to take this to Town Meeting for approval as well.

If they all approve, then it will be on to Washington, D.C.

This designation will help with projects as far as a quarter-mile away from the center of the river. The Harbor Pond, now inundated with weeds, could get money to help clean out the weeds and repair the river area to what it used to be.

If designated by the president of the United States, it is hoped it will take place by the summer of 2018. This will allow for federal money to come this way to help with river projects.

To see the draft conversation, or to comment, go to wildandscenicnashuarivers.org.

Top: "Move to highlight the Squannacook River" in Lowell Sun, December 3, 2017, by Bill Biswanger.
Bottom: Reprinted in the Nashoba Valley Voice on December 8, 2017, titled
"The Squannacook River: Protecting a jewel in our own backyard."

Nashua River Watershed Association
News and Upcoming Programs for December 2017

Stewardship Plan Being Drafted for the Nashua, Squannacook, and Nissitissit Rivers
Your Input Requested!

Do you care about the biodiversity, history & culture, or recreational & scenic opportunities that are tied to the Nashua, Squannacook, and Nissitissit Rivers? Maybe you love to paddle, fish, or hike along those rivers. Maybe you love the variety of wildlife that makes its home in the river and along the banks. Or maybe you love the history of this area, the stories of the early inhabitants, the rise of the mills, and the story of the Nashua River's clean-up. **The Nashua River Wild and Scenic River Study Committee is looking for your input on its draft Stewardship Plan for sections of these three rivers.**

As part of the Nashua River Wild and Scenic River Study, this locally-driven Stewardship Plan is being drafted for two purposes. One is to provide necessary background information to the National Park Service as part of the process for Partnership Wild and Scenic Rivers designation. The other is to provide guidance to volunteers focused on river stewardship actions going forward.

The importance of the Nashua, Squannacook, and Nissitissit Rivers goes well beyond the confines of the rivers' corridors, and a number of resources contribute to give these river sections regional and national significance. These include:

- Public, permanently protected lands in the "greenway" corridor, including private and municipal conservation areas and forests, four state forests, three state wildlife management areas, and other "wild-like" parcels.
- Outstanding fisheries, which are the best for trout in eastern Massachusetts and are being improved through local restoration projects.
- High quality biodiversity, recreation & scenic, and historic & cultural experiences in close proximity to Boston MA, Worcester MA, and Nashua NH, thus providing local economic stimulus from visitors from these nearby urban areas.
- Varied canoeing and boating opportunities.

A Stewardship Plan for these three rivers is needed because the residents of this region are concerned about maintaining and enhancing the unique resources. According to this draft Plan, people are seemingly most concerned about sustaining the relatively high water quality, gains that have been decades long in the making, but that are still and increasingly threatened today) and, most people participating in this locally-determined study expressed support for a concerted effort to conserve the key resources of the rivers' for future generations.

What's important to you? How can we work together across community lines to conserve and enhance these outstanding resources? Representatives from 11 communities in MA and NH are working together on this Plan, and they welcome your input to help make the Plan as robust as possible. You can read the draft Stewardship Plan online. Please share your comments by email with Alf Futterman, NRWA Land Programs Director, at Alf@NashuaRiverWatershed.org.

NRWA January 2018 monthly e-newsletter with feature article calling for photo and video submissions to be used in connection with the Nashua River Wild and Scenic River Study, sent to list of approximately 4,000.

Nashua River Watershed Association
News and Upcoming Programs for January 2018

Call for Images for Use by the NRWA for the Wild and Scenic River Study Project

The NRWA is looking for great images or video footage to use as we work with the Nashua River Wild and Scenic River Study Committee. The images may be used in a short video that is being produced with NorthPoint Productions about our Wild and Scenic project, or used in the Nashua, Squannacook, and Nissitissit Rivers Stewardship Plan that is being drafted, or they may be archived by NRWA for future use in our newsletters, on our website, or on our Facebook page. For any image that is selected to be used, credit will always be given to the photographer/videographer. Can you help us out by sharing great images that you've captured while out and about in our watershed? Here are a few more details:

What to Submit: We're looking for images/videos of our rivers and streams, landscapes, wildlife, people enjoying outdoor recreation, historical or cultural images/videos connected to our rivers. The images/videos do need to be taken in the Nashua River watershed—we're looking for local authenticity. The focus is on the Nashua, Squannacook, and Nissitissit Rivers in the 11 communities involved in the Study Area: Ayer, Bolton, Brookline, Dunstable, Groton, Harvard, Hollis, Lancaster, Pepperell, Shirley, and Townsend. Photographs and videos from any season are welcome. The images need to be high resolution, minimum of 300 dpi for print production.

How to Submit: Each image/video needs to be labeled with simple description, location, and your name. Images should be JPGs or PNGs; videos should be MP4 files. The images/videos should be submitted to WynneT@NashuaRiverWatershed.org. If the files are large (total more than 6MBs), consider sending them in multiple emails, using a free service like DropBox, or you can even make arrangements to stop by with a thumb drive (we're always happy to meet with you). Please send files as attachments, do not embed the image in the email.

Deadline: January 28, 2018

You can find more info about the Nashua River Wild and Scenic River Study Committee and the Study project at: www.wildandscenicnashuarivers.org. Go to the Documents Tab and click on "Draft Stewardship Plan" to get a feel for the document in which some of the photos might be used.

Questions: Email WynneT@NashuaRiverWatershed.org.

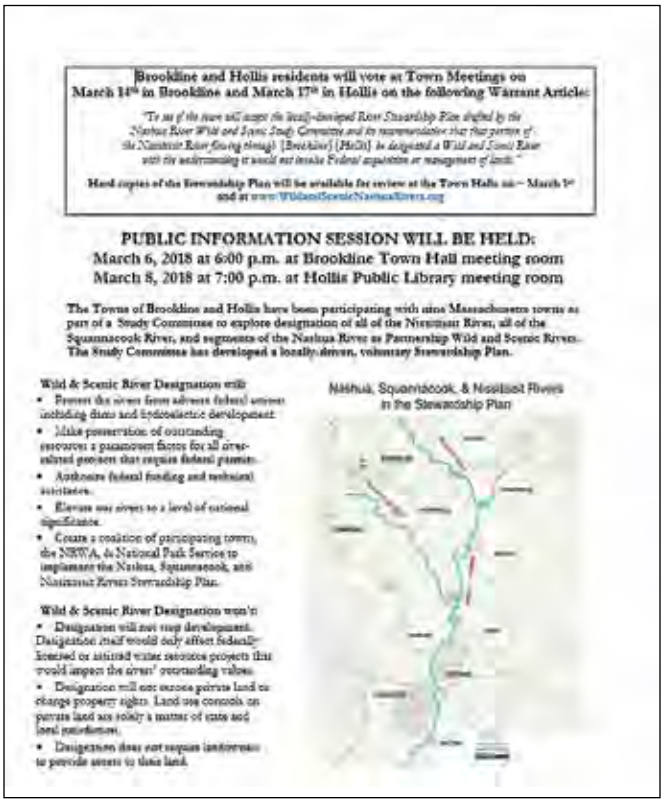
Thank you to all of you who have shared your images with us in the past, either for this project or for other projects. The images you have sent have been hugely helpful to us for our newsletters, emails, Facebook, and other outreach materials. We have a nice archive; please know that if you've submitted images before, they are being reviewed for use in this project as well.

NRWA January 2018 monthly e-newsletter with feature article calling for photo and video submissions to be used in connection with the Nashua River Wild and Scenic River Study, sent to list of approximately 4,000.

Nashua River Wild and Scenic River Study Committee PSA seeking input on Stewardship Plan, posted to all local cable access channels in the participating communities.

Nashua, Nissitissit, and Squannacook Rivers: FOREVER WILD AND SCENIC

Opening screen of "Nashua, Squannacook, and Nissitissit Rivers: Forever Wild & Scenic", a short informational video being created by the Nashua River Wild and Scenic River Study Committee. It will be posted to YouTube, the Committee's website, NRWA's website, shown on local cable access channels in participating communities, and shown at public outreach events.
Producer: NorthPoint Productions.



Brookline and Hollis residents will vote at Town Meetings on March 14th in Brookline and March 17th in Hollis on the following Warrant Article:

"To see if the town will accept the locally-developed River Stewardship Plan drafted by the Nashua River Wild and Scenic Study Committee and its recommendation that that portion of the Nissitissit River flowing through [Brookline] [Hollis] be designated a Wild and Scenic River with the understanding it would not involve Federal acquisition or management of lands."

Hard copies of the Stewardship Plan will be available for review at the Town Halls on – March 1st and at www.WildandScenicNashuaRivers.org

PUBLIC INFORMATION SESSION WILL BE HELD:
March 6, 2018 at 6:00 p.m. at Brookline Town Hall meeting room
March 8, 2018 at 7:00 p.m. at Hollis Public Library meeting room

The Towns of Brookline and Hollis have been participating with nine Massachusetts towns as part of a Study Committee to explore designation of all of the Nissitissit River, all of the Squannacook River, and segments of the Nashua River as Partnership Wild and Scenic Rivers. The Study Committee has developed a locally-driven, voluntary Stewardship Plan.

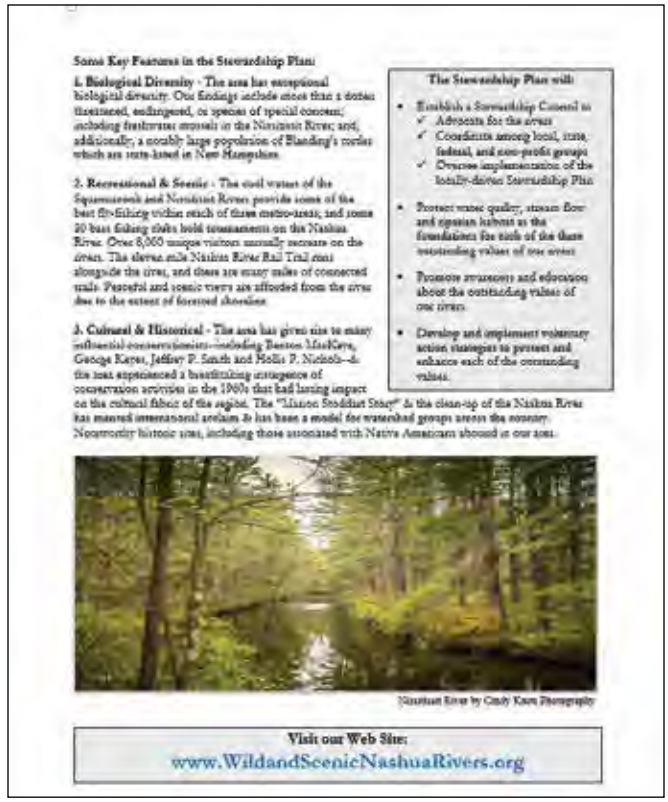
Wild & Scenic River Designation will:

- Protect the rivers from adverse federal actions including dams and hydroelectric development.
- Make preservation of outstanding resources a paramount factor for all river-related projects that require federal permits.
- Authorize federal funding and technical assistance.
- Elevate our rivers to a level of national significance.
- Create a coalition of participating towns, the NRWA, & National Park Service to implement the Nashua, Squannacook, and Nissitissit Rivers Stewardship Plan.

Wild & Scenic River Designation won't:

- Designation will not stop development. Designation itself would only affect federally-licensed or assisted water resource projects that would impact the rivers' outstanding values.
- Designation will not rezone private land to change property rights. Land use controls on private land are solely a matter of state and local jurisdiction.
- Designation does not require landowners to provide access to their land.

Nashua, Squannacook, & Nissitissit Rivers in the Stewardship Plan



Some Key Features in the Stewardship Plan:

1. Biological Diversity - The area has exceptional biological diversity. Our findings include more than a dozen threatened, endangered, or species of special concern; including freshwater mussels in the Nissitissit River; and, additionally, a notably large population of Blanding's turtles which are state-listed in New Hampshire.

2. Recreational & Scenic - The cool waters of the Squannacook and Nissitissit Rivers provide some of the best fly-fishing within reach of three metro-areas; and some 20 bass fishing clubs hold tournaments on the Nashua River. Over 8,000 unique visitors annually recreate on the rivers. The eleven mile Nashua River Rail Trail runs alongside the river, and there are many miles of connected trails. Peaceful and scenic views are afforded from the river due to the extent of forested shoreline.

3. Cultural & Historical - The area has given rise to many influential conservationists—including Benton MacKaye, George Keyes, Jeffrey P. Smith and Hollis P. Nichols—& the area experienced a breathtaking resurgence of conservation activities in the 1960s that had lasting impact on the cultural fabric of the region. The "Marion Stoddart Story" & the clean-up of the Nashua River has manned international acclaim & has been a model for watershed groups across the country. Noteworthy historic sites, including those associated with Native Americans abound in our area.

The Stewardship Plan will:

- Establish a Stewardship Council to
  - ✓ Advocate for the rivers
  - ✓ Coordinate among local, state, federal, and non-profit groups
  - ✓ Oversee implementation of the locally-driven Stewardship Plan
- Protect water quality, stream flow and riparian habitat as the foundations for each of the three outstanding values of our rivers
- Promote awareness and education about the outstanding values of our rivers
- Develop and implement voluntary action strategies to protect and enhance each of the outstanding values.

Nissitissit River by Cindy Kern Photography

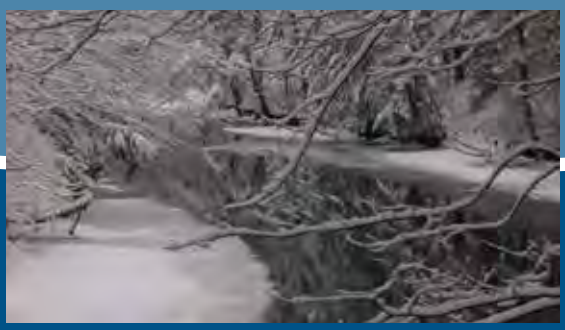
Visit our Web Site:
www.WildandScenicNashuaRivers.org

Front and back of flyer distributed at public information meetings in Hollis and Brookline, New Hampshire beginning in February 2018.

Nashua River Wild and Scenic River Study Committee
c/o Nashua River Watershed Association
592 Main Street, Groton, Massachusetts 01450
978-448-0299 | www.WildandScenicNashuaRivers.org

NASHUA RIVER
WILD & SCENIC
STUDY COMMITTEE
Nashua • Squannacook • Nissitissit Rivers

Nashua River. Photo: Ken Hartlage



Squannacook River. Photo: Joan Wotkowicz

Nissitissit River. Photo: Cindy Knox Photography

February 15, 2018