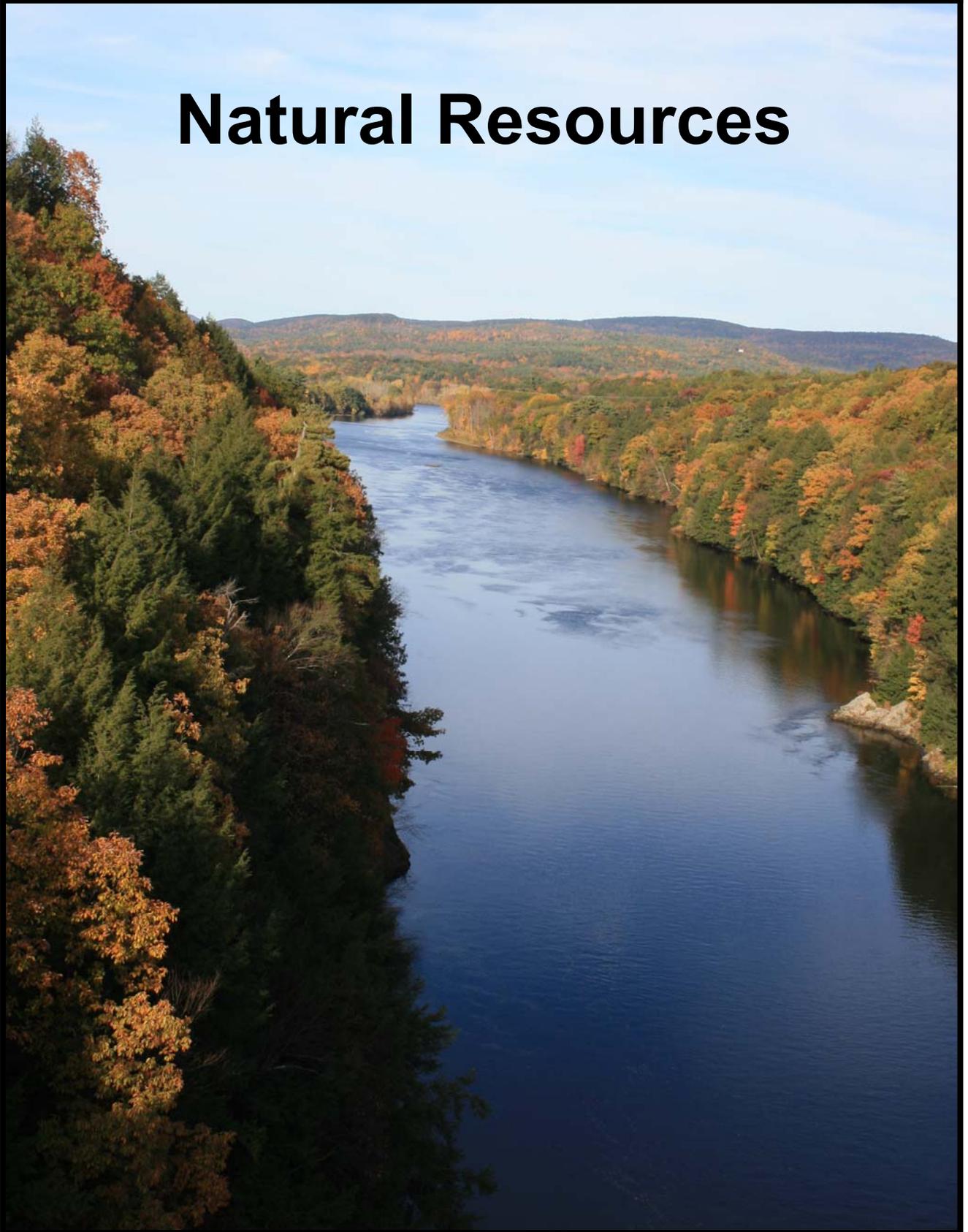


Natural Resources



Along the Mohawk Trail East Scenic Byway lies a wealth of important natural resources. Among these resources are: the Connecticut and Millers Rivers, which are priority trout habitat; habitat for endangered and threatened species including Bald Eagles; and miles of northern hardwood forests. The Byway area also has important geology, flora and fauna that contribute to the areas unique experience. This wealth of natural resources also adds to the beautiful scenery, and attracts recreational tourists who are looking to experience nature.

This chapter of the Mohawk Trail East Corridor Management Plan contains an overview and inventory of the Byway's natural resources. Information on the geology, soils, water resources, and rare species habitat areas located within the Byway study area are included. This inventory is not intended to provide an in-depth review or assessment of these resources. The purpose is to highlight the Byway's primary natural and environmental assets. The chapter also discusses potential issues that could affect the quality of these resources over time. The chapter concludes with recommendations that are intended to protect, maintain, and enhance the Byway's natural resources.

Geologic Resources

Geologic History

The landscape along the Mohawk Trail East Scenic Byway is a product of the collision of two super continents approximately 400 million years ago, which created huge mountains as tall as the Alps that divided eastern and western Massachusetts. The collision, known as the Acadian Orogeny (a geologic term for a mountain building event), affected much of central New England. During this event, in the location between the towns of Athol and Erving, gigantic folds of rocks called nappes, were squeezed up and out of the collision zone like paint from a tube. The older, less dense gneiss, the "basement" rock, escaped the tremendous pressure by floating upward and outward, forming

nearly upright domes. Many of the north-south trending hills and ridges that border the Byway corridor are all that remain of these ancient mountains and gneiss domes.

Approximately 200 million years ago, a great rift basin formed in the area that would eventually become the present day Connecticut River as the sutured continental plates were pulled apart. Triassic and Jurassic-aged sedimentary rocks and basalts filled the rift basin and dinosaurs roamed across the area, leaving behind their footprints for us to discover. As the last ice sheet began to melt approximately 15,600 years ago, Glacial Lake Hitchcock covered the valley as the melting water was trapped behind naturally-formed dams.

Geology Today

A portion of this rift valley is known as the Deerfield Basin and extends from Northampton northward to Bernardston. The Mohawk Trail East Scenic Byway crosses the northern section of this basin and many of its geologic features can still be seen. The 180-foot thick Deerfield basalt, formed of volcanic lava, is sandwiched between the sedimentary rocks of the Mt. Toby conglomerate and Sugarloaf Arkose. Rocky Mountain, a black ridge of Deerfield basalt, is in the Pocumtuck Range in Greenfield. Greenfield's Poets Seat Tower is perched on the crest of a lava flow between Turners Falls and Greenfield and boasts spectacular views of the valley and surrounding upland areas.

In the Turners Falls area of Montague, just south of the Byway, the fine-grained Turners Falls sandstone contains a wealth of fish, clams, and plant fossils. These fossil-rich rocks are well exposed along the rocky banks of the Connecticut River at Turners Falls.

A long road cut along the Byway in Gill exposes the rocks of the Deerfield Basin. The fossil-rich Turners Falls sandstone and the sequence of volcanic flows (Deerfield basalt) that comprise the lava ridge between Turners Falls and Greenfield (Rocky Mountain) are visible in this road cut. There are several areas to park and picnic in the Riverside section of Gill, which provide opportunities for exploring the rock formations. Three layers of the Deerfield basalt are exposed in the road cut, including: pillow basalt that was created when lava erupted under water, basalt with columnar jointing (lava that has cooled into long columns),

and red vesicular or sponge-like basalt.

Most of the route that the Mohawk Trail East Scenic Byway travels lies within the Millers River Watershed, which includes some of the most rugged and steep terrain of the state's central upland. Monadnocks, hills of erosion-resistant rock, are an important landscape feature that is characteristic of the watershed. The watershed boasts a vast acreage of unspoiled open space and forested lands in public and quasi-public ownership that provides a wide variety of outdoor opportunities such as camping, hiking, picnicking, and scenic viewing.

Soils

The characteristics of the soil types found along the Mohawk Trail East Scenic Byway corridor play an important role in determining what types of activities and developments can reasonably occur, particularly if a septic system is needed to dispose of sanitary waste. The soil types found along the Byway corridor occurs in natural groups known as soil associations. This section of the chapter contains an overview of the soil associations found along the Byway, traveling from Athol (in the east) to Greenfield (in the west).

The **Charlton-Chatfield** association is located in a small area of the Byway corridor on the north side of Route 2A just east of the Franklin-Worcester County border and extending east to the developed area of downtown Athol (approximately at Athol Road). This soil series is a deep, well drained loamy soil that was formed in glacial till. The till tends to be acidic due to the presence of

schist, gneiss, and/or granite. These soils are typically well-drained with little runoff and are commonly stony in nature, making the most common use of these soils as woodland or unimproved pasture. There are slight limitations on septic system siting for level to gently sloping land. However, as the slope increases there is more of a moderate to severe limitation for the siting of septic systems.

The **Hinckley-Merrimac** soil association extends from the intersection of Routes 78 and 2A in Orange east to Athol. These are very permeable sandy and gravelly soils. They formed in the deep sand and gravel deposits found in level to gently sloping glacial outwash plains and stream terraces. In general, these soils pose slight limitations on the siting of septic systems; however the rapid permeability of these soils may result in septic effluent contamination of nearby shallow wells. Development on these soils should be limited in floodplain areas. Because of their characteristics, these soils are well suited as potential sources of water for commercial, residential, or municipal uses. However, due to the soils' permeability, any wells in this area must be located far enough away from potential sources of pollution, including septic systems, to avoid contamination.

The **Shapleigh-Essex-Gloucester** association is found between Millers Falls and the intersection of Routes 78 and 2A in Orange. Forested, rolling, stony and rocky hills are prominent in this soil association. These (both shallow and deep) well-drained soils formed in the sandy glacial till found in upland areas east of

the Connecticut River valley. Most of the soils are stony and contain many large boulders. The Shapleigh soils are shallow, with a depth to bedrock of less than 18 inches, and cover steep slopes that have many rock ledges or outcrops. The Gloucester and Essex soils are found on the upper parts of the hills. These soils are similar, except the Essex soils have a hard layer (hardpan) at a depth of approximately 2 feet, while the Gloucester soils have hardpan at a depth of approximately 3 to 5 feet. Both the Shapleigh and Essex soils have severe limitations for the siting of septic systems due to their shallow depth to bedrock and the low permeability of the hardpan layer, respectively. The Gloucester soils have a slight to severe limitation for the siting of septic systems, depending upon the thickness of the hardpan layer and/or the slopes.

There is a small area that contains **Holyoke-Sunderland-Cheshire** association within the Byway study area in the town of Greenfield near the Connecticut River. These well-drained soils have red subsoil and are found on bedrock ridges in the Connecticut River valley. The soils in this association overlay the dikes and ridges of red Triassic rocks that rise abruptly to a height of 400 to 1,000 feet above the valley floor. Bedrock is generally within 1.5 feet of the surface and the slopes range from 15 to 90 percent; making these soils very unsuitable for development.

The **Hinckley-Windsor-Merrimac** association is the major soil group along the segment of the Byway between Greenfield and Millers Falls. These soils are found on the flat to steep terraces

along streams and the Connecticut River. These soils formed in deep deposits of wind or water-sorted sand and are moderately to very permeable. They are also sandy and gravelly with a depth to bedrock that is greater than 10 feet. The Hinckley soils, which are classified as droughty because they have a low capacity for retaining water, are the most extensive soil type in the association. Due to their rapid permeability, droughtiness, and very low natural fertility, the soils in this association have a limited suitability for crops, hay, and pasture. However, irrigation and fertilization does improve the use of these soils for cultivated crops. The Hinckley soils are rated as having a slight limitation on septic tank effluent disposal in areas with slopes under 8 percent; although the high permeability of these soils may allow pollution to occur of nearby shallow drinking water wells. In areas of moderate to steep slopes, the soils are rated as having moderate to severe limitations for the siting of septic systems.

Water Resources

The Mohawk Trail region has an abundance of relatively clean and clear water resources that provide habitat for a variety of wildlife, including rare and endangered species, and water for public and private drinking water supplies. These water resources also provide numerous opportunities for outdoor recreation, such as fishing and boating. The Mohawk Trail East Scenic Byway travels through the watersheds of three major rivers: the Deerfield, the Connecticut, and the Millers.



Starting in Athol and traveling west, the Byway runs parallel to the Millers River through Athol, Orange, and into Erving. In Erving, the Byway crosses the French King Bridge, which marks the divide between the Connecticut and the Millers River Watersheds. The Byway then continues west along the Connecticut River through Gill and Greenfield. It then crosses the Fall River and turns south. As the Byway travels through Greenfield, it runs through a portion of the Deerfield River watershed and crosses the Green River, which is a major tributary of the Deerfield River.

Rivers and Streams

The Mohawk Trail East Scenic Byway corridor contains a number of significant water resources, including the Connecticut, Millers, and Green Rivers and their tributaries. The Connecticut River is New England's largest river ecosystem. The rich natural diversity and special qualities of the Connecticut River and its watershed have garnered national recognition. In 1991, the entire

The Quinnetucket II, a tourist boat operated on the Connecticut River by FirstLight the owner of Northfield Mountain Pumped Storage facility.

Connecticut River watershed was designated the Silvio O. Conte National Fish and Wildlife Refuge, and in 1998 the river was designated an American Heritage River.

For 30 years, the Connecticut River has been the focus of a multi-state and federal initiative, known as the Connecticut River Basin Atlantic Salmon Compact, to restore Atlantic salmon to the river. Once relatively common, salmon disappeared from the Connecticut River approximately 200 years ago as dams were built on the mainstem and tributaries during the "Industrial Revolution," cutting off access to spawning habitat. The salmon restoration effort has succeeded in bringing back not only salmon, but other migratory fish including: American Shad, Blueback Herring, Alewife, Striped Bass, Sea Lamprey, American Eel, and Shortnose Sturgeon. The restoration effort is enhanced by a fish ladder located within the Byway Corridor at the Turners Falls Dam in Montague. The dam is equipped with a spillway ladder, where the fish climb up over the dam through a series of 42 pools. The fish then swim past a viewing area and a counting area and exit the fish-way above the Turners Falls Dam.

The river also provides habitat for the Bald Eagle, a Massachusetts-listed endangered species. In 1982, the Massachusetts Division of Fisheries and Wildlife began reintroducing the Bald Eagle to Massachusetts in the area of the Quabbin Reservoir. Now there is a nesting pair of Bald Eagles within the Byway corridor, at Barton Cove on the Connecticut River. Over the years, thirteen young ea-

gles have hatched and fledged from the Barton Cove nest.

The Connecticut River is highly valued not only for its wildlife habitat and recreational opportunities, but also for its hydroelectric generating capacity. For many decades before the advent of the Industrial Revolution, people used the power of falling water in the tributaries of the Connecticut River to run grist mills, saw mills, wood-working shops and small machine shops that produced goods for their local communities. However, the power needs of the new manufacturing facilities that were being built along the Connecticut River during the Industrial Revolution were enormous in comparison. In 1866, a stone-filled wooden crib dam was built at Turners Falls in Montague to create a pool of water behind the dam which could be used to generate power. This dam most likely replaced a smaller one that had been constructed in the 1790's. Twenty years later, an enterprising mill owner in Turners Falls was the first to sell electricity generated by the Connecticut River to local residents for their household light fixtures. In 1905, the wooden crib dam at Turners Falls was replaced with a concrete dam and by 1907, electricity generated in Turners Falls was being transmitted to Amherst. The elevation of the dam was raised to 172.3 feet in 1913 which extended the pool upstream to the French King Gorge. By 1915, flashboards had been added to the dam raising the water level an additional 7 feet and extending the pool to the confluence of the Ashuelot River in the town of Hinsdale, New Hampshire. Power generated in Turners Falls could now be used in the greater Springfield, Massachusetts area.

Just ten years later, due to the expansion of transmission facilities and increases in generation efficiency, the Connecticut River at Turners Falls supplied electricity to homes and businesses as far south as Hartford, Connecticut and as far west as Pittsfield, Massachusetts.

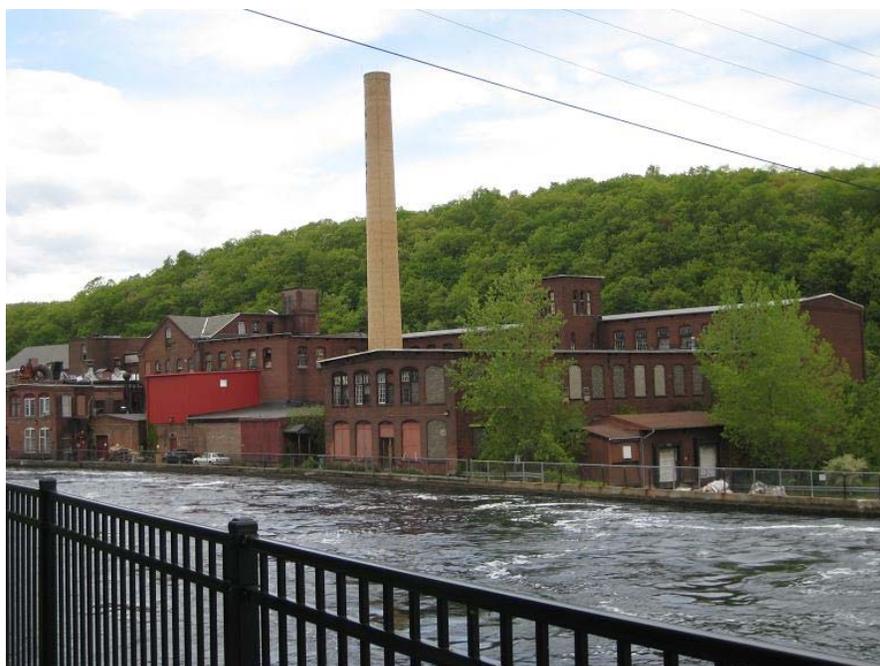
The Northfield Mountain Pumped Storage Project, a hydroelectric facility that was completed in 1970, is located about five miles upstream of the Turners Falls Dam. During the construction of the Pumped Storage Project, the dam at Turners Falls was once again raised to accommodate a power generating facility, this time to an elevation of 185.5 feet. A 2,500 acre lower "reservoir", known as the Turners Falls Power Pool, was created behind the dam. The Turners Falls Power Pool is a 22-mile long reach of the Connecticut River between the Turners Falls Dam and the Vernon Dam in Vernon, Vermont.

The Turners Falls Dam is an impressive structure that can be seen from a turn-out area on the Byway in Gill just west of the intersection of Main Road. On the Montague side of the dam there are two hydroelectric generating facilities that divert water from the Connecticut River through a canal to generate power.

Historically, the Millers River has also been used for industrial purposes. Many of the mills in the towns along the river used water power to run their factories during the Industrial Revolution. To capture the river power, several dams were constructed along the Millers River in the Byway study area towns of Erving, Orange, and Athol. Despite this industrial history, the Millers River and many

of its larger tributaries are for the most part considered to have good water quality. The Byway travels alongside the Millers River for approximately fourteen miles, and also crosses its tributaries. According to assessments performed by the Massachusetts Department of Environmental Protection (MA DEP), the Millers River and several of its larger tributaries (Lyons Brook, Mormon Hollow Brook, Keyup Brook, Whetstone Brook, and the East Branch of the Tully River) meet Surface Water Quality Standards for "Aquatic Life" and "Primary" and "Secondary Contact Recreation". The "Aquatic Life" use is supported when suitable habitat and water quality is available for sustaining a native, naturally diverse community of aquatic flora and fauna. The "Primary Contact Recreational" use is supported when recreational use of the water, such as swimming, wading, diving, and water skiing can occur without risk of illness due to ingestion of fecal coliform bacteria. "Secondary Contact Recreation"

The Connecticut River power canal and factories in Turners Falls Massachusetts.



use is supported when conditions are suitable for any recreational use in which contact with the water is either incidental or accidental; for example, fishing and boating.

The MA DEP has not assessed the “Primary” and “Secondary Contact Recreation” uses for the Connecticut River. Upstream of the Turners Falls Dam, the “Aquatic Life” use is only partially supported due to flow and habitat alterations attributable to the operation of the Northfield Mountain Pumped Storage facility. For 2.3 miles downstream of the dam, the “Aquatic Life” use is not supported because most of the flow of the Connecticut River is diverted through the power canal, rendering this reach of the river dry for part of the year. No water quality data is available for the several unnamed tributaries within the Byway that drain to the Connecticut River.

The Byway crosses several water-bodies classified as Cold Water Fisheries, including the Green River, Fall River, and Lyons Brook. This designation indicates that the water supports trout and other species that are especially sensitive to pollution and require cold, clean water to survive. It is essential that the watershed areas for these Cold Water Fisheries be protected from the negative impacts associated with development, roadway runoff and ill-managed woodland forestry clearing. More generally, it is important that all activities along the Byway corridor, including recreation, tourism, and development, occur in a manner than minimizes any potentially adverse impacts of these activities on the Byway’s natural resources.

Lakes and Ponds

There are a number of lakes and ponds that dot the landscape surrounding the Mohawk Trail East Scenic Byway. Almost all of these water bodies are man-made and serve as recreational features, but several function as reservoirs for water supply and fire protection. Lake Pleasant in the Town of Montague is a good example of a lake that is used for water supply. Northfield Mountain Reservoir in the Town of Erving is used for both recreation and hydropower.

Threats to Water Quality

As stated previously, there are many rivers and streams along the Mohawk Trail East Scenic Byway that are cold water fisheries. These fisheries support trout, which require cold, clean water and are especially sensitive to pollution. It is therefore essential that the cold water streams be protected from the negative impacts associated with development and roadway runoff. One specific issue of concern is the pollution caused by stormwater runoff from the road surface of the Byway. Recently, there have been many improvements along Route 2, which have included upgrades of the roadway drainage systems. Future roadway improvements should continue to incorporate upgrades to the current stormwater management systems to treat or remove pollutants from stormwater runoff before it is discharged into nearby waterways.

It is important that state and local transportation agencies work to ensure that all road projects incorporate measures to minimize their potentially adverse impacts on the rivers’ water quality. The Mohawk Trail East Scenic Byway advocacy groups should encourage

best management practices to preserve and improve water quality of the rivers along the Byway. The FRCOG and MRPC can support the use of best management practices through their roles in regional transportation planning activities. Future road maintenance and improvement projects are also excellent opportunities to upgrade and/or improve stormwater control measures to protect the natural resources that exist in the waterways along the corridor. In addition, the regional planning agencies can apply for grants to implement stormwater management improvements provided by the EPA and DEP through the 319s Non-Point Source Pollution Grant Program.

A final issue involving river water quality concerns the possibility of a hazardous materials spill along the Byway. The Byway is used by trucks and trains that transport hazardous materials, and accidents and spills of these materials can occur. Hazardous spill management in Massachusetts is coordinated by the Massachusetts Department of Environmental Protection (DEP). Recognizing the serious effects that a hazardous spill could have on water quality, animals, and plants, the towns and the appropriate regional planning agencies should work with DEP to develop a regional local emergency planning committee to help create an Emergency Hazardous Materials Spill Plan. This will help mitigate any serious consequences in the event of such an occurrence for those rivers.

Public Drinking Water Resources

As with the quality of rivers and streams along the Scenic Byway, the public drinking water resources within the Byway corridor can also be threatened or degraded by nearby land uses, roadway runoff, and the use of salt and sand for road maintenance during winter months. There are twenty-one public water systems located within the one-mile wide Byway study area. The systems identified within the corridor study area are all groundwater wells. The Natural Resource Maps at the end of this chapter indicates the location of these water resources. A public water system can be either a “community water system” or a “non-community water system.” By definition, a “community water system” has fifteen or more service connections that are used by year-round residents or that regularly serve 25 year-round residents. A “non-community water system” serves at least 25 persons for at least 60 days per year. These systems can be publicly owned and maintained, such as city and town wells, or can be privately owned and maintained, such as those for mobile home parks, factories, rest stops, motels, and restaurants.

The water systems within the Byway corridor are listed in Table 3.1 below and are shown on the Natural Resources Maps at the end of this chapter. Seven of the wells are “community water systems” and the remaining wells are “non-community water systems” for private businesses, including the Erving Paper Mill and various restaurants, bars, motels, and retail establishments.

Table 3.1: Public Water Systems within the Byway Corridor

Map ID	Private or Public	County Location	Town Location
1	Non-Community	Franklin	Erving
2	Non-Community	Franklin	Erving
3	Non-Community	Franklin	Erving
4	Non-Community	Franklin	Erving
5	Non-Community	Franklin	Erving
6	Community	Worcester	Athol
7	Community	Worcester	Athol
8	Community	Franklin	Erving
9	Community	Franklin	Orange
10	Community	Worcester	Athol
11	Community	Worcester	Athol
12	Non-Community	Franklin	Erving
13	Non-Community	Franklin	Erving
14	Non-Community	Franklin	Orange
15	Non-Community	Franklin	Erving
16	Non-Community	Franklin	Gill
17	Non-Community	Franklin	Erving
18	Non-Community	Franklin	Erving
19	Non-Community	Franklin	Erving
20	Community	Franklin	Erving
21	Non-Community	Franklin	Gill

Plant and Animal Species

The Byway has miles of forestlands that support a host of wildlife. The vegetation along the Byway varies as one travels from Athol to Greenfield. Generally, the Mohawk Trail East Scenic Byway is characterized by a mixture of farmland and forests. The forests are predominantly

“Transition Forests,” a combination of plants and evergreen and deciduous trees from Middle Atlantic Forests and Northern Forests. Middle Atlantic Forests contain oak, and many other tree species. Northern Forests are comprised of hemlock, maple, beech, birch, northern red oak, ash, and pine. East of the Connecticut River Valley, the Byway corridor contains large stands of Northern Hardwood Forests primarily composed of oak and hickory trees. Among the variety of animal species present along the Byway include: beaver, bobcat, bald eagles, deer, coyote, and turkey.

These lush forestlands contribute to the local economy in a variety of ways, including revenues from tourism in the nearby state forests. They also support maple syrup making, timber products, and outdoor recreational activities such as hiking, camping, fishing, hunting, boating, skiing, snowshoeing, and snowmobiling. Maple sugar producers near and in the Byway region include Zilinski Sugarhouse in Erving, Old Homestead Farm and Ripley Farm Sugarhouse in Montague, Gauvin's Sugarhouse in Orange, and Sugarbush Farm in Wendell.

Recreational opportunities along the Byway are further discussed in the Recreational Resources chapter. It is important that recreational activities and the harvesting of forest-based resources within the corridor occur in a sustainable way that ensures the long-term viability of the plant and animal species in the area.

Rare and Endangered Species and Significant Natural Communities

The Natural Heritage and Endangered Species Program (NHESP), which is administered by the Massachusetts Division of Fisheries and Wildlife, collects and maintains information on over 400 rare and endangered species throughout the Commonwealth. The goal of the NHESP is to protect biological diversity in the state through biological research and the inventorying of species, data management, environmental impact review, restoration and management of rare species and their habitats, land acquisition, and education.

Approximately 23 of the 28 miles of the Byway travels through or is adjacent to habitat that has been documented by the NHESP as supporting some of the most important natural communities and state-listed rare species in Massachusetts. These sections of the Byway contain endangered species habitat, as well as important natural communities that are categorized as being moderately to highly significant. The NHESP reviews development proposals on a case-by-case basis as required by the Massachusetts Endangered Species Act Regulations (321 CMR 10.00).

The sites shown on the Natural Resources Maps represent two distinct categories of habitats regulated under Massachusetts law. **Estimated Habitat** areas delineate the approximate geographical extent of the habitats of state-protected rare wildlife for use with the Wetlands Protection Act (310 CMR 10.00) and the Forest Cutting Practices Act (304 CMR

Table 3.2: Documented Rare Animals and Plants Found along the Scenic Byway

Species	Taxon	Rating
Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	Amphibia	Special
Four-toed Salamander (<i>Amphibian hemidactylum</i>)	Amphibia	Special
Marbled Salamander (<i>Ambystoma opacum</i>)	Amphibia	Threatened
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Bird	Endangered
Sedge Wren (<i>Cistothorus platenis</i>)	Bird	Endangered
Vesper Sparrow (<i>Pooecetes gramineus</i>)	Bird	Threatened
American Bittern (<i>Botunarus lentiginosus</i>)	Bird	Endangered
Peregrine Falcon (<i>Falco peregrines</i>)	Bird	Endangered
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	Bird	Threatened
Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	Bird	Endangered
Orange Swallow Moth (<i>Moth Rhodoecea</i>)	Butterfly	Threatened
Midland Clubtail (<i>Gomphus fraternus</i>)	Dragonfly	Endangered
Cobra Cubtail (<i>Gomphus vastus</i>)	Dragonfly	Special
Skillet Cubtail (<i>Gomphus ventricosus</i>)	Dragonfly	Special
Spine-crowned Cubtail (<i>Gomphus abbreviates</i>)	Dragonfly	Endangered
Stygian Shadowdragon (<i>Neurocordulia</i>)	Dragonfly	Special
Tule Bluet (<i>Enallagma carunculatum</i>)	Dragonfly	Special
Riverine Cubtail (<i>Stylurus amnicola</i>)	Dragonfly	Endangered
Clubtail Dragonfly (<i>Stylurus spiniceps</i>)	Dragonfly	Threatened
Ocellated Darner (<i>Boyeria grafiana</i>)	Dragonfly	Special
Zebra Cubtail (<i>Stylurus scudderi</i>)	Dragonfly	Endangered
New England Bluet (<i>Enallagma laterale</i>)	Dragonfly	Special
Brook Snaketail (<i>Ophiogomphus asperses</i>)	Dragonfly	Special
Brindle Shiner (<i>Notropis bifrenatus</i>)	Fish	Special
Longnose Sucker (<i>Catostomus catostomus</i>)	Fish	Special
Shortnose Sturgeon (<i>Acipenser brevirostrum</i>)	Fish	Endangered
Burbot (<i>Lota lota</i>)	Fish	Special
Northern Redbelly Dace (<i>Phoxinus eos</i>)	Fish	Endangered
Triangle Floater (<i>Alasmidonta undulata</i>)	Mussel	Special
Creeper (<i>Strophitus undulatus</i>)	Mussel	Special
Adder's-tongue Fern (<i>Ophioglossum pusillum</i>)	Plant	Threatened
Algae-like Pondweed (<i>Potamogeton confervoides</i>)	Plant	Threatened
Barren Strawberry (<i>Waldsteinia fragarioides</i>)	Plant	Special

Table 3.2: Documented Rare Animals and Plants Found along the Scenic Byway — Continued

Species	Taxon	Rating
Black Maple (<i>Acer nigrum</i>)	Plant	Special Concern
Bristly Buttercup (<i>Ranunculus pensylvanicus</i>)	Plant	Threatened
Broad Waterleaf (<i>Hydrophyllum canadense</i>)	Plant	Endangered
Climbing Fumitory (<i>Adlumia fungosa</i>)	Plant	Special Concern
Downy Arrowwood (<i>Viburnum rafinesquianum</i>)	Plant	Endangered
Fragile Rock-brake (<i>Cryptogramma stelleri</i>)	Plant	Endangered
Frank's Lovegrass (<i>Eragrostis frankii</i>)	Plant	Special Concern
Gattinger's Panic-grass (<i>Panicum gattingeri</i>)	Plant	Special Concern
Giant St. John's Wort (<i>Hypericum ascyron</i>)	Plant	Endangered
Gray's Sedge (<i>Carex grayi</i>)	Plant	Threatened
Green Rock-cress (<i>Boechera missouriensis</i>)	Plant	Threatened
Hitchcock's Sedge (<i>Carex hitchcockiana</i>)	Plant	Special Concern
Large-bracted Ticktrefoil (<i>Desmodium cuspidatum</i>)	Plant	Threatened
Lily-leaf Twayblade (<i>Lipais liliifolia</i>)	Plant	Threatened
Long-styled Sanicle (<i>Sanicula odorata</i>)	Plant	Threatened
Low Bindweed (<i>Calystegia spithamea</i>)	Plant	Endangered
Michaux's Sandwort (<i>Minuartia michauxii</i>)	Plant	Threatened
Mountain Alder (<i>Alnus viridis</i> ssp.cCrispa)	Plant	Special Concern
Mountain Firmoss (<i>Huperzia selago</i>)	Plant	Endangered
Muskflower (<i>Mimulus moshatius</i>)	Plant	Threatened
New England Blazing Star (<i>Liatris scariosa</i> var. <i>novae-anglia</i>)	Plant	Special Concern
Nodding Chickweed (<i>Cerastium nutans</i>)	Plant	Endangered
Nodding Pogonia (<i>Triphora trianthophora</i>)	Plant	Endangered
Purple Clematis (<i>Clematis occidentalis</i>)	Plant	Special Concern
Putty-root (<i>Aplectrum hyemale</i>)	Plant	Endangered
Pygmyweed (<i>Tillaea aquatica</i>)	Plant	Threatened
Red Mulberry (<i>Morus rubra</i>)	Plant	Endangered
Roundleaf Shadbush (<i>Amelanchier sanguinea</i>)	Plant	Special Concern
Sand Violet (<i>Viola adunca</i>)	Plant	Special Concern

11.00). Rare wildlife data for these areas were collected from 1974 through 1998 and have been updated as recently as 2007. If a construction or development project is located within an Estimated Habitat and requires the filing of a Notice of Intent (NOI) under the Wetlands Protection Act, then the NOI and supporting materials must be forwarded to the NHESP for review before the project can proceed.

Priority Habitat areas delineate habitats for rare plant and animal populations protected under the Massachusetts Endangered Species Act (321 CMR 10.00). These areas indicate the approximate geographic extent of rare species populations taken from the NHESP database. These areas should also be used in conjunction with the Rare Species Threshold in the Massachusetts Environmental Policy Act (301 CMR 11.03(2)). Under this review process, all projects two acres in size or larger and occurring in a Priority Habitat should be reviewed by the NHESP. Priority Habitat areas are also used in conjunction with the Forest Cutting Act Practices Act.

The NHESP has documented a total of 74 significant species, including 31 rare and endangered species of animals and 43 rare and endangered species of plants, within the Byway corridor. The identity of the rare and endangered species found within each specific habitat area is not publicized in order to protect the individual plants and animals.

Each of these species has been assigned a rating by the NHESP that reflects the rarity and threat of that species within Massachusetts. There are three categories for rare and endangered

communities: “Endangered,” “Threatened,” and “Species of Special Concern.” “Endangered” species are native species that are in danger of extinction throughout all or part of its range, or which are in danger of extirpation from the state. “Threatened” species are native species that are likely to become endangered in the foreseeable future, or which are declining or rare. “Species of Special Concern” are native species that either have suffered a decline that could threaten the species if allowed to continue unchecked, or occur in such small numbers, or with such restricted distribution or specialized habitat requirements, that they could easily become threatened within the state.

Table 3.2 lists the 74 documented rare and endangered species within the Byway corridor and gives the NHESP sensitivity rating for each.

Table 3.2: Documented Rare Animals and Plants Found along the Scenic Byway — Continued

Species	Taxon	Rating
Sandbar Cherry (<i>Prunus pumila</i> var. <i>depressa</i>)	Plant	Special Concern
Sandbar Willow (<i>Salix exigua</i>)	Plant	Threatened
Shore Sedge (<i>Carex lenticularis</i>)	Plant	Threatened
Threadfoot (<i>Podostemum ceratophyllum</i>)	Plant	Special Concern
Tuckerman’s Sedge (<i>Carex tuckermanii</i>)	Plant	Endangered
Tufted Hairgrass (<i>Deschampsia cespitosa</i> ssp. <i>glauca</i>)	Plant	Endangered
Tradescant’s Aster (<i>Aster tradescantii</i>)	Plant	Special Concern
Upland White Aster (<i>Solidago ptarmicoides</i>)	Plant	Endangered
Variable Pondweed (<i>Potamogeton diversifolius</i>)	Plant	Endangered
Wall-rue Spleenwort (<i>Asplenium ruta-muraria</i>)	Plant	Threatened
White Adder’s-mouth (<i>Malaxis brachypoda</i>)	Plant	Threatened
Wood Turtle (<i>Clemmys insculpta</i>)	Reptile	Special Concern

Source: Natural Heritage and Endangered Species Program, June 2008.

Summary of Important Natural Resources and Features along the Scenic Byway Corridor

There are a number of natural resource features and sites of natural, environmental, and/or geological significance that offer important recreation and tourism opportunities. These resources contribute greatly to the scenic value of the Byway. However, these resources are also very sensitive, and could be degraded by development or tourism that occurs along the corridor. Public access to

Bald eagle nest with parents and eaglets at Bartons Cove in Turners Falls as seen from the FirstLight web cam.



these fragile areas should be managed to ensure their preservation. The significant natural resource sites within the Scenic Byway corridor are listed below by county with a brief description of each location. Many of these sites are also described in greater detail in the Recreational Resources or Tourism chapters of this Plan.

■ **North Quabbin Region**

makes up more than half of the eastern portion of the area surrounding the Byway. It includes the Byway towns of Athol, Orange, Erving, and Wendell. It contains dramatic scenery that was carved by glaciers thousands of years ago creating a series of north-south running hills, valleys, and ridges. The elevation in the region changes from over 1,600 feet to 210 feet above sea level. The region contains many ponds, lakes, and streams, which support diverse animal and fish populations, including trout. Because of the high water quality of the region, it is also home to the Quabbin Reservoir which supplies water to the Boston metropolitan region. The reservoir, located approximately 5 miles south of the Byway, is the largest man-made lake in Massachusetts providing many recreational opportunities.

■ **Millers River** closely borders the Byway through the towns of Erving, Wendell, Orange, and Athol. The Millers River meets the Byway at the border of Erving, Gill, and Montague as the road crosses the beautiful French King Gorge.

Between Athol and where it flows into the Connecticut, the Millers River contains at least four existing dams used for either flood control or hydropower purposes. This stretch of river is characterized by swiftly flowing water with frequent rapids. It is also home to a large variety of fish and bird species, including ospreys and blue herons, as well as other animals. Many of its tributaries support trout populations.



■ **French King Gorge** is at the scenic junction of the Connecticut and Millers Rivers located at the border of the towns of Erving, Gill, and Montague. This gorge was created by the scouring of glaciers and consequent erosion of the soft underlying rock by the Connecticut River. Visitors to the Byway can see magnificent vistas of the river and surrounding landscape from the French King Bridge as they drive over it.

Fortunately, this view has been protected through conservation easements on 660 surrounding acres, which were purchased by nonprofit organizations.



- **Connecticut River** is the largest river in New England, flowing between New Hampshire and Vermont, through Massachusetts and Connecticut, finally ending in the Atlantic Ocean. The Byway follows a stretch of it beginning in Greenfield, through Gill, and ending at the French King Gorge. In addition to beautiful scenery and a supportive habitat for many diverse species, the river also offers many opportunities for recreation, which are outlined in the Recreational Resources Chapter.
- The **Plunge Pools** are located on the Barton Cove peninsula. These semi-circular pools are surrounded by cliffs up to 60 feet high and were once the site of large waterfalls before the Connecticut River slightly changed its course to go around the waterfalls. The large pools are now popular fishing holes for large bass.
- **Barton Cove**, located on the Connecticut River between the towns of Gill and Montague, is a rocky peninsula that provides scenic views, as well as opportunities for boating, hiking, and camping. It is home to a Bald Eagles nest located on an island within the cove. The public can not only view the Bald Eagles at the cove, but they can also see them via a webcam at <http://www.Firstlightpower.com/eagles/default.asp>. Barton Cove also contains an abandoned dinosaur footprint quarry.

ISSUES AND RECOMMENDATIONS

Issues

- Approximately 23 miles of the Byway corridor have been designated as Estimated Habitat or Priority Habitat for rare and threatened animal and plant species. These habitats need to be protected from the potentially adverse impacts of increased vehicle traffic, tourism, and development along the Byway.
- Similarly, increased recreational and tourism-based access to the Byway's natural resources, including its rivers, streams, forests, and sensitive wildlife areas, could threaten the quality of these resources if access to these assets is not properly managed.
- There is the potential for growing conflicts between wildlife (such as bear, deer and coyotes) and humans if development, recreation, and tourism continue to expand within the Byway corridor.
- The Byway travels along two of New England's major rivers, the Millers River and the Connecticut River, through a very scenic rural landscape, and near premier recreational lands, yet no cohesive promotional effort has been made to attract vacationers, tourists and recreationists to the area.
- Threats to water quality in rivers along the Byway, e.g. road runoff and accidental hazardous material spills.

Recommendations

- Explore all public and privately-based options for permanently protecting open space, forests, and agricultural land along the Byway.
- As opportunities arise purchase conservation restrictions and/or Agricultural Preservation Restrictions (APR) from willing land owners.
- Individual towns may consider investigating the possibility of implementing zoning changes, such as creating a Corridor Overlay District, to protect sensitive habitats, preserve natural and scenic resources, and to focus new development into existing village center areas.
- Work with MassHighway to ensure that Scenic Byway road improvements incorporate best management mitigation techniques to treat road runoff before it is discharged into sensitive habitat areas or waterways.
- Work to develop/update hazardous material preparedness plans in the event of a hazardous materials spill.
- Expand opportunities for visitors to learn about the natural resources that can be enjoyed along the Byway. The Byway could be used as a vehicle to introduce the natural resources within the forests and parks system.
- Develop a promotional/educational campaign which focuses on the natural resources located along the Byway. This campaign should include ways to minimize the potential negative impacts of visiting natural areas, by respecting the land and "treading softly."
 - Include information to promote practices which minimize conflicts between humans and wildlife by educating visitors to control food waste and not to purposely feed the animals. This information could be provided to the public on signs located at pull-offs or other appropriate public areas along the Byway or in promotional materials or informational websites.
 - Create signs to educate visitors to stay on marked/established hiking trails.
 - Include information on the Millers, Connecticut and Green Rivers in this promotional campaign.
 - Incorporate this campaign to respect and protect the natural areas along the Byway while enjoying them into recreational tourism brochures and materials for the Mohawk Trail.
 - Local conservation and recreational groups should coordinate this effort with all appropriate agencies including but not limited to the Natural Heritage and Endangered Species Program (NHESP), Massachusetts Department of Conservation and Recreation, and the local Conservation Commissions.
 - Once brochures and other materials are developed, tourism-oriented businesses and visitor centers could distribute them to customers and visitors.
- Develop a cohesive promotional campaign that centers on the Millers and Connecticut Rivers and the surrounding resources.