SECTION 4

ENVIRONMENTAL INVENTORY AND ANALYSIS

The natural resources and scenic landscapes of the Town of Whately have been cherished by residents for generations. This Open Space and Recreation Plan is intended to help residents protect the town's scenic value and natural resources in the face of increasing development pressure, while recognizing that people need places to live, learn, work and play. These needs require infrastructure, such as homes, roads, power, water, and wastewater systems. These collective needs, in turn, both depend upon and have an impact on critical natural systems like the water cycle. One way to understand the impact of development on natural resources is to study the ecosystems of the town and the region.

An ecosystem is a concept that describes how living organisms (plants, animals and microorganisms) interact with each other and their physical environment (soil, climate, water, air, light, etc.). Ecosystems exist at different scales. A large forest can be an ecosystem and so can a decayed tree trunk. The integrity of ecosystems depends on the interdependent relationship between living beings and their environment. Wetlands, for example, are ecosystems consisting of plants and animals that depend on water from the surface and from underground. Wetland vegetation grows where soils are saturated by water for at least several weeks a year. This vegetation provides shade, food, and habitat for a wide variety of insects, birds, and fish.

Ecosystems provide a variety of "services" that are very important to human communities. Wetlands, for example, trap and remove sediments, nutrients and toxic substances from surface water. They store floodwaters during and after storms, preventing damage to public and private property, recharge water to groundwater aquifers, and retain it during droughts. These functions are vulnerable to the impacts of land development. Construction in and around wetlands not only displaces the animals that depend on this ecosystem; it may also result in increased flooding, storm damage, and reduction in the quality and quantity of drinking water. Whately residents need to understand the impact of their actions and land uses on the environment and on their quality of life as they analyze their open space and recreational resources and needs.

The information provided in this section explores the biological and physical components of the town's ecosystems. These components include soils, surface and ground water, vegetation, fisheries and wildlife. The subsection entitled *Geology, Soils, and Topography* provides a general understanding of the ways different soil characteristics can impact land use values. *Landscape Character* provides an overall scenic context of the farms and forests in the Town of Whately. *Water Resources* describes all of the water bodies in town, above and below ground, including their recreational value, public access, and any current or potential quality or quantity issues. In the subsection *Vegetation*, plants found in Whately's forests,

farmland, and wetlands are documented. In *Fisheries and Wildlife*, wildlife, habitat, special corridors, and rare, threatened, and endangered species are discussed. Whately's *Scenic Resources and Unique Environments* are identified. Finally, *Environmental Challenges* addresses current and potential problems that may influence open space and recreation planning.

Decisions relating to open space and recreation planning should take into consideration the inherent suitability of a site for different uses. Geology, soils, and topography are essential in determining potential sites for future residential, commercial, and industrial development and for new parks, hiking trails, and open space.

A. GEOLOGY, SOILS AND TOPOGRAPHY

The characteristics of a community are often greatly affected by its geology, topography, and soils. Whately's eastern topography is a level plain extending from the Connecticut River to the Mill River. Level land is traditionally more easily developed than land with steep slopes. This explains why Whately's current developmental layout has agricultural, industrial, commercial, and residential uses primarily located in the more level, low-lying areas of town. Additionally, the predominance of hilly terrain in the western half of town has helped to sustain the current quality of natural resources in Whately. The town's rugged terrain in this area provides a constraint to widespread residential development. For these reasons, Whately's geology, topography, and soils have played an important role in the town's past development and will continue to influence its future.

The geological history of the region and the mountains surrounding Whately begins about 220 million years ago during the Triassic Period when a huge fault system running north and south appeared as the earth's crust stretched. Over the next forty million years, the land west of the fault sank as molten magma erupted from the crust to cover the valley floor. Dinosaurs came and went as the climate of the region shifted between moist woodlands and arid desert. The most recent formation of the Connecticut River Valley did not occur until the last glaciation in New England 25,000 to 18,000 years ago. During the last glaciation, an ice sheet over a mile thick gouged its way across the landscape. As it melted 18,000 to 13,000 years ago, meltwater streams from the receding glacier deposited sands and gravels in its wake.[1]

Between 15,000 and 11,000 years ago, a temporary dam of glacial debris near the present location of Rocky Hill, Connecticut created a glacial lake fed by meltwater streams. Lake Hitchcock stretched from Rocky Hill to southern Vermont. The melt waters deposited materials into the lake, creating deep layers of silts and clays in the central portion of the lake, with sands and gravels along its edges. After the dam broke, the remaining flow began to channel into the lake bottom. That meandering channel became the Connecticut River.

The Connecticut Valley Lowland falls within a down-faulted rift basin formed during the Mesozoic Age, characterized by Jurassic and Triassic arkosic sandstones and mudstones intermixed with basaltic lava flows. In the Lowland region, preglacial streams cut deep channels into the soft

[1] Information for this section was adapted from the book Dinosaurs, Dunes and Drifting Continents: The Geohistory of the Connecticut Valley by Richard D. Little.

sedimentary rock. During the most recent glaciation, a layer of till was deposited directly over the bedrock. Later, while the glaciers were melting, large quantities of meltwater were discharged. In some places, the meltwater streams eroded the till and deposited glaciofluvial sand and gravel to form artesian aquifers.

The Western Highland is composed of Ordovician, Silurian, and Devonian Age detrital and carbonate rocks which were subsequently folded and faulted during tectonic episodes. Unconsolidated materials, especially in areas where rock outcroppings are absent, are usually the result of deposits of glacial till—a dense mixture of clay, silt, sand, gravel, and boulders.

The topography of the western half of Whately is rugged and hilly, with narrow, steep-sided stream valleys due to the erosion-resistant nature of the underlying bedrock. The Town of Whately is located in the Connecticut Valley Lowland and the Western Highland sections of the Connecticut River Region. The West Brook and its tributaries eroded the surrounding hills over the millennia to produce the deep valley through which the brook still travels. The surrounding mountains within Whately include Mount Esther (elevation 980 feet), Chestnut Mountain (elevation 770 feet), and four hills south of Williamsburg Road in the southwestern corner of town, each with an elevation of over 1,000 feet.

A.1 Soils

Soil is the layer of minerals and organic material that covers the rock of the earth's crust. All soils have characteristics that make them more or less appropriate for different land uses. Scientists classify soils according to their characteristics, which include: topography; soil structure, particle size, stoniness and depth to bedrock; drainage or permeability to water, depth to the water table and susceptibility to flooding; behavior or engineering properties, and biological characteristics such as the presence of organic matter and fertility *(Natural Resource Inventory for Franklin County,* University of Massachusetts Cooperative Extension; 1976). Soils are classified and grouped into associations that are commonly found together.

Many communities in the Connecticut River Valley are aware of the value that soils play in determining which land is considered prime for agriculture. Agricultural land is treasured in the Town of Whately, and represents 20 percent of the entire land area. Forestland is also extensive in Whately, covering 66 percent of the community. According to the U.S. Department of Agriculture's *Soil Survey: Franklin County, Massachusetts* published in 1967, the three main soil associations in Whately are the Hadley-Winooski-Limerick association in the Connecticut River Floodplain, the Hinckley-Windsor-Merrimac association in the Connecticut Valley Lowland, and the Westminster-Colrain-Buckland association in the Western Highland.

The soils in the Connecticut River floodplain are silty flood deposits on varved clay. Over the centuries, flooding has deposited ten or more feet of the well-drained silty soils on glacial Lake Hitchcock's clay layers, creating some of the most productive agricultural soils in the world. Many of these soils are Prime Farmland soils and contain the best combination of physical characteristics for producing food, feed, forage, fiber, and oilseed crops. In addition, the soils are highly permeable and are not stony so they are easily worked. This area of Whately has been extensively farmed and is highly productive, yielding cash crops that include corn, tomatoes, cucumbers, carrots, winter squash, tobacco, berries, and nursery plants. The flat,

well-drained character of these soils also makes them attractive to residential and commercial development.

The soils in the Connecticut Valley Lowland, the Hinckley-Windsor-Merrimac association, were formed in water-sorted materials like glacial outwash. These soils are usually located in valleys, on nearly level to rolling terraces, deltas, kames, and eskers, which are all land formations created through glacial movement thousands of years ago. The large percentage of sand and gravel in these soils means that water can permeate through the surface layers easily, creating important groundwater recharge areas. These soils are often suitable for agriculture with droughtiness their only limitation. Soils in this association are used for dairying and vegetable crops, as well as for residential, commercial, and industrial development.

The upland soils of Whately fall into the broad soil group classification called Westminster-Colrain-Buckland association. These soils are found on rolling to steep rocky hills and in narrow valleys. The Westminster soils are generally shallow, on steep slopes, and have many rock ledges. They are the predominant soils found on the moderate to steep forested slopes in the Town of Whately. The Colrain soils are deeper, well drained, and are found on gentler slopes. The Buckland soils are moderately drained. This soil association supports dairy farming and apple orchards, as well as woodlands. Within this soil association, development is often severely restricted by poor drainage, depth to bedrock, and steep slopes. Only the Colrain soils offer a moderate limitation for development of septic systems, if slopes are not over 15 percent.

The University of Massachusetts, Department of Forestry and Wildlife Management, in cooperation with State and Federal conservation agencies, developed a methodology for determining which soils provide the best conditions for growing timber or other forest products. This consortium produced a research bulletin on this methodology in October 1985 entitled, "Prime Forestland Classification for Forest Productivity in Massachusetts." By assigning productivity values for both white pine *(Pinus strobus)* and northern red oak *(Quercus rubra)* to different soils throughout the State based on associated land characteristics including slope, aspect, and moisture levels, the researchers were able to determine which soils could be considered prime for forestland. They developed nine different productivity categories including Prime 1, 2, and 3, Statewide Importance, Local Importance, and Unique. Prime forestland soils support a production of wood fiber at a rate greater than eighty-five cubic feet per acre per year. Only forestland with Prime 1, 2, and 3 soils is worthwhile to manage intensively for wood products. Soils of statewide and local importance also have the potential for producing wood products but the possible financial return of such production is not as high.

By comparing the list of Prime (1, 2, and 3) forestland soils in the Prime Forest Classification research bulletin (MacConnell et al.; 1985) to the soil survey maps for the Town of Whately, it is possible to identify the areas in Town that contain prime forestland soils. Much of Whately's forests are on prime forestland soils in the Western Highland area. In fact, 4,118 acres, or 45 percent of the forest, was on prime forestland soils in 1985.

Prime forestland soils are not the only criteria for choosing land to manage for timber production. Three other important factors to consider include the forest's condition, its access,

and its slope. Ultimately, determining which lands to manage for timber requires an on-the-ground analysis of all of these factors.

Please note that the map "Prime Farmland and Development Constraints" at the end of this section displays available GIS information that typically reflect soil characteristics: slopes over 25 percent grade (depth to bedrock), prime farmland soils (slope, organic matter content, and permeability), wetlands (depth to groundwater and slope) and areas that produce constraints to development including protected lands and the first 100 feet of the Rivers Protection Act zone. The US Natural Resources and Conservation Service (NRCS) has yet to complete digital soils mapping for Franklin County communities. Therefore, this map, which reflects soil attributes rather than identifying the actual locations of soil types, must suffice for the purposes of the Whately Open Space and Recreation Plan.

B. LANDSCAPE CHARACTER

Despite increasing development on former agricultural lands, the farming tradition remains strong in Whately. The land continues to be cultivated as it has been since Native Americans settled here thousands of years ago. Woodlands blanket the Western Highland area. These farmlands and large contiguous blocks of forest are among the most significant features that define the character of the Town of Whately and each is discussed in detail below. (*See the Scenic Resources and Unique Environments Map at the end of this section. Also refer to subsection F below, of the same name, for more detailed information on these features.*)

B.1 Farmland

There are 2,687 acres of cropland and pasture in the Town of Whately, according to the MacConnell Massachusetts GIS Land Use Coverage data for 1999 *(see Tables 3-9 and 3-10 in Section 3, D, Growth and Development Patterns*). The soil suitability and the topographical characteristics of the landscape determine the locations of these two farmland uses. As mentioned earlier, cropland is located where the topography is more level, and where the soils have a higher silt content. In Whately, cropland spans across most of the lowland area, between the Connecticut River and the valley walls. Farmland is also found along Masterson Road, Jimmy Nolan Road, Conway Road, and in scattered sites where glacial deposition has left rich soils with more gentle terrain.

In Franklin County overall, the number of farms is decreasing as is the land acreage devoted to farming. Between 1997 and 2002, the number of farms decreased by 14 percent, down from 679 farms to 586. Acreage devoted to farming in Franklin County declined by 8 percent, from 81,121 acres in 1997 to 74,281 acres in 2002. In the state of Massachusetts, the number of farms has declined 17 percent between 1997 and 2002, from 7,307 farms to 6,075. The acreage devoted to farming also declined by 10 percent, from 577,637 acres in 1997 to 518,570 acres in 2002.

Development pressures threaten to further reduce the acreage that is dedicated to farming in Whately. Residential development along existing roads and on large lots is consuming farmland at a fast pace and is causing conflicts between farms and non-farming areas.

B.2 Large Blocks of Contiguous Forestland

Another important natural resource that defines the character of the Town of Whately and the region are the large blocks of contiguous forests. In 1999, forestland accounted for 66 percent of the total land area of the Town of Whately, according to MassGIS data. Much of this forestland is located on peaks and ridges formed as the result of millennia of geologic activity, climatic change, and human influence.

Large blocks of contiguous forestland that are not traversed or fragmented by paved roads, wide rivers, development, or by open fields are important regional resources for several reasons. Two of the most important things that result from protecting forestland are maintaining the long-term integrity of wildlife habitats and water quality within the watershed's surface and ground waters. Wildlife species that require a certain amount of deep forest cover tend to migrate out of fragmenting landscapes like suburban residential developments. Forestland conserves water supplies by sustaining the soil's ability to receive precipitation and recharge ground and surface waters slowly. Woodlands and their changing foliage give residents gorgeous surroundings for hiking and other recreational activities. Forests clean the air and provide cool air currents in warm months. Larger blocks of forest are more suitable for active forest management as well.

C. WATER RESOURCES

Extensive water resources are another of the unique features that define the rural character of the Town of Whately. Watersheds are the areas of land that drain to a single point along a stream or river. Sub-watersheds contain first and second order stream tributaries. These are the most extensive component of any watershed. They are also the most sensitive to land use, both the negative impacts of runoff and the positive effects of forest cover. The entire Town of Whately is located within the Connecticut River Watershed. Two sub-watersheds, for the Mill River and West Brook, also drain to the Connecticut.

It may be difficult to imagine running out of water in Whately with all of its bountiful water resources. However, water moves within a watershed in a particular way called the hydrologic cycle. Precipitation delivers water in the form of rain, sleet, or snow to the watershed's surfaces. This precipitation collects on vegetation, slowly entering the soil, or drains off of less permeable surfaces. The water in the soil is called groundwater. The groundwater flows downgradient, and sometimes enters small and large streams. Groundwater can also enter channels in the bedrock or sections of gravel and sand that represent large bodies of water underground. These underground bodies of clean drinking water are called aquifers.

Aquifers are replenished by precipitation, groundwater, and by rivers and streams. The quality and quantity of the area's drinking water can therefore be sustained by three main actions. First, identify the recharge area for the community drinking water supply and enact land use regulations that manage development in that area. Second, identify and then seek to minimize the amount of impervious surfaces within the recharge area. Impervious surfaces, such as asphalt, prevent precipitation from permeating into the soil, entering the groundwater, and

recharging the aquifers. Third, ensure that rivers and streams within the watershed are free from contamination through regular monitoring. The following subsections contain information on the quality of the water resources within the watersheds, rivers, streams, wetlands, and aquifers in the Town of Whately. *(See also the Water Resources Map at the end of this section).*

C.1 Watersheds and Surface Waters

C.1.1 Connecticut River Watershed

The Connecticut River Watershed is the largest river ecosystem in New England and spans four states, including Vermont, New Hampshire, Massachusetts, and Connecticut. From its beginnings on the Canadian border to its end in Long Island Sound, the Connecticut River drains a landscape that is 11,000 square miles in size and 410 miles long. The river drops 2,400 feet from its source to the sea and is one of the most developed rivers in the Northeast. It enters Massachusetts through the Town of Northfield and flows through forty-five communities before entering the state of Connecticut. The watershed is 80 percent forested, 12 percent agricultural, 3 percent developed, and 5 percent wetlands and surface waters.

The Connecticut River forms the Town's eastern boundary. Years of deforestation, industrialization, and widespread dumping have taken their toll on the river's water quality, resulting in a mass disruption of ecological processes. The effects are more pronounced in the urban sections of the river, although pollution and erosion are concerns in all areas of Franklin County. In recent years, the water quality of the Connecticut River has improved. Fish and wildlife that virtually disappeared from the region twenty years ago have begun to return, including the Atlantic salmon, American shad, the peregrine falcon, and the bald eagle. Nonetheless, present threats to the river are many. These threats include increased development resulting in nutrient and heavy metals loading, and hydroelectric generation as it relates to fisheries and bank erosion. In addition, there are documented toxic and bioaccumulative effects on fisheries resulting from historic discharges or waste sites (Massachusetts Department of Environmental Protection, *Connecticut River Watershed Assessment and Management Report;* March 1995).

In 1999, President Clinton declared the Connecticut River one of ten American Heritage Rivers in the United States. Under the American Heritage River Program, communities within the Connecticut River Watershed enjoy special access to Federal programs that will help to conserve, protect, and enhance the resources of the watershed. To coordinate and administer the various fisheries and wildlife programs taking place within the watershed, the Silvio O. Conte National Fish and Wildlife Refuge (Conte Refuge) was formed by an act of Congress in 1991.

The Connecticut River includes riparian habitats for various fisheries. American shad, blueback herring, and shortnose sturgeon spawn within this stretch of the river. In addition, there are over 30 rare plant and animal species found within this habitat area (U.S. Fish and Wildlife Service, *Final Environmental Impact Statement: Silvio O. Conte National Fish and Wildlife Refuge;* 1995).

There is no public access to the Connecticut River in Whately at this time. The Connecticut River offers a wide variety of untapped recreational opportunities, ranging from wildlife viewing and canoeing to fishing and camping, and has the potential for being a recreational greenway. The Connecticut River also represents a wildlife corridor for anadromous fisheries as well as for mammals like the bobcat and moose that may use the riparian forests to move between habitat areas.

The water quality of a river or lake fluctuates periodically along with surface runoff trends and other factors; therefore water quality must be periodically measured to look for trends. Water that is determined to be safe for one use may be unacceptable for another purpose or species. Pollution occurs in many different forms and can impact the natural environment in many ways. Point source pollution is broadly defined as any discernible, confined and discrete conveyance from which pollutants may be discharged and can be easily identified and managed. Non-point source (NPS) pollution is contaminated runoff that is deposited into surface and ground waters. NPS pollution is caused by rainfall or snowmelt that flows over the surface of the landscape, picking up and carrying away natural and human-made pollutants and depositing them into lakes, rivers, wetlands, and groundwater aquifers. Non-point sources of pollution are harder to identify and, thus, to remedy. There are four main sources of NPS pollution: sediments, nutrients, toxic substances and pathogens. NPS pollution loads are closely associated with land use types, particularly agricultural and industrial uses. Loss of wetlands and increases in impervious surfaces also contribute to increases in polluted runoff from NPS sources. Erosion along riverbanks is a major source of sedimentation that can have a negative impact on water quality.

The Connecticut River has a Class B designation from the New Hampshire-Vermont border south to Holyoke, and is classified as a warm water fishery. Class B waters are supposed to provide suitable habitat for fish and other wildlife, and to support recreational activities such as fishing and swimming. The water should also be suitable for irrigation and other agricultural uses. The Connecticut River Forum report *The Health of the Watershed,* published in January 1998 by the New England Interstate Water Pollution Control Commission (NEIWPCC), listed bioaccumulation and toxicity as specific water quality issues for the entire length of the Connecticut River in Massachusetts, and specifically identified polychlorinated biphenyls (PCBs) in fish as a problem. Also in 1998, the Massachusetts Department of Public Health (DEP) issued a public health advisory for certain species of fish contaminated by PCBs in the Connecticut River (Department of Environmental Protection, *Commonwealth of Massachusetts Summary of Water Quality;* 1998). The advisory recommended that the public not eat any of affected fish species, which include channel and white catfish, American eel, and yellow perch. It also advised pregnant women and nursing mothers not to eat any fish from the Connecticut River.

Published water quality information for the Connecticut River is limited. There is a paucity of current, comprehensive water quality sampling data for the main stem of the Connecticut River due to a severely curtailed DEP water quality monitoring program. Monitoring and follow-up investigations regarding the source and extent of pollutants are urgently needed. There are numerous point sources of pollution along the Connecticut River such as wastewater treatment plants and industries with National Pollution Discharge Elimination System (NPDES) permits. While a listing

of NPDES permit holders exists, there is no published analysis of the water quality testing required to be conducted by the permit holders. In addition, many point sources of pollution have permits that have expired (DEP; March 1995). Clearly, additional water quality testing and an evaluation of existing NPDES permits testing results is needed to determine the health of the Connecticut River ecosystem and to better identify which uses along the river may affect its water quality.

A 1998 publication issued by the U.S. Geological Survey (USGS), *Water Quality in the Connecticut, Housatonic, and Thames River Basins* (USGS Circular 1155), as part of the National Water Quality Assessment Program, identified various pesticides used by agricultural operations as NPS pollutants in the Connecticut River in Franklin County. While current drinking water standards were not exceeded in the river, the report noted that existing drinking water standards do not include some pesticides detected in the river or their breakdown products. In addition, the current drinking water standards do not consider the cumulative impacts of more than one pesticide in the water. As a result, the actual health risks posed by the river's current water quality is uncertain.

C.1.2 Mill River Sub-Watershed

The Mill River Sub-Watershed is located in Conway, Deerfield, Whately, Hatfield, Williamsburg, and Northampton. Seventy (70) percent of the watershed is forested, 17 percent is agricultural, and 7 percent is residential. The Mill River has five main tributaries, two of which have water supply reservoirs (West Brook and Roaring Brook). In the Town of Whately, the West Brook is dammed for the Northampton Reservoir and experiences no-flow conditions during dry periods. Roaring Brook is dammed in Conway and Whately and the water used for the Town of Deerfield. From its headwaters in Conway, the Mill River first flows southeast, then south through Deerfield, Whately, and Hatfield to the confluence with the Connecticut River. The topography of the watershed is rugged at the headwaters in Conway's uplands and along the banks of three tributary streams in the highlands. The other two tributaries flow into the Mill River over the Connecticut Valley Lowlands. Once the Mill River reaches the plain of glacial Lake Hitchcock, the topography is flat and the river slows to meander across the landscape. Glacial deposits of till, sand, and gravel dominate the geology. The total river length of the Mill River is listed as 24.6 miles.

Although the northwestern region of the sub-watershed is rural and forested, a significant portion is influenced by adjacent agricultural, residential, and commercial development, as well as channelization and the Interstate 91 transportation corridor. The disruption of habitat and vegetation, with the influence of stormwater runoff on water quality, poses fundamental threats to the ecological viability of this system. Water quality is poor in the two tributaries that drain across agricultural parcels in the Connecticut Valley Lowlands (DEP, *Connecticut River Basin 1998 Water Quality Assessment Report).* The Mill River has been designated a Class B river by the DEP with support of aquatic life and aesthetics, even though trash and debris in localized areas have caused an "Alert Status" to be issued. Fish consumption, primary contact (swimming), and secondary contact (boating) uses have not yet been assessed.

The Mill River supports a diverse population of wildlife, along with federally listed endangered species and several state listed species of special concern. The main stem of the Mill River contains one of the most significant, viable populations of the dwarf wedgemussel *(Alasmidonta heterodon)*

in the country. The river corridor also supports two other state listed rare freshwater mussels as well as a dragonfly and two state-listed plants. In addition, the Smith College Environmental Science and Policy Program documented 22 species of fish in 1998. As part of the Anadromous Fish Restoration Project, hatchery reared salmon fry are stocked in the Mill River and its tributaries.

In addition to providing habitat for wildlife species, surface water and groundwater is withdrawn from the Mill River sub-watershed by six public water suppliers, as the Mill River overlies an aquifer system with a high yield of between 25 – 1,000 gallons per minute. An important consideration in this watershed includes water withdrawal permits. The South Deerfield Water District has applied to MA DEP to increase its water withdrawal rate and has signed a consent decree to quantify water use and perform a hydrologic study of effects on the stream where the well is located. In addition, UMass and Smith College researchers are providing ecological assessments on this tributary (Rhodes and Sanders; 2000). The Mill River has an active watershed group which has addressed a number of issues in recent years. In Whately, where erosion of the river bank has threatened the Whately public water supply wells, a bank stabilization project has been implemented (DEP; 1998).

Another issue of concern for the Mill River is dam safety. Downstream from Whately, the Hatfield Dam has been rated by the Department of Conservation and Recreation (DCR) Dam Safety Group as "at risk of failure." Breaching the dam will result in the loss of critical wetland habitat, especially for the endangered freshwater mussels. A study to determine the impacts of repairing, breaching, or upgrading the dam with a fish ladder needs to be implemented.

C.2 Surface Waters and Wetlands

Brooks and other surface waters also play an important role in Whately. Within the Connecticut River Watershed, there are numerous named and unnamed streams in Whately that drain the upland hills and the low-lying floodplains. The Mill River has numerous streams or tributaries in town including West Brook, Roaring Brook, Esther Brook, Mitchell Brook, Jimmy Nolan Brook, Potash Brook, and Ground Brook. The small streams and brooks in Whately provide the community with a diversity of wildlife and fisheries habitats, scenery, and recreational opportunities.

Wetlands help ensure good water quality. The U.S. Fish and Wildlife Service's 2000 National Wetlands Inventory has estimated that in Whately there are approximately 1,500 acres of forested wetlands, 53 acres of nonforested wetlands, and 321 acres of surface water in 1997. Wetlands represent unique and special habitats that help maintain biological diversity and often provide critical habitat for threatened and endangered species. Both inland wetlands and floodplains are important natural resources that are of tremendous value to the community. They provide flood storage and control, and pollution filtration. In Whately, the large tracts of forested wetland areas are found in the eastern half of town, in the Connecticut Valley Lowlands.

Historically, wetlands have been viewed as unproductive wastelands, to be drained, filled and "improved" for more productive uses. Over the past several decades, scientists have recognized that wetlands perform a variety of extremely important ecological functions. They

absorb runoff and prevent flooding. Wetland vegetation stabilizes stream banks, preventing erosion and trapping sediments that are transported by runoff. Wetland plants absorb nutrients, such as nitrogen and phosphorus, which would be harmful if they entered lakes, ponds, rivers and streams. They also absorb heavy metals and other pollution. Finally, wetlands are extremely productive, providing food and habitat for fish and wildlife. Many plants, invertebrates, amphibians, reptiles and fish depend on wetlands to survive. Wetlands have economic significance related to their ecological functions. It is far more cost-effective to maintain wetlands than build treatment facilities to manage stormwater and purify drinking water, and wetlands are essential to supporting lucrative outdoor recreation industries including hunting, fishing and bird-watching.

In recognition of the ecological and economic importance of wetlands, the Massachusetts Wetlands Protection Act is designed to protect eight "interests" related to their function: public and private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, land containing shellfish, fisheries, and wildlife habitat. To this end, the law defines and protects "wetland resource areas," including banks of rivers, lakes, ponds and streams, wetlands bordering the banks, land under rivers, lakes and ponds, land subject to flooding, and "riverfront areas" within two hundred feet of any stream that runs all year.

Local Conservation Commissions are responsible for administering the Wetlands Protection Act. The Wetlands Protection Act requires a permit for any alteration of wetland areas or for any landscape disturbance within 100 feet of bordering vegetated wetlands if a local Conservation Commission concludes that such activity will alter a resource area (wetland or waterbody). Permits are also required for landscape alterations within 200 feet of rivers and perennial streams.

The conversion of wetlands for development is a serious problem with high-priced consequences. Watersheds with degraded or destroyed wetlands experience substantially higher flood peaks. Moreover, wetlands replicated with engineered solutions do not function nearly as well ecologically as undisturbed natural wetland systems. Wetlands also provide vital habitat to a diverse range of wildlife including game species and songbirds. In addition, wetlands and other types of surface water are interconnected to groundwater and drinking water supplies. Due to this connectivity, the contamination of any one wetland in Whately could degrade the quality of the public drinking water supply. To prevent this, Whately could follow the example set by three other communities in Franklin County (Sunderland, Shutesbury, and Heath) and adopt local wetlands bylaws that would offer its wetlands more protection than the State's Wetlands Protection Act does on its own.

C.3 Aquifer Recharge Areas

Whately residents get their drinking water from private wells and springs or from public water supplies. The public water distribution systems in Whately and private wells pump water from underground. Usually a public distribution system that utilizes groundwater accesses a large volume of water from an aquifer; either large sand and gravel deposits or bedrock fractures. Underground aquifer levels are maintained by groundwater flow from aquifer recharge areas.

When rain falls in the area's hills, some of it ends up in the small streams that course down to the Mill or Connecticut Rivers, but much of it enters the groundwater. Protecting groundwater and aquifers from contamination by hazardous materials, sewage, salts, pesticides, and other pollutants is critical to maintaining the quality of both public and private drinking water sources.

Public water supplies are classified as either community or non-community sources. Community sources supply water to a public distribution system. A non-community source is one that serves twenty-five (25) people or more, such as a school, factory, campsite, or restaurant, and is not part of a public distribution system. These sources may be transient or non-transient, depending upon the usage period. Sources that are used for less than six months by specific people, such as campgrounds, are considered transient. Non-transient, non-community public water sources are those located at private locations where people stay for longer than six months.

The type of public water system determines the level of testing required by the Massachusetts Department of Environmental Protection. Transient, non-community water sources must test for coliform bacteria, sodium, nitrates, and nitrites, but not for pesticides. Non-transient, non-community water sources must test for a more extensive list of contaminants because people drink from these sources for longer periods of time. Community groundwater sources (i.e. wells) are required by the DEP to be thoroughly tested for a comprehensive list of organic and inorganic compounds including pesticides.

There are two community water supplies that serve residents and businesses in Whately. All other areas of Town are served by private wells or springs. The Whately Water District has two deep bedrock wells located off Haydenville Road that are pumped together to serve approximately 100 people, including 41 households and some commercial businesses. In 2001, the Whately Water District pumped approximately 3 million gallons of water for an average daily withdrawal of 8,000 gallons.

The second community drinking water supply source is operated by the Whately Water Department. The Whately Water Department has two wells located in the Mill River watershed that are screened in the same confined aquifer. Located between Chestnut Plain Road and Interstate 91, the wells are approximately 0.3 miles north of the Hatfield town line. The two wells are located approximately 40 feet from each other and are screened at depths of about 200 feet in a confined sand and gravel aquifer, known locally as the lower aquifer. Well #1 is a 6-inch diameter gravel-packed well and serves as the backup well for the Water Department. Well #2 is a 12-inch diameter gravel-packed well that serves as the main water supply. The DEP has established approved pumping rates of 100 gallons per minute (gpm) for Well #1 and 150 gpm for Well #2 and has an approved safe yield of 360,000 gallons per day. A thick layer of glacial lake clay lies above portions of the sand and gravel deposits of the lower aquifer. However, this clay layer is not of a uniform thickness and becomes thinner, especially along the flanks of the West Whately hills. Above the clay is the upper aquifer, a thin sandy gravel layer that varies from 1 to 25 feet in thickness. In 1983, this shallow upper aquifer, which served as water supply to numerous private wells in town, was found to be contaminated by the pesticides ethylene dibromide (EDB) and aldicarb (Temik). After an engineering study was completed, the Whately Water Department was formed and Wells #1 and #2 were developed in 1985.

The Massachusetts Department of Environmental Protection (MA DEP) prepared a study, *Source Water Assessment and Protection (SWAP) Report for Whately Water Department,* in 2002. Its conceptual Zone II delineation used modeling techniques that analyzed historic pumping tests and hydrological and geological surveys. This methodology was used instead of using a full capacity pumping test during an extended dry period based on the notion that the aquifer boundary would most likely exist between the low-yielding, bedrock till areas and the water bearing unconsolidated materials.

The delineated Zone II recharge area for Whately's Well #1 and #2 extends north along the Mill River in Whately and south into Hatfield, and includes the West Brook Delta. The majority of the Zone II lies within the Agriculture/Residential zoning district with a small area along State Road, west of Interstate 91, within the Commercial district. Approximately 1.5 miles of Interstate 91 and a small section of the railroad tracks are located within the Zone II recharge area as well. The aquifer's Zone III extends west into the sub-watershed for the West Brook and contains most of Whately, including the Interstate 91 corridor and the Great Swamp.

According to the MA DEP, Whately's wells are located in an aquifer with a high vulnerability to contamination. While a protective clay layer provides some protection to the aquifer from land uses in the wellfield itself, the confining layer of clay is not contiguous throughout the entire Zone II area. The clay layer is estimated to be thicker to the east and thinner to the west, where the upland highlands are. There is evidence that the clay layer "pinches out" to the west where much of the aquifer is likely to occur. Recharge primarily enters the aquifer along the edges of the valley and in areas north of the wells. Due to the absence of a complete hydrogeologic barrier which can prevent contamination from the ground surface, the aquifer is considered vulnerable.

According to the DEP's 2002 Source Water Assessment Program (SWAP) Report, Whately's Water District is ranked "moderate" in terms of susceptibility to contamination. Key land use issues that could lead to contamination in the district include a nonconforming Zone I which allows for passive recreation and is not wholly owned by the district, the presence of residential homes near the wells, and the location of septic systems within the wells' Interim Wellhead Protection Area (IWPA). These conditions could lead to the introduction of contaminants such as microbes, pesticides, and household hazardous wastes and chemicals. In addition, a transformer has been located near the town's wells which may threaten to pollute them with oil and possible PCBs.

The 2002 SWAP report for Whately wells' Zone II recharge area also identified a number of potential sources of contamination. Agricultural threats include forestry operation, nurseries, dairy farms, and farms with fertilizer and pesticide use. Commercial threats include the railroad tracks, a former gas station/body shop, and sand and gravel mining/washing. Residential threats are fuel oil storage, lawn care pesticides, and leaking septic systems. Miscellaneous threats include transportation corridors, electric line maintenance, and oil and hazardous waste sites. The DEP list of potential high-risk threats includes the railroad tracks, a former gas station/body shop, and seven farms that handle fertilizers and pesticides for storage and use. Each of these activities uses materials that present a potential risk to the continued high water quality in the aquifer, if potential contaminants are managed improperly.

Water from the Whately wells is treated to remove manganese and is then chlorinated before distribution. Water quality testing for the wells has periodically shown low levels of volatile

organic compounds, however, it is at concentrations well below drinking water standards. The Town of Whately, in conjunction with the Franklin Regional Council of Governments, developed a Local Wellhead Protection Plan which contains strategies to protect the quality of the drinking water supply and educate residents about the things they can do to help protect water quality.

C.4 Flood Hazard Areas

Flooding along rivers is a natural occurrence. Floods happen when the flow in the river exceeds the carrying capacity of the channel. Some areas along rivers flood every year during the spring, while other areas flood during years when spring runoff is especially high, or following severe storm events. The term "floodplain" refers to the land affected by flooding from a storm predicted to occur at a particular interval. For example, the "100-year floodplain" is the area predicted to flood as the result of a very severe storm that has a one percent chance of occurring in any given year. Similarly, the 500-year floodplain is the area predicted to flood in a catastrophic storm with a 1 in 500 chance of occurring in any year.

Flood hazard areas or floodplains located along the river corridors in Whately help to protect and regenerate public water sources. Stronger measures enacted to avoid some of the detrimental effects of building on Whately's flood plains may not be as effective in practice as anticipated. Development can still occur in flood prone areas. Special flood hazard areas are defined in the Town Code as those designated in the National Flood Insurance Maps as Community Panel 250132, Panels 1-7. Regulations affecting land uses in these special flood hazard areas may need to be evaluated and updated to help ensure an adequate quality and quantity of water.

D. VEGETATION

The soils and water resources in Whately create ecosystems that support a broad range of types of vegetation. The plants that are a critical component of these ecosystems convert solar energy into food, which supports all animal life. Plants cycle energy through the ecosystem by decaying, by removing carbon from the atmosphere and by shedding oxygen. Plants help moderate temperatures and act as shelter and feeding surfaces for herbivores, omnivores, and carnivores.

Plants and animals together make up *natural communities*, defined as interacting groups of plants and animals that share a common environment and occur together in different places on the landscape. Over the past decade, ecologists and conservationists in Massachusetts have devoted increasing effort to studying and protecting these natural communities, rather than focusing on individual species. This section and the following section will address both natural communities and their component species.

Whately is rich in a variety of plant life including coniferous and deciduous forests, meadows, cropland, wetlands, and riparian vegetation. Soil type, elevation, and climate largely determine the types of vegetation that exist. Approximately 66 percent of the total land area of the Town of Whately is forested. The forests in Whately are different from each other with respect to age, density, height and diameter, and species of trees in different locations within

the watershed, within the Town, and even on the slope of one hill in Whately. A diversity of plant species, temperatures, moistures, and colors are evident at different elevations in the West Whately hills. Of particular note is a large block of relatively unfragmented forest in the western portion of Whately that originates near Fitzgerald Lake in Northampton, and includes portions of Hatfield, Williamsburg, Conway and Ashfield. This important area has been targeted for protection by several organizations. The Nature Conservancy has identified this tract as a forest matrix focus area. In addition, this area is also a focus area of the Greater Mill River Watershed Coalition and one of only a handful of focus areas for the Forest Stewardship Program.

On a large scale, the dominant vegetation in Whately is characterized as mixed hardwood-softwood forest. For nearly one hundred and fifty years, the hills have been recovering from a sequence of clearing and heavy lumbering that had been the historical use of their landscape. Nearly all forest cover in Whately is considered to be second and third growth forest. This means that the most dominant trees present today are at least the second, and more likely the third, generation of trees that have grown in the same place. The first generation of trees is considered to have existed in Whately during the pre-Colonial period.

The mixed forest stands include northern red oak, hickory, red and sugar maple, white pine, and eastern hemlock. The softwood stands are predominantly white pine and eastern hemlock. The riparian corridors often have sandy flats along their banks, which support white pine and northern red oak. Younger tree communities in these areas are comprised of quaking aspen and white and grey birch. Occasionally eastern hemlock, yellow birch, and American beech (which typify the original northern hardwood forest type) are found on these sites. The upland areas of this type support coniferous species such as eastern hemlock in the moist sites with the drier sites dominated by hardwood species such as northern red oak, white ash, sugar maple, and white birch.

Vegetation along the banks of the Connecticut and Mill Rivers and their tributary streams provides several important benefits. Forested buffers of the rivers and streams purify water by filtering out harmful nutrients from road run-off and lawns, therefore reducing the amount of suspended solids and phosphates that enters the rivers. Vegetation also adds to the organic matter content of local soils, shelters and feeds wildlife, and cools water temperatures, which prevents the excessive growth of algae and aquatic vegetation. Vegetation also acts like a sponge that absorbs, holds, and slowly disperses water toward rivers. This function is particularly important during major storm events and the springtime thaw when flooding may be an issue.

Whately provides habitat for plant and wildlife species that are endangered or considered to be of special concern by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) and the Federal government. In recent years, the NHESP analyzed data on rare species and uncommon natural communities in Massachusetts. The BioMap project identified core habitat for rare terrestrial and wetland species. The BioMap information and mapping provided by NHESP are of particular importance for the town of Whately as it works to develop growth strategies that prioritize for protection critical tracts of unprotected open space necessary for preserving biodiversity and for sustaining surface and groundwater quality and quantity.

Whately contains several BioMap areas that NHESP has determined are the most critical to protect in order to maintain the biodiversity of the town, the region and the state. The Mill River runs through the middle of the town and is surrounded by BioMap core habitat. This area of BioMap core also includes the Great Swamp. There is another area of core habitat immediately east of the Mill River that includes an additional large expanse of wetlands, much of it the uncommon Black Gum – Pin Oak – Swamp White Oak "Perched" Swamp. The Great Swamp includes this uncommon plant community in several large fragments of the original distribution of this community type. This plant community is also present in the large wetland area between Long Plain Road and I-91. To the west of the Mill River is a large expanse of Supporting Natural Landscape (SNL) that serves to buffer and connect the BioMap core habitats. Since all three of these areas have very little permanently protected Open Space, these areas would be a good focus for protection efforts. By using the existing protected parcels and connecting and protecting separate pieces within the BioMap core and SNL, the viability of rare species populations will continue over the long term and the biodiversity in Whately will be maintained. The northwest region of town also contains an area of BioMap core habitat. This area includes the Northampton Reservoir and abuts the Conway State Forest to the north and west. The NHESP recommended that further biological inventory and study would benefit this area. The fourth area of BioMap core habitat are the riparian lands along the Connecticut River, north of Chestnut Plain Road.

The NHESP identified 241 native plant species as rare in the Commonwealth. Several rare species and uncommon natural communities have been documented in the Town of Whately. The rare plant species that are located in Whately are shown in Table 4-1. *(See also the Scenic Resources and Unique Environments Map at the end of this section.)* While these species may be small and relatively unknown, none should be overlooked since all play a crucial role in Whately's ecosystems. Permanently protecting the habitat areas of these species should be a top priority.

Table 4-1: Rare Plant Species and Uncommon Natural Communities Documented in the Town of Whately as of January 6, 2004

Scientific Name	Common Name	Status	Most Recent Year Seen
Vascular Plants			
Sanicula oderata	Long-styled Sanicle	Threatened	1934
Scirpus pendulus	Pendulous Bulrush	Unofficial Watch List	1977
Natural Communities			
Black gum-Pin Oak-Swamp White Oak "Perched" Swamp	Black gum-Pin Oak Swamp White Oak "Perched" Swamp		1993

Source: Massachusetts Division of Fisheries and Wildlife, NHESP; 2004. This list does not include data sensitive species.

E. FISHERIES AND WILDLIFE

Whately's landscape consists of an eastern lowland and a western highland region blanketed with forests of white pine, eastern hemlock, northern red oak, and mixed hardwoods with larges patches of cultivated fields, pasture, and a few developed areas along the transportation corridors. The region's wildlife travels across the landscape in patterns that disregard the

political boundaries of towns. Rivers, wetlands, forests, open meadows, croplands, and mountain ridges all provide sustenance, mating grounds, and cover to the wildlife who dwell within them. Whately's forests support a diverse mix of upland species that includes red and grey fox, snowshoe hare, bobcat, beaver, deer, porcupine, and black bear. Wild turkey, grouse, and birds of prey are also found in Whately's woodlands. The forests also provide a north-south corridor for moose and unconfirmed sightings of mountain lion have been reported. Since many species rely on different habitats during different periods of their life cycles, species diversity is greatest in areas where several habitat types occur in close proximity to each other. With this in mind, it is clear that the protection of all habitat types is vital for maintaining and enhancing biodiversity in Whately.

How does one determine the quality of the wildlife habitat in Whately and the most appropriate conservation strategies? There are three general paths to follow in conserving the health of wildlife populations. One way is to protect the habitats of specific species that are rare, threatened, or endangered. It is thought that protecting the habitats of these species will also benefit other species. A second path is to conserve certain landscape-level resources such as large contiguous forests or riparian habitats along rivers. This approach helps to conserve the habitats of a large number of species, but it might lose sight of some rare and endangered species. The third method is a combination of the first two. Conserving the long-term biodiversity of the Whately area requires efforts to protect unique habitats, networks of habitats that assist population dynamics, and landscape-level resources like large contiguous forest patches and riparian areas.

Recognizing the general areas where wildlife mate, feed, and travel is often the first step. Large blocks of forest with more than 185 acres provide interior forest habitats for a variety of birds and mammals, as well as protection of first and second order stream tributaries. Networks or greenways of protected forestland or vegetated riparian corridors are resources that help sustain populations of animals requiring diverse habitats over time and space. Whately is fortunate in that there is an unbroken corridor of forestland with some level of protection in the western part of town that extends from the town's southern border all the way up to the town's northern border. This corridor is a portion of the larger focus area discussed above. A portion of this corridor is permanently protected as the Whately Wildlife Management Area. It covers 274 acres in western Whately and abuts the Northampton Reservoir lands which have limited protection. The Audubon Society also maintains the 650-acre Graves Farm Wildlife Sanctuary, with 85 acres in Whately, along the southern border with Williamsburg. There are also other small parcels owned by the Valley Land Fund and a recent conservation restriction set up by the Hilltown Land Trust for land owned by Norman Graves. To the north, the 1,680-acre Conway State Forest links to the Reservoir lands so a significant wildlife corridor is established in the area. Whately's western hills and sparsely populated terrain contributes to the wildlife value offered by its permanently protected forestland.

Periodic logging of forestland can create early successional habitats favored by deer and certain bird species. The Massachusetts Division of Fish and Game (DFG) uses a percentage of the income derived from hunting and fishing licenses for the purchase of wildlife habitats and for important research into wildlife management. On some of its properties, the DFG reclaims old fields for the purpose of creating habitats for wildlife that require the young tree and shrub communities common to early successional landscapes. A number of forest landowners

in Whately are in the Chapter 61 Forest Classification and Taxation Program, which includes 1,192 acres as of April 2006.

The Town of Whately has the potential for sustaining wildlife species that require interior forest habitat atop its mountain ridges. Unfortunately, any areas that are traversed by roadways are considered to be fragmented by wildlife biologists and therefore should be removed from consideration as interior forest habitat. Large forest patches should be maintained with connecting greenways to the riparian corridors of streams and rivers. Protecting large tracts of forest will also help to protect the first and second order streams that feed the Connecticut and Mill Rivers and West Brook. This is especially relevant for those tributaries that are within the Zone II and Zone III recharge areas for Whately's aquifer. By protecting the Zone III recharge area to the aquifer, the Town of Whately will also be helping to maintain its community drinking water supply.

The Connecticut River and its tributaries play dual roles for the region's wildlife. Riparian corridors often contain a greater degree of species diversity than any other portion of the landscape. NHESP considers the riparian areas along the Mill and Connecticut Rivers to be critical habitats for endangered, rare, threatened species, or those of special concern.

The rivers also serve as important regional migration corridors. In 1996, the Conte Refuge sponsored a survey of migratory birds along the Connecticut River that revealed that 133 species, mostly woodland species, use the riverside habitat as a migratory corridor. The rivers also provide habitats for native freshwater fisheries as well as anadromous fish species.

The Connecticut and Mill Rivers have native freshwater fisheries and are being stocked with Atlantic salmon. Within the past few years, Atlantic salmon restoration work has been conducted each spring in the Mill River, and trout are stocked in various water bodies throughout the watershed. The Massachusetts Division of Fisheries and Wildlife stocks a variety of trout species, including non-native rainbow, eastern brook, and brown trout, for sport fishing in the Connecticut River and its tributaries. Resident fish species in the Connecticut River include walleye, channel catfish, northern pike, small and largemouth bass, and pickerel.

Anadromous fish species (defined as those which are born in fresh water, migrate to salt water where they mature, and then return to freshwater to spawn) include striped bass, sea lamprey, blueback herring, American shad, Atlantic salmon, and shortnose sturgeon. The Conte National Fish and Wildlife Refuge is responsible for restoring migratory fish to the Connecticut River Watershed and is funding a number of projects to enhance present fish populations.

Unfortunately, dams along the Connecticut River threaten many species—especially Atlantic salmon, blueback herring, and American shad—by blocking fish passage and altering natural river flows. During spawning season, fluctuating water releases sweep away fish eggs and larvae. Dams also have a detrimental effect on young fish and place stress on older fish that must constantly alter their feeding and resting areas due to habitat changes resulting from fluctuating flows. In addition, fish may be killed by turbines or stranded in isolated pools when high flow releases recede. Fisheries in the Massachusetts portion of the Connecticut

River Watershed are also threatened by sedimentation, erosion, toxicity, bacterial contamination, elevated stream temperatures, bioaccumulation, and low flow due to damming for hydroelectric operations.

The construction of fishways at key points on the Connecticut River has reduced some of the harmful effects of dams. Regular stocking has led to marginal populations of Atlantic salmon and increased populations of American shad. Lamprey eel numbers have also increased significantly, which indicates improving water quality throughout the Connecticut River Watershed and more efficient fish passage installations.

NHESP's Living Waters project identified habitat for freshwater species and exemplary freshwater habitat, as well as areas critical to the integrity of those habitats (Critical Supporting Watersheds). The Living Waters core habitats in Whately are located adjacent to the Mill and Connecticut Rivers. Living Waters core habitats include a 300-foot buffer from the water's edge to indicate areas critical for maintaining the integrity of freshwater habitats. Critical Supporting Watersheds were also delineated for Living Waters core habitats. These include land areas that contribute directly to the quality of core habitats. Therefore, NHESP recommends that the town pay special attention to projects proposed in these areas that may impact water quality and quantity (i.e., polluted stormwater runoff, an increase in impervious surfaces, large groundwater withdrawals, and sediment deposition in surface waters).

The NHESP has identified the rare species in Whately that depend upon the different habitats present in the town (Table 4-2). Permanently protecting the habitat areas of these species should be a top priority.

Table 4-2: Rare Species and Uncommon Natural Communities Documented in the Town of Whately as of January 6, 2004

Scientific Name	Common Name	Status	Most Recent Year Seen
Vertebrates			
Ambystoma jeffersonianum	Jefferson Salamander	Special Concern	2002
Ambystoma opacum	Marbled Salamander	Threatened	1995
Clemmys guttata	Spotted Turtle	Special Concern	1996
Invertebrates			
Desmocerus palliates	Elderberry Long-Horned Beetle	Special Concern	2002
Ophiogomphus asperses	Brook Snaketail	Special concern	1998
Alasmidonta heterodon	Dwarf Wedgemussel	Endangered, Federal Endangered	2001
Ligumia nasuta	Eastern Pondmussel	Special concern	2001
Strophitus undulates	Creeper (or Squawfoot)	Special Concern	2001

Source: Massachusetts Division of Fisheries and Wildlife, NHESP; 2004. This list does not include data sensitive species.

In addition to the list of rare species in Table 4-2, the NHESP also provided a detailed description of many of the rare species which are currently known to occur in the town of Whately. Both the Jefferson Salamander and the Marbled Salamander generally reside in upland hardwood forests within several hundred feet of wetlands or vernal pools, where

breeding occurs. The NHESP has documented areas in West Whately that provide habitat for these salamanders. The Spotted Turtle also uses upland areas for much of its life, including foraging for food and nesting, but the turtle is predominantly associated with wetlands and riparian zones. The NHESP has documented an area of the large wetland between Long Plain Road and I-91 that provides habitat for the Spotted Turtle.

The Shortnose Sturgeon, a Federally Endangered fish, uses several different habitats throughout the year. The sturgeons in Whately are part of the Connecticut River population that migrates predominantly between the Holyoke Dam and the lower Connecticut River and estuary in Connecticut.

Whately is also home to several rare state-listed freshwater mussels: the Eastern Pond Mussel, the Creeper (or Squawfoot), and the Dwarf Wedgemussel. The Eastern Pond Mussel lives in protected areas of lakes and in slack water areas of rivers. This species of mussel prefers slow-moving or still water and sand/sand-silt or gravelly substrates. Conversely, the Creeper prefers small streams and brooks, although it has been found in large rivers and occasionally in lakes and ponds. Most often, the Creeper mussel is found in cobble/gravel or sand/cobble/gravel substrate, sand and fine gravel. This mussel tolerates a range of flow conditions but is rarely found high-gradient streams. The Federally Endangered and State Endangered Dwarf Wedgemussel is never found in still waters; it prefers slow to moderate streams with little silt deposition. This species prefers well-oxygenated streams and rivers with sand/muddy sand, and gravelly substrates. According to the NHESP, all three of these rare freshwater mussels have been documented in the Mill River in Whately.

The Elderberry Long-horned Beetle is most often found in proximity to the leaves and flowers of elderberry bushes. The beetle lays its eggs on the leaves and stems of the plant, and once hatched, the larvae bore long burrows along the axis of the stem. The Brook Snaketail is a dragonfly found along small, clear streams that have a sandy bottom and a high to moderate gradient. The Mill River provides habitat for both of these species. The Longstyled Sanicle, a state-listed rare plant, has not been documented in Whately since 1934. This species inhabits rich mesic woods and thickets. Forest succession, development and habitat loss may have contributed to the loss of this species in town.

The Connecticut River and its adjacent riparian lands provide habitat to the following state listed species (Table 4-3).

Table 4-3: Priority Habitat In and Adjacent to the Connecticut River in the Town of Whately as of January 7, 2004

Scientific Name	Common Name	Status	Most Recent Year Seen
	Fish		
Acipenser brevirostrum	Shortnose Sturgeon	Endangered, Federally Endangered	1980
	Dragonflies		
Gomphus abbreviatus	Spine-crowned clubtail	Endangered	1996
Gomphus vastus	Cobra Clubtail	Special Concern	1997

Scientific Name	Common Name	Status	Most Recent Year Seen
Gomphus fraternus	Midland Clubtail	Endangered	1991
Stylurus amnicola	Riverine Clubtail	Endangered	1996
	Plants		
Elatine Americana	American waterwort	Endangered	2002
Eleocharis intermedia	Intermediate spike-sedge	Threatened	2002

Source: Massachusetts Division of Fisheries and Wildlife, NHESP; 2004.

F. SCENIC RESOURCES AND UNIQUE ENVIRONMENTS

The characteristics that allow a stranger to distinguish Whately from other towns in the region may be different than the unique qualities and special places that only residents can really know. This section identifies the scenic resources and unique environments that most town residents would agree represent the essence of Whately's character. In many ways the history of Whately—how people came to settle the land, use its resources, and enjoy its forests, streams, and bodies of water—can be seen in the landscapes that have retained a sense of the past. The unique environments in Whately play a very important role in providing residents with a sense of place. Brooks, mountains, wetlands, and village centers provide markers on the landscape within which we navigate our lives.

Scenic landscapes often derive their importance from their location relative to other landscape features. The unique environments inventories in this section include archeological and historic areas that also define the character of Whately. The purpose of inventorying scenic resources and unique natural environments in Whately is to provide a basis for setting priorities for resource protection.

F.1 Scenic Resources

In 1982, the Massachusetts Department of Environmental Management (now the Division of Conservation and Recreation) and the Nature Conservancy conducted a "landscape inventory" which classified rural landscapes of the Commonwealth's six physiographic regions. The three classes of scenic quality are Common, Noteworthy, and Distinctive. Together, Noteworthy and Distinctive landscapes are considered scenic. According to the report, the Pioneer Valley (of which Whately is a part) "covers the largest area of relatively unspoiled Connecticut River Valley scenery" and "contains more vestiges of the 18th century landscape than anywhere in the Commonwealth".

Distinctive landscapes are larger than one square mile and typically exhibit the following attributes (noteworthy landscapes have the same characteristics but are of lesser, nevertheless important, visual quality):

- Openness
- High relative relief (hills, mountains and valleys)
- Historic structures and land uses
- Agriculture

- Surface water
- Significant vegetation
- Important geological features
- Low population density
- Lack of contemporary development

Whately has a large number of historic, scenic, and recreational resources. These assets contribute significantly to the community's character and quality of life. The Town also contains a number of important habitat areas. The Scenic Resources and Unique Environments Map at the end of this section identifies the key locations for these various resources so that they can be better preserved and protected from development.

Included in this map are some of the historically significant sites in Whately such as the Pound and the Stockade. Burial grounds are important historic resources, and are often rich with genealogical data, town history, art, and monuments. The town has two Historic Districts, one in Whately Center and one in West Whately. In addition, the Historical Commission is working to establish another district along Christian Lane between River Road and the railroad tracks.

In many parts of Whately, historic landscapes blend with scenic viewsheds. Scenic roads, which overlap both, provide a way for residents and visitors to access these special places. The Town has designated several scenic roads, including: North Street, Haydenville Road and Chestnut Plain Road. Portions of Conway and Poplar Roads are also listed as scenic roads. The Historical Commission has proposed that Westbrook Road and the remainder of Conway and Poplar Roads also be designated as scenic roads.

Roads which are officially designated as local scenic roads afford some protection to the historic and scenic resources along its route. Once a road has received local scenic road designation, the local Planning Board must given written approval before any repair, maintenance, or construction of the road is permitted, if that activity would involve the cutting or displacement of trees or the removal of stone walls within the public right-of-way. The current and proposed scenic roads are shown on the Scenic Resources and Unique Environments Map.

F.2 Archeological Resources

A portion of one of the oldest archeological sites in the eastern United States is located within Whately's borders, attesting to the people who occupied the area for more than 10,000 years. This site, that straddles the Whately-Deerfield border, is called the DEDIC (Deerfield Economic Development and Industrial Corporation) site due to its location on the grounds of the Deerfield Industrial Park just southwest of Mt. Sugarloaf. It contains artifacts from the Paleo-Indians (Old Indians) who inhabited the area 9,000 to 12,000 years ago. A 1977 excavation of the site yielded nearly 2,000 artifacts and sufficient information to place it on the National Register of Historic Places. This designation affords limited protection from the adverse effects of federally assisted projects and state actions but in no way interferes with the property owner's right to alter, manage or sell the property when using private funds. Given

this fact, damage to the archeological find from insensitive land use decisions remained a possibility. To protect the priceless contents from vandalism and so that future study can be undertaken, the site was buried under twenty feet of fill. It lay undisturbed until investigations of one section of the site resumed in 1995. The profusion of artifacts recovered there indicates that Sugarloaf was a major Paleo-Indian encampment. The site now enjoys greater protection since the Massachusetts Department of Environmental Management (now the Department of Conservation and Recreation) purchased a 30-acre parcel in 1997. The exploration rights for the remainder of the site were granted to the University of Massachusetts (Gramly; 1998).

G. ENVIRONMENTAL CHALLENGES

A number of environmental challenges loom on the horizon for the Town of Whately including: the loss of farmland and fragmentation of large blocks of forested land; restoring and maintaining adequate streamflow; and water quality issues, including: erosion and sedimentation from new development, and maintaining and improving surface and groundwater quality. All of these problems are interrelated and all are the result of increasing population and development. In the coming years, the Town must contemplate what actions to take in order to resolve these pressing problems and plan for a future that preserves Whately's rich agricultural, cultural, and natural heritage.

G.1 Farm and Forestland Fragmentation

The population of Whately has been growing at a faster rate than in the state overall during the last thirty years. This has led to an ever-increasing demand for single-family detached housing in Whately. Most of this development has taken place on farm and forestlands. Taking other constraints into consideration, including wetlands and buffer areas to surface waters, 8,336 acres of land could still be developed in town. This is equal to 63 percent of the town. There is enough land in town to fit 5,916 more building lots. This means that 18,273 residents and 3,208 more school-aged children could live in Whately at some point in the future.

Many of the largest undeveloped parcels in town are also the most suitable for development and include farm and forestland with slopes under 25 percent which are not protected from development. These open and forested lands contribute most to the town's rural character and are owned by a handful of families. Their agricultural businesses maintain the landscapes as they are: pastoral, historic, and overall, simply breathtaking. Were these farm businesses to fail, the future of the farms and their families, as well as the rural character of the town itself, would be in jeopardy.

G.2 Maintaining Adequate Streamflow

The flow in Roaring Brook and West Brook, two tributaries of the Mill River, is severely impacted by upstream impoundments for public drinking water supplies. The state Water Resources Commission is currently in the process of setting streamflow standards and useful

information may come from this work[2]. The Town should initiate and maintain an ongoing dialogue with the state Department of Environmental Protection, which issues permits for drinking water supplies[3], the City of Northampton, and the Town of Deerfield to ensure that Whately's concerns about adequate streamflow are considered during permitting and operation of the water supply reservoirs.

G.3 Water Quality and Pollution

Water quality problems have been identified in both the Connecticut River Watershed and the Mill River Sub-Watershed. Years of deforestation, industrialization, and widespread dumping have taken their toll on the Connecticut River's water quality, resulting in a mass disruption of ecological processes. The effects are more pronounced in the urban sections of the river, although pollution and erosion are concerns in all areas of Franklin County. Threats to water quality include increased development resulting in nutrient and heavy metals loading, and hydroelectric generation as it relates to fisheries. In addition, there are documented toxic and bioaccumulative effects on fisheries resulting from historic discharges or waste sites. Various pesticides used by agricultural operations have been identified as nonpoint source pollutants in the Connecticut River in Franklin County.

Published water quality information for the Connecticut River is limited. There is a paucity of current, comprehensive water quality sampling for the main stem of the Connecticut River due to a severely curtailed DEP water quality monitoring program. Monitoring and follow-up investigations regarding the source and extent of pollutants are urgently needed. Existing drinking water standards do not include some pesticides detected in the river or their breakdown products. In addition, the current drinking water standards do not consider the cumulative impacts of more than one pesticide in the water. As a result, the actual health concern posed by the river's current water quality is uncertain.

Although the northwestern region of the Mill River Sub-watershed is rural and forested, a significant portion is influenced by adjacent agricultural, residential, and commercial development, as well as channelization and the Interstate 91 transportation corridor. The disruption of habitat and vegetation, with the influence of stormwater runoff on water quality, poses fundamental threats to the ecological viability of this system.

Water quality problems in Bloody Brook have also been identified in the Mill River Sub-watershed. The source of pollution in this area is NPS runoff from residential, agricultural and commercial development. These land uses may lead to the runoff of sediments, pesticides, fertilizers, chlorides, effluent and hazardous wastes into water bodies. To thwart further deterioration of Whately's water supplies, concerted action will need to be taken to address and minimize these non-point sources of pollution.

[2] www.mass.gov/envir/mwrc/default.htm See Streamflow Standards and Stress Redesignation power point presentation. www.mass.gov/envir/mwrc/ppt/streamflow_standards_stress_redesignation.ppt
[3] www.mass.gov/dep/water/approvals/wmgforms.htm