The Westfield River Watershed

OPEN SPACE and RECREATION PLAN

Prepared by
Pioneer Valley Planning Commission

December 2003

The Westfield River Watershed
OPEN SPACE and RECREATION PLAN

December 2003

Credits

Project Managers: Christopher Curtis, Catherine Miller

Research and Writing: Christopher Curtis, Catherine Miller, Anne Capra, Matthew DelMonte, Jenica Ansanitis

Graphics/Cartographics: Shaun Hayes, Ray Centeno

GIS: Jim Scace

This plan is funded in part by the Executive Office of Environmental Affairs and the Massachusetts Watershed Initiative.

Acknowledgements

The Pioneer Valley Planning Commission would like to thank members of the Westfield River Watershed Association, the former Westfield River Watershed Team, the Westfield River Wild and Scenic Advisory Committee, and Jennifer Soper for their guidance and support.

TABLE OF CONTENTS

Tables

Figures

Maps

EXECUTIVE SUMMARY

The Westfield River watershed in western Massachusetts is one of the most spectacular working landscapes in the United States. It is composed of 23 communities[1], 330,000 acres of land, 98,000 people, 89 state-listed rare species, 19 state forests and parks, 630 miles of rivers and streams, and hundreds of miles of trails and scenic roads.

Less than five percent of the Westfield River watershed is developed with 42 percent afforded some type of protection; however, only 25 percent (82,300 acres) is considered protected in perpetuity. Over 50 percent of the basin's open space and recreation land is privately owned with 44 percent being private for-profit. The Commonwealth's Division of Conservation and Recreation (formerly DEM), Department of Fish and Game, and the Springfield Water and Sewer Commission are the largest landowners in the watershed, owning over 60 percent of the permanently protected land. Of the privately protected lands in the basin, nearly 69,000 acres are enrolled in one of the Chapter 61 tax deferment programs and nearly 4,000 acres are preserved by the Agricultural Preservation Restriction program.

The overwhelmingly dominant land use in the watershed is forest at over 79 percent; residential land use is a distant second at only seven percent. Spectator and water-based recreation uses are the two least dominant in the basin, accounting for less than .1 percent combined.

According to the U.S. Geological Survey, there are 78 lakes and ponds in the Westfield River basin and approximately 5,600 acres of open water. The Cobble Mountain Reservoir in Blandford, Russell, and Granville is the largest lake in the basin, occupying approximately 1,135 acres. Aside from recreation and wildlife habitat, the waters within the Westfield River watershed are used for industrial processing, waste assimilation, hydroelectric power, water storage, and water supply. Over 73,000 acres of the Westfield River watershed have been designated as "Outstanding Resource Waters" as identified by the Massachusetts Surface Water Quality Standards of 1995.

[1] While 29 communities have a portion of their legal boundaries in the watershed, only 23 have a significant amount of land.

There are five major water supply reservoirs and one regional aquifer providing public water supply in the Westfield River basin. Borden Brook and Cobble Mountain Reservoir, located in Granville, Blandford, and Russell, are both part of the second largest water supply storage system in the state, serving more than 250,000 people in the Pioneer Valley. The Granville Reservoir in Granville supplies water to approximately 20,000 Westfield residents. In addition to surface waters in the basin, there are 84 transient non-community groundwater wells and 39 community water supply wells serving eight municipal systems.

Over the past 30 years, sprawl has become the dominant force affecting land use change in the Westfield River watershed. From 1971 to 1999, the communities of Westfield and Agawam have experienced the greatest loss of cropland in the entire Pioneer Valley, losing nearly 2,400 acres. In that same time period, the communities with the greatest increase in commercial development were: Holyoke, Westfield, West Springfield, and Agawam. The watershed communities of Cummington and Middlefield have experienced the greatest increase in population in the last 10 years, and projections to 2030 show them continuing to grow the most.

This watershed-based regional Open Space and Recreation Plan addresses both the assets and problems of the Westfield River watershed. Watershed assets include:

- The first designated National Wild and Scenic River in Massachusetts (the Westfield River)
- Massachusetts' only regenerating Atlantic salmon habitat
- An active corps of volunteer and professional planners, government officials, environmentalists, developers, advocates, builders, and citizens
- Outstanding biodiversity
- Extraordinary scenic and historic resources, such as Jacob's Ladder Trail, Keystone Arch Bridges, Glendale Falls, and Chesterfield Gorge, that can attract low-impact tourism
- Excellent water quality, one of Massachusetts' best coldwater fisheries, and one of the finest whitewater boating areas in the northeast U.S. on the Westfield River
- An increasingly diverse population
- Many traditional New England villages with beautiful historic buildings and town centers
- A population density of less than one-half person per acre—the second lowest density of all Massachusetts watersheds
- A National Recreation Trail (the Metacomet-Monadnock Trail)

Watershed problems include:

- Sprawling development in the lower watershed, including four of the Pioneer Valley region's fastest urbanizing communities
- Urban problems of crime, littering, and vandalism in the watershed's cities
- Seasonal and second home development in the upper watershed
- Continued development in the floodplain in Westfield and other downstream communities
- Increasing recreational pressures on the Westfield River and surrounding watershed lands
- Lack of up-to-date land use controls and regulations in many communities

Preparing an open space and recreation plan for this special place, one of only three to be funded by the Massachusetts Watershed Initiative (MWI), was both an opportunity and a challenge. The staff at the Pioneer Valley Planning Commission, guided and advised by staff at the Executive Office of Environmental Affairs, the dedicated members of the Westfield River Wild and Scenic Advisory Committee, the Westfield Watershed Team, and the Westfield River Watershed Association, have labored to reflect the unique quality of this place while at the same time seriously considering the opportunities and threats facing the Westfield watershed. These groups also identified and prioritized areas for future work into a practical five-year action plan.

Because this place is so special, it is a focus of many varied efforts to protect its beauty, preserve its natural resources, and provide opportunities for recreation. Many regional, statewide, and sub-regional planning, protection, and research and development efforts are underway in the watershed.

These include:

- The Westfield River Watershed Association
- The Westfield River Wild and Scenic Advisory Committee
- The Highlands Community Initiative, a five-year, five million dollar effort to protect the region

- The Jacob's Ladder Trail strategic plan
- The Nature Conservancy's work on the preservation of unfragmented forest
- The Silvio O. Conte National Wildlife Refuge
- The American Heritage Rivers Initiative
- The Massachusetts Woodlands Cooperative
- The Massachusetts DCR Greenways Plan
- The Pioneer Valley Greenways Plan
- The Metacomet-Monadnock Trail study

This is an area universally recognized as needing open space protection. At the same time, the area boasts a wealth of natural resources that people cannot resist exploiting for recreation and residential development. The need for a watershed-wide open space and recreation plan is obvious and overdue.

The top goals for the Westfield River watershed, articulated via this planning process, are:

- Preserve the regional character
- Protect natural resources, unfragmented forests, and significant habitats
- Maintain the excellent quality of all ground and surface water
- Maintain remarkable river and stream corridors
- Enhance recreational opportunities for people of all ages and abilities
- Preserve and protect agricultural lands and encourage environmentally sound agricultural practices
- Promote economic development that respects the environment and historic resources

This plan offers a practical way to protect open space and assure recreation in the Westfield River watershed.

INTRODUCTION

The Pioneer Valley Planning Commission (PVPC) was commissioned to produce an Open Space and Recreation Plan (OSRP) for the Westfield River Watershed in August of 2002. At the time the Massachusetts Executive Office of Environmental Affairs (EOEA) was committed to a watershed-based approach to regional planning and development. Regional OSRPs were new phenomena in the state and this particular plan was to serve as a potential model for other basins to follow. Only the much smaller Ten-Mile River basin had previously completed such a plan. Since the contract between PVPC and EOEA was signed, however, Governor Mitt Romney has dissolved the Massachusetts Watershed Initiative.

EOEA's goals for this plan were to identify and recommend both municipal and inter-municipal opportunities and strategies for:

- Preserving and protecting regional water supply resources
- Identifying, preserving and protecting wildlife habitats of regional significance
- Developing, preserving, and protecting regional greenways and trails
- Identifying, preserving, and protecting regionally significant conservation areas and forests for future acquisition
- Identifying, preserving, and protecting regionally significant scenic landscapes and resources

- Identifying, preserving, and protecting regionally significant recreation resources
- Identifying, preserving, and protecting regionally significant historic an cultural resources
- Establishing consensus on a watershed-wide protected acreage goal

This plan achieves EOEA's original goals. It also serves as a review and summary of the many ongoing planning, resource protection, and development efforts underway in this special place. The plan describes the watershed in detail, includes updated GIS maps, provides a comprehensive summary of all the municipal OSRPs in the watershed, and offers a five-year action plan to preserve and protect open space and recreation opportunities in the watershed. The plan is intended to help groups, organizations, and municipal governments to work collaboratively toward a shared vision for the watershed and to secure funding in order to implement the many projects planned to protect and use the watershed.

Benefits to Protecting and Preserving Open and Recreational Space

Open space in the Westfield River watershed provides many benefits. Quantifying these benefits can be difficult, but is certainly a worthwhile undertaking. Open space is essential to ensure we have clean water, clean air, fish and wildlife habitat, recreational opportunities, and tranquility and solitude. Resource management also provides essential products, such as paper, wood, and agricultural products, and provides direct economic returns to the region's communities, landowners, and workers.

Environmental and Ecological Benefits

Healthy wetlands, forests, lakes, and ponds play an important role in environmental and ecological protection of the watershed and support some of the most diverse habitats in the state. Undeveloped land protects the quality of underground and surface water supplies. Wetlands filter toxins, improve water quality, provide shellfish and wildlife habitat, and store water. Rivers dilute treated sewage, provide wildlife habitat, and offer recreational opportunities. Forests remove carbon dioxide from the atmosphere, provide wildlife habitat, intercept storm water, and are a primary source of clean water.

The health of our flora and fauna is an indicator of the health of our region's environment. Maintaining unfragmented, undeveloped land is essential to retain the diversity of significant plant and animal species helping to prevent future endangerment.

The Westfield River watershed is nearly 80 percent forested and contains over 16,000 acres of wetlands. In addition, the Westfield River basin contains approximately 51,000 acres of BioMap core habitat and contains the Commonwealth's only regenerating Atlantic salmon habitat.

Social Benefits

Recreational lands can provide the opportunity for escape from the stresses of everyday life and outdoor adventures are an inexpensive form of relaxation.

Urban parks bring a sense of community to urban neighborhoods and are sites for outdoor recreation. Mittineague Park in West Springfield, Robinson State Park in Agawam, Ashley and Wright Ponds in Holyoke, and Hampton Ponds State Park in Westfield are just a few examples of popular watershed locations that improve quality of life for urban and suburban residents of the watershed.

Natural and historic landmarks are our common heritage; they give us a sense of belonging, teach us about the past, and are the foundation for the future. The Trustees of Reservations' William Cullen Bryant Homestead in Cummington and the Keystone Arch Bridges in Middlefield and Chester are such historic landmarks.

Economic Benefits

Open space and recreation have significant economic benefits. Parks, landscapes, waters, wildlife, forests, and historic sites are vital to the region's tourism and travel industry, and generate sales to local businesses. Agriculture, timber harvesting, and horticulture all contribute to the local economy.

Open space costs communities substantially less than residential development, based on the costs for local services. According to the American Farmland Trust, residential land use costs communities an average of $1.15 for every dollar of revenue raised, while open lands, farms, and forests average only 36 cents per dollar. Open land, recreation, and scenic and historic sites are important to the region's quality of life and thus are a primary factor in attracting and retaining local economic investment. Proximity to open lands also increases property values while attracting new residents.

Clean and affordable local water supplies allow communities and businesses to grow without economic burden. Over 350,000 in- and out-of-basin residents, as well as hundreds of businesses, rely on the Westfield River watershed for potable water.

Open space is also a low-cost solution to many environmental problems. Forests, for example, reduce noise pollution, intercept stormwater, and improve air quality. Open space and trees in urban environments can significantly reduce commercial and residential heating and cooling costs, and reduce air pollution, making for a more livable community.

Elements of the Plan

The purpose of the Watershed Open Space and Recreation Plan is to identify watershed issues and implement regional solutions. Throughout this plan, "regional" is understood to mean the Westfield River watershed. Watershed towns are understood to be only the 23 municipalities identified by PVPC and the EOEA in the scope of work including Agawam, Ashfield, Beckett, Blandford, Chester, Chesterfield, Cummington, Goshen, Granville, Holyoke, Huntington, Middlefield, Montgomery, Peru, Plainfield, Russell, Savoy, Southwick, Washington, Westfield, West Springfield, Worthington, and Windsor. All 29 communities of the basin are referenced in this report at times, but for statistical purposes only.

Due to the variable socioeconomic profiles of the 23 municipalities in this plan, separate analyses were often conducted for: (1) all watershed communities, (2) the Hilltowns, and (3) the five most urban communities. Due to the unique characteristics of Westfield, West Springfield, Agawam, Holyoke, and Southwick, they were analyzed as urban communities independent of the 18 more rural towns referred to in this plan as "hilltowns." Hilltowns include Ashfield, Beckett, Blandford, Chester, Chesterfield, Cummington, Goshen, Granville, Huntington, Middlefield, Montgomery, Peru, Plainfield, Russell, Savoy, Washington, Worthington, and Windsor.

The plan includes an executive summary; a detailed description of the watershed designed to highlight the strengths, weaknesses, opportunities and threats facing the watershed, its communities, natural resources and residents; a summary of relevant municipal OSRPs; goals; objectives, and a practical action plan. It also offers a summary of existing plans in the watershed and other relevant open space and recreation-related initiatives in the watershed.

PLANNING PROCESS AND PUBLIC PARTICIPATION

Advisory Committees

Three existing watershed organizations served as the regional advisory committee for this plan. The three groups are: the Westfield River Watershed Team, the Westfield River Wild and Scenic Advisory Committee, and the Westfield River Watershed Association. The plan was developed through an iterative process, wherein PVPC staff would draft components of the plan, review them with the three advisory committees, post drafts on the PVPC website for public review, and modify the draft based on public input.

Nineteen meetings with the various regional advisory committees were held as part of the public involvement process for this plan, as shown in Table 1.

Westfield River Watershed Team

Formed through the Massachusetts Watershed Initiative, the Team is composed of a range of watershed stakeholders including municipal staff, state agencies, the regional planning commission, local lake and pond associations, interested citizens, and others. The Team met monthly until February 2003 to discuss issues of relevance to the watershed, provide updates to ongoing projects funded under the Team's annual work plan, and encourage communication at all levels of management throughout the watershed. The Westfield River Watershed Team was dissolved in February 2003 due to a state reorganization and the disbanding of the Massachusetts Watershed Initiative.

Westfield River Watershed Association (WRWA)

WRWA was established in 1952 to protect and improve the natural resources of the Westfield River Watershed and to expand recreational opportunities for people's enjoyment and for sound ecology. WRWA is a tax-exempt non-profit organization funded largely by membership dues and some grants. The membership is made up of people from a wide variety of backgrounds as well as businesses, industries, towns and cities, and other organizations, all with the common interest of protecting and enhancing the Westfield River Watershed.

Westfield River Wild and Scenic Advisory Committee (WRWSAC)

Formed in 1990 by the signing of the Memorandum of Agreement for the protection of the Westfield River, the WRWSAC was originally composed of municipally appointed representatives from the communities of Becket, Chester, Chesterfield, Cummington, Middlefield, and Worthington, and representa-

Table 1: Regional Advisory Committee Meetings Held on the Westfield River Open Space Plan

Meeting Date	Committee
July 24, 2002	Westfield River Team meeting
August 8, 2002	Westfield River Wild and Scenic Advisory Committee meeting
August 21, 2002	Westfield River Team meeting
August 26, 2002	Westfield River Watershed Association
September 10, 2002	Westfield River Wild and Scenic Advisory Committee meeting
October 8, 2002	Westfield River Wild and Scenic Advisory Committee meeting
December2, 2002	Westfield River Wild and Scenic Advisory Committee meeting
December 18, 2002	Westfield River Team meeting
January 9, 2003	Westfield River Wild and Scenic Advisory Committee meeting
January 14, 2003	Westfield River Team meeting
February 6, 2003	Westfield River Wild and Scenic Advisory Committee meeting
February 11, 2003	Westfield River Team meeting (final meeting)
February 24, 2003	Westfield River Watershed Association
March 3, 2003	Westfield River Wild and Scenic Advisory Committee meeting
March 24, 2003	Westfield River Watershed Association
April 3, 2003	Westfield River Wild and Scenic Advisory Committee meeting
April 28, 2003	Westfield River Watershed Association
May 1, 2003	Westfield River Wild and Scenic Advisory Committee meeting
June 5, 2003	Westfield River Wild and Scenic Advisory Committee meeting

tives from the National Park Service, the Department of Environmental Management, the EOEA, the PVPC, the WRWA, and the Department of Fisheries, Wildlife, and Environmental Law Enforcement. Since then, the communities of Savoy, Windsor, Huntington, and Washington, and the Trustees of Reservations have joined WRWSAC. In 1993, WRWSAC was instrumental in securing 43 miles of the Westfield River's East, Middle and West branches in the towns of Becket, Chester, Chesterfield, Cummington, Middlefield, and Worthington as the first National Wild and Scenic River in Massachusetts. WRWSAC has submitted a proposal to the Secretary of the Interior for an expansion of the National Wild and Scenic designation, adding 34.9 river miles.

Public Input

In addition to meeting with existing watershed organizations, PVPC prepared three press releases to announce the plan to the public and solicit feedback and participation. Releases were published in the *Republican* (formerly the *Union News)*, *The Daily Hampshire Gazette*, and the *Country Journal* on three separate occasions. Press releases are included in Appendix A.

Contact information and links to draft plans were also made available from August 2002 to June 2003 through the World Wide Web at:

- The Pioneer Valley Planning Commission www.pvpc.org
- The Westfield River Watershed Association www.westfieldriver.org

Public input was also solicited in two newsletters:

- The Westfield River Watershed Association newsletter *The Watershed News*
- The Highland Community Initiative newsletter *Highland Happenings*

PVPC staff mailed a letter to all 23 municipalities at the start of the project explaining the planning process and the purpose of the plan, and inviting them to participate. In April 2003, PVPC hand delivered and mailed draft copies of the revised plan to each town hall in the participating communities. The draft included a short comment survey. Nine communities (40 percent) returned the survey—five using the survey form and four e-mailing comments in a narrative format. Of the five communities that returned the actual survey, 100 percent are satisfied with how the draft plan described the watershed, how the plan summarizes community goals and objectives, and how the plan summarizes issues and concerns in the watershed. One hundred percent of respondents endorsed the recommendations of the draft plan.

PVPC hosted two sessions and staffed a booth/poster display at the 9th Annual Westfield River Symposium on March 29, 2003 to discuss the draft plan with the public (see Appendix A). The PVPC display showed a watershed land use map as well as a digital orthophoto of the entire basin. In addition, the draft watershed OSRP was distributed to attendees as was a comment form/survey. Seventy-seven drafts and surveys were distributed at the event.

In an attempt to rank watershed issues and concerns, a voting station was included at the symposium. The three issues and concerns receiving the most votes were maintenance and management of unfragmented forests, inter-municipal and regional collaborations, and balancing the costs/benefits of open space.

The two workshops conducted at the symposium helped to identify additional regional issues and concerns as well as to help develop the Action Plan. Sixty people attended the two workshops. A list of additional regional problems and concerns identified by the two workgroups as well as actions identified by the groups to help solve basin problems and accomplish goals is included in Appendix A.

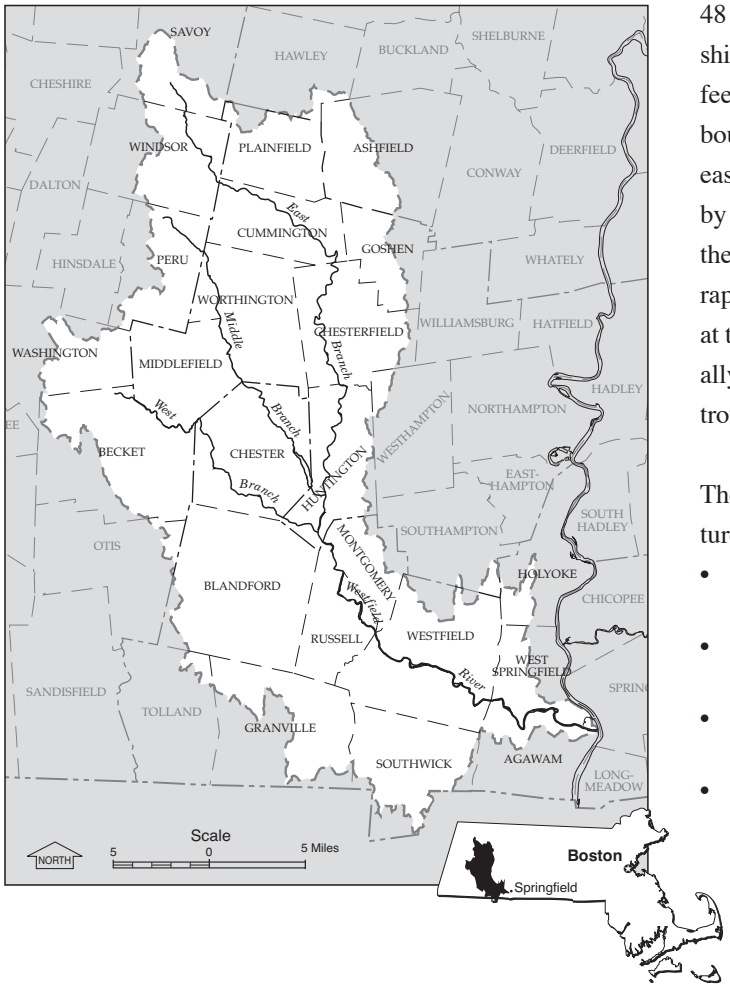
In addition to the formal public involvement projects and initiatives, PVPC encouraged members of the advisory committees and others who reviewed the draft to share it with others and received comments on the draft plan from staff at the EOEA, the Division of Conservation Services, the state agency responsible for reviewing all municipal OSRPs, the Nature Conservancy, the Fish and Wildlife Service, the Highlands Community Initiative, the Sustainable Forestry Initiative, and many others.

REGIONAL SETTING

Regional Context

The Westfield River watershed in western Massachusetts is one of the most spectacular working landscapes in the United States. It is composed of 23 communities[2], 330,000 acres of land, 98,000 people, 89 state-listed rare species, 19 state forests and parks, 630 miles of rivers and streams, and hundreds of miles of trails and scenic roads. Located in western-central Massachusetts, the Westfield River basin drains an area of approximately 517 square miles and includes municipalities in portions of Franklin, Hampshire, Hampden, and Berkshire counties. Only Cummington, Worthington, Middlefield, Chester, and Russell drain entirely to the Westfield River.

Westfield River Watershed



The drainage area forms a general "L" shape, approximately 48 miles long and 20 miles wide, extending from the Berkshire Mountains to the Connecticut River. The river drops 2,000 feet before entering the Connecticut River. The watershed is bounded on the north by the Deerfield River Basin, on the east by the Connecticut River Basin, and on the west and south by the Housatonic and Farmington River Basins. Thin soils in the hills combine with steep gradients to produce extreme and rapid differences in the rate of flow, occasional flooding, and at times low water conditions. The annual spring run-off usually provides excellent whitewater canoeing and months of trout fishing.

The Westfield River corridor encompasses many valuable features and resources, including:

- The first designated National Wild and Scenic River in Massachusetts in the Westfield River
- The longest uncontrolled river in the state (West Branch of the Westfield River)
- Massachusetts' only regenerating Atlantic salmon habitat
- An active corps of volunteer and professional planners, government officials, environmentalists, developers, advocates, builders and citizens

[2] While 29 communities have a portion of their legal boundaries in the watershed, only 23 municipalities were included in the scope of work.

- Outstanding biodiversity
- Extraordinary scenic and historic resources, such as Jacob's Ladder Trail, Keystone Arch Bridges, Glendale Falls and Chesterfield Gorge, that can attract low-impact tourism
- Excellent water quality, one of Massachusetts' best coldwater fisheries, and one of the finest whitewater boating areas in the northeast U.S. on the Westfield River
- An increasingly diverse population
- Many traditional New England villages with beautiful historic buildings and town centers
- A population density of less than one half person /acre — the second lowest density of all Massachusetts watersheds
- A National Recreation Trail in the Metacomet-Monadnock Trail

Land Use and Development Patterns

The Westfield River watershed is divided into distinctly rural and urban communities. The upper reaches of the watershed are primarily rural communities distinguished by unfragmented forests and scattered with agricultural, seasonal, and home-based businesses. The communities of Westfield, Agawam, West Springfield, Holyoke, and Southwick in the lower (south-eastern) basin are urbanized and some of the fastest growing communities in the region.

The overwhelmingly dominant land use in the watershed is forest at over 79 percent. The towns of Blandford and Becket

Table 2: Watershed Land-Use Types

Land Use	Rank	Acreage*	Percent of Watershed
Forest	1	263,106	79.2
Residential >1/2 acre lots	2	14,210	4.3
Cropland	3	13,507	4.1
Residential 1/4 to 1/2 acre lots	4	6,900	2.1
Pasture	5	6,120	1.8
Water	6	5,599	1.7
Open Land	7	5,160	1.6
Wetlands	8	4,392	1.3
Residential <1/4 acre lots	9	2,507	0.75
Participation Recreation	10	1,902	0.57
Transportation	11	1,693	0.51
Urban Open	12	1,643	0.49
Commercial	13	1,437	0.43
Industrial	14	1,088	0.33
Woody Perennial	15	966	0.29
Mining	16	888	0.27
Residential Multi-Family	17	444	0.13
Waste Disposal	18	268	0.08
Spectator Recreation	19	200	0.06
Water Recreation	20	44	0.01
Totals:		**332,074**	**100%**

Source: PVPC, Mass GIS (1999 data); *Represents the acreage of all 29 watershed communities within basin

Table 3: Land Use in the Hilltowns*

Land Use	Percent of Hilltowns	Land Use	Percent of Hilltowns
Forest	81.5%	Pasture	1.8%
Residential >1/2 acre lots	3.7%	Water	1.5%
Cropland	2.8%	Wetlands	1.4%

Source: PVPC, Mass GIS (1999 data)

*Hilltowns include Ashfield, Beckett, Blandford, Chester, Chesterfield, Cummington, Goshen, Granville, Huntington, Middlefield, Montgomery, Peru, Plainfield, Russell, Savoy, Washington, Worthington, and Windsor

contain the highest percentage of forested lands with over 25,000 acres each. Residential land use with lots greater than 1/2 acre is the second largest land use category in the basin with 14,210 acres (4.3 percent).

According to this land use data, spectator and water based recreation uses are the two least dominant in the basin, occupying less than 250 acres and accounting for less than .1 percent combined. Participatory recreation lands occupy nearly 2,000 acres in the Westfield River watershed with nearly .6 percent of the total acreage.

Total residential uses in the basin account for nearly 24,000 acres; roughly 7 percent of the basin's land use. Industrial and commercial land uses in the watershed account for only .8 percent of the total land use and occupy only 2,525 acres.

Over the past thirty years, urban sprawl has become the dominant force affecting land use change in the Pioneer Valley and in the Westfield River watershed. From 1971 to 1999, the communities of Westfield and Agawam have experienced the greatest loss of cropland in the entire Pioneer Valley losing nearly 2,400 acres. In that same time period, the communities with the greatest increase in commercial development included: Holyoke, Westfield, West Springfield, and Agawam (PVPC). Urban sprawl problems are the worst in suburban communities and the region's smaller cities.

Table 4: Summary of Land Use Suitability Analysis
(includes overlapping categories)

Already Developed Land	15,015 acres
Already Protected Land	82,269 acres
Land Suitable for Protection	140,126 acres
Land Suitable for Compact Development	31,716 acres
Land Suitable for Farmland	4,706 acres
Land Suitable for Low Density Development	93,813 acres
Land Suitable for Commercial or Industrial	234 acres
Land Suitable for General Development	59,764 acres

Land Use Suitability Analysis

A land use suitability map was created by combining and comparing various digital layers of information developed from federal, state, and local sources in a computer model. Overlays of the GIS mapping data identified those lands that are the most environmentally fragile and thus most desirable to protect, as well as those areas that are well suited for new residential and commercial development. A summary of the land use suitability analysis is included in the following table. Categories used in this analysis are defined in Appendix C.

Population Characteristics and Projections

According to the Trustees of Reservations' planning document Conserving Our Common Wealth: A Vision for the Massachusetts Landscape, threats to Western Massachusetts include second-home development and utility and cellular telephone towers.

The Westfield River basin is home to nearly 100,000 residents with a population density of 193 persons per square mile. The cities of Westfield, West Springfield, Agawam, and Holyoke account for the majority of the watershed's population. The 18 rural hilltowns account for 82 percent of watershed area but only 18 percent of the population. Clearly the demographic characteristics of the hilltowns are significantly different from those of Holyoke, Agawam, West Springfield, Southwick, and Westfield. Differences include educational attainment, ethnic background, and average weekly wage. Detailed population statistics are included in Appendix B.

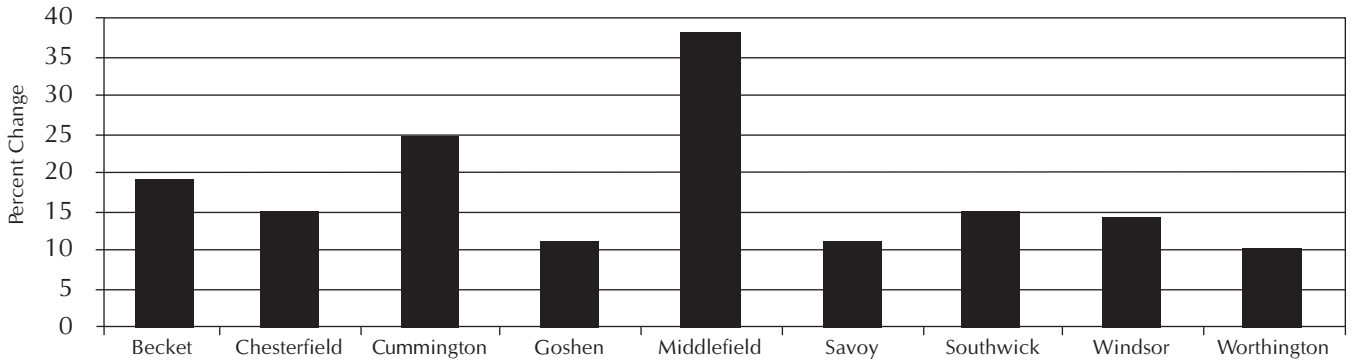
The total population of the five most urban communities was 144,788 in 2000 with 56 percent living in the Westfield basin. Of the five most populated municipalities, West Springfield has the highest population density within the basin with 1,825 persons per square mile. The density of Southwick residents is lowest of the more urban communities with only 307 persons per square mile.

The remaining 18 towns have an average population under 1,200, an average population density of 43 persons per square mile, and an average Caucasian population of nearly 98 percent. This variation is significant when assessing regional needs and concerns. Excluding the more urban municipalities of Holyoke, Westfield, Southwick, Agawam, and West Springfield, the population of the watershed towns was 20,515 in 2000 (18,603 within the basin). Of the hilltowns, Huntington was the most populated in 2000 with 2,192 persons; however, Russell had the highest population density with 94 persons per square mile.

From 1990 to 2000, the town of Middlefield experienced the greatest increase in population with 38 percent; Cummington was second at nearly 25 percent. In the same time period, the communities of Montgomery, Washington, and Holyoke experienced population decreases of 14, 12, and 9 percent, respectively.

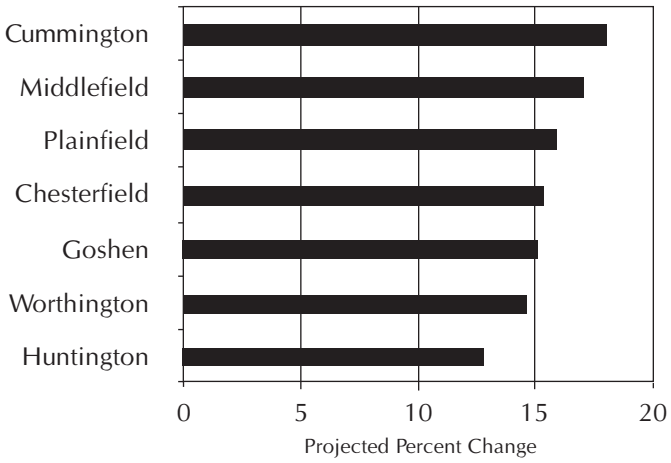
Population projections developed by PVPC in 2003 predict that the watershed communities of Cummington and Middlefield will grow the most by the year 2030 (18.1 percent and 17.2 percent, respectively). As a whole, the population will continue to age but will maintain a sizeable student population. The rural watershed towns of Blandford and Montgomery are the only communities in the entire Pioneer Valley expected to decline in population by 2030.

Figure 1: Watershed Communities with the Greatest Population Increase from 1990 to 2000



Source: PVPC, based on U.S Census data

Figure 2: Watershed Communities with the Greatest Projected Percent Change, 2000 to 2030



Over 64 percent of watershed residents participated in the labor force in 2000 with an average of 4.8 percent unemployed. Thirty-two percent of residents worked in their city or town of residence; this rate was 44 percent in the more in urban communities of Westfield and Holyoke where more employment opportunities exist.

Less than two percent of residents reported using public transportation to commute to work. This rate is generally higher in more urban areas due to the availability of public transportation and shorter commutes. Residents in Holyoke, Westfield, and West Springfield, Washington, and Plainfield claimed the highest rates of public transportation use.

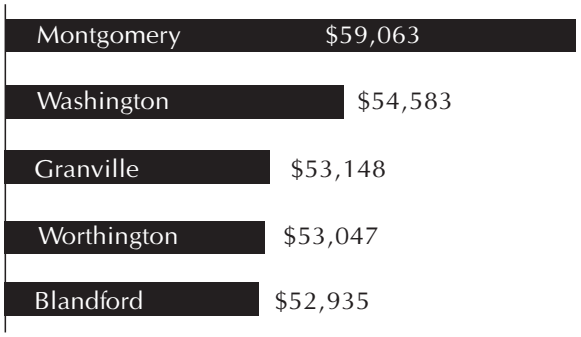
Figure 3: Communities with the Lowest Median Household Incomes

Source: U.S. Census, 2000

The average median household income for watershed residents in 2000 was $47,131 with an average per capita income of $21,451. Montgomery residents had the highest median household income of all watershed towns making an average $59,063 per year. Holyoke had the lowest median household income of watershed towns ($30,441), with a per capita income of $15, 913.

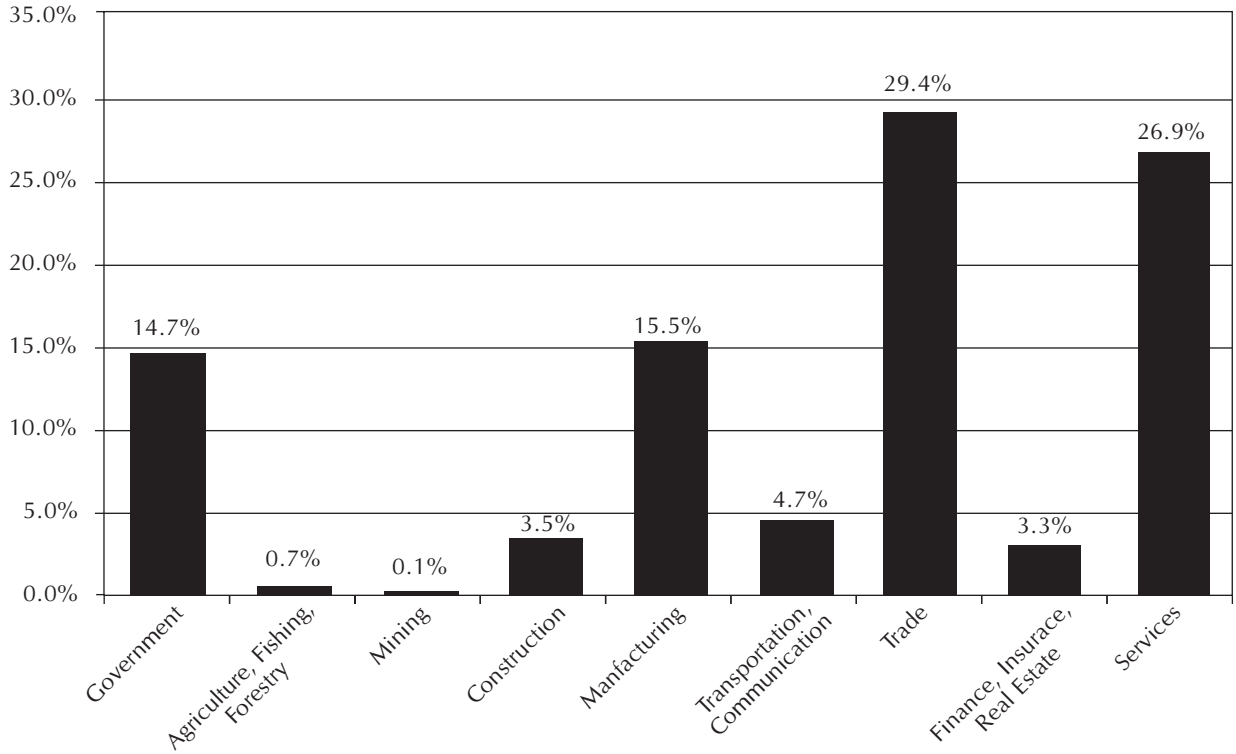
Of the five most populated basin communities, residents in Southwick had the highest median household income in 2000 with $52,296. This is much higher than the watershed average of $47,131. Agawam residents had the highest per capita income with $22,562. Residents of Westfield, West Springfield, and Holyoke had an average household income lower than the basin as a whole. Compared to the more urban municipalities and the watershed as a whole, hilltown residents had a higher per capita and median household income.

Figure 4: Communities with the Highest Median Household Incomes



Source: U.S. Census, 2000

Figure 5: Watershed Employment Characteristics



Source: MA Department of Employment and Training, 2001

Employment Trends and Projections

By 2008, the Massachusetts Division of Employment and Training projects a statewide increase of 47.6 percent in trade employees; a 40 percent increase in service employees, and a 12 percent increase in public administration employees. A 2.8 percent increase is expected in construction and mining employees. It is important to note that these predictions are based on the state as a whole and may not take into account the unique characteristics of western Massachusetts and the Westfield River watershed region.

Anecdotal evidence of an increase in home-based business, especially in the more remote hilltowns, has been widely reported in the watershed. Despite unofficial reports, U.S. Census Bureau statistics show that this type of employment is increasing, but still the exception.

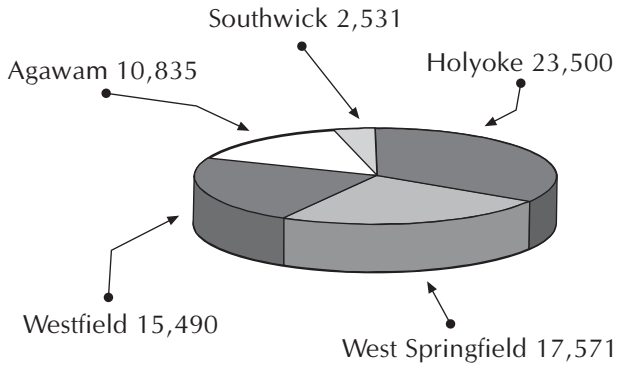
Census 2000 data revealed that over 32 percent of watershed residents do not work in their town of residence. Mean annual drive time to work for residents ranged from 18.6 minutes for Holyoke residents to over 41 minutes for Middlefield residents. Residents in the upper basin commuted nearly 15 minutes longer than the Pioneer Valley regional average of 21.8 minutes.

Massachusetts Division of Employment and Training data reveals that the urbanized communities of Holyoke, West Springfield, Westfield, and Agawam offer the most job opportunities in the watershed (see Figure 6).

In the more rural hilltown areas of the watershed, the towns of Huntington, Granville, Blandford, Worthington, and Cummington have the most job opportunities:

Huntington	380
Russell	302
Cummington	184
Worthington	177
Blandford	154

Figure 6: Communities with the most Job Opportunities



A decline in the region's total labor force and total employment occurred in the early 1990s, but Census 2000 data showed that the region had recovered from this recession. Shrinking unemployment rates from 1992 to 2001 showed a stronger economic trend in the region; however, unemployment rates in 2002 and 2003 have increased once again due to a lagging economy. According to the Massachusetts Department of Employment and Training, unemployment rates in 2001 ranged from 5.4 percent in Holyoke to 1.7 percent in Goshen. In June, 2003 the unemployment rate had increased to 7.1 percent in Holyoke and to three percent in Goshen.

Zoning and Build-out Potential

The Massachusetts EOEA sponsored the creation of a set of buildout maps and analyses for all 351 cities and towns within the Commonwealth. The analyses were intended to be a useful tool for growth and development planning. The maps and analyses depict currently protected and developed land within each community and what it would look like if remaining undeveloped land was completely developed in accordance with current local zoning. Tables 5 and 6 below summarize the buildout analyses and impacts for the 23 watershed communities, the hilltowns, and the most urban municipalities of Westfield, Southwick, Agawam, West Springfield, and Holyoke.

Table 5: Watershed Buildout Summary

2002 Buildout Summary For:	Entire Watershed	Hilltowns"[1]	Urban Communities[2]
Residents			
1990	163,589.00	18,986.00	144,603.00
Current	165,317.00	20,529.00	144,788.00
Buildout	471,563.00	238,817.00	232,746.00
% Increase at Buildout	**185%**	**1,063%**	**61%**
Students (K-12)			
1990	25,565.00	3,532.00	22,033.00
Current	27,730.00	3,656.00	24,074.00
Buildout	78,529.00	39,301.00	39,228.00
% Increase at Buildout	**183%**	**975%**	**63%**
Residential Units			
1990	61,086.00	6,783.00	54,303.00
Current	68,990.00	9,888.00	59,102.00
Buildout	180,631.00	88,858.00	91,773.00
% Increase at Buildout	**162%**	**799%**	**55%**
Water Use (gallons/day)			
Current	22,104,447.75	1,207,639.81	20,896,807.95
Buildout	49,777,028.75	16,512,417.81	33,264,610.95
% Increase at Buildout	**125%**	**1,267%**	**59%**

[1] Does not include Westfield, Southwick, Agawam, Holyoke, and West Springfield
[2] Agawam, Holyoke, Southwick, Westfield, and West Springfield

Source: EOEA Community Preservation Initiative

Table 6: Watershed Buildout Impacts Summary

Buildout Impacts For:	Entire Watershed	"Hilltowns"[1]	Urban Communities[2]
Additional Residents	306,246.00	218,288.00	87,958.00
Additional Students (K-12)	51,450.00	36,296.00	15,154.00
Additional Residential Units	111,641.00	78,970.00	32,671.00
Additional Developable Land Area (acres)	230,852.00	194,614.00	36,238.00
Additional Commercial/Industrial Buildable Floor Area (sq ft)	82,098,862.00	11,171,992.00	70,926,870.00
Additional Water Demand at Buildout (gallons/day)	27,672,581.00	15,304,778.00	12,367,803.00
Residential	21,474,062.00	14,466,880.00	7,007,182.00
Commercial and Industrial	6,198,519.00	837,898.00	5,360,621.00
Additional Solid Waste (tons/yr)	151,014.00	104,934.00	46,080.00
Non-Recyclable	91,546.00	75,580.00	15,966.00
Recyclable	35,896.00	29,354.00	6,542.00
Additional Roadway at Buildout (miles)	2,755.00	1,827.00	928

[1] "Hilltowns" do not include Westfield, Southwick, Agawam, Holyoke, or West Springfield.
[2] Urban Communities include only Westfield, Southwick, Agawam, Holyoke, and West Springfield.
Source: EOEA Community Preservation Initiative

It is apparent from summaries in Tables 5 and 6 that the infrastructures and natural environments of the region would be overwhelmed by such a buildout. Present municipal zoning must be reconsidered to allow for a more sustainable growth pattern.

Compare the buildout projections of over 110,000 new residential units with the PVPC landuse suitability analysis (Table 4). The land use suitability analysis proposes compact development on 31,716 acres, low density development on 93,813 acres, and general development on 59, 764 acres. Totaled, this allows for possible residential development on approximately 186,000 acres, which means an average of a residence on every 1.7 developable acres of the watershed. The municipalities that have size requirements in place for residential development will drive these projected newcomers to neighboring communities.

Summary of Existing Regional and Statewide Plans

As noted, the Westfield River watershed in western Massachusetts is an exceptional region. It is physically beautiful, ecologically diverse, geologically interesting and simply a pleasant place to be. Accordingly it has been very well studied and planned for. This plan has benefited from the many previous planning projects that have encompassed the watershed including but not limited to those summarized below.

Updated Westfield River Greenway Plan (PVPC, 1993)

This plan was prepared by PVPC in collaboration with the Westfield River Watershed Association in 1993. Though 10 years old, the plan still provides a useful overview of strategies to enhance the watershed. It focuses on the river, which is the predominant natural feature of the watershed. The Westfield River Greenway Plan was the force behind the wild and scenic designation and behind the urban communities' participation in the Connecticut Riverwalk and Bikeway—one of the region's premier off-road trail projects. The Westfield River Greenway Plan is a testimony to the utility of regional planning.

Four of the nine key recommendations have been implemented: the intergovernmental compact, wild and scenic river designation, local river protection bylaws, and salmon restoration. The remaining five recommendations have been acted upon, but remain areas of concern and surfaced as action items to be included in this plan. They are: promote voluntary conservation restrictions; increase maintenance and policing at river access points, and grant funds for land acquisitions or improvements, water quality clean-up, and riverbank beautification.

Valley Vision (PVPC, 1997)

In 1997 PVPC created a regional land use plan for the Pioneer Valley. This document presents a compelling argument for smart growth and makes the case that sprawl is a concern for this region. It includes a regional land use map with spatial basis for recommended land uses and provides model zoning ordinances to implement many of the smart growth recommendations. Most of its recommendations are relevant for the communities of the Westfield watershed.

Regional Transportation Plan (PVPC, 2003)

Every three years PVPC updates the region's transportation plan. This plan documents the pressing transportation needs in the watershed and makes recommendations to respond to them.

Commonwealth Connections: A Greenway Vision for Massachusetts (DEM, 2002)

This plan was a collaborative effort between the Commonwealth's DEM, the Appalachian Mountain Club, and the National Park Service. Commonwealth Connections reflects the priorities of the greenway and trail communities. The plan provides a unified framework for connecting Massachusetts residents to the land, their history, and to each other, calling for a coordinated network of greenways and trails. Recommendations of the plan include:

- Protect and promote long-distance trail corridors as primary spines of the Massachusetts Greenway and Trail System
- Protect critical river corridors and their tributaries statewide
- Strategically link important natural resources and human communities
- Create a cross-state multi-use trail reaching from Boston to the Berkshires
- "Trail bank" unused trail corridors and work to gain public access to utility corridors
- Assist the greenways and trails community with technical support and funding needed to establish a coordinated statewide greenway system
- Increase funding for greenways and trails

The plan specifically advocates creating and protecting a greenway corridor along the Westfield River and potentially linking the three branches of the river; protecting the Connecticut River and its tributaries; and protecting the Metacomet-Monadnock Trail.

Pioneer Valley Greenways Plan (PVPC, 2003)

The Pioneer Valley Regional Greenways Plan was developed to promote cooperative and coordinated protection of open space and greenways between state agencies, land trusts, municipalities and non-profit conservation groups. This Regional Greenways Plan brings together many plans and priorities of private organizations, public agencies, and Pioneer Valley citizens into a single, usable document.

The plan is intended to be both visionary and practical. The greenways vision is to create a linked network of protected open spaces across the Pioneer Valley that protect the region's special places including the Westfield River and the Metacomet-Monadnock Trail. The practical use for this Regional Greenways Plan is to create a valuable asset for any-

one working on land protection, by assembling the many layers of mapped natural resource data together in a user-friendly format and at a scale with sufficient detail.

The Westfield River watershed contains nearly 70,000 acres within the Upper Westfield River focus area, and 12,300 acres within the Metacomet-Monadnock focus area of the Regional Greenways Plan.

Jacob's Ladder Trail Scenic Byway Study (PVPC, 1994)

This study served as a pilot project in the Commonwealth for establishing criteria, structure, and a designation process for projects within the state's scenic byway program. The Jacob's Ladder Trail in the communities of Russell, Chester, Becket, and Lee was chosen due to its unique and historic corridor setting coupled with the dependence as a principal transportation route. The four components assessed in this study included cultural resources, highway and safety, land use, and landscape inventory. As a result of this project, an historic inventory was completed, land use strategies were recommended, a tour book was published, a transportation assessment was completed, and an advisory committee was created.

Jacob's Ladder Trail Vegetation Management Plan (PVPC, 1999)

This report offers an extremely detailed description of the plants growing in four towns located in the Westfield River watershed. The plan was written for the caretakers of the Jacob's Ladder Trail to inspire and guide conservation and enhancement of the trail's scenic quality.

Forest Resources of Massachusetts (DEM, 2000)

This plan/report, published by the Massachusetts Department of Environmental Management in 2000, documents the forest resources in the Commonwealth and highlights ways that forests can be used. It provides a very useful context within which to understand the forest resources of the Westfield River Watershed. The benefits that accrue to residents of the Westfield River Watershed from their forest resources include recreational opportunities, cleaner air and water, and wood products.

Summary of Existing Projects/Initiatives

Just as the watershed is featured in many existing plans, there are many ongoing projects and initiatives in the region. All of these efforts support one another in their shared desire to protect the watershed while allowing human, plant and animal life to thrive in this unique and wonderful place.

Wild and Scenic Designation

In 1993, 43 miles of the Westfield River's East, Middle and West Branches in the towns of Becket, Chester, Chesterfield, Cummington, Middlefield, and Worthington were designated as the first National Wild and Scenic River in Massachusetts. This designation was sought in order to protect the free-flowing and outstanding scenic qualities of the Westfield River.

The Westfield River was designated as a state and locally initiated National Wild and Scenic River, under the provisions of Section 2aii of the National Wild and Scenic Rivers Act. In accordance with this designation, the river has been managed the past 10 years using state and local resources, under an intergovernmental Memorandum of Agreement and the provisions of the Westfield River Greenway Plan.

Segments designated in 1993 include:

- The East Branch, from the Windsor/Cummington town line to a point .8 miles upstream of the confluence with the Holly Brook in Chesterfield
- The Middle Branch, from the Peru/Worthington town line downstream to the confluence with Kinne Brook in Chester
- The West Branch, from a railroad bridge in Becket center to the Chester/Huntington town line
- The Glendale Brook, from Clark Wright Road Bridge to the Middle Branch

In 2002, the Commonwealth of Massachusetts, through the WRWSAC and PVPC, submitted an application to the National Park Service to extend the designated Wild and Scenic segments of the Westfield River. Specifically, the river segments proposed for the extended designation were

Becket

- Shaker Mill Brook, 2 miles, from the Becket-Washington town line to its confluence with Depot Brook

- Depot Brook, 0.3 miles, from the Becket-Washington town line to its confluence with Shaker Mill Brook
- Savery Brook, 0.1 miles, from the Becket-Washington town line to its confluence with Shaker Mill Brook
- Watson Brook from the Becket-Washington town line to its confluence with Shaker Mill Brook

Huntington

- The West Branch, from the Chester-Huntington town line, downstream to the confluence with the Main Stem in Huntington
- The Middle Branch, from Littleville Dam, downstream to the confluence with the East Branch in Huntington
- The East Branch, from the confluence with Sykes Brook, downstream to the confluence with the Middle Branch in Huntington
- The Main Stem, from the East Branch-Middle Branch confluence, downstream to the Huntington-Russell town line

Savoy

- The East Branch, from the confluence with Drowned Land Brook to the Savoy-Windsor town line
- Drowned Land Brook from the Savoy-Windsor town line to its confluence with the East Branch in Savoy

Washington

- Shaker Mill Brook from the headwaters to the Becket-Washington town line
- Depot Brook from the headwaters to the Becket-Washington town line
- Savery Brook from the headwaters to the Becket-Washington town line
- Watson Brook from the headwaters to the Becket-Washington town line
- Coles Brook from the headwater to the Middlefield-Washington town line

Windsor

- The East Branch, from the Savoy-Windsor town line to the Windsor-Cummington town line
- Drowned Land Brook from the headwaters in Windsor to the Savoy-Windsor town line
- Windsor Jambs Brook from the headwaters to its confluence with the East Branch of the Westfield River

The Westfield River Wild and Scenic communities, through the WRWSAC, have taken a great interest in the Westfield River and a greater ownership in their resource. This committee has developed brochures explaining the Wild and Scenic designation aimed at residents within the designated areas, created a GIS map of sanctioned trails within the watershed communities, and is currently developing a continuous network of trails along the East Branch of the river. These projects are funded in part through grants from the Silvio O. Conte Wildlife Refuge, the DEM Trailways and Greenways Program, and the National Park Service Rivers and Trails Program.

The designation has been a positive experience for the original communities, evident by the commitment to the WRWSAC and by education, outreach, and stewardship in the designated areas.

Highlands Community Initiative (HCI) of the Trustees of Reservations

This grant-funded program aims to promote land conservation and community preservation in the rural "highlands" of western Massachusetts. In all, 18 of 23 Westfield River watershed towns lie in this region. The HCI provides municipal boards, land trusts, community leaders, and others with the tools they need to be effective advocates for conservation and community preservation.

Highland Communities in the Westfield River Watershed

Ashfield	Beckett
Chester	Blandford
Cummington	Chesterfield
Granville	Goshen
Huntington	Middlefield
Montgomery	Peru
Plainfield	Russell
Savoy	Windsor
Washington	Worthington

Silvio O. Conte National Fish and Wildlife Refuge

In 1991, the Silvio O. Conte National Fish and Wildlife Refuge Act was signed by President Bush. The law charged the Fish and Wildlife Service with an important task: to study the entire 7.2 million acre Connecticut River watershed and create a new national fish and wildlife refuge. Operated by the United States Fish and Wildlife Service, the Conte Refuge serves to conserve, protect, and enhance the Connecticut River basin's fish and wildlife and their habitats for the continuing benefit of people.

American Heritage Rivers Initiative

The Westfield River is a tributary to one of the nation's first American Heritage Rivers, the Connecticut River. This national status recognizes the importance of this river resource and focuses federal resources along the river in three categories: economic revitalization, natural resource protection, and cultural/historical preservation. The designation is symbolic of the dramatic improvements in the health of the Connecticut River and its tributaries since the passage of the Clean Water Act in 1972.

Jacob's Ladder Trail

The Jacob's Ladder Trail, which connects five communities along the Westfield River, is rich in scenic locations, historic houses and villages, and cultural centers and shops. It extends from Lee and Becket in Berkshire County through Chester and Huntington to Russell in Hampshire and Hampden counties. The Jacob's Ladder Trail has been recognized as one of the 10 most scenic byways in the United States by Scenic America, a conservation organization.

Keystone Arch Bridges Historic District

The Keystone Arch Bridges, the oldest bridges of their kind built for railroad use in the United States, are located within the Middlefield-Becket Stone Arch Railroad Bridge District of the National Register of Historic Places. Current work in the district includes restoration of the two largest Keystone bridges and completion of the Keystone Arch Bridges Trail, located in Middlefield, Becket, and Chester. The trail provides the only public access to the historic bridges and to the Wild and Scenic West Branch gorge of the Westfield River.

The Massachusetts Woodlands Cooperative

Massachusetts Woodlands Cooperative is a forest landowner management, processing, and marketing cooperative organized by and on behalf of forest landowners in western Massachusetts. The mission of the cooperative is to maintain the environment and character of western Massachusetts through the protection, enhancement, and careful economic development of one of the region's most plentiful resources, the forest.

EOEA Protection Goal of 100,000 acres of Open Space

In October 1998, the Swift administration set an ambitious goal of protecting 200,000 acres of open space in the Commonwealth of Massachusetts by the year 2010. Less than three years later, Governor Swift and EOEA Secretary Bob Durand announced that the Commonwealth and its land protection partners had reached the halfway mark in achieving that goal: 100,000 acres.

This initiative of the EOEA exhibits some of the remarkable land protection efforts in the various regions and watersheds throughout the Commonwealth. The report highlights the diverse partnerships that have been built with the land trust community, municipal and federal partners, and local landowners. Highlights from the document include the Mica Mill Tract and Hull-Peck project in which EOEA contributed more than $2,000,000 towards conservation restrictions in the watershed.

Metacomet-Monadnock Study

The Metacomet-Monadnock Trail (M&M) is a long distance hiking foot path that is maintained by the Berkshire chapter of the Appalachian Mountain club and other volunteers (Appalachian Mountain Club). In December 2002, the President signed Public Law 107-338 directing the National Park Service to study the trail system in Connecticut and Massachusetts for possible inclusion in the National Trails System.

The specific purposes of the Metacomet-Monadnock Trail Feasibility Study are to: (1) evaluate the potential advantages and disadvantages of National Scenic Trail designation, (2) determine if the trail is eligible based on its scenic resources and availability for public use, and (3) prepare findings and recommendations based on the input of communities and landowners along the M&M Trail and other state agencies and non-profit stakeholders in the region.

TNC' Westfield River Watershed Conservation Area Plan

The Westfield River watershed is a 10-year action site for the Massachusetts Chapter of The Nature Conservancy (TNC). TNC is currently in the process of developing a conservation area plan. In this planning process, TNC will:

- Identify the ecosystems, natural communities, and species that are characteristic of the watershed ("system targets")
- Identify threats to the integrity and viability of the targets (stresses and sources of stress)
- Develop strategies to abate threats (strategies)
- Implement conservation and restoration strategies and evaluate effectiveness (measures of success)

The conservation targets selected are:

- Matrix forest (northern hardwood and mixed oak forest)
- Size 1 aquatic systems (headwater streams)
- Size 2 aquatic systems (East, Middle and West branches and Little River)
- Size 3 aquatic systems (Westfield River mainstem)
- Wetland patch communities
- Terrestrial patch communities

System and community targets are intended to capture species as "embedded targets," for example, slimy sculpin, rare dragonflies, etc., should be effectively protected by efforts to conserve multiple examples of intact and healthy headwater streams.

With the involvement of many experts from government agencies and other conservation organizations, TNC has developed draft assessments of viability and threats to our targets. TNC is currently working on development and prioritization of strategies for both the forest and aquatic targets.

River Continuity Project

Over the past two years, the River Continuity Project, with funding from the Massachusetts Watershed Initiative and led by Scott Jackson at UMASS-Amherst, in cooperation with the Massachusetts Department of Fish and Game's Riverways Program, has been addressing the impact of roads on our streams by developing a volunteer stream crossings survey protocol, mapping and analyzing stream and roads data, developing a digital database for inventory and evaluation, and convening a technical advisory committee to draft guidelines for stream and river crossings.

This project was initiated in the Westfield River basin in the summer of 2003 by the Riverways' River Restore program and others. These connectivity surveys have led to partnerships among volunteers, watershed groups, conservation commissions, and departments of public works. Ultimately, this connectivity project will improve planning, permitting, and implementation of fish- and wildlife-friendly road crossings.

NATURAL AND CULTURAL INVENTORY

Geology

The geology of the study area is characterized by granite-gneiss and schist bedrock, covered with a basalt ridge of volcanic origin. The Westfield River first cut its southeasterly course through this hard trap-rock. In more recent geologic time, this region was sculpted by advancing glaciers, which deposited a thin layer of till cover upon retreat. Because of such resistant material, the river is unable to forge a very deep course until it reaches the alluvial deposits of the Connecticut River Valley.

Physiology

The extreme western part of the Westfield River watershed is located within the Berkshire Plateau physiographic region with elevations over 2,000 feet above mean sea level. Much of the remainder of the basin reflects the Southern New England upland physiography with rolling hills and elevations from approximately 800 feet to 1500 feet above mean sea level. From Westfield eastward, the physiography changes rapidly to the Connecticut Valley Lowlands characterized by gently rolling hills, large broad terraces, and large spans of flatlands. Approximately 32 percent (107,000 acres) of the basin is covered with slopes greater than 15 percent. These slopes not only create breathtaking views, but keep much of the open space protected from development due to inaccessibility.

Soils

The soils in the Westfield River Watershed are of variable depth, stoniness, and rockiness. Although the region's soils fall into three major soil classification, there are literally hundreds of minor classifications in the basin.

Lyman-Marlow-Peru Association: The soils in this association formed in glacial till derived primarily from mica schist and granite rocks. They occupy gently sloping to steep drumlins, ridges, and low mountain landforms. Bedrock outcrops are common in some areas, especially on steeper slopes. These soils are excessively drained to moderately well drained.

Hinckley-Windsor-Muck-Association: The soils in this association formed in water-sorted materials, primarily glacial outwash, and in pockets of organic materials. They occur generally in the valleys on nearly level to rolling terraces, deltas, kames, and eskers. Much of the land underlain by this association is suited for agriculture.

Hadley-Winooski-Limerick Association: This association consists of soils formed in silty alluvial deposits. Texture throughout these soils is silt loam of very fine sandy loam. Although subject to flooding, the association consists of excellent agricultural soils.

Outstanding Features

Probably the most regionally significant scenic resources are located in the upper, more rural part of the watershed. Several outstanding geologic and scenic features of national or regional significance occur along the East, West, or Middle branches of the Westfield River: Chesterfield Gorge, Glendale Falls, Windsor Jambs, West Worthington Falls, Tekoa and Shatterack mountains, and East Branch "Pork Barrel" Wilderness.

The Westfield River's scenery is "exemplary in the region," according to the National Park Service's National Wild and Scenic eligibility study for the river (1992). The 1981 Massachusetts Landscape Inventory found many of the river's scenic features to be "distinctive," a term reserved for only 4 percent of the state's landscapes at that time. The river's scenic characteristics include deep valleys, gorges, outstanding vistas of valleys, mountains and hills, rock outcrops and formations, and diverse vegetation types.

The West Branch of the Westfield River valley contains 10 beautiful stone arch railroad bridges, known locally as the Keystone Arches, listed as a historic district on the National Register of Historic Places. The bridges were built in 1841 to carry the Boston and Albany railroad over the deep gorge of the West Branch, connecting Middlefield and Becket or Middlefield and Chester. The supervisor of the stone bridges construction was George Washington Whistler, father of artist James Whistler. One bridge, a double-arched granite structure, is in active service today as part of the Conrail-CSX Railroad. The railroad was relocated in 1912 with new poured concrete bridges and changes to some of the earlier stone structures.

Chesterfield Gorge is a superb natural river gorge on the East Branch in West Chesterfield. The gorge is surrounded by sheer granite cliffs and topped with a hemlock and beech forest. It is owned by the Trustees of Reservations, and provides opportunities for picnics, hiking, and exploration of the remains of the High Bridge, part of the Boston to Albany post road.

Glendale Falls in Middlefield is among the largest and most spectacular in the state. Glendale Brook flows through a part of Glendale Farm Meadows and then cascades down a series of falls 100 to 150 feet high. The area affords opportunities for picnics, hiking, nature study, and exploration of historical structures. It is owned by the Trustees of Reservations and managed to preserve its outstanding natural features.

Windsor Jambs in Windsor State Forest is a cascading waterfall that plunges through a 25-foot wide gorge, with 80-foot-high granite walls rising on either side. The Jambs are located in a thick spruce forest highlighted with rolling hills and mountain streams.

West Worthington Falls, sometimes called Thayer Falls, is a series of attractive cascades that fall approximately 50 feet into a rocky gorge on the Middle Branch. The area is privately owned and posted against trespassing. It is certified forestry land, protected under the Massachusetts General Laws Chapter 61, the Forestry Tax Assessment Act.

Tekoa and Shatterack Mountains are two peaks on the Russell/ Montgomery town line along the main stem of the Westfield River which offer scenic views, hiking opportunities, unique natural features, and historical significance. The area is a privately owned, unprotected upon space.

The East Branch "Pork Barrel" wilderness is one of the most wild and scenic portions of the entire river with large, deep pools running over rocks into a four-mile long gorge. This land is located in Chesterfield and much is currently owned by the state Department of Conservation and Recreation (formerly the Department of Environmental Management).

Landscape Character/Historic Resources

The Westfield River flows over 50 miles through 18 towns and travels through 400 years of recorded history. Historic and archeological resources range from early Native Indian sites to the first Keystone Arch Bridge in the country to historically significant buildings and town centers. The resources found along the shores of the river physically trace a history of development in the Westfield River Valley.

The Westfield River Valley's first permanent inhabitants were the Woronoco and Pochassic Indian tribes, members of the Algonquin Nation. The date of their earliest settlement is unknown, but by the year 1500 a village had been established. It was located on the floodplain of the Westfield River near present day city of Westfield. It is also noted that these Indians traded and hunted as far west as the Housatonic and Hudson River valleys.

In the late 1650s, a small number of families from Dorchester, Massachusetts and Windsor, Connecticut settled along the fertile Westfield River floodplain. This resulted in the establishment of Westfield in 1669, which served as a secondary regional core related to, but independent from Springfield, which had been settled some thirty years earlier. Until 1725, Westfield remained the farthest western settlement in Massachusetts.

Most of the hilltowns were originally settled in the mid to late 1700s, first as subsistence farmers with agriculture eventually supporting their economies. The nineteenth century brought improved roads, and eventually, the railroad through the hilltowns. With improved transit, light industry, including mills, emerged. Inhabitants took advantage of the plentiful natural resources.

The turn of the twentieth century brought many changes to the Westfield River valley, notably the rise of the paper industry and the fall of the whip industry (Westfield is still known as "Whip City"). In the hilltowns the decline in agriculture began, along with that of mill and artisan industries. In the lower watershed, paper production grew steadily throughout the basin in the early 1900s. In 1911, Mittineague Paper Company merged with Woronoco Paper to form Strathmore Paper Company. Shortly afterwards, the Westfield River Paper Company started operations in Russell. In 1922, Old Colony Paper Company was founded, and in 1928 Stevens Paper Company was established.

Most industries in the Westfield River Basin did not survive the Great Depression, though some did manage to prosper after World War II. The manufacture of paper, radiators, bicycles, and abrasives continued to be important in the region through the latter half of the twentieth century.

The economy of the Westfield River basin has undergone significant changes over the past decade. Paper companies that were once the mainstay of the region, such as Strathmore Paper and Westfield River Paper, have closed their local operations leaving very few mill industries in the area. This industry shift has led to an increase in economy in transition, with many former industry workers commuting outside the region for employment.

As we begin the twenty-first century, manufacturing has declined, but retail and distribution have increased in the lower watershed relying on the region's transportation corridors. Today, most of the hilltowns are considered bedroom communities with little industry; however, home-based business and local artisans have emerged as popular trends.

Water Resources

According to the U.S. Geological Survey, there are 78 lakes and ponds in the Westfield River basin, 48 of which are greater than 10 acres. Cobble Mountain Reservoir in Blandford, Russell, and Granville is the largest lake in the basin occupying approximately 1,135 acres. Aside from recreation and wildlife habitat, the waters within the Westfield River watershed are used for industrial processing, waste assimilation, hydroelectric power, water storage, and water supply. In all, nearly 6,000 acres of open water exist in the Westfield River watershed.

Outstanding Resource Waters

Over 73,000 acres of the Westfield River watershed have been designated as outstanding resource waters as identified by the Massachusetts Surface Water Quality Standards of 1995 (314 CMR 4.00). According to the regulation, these waters "constitute an outstanding resource as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values." The regulation also states that the quality of these waters shall be "protected and maintained."

Wetlands

Wetlands include rivers, ponds, swamps, wet meadows, beaver ponds, and land within the FEMA-defined 100-year flood area. Wetland areas are home to several watershed species, including several rare, threatened, and endangered species. Wetlands filter toxins improving water quality; provide shellfish and wildlife habitat; and store water. Common wetland plants in Chester include red maple, water lily, arrowheads, cattails, sedges, and many species of ferns.

There are approximately 16,622 acres of wetlands in the Westfield River watershed, nearly five percent of the total area. Identified wetland habitats in the basin occur primarily along streams and rivers as well as in lands adjacent to major ponds. It is important to note that much of the wetland areas in town have not yet been identified by MassGIS or USGS maps and must be identified in the field by wetland scientists.

Wetlands that border rivers and streams are called bordering vegetated wetlands (BVW) and are offered protection by the Massachusetts Wetlands Protection Act and the Rivers Protection Act. Developments within the wetland or the buffer zone are reviewed by the local conservation commission and occur only at their discretion.

State law does not protect non-BVW, called isolated wetlands, unless they are certified vernal pools. Because many basin communities have no local wetlands bylaw, protection of these critical natural areas is not guaranteed.

Major Water Supplies

There are five major water supply reservoirs and one regional aquifer providing public water supply in the Westfield River basin. Borden Brook and Cobble Mountain Reservoir, located in Granville, Blandford, and Russell, are both part of the second largest water supply storage system in the state, serving more than 250,000 people in the Pioneer Valley. The Springfield water system diverts an annual average of 37 million gallons a day from the Westfield basin for use by the municipalities of Springfield, East Longmeadow, Longmeadow, Ludlow, and Agawam.

The Granville Reservoir supplies water to approximately 20,000 Westfield residents. McLean Reservoir, which is located at the basin's eastern periphery, is used as an emergency

Table 7: Drinking Water Supply Reservoirs

DEP ID	Surface Water	Location
1033000-01S	Long Pond Reservoir	Blandford
1059000-01S	Austin Brook Reservoir	Chester
1059000-02S	Horn Pond Reservoir	Becket
1137000-01S	Ashley Reservoir	Holyoke
1137000-03S	Mclean Reservoir	Holyoke
1143000-01S	Cold Brook Reservoir	Blandford
1256000-01S	Upper Black Brook Res.	Blandford
1256000-02S	Lower Black Brook Res.	Russell
1281000-02S	Cobble Mountain Res.	Russell, Blandford, Granville
1281000-03S	Littleville Reservoir	Huntington, Chester
1281000-04S	Borden Brook Reservoir	Blandford
1281000-05S	Holding Pond	Westfield
1325000-01S	Bear Hole Reservoir	West Springfield
1329000-01S	Montgomery Reservoir	Montgomery
1329000-02S	Granville reservoir	Granville

Source: Mass GIS, MA DEP

Table 8:
Primary Sources of Municipal Water Supply Systems

Community	Type	Community	Type
Agawam	SW	Ashfield	PR
Becket	PR	Blandford	SW
Chester	SW	Chesterfield	PR
Cummington	GW	Goshen	PR
Granville	GW	Holyoke	SW
Huntington	GW	Middlefield	PR
Montgomery	PR	Peru	PR
Plainfield	PR	Russell	GW
Savoy	PR	Southwick	GW
Washington	GW	Westfield	GW, SW
West Springfield	SW	Worthington	GW
Windsor	PR		

GW = groundwater **SW** = Surfacewater
PR = private wells, no public system
Source: Mass GIS, MA DEP

back-up water supply for the City of Holyoke. Located south of McLean Reservoir, the Bear Hole Reservoir supplies approximately 21 percent of the City of West Springfield's potable water.

The southern portion of the Barnes Aquifer is located in the Westfield basin in the cities of Holyoke and Westfield. The Barnes Aquifer supplies over five million gallons of water a day to over 60,000 people in four cities and towns and, in recent years, has been under great pressure from commercial and residential development.

Thirteen communities in the Westfield River watershed are served, in part, by municipal water systems. The 10 remaining municipalities in the watershed do not have public water systems and are served only by private groundwater wells.

The Westfield River watershed has 84 non-community water systems served by groundwater wells which serve public populations. These non-community systems are categorized as one of two types: nontransient non-community (NTNC) and transient non-community (TNC). NTNC are those public water systems that are not community system and that regularly serve at least 25 or more of the same persons approximately four or more days per week, more than six months or 180 days per year, such as a workplace providing water to its employees. TNC are public water systems that are not community water systems or non-transient non-community water systems, but public water systems which serve water to 25 different persons at least 60 days of the year.

Wastewater Treatment

There are 11 federally-permitted wastewater discharges to the Westfield River or its tributaries, but only one upstream of Huntington. The U.S. Environmental Protection Agency (EPA) permits point-source discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES). Wastewater effluent from municipal treatment plants in the towns of Westfield, Huntington, and Russell is discharged into the Westfield River. Regulated NPDES permit holders within the watershed are listed in Table 9.

Table 9: Regulated NPDES Dischargers in the Westfield River Watershed

Facility Name	Town	Permit Number	Receiving Waters
Cobble Mountain Station	Westfield	MA0035556	Little River
Decorated Products	Westfield	MAP250228	Westfield River
Fibermark, DSI	West Springfield	MAG250966	Westfield River
Huntington WWTP	Huntington	MA0101265	Westfield River
Jen-Coat, Inc	Westfield	MAG250856	Westfield River
The Maples	Worthington	MA0027871	Wards Brook
Russell WWTP	Russell	MA100960	Westfield River
Texon USA	Russell	MA0005282	Westfield River
West Parish Filters	Westfield	MAG640023	Cooks Brook
Westfield WPCP	Westfield	MA0101800	Westfield River
Woronoco Village WWTP	Russell	MA0103233	Westfield River

Source: EPA Envirotrac Database; DEP

Impaired Waters

The Massachusetts Department of Environmental Protection (DEP) is responsible under Massachusetts General Laws (MGL) Chapter 21 for monitoring the waters of the Commonwealth, identifying those waters that are impaired, and developing a plan to bring them back into compliance with the Massachusetts Surface Water Quality Standards. Ten surface water bodies in the Westfield River Watershed were listed on the 1998 303(d) list of impaired waters (approved by the US EPA in 1999).

For 2002, the Massachusetts DEP developed an integrated list of waters to meet the reporting requirements of sections 305(b) and 303(d). Waters listed in Category 5 constitute the 303(d) List and, as such, are reviewed and approved by the EPA. The remaining four categories are submitted in fulfillment of the requirements under ß 305(b), essentially replacing the old 305(b) Report format. The Draft Massachusetts Year 2002 Integrated List of Waters categorizes state surface waters based on:

Category 1	Unimpaired and not threatened for all designated uses
Category 2	Unimpaired for some uses and not assessed for others
Category 3	Insufficient information to make assessments for any uses
Category 4	Impaired or threatened for one or more uses but not requiring the calculation of a TMDL
Category 4a	TMDL complete
Category 4b	Expected to attain all designated uses in the near future
Category 4c	Impairment not caused by a pollutant
Category 5	Impaired or threatened for one or more uses and requiring a TMDL

(Source: MA DEP)

Five surface water bodies within Westfield River watershed are listed as category 4c waters. Blair Pond in Blandford and the Little River are new additions to the impaired list (category 4c). Connor Reservoir in Holyoke, Crooked Pond in Plainfield, and Damon Pond in Goshen and Chesterfield, which were listed on the 1998 list, are included in category 3 of the Draft Integrated List (no uses assessed).

Table 10: Draft List of Category 4c Waters
(impairment not caused by a pollutant)

Waterbody	Town	Impairment Cause
Blair Pond	Blandford	exotic species
Buck Pond	Westfield	exotic species
Congamond Lakes	Southwick	exotic species
Horse Pond	Westfield	exotic species
Little River	Westfield	flow alteration

Source: Massachusetts DEP, 2001

Waters listed in Category 5 constitute the new 303(d) List. Four surface water bodies within Westfield River watershed are listed as category 5 waters:

Table 11: Draft List of Category 5 Waters
(requiring a TMDL)

Waterbody	Town	Impairment Cause
North Railroad Pond	Holyoke	noxious aquatic plants, turbidity
Pequot Pond	Westfield Southampton	noxious aquatic plants, nutrients, organic enrichment/low DO, (exotic species)
Windsor Pond	Windsor	organic enrichment/low DO, (exotic species)
Powdermill Brook	Westfield	siltation,pathogens, suspended solids, turbidity

Source: Massachusetts DEP, 2001

Section 303 (d) of the Federal Clean Water Act (CWA) requires states to identify water bodies that are not expected to meet surface water quality standards, after implementation of technology-based controls. Development of total maximum daily loads (TMDL) is required for those listed (DEP). Currently, TMDLs do not exist for any water bodies in the Westfield River watershed.

According to the Massachusetts Department of Public Health's Bureau of Environmental Health Assessment, there are no water bodies within the Westfield River basin listed on the Freshwater Fish Consumption Advisory List (June 2002).

Water Quality Impairment Investigation of the Lower Westfield River Watershed, Massachusetts

(Environmental Science Services, 2000)

Environmental Science Services (ESS) conducted water quality sampling in the lower Westfield River watershed to characterize the chemical, physical, and biological properties of the river. The survey was conducted at the request of the Westfield River Watershed Team to further analyze conditions within the river system after water quality monitoring conducted by PVPC and the state DEP revealed impaired water quality in the lower portions of the Main Branch.

Wet weather sampling analyses at 25 of the 51 sampling locations revealed fecal coliform bacteria at concentrations considered impaired by Massachusetts Class B surface water quality standards. Using these same standards, 20 of the 51 sampling locations were considered impaired for nitrate-nitrogen during dry weather sampling. The highest concentration of total phosphorus was detected during wet-weather sampling at Moose Meadow bridge adjacent to the Conrail bridge in Westfield (1.54 mg/L). Fecal coliform bacteria levels were highest in samples taken from White Brook at Park Road in Robinson State Park and Block Brook at the Conrail bridge in Mittineague Park (over 10,000 colonies per 100 ml).

This investigation revealed varying levels of nonpoint source pollution in the Westfield River, especially in the Powdermill Brook subwatershed. Significant sources of nonpoint source pollution identified in the basin included runoff from urban and commercial uses, a state hospital, ongoing construction activities, agricultural land uses, and residential areas. Recommendations from the investigation included agricultural and residential BMPs, public education, and more frequent catch basin cleaning and street sweeping.

Table 12: Sampling Locations with the Greatest Wet Weather Impairments (Lower Basin)*

Location	Impairments				
	FC	TP	TKN	Turb	NO_3
Great Brook at Little River and Feeding Hills Road	X	X			X
Westfield River at Route 5 bridge, W. Springfield	X	X			X
Moose Meadow bridge at Conrail bridge, Westfield	X	X	X	X	X
Powdermill Brook at Routes 10/202 bridge, Westfield	X	X	X	X	
Bush Brook at Pond Brook, Westfield	X	X	X	X	
Unnamed tributary at Route 20 bridge, Westfield	X	X	X	X	
Unnamed tributary at Route 20 bridge, W. Springfield	X	X	X	X	X
White Brook at Park Road, Robinson State Park	X	X	X	X	
Block Brook at Conrail bridge, Mittineague Park	X	X	X	X	
Jack's Brook at City View Blvd bridge, Westfield	X		X	X	
Unnamed tributary to Powdermill Brook at Lockhouse Rd. bridge, Westfield		X	X	X	

FC - Fecal Coliform, **TP** - Total Phosphorus, **TKN** - Total Kjeldahl Nitrogen , **Turb** - Turbidity , **NO_3** - Nitrate-Nitrogen
X indicates impairment based on Massachusetts Surface Water Quality Standards Class B
*Table based on ESS wet weather analyses, 2000

Vegetation

Natural vegetation is both aesthetically pleasing and environmentally beneficial. Vegetation stabilizes slopes, prevents erosion, improves water quality, and provides significant wildlife habitat. The vegetated landscape of the Westfield River watershed is covered with a variety of species common to most of the Pioneer Valley.

Invasive Species

Invasive species are non-native plants that have great potential for rapid colonization. These plants significantly impact the biodiversity of aquatic and upland habitats in our watershed by shading out native plants, offering very little value to wildlife, and degrade water quality. Controlling invasive plants is often very difficult and early detection is vital. Complete eradication of a species can take years and may never be achieved. Although many invasive species exist in the watershed, the most common are:

European Water Chestnut *Trapa natans*
Common Reed *Phragmites australis*
Purple Loosestrife *Lythrum salicaria*
Eurasian Milfoil *Myriophyllum spicatum*
Variable Milfoil *Myriophyllum heterophyllum*
Multiflora Rose *Rosa multiflora* Thunb.
Fanwort *Cabomba caroliniana*
Honeysuckle *Lonicera japonica* Thunb.
Oriental Bittersweet *Solanum dulcamara*
Autumn Olive *Elaeagnus umbellata*
Norway Maple *Acer platanoides*
Japaneese Knotweed *Polygonum cuspidatum*
Barberry *Berberis vulgaris, thunbergii*

Rare and Endangered Species

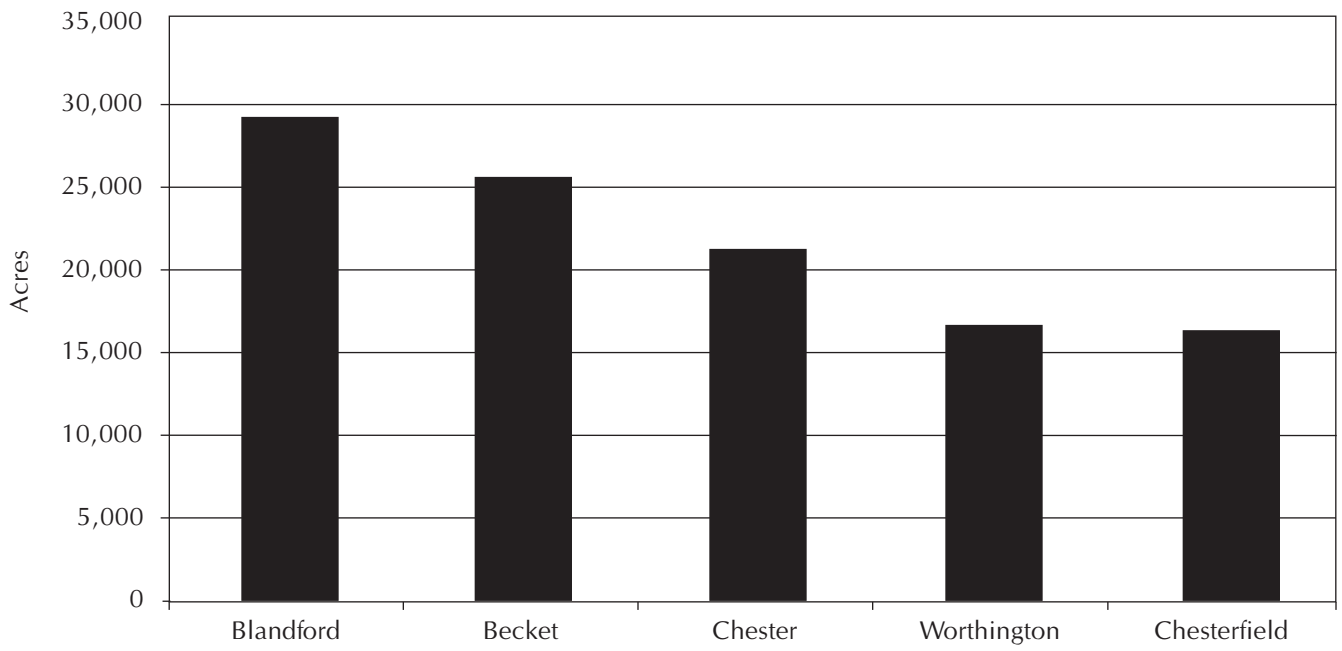
There are 89 species of vascular plants found in the Westfield River valley that are endangered, threatened, or of special concern according to the Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement's (DFWELE) Natural Heritage and Endangered Species Program (2003). Thirty-six species of vascular plants are endangered, 36 are threatened, and 17 are of special concern. A complete list of watershed endangered, rare, and special concern species is included in Table 16. A community listing in included in Appendix E.

Table 13: Dominant Westfield River Basin Species

Wetlands	Old Field Succession	Shrub/Woody Swamp
Cottonwood (T)	White Pine (T)	Red Maple (T)
Silver Maple (T)	Grey Birch (T)	Black Ash (T)
Box Elder (T)	Red Cedar (T)	Slippery Elm (T)
Sycamore (T)	Black/Choke Cherry (T)	Swamp Azalea (S)
Silky Dogwood (S)	Black Locust (T)	Poison Sumac (S)
Alders (S)	Juniper (S)	Alders (S)
Virginia Creeper (V)	*Autumn Olive (S)	Spicebush (S)
Poison Ivy (V)	Staghorn/Smooth Sumac (S)	Meadowsweet (S)
Grape (V)	Sweetfern (S)	Mapleleaf Vibernum (S)
Jewelweed (H)	Grape (V)	Royal Fern (H)
Nettles (H)	Poison Ivy (V)	Cinnamon Fern (H)
Osrich Fern (H)	Virginia Creeper (V)	Sensitive Fern (H)
Turtlehead (H)	Clovers (H)	Jewelweed (H)
	Smartweed (H)	Skunk Cabbage (H)
	Ragweed (H)	*Burning Bush (S)

T= Tree **S**= Shrub **H**= Herb **V**=Vine
* invasive

Figure 7: Communities with the Most Forest Cover



Source: PVPC, Mass GIS Land Use data (1999)

Forests

The Westfield River basin has significant forest resources that can provide a benefit to wildlife and residents. Protecting and enhancing these resources can provide long term economic benefits and protection for the diversity of wildlife species that are fully dependent on the forestlands. Forestry is an important land use and source of employment in the upper Westfield River watershed. Forested lands are, by far, the most predominant land use in the basin communities, covering over 263,000 acres or 79 percent. Over 13 percent of this forested land (42,000 acres) is enrolled in the Commonwealth's Chapter 61 tax deferment program. Figure 7 identifies the communities with the largest amount of forest cover within the Westfield River watershed boundaries.

According to the Massachusetts Audubon Society, there are approximately 300 acres of Old Growth Forest left in the state - found solely in Western Massachusetts.

The economic value and greater value of the forest resources to the communities as a whole extends beyond lumbering and sale of Class I Prime forest species. Trees that are not harvested for their commercial application provide flood mitigation and water supply filtration, which benefits residents and businesses alike. Specifically, these important benefits include:

- Flood control in upland forested areas, where treed slopes can slow storm water runoff and minimize down-stream flood impacts on farms, residences, and businesses
- Flood control in lowlands, where trees can absorb run-off before it reaches surface water sources
- Water supply protection for public and private sources. Trees and shrubs absorbing and filtering pollutants prior to absorption into aquifers, and surface water supplies
- Air quality improvements
- Erosion control, which benefits downhill farming, and water supply and surface water quality
- Recreational opportunities for hiking, biking, skiing, and hunting
- Visual buffers between uses.

Though the public health benefits of maintaining forest resources are extensive, these resources also provide significant wildlife habitat. The extensive forestland in the hills and along riparian corridors provides vital resources for wildlife including:

- Protection and shelter for inland and water-based species such as black bear, moose, and fox
- Nutrient and food source for land and water species
- Contiguous unfragmented habitat
- Nesting areas for indigenous birds such as osprey, duck, and heron
- Seasonal shelter and food source for migratory birds
- Protected breeding areas

Without forested areas, floodwaters from heavy storms would run off more rapidly, raising flood waters and assuring more property and crop damage. Other environmental impacts such as air quality degradation, reduction of visual buffers from adjacent uses, and elimination of habitat could ensue as well. Deforested areas in the hills also could cause impacts on down-gradient properties as the rapid runoff causes erosion of stream banks and hillsides, sending sediment onto farmland and other properties and potentially causing greater damage to homes and businesses during major storm events. Erosion causes streams and rivers to fill with silt, resulting in oxygen deprivation to water plants and animal species, which kills them and causing down-slope wetlands to deteriorate. This in turn would eliminate food sources for migratory birds and land animals.

Finally, the loss of significant forested areas would visually alter the character and reduce the distinctive scenery of the basin.

Watershed forests are predominantly second and third growth forests. Present stands in greater basin elevations range from northern hardwood species with mixed stands of softwood and mixed hardwoods including mixtures of maple, white ash, hemlock, yellow birch, beech, cherry, and white and red oak. The lower basin elevations tend to contain mixed hardwoods and softwoods including red maple, white ash, white pine, oaks, and elms.

Table 14: Common Forest Species in the Westfield River Basin

Oak Forest (Low and Mid-slope)	Oak Forest (Upland)	Northern Hardwoods
Red/White Oak	Chestnut Oak	Hemlock
White Ash	Black/White/Scarlet Oak	White Pine
Black Cherry	Red Maple	American Beech
Ironwood	Pitch/White Pine	Yellow Birch
White/Black Birch	Pignut Hickory	Sugar Maple
Shagbark/Pignut Hickory	White/Black Birch	White Ash
Flowering Dogwood		White Birch
Red Maple		
White/Red Pine		

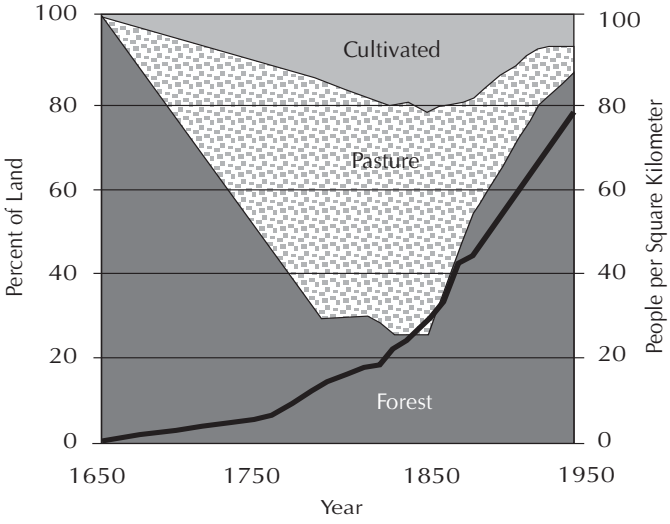
According to Society of American Foresters (SAF), four natural forest vegetation zones exist in the Westfield River watershed: the Spruce-Fir Northern Hardwoods, the Northern Hardwoods-hemlock-white-pine, the Transition Hardwoods-white pine-hemlock, and the Central Hardwoods-hemlock-White Pine.

Forest History

When the first European settlers arrived in New England, land consisted primarily of ancient forest. Forests at the time consisted of oaks and hickories in the lowlands with beech, hemlock, and sugar maple dominating highlands. The small Native American population that occupied Massachusetts at the time managed only a small portion of the forests for game supply, small-scale farming, boat building, and construction. Native Americans were also known to burn small tracts of forest to improve wildlife habitat.

As immigration increased in the early to mid 1700s, New England rapidly became a farming population as the forests were cleared by European settlers for subsistence. Cleared timber allowed for livestock pasture, agriculture, and homesteads. The timber was used to build and heat homes, as well as to construct barns and worm fences.

Figure 8: Changes in Land Use in Massachusetts 1650 to 1950



Source: Forest History Society from http://www.lib.duke.edu/forest/index.html ☐(May, 2003)

After the American Revolution, road networks improved and more land was cleared for increased grain and livestock production. By the early nineteenth century, mills, tanneries, and brickyards emerged, requiring consuming additional wood for fuel and construction. Industrious residents continued to increase livestock and agricultural production, directly supporting the growing cities of New York, Boston, and Providence. By mid-century, however, farmers found themselves abandoning lands as the railroads emerged and brought in cheaper grain and livestock from the western states. By 1870, with nearly half the open land out of production, forest succession began to reclaim the Massachusetts landscape.

White pine forests quickly developed on abandoned agricultural fields and soon became marketable in the region. The pine was light, easily worked, and used for many products such as packing materials, toys, and woodenware. The better stands were even used as framing lumber. Portable sawmills emerged across New England into the early twentieth century as stands of white pine continued to be clear-cut. Soon, shade-tolerant hardwoods began to emerge in the open spaces and understories and native forests re-emerged. Diverse species with differing growth rates brought post-agricultural vegetation that supported a wide range of wildlife habitats. Mixed hardwood stands continued to develop throughout the early to mid-1900s, with red oaks becoming the dominant species of the new forest.

Today, the region's forests continue to mature as farm abandonment continues and the landscape becomes more populated. Current logging activity has not kept up with forest growth leading to larger, older trees and increased timber volume. The region's forests are generally well aged; however, examples of poor management and over-cutting have been identified. The forests of western Massachusetts lack a diverse age structure, woody debris, and snags. Younger seedlings and older, large saw timber are generally under-represented, with saw timber dominating the region. A more diverse forest structure can lead to an increase in wildlife species diversity and a decrease in loss due to insects and disease. According to the U.S. Forest Service, a diverse forest structure consists of 10 percent seedlings, 30 percent saplings and poles, 50 percent saw timber, and 10 percent large saw timber.

Major Forest Managers and Owners in the Watershed

- The Commonwealth of Massachusetts Department of Conservation and Recreation (formerly DEM)
- The Commonwealth of Massachusetts Department of Fish and Game (formerly DFWELE)
- The City of Springfield
- Hull Forest Products
- The Trustees of Reservations (TTOR)
- The New England Forest Foundation (NEFF)

The Massachusetts Forest Cutting Practices Act (FCPA)

The Massachusetts FCPA was created to ensure the long-term public benefits provided by forests. The FCPA states that public welfare requires the rehabilitation, maintenance, and protection of forestlands for the purposes of conserving water, preventing floods and soil erosion, improving conditions for wildlife and recreation, and insuring a continuous supply of wood.

The FCPA protects the benefits of forests through a permitting process. Applicable to timber harvesting on both public and private forestland, the FCPA regulates any commercial timber cutting of wood products greater than 25 thousand board feet or 50 cords on any parcel of land at any one time. Activities exempt under the FCPA include harvesting for:

- Rights-of-way for public utilities and public highways
- Cultivation, pasture or pasture maintenance
- Non-commercial use of the landowner or tenant
- Changing land use when permitted by town or city
- Small commercial harvests (however, a cutting plan may be filed to gain exemption to M.G.L. Ch. 131 the Wetlands Protection Act if wetland resources are involved)

If an activity is not exempt, the FCPA requires filing a forest cutting plan with the Department of Environmental Management (DEM) and the local conservation commission at least 10 business days before the proposed start date. Once a properly prepared forest cutting plan is received by the DEM, the local service forester has ten business days to review the plan for compliance. The service foresters review the wetland mapping, ensure that best management practices are correctly identified to protect water resources, and that the standards for forest regeneration are being met. After a site visit, the service forester can approve the plan, ask for further clarification or information, or disapprove the plan.

Proposed Forest Legacy Area

The Nature Conservancy (TNC) is proposing a new Forest Legacy Area that touches portions of Berkshire, Franklin, Hampshire, and Hampden counties including much of the Westfield River watershed. This program is funded by the USDA Forest Service and administered in Massachusetts by the Department of Environmental Management Bureau of Forestry. This program identifies environmentally important private forestlands and protects them through acquisition or the purchase of conservation restrictions. The maximum federal contribution for acquisition or restrictions under this program is 75 percent with a minimum non-federal match of 25 percent. Landowner participation in this program is completely voluntary.

Fisheries and Wildlife

Fisheries

The East, Middle, and West branches of the Westfield River support naturally reproducing or wild populations of brown and brook trout (*Salmo trutta* and *Salvelinus fontindis*), according to the Massachusetts Division of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE). DFWELE classifies such naturally reproducing trout populations as a "critical resource" due to their rarity in Massachusetts. Trout require exceptionally clear, cold waters in which to reproduce. Development can play a crucial role in degrading the pristine water quality to support these species of fish.

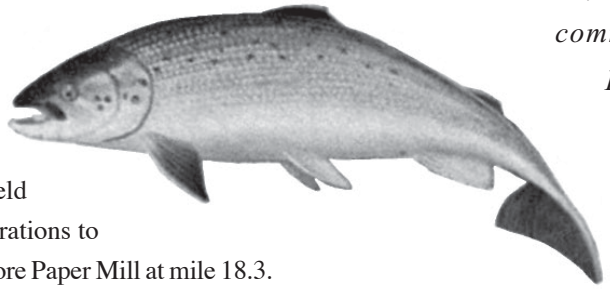
The Westfield River is an important component in federal and state efforts to restore Atlantic salmon and other anadromous species to Massachusetts. As part of this restoration program, members of the U.S. Department of Fish and Wildlife and the Massachusetts DFWELE have been working together to improve anadromous fish populations and fish passage along all reaches of the Westfield River. This project has involved extensive research, stocking, and monitoring programs, and has

Table 15: DSI Fish Ladder Fish Counts

Species	1996	1997	1998	1999	2000	2001	2002
American Shad	1,413	1,012	2292	2,668	3,558	4,720	2,762
Blueback Herring	1	0	2	0	0	2	4
Sea Lamprey	4,699	2,255	1756	643	2,040	2,345	3,638
Striped Bass	0	0	5	0	0	2	0
Atlantic Salmon*	19	37	47	17	11	8	5
Gizzard Shad	0	0	1	1	122	0	1
White Sucker	4,699	2,255	5,515	1,227	3,158	3,735	2,242
Small-mouth Bass	110	64	149	109	207	129	146
Brown Trout	12	77	210	162	77	116	160
Rainbow Trout	91	8	18	3	9	18	9
Brook Trout	7	12	42	23	9	8	9
Tiger Trout	0	0	44	103	44	34	90

*Adult Atlantic salmon were netted at the base of the dam from 1992-1995
Source: Slater, Job Performance Report, 2002

been relatively successful due to intensified efforts in the past decade. According to recent research, the adult salmon range on the Westfield River extends into the towns of Cummington and Windsor on the East Branch and up through Becket on the West Branch.



As part of the federal and state restoration program, a fish ladder was installed at the Rexam/DSI facility in West Springfield in 1996. This fish passage, located at mile 3.7 of the main stem of the Westfield River, allows anadromous fish migrations to continue upstream until the Strathmore Paper Mill at mile 18.3. The fish ladder also acts to trap Atlantic salmon that are then transported to a fish hatchery for brood stock development. Also in recent years, 10 percent of all salmon trapped at the fish ladder have been released above Knightville Dam in Huntington, from which point the fish can return to their natural spawning site. Table 15 lists the yearly passage totals of fish at the DSI fish ladder along the Westfield River in West Springfield.

Restoration of the Atlantic salmon to the Westfield and Connecticut Rivers is a process that may take decades to complete. To date, the program has been successful in returning salmon to the rivers; however, many factors influence the return rates to the river. According to the U.S. Fish and Wildlife Service:

The number of adult salmon returning to the river is determined by several key factors: the number of smolts leaving the river, the natural mortality of those smolts, and the commercial harvest at sea. Each of these factors is influenced by many other variables. For example, the number of smolts returning each year depends on the number of fry stocked years earlier, the weather during subsequent growing seasons, the impact of predation during seaward migration, the number of smolts killed by hydroelectric turbines, and the river flow during smolt migration. Even in a native salmon population, all of these environmental factors vary, resulting in naturally fluctuating adult salmon runs from one year to the next, regardless of human influence.

Return rates for Atlantic salmon continue to fluctuate; however, today the Westfield River provides a place of suitable habitat for the salmon and that is perhaps more important than the return numbers.

The Atlantic Salmon Egg-Rearing Program (ASERP) was developed by Trout Unlimited with the assistance of the Massachusetts Division of Fisheries & Wildlife and the U.S. Department of Fisheries and Wildlife. The Westfield River Watershed Association (WRWA) has facilitated the program with participation from watershed schools since 2000. The ASERP is an offshoot of state and federal agency projects designed to reintroduce Atlantic salmon, and other fish species that were once abundant here, to the Connecticut River and its tributaries. The WRWA provides equipment and technical assistance to schools that house the eggs and fry until they are released to watershed streams in the spring.

Wildlife

The Westfield River basin also provides habitat to a wide range of mammals because of its large blocks of contiguous forests and exceptional water quality. These tracts provide a vital habitat link from the mid-Atlantic through the Northern Appalachians. Watershed species are numerous: white-tailed deer, black bear, mink, bobcat, fisher, red and grey fox, grouse, and the state endangered American Bittern.

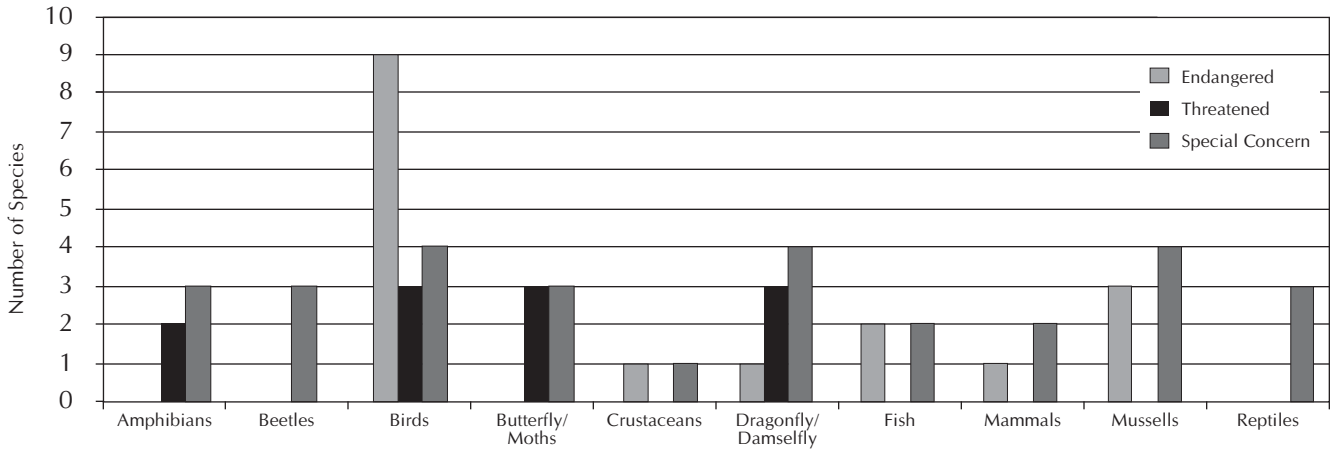
There are four species of fish and 52 additional species of animals found in the Westfield River basin listed as endangered, threatened, or of special concern by the Commonwealth's Natural Heritage and Endangered Species Program (NHESP). In addition, two federally listed rare species and 13 TNC ecoregional target species have been recorded in the watershed. A complete list of state endangered, rare, and special concern species is included in Table 16.

Rare Species in the Westfield River Watershed

This section prepared by the Massachusetts Natural Heritage & Endangered Species Program, June 2003

Eighty-nine state-listed rare species have been documented from the Westfield River watershed, according to Natural Heritage records. This represents more than 20 percent of the state's total of 448 rare species, a considerable proportion of the state's rare biodiversity. Fifty of these 89 species are plants. Fact sheets outlining the natural history and habitat requirements of many of these species are available on the Natural Heritage web site, http://www.state.ma.us/dfwele/dfw/nhesp/ and the rest can be ordered from Natural Heritage by calling

Figure 9: Distribution of Species by Taxonomic Group



Source: NHESP, 2003

Table 16: Rare Species of the Westfield River Watershed

Scientific Name	Common Name	State Status
Apodrepanulatrix liberaria	New Jersey Tea Inchworm	E
Bartramia longicauda	Upland Sandpiper	E
Botaurus lentiginosus	American Bittern	E
Carex baileyi	Bailey's Sedge	E
Carex lupuliformis	False Hop-Sedge	E
Carex mesochorea	Midland Sedge	E
Carex michauxiana	Michaux's Sedge	E
Cerastium nutans	Nodding Chickweed	E
Cistothorus platensis	Sedge Wren	E
Claytonia virginica	Narrow-Leaved Spring Beauty	E
Couesius plumbeus	Lake Chub	E
Cyperus houghtonii	Houghton's Flatsedge	E
Doellingeria infirma	Cornel-Leaved Aster	E
Eulimnadia agassizii	Agassiz's Clam Shrimp	E
Gentiana andrewsii	Andrews' Bottle Gentian	E
Gomphus descriptus	Harpoon Clubtail	E
Halenia deflexa	Spurred Gentian	E
Juncus filiformis	Thread Rush	E
Ludwigia polycarpa	Many-Fruited False-Loosestrife	E
Mimulus moschatus	Muskflower	E
Moehringia macrophylla	Large-Leaved Sandwort	E
Morus rubra	Red Mulberry	E
Rotala ramosior	Toothcup	E
Senna hebecarpa	Wild Senna	E
Sorbus decora	Northern Mountain-Ash	E
Spiranthes romanzoffiana	Hooded Ladies'-Tresses	E
Trisetum triflorum ssp molle	Spiked False Oats	E
Vermivora chrysoptera	Golden-Winged Warbler	E
Viola nephrophylla	Northern Bog Violet	E
Name not revealed	*2 species*	E
Adlumia fungosa	Climbing Fumitory	T
Agrimonia pubescens	Hairy Agrimony	T
Ambystoma opacum	Marbled Salamander	T
Amelanchier bartramiana	Bartram's Shadbush	T
Ammodramus savannarum	Grasshopper Sparrow	T
Arabis laevigata	Smooth Rock-Cress	T
Arabis missouriensis	Green Rock-Cress	T
Asclepias verticillata	Linear-Leaved Milkweed	T
Carex alopecoidea	Foxtail Sedge	T
Dichanthelium scabriusculum	Rough Panic-Grass	T
Eriophorum gracile	Slender Cottongrass	T
Gomphus quadricolor	Rapids Clubtail	T
Lipocarpha micrantha	Dwarf Bulrush	T
Milium effusum	Woodland Millet	T
Ophiogomphus carolus	Riffle Snaketail	T
Pieris oleracea	Eastern Veined White	T
Platanthera dilatata	Leafy White Orchis	T

Table 16 Rare Species of the Westfield River Watershed (continued)

Scientific Name	Common Name	State Status
Platanthera flava var herbiola	Pale Green Orchis	T
Pooecetes gramineus	Vesper Sparrow	T
Ranunculus pensylvanicus	Bristly Buttercup	T
Rhodoecia aurantiago	Orange Sallow Moth	T
Scaphiopus holbrookii	Eastern Spadefoot	T
Sphenopholis nitida	Shining Wedgegrass	T
Zanclognatha martha	Pine Barrens Zanclognatha	T
Acer nigrum	Black Maple	SC
Alasmidonta undulata	Triangle Floater	SC
Ambystoma jeffersonianum	Jefferson Salamander	SC
Amelanchier sanguinea	Roundleaf Shadbush	SC
Arceuthobium pusillum	Dwarf Mistletoe	SC
Boyeria grafiana	Ocellated Darner	SC
Carex hitchcockiana	Hitchcock's Sedge	SC
Catostomus catostomus	Longnose Sucker	SC
Cicindela duodecimguttata	Twelve-Spotted Tiger Beetle	SC
Clematis occidentalis	Purple Clematis	SC
Clemmys guttata	Spotted Turtle	SC
Clemmys insculpta	Wood Turtle	SC
Desmocerus palliatus	Elderberry Long-Horned Beetle	SC
Enallagma carunculatum	Tule Bluet	SC
Equisetum scirpoides	Dwarf Scouring-Rush	SC
Eubranchipus intricatus	Intricate Fairy Shrimp	SC
Gomphus borealis	Beaverpond Clubtail	SC
Gyrinophilus porphyriticus	Spring Salamander	SC
Hemidactylium scutatum	Four-Toed Salamander	SC
Itame sp 1 near inextricata	Pine Barrens Itame	SC
Liatris borealis	New England Blazing Star	SC
Limnadia lenticularis	American Clam Shrimp	SC
Myotis leibii	Eastern Small-Footed Bat	SC
Oporornis philadelphia	Mourning Warbler	SC
Panicum philadelphicum	Philadelphia Panic-Grass	SC
Papaipema sp 2 near pterisii	Ostrich Fern Borer Moth	SC
Podostemum ceratophyllum	Threadfoot	SC
Ribes lacustre	Bristly Black Currant	SC
Somatochlora elongata	Ski-Tailed Emerald	SC
Sorex palustris	Water Shrew	SC
Strophitus undulatus	Creeper	SC
Terrapene carolina	Eastern Box Turtle	SC
Waldsteinia fragarioides	Barren Strawberry	SC
Name not revealed	*1 species*	SC

Source: the Massachusetts Natural Heritage & Endangered Species Program, June 2003

Notes: **E** – Endangered; **T** – Threatened; **SC** – Species of Special Concern.
Natural Heritage does not reveal the name of some species that are particularly susceptible to over-collection.

(508) 792-7270 x200. Protecting such a wide diversity of rare species will involve protecting an equal diversity of their habitats, everywhere from vernal pools and riverine corridors to ridgetops and diverse deciduous forests.

Rare animals in the watershed range from the endangered American Bittern, found in marshes, to the threatened Pine Barrens Zanclognatha moth, of pitch pine-scrub oak barrens, to the special concern Ocellated Darner dragonfly, found in shallow, fast, rocky rivers. Protecting rare animals often involves protecting large tracts of land, where several interconnected populations of the animal can breed successfully over many years. For example, wood turtles live along slow-moving streams, spending some of their time in the water and some in the adjacent uplands, mostly within about 300 meters on either side of the stream. Their home range is about seven and a half to 12 acres (three to five hectares), which means that an individual wood turtle travels a considerable distance along a stream in the course of its activities. The greatest threats to wood turtles are roads, on which turtles are killed by vehicles as the turtles move along a stream or to upland nesting sites, and nest predators, such as raccoons and skunks, which tend to live in greater numbers around human dwellings. Thus, to protect a population of wood turtles, long, uninterrupted sections of streams and adjacent uplands must be protected. The best and most accessible indicators of the areas needed for viable populations of terrestrial and most wetland rare species are the core habitats of the BioMap recently produced by the Natural Heritage and Endangered Species Program. For aquatic species, the equivalent areas are the core habitats of the Living Waters map, due to be released by the Natural Heritage Program in early summer, 2003.

The rare plants of the Westfield River watershed range from those of specialized habitats, such as the Large-leaved Sandwort, found only on serpentine ledges, to plants of Sugar Maple-dominated woods, such as the Woodland Millet, to the Pale Green Orchis found in wet meadows. Protecting these species involves protecting their particular habitats from development or other threats, such as changes in water quality or quantity, or succession to dense forests. As many of the rare plants are associated with the river valleys, where the rivers have cut down through rich bedrock, protecting the steep valleys of the Westfield and its tributaries will help ensure good water quality and the preservation of rare plants. The most viable populations of rare plants are delineated as core habitats on the BioMap and Living Waters map.

Biodiversity

BioMap Core Habitat and Supporting Natural Landscape

The Westfield River basin contains approximately 51,240 acres of BioMap core habitat and 146,000 acres of supporting natural landscape. According to NHESP Mass GIS data, 15 percent of the total land area in the Westfield River watershed is core habitat and 44 percent is supporting natural landscape. While the Westfield River basin only accounts for 4.8 percent of the Commonwealth's total land area, it contains 15.1 percent of its BioMap supporting natural landscape.

The Massachusetts Division of Fisheries and Wildlife's NHESP developed the BioMap to identify the areas most in need of protection in order to protect the native biodiversity of the Commonwealth. BioMap focuses primarily on state-listed rare species and exemplary natural communities but also includes the full breadth of the State's biological diversity.

BioMap core habitats are areas with the highest priority for conservation and biodiversity conservation. They represent the sum total of viable rare plant habitat, viable rare animal habitat, and viable exemplary natural communities. BioMap Supporting Natural Landscapes are the most intact lands adjacent to and near core habitat areas. These lands provide linkages between habitats, buffer core habitat, and are thought to contain rare species not yet discovered.

Vernal Pools

Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rising ground water and rainfall and remain ponded through the spring and into summer. Some vernal pools are protected in Massachusetts under the Wetlands Protection Act regulations, as well as several other federal and state regulations, and local bylaws.

Table 17: Potential Vernal Pools by Municipality

Agawam	16
Ashfield	17
Becket	39
Blandford	44
Chester	54
Chesterfield	37
Cummington	32
Goshen	8
Granville	37
Holyoke	21
Huntington	25
Middlefield	41
Montgomery	22
Peru	17
Plainfield	43
Russell	16
Savoy	13
Southwick	40
Washington	13
West Springfield	52
Westfield	68
Windsor	15
Worthington	64

Source: PVPC, NHESP

The NHESP serves the important role of officially "certifying" vernal pools that are documented by citizens. Finding vernal pools is the first step for protection. According to NHESP, 52 vernal pools within the Westfield basin have been certified in only seven communities. The Massachusetts aerial photo survey of potential vernal pools has been produced by the NHESP to help locate likely vernal pools; 748 potential vernal pools have been identified throughout the basin using this survey. Communities with certified vernal pools in the basin include:

- Becket (6)
- Cummington (3)
- Holyoke (8)
- West Springfield (29)
- Huntington (2)
- Westfield (3)
- Southwick (1)

Natural Communities in the Westfield River Watershed

Seventeen different types of natural communities have been documented in the Westfield River watershed. Many of these are large or good-condition examples of common natural communities, such as Northern Hardwoods - Hemlock - White Pine Forest. Several are uncommon statewide, such as Hickory – Hop Hornbeam Forest/Woodland and High-Terrace Floodplain Forest. More information on each of these community types is available from the draft Classification of the Natural Communities of Massachusetts, produced by the Natural Heritage Program and available online at http://www.state.ma.us/dfwele/dfw/nhesp/nhclass.htm. The best examples of these communities are mapped in the BioMap. There are also at least two bat hibernacula in the watershed.

Biodiversity Significance of the Westfield River Watershed

The Nature Conservancy (TNC), an international non-profit conservation group, has identified the Westfield River basin as an ecoregional priority area. Massachusetts has had a TNC chapter since 1992 with 30,000 members and over 15,000 acres protected to date in the State. The Conservancy's mission is to preserve the plants, animals and natural communities that rep-

Table 18:
Natural Communities of the Westfield River Watershed

Natural Communities
Acidic Graminoid Fen
Circumneutral Talus Forest/Woodland
Forest Seep Community
Hemlock Ravine Community
Hemlock-Hardwood Swamp
Hickory - Hop Hornbeam Forest/Woodland
High-Energy Riverbank
High-Terrace Floodplain Forest
Level Bog
Northern Hardwoods - Hemlock - White Pine Forest
Pitch Pine - Scrub Oak Community
Rich, Mesic Forest Community
Ridgetop Chestnut Oak Forest/Woodland
Ridgetop Pitch Pine - Scrub Oak Community
Riverside Rock Outcrop Community
Shrub Swamp
Spruce-Fir Boreal Swamp

Source: NHESP, June 2003

resent the diversity of life on Earth by protecting the lands and waters they need to survive.

In pursuit of that mission, the Massachusetts Chapter, cooperating with neighboring states and many partners, has been engaged in a scientific planning exercise that has ranked regional forest resources. Within the Lower New England/Northern Piedmont ecoregion—an area that stretches from Maryland to Maine and comprises parts of 12 states, TNC identified several large forest blocks ("matrix forests") on the Berkshire plateau as being among the highest priorities for conservation. These blocks represent the highest quality and least fragmented areas of their kind in the Northeast, and thereby represent biodiversity of global significance.

The Westfield River Watershed area is unique for its integration of intact forest, aquatic systems, and embedded wetlands. The forests provide a link between the forests of northern New England with those of southern New England and the mid-Atlantic states to the south. They provide opportunities for movement of wide-ranging species across the landscape as well as high quality breeding habitat for interior nesting neotropical migrant birds.

In 2002, the major aquatic systems of this area, including the mainstem of the Westfield and its three main tributaries, were identified as ecoregional priorities. The upper reaches of the watershed offer exceptional habitat for coldwater fish and juvenile Atlantic salmon; the lower mainstem provides high quality spawning habitat for three species of migratory fish (American shad, blueback herring, and sea lamprey).

By definition, matrix forests are large forested areas that, if allowed to regain their natural condition, will maintain ecological processes and provide habitat necessary to support many natural communities and species populations. The site encompasses patch targets including acidic peatlands and a pitch pine-scrub oak ridgetop community. Thirty nine state-listed rare species, two federally-listed species, and thirteen TNC ecoregional target species have been recorded in the area. The Westfield is a recovered and recovering landscape – one that was completely cleared in the early 1800's – and it offers one of the last opportunities for large-scale forest and aquatic system conservation in southern New England.

Threats to the Watershed as Determined by TNC

Approximately 70 percent of the Westfield River Watershed's forested areas lack formal protection, leaving much of it vulnerable to development, utilities, and new roadways, including a proposed Mass Turnpike exit. In addition to the loss of forest, this kind of development often leads to the division of land parcels, which fragments habitat and complicates protection efforts.

Within the forest, threats include the spread of non-native weeds that suppress indigenous plant species, insect infestations (such as hemlock wooly adelgid), existing land management and logging practices that do not fully support biodiversity, and dams and water withdrawal practices that impact passage of both resident and migratory fish. One of the biggest threats to the landscape is the insidious creep of hard-to-measure threats such as non-point source pollution, land ownership fragmentation, and unplanned forest cutting. It is important to develop and begin to implement strategies to address the creep of degradation across this landscape while the opportunity still exists.

Environmental Challenges

The following challenges are regional issues identified by the Westfield River OSRP Advisory Committees and the general public. Environmental challenges are issues that could potentially degrade recreational opportunities and environmental quality in the Westfield River basin, and include:

- Maintenance and management of unfragmented forests
- Loss of significant wildlife habitat to development
- Deteriorating roads, bridges, and culverts
- Failing septic systems and Title 5 code changes
- Non-point source pollution
- Trail erosion from motorized vehicles
- Lack of public access points to river
- River bank erosion and sediment control

EXISTING OPEN SPACE AND RECREATION LANDS

Methodology for Municipal Open Space Inventories

Advisory committee members, town employees, and other volunteers updated open space inventories for individual watershed communities. The municipalities of West Springfield, Westfield, Agawam, and Holyoke employ GIS and planning coordinators who accomplished this work. Updates for the town of Ashfield were accomplished by the Franklin Regional Council of Government (FRCOG). Volunteers in the municipalities of Montgomery, Peru, and Worthington were not available for complete updates. The following process was utilized:

I. **Distribution of land ownership and protection maps to community representatives.** Two maps were distributed to each community representative. One map showed the ownership and level of protection, along with a spreadsheet of the available data about the properties. The other map was an orthophoto illustrating property boundaries and IDs.

II. **Municipal review of land ownership and protection maps.** The maps were reviewed making note of:
   - Missing properties
   - Property that is not recreational or protected in some form
   - Property boundaries shown wrong
   - Missing or incorrect data

III. **Obtain assessor's tax maps for incorrect or missing properties.** New or corrected base data was required to ensure accurate processing into the digital GIS format.

IV. **Complete individual property worksheets:** Work sheets provided data on what land in the community is protected, has limited protection, temporarily protected, or is unprotected.

V. **Return maps with worksheets to PVPC:** Maps and worksheets were returned to PVPC for digital editing based on comments and new data.

Summary of Open Space and Recreation Lands

Approximately 138,000 acres (42 percent) of the Westfield River basin is considered protected in some manner; however, only 25 percent is considered permanently protected. Over fifty percent of the basin's open space and recreation land is privately owned with 43 percent being private for profit. The Commonwealths' Department of Environmental Management (DEM) and Division of Fisheries, Wildlife, and the Springfield Water and Sewer Commission are the largest landowners in the watershed. The ten largest owners of watershed land own 50 percent of the protected land.

Twenty-five percent of the basin is owned by various state agencies with municipalities owning another 21 percent. Private landowners own 43 percent of protected lands.

Figure 10: Ownership of Watershed Open Space and Recreation Land

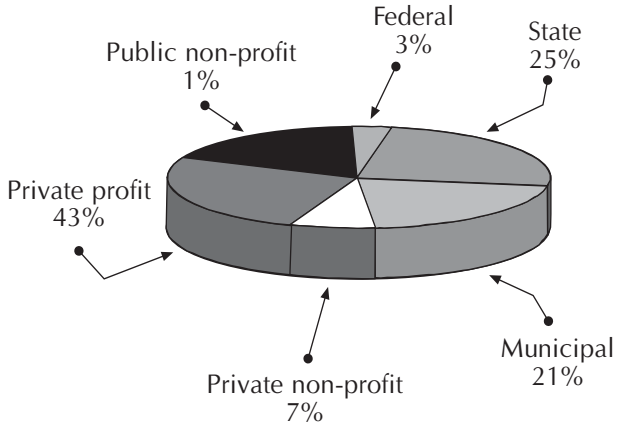


Table 19: Largest Watershed Landowners

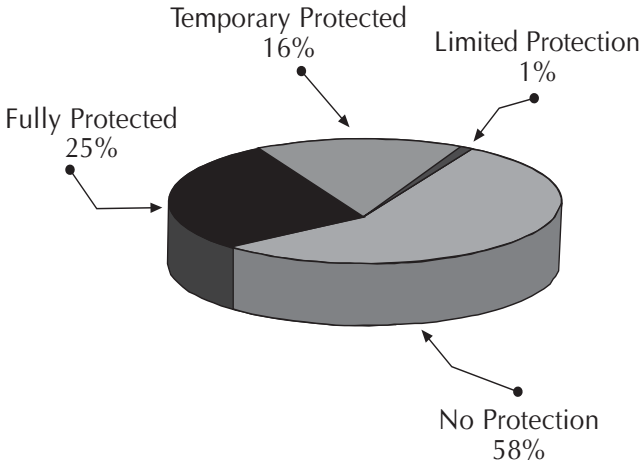
Owner	Acres
Division of State Parks and Recreation (formerly the Department of Environmental Management -DEM)	22,567 15% of all protected land
City of Springfield/Water and Sewer Commission	14,128
Department of Fish and Game (formerly the Division of Fisheries, Wildlife, and Environmental Law Enforcement	13,809
City of Westfield	7,578
Army Corp of Engineers	3,895
The Trustees of Reservations	3,431
Town of Russell	3,030
City of West Springfield	2,096
City of Holyoke	1,400
YMCA	1,382
subtotal	**73,316** 50% of all protected land

Nearly 4,000 acres of land (3 percent) in the watershed are protected from development through the use of Agricultural Preservation Restrictions (APR) administered by the Massachusetts Department of Food and Agriculture (DFA). Conservation restrictions are used to protect another 3,000 acres. Approximately 69,000 acres are temporarily protected through the Commonwealth's Chapter 61, 61A, and 61B tax deferment programs. The Chapter 61 program alone protects approximately 41,500 acres of actively managed forest land in the basin.

Table 20: Private Ownership of Open Space and Recreation Lands

Type	Acreage
APR land	3,948
Conservation Restrictions	2,881
c. 61	41,565
c. 61A	20,746
c. 61B	6,291
Unknown c. 61	284
Total	**75,715**

Figure 11: Protection Level of Watershed Lands



Recreational Resources

The Westfield River Basin Provides a wealth of recreational activities including:

- biking (mountain and road)
- birding
- hiking/snowshoeing
- skiing (alpine and x-country)
- rock climbing
- boating (inc. whitewater)
- golfing
- sledding
- snowmobiling
- fishing
- swimming
- camping
- horseback riding
- hunting
- hot-air ballooning
- sport shooting

Water Recreation

The Westfield River provides about 20 miles of class III or IV whitewater canoeing. The river provides exciting and challenging canoeing opportunities. The Appalachian Mountain Club canoe guide rates the scenery along most segments as good or excellent. The Westfield River's whitewater boating opportunities are "regionally rare" according to the National Park Service (1992). The Westfield River provides the only high turbulence whitewater boating opportunities in the state that are not dam regulated.

The Westfield River has been rated as one of the best cold water fisheries in Massachusetts by the New England River Basin Commission, providing excellent opportunities for sport fishing.

The town of Huntington annually hosts the Westfield River Whitewater Races. The popularity and value of the Westfield River as a recreational resource was evidenced by its selection for major regional and national whitewater river race events. The Westfield Canoe Club, Inc. hosted the Whitewater Open Canoe Downriver National competition in April of 1993. One of the key factors in locating the race was because the Westfield River Route 20 and Route 112 connections offer the best site for spectators of any other race throughout the United States. This event, combined with the 40th Annual Westfield Whitewater Canoe Race, creates a ten-day span of events that draws approximately 3,000 race participants and 10,000 to 20,000 spectators, for a total influx of 13,000 to 23,000 visitors.

Trails

The Westfield basin is traversed by hundreds of miles of trails. From fire roads and abandoned county roads to single-track, these trails afford important human linkages while providing needed resources for escape and relaxation.

Recent efforts funded by the former Massachusetts Watershed Initiative have led to the mapping of "official" trails in the watershed. Hundreds of miles of unofficial trails exist in the basin, unmapped –mostly due to legal issues.

The WRWSAC and the Geography and Regional Planning Department at Westfield State College (WSC) have both recently completed regional trail mapping projects in the upper and lower watershed. Watershed trails can also be mapped using the watersheds' interactive online atlas at http://river.wsc.ma.edu/.

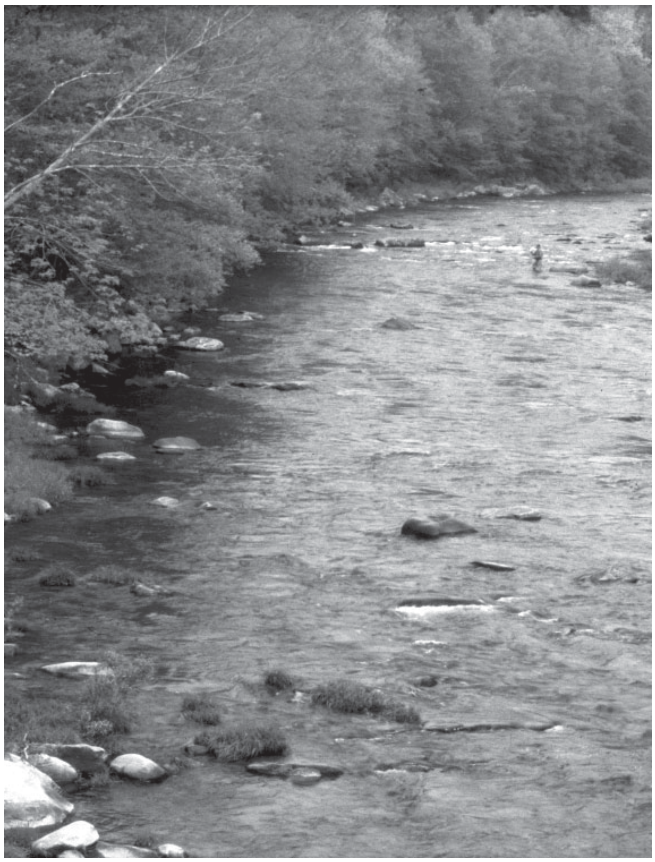
The WRWSAC has recently begun creating a trail network along the East Branch of the Westfield River that aims at connecting unique natural, geological, cultural and historical features to the communities. In addition they have recently distributed the first edition of a quarterly newsletter about the project.

The Metacomet-Monadnock (M-M) trail is a national recreation trail that meanders through the Westfield River water-

Table 21: Location of Watershed Trails

Location of Watershed Trails
Appalachian Trail -*Washington, Becket*
Chester Blandford State Park -*Chester, Blandford*
Chesterfield Gorge -*Chesterfield*
Connecticut River walk and Bikeway -*Agawam*
Dead Branch State Forest -*Chesterfield*
Deer Hill State Reservation -*Cummington, Plainfield*
Fox Den WMA -*Worthington*
Gardner State Park -*Huntington*
Granville State Forest -*Granville*
Huntington State Forest -*Huntington, Montgomery*
J.J. Kelly WMA -*Chester*
Keystone Arch Bridges Trail -*Chester, Middlefield*
Knightville Recreation Area -*Huntington*
Krug Sugarbush -*Chesterfield*
Littleville Recreation Area -*Huntington, Chester*
Metacomet-Monadnock Trail -*Agawam, Westfield, West Springfield, Holyoke*
Mittineague Park -*West Springfield*
Noble View (AMC) -*Russell*
Notchview Reservation -*Windsor*
October Mountain State Park -*Washington, Becket*
Robinson State Park -Westfield, *Agawam*
Savoy Mountain State Forest -*Savoy*
Stanley Park -*Westfield*
Tekoa/Shatterack Mountians -*Russell, Montgomery*
Walnut Hill WMA -*Middlefield*
Westfield Riverside Trail -*Westfield*
William Cullen Bryant Homestead -*Cummington*
Windsor State Forest -*Windsor, Savoy*

Source: Westfield River Watershed Upper and Lower Trail Inventories



shed. In all, 12 miles of the 117-mile trail pass through the watershed communities of Agawam, West Springfield, Westfield, and Holyoke. The M-M trail was originally built by the late Professor Walter M. Banfield in the 1950's, and has been evolving ever since. It passes through some of the prettiest landscape in Western Massachusetts, including the Mt. Tom State Reservation, and Skinner State Park (Appalachian Mountain Club).

In December 2002, the President signed Public Law 107-338 directing the National Park Service to study the Metacomet-Monadnock-Mattabesett trail system in Connecticut and Massachusetts for possible inclusion in the National Trails System. This study began in the fall of 2003.

Key Lands of Conservation and Recreational Interest

Approximately 42 percent of the Westfield River basin is considered protected in some manner with 25 percent considered permanently protected. The largest tracts of open space in the basin include:

Springfield Water Supply Land	12,129 acres
Peru Wildlife Management Area	3,454 acres
Middlefield State Forest	3,397 acres
Fox Den Wildlife Management Area	3,390 acres
October Mountain State Forest	3,116 acres
Chester-Blandford State Forest	2,790 acres
Peru State Forest	2,725 acres
Hiram H. Fox Wildlife Mgt.Area	2,639 acres
Gilbert A. Bliss State Forest	2,279 acres

The following tables list the locations and acreage of significant conservation and recreation lands in the Westfield River watershed. Parcels less than one acre is size and cemeteries have been omitted from the tables.

In addition to the state, federal, non-profit, and municipally owned parcels listed above, nearly 1,400 conservation and recreation parcels totaling over 70,000 acres are privately owned in the Westfield River watershed.

Table 22: Key Lands of Conservation and Recreational Interest

State Owned Lands	Location	Acres
Appalachian Trail corridor	Washington	25
Becket State Forest	Becket	621
Bryant Mountain State Forest	Cummington	637
C.M. Gardner State Park	Huntington	87
Chester-Blandford State Forest	Chester, Blandford	2,790
Crooked Pond	Plainfield	34
Cummington Wildlife Management Area	Cummington	164
Dead Branch State Forest	Chesterfield	69
Deer Hill State Reservation	Plainfield, Cummington	323
Carrington Road property	Russell	37
Dubuque Memorial State Forest	Hawley, Plainfield, Windsor	1,039
East Mountain Wildlife Management Area	Holyoke	62
Eugene Moran Wildlife Management Area	Windsor	7
Westfield River access	Russell	88
Fisk Meadow Wildlife Management Area	Chesterfield	508
Former Hull property	Russell	74
Fox Den Wildlife Management Area	Chester, Middlefield, Worthington,	3,390
Gateway Regional School fields	Huntington	37
Gilbert A. Bliss State Forest	Chesterfield, Cummington	2,279
Grace A. Robson Sanctuary	Montgomery, Westfield	61
Hampton Ponds State Park	Westfield	48
Hiram H. Fox Wildlife Management Area	Chester, Chesterfield, Worthington, Huntington	2,639
Honey Pot Natural Heritage Area	Westfield	70
Huntington State Forest	Huntington, Montgomery	661
John J. Kelly Wildlife Management Area	Chester	267
Knightville Dam Wildlife Management Area	Huntington	296
Krug Sugarbush	Chesterfield	92
Lily Pond Wildlife Area	Goshen	69
Middlefield State Forest	Middlefield, Peru	3,397
October Mountain State Forest	Becket, Washington	3,116
Otis State Forest	Becket, Otis	53
Peru State Forest	Peru, Worthington, Middlefield	2,725
Peru Wildlife Management Area	Peru, Windsor	3,454
Powell Brook Wildlife Management Area	Cummington	250
Robinson State Park	Agawam, Westfield	1,028
Savoy Mountain State Forest	Savoy	1,540
Savoy Wildlife Management Area	Savoy, Windsor	265
Tekoa Mountain Wildlife Management Area	Montgomery, Russell	705
Tolland State Forest	Tolland, Blandford	454
Walnut Hill Wildlife Management Area	Middlefield, Becket	903
Westfield River access area	Worthington	26
Westfield River access area	Middlefield	2.5
Westfield River access area	Westfield	98
Westfield River Wildlife Management Area	Westfield	53
Westfield Wildlife Management Area	Westfield	243
Windsor State Forest	Windsor	1,550
Worthington State Forest	Worthington	186

Non-Profit Parcels	Location	Acres
Arms Acres	Blandford	103
Arunah Hill Natural Science Center	Cummington	47
Bear Swamp Reservation	Ashfield	5
Bisbee Museum	Chesterfield	2
Blandford Fairgrounds	Blandford	17
Boy Scout Camp	Chester	238
Bryant Homestead	Cummington	195
Camp Becket	Becket	15
Camp Chimney Corners	Becket	9
Camp Father Freel	Goshen	32
Camp Holy Cross	Goshen	144
Camp Kinnebrook	Chester	53

Table 22: Key Lands of Conservation and Recreational Interest *(Continued)*

Non-Profit Parcels	Location	Acres
Camp Norwich	Huntington	146
Camp Sandy Brook	Huntington	67
Chesterfield Bend Association property	Chesterfield	4.6
Chesterfield Boy Scout Camp	Chesterfield	556
Chesterfield Gorge Reservation	Chesterfield	198
Cummington Fair grounds	Cummington	28
Girl Scout Camp	Becket	7
Glendale Falls	Middlefield	139
Goshen playground/church	Goshen	11
Greenwood Music Camp	Cummington	60
Hampshire Riding Club	Goshen	48
High Folly Retreat	Blandford	113
Holyoke Boys Club	Hawley	20
Massachusetts Audubon Society Wildlife Sanctuary	Windsor	18
Kingman Tavern Museum	Cummington	2.5
Massachusetts Audubon Society Mcelwain-Olsen property	Middlefield	71
Massachusetts Audubon Society West Mountain	Plainfield	1,210
Horace A. Moses Scout Reservation	Russell, Blandford	1,257
Middlefield Fairgrounds	Middlefield	10
Notchview Reservation	Windsor	2,894
Nobleview – Appalacian Mountian Club	Russell	372
Phelon Mountain Forest	Granville	101
Parish House	Granville	7
YMCA Camp Becket	Becket	678
Springfield Boys Club	Blandford	51

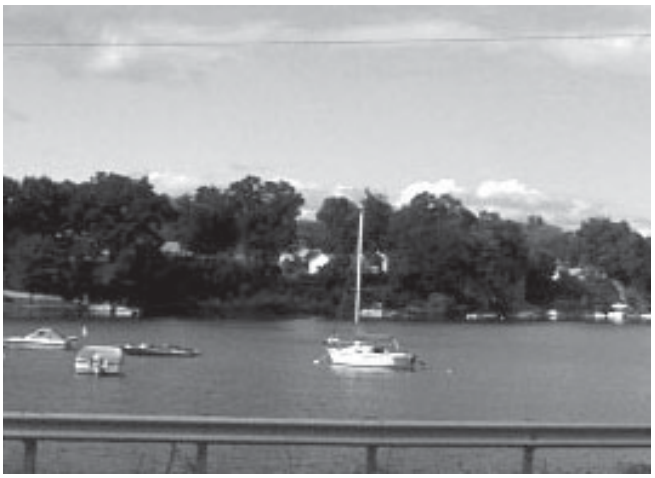
Federal Lands	Location	Acres
Knightville Dam and Recreation Area	Huntington	2,345
Indian Hollow	Chesterfield	213
Littleville Dam and Recreation Area	Huntington, Chester	1,337

Municipal Lands	Location	Acres
Agawam Country Club	Agawam	6
Alice Carson playground	West Springfield	2
Allen Park & swimming pool	Westfield	11
Appremont Park	Westfield	32
Ashley Reservoir watershed land	Holyoke	1,278
Bear Hole Watershed land	West Springfield, Holyoke	1,293
Becket Consolidated School	Becket	4
Berkshire Trail Elementary School	Cummington	2
Blandford Elementary School	Blandford	3
Blandford Historical Society	Blandford	4
Bryant Library	Cummington	12
Chapman playground	Westfield	6
Chester Elementary School	Chester	1.5
Chester water supply land	Becket	716
Chimney Corners Camp	Becket	7
Columbia Circle	Westfield	.5
Community house	Cummington	1
Becket conservation land	Becket	12
Consolidated School	Southwick	13
Conwell School playground	Worthington	13
Cross Street Playground	Westfield	7
Glen Grove Wildlife Sanctuary	Worthington	65
Granville Gorge	Granville	6
Granville Village School	Granville	6
Half Mile Falls Park	Westfield	1
Hammond Pond land	Goshen	1
Hampden Street Park	Chester	12
Highland School	Westfield	21
Hillgate Park	Huntington	7
Holyoke Community College	Holyoke	46
Holyoke watershed land	Holyoke	61
Little River playground	Westfield	1
Littleville Fairgrounds	Chester	19
Main Road Town Park	Savoy	40
CT Metropolitan District Commission watershed land	Granville	90
Memorial Playground	West Springfield	7
Middlefield Elementary School	Middlefield	5
Mittineague Park	West Springfield	244
Moxies Grove	Holyoke	12

Table 22: Key Lands of Conservation and Recreational Interest *(Continued)*

Municipal Lands	Location	Acres
Munger Hill playground	Westfield	22
Norwich Lake public boat launch land	Huntington	1
Ohio Avenue Playground	West Springfield	12
Paper Mill Road Playground	Westfield	6
Parade grounds	Becket	3
Park Square	Westfield	7
Peckham Lot	Russell	2.5
Pettingill Field	Cummington	23
Pettis Field	Huntington	3
Piper wells	West Springfield	3
Pittsfield watershed land	Washington	259
Playground, Devon	Westfield	24
Pond Brook area	Westfield	150
Rail trail land	Southwick	92
Ridgeview Park	Agawam	70
Riverside Park	Chester	10
Russell Elementary School	Russell	7
Russell watershed land	Huntington, Russell	1,623
Pynchon Point	Agawam	5
Savoy Elementary School	Savoy	5
School Lot	Plainfield	2
Shea Field	Agawam	45
Southwick Recreation Center	Southwick	22
Springfield water supply land	Granville	2,214
Springfield water supply land	Blandford	9,658
Stanley Park (partial)	Westfield	13
Strathmore Park	Russell	75
Tatham Playground	West Springfield	3
Tekoa Park	Westfield	1
Town beach	Russell	1.5
Town Common	Blandford	4
Town Common	Huntington	1.5
Town Common	West Springfield	11
Town forest	Russell	38
Town Green	Granville	1
Town land south of Dingle Rd.	Worthington	30
Town Library	Cummington	10
Town of Russell watershed land	Blandford	2,754
Town Park	Chesterfield	4
Town Park	Russell	10
Town Park	Windsor	3
Town Park	Goshen	15
Town swimming hole	Cummington	7
Town well land	Russell	9
Town wellfields	Huntington	28
Watershed land	Russell	4
Watson Park	Blandford	12
Westfield High School	Westfield	62
Westfield Junior High School	Westfield	30
Westfield watershed lands	Southwick	42
Westfield Water works land	Granville	3,495
Westfield watershed land	Montgomery	2,239
Whitney Field	Westfield	16
Worthington Town park	Worthington	13

Source: PVPC GIS database



REGIONAL ISSUES AND CONCERNS

The following regional concerns and issues were identified by the open space and recreation plan advisory committees, the general public, and through existing OSRPs (listed in no particular order).

According to the Massachusetts Audubon Society, between 1872 and 1996 the Commonwealth's population increased roughly 6%, while the amount of developed land increased roughly 69%.

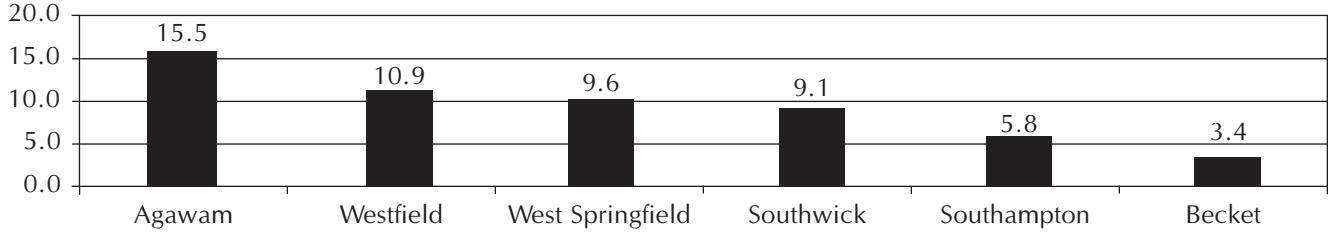
Sprawl

The population of the watershed is not increasing in proportion to the pace of development. Land is being used often without reference to any plan. Using a formula and ranking system that combines acres developed for low-density residential use and commercial use and acres of farmland lost over the period 1971-1999, the watershed communities with the greatest amount of sprawl are Westfield, Southwick, and Agawam.

Challenge of balancing the costs and benefits of open space

Reduced property taxes are paid on portions of the Westfield River basin's open space and recreation parcels due to Chapter 61 and other programs. This can significantly impact rural municipalities or those communities with a high percentage

Figure 12: Percent of Town Area Lost to Development 1971 to 1999



of publicly owned land with fewer residents to share the tax burden. For example, approximately 67 percent of land in Middlefield and 59 percent of land in Blandford are under some form of protection.

Considering that open space and recreation lands are vital to preserving regional character, protecting natural systems, require little or no community-supplied services, and draw tourists, municipalities have learned to balance the benefits with the costs of preserving and protecting open space and recreation lands. According to the American Farmland Trust, residential land use costs communities an average of $1.15 for every dollar of revenue raised; while open lands, farms, and forests cost only 36 cents per dollar.

Loss of Farmland

From 1971 to 1999, the communities of Westfield and Agawam have experienced the greatest loss of cropland in the watershed and in the entire Pioneer Valley; losing nearly 2,400 acres. In that same time period, the communities with the greatest increase in commercial development included: Holyoke, Westfield, West Springfield, and Agawam.

Growth pressures are great in the Westfield River watershed, but so is the level of public concern for farm retention. The process of converting farmland to urban development is not random; it is subject to both the market place and governmental policies. By implementing strategies to keep farmland, the region can retain a valuable, productive resource and avoid the negative consequences of its conversion to developed uses. Sustaining agriculture can make a vital contribution to the economy, open spaces, and a desirable pattern of land use.

Maintenance of the Watershed's Roads and Transportation Infrastructure

Roads that are in disrepair can limit access to the regions' wealth of open space and natural resources. Municipalities must work to ensure that roads are safe for drivers and the environment while preserving the character and history of the region. Examples of basin roads in disrepair include the Skyline Trail in Middlefield as well as Fairgrounds Road in Cummington and Chesterfield. Maintenance of this infrastructure is critical to access the basin's recreational and scenic resources as well as to ensure the continued flow of tourists. In addition, erosion of dirt and gravel roads negatively impacts water resources and wildlife habitat.

Threats to Historic Properties and Legacy

A comprehensive inventory of historic landmarks and bridges could become the basis from which towns make preservation-planning decisions. Such an inventory is also required to list properties on the National Register of Historic Places. The Lower Pioneer Valley Planning Commission completed a historic preservation study in 1974; however, this inventory needs to be updated. Specifically, the communities of Westfield, Blandford, Huntington, and Middlefield could benefit from additional historic planning.

Maintenance and Management of Unfragmented Forests

The Westfield basin has been identified as having some of the most unique unfragmented forests in the Northeast. Management of these resources is vital to the maintenance of regional character, biodiversity, economic base.

Intermunicipal and Regional Collaborations

Intermunicipal collaborations and regional collaborations are of great interest to watershed residents and provide valuable benefits such as saving money. Inter-municipal collaborations include sharing recreational facilities, resources, and schools. Existing regional collaborations include the Gateway Regional School and the Washington/Becket shared recreation fields.

Failing septic systems and the potential effects of Title-5 regulation changes

New Title-5 percolation rates may impact rural towns by allowing development on previously constrained soils. Towns that previously used the 30 min/inch rate as a growth management tool need to amend existing zoning. In addition, failing or improperly designed septic systems negatively impact public health and natural resources.

Non-Point Source Pollution Control and River Bank Erosion

Non-point source pollution is an inevitable result of increased development and changing land uses. As the watershed population continues to grow, non-point source pollution will be-

come more of a concern. Several streams in the watershed show signs of erosion. The causes of this erosion are normally increased road runoff. Continued monitoring and the use of "stream teams" should be encouraged to fully assess these conditions. Basin waterbodies impaired by non-point source pollution include Pequot Pond, Powdermill Brook, and Windsor Pond.

Trail Erosion and Trespassing of Motorized Vehicles

With such a diverse population of residents, the watershed also has diverse recreation needs. A growing trend in the basin seems to be motorized vehicle use in prohibited areas. Specifically, the cities of Westfield and West Springfield as well as the town of Chester have experienced recent increases in the amount of trespassing by all-terrain vehicle (ATV) operators. These vehicles cause unnecessary erosion of trails as well as habitat disturbance. In order to address this issue, municipalities and state personnel should work to provide access for this growing recreational use.

Public Access to the Westfield River

The Westfield River Watershed contains hundreds of miles of trails and over 600 miles of rivers and streams; however, limited and unidentified access to these resources has been identified as a concern for citizens. These access limitations can leave residents without a feeling of connection to the resource and may also result in trespassing by people who do not know how to access the river legally.

Trash Along the Westfield River

In recent years, rest stops and access points along the Westfield River have become dumping grounds for trash, tires, bottles, lawn clippings, and other miscellaneous debris. The Westfield River Watershed Association has recently integrated turnouts into their annual river cleanups and some locations are cleaned by other volunteers, but additional policing is required to address this issue if the scenic qualities of the river are to be preserved. Areas in Westfield, Russell, and Huntington seem to be the most neglected.

River and Stream Connectivity

Bridges and culverts often cause fragmentation of fish and wildlife habitat because they are too big, too small, or are perched. This fragmentation can lead to the isolation of populations and even local extinction of species. These barriers affect aquatic species as well as the terrestrial species that move along the stream corridor. Currently, efforts are underway to survey such obstacles in the Westfield River watershed.

GOALS AND OBJECTIVES

Regional Goals and Objectives

The Regional Open Space and Recreation Goals are the product of:

- Existing municipal Open Space and Recreation Plans
- The input of the regional advisory committees (the Westfield River Watershed Team, the Westfield River Watershed Association, and the Westfield River Wild and Scenic advisory Committee)
- Participants in the public participation process
- Review of existing plans, projects and initiatives in the watershed

The goals address the identified issues. A goal is defined as an achievable concept or vision; whereas, an objective is a specified refinement of a goal needed to accomplish the goal.

Preliminary Regional Goals

Preliminary regional goals were established based on the number of communities that identified a specific goal in their municipal OSRP. The top three regional goals identify the importance of recreational opportunities, open space, and the quality of water throughout the Westfield watershed:

- Promote recreational opportunities exist for people of all ages and abilities
- Protect natural resources and rare habitats are protected
- Protect the excellent quality of all ground and surface water is excellent

Secondary regional goals based on the number of communities that identified specific goals include:

- Preserve the integrity of historic sites
- Preserve and protect agricultural landscapes
- Preserve and protect forests
- Preserve the rural landscape and character

Refined Goals

1. Preserve the regional character
2. Protect natural resources, unfragmented forests, and significant habitats
3. Maintain the excellent quality of all ground and surface water
4. Maintain remarkable river and stream corridors
5. Enhance recreational opportunities for people of all ages and abilities
6. Preserve and protect agricultural lands and encourage environmentally sound agricultural practices
7. Promote economic development respectful of the environment and historic resources

Refined Goals and Objectives

Goal 1 **Preserve the Regional Character**

Objective 1-1: Identify the characteristics that create the regional character of the Westfield River Watershed.

Objective 1-2: Assist municipalities in the adoption of growth management bylaws that will protect natural resources and minimize the impacts of new housing, transportation, and economic development.

Objective 1-3: Assist municipalities in adoption of Scenic Upland Zoning Bylaws.

Objective 1-4: Promote intelligent economic development respectful of the environment and historical resources.

Objective 1-5: Develop a comprehensive inventory of historic resources (and their condition) in the watershed.

Objective 1-6: Work with historical commissions and local experts to increase historic preservation and planning.

Objective 1-7: Promote urban beautification. Reduce the amount of trash and debris at parks and roadside stops.

Goal 2: **Protect natural resources, unfragmented forest blocks, and significant habitats**

Objective 2-1: Promote land conservation with residents as a tool for protecting natural resources. Encourage conservation organizations and state agencies to pursue conservation projects in the watershed to protect important ecological communities, large forested blocks, and corridors.

Objective 2-2: Encourage natural resource inventories and plans of all kinds.

Objective 2-3: Identify populations of invasive –exotic plants and work with non-governmental organizations, state, and federal agencies to control them throughout the Westfield River Watershed.

Objective 2-4: Seek grant funding for acquiring land along regional greenway corridors.

Objective 2-5: Promote local education programs (e.g. coverts) that encourage a high standard of land management on private property within the watershed.

Goal 3: **Maintain the integrity of aquatic ecosystems and protect quality of all surface- and ground-water drinking water sources**

Objective 3-1: Encourage cross-municipal adoption of drinking water protection districts.

Objective 3-2: Support the restoration of migratory fish to the Westfield River Watershed.

Objective 3-3: Promote municipal and regional source water assessment and planning.

O*bjective 3-4:* Encourage the use of stream teams and community adoption programs as a watershed assessment tool.

Objective 3-5: Develop municipal and regional emergency water supply plans

Goal 4: **Recognize, maintain, and protect remarkable river and stream corridors**

Objective 4-1: Promote voluntary conservation restrictions on riverfront property.

Objective 4-2: Collaborate with governmental agencies, watershed organizations, and municipalities to ensure protection of remarkable river resources.

Objective 4-3: Educate residents on the significance of our remarkable river and stream resources.

Goal 5: **Enhance Recreational opportunities for people of all ages and abilities**

Objective 5-1: Maintain updated open space and recreation plans (OSRPs).

Objective 5-2: Increase the number of "official" public access points along rivers and increase maintenance and policing at existing r access points.

Objective 5-3: Develop and distribute regional trail maps.

Objective 5-4: Educate users on and provide signage for existing recreational and historic resources.

Objective 5-5: Assess access to municipal and state property within the watershed.

Objective 5-6: Consider the ADA accessibility of recreational areas in the watershed.

Goal 6: **Preserve and protect agricultural lands and encourage environmentally sound agricultural practices**

Objective 6-1: Promote the education and use of the C. 61 and APR programs amongst landowners and municipalities.

Objective 6-2: Support locally based agriculture.

Objective 6-3: Provide educational programs to farmers regarding best management practices that allow for successful, productive farms as well as a healthy natural environment (especially water resources).

Goals by Community – Summary of past OSRPs

Preliminary regional goals were extracted from existing OSRPs. Regional goals were initially established based on the number of communities that identified a specific goal in their municipal OSRP. The communities of Ashfield, Granville, Montgomery, Peru, Russell, and Worthington did not have existing plans available for review. The communities of Blandford, Goshen, Chester, Chesterfield, and Middlefield were in the process of developing plans.

Objectives by Community –Summary of past OSRPs

The regional objectives were initially extracted from existing municipal OSRPs and refined by the regional advisory committees. The advisory committees refined the watershed goals stressing the importance of water quality, community setting, recreation, and open space throughout the Westfield River watershed.

Table 23: Municipal Goals

MUNICIPAL GOALS	Agawam	Ashfield*	Becket	Blandford*	Chester	Chesterfield	Cummington	Goshen*	Granville*	Holyoke	Huntington	Middlefield	Montgomery*	Peru*	Plainfield	Russell*	Savoy	Southwick	Washington	Westfield	W. Springfield	Windsor	Worthington*
WATER QUALITY																							
Quality of all ground and surface water is excellent			X		X	X	X				X				X		X		X	X	X	X	
Quantity of water resources meets community needs															X					X			
COMMUNITY SETTING																							
Historic integrity/sites preserved.						X	X				X				X				X			X	
Rural character/landscape preserved			X		X	X	X				X	X					X					X	
Urban landscape is beautiful																				X			
Promote/preserve agriculture											X				X				X			X	
Zoning consistent with public needs															X								
Roads are improved without sacrificing rural character																							
Growth is controlled																				X			
Improve interactions with state and regional government												X											
RECREATION																							
Recreational opportunities exist for people of all ages and abilities	X		X		X		X			X					X		X		X	X	X	X	
Establish outdoor recreational facilities											X												
Recreational opportunities on state land are expanded																	X						
Local recreation promoted to increase tourism																	X						
Year-round recreation opportunities	X																						
Resolve trail use disputes and increase recreational opportunities												X											
OPEN SPACE																							
Residents are informed about open space programs											X									X			
Wetlands are protected											X									X			
Preserve/protect natural resources/rare habitat	X					X	X			X	X				X				X	X	X	X	
Establish/improve open space protection system	X																X						
Encourage forest management practices to protect forests											X								X			X	
Environmental education programs																				X			
Protect the biodiversity of sensitive ecosystems						X																	

* No plan available for review

Table 24: Municipal Objectives

MUNICIPAL OBJECTIVES	Agawam	Ashfield*	Becket	Blandford*	Chester	Chesterfield	Cummington	Goshen*	Granville*	Holyoke	Huntington	Middlefield	Montgomery*	Peru*	Plainfield	Russell*	Savoy	Southwick	Washington	Westfield	W. Springfield	Windsor	Worthington*
WATER QUALITY																							
Protect watersheds via land acquisition			X											X				X	X	X			
Protect watersheds via regulations			X		X									X		X		X	X	X	X		
Protect watersheds via education																X		X	X	X			
Better sediment control			X		X																		
Better sewage treatment			X											X							X		
Erosion on Westfield River is monitored and evaluated							X																
Identify water pollution sources										X						X			X		X		
Create a network of fire ponds														X									
Identify aquifer recharge areas																X							
Identify funding for water quality study and protection																X							
Keep wetlands healthy and protected						X																	
Protect waterways from pollutants						X																	
Educate residents on significant resources					X	X																	
COMMUNITY SETTING																							
Maintain roadside scenic views			X				X							X		X				X			
Use zoning to control growth and protect open space			X		X		X							X		X			X	X	X		
Correlate zoning and development to limitations of soils														X		X							
Establish non-regulatory mechanisms for slowing growth																			X				
Protect privacy of properties			X																				
Analyze Buildout potential in relation to costs to town							X																
Support cultural and artistic communities/venues							X																
Protect historic sites							X			X						X		X		X			
Promote historic, scenic and cultural resources														X		X				X			
Promote urban beautification																			X				
RECREATION																							
Establish a trail network linking open space and rec. facilities			X						X							X			X	X			
Establish an indoor community recreation center			X				X									X							
Develop outdoor recreational facility										X													
Better use of and access to state land for recreation							X									X							

Table 24: Municipal Objectives (continued)

MUNICIPAL OBJECTIVES	Agawam	Ashfield*	Becket	Blandford*	Chester	Chesterfield	Cummington	Goshen*	Granville*	Holyoke	Huntington	Middlefield	Montgomery*	Peru*	Plainfield	Russell*	Savoy	Southwick	Washington	Westfield	W. Springfield	Windsor	Worthington*
RECREATION (continued)																							
Distribute information to residents about recreation facilities	X				X									X				X	X				
Develop strategies and funding for maintaining rec. facilities	X								X					X		X		X	X	X			
Develop strategies for private businesses and neighborhoods to support rec. facilities	X								X														
Use recreational opportunities to increase tourism																X							
Develop methods to discourage off-road vehicle use in environmentally sensitive area					X																		
OPEN SPACE																							
Survey vernal pools					X		X																
Develop new strategies for preserving open space							X			X						X		X		X	X		
Develop strategies for maintaining open space							X													X	X		
Develop and implement environmentally sensitive development incentives	X																						
Acquire lands withdrawing from Chapter 61 program							X																
Acquire open space/Develop funding sources	X																		X	X			
Pursue farmland preservation	X					X								X				X	X	X	X		
Develop protected greenway along Westfield River							X																
Showcase the Westfield River for recreation, business opportunities, and open space protection																			X				
Identify funding resources for land conservation	X								X							X		X			X		
Develop mechanism for prioritizing lands for conservation acquisition									X					X				X		X			
Increase public awareness of natural resources					X				X	X				X		X		X	X		X		
Promote economic benefits of protecting open space									X														
Promote multiple use forest mgt.														X				X			X		
Promote Ch 61 tax program																		X			X		
Enforce Wetlands Protection Act																X		X			X		
Protect lands that are key connectors to already protected open space						X																	
Keep roads rural in character						X																	

* No plan available for review

RECOMMENDED OPEN SPACE PRESERVATION STRATEGIES

Strategy #1:	Adopt the Community Preservation Act (CPA)
Strategy #2:	The Agricultural Preservation Restriction (APR) Program
Strategy #3:	Acquisition of Easements and Conservation Restrictions
Strategy #4:	Chapter 61, 61A, 61B Tax Deferments
Strategy #5:	Community Land Preservation Funds
Strategy #6:	Transfer of Development Rights
Strategy #7:	Farm Viability Program
Strategy #8:	Scenic Byway Designation

The following section describes open space preservation strategies recommended for the Westfield river watershed. A comprehensive list of implementation strategies and tools for protecting open space is included in Appendix D.

Strategy #1

Municipalities Should Adopt the Community Preservation Act (CPA)

The CPA is a new state law that gives cities and towns a funding source for protecting and acquiring open space, natural resources, historic properties, and for creating new affordable housing opportunities. Money is raised through the combination of a local property tax surcharge (up to a maximum of 3 percent) and the allocation of state matching funds, which are placed in a locally controlled Community Preservation Fund. Monies accrued in this fund are to be spent on open space, historic preservation, and affordable housing, with at least 10 percent of the annual receipts going toward each category. Spending can be deferred until needed. The community determines how best to spend the remaining 70 percent among these three categories.

A community may use either of two methods for accepting the act; either approval of both the legislative body of the city or town and the electorate or through the use of a local ballot question petition. The watershed communities of Agawam, Westfield, Southwick, and Southampton have adopted the CPA. A map of participating communities in the Commonwealth is included in Appendix F.

Strategy #2

Landowners Should Participate in the Agricultural Preservation Restriction (APR) Program

The APR program protects farmland from development by compensating the owners of agricultural land for their development rights. This program pays the difference between "fair market value" and the "agricultural value" of their property in exchange for a permanent deed restriction, or APR which prohibits any use of their property that will negatively impact its agricultural viability. The APR program is administered by the Massachusetts Department of Food and Agriculture. A more detailed description of this program is included in Appendix D.

APR Requirements: The program is limited to parcels greater than five acres that have maintained an active commercial agricultural use for two years prior to enrolling in the program. A nominating committee will make offers based on the threat of development, soils, infrastructure, and the general viability of the continued use of the land. Presently, there is an approximate one-year waiting list.

Strategy #3

Landowners, Land Trusts and Municipalities Should Acquire Easements and Conservation Restrictions to Protect Targeted Open Space

Scenic, open space and agricultural resources can be protected through the use of conservation restrictions. A conservation restriction is a legally binding agreement between the landowner and a government agency or qualified conservation organization, such as a land trust, that places constraints on the use of a property in order to protect its natural, scenic or open space values. Uses would typically be restricted to open space, agricultural, or forestry and prohibit development unless specific to those uses (such as a barn for farming purposes). Scenic easements/conservation restrictions can be donated or sold by a landowner. A donation of such a scenic easement can yield a significant tax benefit.

Strategy #4

Landowners Should Participate in Chapter 61, 61A, 61B Where Appropriate

The Massachusetts Chapter 61 tax abatement programs provide temporary protection for lands in agricultural, forestry, or recreational use. These programs offer landowners a reduction in their property taxes, in return for signing a contract promising that the predominant use of the land will not change during an agreed upon time (ten years for Chapter 61 and Chapter 61B, one year for Chapter 61A). The Chapter 61A program helps farmers by reducing their taxes while they farm their land. The Chapter 61 program helps lower the expenses of maintaining actively managed forestland. Landowners with parcels in the Chapter 61B program receive lower property taxes in exchange for keeping their land in open space for ten years.

One of the benefits to the community of the Chapter 61 programs is that they provide a mechanism for purchase of lands threatened with development. When a parcel which has been enrolled in one of the Chapter 61 programs is put up for sale, the Town is provided a one hundred and twenty (120) day waiting period during which it can exercise its right of first refusal to purchase the property. In order to take advantage of the right of first refusal, communities must be prepared to move quickly and have funds available for land purchase. Identifying key parcels and building partnerships with local land trusts and landowners can be an effective planning process resulting in land protection.

Chapter 61 Requirements: To enroll in the Chapter 61 program, landowners must have a minimum of 10 contiguous acres and an approved 10-year management plan. Taxes for Chapter 61 lands are assessed at 5 percent of fair market value plus 8 percent stumpage value for products harvested in the prior year. Applications must be filed with the State Forester by June 30th.

Chapter 61A Requirements: Applicants must have a minimum of 5 acres "actively devoted" to agriculture and/or horticulture at least two years prior to applying. Assessed taxes are based on commercial use value and may change annually. To enroll, an application must be filed with the board of assessors by October 1st with annual filings after.

Chapter 61B Requirements: Applicants must have a minimum of 5 acres in natural, wild, open, or landscaped use. Taxes are assessed at a maximum of 25 percent fair market value. To enroll, an application must be filed with the board of assessors by October 1st with annual filings after. No management plan is required.

Other Considerations:

- The town's right of first refusal is transferable
- If a landowner is considering selling a property or making personal modifications, the land should probably not be classified
- These programs are an important tool for municipalities to retain productive open space before it is developed

Strategy #5

Municipalities and Advocacy Groups Should Research (and create where necessary and useful) Community Land Preservation Funds

Communities can establish Land Preservation Funds to purchase priority lands for open space. Funds can be generated from Town Meeting appropriations, development permits fees, private contributions, or Transfer of Development Rights (TDR) transactions (see strategy #6). The revenue is available for land protection, whether for acquisition of land in fee, scenic easements/conservation restrictions, or for matching funds to supplement APR purchases.

Strategy #6

Municipalities Should Enact Transfer of Development Rights

TDR is a local zoning tool which allows communities to trade development in desires areas for protected open space. TDR allows the private purchase of rights to develop a site (in a designated "sending area") and the transfer of those rights to a different site (in a designated "receiving area). In exchange for the permanent protection of lands in the sending area, the 'sending' land owner is paid an agreed upon value while the 'receiving' land owner gains the ability to use those purchased and transferred rights to develop more intensely at an approved location.

Strategy #7

Farmers Should Take Advantage of the Farm Viability Program

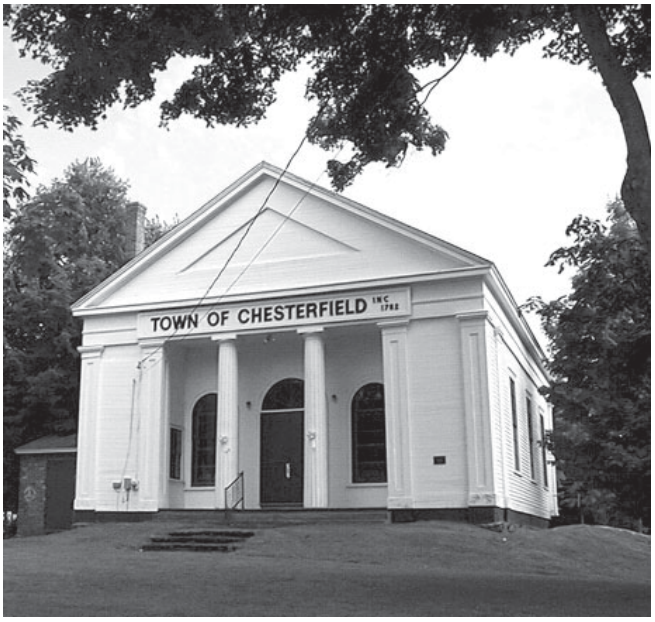
The Farm Viability Program offers farmers the opportunity to develop comprehensive farm business plans for the portions of their land actively used for agriculture. Farmers interested in developing comprehensive farm plans must apply to the Department of Food and Agriculture (DFA) for admission into the program. Once accepted, comprehensive plans are developed with assistance from DFA and suggestions aimed at increasing on-farm income are made. The plans also suggest improved management practices, ways to diversify, direct market strategies and value-added initiatives. Once the farm viability enhancement plan is completed, the farmer is eligible to participate in phase II of the program. Phase II involves an agreement between the farmer and the DFA. Farmers who are willing to sign a non-development restriction covenants are eligible to receive awards of up to $60,000 (MA DFA).

Strategy #8

PVPC, Elected Officials, Advocacy Groups and Municipalities Should Pursue Scenic Byway Designation

Scenic Byway designation is a way of recognizing a road's exceptional scenic quality and can help provide grant funding for acquisition of scenic easements. It offers the following benefits:

- Improved opportunity for federal and state grants that fund projects to protect and enhance the scenic and historic integrity including opportunities for farmland and scenic area preservation
- Special consideration given by state agencies; including Mass Highway on construction projects occurring along the Byway
- Increased local awareness and interest in protecting the Byway's natural, scenic and historic resources



Note: The Jacob's Ladder Scenic Byway is already designated for Route 20 in Russell, Huntington, Chester, Becket, and Lee.

ACTION PLAN

Westfield River Watershed Action Plan

Goal	Objective	Responsible	GroupActions
1) Preserve the rural, scenic, and historic character of the Westfield River watershed	Objective 1-1: Assist municipalities in the passage of the Community Preservation Act (CPA), which provides matching state funds for land acquisition and historic preservation.	Select Boards, Planning Boards, Conservation Commissions, Historical Commissions, Open Space Committees, and Regional Planning Agencies	Municipal Boards should bring the issue to vote at Town Mtg. The Regional Planning Agencies should assist with regional public information and education campaigns to raise public awareness of the benefits of CPA and the relatively limited cost to the community and especially residents.
	Objective 1-2: Network with watershed groups, governmental agencies, and other NGOs to monitor, review and comment on regional growth trends and development proposals that potentially affect the watershed's character	Westfield River Wild and Scenic Advisory Committee	The Westfield River Wild and Scenic Advisory Committee should use its advisory powers to provide comments and technical assistance to municipal boards regarding development proposals.
	Objective 1-3: Assist municipalities in the adoption of growth management tools that will protect natural resources and minimize impacts of new housing, transportation infrastructure, and economic development on the watershed.	Municipal Planning Boards and Regional Planning Agencies	Adopt growth management bylaws such as-scenic upland zoning, backlot with open space, shared driveways, erosion and sediment controls, natural resource protection overlay districts, open space development, site plan review, flexible development, transfer of development rights
	Objective 1-4: Promote economic development respectful of the environment and historical resources	Municipal Planning Boards, Select Boards and Regional Planning Agencies	Ensure that local and regional transportation plans and projects meet the needs of all watershed towns (e.g. road salt, erosion, town character)—work to implement Mass Highway's "Fix it first" initiative.
	Objective 1-5: Develop a complete inventory of historic resources, and their condition, in the watershed	Historical Commissions and Regional Planning Agencies	Identify deteriorating historic bridges, roads, and public buildings. This inventory could be completed using college interns, community volunteers, or a grant from the Massachusetts Historical Commission.
	Objective 1-6: Work with historical commissions and local experts to increase historic preservation and planning.	Historical Commissions, Planning Boards, and Regional Planning Agencies	Identify resources that contribute to the rural character of municipalities and the region including landmarks, barns, homes, etc Work to have historic sites and buildings added to the National Historic Register.
	Objective 1-7: Promote urban beautification.	Select Board, Planning Board, and Conservation Commissions	Launch urban forestry programs by taking advantage of funding from the Department of Environmental Management.

Westfield River Watershed Action Plan *(continued)*

Goal	Objective	Responsible	GroupActions
2) Protect natural resources, unfragmented forest blocks, and significant habitats	Objective 2-1: Promote land conservation with residents as a tool for protecting natural resources. Work with conservation organizations and state agencies to pursue land acquisition and conservation projects in the watershed to protect ecological communities, large forested blocks, and wildlife corridors.	Planning Boards, Local Land Trusts and Regional Planning Agencies	Encourage municipalities to use Geographic Information Systems, their Open Space and Recreation Plans and Chapter 61 lands to identify individual parcels targeted for protection. Land trusts should assist municipalities in exercising their right of first refusal to purchase Chapter 61 parcels when such parcels become available due to landowners withdrawal from Chapter 61. Support the addition of the Berkshire Plateau as a Forest Legacy Area. Promote conservation restrictions that allow for continued agricultural and forest management in order to maintain farms and productive forests.
	Objective 2-2 Encourage communities and conservation groups to develop natural resource inventories and plans.	Executive Office of Environmental Affairs, Regional Planning Agencies, Planning Boards and Conservation Commissions	Encourage ecological inventories and the study of forest blocks by landowners, conservation organizations, and public agencies. Conduct training of municipal officials and volunteers to identify and certify verbal pools.
	Objective 2-3: Identify populations of invasive –exotic plants and work with NGOs, state, and federal agencies to control them throughout the Connecticut River Basin.	Westfield River Wild and Scenic Advisory Committee, Conservation Commissions, Westfield River Watershed Association	Pursue grant funding to perform an inventory of invasive plants along the Westfield River corridor concentrating on sensitive ecological areas. Develop plans to address removal and control of invasive plants
	Objective 2-4: Seek grant funding for acquiring open space, particularly with Regional Greenway Focus Areas (see PVPC's Regional Greenways Plan, 2003).	Regional Planning Agencies, Local Land trusts, Conservation Commissions	Pursue available grant programs to assist communities in financing open space and recreation projects, including the Massachusetts Self-Help Program, the Aquifer Land Acquisition Program, and the Federal Land and Water Conservation Fund.
	Objective 2-5: Promote local education programs (e.g. Coverts) that encourage a high standard of land management on private property within the watershed.	Regional Planning Agencies, Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association	Educate landowners on proper forest management programs and options. Educate landowners on the value of their woodlands, providing information on sustainable forestry and the use of local forest products.

Westfield River Watershed Action Plan *(continued)*

Goal	Objective	Responsible	GroupActions
3) Maintain the integrity of aquatic ecosystems and protect quality of all surface and groundwater drinking water sources.	Objective 3-1: Encourage inter-municipal cooperation in adopting water supply protection zoning districts.	Conservation Commissions, Planning Boards, Regional Planning Agencies	The watersheds and recharge areas that supply drinking water to many municipalities cross town lines. Communities should work together to ensure the protection of their neighbor's drinking water by adopting protective zoning within these recharge areas. Communities that share watershed or aquifer recharge areas include: Chester-Becket, Huntington-Chester, Russell-Blandford, and Westfield-Granville
	Objective 3-2: Support the restoration of migratory fish to the Connecticut River Basin.	Executive Office of Environmental Affairs, Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association	Increase public awareness and education about restoration programs and promote volunteer efforts to restore migratory fish. Restoration often means identifying dams and culverts that block migration pathways, and developing fish passage alternatives.
	Objective 3-3: Promote municipal and regional source water assessment and planning.	Regional Planning Agencies, Department of Environmental Protection	Asses the adequacy of municipal water supplies, safe yields to meet projected water supply withdrawal needs in years 2005 and 2025 while maintaining the integrity of aquatic systems
	Objective 3-4: Encourage the use of stream teams and community adoption programs as a watershed assessment tool.	Executive Office of Environmental Affairs, Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association, Conservation Commissions	Follow through on previous stream team efforts and pursue additional assessments. Establish volunteer water quality monitoring sites throughout the watershed.
4) Recognize, maintain, and protect remarkable river and stream corridors.	Objective 4-1: Promote voluntary conservation restrictions on riverfront property	Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association, Regional Planning Agencies, and Local land trusts	Local Conservation Commissions, working with WRWA, WRWSAC, The Trustees of Reservations (TTOR), The Nature Conservancy (TNC), and others, should work actively with private landowners to encourage the voluntary donation of conservation restrictions and/or easements for riverfront properties. Work actively with landowners on a public relations and education campaign.
	Objective 4-2: Educate residents on the significance of our remarkable river and stream resources.	Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association	Conduct school visits and mailings in the watershed. Use fairs and existing watershed events as additional means. Expand National Wild and Scenic River designation to include more tributaries and river miles. Encourage adoption of local river protection zoning bylaws.

Westfield River Watershed Action Plan *(continued)*

Goal	Objective	Responsible	GroupActions
5) Enhance recreational opportunities for people of all ages and abilities.	Objective 5-1: Maintain updated open space and recreation plans (OSRPs).	Regional Planning Agencies, Local land trusts, Conservation Commissions	Massachusetts Division of Conservation Services approved Open Space and Recreation Plans must be updated every five years to ensure the community is eligible for state and federal grant funds for financing open space acquisitions or improvements. Identify funding sources and promote OSRPs and OSRP updates. Assist communities to apply for Land and Water Conservation Fund grants to provide more recreation opportunities, including: riverfront parks and small boat access areas, swimming areas, hiking trails and passive recreation areas.
	Objective 5-2: Increase the number of established public access points in the watershed and increase maintenance and policing at existing access points.	Executive Office of Environmental Affairs, Westfield River Wild and Scenic Advisory Committee, Westfield River Watershed Association	Map official and unofficial access sites to identify areas where public access should be encouraged, and develop appropriate parking and facility maintenance plans for the access sites. Work in conjunction with local boards, recreation committees, landowners, and/or the Public Access Board design and upgrade public access points along the Westfield River and its tributaries. Develop and distribute regional trail maps. Assist WRWSAC and other watershed initiatives in completion of regional trails on publicly owned land. Distribute the maps regionally to inform residents about trails in the watershed. Distinguish between those used for planning purposes and for public distribution. Assist municipalities in the purchase of Chapter 61b parcels when available.
	Objective 5-3: Educate users and provide signage for existing recreational and historic resources.	Historic Commissions, Planning Boards, Open Space Committees	Investigate the feasibility of establishing a regional tourism council that focuses on the Hilltown area. Institute an educational program informing people who use recreational areas of the vulnerability of the area to improper use. Encourage people to report detrimental actions to administrators. Work with state agencies to develop strategies to address off-road motorized vehicle use in state forests. Work with municipal officials, state landowners, and water boards to manage reduced-tax parcels in order to permit passive recreation activities on currently inaccessible lands (e.g. watershed protection land). Pursue funding to study the current tax structure and how it affects land use. Conclude with recommendations to legislature as to changes that will benefit the rural communities.
	Objective 5-4: Consider the American with Disabilities Act (ADA) accessibility of recreational areas in the watershed.	Planning Boards, Select Boards, and Open Space Committees	Develop strategies for funding an ADA accessibility study. Consider accessibility when developing and rehabilitating recreational facilities and trails in the watershed.

Westfield River Watershed Action Plan *(continued)*

Goal	Objective	Responsible	GroupActions
6) Preserve agricultural lands and encourage environmentally sound agricultural practices	Objective 6-1: Promote the education and use of the Chapter 61 and Agricultural Preservation Restriction (APR) programs among landowners and municipalities.	Planning Boards, Select Boards	Inventory and assess agricultural lands appropriate for protection. Educate landowners of significant parcels about existing programs. Assist municipalities in the purchase of c. 61a parcels when available.
	Objective 6-2: Support locally based agriculture.	All	Support organizations that promote land conservation and the agricultural infrastructure and economy (Berkshire Grown, CISA, NOFA, etc.). Establish farmer's markets and/or farm stands throughout the region.

APPENDICES

Appendix A:

Public Involvement Materials and Selected Press Coverage

Additional Watershed Issues and Concerns Identified during the 9th annual Westfield River Symposium on March 29, 2003

- Lack of Public Transportation
- Road runoff and NPS pollution
- Lack of a comprehensive endangered species inventory
- Issues not addressed at the sub-watershed level – tributaries
- Information not available to landowners (re: c.61, APR, etc.)
- Concerns of "hilltowns" and urban communities must be addressed individually and specific to the issue
- A thorough historic inventory is very important
- Continued support from MA Forestry needed
- Salmon Restoration is a high priority of WRWA and WRWSAC –attention should be given to the condition of the river needed for fish to return –not the numbers of fish
- Long-term maintenance of public trails
- Prohibited public access on protected lands results in a loss of appreciation and support for open space lands (e.g. Cobble Mountain Road closure)

Proposed Solutions to Watershed Related Concerns Include:

- Initiate an "Adopt a Trail" program to ensure continued maintenance of public trails
- Publish and distribute recreational information on the WWW and through COCs
- Organize Land-trusts in all watershed communities
- Develop and propose additional local bylaws (e.g. cell-towers, perc. rates)
- Distribute NRCS info to landowners to encourage planting of vegetative buffer strips
- Conduct a comprehensive NPS pollution study of the watershed using DEP/DFWELE guidance
- Set aside recreational lands for motorized vehicles
- Promote increased communications between residents and government agencies (e.g. public comment)
- Increase water rates to reflect the burden that watershed lands place on residents (Blandford/Granville)
- Balance the interests of conservation/education/and access

Greetings!

Thank you for taking the time to review the DRAFT Westfield River Watershed Open Space and Recreation Plan (OSRP).

Regional OSRPs are a new phenomenon here in Massachusetts—and it is VERY important that we develop this plan with as much input as possible.

Below is a simple survey designed to solicit your comments on the DRAFT plan and give you an opportunity to weigh in on issues of open space and recreation if you haven't already done so.

Please take a few minutes to review the draft OSRP and complete this survey. If you prefer —you may email comments to mdelmonte@pvpc.org or call Matt at 413/781-6045. **THANKS!**

Please Attach Additional Pages if Needed

Name (optional): _____
Affiliation (optional): _____

1) Are you satisfied with how the plan describes the Watershed?
yes: ___ no: ___
Comments:

1a) What do you consider to be the most valuable natural features of the Westfield River Watershed?

1b) Do you know of <u>specific</u> areas that should be preserved as open space? Where? Why?

1c) Describe your interest/concerns regarding recreational issues?

2) Are you satisfied with how the plan summarizes community goals and objectives? (Section VI)
yes: ___ no: ___
Comments (what's missing?):

3) Are you satisfied with how the plan summarizes issues/concerns in the Watershed? (Section VII)

4) Do you endorse the recommendations of the DRAFT plan: (Section VIII)
yes: ___ no: ___

Please rank the following recommendations, opportunities and strategies of the Westfield River OSRP: 0 not important, 1 less important, 2 important, 3 very important

Preserving and protecting regional water supply resources	0 1 2 3
Identifying, preserving, and protecting:	
wildlife habitats of regional significance	0 1 2 3
regionally significant conservation areas and forests for future acquisition	0 1 2 3
regionally significant scenic landscapes and resources	0 1 2 3
regionally significant recreation resources	0 1 2 3
regionally significant historic and cultural resources	0 1 2 3
Developing, preserving, and protecting regional greenways and trails	0 1 2 3
Establishing consensus on a watershed-wide protected acreage goal	0 1 2 3

Comments/Others:

5a) Do you see benefits to regional or inter-municipal collaborations? Benefits could include unified planning, saving money, reducing redundancy, sharing resources. Are there special topics where this could be particularly valuable? Please check off and describe benefits:

- ❑ wildlife and fisheries protection_____
- ❑ river protection_____
- ❑ water supply/water quality protection_____
- ❑ sharing recreational facilities_____
- ❑ protecting forest lands_____
- ❑ other issues_____
- ❑ I see no benefits_____

5b) Are you aware of any current inter-municipal, watershed or regional efforts to protect open space, recreation, and natural resources? Please describe and indicate if they were successful.

6) Comments, suggestions about open space in the Westfield River Watershed:

PRESS RELEASE

CONTACT: Catherine Miller, PVPC Senior Planner, (413) 781-6045

FOR IMMEDIATE RELEASE
August 12, 2002

PVPC to Develop Open Space Plan for Westfield River Watershed

The Pioneer Valley Planning Commission (PVPC) has been awarded $70,000 in Massachusetts Watershed Initiative project funding to develop a regional open space plan to help determine current land use in the Westfield River watershed. The award was announced by Bob Durand, Massachusetts Secretary of Environmental Affairs.

PVPC will also be working with five communities within the watershed—Chester, Chesterfield, Cummington, Middlefield, and Worthington—to complete their municipal open space and recreation plans (OSRP), which help communities protect open space and make them eligible for state funds.

PVPC and the Executive Office of Environmental Affairs will promote active cooperation and participation by all Westfield River watershed communities to implement the regional open space plan upon its completion.

For more information on this project, or to find out how to become actively involved in watershed protection efforts, please contact PVPC's Catherine Miller, project manager, at (413) 781-6045 or cmiller@pvpc.org.

—30—

Union-News, Wednesday, March 26, 2003

Report warns of sprawl potential

The public is invited to comment on the draft plan during the 9th annual Westfield River Symposium.

By GEORGE GRAHAM
Staff writer

WESTFIELD – Current zoning within the Westfield River watershed communities does little to thwart potential for sprawl, according to a draft open space and recreation plan from the Pioneer Valley Planning Commission.

The draft states that an analysis of the 23 communities within the watershed shows the watershed would be "devastated" if undeveloped land were to be fully developed.

"Current zoning allows for an unsustainable future growth pattern," the report says.

The watershed's more urban communities – Westfield, Southwick, Agawam, West Springfield and Holyoke – currently have a combined population of 144,788, according to the report.

An analysis shows the population of those communities has the potential to increase by nearly 61 percent to 232,746, meaning an even greater impact on the remaining communities – all of them Hilltowns – within the watershed.

The current combined population of those 18 Hilltowns, communities such as Huntington, Middlefield and Peru, is only 20,592. More building would increase the population of those largely rural areas by 1,063 percent to 238,817, the report states.

The public will be invited to view the draft plan and comment on it during the ninth annual Westfield River Symposium set for 8 a.m. March 29 in Wilson Hall at Westfield State College.

This year's theme is "A Look at the Future: Water Resources and Open Space."

"If we don't stop planning for the future now we may end up with something we don't like," Michael A. Young, president of the Westfield River Watershed Association, said yesterday.

Young said the symposiums have been well-attended for the last few years.

Keynote speaker Richard Evans, a Northampton-based environmental lawyer, will open the program with a presentation on open space issues titled "Is Forever Forever?"

The draft plan can also be viewed on the Pioneer Valley Planning Commission Web site. Call the commission for the Web site address at (413) 781-6045.

George Graham can be reached at ggraham@union-news.com

The WINTER 2003

WatershedNews

Westfield River Watershed Association (WRWA) ~ P.O. Box 1764 ~ Westfield, MA 01086-1764 ~ (413) 532-7290 ~ www.westfieldriver.org

Westfield River Symposium

by Kathy Meyer, Westfield River Watershed Association

On March 29, the Westfield River Watershed Association (WRWA) will hold its Ninth Annual Westfield River Symposium. "A Look at the Future: Water Resources and Open Space" is the program's theme.

Keynote speaker Dick Evans, an environmental attorney from Northampton, will open the program with a provocative look at open space preservation issues entitled "Is Forever Forever?" Following the keynote address, attendees can select from various speakers in the three concurrent sessions that round out the morning. These speakers will share their expertise on specific topics related to open space preservation and water quality. One of the highlights will be the Pioneer Valley Planning Commission's unveiling of a new draft regional open space and recreation plan (OSRP) for the entire Westfield River Watershed.

Throughout the morning and between concurrent sessions, attendees can view displays and get information from exhibits of approximately 20 local environmental organizations. Besides checking the great exhibits, the breaks are a chance to network with other people interested in the environment. There will be information on hikes, outings, chances to volunteer, and plan an action packed spring.

To fortify participants on their quest for knowledge, the WRWA will supply continental breakfast and snacks though out the morning. Best of all, the food is free of charge, as is the symposium!!

In the afternoon, there will be a choice of field trips. At the time of this writing, a tour of the West Parish Filter (Westfield) is confirmed. Another field trip will be added. Those planning to attend the afternoon field trips should bring a bag lunch or plan to have lunch on their own.

The symposium will be held at Westfield State College in the Wilson Hall Auditoriums with registration beginning at 8:00 a.m. It is sponsored by the Westfield River Watershed Association with support from Winding River Land Conservancy, Westfield State College, Massachusetts Watershed Initiative and Westfield Gas & Electric Company. For further information, call WRWA at 532-7290 or 572-5304 or visit our website at

Winter 2003 Page 2

WESTFIELD EVENING NEWS, Friday, March 21, 2003

Draft Westfield River Watershed Open Space Plan Available for Review and Comments

WESTFIELD - The Pioneer Valley Planning Commission has prepared a draft open space and recreation plan (OSRP) for the Westfield River watershed. PVPC also invites interested citizens to the Westfield River Symposium on March 29 at Westfield State College to participate in an OSRP plan development workshop and to receive a copy of the draft plan.

Anyone living, working, or recreating in the Westfield River watershed is welcome to submit comments on draft plan items. PVPC strongly encourages public feedback so that the plan meets the needs of the entire watershed community.

To view the draft plan, visit PVPC's website at www.pvpc.org ("Public Review Documents" section), e-mail mdelmonte@pvpc.org, or call (413)781-6045.

For more information on this project, or to find out how to become actively involved in watershed protection efforts, please contact PVPC's Catherine Miller, project manager, at (413)781-6045 or cmiller@pvpc.org.

The OSRP is being funded by the Massachusetts Executive Office of Environmental Affairs Watershed Initiative.

EXHIBITS
Open from 8:00 to 1:00

Appalachian Mountain Club	Riverways/River Restore
Keystone Arches Model	Mass Fish and Wildlife
Pioneer Valley Planning Commission	Westfield River Watershed Association
Trout Unlimited	Trustees of Reservation
US Fish and Wildlife	Springfield Water Department
American Chestnut Foundation	Nature Photography by John Green
Winding River Land Conservancy	WSC Biology Dept. (GIS)
WSC Biology Dept. (Birds)	Bill Hardie, Licensed Trapper
Westfield River Wild & Scenic Committee	Natural Resources Conservation Service

Sponsored by:

Westfield River Watershed Association
P.O. Box 1764
Westfield, MA 01086-1764
(413) 532-7290

Westfield State College

Winding River Land Conservancy

Western Massachusetts Geographic Center at WSC

Massachusetts Watershed Initiative

Westfield Gas & Electric Company

Welcome to the
9th Annual

Westfield River Symposium

A Look at the Future: Water Resources and Open Space

March 29, 2003

9th Annual Westfield River Symposium
A Look at the Future: Water Resources and Open Space

8:00 - 8:30	Foyer Registration	The Exhibits and Continental Breakfast will be available from 8:00 a.m. to 1:00 p.m.	
8:30 - 9:30	Auditorium A	Welcome by Mike Young, WRWA President Keynote Address "Is Forever Forever? by Dick Evans, Attorney	
9:45 - 10:30	Concurrent Sessions		
	Auditorium A Updating Westfield's Open Space Plan by Larry Smith, Principal Planner, City of Westfield	Auditorium B Restoring Yokum Brook Through Partnership by Karen Pelto, River Restore Coordinator, Mass. Dept. of Fish and Wildlife	Auditorium C Planning for YOur Watershed: A Public Outreach Workshop by Catherine Miller and Matt Del Monte, Pioneer Valley Planning Commission
10:45 - 11:30	Concurrent Sessions		
	Auditorium A Planning for Your Watershed: A Public Outreach Workshop by Catherine Miller and Matt Del Monte, Pioneer Valley Planning Commission	Auditorium B Updating Westfield's Open Space Plan by Larry Smith, Principal Planner, City of Westfield	Auditorium C Mapping the Westfield River Watershed Robert Bristow, Dept. of Geography & Regional Planning Westfield State College
11:45 - 12:30	Concurrent Sessions		
	Auditorium A The Nature Conservancy's Site-based Conservation Planning in the Westfield River Watershed by Alison Bowden, Nature Conservancy	Auditorium B Westfield River - Wild & Scenic - So What? Now What? by Liz Lacy, National Park Service & Carrie Banks, Wild & Scenic Committee	Auditorium C Restoring Yokum Brook Through Partnership by Karen Pelto, River Restore Coordinator, Mass. Dept. of Fish and Wildlife
1:30 - ?	Field Trips	West Parish Filters (Westfield): Ralph Tarnauskas, Springfield Water Department Protecting Open Space in Westfield: Mark Noonan, Winding River Land Conservancy	

Appendix B:

Demographic Data

Population Characteristics

Municipality	*Population*	*Percent per Square Mile*	*Percent White, Non-Hispanic*	*Percent Black or African American*	*Percent Asian*	*Percent Hispanice or Latino*
Agawam	28,144	1211	95.4%	1.1%	1.2%	1.4%
Ashfield	1,801	45	97.8%	0.0%	0.3%	0.7%
Becket	1,751	38	97.1%	0.5%	0.1%	1.0%
Blandford	1,214	23	97.9%	0.2%	0.0%	1.0%
Chester	1,306	36	97.4%	0.3%	0.8%	0.8%
Chesterfield	1,201	39	100.0%	0.0%	0.0%	0.0%
Cummington	1,004	44	96.3%	0.0%	0.0%	1.8%
Goshen town	903	52	97.1%	0.1%	0.0%	1.4%
Granville town	1,521	36	98.2%	0.4%	0.5%	0.9%
Holyoke	39,838	1871	54.3%	4.2%	1.1%	41.0%
Huntington	2,192	82	97.5%	0.0%	0.0%	1.7%
Middlefield	580	24	99.7%	0.3%	0.0%	0.0%
Montgomery	656	44	97.6%	0.0%	0.6%	0.8%
Peru	801	31	100.0%	0.0%	0.0%	0.0%
Plainfield	576	27	97.4%	0.0%	0.0%	1.4%
Russell	1,655	94	97.6%	0.2%	0.1%	1.1%
Savoy	692	19	96.8%	1.4%	0.0%	0.4%
Southwick	8,835	285	95.7%	0.4%	0.5%	2.2%
Washington	548	15	99.6%	0.0%	0.0%	0.0%
West Springfield	27,899	1666	88.7%	2.0%	1.8%	5.8%
Westfield	40,072	860	92.1%	0.8%	0.6%	5.3%
Windsor	895	26	97.3%	0.3%	1.2%	0.0%
Worthington	1,219	38	97.6%	0.7%	0.0%	1.5%
Westfield Watershed Region	**165,303**	**237**	**83.9%**	**1.8%**	**1.0%**	**12.6%**

Source: U.S. Census Bureau

Population Characteristics (continued)

Municipality	*Percent of the population under 18 years old*	*Percent of the population 65 years and over*
Agawam	21.8%	16.6%
Ashfield	23.8%	11.0%
Becket	24.4%	12.2%
Blandford	24.5%	9.7%
Chester	26.6%	11.7%
Chesterfield	25.4%	9.7%
Cummington	26.3%	11.2%
Goshen town	20.0%	10.5%
Granville town	28.0%	10.8%
Holyoke	29.5%	15.4%
Huntington	28.1%	9.8%
Middlefield	24.3%	8.4%
Montgomery	25.2%	9.6%
Peru	27.5%	9.2%
Plainfield	24.7%	13.9%
Russell	24.7%	10.5%
Savoy	20.8%	11.8%
Southwick	26.4%	11.5%
Washington	24.8%	12.8%
West Springfield	23.3%	15.9%
Westfield	23.7%	13.6%
Windsor	26.8%	9.3%
Worthington	25.5%	11.6%
Westfield Watershed Region	**25.1%**	**14.5%**

Source: U.S. Census Bureau

Population Characteristics (continued)

Municipality	*Poverty Rate*	*Child Poverty Rate*	*Percent of Housholds with Public Assistance Income*	*Percent of Households with Retirement Income*	*Percent of Families Headed by Single Mothers*
Agawam	5.6%	7.0%	1.5%	18.0%	8.0%
Ashfield	7.6%	15.4%	1.5%	15.4%	8.8%
Becket	4.5%	5.0%	1.2%	21.6%	4.3%
Blandford	3.4%	2.4%	1.5%	20.7%	2.0%
Chester	5.8%	5.0%	2.9%	15.1%	10.3%
Chesterfield	5.7%	5.7%	1.1%	15.2%	7.4%
Cummington	6.6%	7.8%	3.4%	19.0%	1.9%
Goshen town	7.9%	8.9%	2.2%	17.4%	1.3%
Granville town	3.4%	2.2%	0.0%	10.7%	4.1%
Holyoke	26.4%	41.9%	11.2%	17.7%	23.2%
Huntington	5.8%	6.6%	3.2%	15.6%	7.9%
Middlefield	8.6%	9.2%	1.4%	18.7%	2.4%
Montgomery	2.9%	1.3%	1.6%	13.6%	2.5%
Peru	4.9%	7.3%	4.4%	16.3%	7.2%
Plainfield	8.0%	4.9%	2.8%	23.9%	3.0%
Russell	9.0%	14.7%	4.3%	12.9%	9.6%
Savoy	5.4%	9.2%	3.1%	16.8%	4.9%
Southwick	6.1%	6.3%	2.3%	14.0%	5.8%
Washington	6.9%	12.5%	1.0%	25.6%	3.6%
West Springfield	11.9%	20.8%	4.7%	18.8%	9.9%
Westfield	11.3%	16.4%	3.7%	17.5%	8.7%
Windsor	5.1%	6.4%	1.2%	18.9%	2.8%
Worthington	3.5%	2.6%	1.1%	19.5%	4.5%
Westfield Watershed Region	**13.1%**	**21.1%**	**5.0%**	**17.6%**	**11.5%**

Source: U.S. Census Bureau

Population Characteristics (continued)

Municipality	*Percent of the Population that is Foreign Born*	*Percent of Foreign Born Persons who Immigrated between 1990 and 2000*	*Percent of the Population over 5 Speaking Spanish at home*	*Percent of the Population over 5 Speaking an Indo-European language other than Spanish or English at home*
Agawam	5.3%	28.2%	1.3%	6.1%
Ashfield	2.9%	50.9%	1.2%	2.2%
Becket	2.5%	13.6%	1.9%	1.9%
Blandford	2.2%	22.2%	1.4%	3.1%
Chester	1.3%	11.8%	0.5%	2.3%
Chesterfield	1.6%	0.0%	0.8%	1.9%
Cummington	2.6%	34.6%	2.5%	4.6%
Goshen town	1.3%	0.0%	0.7%	2.7%
Granville town	2.7%	26.8%	1.8%	4.0%
Holyoke	5.4%	26.5%	35.9%	5.8%
Huntington	1.4%	19.4%	1.1%	2.7%
Middlefield	2.8%	12.5%	0.4%	2.0%
Montgomery	2.3%	46.7%	0.6%	2.7%
Peru	1.0%	37.5%	1.5%	1.0%
Plainfield	4.0%	8.7%	1.8%	4.7%
Russell	4.2%	79.7%	1.5%	4.6%
Savoy	1.0%	0.0%	1.8%	1.4%
Southwick	2.6%	15.4%	2.4%	4.5%
Washington	1.5%	0.0%	2.5%	1.5%
West Springfield	10.9%	65.2%	4.7%	10.8%
Westfield	7.1%	58.5%	4.0%	7.8%
Windsor	2.5%	45.5%	0.8%	2.9%
Worthington	1.6%	26.3%	3.2%	2.4%
Westfield Watershed	**6.2%**	**47.2%**	**10.8%**	**6.7%**

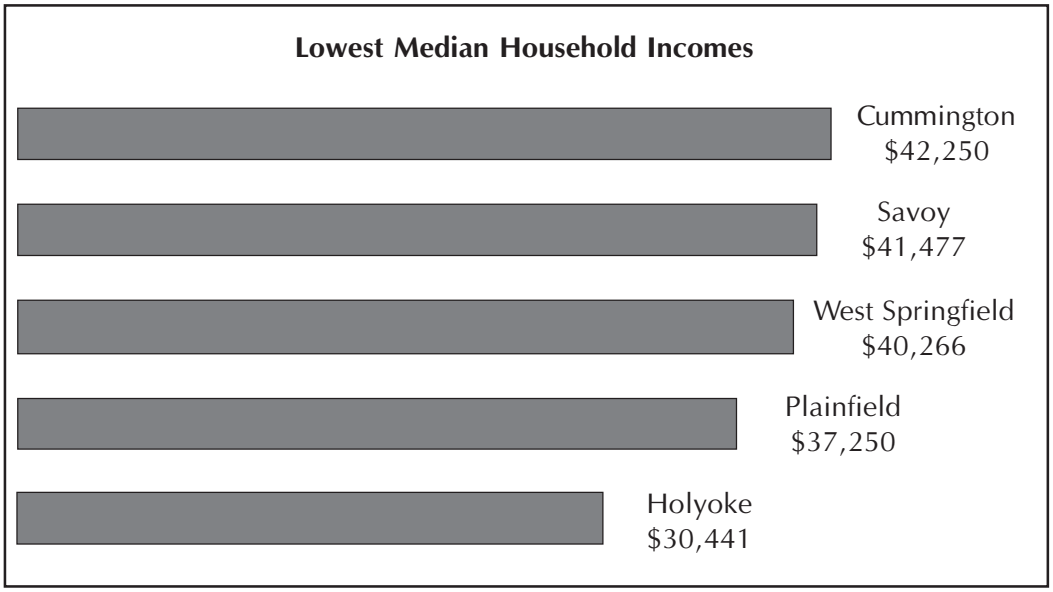
Source: U.S. Census Bureau

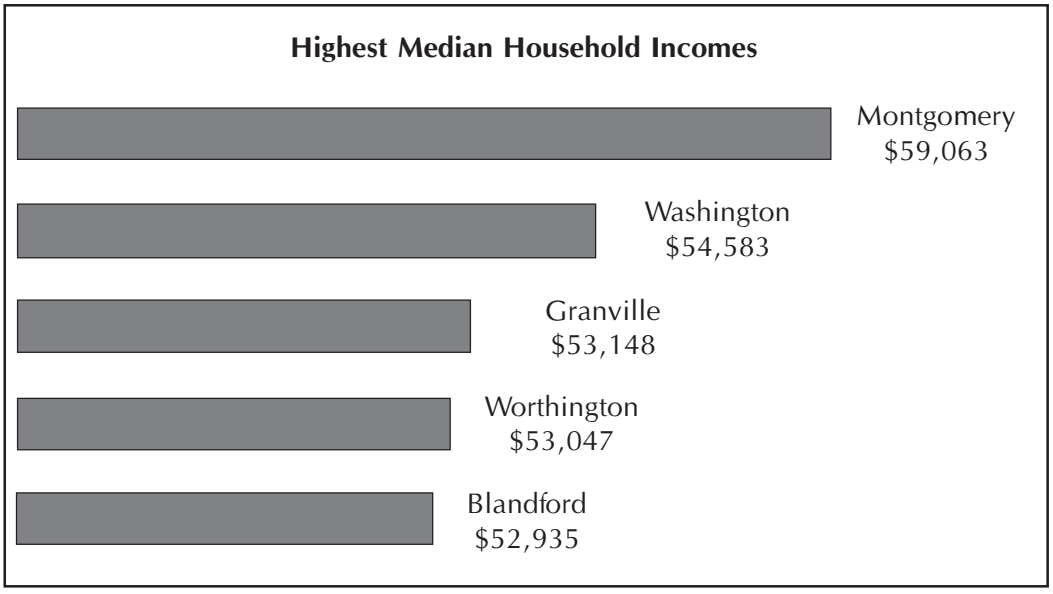
Income Characteristics

Municipality	*Median Household Income*	*Per Capita Income*
Holyoke	$30,441	$15,913
Plainfield	$37,250	$20,785
West Springfield	$40,266	$20,982
Savoy	$41,477	$20,223
Cummington	$42,250	$21,553
Westfield Watershed Region	**$42,401**	**$20,093**
Chester	$43,816	$18,098
Peru	$44,531	$18,636
Westfield	$45,240	$20,600
Russell	$46,600	$21,318
Becket	$46,806	$21,861
Huntington	$48,958	$19,385
Chesterfield	$49,063	$19,220
Agawam	$49,390	$22,562
Goshen town	$49,583	$22,221
Middlefield	$50,938	$24,137
Windsor	$51,389	$21,794
Southwick	$52,296	$21,756
Ashfield	$52,875	$26,483
Blandford	$52,935	$24,285
Worthington	$53,047	$24,190
Granville town	$53,148	$22,315
Washington	$54,583	$23,610
Montgomery	$59,063	$25,942

Source: U.S. Census Bureau

Income Characteristics (continued)





Education Attainment

Municipality	*Percent who did not complete high school*	*Percent who have a bachelor's degree*
Agawam	12.5%	21.4%
Ashfield	5.5%	46.5%
Becket	12.4%	23.9%
Blandford	11.4%	25.8%
Chester	13.0%	17.4%
Chesterfield	8.4%	24.9%
Cummington	5.6%	40.3%
Goshen town	9.7%	30.1%
Granville town	7.7%	31.3%
Holyoke	30.0%	16.9%
Huntington	10.3%	20.2%
Middlefield	11.6%	28.1%
Montgomery	7.0%	33.6%
Peru	12.9%	18.9%
Plainfield	11.3%	30.8%
Russell	16.5%	17.3%
Savoy	15.7%	15.1%
Southwick	15.3%	21.4%
Washington	11.6%	25.4%
West Springfield	16.3%	21.6%
Westfield	15.1%	24.2%
Windsor	9.0%	30.9%
Worthington	6.5%	36.3%
Westfield Watershed	**17.5%**	**21.9%**

Source: U.S. Census Bureau

Employment Characteristics (continued)

Municipality	*Labor Force Participation*	*Unemployment Rate*	*Percent of Workers working in their City/Town of Residence*	*Percent of Workers using Public Transportation to get to work*	*Percent of 16 to 19 year olds who are not high school graduates, not enrolled in school, and not employed*
Agawam	68.0%	4.1%	24.5%	0.5%	2.2%
Ashfield	76.3%	3.2%	25.0%	0.7%	3.4%
Becket	66.7%	5.0%	16.9%	0.2%	0.0%
Blandford	72.9%	3.9%	12.4%	0.0%	0.0%
Chester	71.6%	5.6%	12.0%	0.6%	6.1%
Chesterfield	74.9%	3.5%	13.7%	0.0%	0.0%
Cummington	60.8%	1.4%	22.3%	0.0%	0.0%
Goshen town	76.3%	3.4%	11.5%	0.6%	0.0%
Granville town	75.8%	5.6%	17.5%	0.2%	4.2%
Holyoke	54.3%	6.7%	44.9%	3.2%	10.6%
Huntington	74.0%	3.7%	15.5%	0.8%	1.5%
Middlefield	70.0%	4.4%	16.2%	0.7%	14.3%
Montgomery	73.4%	2.1%	5.5%	0.6%	0.0%
Peru	72.5%	2.3%	11.0%	0.0%	0.0%
Plainfield	62.8%	1.4%	21.2%	1.1%	0.0%
Russell	70.7%	4.0%	7.7%	0.2%	1.9%
Savoy	65.5%	4.8%	11.3%	0.9%	5.9%
Southwick	71.3%	5.3%	22.0%	0.0%	1.8%
Washington	69.2%	4.7%	9.6%	1.4%	4.9%
West Springfield	64.2%	4.1%	27.5%	2.1%	7.5%
Westfield	66.0%	4.9%	43.1%	1.4%	3.5%
Windsor	68.3%	0.6%	13.4%	0.0%	5.1%
Worthington	68.8%	3.0%	22.1%	0.3%	2.3%
Westfield Watershed	**64.3%**	**4.8%**	**32.1%**	**1.5%**	**5.4%**

Source: U.S. Census Bureau

Employment Characteristics (continued)

Municipality	*Laborforce*	*Employment*	*Unemployment*	*Unemployment Rate*
Agawam	14,390	13,913	477	3.3%
Ashfield	1,029	1,004	25	2.4%
Becket	1,052	1,025	27	2.6%
Blandford	838	810	28	3.3%
Chester	891	848	43	4.8%
Chesterfield	915	894	21	2.3%
Cummington	638	620	18	2.8%
Goshen	663	652	11	1.7%
Granville	1,068	1,044	24	2.2%
Holyoke	15,853	15,002	851	5.4%
Huntington	1,074	1,035	39	3.6%
Middlefield	323	317	6	1.9%
Montgomery	410	399	11	2.7%
Peru	530	518	12	2.3%
Plainfield	438	423	15	3.4%
Russell	872	834	38	4.4%
Savoy	389	370	19	4.9%
Southwick	4,681	4,507	174	3.7%
Washington	410	396	14	3.4%
West Springfield	13,667	13,124	543	4.0%
Westfield	18,830	18,187	643	3.4%
Windsor	562	550	12	2.1%
Worthington	850	828	22	2.6%
Westfield Watershed Region	**80,373**	**77,300**	**3,073**	**3.8%**

Source: MA Department of Employment and Training, 2001

Housing Characteristics

Municipality	*Housing Units*	*Housing Units per Square Mile*	*Vacant Housing Units (seasonal not included)*	*Owner Occupancy Rate*	*Median Year Structures Built*	*Median Gross Rent for Rental Units*	*Median Value of Owner Occupied Housing*
Agawam	11,659	501.6	2.0%	73.6%	1966	$651	$132,000
Ashfield	821	20.4	2.2%	77.8%	1950	$571	$129,200
Becket	1,449	31.3	2.1%	88.3%	1972	$704	$108,700
Blandford	526	10.2	4.0%	88.8%	1952	$650	$127,800
Chester	576	15.7	3.6%	83.9%	1939	$656	$106,100
Chesterfield	524	16.8	5.0%	86.8%	1956	$675	$129,100
Cummington	461	20.0	5.0%	75.2%	1939	$506	$124,000
Goshen town	560	32.2	6.3%	87.2%	1959	$663	$133,400
Granville town	595	14.1	3.7%	87.6%	1960	$775	$142,300
Holyoke	16,210	761.5	7.5%	41.5%	1950	$503	$105,600
Huntington	911	34.2	2.0%	76.5%	1956	$625	$117,800
Middlefield	241	10.0	0.0%	92.3%	1972	$592	$105,200
Montgomery	258	17.1	0.0%	96.1%	1968	$525	$158,400
Peru	371	14.3	10.5%	92.1%	1974	$575	$97,900
Plainfield	310	14.7	14.8%	85.1%	1955	$419	$121,000
Russell	640	36.4	3.8%	82.5%	1956	$583	$123,100
Savoy	324	9.0	5.9%	94.0%	1976	$505	$99,100
Southwick	3,533	114.1	4.6%	81.4%	1968	$622	$140,800
Washington	238	6.3	1.7%	97.1%	1972	$-	$121,400
West Springfield	12,259	731.9	2.8%	58.2%	1956	$546	$123,000
Westfield	15,441	331.5	3.2%	67.8%	1961	$590	$133,400
Windsor	481	13.7	7.1%	91.5%	1964	$540	$140,100
Worthington	596	18.6	3.2%	88.7%	1951	$450	$130,100
Westfield Watershed Region	**68,984**	**98.7**	**4.1%**	**63.8%**	**1958**	**$557**	**$125,950**

Source: U.S. Census Bureau

Parcel Counts (by Land Use Category)

Municipality	*Single Family*	*Multi Family*	*Condos*	*Apt*	*Misc. Residence*	*Vacant Land*	*Open Space*	*Comm-ercial*	*Industrial*	*Other Usage*	*Total*	*Percent Residential*	*Percent Commercial*
Agawam	7,369	415	1,537	60	15	934	-	313	164	184	10,991	85.5%	4.3%
Ashfield	613	40	-	3	26	390	-	34	24	311	1,441	47.3%	4.0%
Becket	1,554	6	-	-	67	2,171	-	14	2	54	3,868	42.1%	0.4%
Blandford	492	8	-	-	11	392	-	6	5	77	991	51.6%	1.1%
Chester	471	24	-	1	15	401	-	16	7	101	1,036	49.3%	2.2%
Chesterfield	478	10	-	1	12	229	-	6	12	94	842	59.5%	2.1%
Cummington	315	18	-	3	16	251	-	6	4	108	721	48.8%	1.4%
Goshen	478	8	13	-	10	319	-	12	5	91	936	54.4%	1.8%
Granville	520	19	-	-	6	187	-	32	9	123	896	60.8%	4.6%
Holyoke	5,131	1,554	311	329	24	953	-	699	412	259	9,672	76.0%	11.5%
Huntington	709	47	-	5	58	401	-	13	12	101	1,346	60.8%	1.9%
Middlefield	184	5	-	-	1	181	-	5	1	130	507	37.5%	1.2%
Montgomery	320	-	-	-	-	115	-	1	7	60	503	63.6%	1.6%
Peru	295	1	-	-	66	335	-	2	2	33	734	49.3%	0.5%
Plainfield	231	8	-	-	28	257	-	16	24	116	680	39.3%	5.9%
Russell	479	35	-	7	11	133	8	16	37	51	777	68.5%	6.8%
Savoy	280	4	-	-	55	229	-	1	-	14	583	58.1%	0.2%
Southwick	2,726	93	125	107	26	787	-	115	43	210	4,232	72.7%	3.7%
Washington	234	-	-	-	1	238	-	12	2	22	509	46.2%	2.8%
West Springfield	6,246	812	588	143	27	555	-	680	170	95	9,316	83.9%	9.1%
Westfield	8,916	1,129	566	142	86	988	-	540	185	357	12,909	84.0%	5.6%
Windsor	427	1	-	-	7	293	10	1	17	47	803	54.2%	2.2%
Worthington	492	13	-	-	32	169	-	6	5	118	835	64.3%	1.3%
Westfield River Region	**38,960**	**4,250**	**3,140**	**801**	**600**	**10,908**	**18**	**2,546**	**1,149**	**2,756**	**65,128**	**73.3%**	**5.7%**
Percent for Region	**59.8%**	**6.5%**	**4.8%**	**1.2%**	**0.9%**	**16.7%**	**0.0%**	**3.9%**	**1.8%**	**4.2%**			

Source: MA Department of Revenue, Municipal Data Bank, Fiscal Year 2002

Municipal Expenditures

Municipality	General Gov't	Police	Fire	Other Public Safety	Education	Public Works Highway	Human Services	Culture & Recreation	Debt Services	Fixed Costs	Intergovern-mental	Total Expenditures
Agawam	$1,868,987	$2,931,851	$2,603,652	$199,137	$26,901,794	$6,728,909	$817,782	$811,122	$2,955,160	$4,788,925	$472,022	$51,079,341
Ashfield	$181,925	$89,700	$31,485	$32,243	$1,350	$360,686	$28,758	$43,892	$42,746	$93,939	$1,430,449	$2,337,173
Becket	$320,043	$75,077	$22,900	$187,754	$1,383,366	$506,204	$24,091	$26,326	$178,586	$237,228	$-	$2,961,575
Blandford	$131,196	$7,117	$20,261	$16,952	$915,587	$276,923	$17,269	$36,409	$22,096	$66,031	$8,391	$1,518,232
Chester	$122,129	$20,729	$35,517	$13,496	$897,441	$330,618	$12,832	$24,030	$51,010	$111,905	$7,668	$1,627,375
Chesterfield	$129,205	$21,244	$10,336	$14,479	$1,110,502	$281,836	$3,078	$18,905	$110,587	$61,910	$14,259	$1,776,341
Cummington	$107,162	$15,988	$9,805	$7,975	$780,250	$220,726	$500	$12,398	$12,018	$65,251	$2,472	$1,234,545
Goshen	$135,147	$46,108	$50,761	$40,030	$832,968	$235,962	$10,761	$9,001	$56,554	$82,024	$9,424	$1,508,740
Granville	$124,642	$39,480	$25,003	$19,462	$1,922,772	$320,049	$5,502	$20,138	$437,330	$203,192	$21,171	$3,138,741
Holyoke	$3,048,598	$8,982,986	$7,033,461	$372,263	$63,294,151	$4,878,630	$1,018,565	$1,320,999	$8,391,755	$12,918,110	$1,812,567	$113,072,085
Huntington	$213,772	$61,717	$28,945	$17,720	$1,241,066	$302,716	$18,031	$60,644	$106,514	$85,690	$15,118	$2,151,933
Middlefield	$67,524	$5,687	$7,534	$6,179	$394,492	$209,119	$8,606	$9,426	$23,114	$46,330	$3,800	$781,811
Montgomery	$104,224	$4,043	$15,098	$9,454	$573,914	$184,714	$1,280	$14,710	$37,010	$22,077	$4,925	$971,449
Peru	$79,398	$10,641	$15,544	$3,095	$619,030	$225,641	$1,200	$3,383	$1,161	$25,467	$368	$984,928
Plainfield	$104,909	$8,265	$7,513	$13,460	$451,975	$223,623	$1,662	$13,949	$13,979	$73,151	$723	$913,209
Russell	$189,695	$2,502	$33,941	$76,227	$921,002	$198,348	$6,004	$60,748	$10,000	$125,603	$7,940	$1,632,010
Savoy	$67,679	$1,402	$18,307	$565	$842,647	$207,452	$6,925	$1,922	$9,520	$74,806	$494	$1,231,719
Southwick	$1,324,373	$1,175,550	$224,556	$74,398	$4,684,297	$1,238,352	$123,134	$347,654	$823,698	$568,806	$338,788	$10,923,606
Washington	$59,167	$454	$10,298	$2,229	$439,111	$220,744	$822	$5,922	$38,635	$42,778	$226	$820,386
West Springfield	$2,635,510	$4,889,528	$3,227,729	$396,827	$25,946,193	$6,657,696	$688,689	$1,070,837	$3,424,981	$7,275,593	$1,302,330	$57,515,913
Westfield	$3,747,900	$4,609,622	$4,353,220	$365,104	$42,137,919	$4,757,416	$559,057	$873,371	$9,039,726	$10,680,704	$1,814,442	$82,938,481
Windsor	$65,628	$14,916	$10,253	$4,825	$721,828	$237,424	$4,144	$625	$343,132	$50,272	$15,309	$1,468,356
Worthington	$104,658	$14,569	$34,917	$16,340	$1,070,178	$275,566	$6,740	$8,850	$8,436	$66,314	$718	$1,607,286
Westfield River Region	**$14,933,471**	**$23,029,176**	**$17,831,036**	**$1,890,214**	**$178,083,833**	**$29,079,354**	**$3,365,432**	**$4,795,261**	**$26,137,748**	**$37,766,106**	**$7,283,604**	**$344,195,235**
Percent for Region	**4.3%**	**6.7%**	**5.2%**	**0.5%**	**51.7%**	**8.4%**	**1.0%**	**1.4%**	**7.6%**	**11.0%**	**2.1%**	

Source: MA Department of Revenue, Municipal Data Bank, Fiscal Year 2001

Municipal Revenues

Municipality	*Tax Levy*	*State Aid*	*Local Receipts*	*All Other*	*Total Receipts*
Agawam	$30,406,026	$17,307,032	$8,927,190	$3,275,863	$59,916,111
Ashfield	$2,100,149	$312,851	$396,680	$292,949	$3,102,629
Becket	$2,610,287	$268,056	$339,200	$325,534	$3,543,077
Blandford	$1,408,954	$147,309	$401,479	$133,065	$2,090,806
Chester	$1,322,635	$239,138	$245,772	$287,311	$2,094,856
Chesterfield	$1,451,612	$302,317	$161,889	$230,145	$2,145,963
Cummington	$997,536	$166,466	$180,000	$325,665	$1,669,667
Goshen	$1,261,975	$180,012	$153,300	$134,827	$1,730,114
Granville	$1,729,536	$1,264,136	$243,183	$399,422	$3,636,277
Holyoke	$34,550,207	$75,862,047	$10,067,750	$6,459,972	$126,939,976
Huntington	$1,787,688	$397,865	$451,900	$438,642	$3,076,095
Middlefield	$696,762	$113,517	$67,077	$191,019	$1,068,375
Montgomery	$853,928	$98,635	$119,600	$201,794	$1,273,957
Peru	$818,490	$181,397	$63,800	$86,938	$1,150,625
Plainfield	$753,450	$155,855	$77,150	$43,926	$1,030,381
Russell	$1,441,906	$241,621	$1,024,158	$355,300	$3,062,985
Savoy	$605,529	$584,314	$59,000	$219,379	$1,468,222
Southwick	$8,610,572	$1,328,815	$1,994,097	$1,058,511	$12,991,995
Washington	$534,679	$150,394	$101,100	$95,246	$881,419
West Springfield	$33,835,493	$18,964,960	$10,224,314	$3,990,150	$67,014,917
Westfield	$37,463,570	$38,018,347	$17,033,608	$2,146,252	$94,661,777
Windsor	$836,156	$234,847	$132,300	$229,593	$1,432,896
Worthington	$1,603,493	$148,065	$166,200	$228,449	$2,146,207
Westfield River Region	**$167,680,633**	**$156,667,996**	**$52,630,747**	**$21,149,951**	**$398,129,327**
Percent for Region	**42.1%**	**39.4%**	**13.2%**	**5.3%**	

Source: MA Department of Revenue, Municipal Data Bank, Fiscal Year 2001

Municipal Tax Rates

Municipality	*Residential*	*Open Space*	*Commercial*	*Industrial*	*Personal Property*
Agawam	15.11		21.78	21.78	21.78
Ashfield	16.53		16.53	16.53	16.53
Becket	11.42		11.42	11.42	11.42
Blandford	16.12		16.12	16.12	16.12
Chester	18.34		18.34	18.34	18.34
Chesterfield	18.98		18.98	18.98	18.98
Cummington	13.71		13.71	13.71	13.71
Goshen	18.33		18.33	18.33	18.33
Granville	16.44		16.44	16.44	16.44
Holyoke	16.73		37.12	37.12	37.12
Huntington	17.09		17.09	17.09	17.09
Middlefield	18.4		18.4	18.4	18.4
Montgomery	15.65		15.65	15.65	15.65
Peru	17.83		17.83	17.83	17.83
Plainfield	15.2		15.2	15.2	15.2
Russell	15.85	15.85	25.04	25.04	25.04
Savoy	15.6		15.6	15.6	15.6
Southwick	15.99		15.99	15.99	15.99
Washington	14.28		14.28	14.28	14.28
West Springfield	17.66		31.67	31.67	31.67
Westfield	17.12		29.73	29.73	29.73
Windsor	13.12	13.12	13.12	13.12	13.12
Worthington	17.27		17.27	17.27	17.27
Westfield Watershed Region Avg	**16.21**	**14.49**	**18.94**	**18.94**	**18.94**

Note: Rates are tax per $1,000 of value.
Source: MA Department of Revenue, Municipal Data Bank, Fiscal Year 2002

Appendix C:

Catagories Used in Land Use Suitability Analysis

To aid in the visualization of these future land use priorities, PVPC has developed eight categories for all lands in the basin. Every acre of land in the Westfield River watershed falls into one of these categories. A brief description of each land use category, including the list of mapping data or characteristics used to create the category, follows:

Category 1: Existing Developed Lands

This category includes lands that are currently shown as developed on the most recent McConnell Land Use Maps from UMASS.

Category 2: Protected from Future Development

This category includes lands that are most likely to remain undeveloped in the future. In some cases this is because the identified lands are protected from development or are in government or institutional ownership and are unlikely to be developed in the near future.

Category 3: Land Suitable for Protection

This category includes lands that provide some valuable benefit to the natural or human environment in Goshen and that should be protected from future development.

Data Layers

All lands not in Category 1 or 2 but including:

A. Resource Areas

- 100-year Flood Plain
- DEP Zone 1
- Outstanding Water Resource Watershed
- Wetlands (plus 100-foot buffer)
- Rivers Protection Act (100-foot buffer, inner riparian zone)
- BioMap Core Habitat Areas
- Certified and Potential Vernal Pools (point designations only)
- Steep Slopes (over 25%)
- NHESP Rare & Endangered Species Habitat

B. Existing Open Space with Limited Protection from Development

- Government-owned Lands
- Institutional Lands
- Private Lands
  - Can include active farmland
  - Does not consider existing zoning designations

Category 4: Land Suitable for Compact Development *(Mixed Use, Affordable Housing, Commercial Development)*

This category includes lands that are currently served – or could be potentially served – by the infrastructure that supports the most intensive development. Many times, these lands will occur around village centers, along developed commercial corridors, or in more intensively developed residential and mixed use neighborhoods.

Data Layers

Unprotected, unconstrained lands within any of the following simple buffers to be established showing lands within:

Services

__ mile of water line
__ mile of sewer line
__ mile of public transit line
__ mile of an interstate (or turnpike) exchange

Places

__ mile of major employer/employment center
__ mile buffer of town center/s
__ mile buffer of village centers
__ mile buffer of other community-designated growth node
- Does not include active farmlands
- Commercial/Industrial zoned land not included (these lands appear in Category 6)

Category 5: Land Suitable for Farmland

This category includes all undeveloped and unrestricted farmland not in Categories 1, 2, or 3.

Category 6: Sensitive Lands Suitable for Low Intensity Use

This category includes environmentally-sensitive lands that are most appropriate for low intensity uses such as low density residential housing, active recreational uses, or scattered, low-impact commercial activity. When appropriate, some of these areas may also be appropriate for long-term protection from development such as in the case of active agricultural lands.

Data Layers

All undeveloped and unrestricted lands not within above categories, but within:

- DEP approved Zone 2
- Aquifer Protection Overlay Zones
- Interim Wellhead Protection Areas
- Nontransient/Noncommunity Water Supply Buffers
- Steep Slopes (15% - 25%)
- Pioneer Valley Regional Greenways Priority Areas
- Planned Municipal trails or greenway corridors

Category 7: Land Suitable for Commercial of Industrial Use (High Intensity)

This category includes lands that may be suitable for high intensity commercial or economic development in Goshen. Not all communities have areas in all of these categories, but it is likely that at least some areas in town will fall into this category.

Data Layers

Undeveloped, unprotected, unconstrained lands within:

- Existing Industrial Park
- Designated Economic Opportunity Area
- Brownfield Sites
- Existing Vacant/Underdeveloped Industrial/Commercial Sites
- Lands Currently Zoned for Commercial or Industrial Use

Category 8: Suitable for General Development or Local Designation

These lands are those that offer neither prime development opportunities nor particularly valuable environmental assets. The Community Development Planning Committee may choose whether or not to include specific strategies regarding future uses of these lands.

Data Layers

All remaining lands not included in other categories

Appendix D:

Implementation Strategies and Tools for Protecting Open Space

The following tools and strategies are recommended to promote open space protection and to help create regional greenways:

Municipal Actions

Massachusetts Community Preservation Act. The CPA enables communities to establish, through a ballot referendum, a local Community Preservation Fund dedicated to historic preservation, low- and moderate-income housing, and open space including active and passive recreational uses. Revenue for the fund is generated through a surcharge of up to 3 percent of the local property tax. While local adoption of the Act is optional, the Commonwealth is providing, as an adoption incentive, state matching funds totaling approximately $26 million annually.

Local Land Protection Fund. Many towns set up local funds to enable them to act quickly to buy parcels for open space, as they become available. Sometimes these are administered through the local Conservation Commission, with funding from Notice of Intent application fees and other municipal fees. A Local Protection Fund can also help provide the matching funds required by most state and federal land grant programs.

Chapter 61, 61A, 61B. Massachusetts General Laws, Chapters 61, 61A, and 61B are designed to encourage the preservation and enhancement of forests, agricultural and horticultural lands, and open space. These programs offer significant local tax benefits to property owners who are willing to make long-term commitments to preserving their land in these categories. When such properties go on the market, towns have a 120 day right of first refusal to purchase them for open space.

State Land Protection Programs

Massachusetts Self-Help Program. This Division of Conservation Services program assists municipal conservation commissions in acquiring land for natural resources and passive outdoor recreation. Eligible land may include wildlife habitat, trails, unique natural or cultural resources, water resources, forest, and farmland. Compatible passive outdoor recreational uses such as hiking, fishing, hunting, cross-country skiing, and bird watching are encouraged. Access to the land by the public is required.

Massachusetts Land & Water Conservation Fund. Federally funded, this program is administered by the Massachusetts Division of Conservation Services and provides up to 50 percent of the total project cost for the acquisition, development, and renovation of park, recreation, or conservation areas. Municipalities, special districts, and state agencies are eligible to apply. Access by the public to these areas is required.

Massachusetts Agricultural Preservation Restriction Program. APR is a voluntary program, administered by the Massachusetts Department of Food and Agriculture, Bureau of Land Use that offers farmers and other owners of "prime" and "state important" agricultural land an alternative to future development. The APR program pays farmers the difference between the "fair market value" and the "agricultural value" of their farmland, in exchange for a permanent deed restriction that prohibits any use of the property that would damage its agricultural viability.

Massachusetts Department of Environmental Management - Land Acquisition Program. One of the methods by which the Department of Environmental Management acts as a steward for the state's natural resources is through the direct acquisition of land and property interests to protect and enhance Massachusetts' natural, historic, and recreational assets.

Massachusetts Department of Fisheries and Wildlife - Habitat and Land Protection Program. Administered by the Department of Fisheries, Wildlife, and Environmental Law Enforcement, this program acquires river corridors, wetlands, forested uplands, and habitat of state-listed endangered and threatened species.

Massachusetts Areas of Critical Environmental Concern Program. ACECs are places that receive special recognition from the Department of Environmental Management because of the significance of the areas' natural and cultural resources. ACEC designation creates a framework for local and regional stewardship of these resources.

Greenways and Trails Demonstration Grants Program. The Department of Environmental Management provides grant awards to municipalities, non-profits, and regional planning agencies to support innovative projects that advance the creation and promotion of greenway and trail networks throughout Massachusetts.

Historic Landscape Preservation Program. This competitive grant program, run by the Department of Environmental Management, supports the preservation and restoration of historic landscapes listed in, or eligible for listing on the State or National Register of Historic places.

Lake and Pond Grant Program. This Department of Environmental Management program awards grants for the protection, preservation, and enhancement of public lakes and ponds in the Commonwealth. A maximum grant of $25,000 is available to eligible municipalities and local organizations on a 50/50 cost-sharing basis.

Recreational Trails Program Grants. This Department of Environmental Management program provides for the transfer of fuel tax revenue, generated by the use of off-highway vehicles and in backcountry camping, to non-profit organizations, government agencies, and municipalities for a variety of trail projects.

Federal Land Protection Programs

Farmland Protection Program. This program, run by the Natural Resources Conservation Service of the USDA, provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural use. The USDA will provide up to 50 percent of the fair-market easement value of the land.

The Forest Legacy Program. Funded by the USDA Forest Service, and administered in Massachusetts by the Department of Environmental Management Bureau of Forestry, this program identifies and protects environmentally important private forestlands through acquisition or conservation restriction.

Municipal Planning and Zoning Tools

Open Space and Recreation Plan. Prepared by volunteer groups or by consultants for municipalities, OSRPs are blueprints for how towns can protect important open space and recreation lands. The Massachusetts Division of Conservation Services must approve a municipal OSRP before the town can apply for grants administered by the DCS.

Master (or Comprehensive) Plan. A municipality, working through its Planning Board, may develop a long range land use planning document referred to as a Master Plan. Master planning offers the unique opportunity for a community to create a vision of its future. Key topics addressed include economic development, housing, transportation, public services, infrastructure, cultural & historical resources, and open space and natural resources.

Community Development Plan: Executive Order 418 helps communities proactively plan for open space and water resources, affordable housing, economic development, and transportation. Towns are offered up to $30,000 in planning services to develop Community Development Plans.

Transfer of Development Rights (TDR). TDR allows the private purchase of rights to develop a site (in a designated "sending area") and the transfer of those rights to a different site (in a designated "receiving area). In exchange for the permanent protection of lands in the sending area, the 'sending' land owner is paid an agreed upon value while the 'receiving' land owner gains the ability to use those purchased and transferred rights to develop more intensely at an approved location.

Overlay Districts. Many towns enact overlay districts to protect wetland areas, flood plains, watersheds, and aquifers. An overlay zone is a district superimposed on one or more established zoning districts which may be used to impose supplemental restrictions on uses in these districts.

Local Land Trust Actions

Community-based land trusts are experts at helping landowners find ways to protect their land in the face of ever-growing development pressure. Land trusts protect land in several ways: by working with landowners who want to donate or sell conservation easements (permanent deed restrictions that prevent harmful land uses), and by acquiring land outright to maintain it as open space.

Land Owner Actions

Land owners can act in several important ways to help establish a healthy and vital greenways system in the Pioneer Valley.

Donation of Land & Easements. Land owners may donate property – or easements on property – to an appropriate land trust or government for establishing a local greenway.

Municipal Participation. Citizens may volunteer to serve on local planning committees that are developing master plans, open space and recreation plans, or greenways plans for their community. Individuals may also choose to attend board meetings or Town Meetings to advocate for the protection of local greenways.

Join a Local Land Trust. Individual support of any of the outstanding local land trusts in the Pioneer Valley may take the form of membership, monetary support or volunteer effort.

Land Stewardship. Land owners may choose to act as stewards of their property and take an active role in protecting open space through responsible forest management, re-establishment of native plant species, allowing trail corridors or simply improving wildlife habitats in their backyards.

Collaborative and Innovative Strategies

In order to stay ahead of the rapid pace of development in the Pioneer Valley and achieve a regional greenway network, it will be vital to employ innovative and collaborative land protection strategies. The Regional Greenways Plan recommends the following:

Regional Greenways Funding Pool: Funds derived from municipal Community Preservation Act revenues, land trust contributions, donations from corporations and individuals could be combined in a Regional Greenways Funding Pool, to provide more effective and well-financed mechanism to act quickly on regionally significant open space acquisitions. This pool could be administered by a non-profit organization, with a board of directors made up of representatives from land trusts, municipalities, and conservation groups. The pool could eventually even include revenues from a new regional sales tax created specifically for open space preservation and authorized by a regional ballot initiative.

Merging Resources on Individual Parcel Protection. The region has an excellent track record of land individual land parcel protection success stories based on collaborative funding provided by land trusts, state agencies, municipal contributions and individual donations. This form of collaboration is vital to continued success and is facilitated by such groups as the regional land trust meetings.

Creating Local or Regional Land Banks. Some communities (i.e. Hadley, MA) have already created local land banks or local open space funds. These are capitalized through annual Town Meeting appropriations, development impact fees or payments, individual donations or bequests, and even through donations from a Transfer of Development Rights ordinance. These are excellent vehicles for protecting land, and can provide local matching funds for state-funded acquisitions, such as Self-help grants or Agricultural Preservation Restrictions.

Campaign to Promote Municipal Adoption of Community Preservation Act. Only a very few communities in the Pioneer Valley (e.g. Southampton) have adopted the provisions of the Community Preservation Act, and benefited from the matching state funds available through this program. A number of communities have voted CPA measures down at Town Meeting, in part due to strong negative campaigns by real estate interests. CPA advocates should develop an effective regional public awareness campaign to promote the benefits of CPA for open space protection, and to get more CPA initiatives on local ballots.

Regional Open Space Coordinator. Only one Pioneer Valley community (Amherst) has a local Open Space Coordinator, and he has been extraordinarily effective in helping to protect over 5,000 acres of open space in over 30 town-owned conservation areas. Other communities have suffered from the lack of such professional assistance, because they cannot afford to hire a permanent open space coordinator. Communities could band together to hire a regional open space coordinator to serve this function, and only pay for a fraction of the cost of a full-time staff person. The payback in new grants and protected land would more than justify this cost. A regional open space coordinator would work with landowners on voluntary land or easement donations, write open space grant applications, and help assemble land protection deals.

Promoting Adoption of Innovative Zoning Tools: Tools such as Transfer of Development Rights and by-right Cluster Development can help protect open space, but very few communities have adopted these zoning bylaws. Hadley has adopted a new and effective TDR bylaw, and both TDR and by-right cluster have recently been authorized through amendments to the state's Zoning Act. More communities should be encouraged to adopt these innovative zoning strategies.

Appendix E:

Community Rare Species List

(Updated 3-1-2003)

Town	Taxonomic	Scientific Name	Common Name	Status
AGAWAM	Fish	Acipenser brevirostrum	Shortnose Sturgeon	Endangered
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys guttata	Spotted Turtle	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Ammodramus savannarum	Grasshopper Sparrow	Threatened
	Bird	Bartramia longicauda	Upland Sandpiper	Endangered
	Mussel	Alasmidonta undulata	Triangle Floater	Special Concern
	Vascular Plant	Claytonia virginica	Narrow-Leaved Spring Beauty	Threatened
ASHFIELD	Fish	Catostomus catostomus	Longnose Sucker	Special Concern
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Vascular Plant	Alnus viridis ssp crispa	Mountain Alder	Special Concern
	Vascular Plant	Arceuthobium pusillum	Dwarf Mistletoe	Special Concern
	Vascular Plant	Carex michauxiana	Michaux's Sedge	Endangered
	Vascular Plant	Carex pauciflora	Few-Flowered Sedge	Endangered
	Vascular Plant	Carex tuckermanii	Tuckerman's Sedge	Endangered
	Vascular Plant	Eleocharis intermedia	Intermediate Spike-Sedge	Threatened
	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Hypericum ascyron	Giant St. John's-Wort	Threatened
	Vascular Plant	Ophioglossum pusillum	Adder's-Tongue Fern	Threatened
	Vascular Plant	Penstemon hirsutus	Hairy Beardtongue	Endangered
	Vascular Plant	Platanthera dilatata	Leafy White Orchis	Threatened
	Vascular Plant	Sanicula canadensis	Canadian Sanicle	Threatened
	Vascular Plant	Senna hebecarpa	Wild Senna	Endangered
	Vascular Plant	Spiranthes romanzoffiana	Hooded Ladies'-Tresses	Endangered
BECKET	Fish	Notropis bifrenatus	Bridle Shiner	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Vascular Plant	Arceuthobium pusillum	Dwarf Mistletoe	Special Concern
	Vascular Plant	Carex livida var radicaulis	Glaucous Sedge	Endangered
	Vascular Plant	Carex pauciflora	Few-Flowered Sedge	Endangered
	Vascular Plant	Lygodium palmatum	Climbing Fern	Special Concern
	Vascular Plant	Sisyrinchium mucronatum	Slender Blue-Eyed Grass	Threatened

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
BLANDFORD	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Bartramia longicauda	Upland Sandpiper	Endangered
	Bird	Circus cyaneus	Northern Harrier	Threatened
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Vascular Plant	Gentiana andrewsii	Andrews' Bottle Gentian	Endangered
	Vascular Plant	Rhododendron maximum	Great Laurel	Threatened
	Vascular Plant	Sisyrinchium mucronatum	Slender Blue-Eyed Grass	Threatened
CHESTER	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Mammal	Myotis leibii	Eastern Small-Footed Bat	Special Concern
	Mammal	Myotis sodalis	Indiana Myotis	Endangered
	Dragonfly/Damselfly	Boyeria grafiana	Ocellated Darner	Special Concern
	Dragonfly/Damselfly	Enallagma carunculatum	Tule Bluet	Special Concern
	Dragonfly/Damselfly	Gomphus borealis	Beaverpond Clubtail	Special Concern
	Dragonfly/Damselfly	Gomphus descriptus	Harpoon Clubtail	Endangered
	Dragonfly/Damselfly	Gomphus quadricolor	A Clubtail Dragonfly	Threatened
	Dragonfly/Damselfly	Ophiogomphus carolus	Riffle Snaketail	Threatened
	Beetle	Cicindela duodecimguttata	Twelve-Spotted Tiger Beetle	Special Concern
	Butterfly/Moth	Papaipema sp 2	Ostrich Fern Borer Moth	Special Concern
	Vascular Plant	Arabis laevigata	Smooth Rock-Cress	Threatened
	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Moehringia macrophylla	Large-Leaved Sandwort	Threatened
CHESTERFIELD	Fish	Couesius plumbeus	Lake Chub	Endangered
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Dragonfly/Damselfly	Boyeria grafiana	Ocellated Darner	Special Concern
	Vascular Plant	Halenia deflexa	Spurred Gentian	Endangered
	Vascular Plant	Platanthera flava var herbiola	Pale Green Orchis	Threatened
CUMMINGTON	Fish	Couesius plumbeus	Lake Chub	Endangered
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Bird	Oporornis philadelphia	Mourning Warbler	Special Concern
	Dragonfly/Damselfly	Boyeria grafiana	Ocellated Darner	Special Concern
	Dragonfly/Damselfly	Gomphus descriptus	Harpoon Clubtail	Endangered
	Dragonfly/Damselfly	Ophiogomphus carolus	Riffle Snaketail	Threatened
	Dragonfly/Damselfly	Somatochlora elongata	Ski-Tailed Emerald	Special Concern
	Beetle	Cicindela duodecimguttata	Twelve-Spotted Tiger Beetle	Special Concern
	Vascular Plant	Blephilia hirsuta	Hairy Wood-Mint	Endangered
	Vascular Plant	Carex hitchcockiana	Hitchcock's Sedge	Special Concern
	Vascular Plant	Carex tuckermanii	Tuckerman's Sedge	Endangered

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
CUMMINGTON	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Halenia deflexa	Spurred Gentian	Endangered
	Vascular Plant	Milium effusum	Woodland Millet	Threatened
	Vascular Plant	Mimulus moschatus	Muskflower	Threatened
	Vascular Plant	Waldsteinia fragarioides	Barren Strawberry	Special Concern
GOSHEN	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Dragonfly/Damselfly	Gomphus descriptus	Harpoon Clubtail	Endangered
	Vascular Plant	Cimicifuga racemosa	Black Cohosh	Endangered
GRANVILLE	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Vascular Plant	Adlumia fungosa	Climbing Fumitory	Threatened
	Vascular Plant	Ophioglossum pusillum	Adder's-Tongue Fern	Threatened
	Vascular Plant	Senna hebecarpa	Wild Senna	Endangered
HOLYOKE	Fish	Acipenser brevirostrum	Shortnose Sturgeon	Endangered
	Fish	Notropis bifrenatus	Bridle Shiner	Special Concern
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Ambystoma opacum	Marbled Salamander	Threatened
	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Accipiter striatus	Sharp-Shinned Hawk	Special Concern
	Bird	Falco peregrinus	Peregrine Falcon	Endangered
	Bird	Haliaeetus leucocephalus	Bald Eagle	Endangered
	Bird	Podilymbus podiceps	Pied-Billed Grebe	Endangered
	Mussel	Alasmidonta undulata	Triangle Floater	Special Concern
	Mussel	Lampsilis cariosa	Yellow Lampmussel	Endangered
	Mussel	Leptodea ochracea	Tidewater Mucket	Special Concern
	Mussel	Ligumia nasuta	Eastern Pondmussel	Special Concern
	Mussel	Strophitus undulatus	Creeper	Special Concern
	Dragonfly/Damselfly	Stylurus spiniceps	A Clubtail Dragonfly	Threatened
	Beetle	Desmocerus palliatus	Elderberry Long-Horned Beetle	Special Concern
	Butterfly/Moth	Rhodoecia aurantiago	A Noctuid Moth	Threatened
	Vascular Plant	Acer nigrum	Black Maple	Special Concern
	Vascular Plant	Adlumia fungosa	Climbing Fumitory	Threatened
	Vascular Plant	Agrimonia pubescens	Hairy Agrimony	Threatened
	Vascular Plant	Amelanchier sanguinea	Roundleaf Shadbush	Special Concern
	Vascular Plant	Arabis lyrata	Lyre-Leaved Rock-Cress	Endangered
	Vascular Plant	Arabis missouriensis	Green Rock-Cress	Threatened
	Vascular Plant	Artemisia campestris ssp borealis	Boreal Wormwood	Endangered
	Vascular Plant	Asclepias verticillata	Linear-Leaved Milkweed	Threatened
	Vascular Plant	Asplenium ruta-muraria	Wall-Rue Spleenwort	Threatened

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
HOLYOKE *(cont'd.)*	Vascular Plant	Clematis occidentalis	Purple Clematis	Special Concern
	Vascular Plant	Carex glaucodea	Glaucescent Sedge	Endangered
	Vascular Plant	Carex lupuliformis		Endangered
	Vascular Plant	Carex mesochorea	Midland Sedge	Endangered
	Vascular Plant	Cimicifuga racemosa	Black Cohosh	Endangered
	Vascular Plant	Clematis occidentalis	Purple Clematis	Special Concern
	Vascular Plant	Cyperus houghtonii	Houghton's Flatsedge	Endangered
	Vascular Plant	Deschampsia cespitosa ssp glauca	Tufted Hairgrass	Endangered
	Vascular Plant	Doellingeria infirma	Cornel-Leaved Aster	Endangered
	Vascular Plant	Liatris borealis	New England Blazing Star	Special Concern
	Vascular Plant	Lipocarpha micrantha		Threatened
	Vascular Plant	Morus rubra	Red Mulberry	Endangered
	Vascular Plant	Nuphar microphylla	Tiny Cow-Lily	Endangered
	Vascular Plant	Oxalis violacea	Violet Wood-Sorrel	Endangered
	Vascular Plant	Panicum philadelphicum	Philadelphia Panic-Grass	Special Concern
	Vascular Plant	Pedicularis lanceolata	Swamp Lousewort	Endangered
	Vascular Plant	Ranunculus pensylvanicus	Bristly Buttercup	Threatened
	Vascular Plant	Rotala ramosior	Toothcup	Endangered
	Vascular Plant	Sagittaria cuneata	Wapato	Threatened
	Vascular Plant	Salix exigua	Sandbar Willow	Threatened
	Vascular Plant	Solidago ptarmicoides	Upland White Aster	Endangered
	Vascular Plant	Sphenopholis nitida	Shining Wedgegrass	Threatened
	Vascular Plant	Symphyotrichum tradescantii	Tradescant's Aster	Threatened
	Vascular Plant	Trichostema brachiatum	False Pennyroyal	Endangered
	Vascular Plant	Trichostema brachiatum	False Pennyroyal	Endangered
	Vascular Plant	Trisetum triflorum ssp molle	Spiked False Oats	Endangered
	Vascular Plant	Verbena simplex	Narrow-Leaved Vervain	Endangered
	Vascular Plant	Veronicastrum virginicum	Culver's-Root	Threatened
HUNTINGTON	Fish	Couesius plumbeus	Lake Chub	Endangered
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Accipiter striatus	Sharp-Shinned Hawk	Special Concern
	Bird	Oporornis philadelphia	Mourning Warbler	Special Concern
	Bird	Vermivora chrysoptera	Golden-Winged Warbler	Endangered
	Mammal	Sorex palustris	Water Shrew	Special Concern
	Mussel	Strophitus undulatus	Squawfoot	Special Concern
	Dragonfly/Damselfly	Boyeria grafiana	Ocellated Darner	Special Concern
	Dragonfly/Damselfly	Ophiogomphus carolus	Riffle Snaketail	Threatened
	Dragonfly/Damselfly	Somatochlora elongata	Ski-Tailed Emerald	Special Concern
	Beetle	Cicindela duodecimguttata	Twelve-Spotted Tiger Beetle	Special Concern
	Beetle	Desmocerus palliatus	Elderberry Long-Horned Beetle	Special Concern
	Butterfly/Moth	Papaipema sp 2	Ostrich Fern Borer Moth	Special Concern

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
HUNTINGTON	Vascular Plant	Carex alopecoidea	Foxtail Sedge	Threatened
(cont'd.)	Vascular Plant	Carex hitchcockiana	Hitchcock's Sedge	Special Concern
	Vascular Plant	Mimulus moschatus	Muskflower	Threatened
	Vascular Plant	Podostemum ceratophyllum	Threadfoot	Special Concern
	Vascular Plant	Senna hebecarpa	Wild Senna	Endangered
	Vascular Plant	Waldsteinia fragarioides	Barren Strawberry	Special Concern
MIDDLEFIELD	Fish	Couesius plumbeus	Lake Chub	Endangered
	Vascular Plant	Arabis laevigata	Smooth Rock-Cress	Threatened
	Vascular Plant	Claytonia virginica	Narrow-Leaved Spring Beauty	Threatened
	Vascular Plant	Milium effusum	Woodland Millet	Threatened
	Vascular Plant	Moehringia macrophylla	Large-Leaved Sandwort	Threatened
MONTGOMERY	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Bird	Podilymbus podiceps	Pied-Billed Grebe	Endangered
	Vascular Plant	Carex lenticularis	Shore Sedge	Threatened
PERU	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Accipiter striatus	Sharp-Shinned Hawk	Special Concern
	Bird	Ammodramus henslowii	Henslow's Sparrow	Endangered
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Vascular Plant	Amelanchier bartramiana	Bartram's Shadbush	Threatened
	Vascular Plant	Arceuthobium pusillum	Dwarf Mistletoe	Special Concern
	Vascular Plant	Juncus filiformis	Thread Rush	Threatened
	Vascular Plant	Ophioglossum pusillum	Adder's-Tongue Fern	Threatened
	Vascular Plant	Rhododendron maximum	Great Laurel	Threatened
	Vascular Plant	Ribes lacustre	Bristly Black Currant	Special Concern
	Vascular Plant	Spiranthes romanzoffiana	Hooded Ladies'-Tresses	Endangered
	Vascular Plant	Waldsteinia fragarioides	Barren Strawberry	Special Concern
PLAINFIELD	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Pooecetes gramineus	Vesper Sparrow	Threatened
	Vascular Plant	Arceuthobium pusillum	Dwarf Mistletoe	Special Concern
	Vascular Plant	Carex michauxiana	Michaux's Sedge	Endangered
	Vascular Plant	Carex pauciflora	Few-Flowered Sedge	Endangered
	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Listera cordata	Heartleaf Twayblade	Endangered
	Vascular Plant	Spiranthes romanzoffiana	Hooded Ladies'-Tresses	Endangered
RUSSELL	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Bartramia longicauda	Upland Sandpiper	Endangered
	Bird	Falco peregrinus	Peregrine Falcon	Endangered
	Vascular Plant	Adlumia fungosa	Climbing Fumitory	Threatened
	Vascular Plant	Arabis laevigata	Smooth Rock-Cress	Threatened
	Vascular Plant	Trisetum triflorum ssp molle	Spiked False Oats	Endangered
	Vascular Plant	Viola nephrophylla	Northern Bog Violet	Threatened
SAVOY	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Bird	Accipiter striatus	Sharp-Shinned Hawk	Special Concern

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
SAVOY *(cont'd.)*	Bird	Ammodramus henslowii	Henslow's Sparrow	Endangered
	Bird	Ammodramus savannarum	Grasshopper Sparrow	Threatened
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Bird	Dendroica striata	Blackpoll Warbler	Special Concern
	Bird	Oporornis philadelphia	Mourning Warbler	Special Concern
	Dragonfly/Damselfly	Gomphus borealis	Beaverpond Clubtail	Special Concern
	Dragonfly/Damselfly	Somatochlora elongata	Ski-Tailed Emerald	Special Concern
	Vascular Plant	Amelanchier bartramiana	Bartram's Shadbush	Threatened
	Vascular Plant	Aster prenanthoides	Crooked-Stem Aster	Special Concern
	Vascular Plant	Carex baileyi	Bailey's Sedge	Endangered
	Vascular Plant	Carex lenticularis	Shore Sedge	Threatened
	Vascular Plant	Carex michauxiana	Michaux's Sedge	Endangered
	Vascular Plant	Juncus filiformis	Thread Rush	Threatened
	Vascular Plant	Milium effusum	Woodland Millet	Threatened
	Vascular Plant	Myriophyllum farwellii	Farwell's Water-Milfoil	Endangered
	Vascular Plant	Platanthera dilatata	Leafy White Orchis	Threatened
	Vascular Plant	Ribes lacustre	Bristly Black Currant	Special Concern
	Vascular Plant	Viola nephrophylla	Northern Bog Violet	Threatened
SOUTHWICK	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys guttata	Spotted Turtle	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Vascular Plant	Eriophorum gracile	Slender Cottongrass	Threatened
	Vascular Plant	Liatris borealis	New England Blazing Star	Special Concern
	Vascular Plant	Lygodium palmatum	Climbing Fern	Special Concern
	Vascular Plant	Ophioglossum pusillum	Adder's-Tongue Fern	Threatened
	Vascular Plant	Polygonum setaceum var interjectum	Strigose Knotweed	Special Concern
	Vascular Plant	Ranunculus pensylvanicus	Bristly Buttercup	Threatened
WASHINGTON	Amphibian	Gyrinophilus porphyriticus	Spring Salamander	Special Concern
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Dragonfly/Damselfly	Enallagma carunculatum	Tule Bluet	Special Concern
	Dragonfly/Damselfly	Gomphus borealis	Beaverpond Clubtail	Special Concern
	Butterfly/Moth	Pieris oleracea	Mustard White	Special Concern
	Vascular Plant	Listera cordata	Heartleaf Twayblade	Endangered
	Vascular Plant	Rhododendron maximum	Great Laurel	Threatened
WEST SPRINGFIELD	Fish	Acipenser brevirostrum	Shortnose Sturgeon	Endangered
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Reptile	Clemmys guttata	Spotted Turtle	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Haliaeetus leucocephalus	Bald Eagle	Endangered
	Bird	Tyto alba	Barn Owl	Special Concern

Community Rare Species List *(continued)*

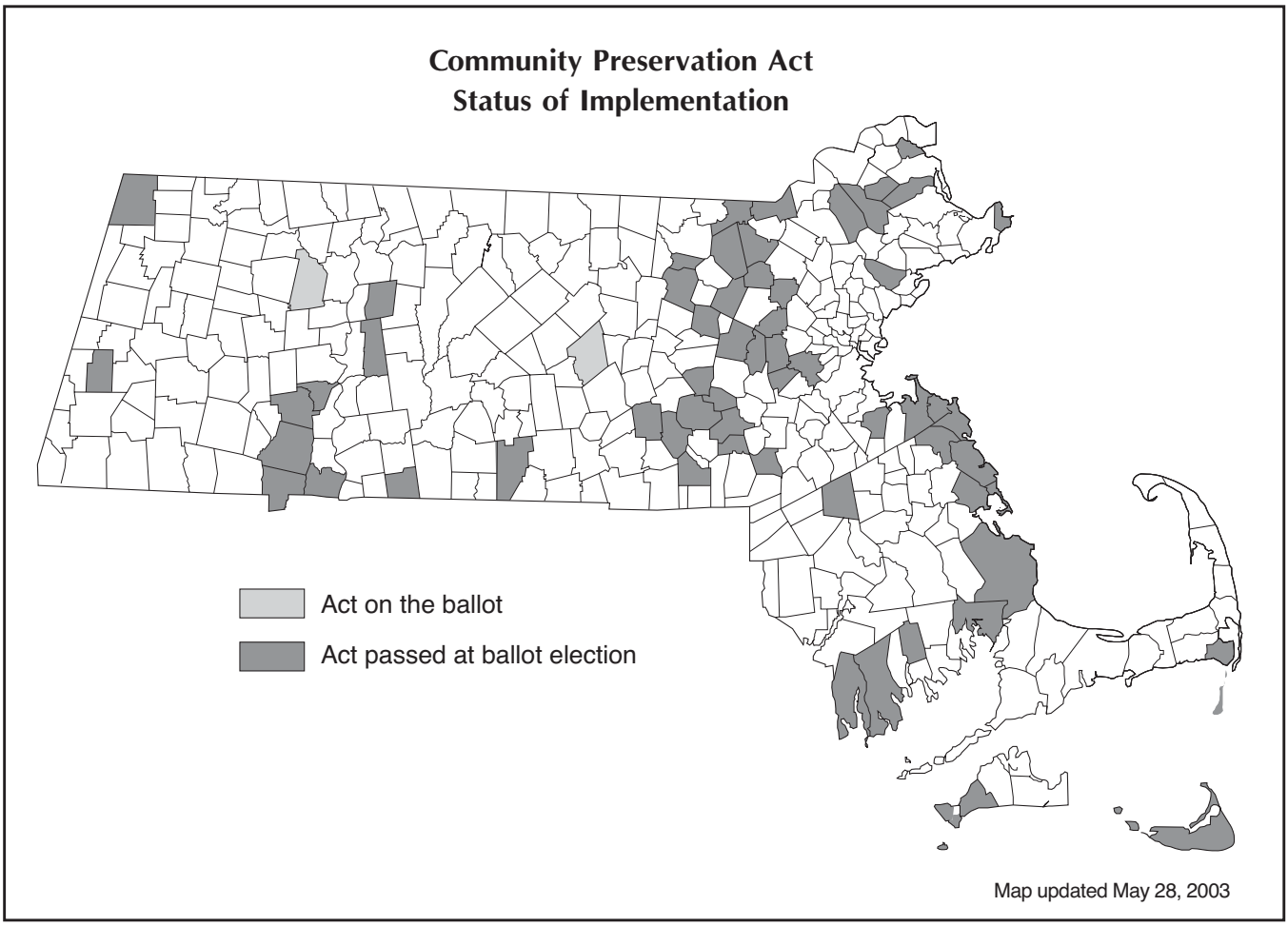
Town	Taxonomic	Scientific Name	Common Name	**Status**
W. SPRINGFIELD	Mussel	Alasmidonta undulata	Triangle Floater	Special Concern
(cont'd.)	Beetle	Cicindela purpurea	Purple Tiger Beetle	Special Concern
	Vascular Plant	Acer nigrum	Black Maple	Special Concern
	Vascular Plant	Arabis laevigata	Smooth Rock-Cress	Threatened
	Vascular Plant	Asclepias verticillata	Linear-Leaved Milkweed	Threatened
	Vascular Plant	Aster infirmus	Cornel-Leaved Aster	Endangered
	Vascular Plant	Cerastium nutans	Nodding Chickweed	Endangered
	Vascular Plant	Clematis occidentalis	Purple Clematis	Special Concern
	Vascular Plant	Dichanthelium scabriusculum		Threatened
	Vascular Plant	Ludwigia polycarpa	Many-Fruited False-Loosestrife	Threatened
	Vascular Plant	Morus rubra	Red Mulberry	Endangered
	Vascular Plant	Pedicularis lanceolata	Swamp Lousewort	Endangered
	Vascular Plant	Scleria triglomerata	Tall Nut-Sedge	Endangered
	Vascular Plant	Veronicastrum virginicum	Culver's-Root	Special Concern
WESTFIELD	Fish	Notropis bifrenatus	Bridle Shiner	Special Concern
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Amphibian	Ambystoma opacum	Marbled Salamander	Threatened
	Amphibian	Hemidactylium scutatum	Four-Toed Salamander	Special Concern
	Amphibian	Scaphiopus holbrookii	Eastern Spadefoot	Threatened
	Reptile	Clemmys guttata	Spotted Turtle	Special Concern
	Reptile	Clemmys insculpta	Wood Turtle	Special Concern
	Reptile	Terrapene carolina	Eastern Box Turtle	Special Concern
	Bird	Ammodramus savannarum	Grasshopper Sparrow	Threatened
	Bird	Bartramia longicauda	Upland Sandpiper	Endangered
	Bird	Vermivora chrysoptera	Golden-Winged Warbler	Endangered
	Mussel	Alasmidonta heterodon	Dwarf Wedgemussel	Endangered
	Mussel	Alasmidonta undulata	Triangle Floater	Special Concern
	Mussel	Alasmidonta varicosa	Brook Floater (Swollen Wedgemussel)	Endangered
	Mussel	Strophitus undulatus	Squawfoot	Special Concern
	Crustacean	Eulimnadia agassizii	Agassiz's Clam Shrimp	Endangered
	Crustacean	Limnadia lenticularis	American Clam Shrimp	Special Concern
	Beetle	Desmocerus palliatus	Elderberry Long-Horned Beetle	Special Concern
	Butterfly/Moth	Apodrepanulatrix liberaria	New Jersey Tea Inchworm	Threatened
	Butterfly/Moth	Itame sp 1	Pine Barrens Itame	Special Concern
	Butterfly/Moth	Zanclognatha martha	Pine Barrens Zanclognatha	Threatened
	Vascular Plant	Adlumia fungosa	Climbing Fumitory	Threatened
	Vascular Plant	Arabis laevigata	Smooth Rock-Cress	Threatened
	Vascular Plant	Aristida purpurascens	Purple Needlegrass	Threatened
	Vascular Plant	Calystegia spithamaea	Low Bindweed	Endangered
	Vascular Plant	Carex polymorpha	Variable Sedge	Endangered
	Vascular Plant	Clematis occidentalis	Purple Clematis	Special Concern
	Vascular Plant	Cyperus houghtonii	Houghton's Flatsedge	Endangered

Community Rare Species List *(continued)*

Town	Taxonomic	Scientific Name	Common Name	Status
WESTFIELD	Vascular Plant	Elymus villosus	Hairy Wild Rye	Threatened
(cont'd.)	Vascular Plant	Houstonia longifolia var longifolia	Long-Leaved Bluet	Threatened
	Vascular Plant	Hypericum ascyron	Giant St. John's-Wort	Threatened
	Vascular Plant	Liatris borealis	New England Blazing Star	Special Concern
	Vascular Plant	Ranunculus pensylvanicus	Bristly Buttercup	Threatened
WINDSOR	Fish	Couesius plumbeus	Lake Chub	Endangered
	Amphibian	Ambystoma jeffersonianum	Jefferson Salamander	Special Concern
	Bird	Accipiter striatus	Sharp-Shinned Hawk	Special Concern
	Bird	Ammodramus henslowii	Henslow's Sparrow	Endangered
	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Bird	Circus cyaneus	Northern Harrier	Threatened
	Bird	Cistothorus platensis	Sedge Wren	Endangered
	Bird	Ixobrychus exilis	Least Bittern	Endangered
	Dragonfly/Damselfly	Gomphus borealis	Beaverpond Clubtail	Special Concern
	Butterfly/Moth	Pieris oleracea	Mustard White	Special Concern
	Vascular Plant	Amelanchier bartramiana	Bartram's Shadbush	Threatened
	Vascular Plant	Carex baileyi	Bailey's Sedge	Endangered
	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Eragrostis frankii	Frank's Lovegrass	Special Concern
	Vascular Plant	Juncus filiformis	Thread Rush	Threatened
	Vascular Plant	Milium effusum	Woodland Millet	Threatened
	Vascular Plant	Ribes lacustre	Bristly Black Currant	Special Concern
	Vascular Plant	Waldsteinia fragarioides	Barren Strawberry	Special Concern
WORTHINGTON	Bird	Botaurus lentiginosus	American Bittern	Endangered
	Dragonfly/Damselfly	Boyeria grafiana	Ocellated Darner	Special Concern
	Vascular Plant	Equisetum scirpoides	Dwarf Scouring-Rush	Special Concern
	Vascular Plant	Eriophorum gracile	Slender Cottongrass	Threatened
	Vascular Plant	Spiranthes romanzoffiana	Hooded Ladies'-Tresses	Endangered

Appendix F:

Communities Participating in the Community Preservation Act



REFERENCES

Foster, David R., and John F. O'Keefe.
New England Forests Through Time: Insights from the Harvard Forest Dioramas.
Cambridge, MA: Harvard University Press, 2000.

Massachusetts Audubon Society.
Losing Ground: An Analysis of Recent Rates and Patterns of Development and
Their Effects on Open Space in Massachusetts.
May, 1999.

Phinney, Jane Benedict. Taking the High Road: A Two Hundred Year History of a Hilltown.
1997.

Pioneer Valley Planning Commission.
Valley Vision: The regional Land Use Plan for the Pioneer Valley.
September, 1997.

Pioneer Valley Planning Commission.
Discerning the Future for the Pioneer Valley Region 2000-2030.
June, 2003.