

CHAPTER 3

COMMUNITY SETTING

The Deerfield River Watershed contains both rural and urban landscapes, which have been established, developed and impacted by human inhabitants over the past several hundred years. Planning for open space and recreation throughout the watershed must account for the complex relationships between people and the natural resources upon which they depend. Continued growth without consideration of its impact on natural systems will reduce the quality of life for future generations.

This chapter provides an overview of land use in the watershed, moving from the present, to the past, and to the future based on current development trends. *Regional Context* gives a snapshot of the watershed today through a look at the ways in which the location of the watershed within the region has affected the development of communities and the quality of open space and recreational resources as they exist today. *History of the Watershed* summarizes how early residents settled and developed the landscape. *Population Characteristics* provides a description of the people in the watershed today and how population and economic trends may affect the region in the future. Finally, *Growth and Development Patterns* describes how the watershed has developed over time and the potential impacts of current land use regulations on open space and natural, cultural and recreational resources.

Within the Commonwealth of Massachusetts, the Deerfield River Watershed contains portions of the land area of twenty communities in all. However, the Deerfield River Watershed Regional Open Space and Recreation Plan focuses on the fifteen towns that have at least a third of their land area within the watershed: Florida, Savoy, Monroe, Rowe, Charlemont, Hawley, Heath, Buckland, Ashfield, Conway, Deerfield, Shelburne, Greenfield, Leyden, and Colrain.

A. Regional Context

Natural Resources Context

The Deerfield River Watershed is a sub-watershed of the Connecticut River Watershed that drains approximately 665 square miles of the Southern Green Mountains in Vermont and the Northern Berkshires in Massachusetts. Three hundred and forty-seven square miles of this land are located in all or part of twenty western Massachusetts towns, as mentioned earlier. From its headwaters at Stratton Mountain in Vermont, the Deerfield

River flows southeastward for approximately seventy (70.2) miles through the steep terrain of the Berkshires to its confluence with the Connecticut River.

The Deerfield River Watershed is considered to be a very special place by residents and by the people who travel there to work and recreate. A major source of pride, enjoyment, recreation, and regional economic stimulus, is the Deerfield River itself. One organization, the Deerfield River Watershed Association, acts as the unofficial steward of the river and of the quality of surface waters throughout the basin.

A unique characteristic of the watershed is the steepness of its riverbed and surrounding topography. The Deerfield River drops 2,000 ft. in elevation from its headwaters to its confluence with the Connecticut River. This feature has resulted in the management of the Deerfield River for hydroelectric power generation with ten (10) hydroelectric developments constructed on the river since 1911. Despite the impoundments, the Deerfield River is a coldwater fishery prized by anglers throughout New England. As part of the Connecticut River restoration project, the Massachusetts Division of Fisheries and Wildlife and Environmental Law Enforcement (DFWELE) is responsible for the Atlantic salmon restoration effort. The stocking program releases Atlantic salmon fry into tributaries of the Connecticut River. The Deerfield River Watershed (in twenty-one tributaries) is stocked with 700,000 Atlantic salmon fry each spring (Slater, DFWELE; 2001). The River also supports native and stocked trout, making the Deerfield River one of the premier rivers for fishing in the New England. In addition, several successful recreational whitewater guide businesses in the watershed attest to the attraction power the river has for river-based water enthusiasts.

Outside of outdoor recreation opportunities, farmland including pasture, cropland, and orchards represents one of the most visible connections between the land and its people. The pattern of active farms across the watershed follows the presence of fertile soils and agreeable topography. While large assemblages of crop, nursery, orchard and dairy farmlands dominate the fertile soils of the lower elevations of the watershed in Deerfield and Greenfield as well as the upland farms of Shelburne, Conway, and Colrain, east of the North River, the remaining hill towns' farms are more spread out along north-south running roadways.

The watershed's steep terrain within the Berkshire Hills has led to the dominance of forest cover and, to a degree, the protection of a large share of forestland northwest of Ashfield by the Commonwealth of Massachusetts. State and privately owned forests together create large forest blocks that have not been fragmented by development and which today provide habitat for rare plant and animal species and popular game species as well as income from the production of timber, maple syrup, and other forest-based products.

The State's Natural Heritage and Endangered Species Program has identified large BioMap core forest habitats in Savoy and Florida, Hawley, Buckland, Conway, Shelburne, Leyden and Colrain (*see Chapter 4*). Many of these privately owned forests

east of Hawley are currently unprotected from development, though they may be in the Chapter 61 Program (*see Chapter 5*).

The Massachusetts Executive Office of Environmental Affairs is currently working with the U.S. Forest Service to determine the feasibility of expanding the Green Mountain National Forest south into communities of both Berkshire and Franklin Counties. Land protection tools employing easements and promoting long-term private ownership and stewardship have been reviewed. A National Forest in the Deerfield River Watershed would have impacts that could be viewed as both positive and negative by different stakeholders.

Socio-Economic Context

Community Settlement Patterns

How has the watershed's location within the state and the larger New England region impacted its development in the past and how might it affect land use in the future? Outside of Greenfield, the topography and soils of the Deerfield watershed, the steep gradient of the Deerfield River, combined with its location mostly west of the Connecticut River Valley and Interstate 91, have resulted in a sparsely populated forested landscape further characterized by:

- Residential and commercial development clustered in historic village centers with single-family homes spread out along roadways;
- Tourism and commercial development along Rte. 2;
- Small pockets of traditional manufacturing plants along rivers; and
- Assemblages of active farmland parcels within floodplains of both major rivers and brooks as well as on broad hilltop plateaus.

Role of Recreation

The Deerfield River and the Mohawk Trail have been the focus of recreational enthusiasts for almost a century. Recreational opportunities abound and attract people to visit the watershed and participate in traditional tourism activities, white and flat water boating, fishing, hiking along the Trail, downhill and cross-country skiing, and snowmobiling. Recreational-based tourism appears to be a driving force in the economic development initiatives of those towns that border along Rte. 2 west of Greenfield and Deerfield.

Population in Review

The population of the watershed grew at a faster rate than the state average over the past thirty years and is projected to increase almost 20 percent by 2025. By all accounts, the population of the watershed is aging, a trend common to Franklin County. Sprawl is the current development pattern in the watershed as most communities' zoning encourages frontage lots along existing public ways. Principal highways, which provide access to

Interstate 91 and to employment centers outside the basin, encourage growth in residential development.

B. Patterns in Prehistory and History

This section was written by Marcia Starkey, member of the Greenfield Historical Commission. It clearly describes the historic foundations for the watershed's current land use patterns.

Prehistory

Human occupation in the Deerfield watershed reaches to approximately 11,000 years before the present (B.P.). Three prehistorical periods: the PaleoIndian/Early Archaic (c. 11,000-8,000 B.P.), the Archaic (c. 8,000-3,000 B.P.) and the Woodland (c. 3,000-400 B.P.) reflect climatic and cultural adaptation to the post-glacial period.

The known PaleoIndian and Early Archaic settlement record in the watershed's valley floor towns indicate people were organized in small hunting-gathering groups living on large and small game as well as vegetation and the resources associated with bodies of water during the time of climatic change. Middle and Late Archaic people responded to warmer climate with population increases, more territorial establishment in hunting and gathering, and widespread occupation of river valleys.

Woodland period sites and a well-developed system of long trails are known in and through the watershed. During the Contact Period of 1500-1620 a native regional core is thought to have existed in Deerfield, Greenfield, Montague and Gill centered on fertile agricultural land and riverine areas. A trail connected Deerfield and the Hoosuc Highlands in the western part of the watershed, while secondary paths joined Shelburne Falls, Greenfield, Colrain and the Vermont uplands. The towns along the Deerfield River as well as the floodplains of the North River and the Green River corridors probably provided hunting and agricultural resources.

The western sections of the watershed, including the towns of Savoy and Florida in Berkshire County, could be reached from the east via the Mohawk Trail and a network of interconnected local valley and ridgetop paths. These trails connected the Hudson and Connecticut Valleys. The fur trade of the 1600s likely prompted the use of river valleys in most watershed towns as seasonal hunting camps around the territories of core native towns and territories, although it is believed that native settlements were small and reflected both Hudson and Connecticut valley cultures.

New Inhabitants New Patterns

The fifteen towns in the watershed were settled between 1669 and 1800 and incorporated from 1673 to 1822 (the earliest was Deerfield, and the latest Monroe). It took anywhere from 4 years (Deerfield) to 67 years (Greenfield, contested) after initial settlement, to gain autonomy. Nine of the fifteen took two decades more or less, including the last 6 western settlements. It took from 1673 to 1768, during the French and Indian wars, for seven towns (Deerfield, Greenfield, Colrain, Charlemont, Ashfield, Conway and Shelburne) to incorporate.

New watershed towns followed the established pattern by partitioning from older towns when land became either unavailable or costly. For example, the Deerfield settlement included Greenfield (including Gill) 1753, Conway 1767, and Shelburne 1768. After a pause during the Revolution, the remaining towns were established between 1784 and 1822.

While the earliest settlements followed the English nucleated, village street pattern of land grants and orientation to the major rivers, upland towns assumed a more dispersed pattern. Grist, saw and fulling mills, and church-tavern-trading centers at junctions served as gathering points for scattered upland farms during the colonial period.

With the end of French and native conflict in 1763, settlement shifted to these upland areas. After the Revolution, land given to veterans, improvements in roads such as the Mohawk Trail and those leading from Shelburne, Colrain and Leyden to Cheapside on the Deerfield River enabled farmers to access regional and national markets, promoted wayside taverns, and led to a new and different "town folk" society.

The new organization of land holdings, based in land grants to proprietors for hay, pasture and woodland throughout the district or town, resulted in the typical land use pattern of the watershed distinguished by small villages and mill hamlets surrounded by dispersed farmsteads. This character is now being lost as new buildings infill the countryside. Taxes were also based on agricultural value, either "improved," "improvable," or "un-improvable," a value system also largely bypassed. Towns wishing to retain their special character must guide growth so as to retain the traditional land use system while preserving open space.

The following villages in the Deerfield watershed are listed on the National Register of Historic Places: Ashfield Plain, Charlemont Village, Conway Center, Old Deerfield Village, East Hawley Center, and Shelburne Falls Village in Shelburne and Buckland. These places provide a portrait of the special character of each community. They also preserve a sense of home, and as such, are guideposts for the future. Old Deerfield is also designated a National Historic Landmark as possessing "outstanding national significance" by the Department of the Interior.

Locations showing important aspects of community development in the watershed are identified in the Franklin County Commission's Rural Historic Landscape Preservation

Plan. They are Baptist Corner in Ashfield; Shattuckville, Griswoldville and Colrain Center in Colrain; Shirkshire area in Conway; Dodge Corner Road in Hawley; Heath Center and North Heath area; Leyden Center and West Leyden; the Monroe Bridge area in Monroe; and Pelham Lake area in Rowe.

Agriculture: Old Crops/New Crops: Markets

In all watershed towns, as throughout New England, agriculture was the first industry. During the warmer prehistoric Woodland period agriculture flourished, producing crops such as squash, sunflowers, peppers, beans and others now forgotten. Native market crops included freshwater mollusks from the Deerfield River and corn raised in the Connecticut floodplain. The 17th century settlements of Deerfield and Greenfield were supported on these same floodplains by beef, corn, rye, wheat, and tobacco crops, some for subsistence and some as commodities for trade or sale.

In the late 1700s, high value stall-fed oxen were shipped down the river from Deerfield to New York and Boston. After 1795, Cheapside at the confluence of the Deerfield and Connecticut rivers became the head of navigation and key to marketing goods and crops for both lowland and upland communities. Corn and grains were raised in the upland towns and brought to Cheapside in East Deerfield for shipment and sale. Beef herds were also driven overland to the Brighton Market outside Boston or put on boats, and after the arrival of rail, farms could now supply milk, as well as the accustomed large quantities of butter and cheese, to growing urban centers. Taverns sprang up along the way and watershed towns were now economically linked to Boston, New York and Albany.

Rail opened up the central and western watershed towns. Facilitated by the 1845 line along the Connecticut River through Deerfield and Greenfield, the impressive construction of the Hoosac Tunnel in 1867, and South Deerfield's 1880 major junction yard, an 1894 rail line ran northwest along the Deerfield River valley through Charlemont to Florida, west to Pittsfield and Troy, and north through Rowe into Vermont. Market centers grew up along these lines. Apple orchards, sugar maple stands, shops for forging iron, home assembly of shoes for southern markets, wooden ware and furniture all contributed to the flexibility basic to survival in these towns.

Manufactures: Town & Country Partnerships

In the mid-1800s, agricultural crops had become largely market driven and prosperous farmers, especially in valley towns, became partners with new entrepreneurs in other ventures. Tobacco production greatly expanded in the fertile floodplains, large broom corn crops were grown in a few towns and the wooden handles were made on farms in the watershed's upland towns.

The tariff of 1825 and the accompanying introduction of long-staple Merino sheep made wool production a major watershed town/country partnership. Thousands of sheep covered the hills, and wool cloth, formerly a cottage industry, was produced in factories such as the 1814 Shattuckville spinning mill in Colrain. Farms surrounded and fed new

mill hamlets at Factory Hollow in Greenfield, Cheapside in Deerfield, and in most other watershed towns.

Specialized crops such as potatoes, Indian corn and onions were profitable by the 1850s when a pickle factory was established in South Deerfield. Pocketbook factories in Greenfield and elsewhere used sheep and goatskins for lining; local forests produced saw logs, wooden and paper boxes and contributed to a primarily open landscape by 1870. Tanneries provided leather for harness, saddles, boots and shoes sold at roadside towns along what was still the primary overland transportation source for much of the Deerfield watershed.

The tributary streams to the Deerfield and Connecticut Rivers such as Mill and Dunbar Brooks, Mill and South Rivers as well as the Westfield River in Savoy supported, by the early 19th century, a mix of small mills including iron foundries, numerous saw and grist mills, woolen and cotton factories. In Ashfield, Conway and finally Colrain, Joseph Griswold made sashes, doors and blinds, wooden lather boxes and, finally, cotton textiles. Foundries were active for a time, wooden farm tool and vehicle parts shops could be found in most towns, major cutlery production remains in Buckland and Greenfield, chair parts and hand rakes were made in Heath, and clocks in Buckland. Mining occurred in Charlemont and Rowe, and tanneries and box mills in Savoy. These attracted new settlers and other new ventures.

In the late 19th and early 20th centuries, the natural beauty of the watershed's hilltowns, coupled with expansion of the Mohawk Trail as an auto road, began to attract vacationers. This recreation industry continues to be important today and is supported by the State Forests in the western watershed beginning in 1917. The Civilian Conservation Corps (CCC), established in 1933, left landmark roads, bridges and buildings in watershed state parks, including the H.O. Cook SF in Heath, Kenneth Dubuque Memorial SF in Hawley, Mohawk Trail SF in Charlemont, Monroe SF in Monroe, and Savoy Mt. SF in Florida.

Agriculture remains a major industry in these towns, and the use of soil, hills, trees and streams in new ways has led to value-added products from row crops, mushrooms, maple sugar, dairy products and wood, winter and water sports, eco and agri-tourism and buy-local programs. Natural resources, including wind, in the Deerfield watershed continue to shape life in this most scenic and rural part of Massachusetts. The Franklin County Rural Historic Landscape Preservation Plan identified over 400 historic landscapes for further review. Around 135 of these were in the Deerfield watershed, identified with agriculture (63), transportation (8), community development (24), agriculture (63), recreation-conservation (30), and science-technology and religion (2). These provide a baseline to towns for consideration.

C. Population Characteristics

Population data can be used to plan for people’s potential impact on the natural, open space, and recreational resources in the watershed today and in the future. According to the 2000 US Census, the Deerfield River Watershed is home to nearly 38,000 residents with a population density of 108 persons per square mile. The town of Greenfield accounts for almost half (49%) of the total population of the fifteen communities included in the study, but only 6 percent of the area. Based on the 2000 US Census, Greenfield has a population density of 828 people per square mile. Although Deerfield is located within the watershed, most of its more densely populated village area, South Deerfield, is located outside the basin. The thirteen more rural hill towns account for 94 percent of the watershed area and although they contain 51 percent of the population, the population density is only 59 people per square mile. Outside of Greenfield and historic village centers, most of the watershed is sparsely populated.

Table 3-1: Population (in 1970 and 2000) and Population Change (1970-2000) of Deerfield Watershed Communities Ranked by Rate of Growth

	Population 1970 (# of People)	Population 2000 (# of People)	Population Increase 1970-2000 (# of People)	Population Change 1970-2000 (% of change)
Savoy	322	705	383	118.9%
Heath	383	805	422	110.2%
Leyden	376	772	396	105.3%
Conway	998	1,809	811	81.3%
Charlemont	897	1,358	461	51.4%
Hawley	224	336	112	50.0%
Ashfield	1,274	1,800	526	41.3%
Colrain	1,420	1,813	393	27.7%
Rowe	277	351	74	26.7%
Deerfield	3,873	4,750	*877	22.6%
Shelburne	1,836	2,058	222	12.1%
Buckland	1,892	1,991	99	5.2%
Florida	672	676	4	0.6%
Greenfield	18,116	18,168	52	0.3%
Monroe	216	93	-123	-56.9%
Deerfield River Watershed	32,776	37,485	4,709	14.4%
Massachusetts	5,689,377	6,349,097	659,720	11.6%

Sources: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Census of Population and Housing. *Note: It is likely that a majority of the change in Deerfield’s population occurred outside of the Deerfield River basin.

How has the population of the watershed changed over time? Historic records show us that the population in the watershed towns increased steadily over the past 210 years. Between 1800 and 1900 the population of the watershed grew from just under 15,000 people to nearly 20,000. In the last Century the watershed’s population nearly doubled to 37,500. Table 3-1 shows the changes in population between 1970 and 2000 in each of the watershed communities studied. Leyden, Heath and Savoy more than doubled their populations in the last thirty years while the watershed’s population as a whole increased by 14 percent.

What will the population be like in the watershed over the next thirty years? The Franklin Regional Council of Governments (FRCOG) and the Berkshire Regional Planning Commission (BRPC) project populations for fourteen of the fifteen communities to grow by just over 7,300 people by 2025, which is an increase of 19.5 percent. Most of this growth is projected to occur in the hill towns, not in Greenfield. In addition, the 2000 Census shows that the median age of Franklin County residents is nearly 40 years of age (39.5) and a review of town data suggest a population aging over time. Monroe is the exception, which FRCOG projects will decrease in population over the next twenty-five years.

Table 3-2: Median Household Income, Per Capita Income, Percentage Below Poverty Level and Unemployment Rate in 1999

	Median Household Income in 1999	Per Capita Income in 1999	Percentage Below Poverty Level*in 1999	Unemployment Rate in 2000
Conway	\$56,094	\$25,605	3.5%	1.9%
Ashfield	\$52,875	\$26,483	7.6%	2.1%
Heath	\$50,536	\$24,777	9.4%	1.9%
Leyden	\$50,385	\$26,076	4.7%	2.9%
Deerfield	\$49,764	\$24,555	4.5%	2.0%
Charlemont	\$46,548	\$19,577	10.4%	3.5%
Buckland	\$45,833	\$20,033	6.9%	1.0%
Florida	\$43,000	\$16,979	5.8%	Not available
Shelburne	\$42,054	\$20,329	9.9%	4.4%
Rowe	\$41,944	\$28,134	2.8%	5.4%
Savoy	\$41,477	\$20,223	5.4%	4.1%
Colrain	\$40,076	\$18,948	6.8%	2.7%
Greenfield	\$33,110	\$18,830	14.0%	2.7%
Hawley	\$28,125	\$17,333	14.2%	2.5%
Monroe	\$25,500	\$12,400	21.8%	4.2%
Massachusetts	\$50,502	\$25,952	9.4%	2.6%

Source: 2000 Census of Population. *Individuals living below poverty level for whom the poverty status has been determined.

Another way to describe the residents of the watershed is by looking at income levels. Communities that have higher median household incomes may be more likely to absorb the costs of protecting important open space parcels with private or town funds. Conversely, communities with lower income figures and greater shares of its population living below the poverty level could mean that officials need to focus on economic develop strategies that would result in increasing residents' income levels. There is a wide range of income levels in the watershed. The highest median household income levels, which are found in Conway, are more than double the figures for Monroe (*see Table 3-2*). Any watershed-wide open space and recreation effort needs to be sensitive to the varying economic conditions among communities. Not surprisingly, towns with higher household incomes often have less people living below poverty and lower unemployment rates. Watershed open space and recreation strategies should seek to support the development of a variety of employment opportunities based on an understanding of what each offers (e.g., part time vs. full time).

Economic Trends

According to information provided by town Open Space and Recreation Plans and the Massachusetts Division of Employment and Training, the majority of jobs in the watershed occur in Greenfield. Despite the historic dominance of manufacturing as a source of employment in Greenfield, Shelburne, Buckland, Monroe, and Colrain, the current economic base of the watershed is comprised of government (including town education), retail trade, and human services and health care. Light manufacturing still provides a share of the total employment in Buckland, Greenfield, Shelburne, and Colrain and small home-based businesses have the potential to increase employment in the hill towns.

Watershed residents are employed in a broad spectrum of occupations with employers in a variety of industries. More than half of all watershed residents who work (16 yrs. and over) are employed in education, health and social services (28%), manufacturing (15%) and retail trade (12%). Most residents commute between twenty and thirty-seven minutes to job sites within and outside the region and state. Overall, about 5 percent of workers work at home, though in Conway and Ashfield that share is more than doubled.

Agriculture, including cropland, pasture, and orchards, as well as forest-based businesses represent a largely untapped economic engine in almost every community in the watershed. Even in Shelburne, which contains many full time farming families, there is a need to increase the profitability of farms. By promoting growth in a diverse set of local-based and locally-owned businesses, a more diverse regional economy will result in less dramatic changes in employment than has been experienced in historic manufacturing employment centers like Greenfield, Colrain, Shelburne and Monroe. More successful forest and farm-based businesses could provide jobs, increase residents' wealth, and provide more incentives to keep land undeveloped in forest and active farming.

Assisting in the networking of home-based businesses, which is a segment of the economy that is not well measured, can help towns and business associations in creating growth in jobs and in local wealth. However, it is also important to consider that the development of home-based businesses, especially if tied to high speed Internet capabilities, might also lead to an in-migration of new residents looking for the high quality of life that can be found within the watershed.

D. Growth and Development Patterns

Current Land Use Patterns

Without a crystal ball, planning for future land use patterns in the Deerfield River Watershed must depend on existing patterns and an assessment of trends. Current land use patterns can be detected by reviewing Geographic Information Systems maps and

acreage figures for each land use type that are derived from aerial photograph interpretation (*see Natural Resources Map for agricultural land use*).

At a watershed scale, the region is heavily forested with open farmland more common in the eastern half of the watershed. Dense development occurs in specific portions of the watershed including the eastern half of Greenfield, in Shelburne Falls, and to a lesser extent in Charlemont Center. Industrial development is found in pockets along major rivers and commercial development in village centers and along the Mohawk Trail. Other village centers promote a mix of residential and commercial uses. Outside of these historic downtowns, village centers, the rare subdivision like Mohawk Estates in Heath, older homes often house farmers or the owners of abandoned farmland. Most home development within the last fifty years has taken advantage of the scenic qualities of pasture, cropland, and to a lesser extent, ridgelines, and of the ease of building upon approval-not-required, roadside lots. In addition, several communities in the watershed are experiencing second home construction.

Past Changes in Land Use

Land use patterns in the near future can be estimated by looking at changes in the recent past.

Land Use Change in the Deerfield River Watershed 1985-1999

Over the past thirty years, large lot residential development has resulted in a loss of forest and farmland in the watershed, but the impact on agricultural lands has been more severe. Between 1970 and 1985, Franklin County lost about 4,000 acres of forest and 400 acres of agricultural land to development, 75 percent of which was mostly single-family homes. More recently, changes in land use in the fifteen towns of the watershed, between 1985 and 1999, continued the trend resulting in:

A Loss of: **1,750 acres of cropland** (equal to 10% of the amount of cropland in 1985);
 2,370 acres of pasture (equal to 22% of the amount of pasture in 1985); and
 2,070 acres of forest (equal to 1% of the amount of forest in 1985).

A Gain of: **3,443 acres of large lot residential development** (equal to 58% of the amount of land in large lot residential uses in 1985);
 1,300 acres of open land (abandoned pasture and utility easements) (equal to 29% of the amount of open land in 1985);
 390 acres of orchards or nurseries (equal to 31% of the amount of land in orchards and nurseries in 1985);

630 acres of participation recreation land (equal to 94% of the amount of land in participation recreation uses in 1985);
147 acres of commercial land (27% of the amount of land in commercial uses in 1985);
93 acres of industrial land (25% of the amount of land in industrial uses in 1985)

To reiterate, between 1985 and 1999, the Deerfield River Watershed lost 10 percent of its cropland, 22 percent of its pastureland, and 1 percent of forest, while experiencing a 58 percent increase in large-lot residential development, which occurred primarily through the construction of single-family homes on lots along existing roadways. These changes in land use occurred during the latter half of a thirty-year period (1970-2000), during which the population of the watershed grew by 14 percent.

The use of land in the watershed over the next thirty years could follow the same pattern given existing zoning: more single-family development along existing roads on farmland, pastures and forestland and possibly at a faster rate than previously experienced. As is mentioned earlier, FRCOG and BRPC project the population of fourteen of the fifteen communities to grow by 19.5 percent by 2025, which is a greater rate of growth than that which occurred between 1970 and 2000.

Factors Affecting Future Land Use Patterns

Which local factors could impact land use change over the next thirty years? The level of community infrastructure as well as local zoning will likely have an impact on future development patterns.

Community Infrastructure

Transportation resources in the Deerfield River Watershed include freight railroad, limited public transportation, the roadway network, which includes both paved and dirt roads, hiking trails, and snowmobile trails. The population of the Deerfield River Watershed has changed with improvements to transportation resources including highways (Mohawk Trail improvements led to tourism traffic in the 1940s and 1950s) and railroad (access to railroad encouraged commercial and industrial development along the Mohawk Trail corridor).

The principal highways running in an east-west direction in the watershed include State Route 2, also known as the Mohawk Trail, which links watershed towns to Greenfield and Interstate 91 to the east, and North Adams and New York to the west; and, Rte. 116 which connect Ashfield, Conway and Deerfield to Interstate 91 and State Rte. 5/10 to the east. The principal highways running north-south include State numbered Route 8A connecting Charlemont with Heath and Vermont to the north, and Hawley and Plainfield

to the south as well as State numbered Route 112, which connects Colrain, Buckland, Ashfield and Plainfield to points north and south.

Two other types of community infrastructure that can impact future land use include public wastewater treatment facilities and community drinking water supplies. Communities with small municipal water systems include Ashfield, Monroe, and Colrain while larger suppliers produce drinking water for residents of Buckland, Shelburne, Colrain, Greenfield, and Old Deerfield. Towns with public sewer are limited to Charlemont, Ashfield, Old Deerfield, Greenfield, Monroe, and Shelburne Falls. Depending on their use, public water and sewer can serve to concentrate development at a density beyond which could be supported by on-site septic systems and private wells, or their expansion can accelerate sprawl and the development of prime farmland and forestland soils.

Improvements in the level of telecommunications services available to communities in the watershed could provide local business owners with a technological capacity that would allow them to compete and export their products and services to a wider market place. The number of home-based businesses may increase with access to high speed Internet.

Land Use Controls and Build-out Potential

The dominant regulatory land use controls in the watershed are the towns' individual zoning regulations. An example of a non-regulatory land use control, which is described in Chapter 5, is land protection. The most common zoning district in the watershed, in terms of area covered, is the type Rural Residential-Agricultural (RA) (*see Current Zoning Map*), which typically allows single-family homes on lots at least one to two acres in size with frontages of from 150 to 200 feet. The RA districts also allow agricultural uses by right and other developed uses with a permit or not at all. Several towns have a Central Village Residential district (Heath, Colrain, Buckland, Shelburne, and Leyden). Commercial districts are located in Shelburne, East Deerfield, and Greenfield. Industrial districts are found in Shelburne, Colrain, Buckland, Greenfield, and Rowe. Outside of Conway's use of a four-acre minimum back-lot bylaw and the town of Heath's Water Supply Protection District, which limits impervious surfaces, all other towns appear to lack more specific zoning that effectively directs or otherwise limits future development for the protection of open space and recreation resources.

Results of the Build-out Analyses and Estimated Impacts

Potential long-term future land use in the watershed can be estimated by using the build-out analyses for the water shed communities, which were completed in 2001. Typically, build-out analyses estimate impacts of a worst-case scenario of maximum development on all developable land. The Massachusetts Executive Office of Environmental Affairs (EOEA) sponsored the development of the build-out maps and analyses for all cities and towns in the Commonwealth. Build-out maps and results of the analyses were provided to each town to be used as growth management and planning tools. The maps show

which lands are constrained from development and projects potential uses of undeveloped land, based on zoning. Table 3-3 lists selected impacts from maximum build-out conditions for the 15 watershed communities.

At maximum build-out, the watershed as a whole would be home to nearly six times the basin’s current population. For the residents of the thirteen hill towns, the change in population would be more severe from 15,250 people to over 130,000. This increase in population could be on par with doubling the population of all twenty-six towns in Franklin County and then settling them in the thirteen hill town watershed communities. At build-out, residents could be withdrawing almost 20 million gallons of drinking water a day. Because there are only a few high yield aquifers in the region, water could very well be a development constraint in the future. In addition, the 1,200 miles of new subdivision roads would have fragmented any remaining blocks of unprotected forest, restricting both wildlife movement and recreational trail use.

Table 3-3: Selected Results of Maximum Build-out Analyses

Town	Acres of Developable Land	Number of New Residents	Number of Miles of New Subdivision Road Miles	Additional Gallons of Drinking Water Required Daily (million gallons)
Ashfield	18,860	22,407	152	4.72
Buckland	8,212	10,310	67	0.87
Charlemont	8,336	16,967	108	1.43
Colrain	16,174	28,355	134	2.43
Conway	14,256	13,195	60	0.97
Deerfield	12,000	19,557	146	2.30
Greenfield	5,796	18,883	94	1.90
Hawley	6,965	8,057	71	0.60
Heath	11,011	13,942	111	1.10
Leyden	7,926	9,798	64	0.90
Monroe	3,080	3,403	39	0.30
Rowe	5,694	2,923	44	0.50
Shelburne	6,117	7,405	60	0.80
Florida	4,338	5,856	26	0.44
Savoy	6,954	6,027	28	0.45
Deerfield Watershed	135,719	187,085	1,204	19.71

Source: Franklin Regional Council of Governments; 2001. EOE Community Preservation website at <http://commpres.env.state.ma.us/community/> used for Savoy and Florida data.

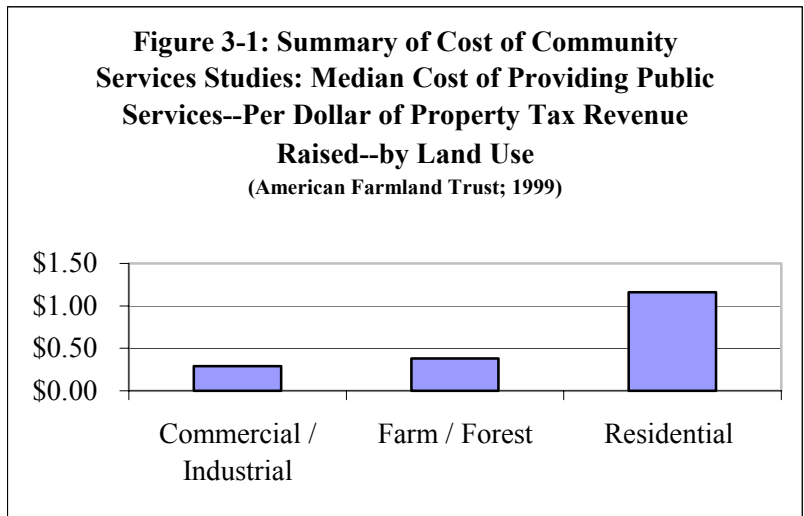
Although it is highly unlikely that maximum build-out conditions would occur throughout the Deerfield River Watershed, significant changes to the basin’s rural character would occur even if only 20 percent of open space was developed. Were that to occur, the population of the watershed could nearly double to over 70,000 based on the build-out assumptions. For example, the Town of Ashfield is projected by FRCOG in its 2003 Regional Transportation Plan, to grow over the next decade at a rate of approximately 12.8 percent, which is consistent with historic growth rates. If Ashfield continues to grow at that rate, for each and every decade hence, they will reach their 20 percent of maximum build-out population of 4,481 in about seventy years. The six towns with higher growth rates could reach 20 percent of maximum build-out sooner given the same assumptions.

There would be both ecological and economic impacts caused by this degree of population growth and development. Ecological impacts could include a reduction in available clean drinking water, decreases in the quantity and quality of wildlife and fisheries habitats, a reduction in the quality of first and second order streams, lower air quality, lower biodiversity, increases in erosion, and the fragmentation of the large areas of forest by subdivisions.

Economic impacts of this level of population growth and development would be felt well before maximum build-out. Would additional commercial and industrial property adequately pay for mounting municipal services like education as well as the loss of the local agricultural sector? The challenge for watershed communities is to manage growth in a manner that protects vital natural resource systems like aquifers and prime farmland soils and at the same time promotes a stable and equitable municipal budget.

In designing the model it is important to understand the measurable fiscal impacts of different land uses. For instance, open space (e.g. farmland/forest), residential, and commercial /industrial development each contribute differently in the amount of property tax revenues generated and they often require different levels of municipal services.

In 1991, the American Farmland Trust (AFT) conducted a Cost of Community Services (COCS) analysis for several towns in Franklin County. A COCS analysis is a process by which the relationship of tax revenues to municipal costs is explored for a particular point in time. The results of the 1991 AFT study showed that residential uses required more in services than they provide in tax revenues and that these communities were balancing their budgets with the tax revenues generated by other land uses like open space and commercial and industrial property.



Source: American Farmland Trust; 1999.

Figure 3-2 demonstrates the summary findings of fifty-eight COCS studies from around the country. For every dollar of property tax revenues received from open space, the

amount of money expended by the town to support farm/forestland was under fifty cents. Open space can therefore help to produce fiscal stability over time.

The second component of a balanced land use plan concerns the development of other tax-generating land uses. Patterns of commercial and industrial uses vary considerably between towns, and having a positive fiscal impact is only one of several important factors that need to be considered when encouraging this type of development. It is just as critical for communities to consider the impact of commercial and industrial development on quality of life.

Viewed in this light, the best types of commercial and industrial development to encourage might have some of the following characteristics: being locally owned and operated; using a large amount of taxable personal property; being a “green industry” that does not use or generate hazardous materials; adding value to the region’s agricultural and forestry products; and, employing local residents. It is also important to consider that successful commercial and industrial development can generate demand for housing, traffic congestion and pollution. Therefore, the type, size, and location of industrial and commercial development require thorough research and planning.

In conclusion, watershed communities and organizations may consider strategies that involve active land conservation, zoning measures that direct development while protecting natural resources, and sustainable economic development. By actively engaging in all three, watershed communities may be able to maintain the watershed’s rural character and sustain the essence of what makes the Deerfield River Watershed special.